

tation prior to the advent of revenue sharing, and only 6 of the Section 147 program systems indicated that revenue sharing had permitted an increase in funds to support passenger mobility. In general, however, it is safe to conclude that revenue sharing has not been tapped in most cases by the rural areas to finance public transit.

SUMMARY AND CONCLUSIONS

The purpose of the current study was to ascertain to what extent rural local communities are using their general revenue funds to support public transit operations in the jurisdictions. The study found widespread use of funds in support of public transportation, but further inquiry led to conclusions that in almost all cases the funds were being spent for road maintenance, road construction, sidewalks, or purchase of road-related capital equipment rather than for public transit. Only two systems of the 120 contacted were discovered to have a public transit program, and only one transit system in the randomly selected sample of rural areas had received revenue-sharing funds. By contrast, of the 53 systems interviewed, the areas (towns and counties) that had received FHWA transit demonstration funds under the Section 147 program were most likely to use revenue-sharing funds for public transit. Nonetheless, revenue sharing is a less widely practiced form of local support for Section 147 programs; it ranks behind funding sources from CETA, aging programs, and CSA.

Viewed in the context of the broader definition of public transportation (including roads), revenue-sharing funds are used for mobility purposes in nearly 40 percent of the rural towns, 56 percent of the counties, and 40 percent of the Section 147 projects (data are for 1975).

The average level of transportation expenditure out of revenue-sharing funds (including roads) for the counties is approximately one-fourth of the total revenue-sharing funds expended. Since available funds may be considerably more, the fraction of the total funds available that transportation represents may be closer to 15 percent. In general, the

trends in figures and the patterns for 1974 and 1975 are difficult to discern, since 1973 was a start-up year. In general, funds were up in all categories, and transportation expenditures kept pace with overall growth rates, except in the Section 147 demonstration program areas. Telephone surveys to jurisdictions that spent money for public transportation indicated that officials were satisfied that levels would not decline in the future.

Advocates of rural public transportation should pursue the question of why systems cannot be supported out of revenue-sharing funds, which appear to be mounting from year to year. An untapped local financial resource, revenue sharing may be looked to as an alternative to federal largesse as a means of financing passenger programs.

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Examination of Regional Transit Cost Allocation Among Towns: Five Case Studies

JOHN COLLURA, JAMES W. MALE, AND AYODELE MOBOLURIN

The design and implementation of procedures now used to allocate regional public transit costs among towns are examined. The basis of this examination is a set of case studies of eight cost-allocation procedures being used in five New England regions—two in Maine and three in Massachusetts. These regions have different demographic and economic characteristics, types of transit service and regional organizations, and sizes of operations. The procedures examined employ variables such as passenger trips, passenger miles, vehicle trips, vehicle miles, and vehicle hours. The population served in the regions varies from 80 000 to 226 000. Three of the regions contain urbanized areas and all five regions include a large amount of rural area. Five of the eight procedures are used to allocate costs of demand-responsive services; the other three are for fixed-route services. The services in Maine are operated by private nonprofit agencies associated closely with human service agencies, whereas the services in

Massachusetts are provided by regional transit authorities under contract with private bus companies and private nonprofit corporations. The eight operating budgets range from approximately \$85 000 to \$580 000, and the local shares of the operating deficit range from \$16 000 to \$64 000. The issues involved in the decision to select a particular procedure are illustrated. Major issues were found to be geographic characteristics of the region, types of transit service provided, and concerns of participating towns regarding an equitable basis of allocation. In addition, the manner in which these issues affected the initial choice and subsequent changes in procedures is reviewed, and a description of the experience of the regional agencies in the implementation of their procedures is given. The results of these case studies provide insight into the process of designing and implementing a procedure to apportion costs to towns that participate in a regional transit program.

The emergence of transportation as a public service and especially the regional coordination and planning of such service necessitate the allocation of costs among the local participants. This allocation can be accomplished by using a number of different procedures. Some procedures are simple and employ a single variable, whereas other more-complex procedures use several variables. The procedure chosen for use in a given region will be the one considered to be acceptable by the participating members of the regional transit authority (RTA) or some coordinating body.

The purpose of this paper is to examine the design, adoption, and implementation of eight procedures currently used in five New England regions. This examination reviews each procedure and identifies the issues involved in the decision to select a particular procedure. In addition, the paper evaluates the manner in which these issues affected the initial choice and subsequent changes in a procedure. Finally, the experiences of the regional agencies in the implementation of their procedures are described.

ALLOCATING REGIONAL TRANSIT COSTS AMONG TOWNS

A variety of procedures are now being used to allocate regional transit costs among participating towns. These procedures can be evaluated with respect to (a) ease and cost of use and (b) equity of results. Ease and cost of use refer to the process of employing each procedure and include such criteria as simplicity, ease of understanding data requirements, and costs of data collection and processing. These criteria can be interrelated because in some cases simple procedures are likely to be less costly to employ because of their lower data requirements. Cost will be associated with the quantity of data collected, the frequency and method of data collection, and the type of data processing. A typical simple low-cost procedure is one that allocates costs based on the population of the town as a percentage of the total regional population. For example, if the total annual operating deficit (annual operating costs minus annual revenues) for a regionwide shared-ride demand-responsive service is \$100 000 and the population of town A totals 10 percent of the regional population, then town A would pay \$10 000. (Obviously, this assumes that no federal or state assistance is available to defray operating costs.) Such procedures require only readily available information, including population data from federal or state census sources and cost and revenue data from the operator's bookkeeping records. Because the operator and/or regional agency is not required to collect data, the costs to use this procedure are low. A disadvantage of such a procedure is that it bears little relation to the amount of service actually consumed by each town and as a result may be considered inequitable and unfair by some of the towns in the region.

Equity of results relates to the actual allocations produced. Broadly speaking, an equitable allocation to a particular town is one that is perceived to be fair to the town involved. This perception is important in order to retain the interest of a town to participate in the regional program.

Although no single universally accepted definition of equity exists, two definitions of equity have been used in allocating regional transit costs among towns (1). One deals with the town's ability to pay, measured, for example, in terms of each town's property valuation compared with all other participating towns' property valuations. The other definition of equity relates to the distribution of benefits received by the towns as a result of the

regional transit service. Since it has been recognized that such a distribution is not easy to measure, it has been suggested that benefits can accrue in different ways (2). One is by making transit service available to residents of a town. Even though all residents of a town do not necessarily benefit directly by riding the bus, they benefit indirectly because the service is available. The quantity of service available to a town might be measured, in the case of a fixed-route, fixed-schedule service, on the basis of the number of vehicle miles or vehicle trips through each town.

Another way benefits can accrue to a town is by actual use by the residents of the town. The distribution of such benefits would be described in terms of each town's relative level of use, possibly measured on the basis of the number of trips made by residents of each town as a proportion of all passenger trips.

CASE-STUDY REGIONS

The purpose of the case studies was (a) to review the procedure now used to allocate transit costs among towns in each region, (b) to identify the issues involved in the decision to select a certain procedure, (c) to evaluate the manner in which these issues affected initial choice and subsequent changes in a procedure, and (d) to describe the experiences of regional agencies in the implementation of their procedures. To achieve this objective, informal discussions were held with the regional transportation officials in five regions who participated in the design, adoption, and implementation of cost-allocation procedures. Two sets of discussions were carried out in each region. The aim of the first set was to obtain basic operating data and information regarding the procedure(s) in use. The second set of discussions focused on the implementation of the procedure(s). [Copies of the questionnaires used to obtain data for these discussions are available from the authors.]

The five case-study regions are located in New England. Two regions are in Maine and three in Massachusetts. Table 1 summarizes selected characteristics of these regions; they represent areas that have different demographic and economic characteristics, types of transit services and regional organizations, and sizes of operation. Although three regions have urbanized areas (Portland, Bangor, and Pittsfield), all five have a large population that lives in low-density rural areas. Demand-responsive service is provided in all five regions, and in two regions of Massachusetts, fixed-route, fixed-schedule service is operated. The services in Massachusetts are provided by RTAs under contract with private bus companies and private nonprofit agencies. In Maine, the services are offered by private nonprofit agencies closely affiliated with human service agencies (HSAs). The operating budgets and local share of the operating deficit range from \$86 159 to \$579 136 and \$15 575 to \$64 435, respectively.

EXAMINATION OF PROCEDURES USED IN EACH REGION

In this section we review the procedures in use to allocate the costs of the various types of service in each case study site. Those allocation procedures employed with fixed-route services are presented first, followed by those procedures used with demand-responsive services. Emphasis is placed on identifying the issues involved in the selection of and changes in a specific procedure. In addition, the experiences of persons in each region who have executed these procedures are described.

Table 1. Selected characteristics of case-study sites.

Major City or Town	Regional Population		Number of		Area (mile ²)	Median Income (\$)	Type of Service	Type of Organization	Allocation Procedure	Total Operating Gross Cost (\$)	Local Share of Deficit (\$)
	Total	Elderly (%)	Towns	Counties							
Greenfield, MA	80 000	13	11	2	703	7 987	FR-FS	RTA	Vehicle hours, vehicle trips, passengers	298 061 ^a	22 468 ^a (est.)
							DR shared-ride	RTA	On-board-vehicle miles	114 372 ^a	16 000 ^a (est.)
Pittsfield, MA	148 563	-	32	1	947	11 235	FR-FS	RTA	Vehicle hours, vehicle miles	548 901 ^b	64 435 ^b
Barnstable, MA	126 481	26	15	1	394	9 242	DR dedicated	RTA	Vehicle hours	86 159 ^b	23 223 ^b
							DR shared-ride	RTA	Passenger miles, passenger trips	273 888 ^c	50 000 ^c
Portland, ME	206 500	14.7	23	1	860	13 305	DR shared-ride	HSA	Passenger miles	579 136 ^b	15 575 ^b
Bangor, ME	225 900	20	76	4	11 176	8 205	DR shared-ride	HSA	Passenger miles	240 469 ^b	48 145 ^b

Note: FR-FS = fixed-route, fixed-schedule service; DR = demand-responsive service; RTA = regional transit authority; HSA = human services agency.

^aFiscal year 1980.

^bFiscal year 1979.

^cFiscal year 1978.

Fixed-Route, Fixed-Schedule Services

Greenfield, Massachusetts

The Franklin Regional Transit Authority (FRTA) uses a procedure based on vehicle hours, vehicle trips, and number of passengers in allocating the deficit costs to towns. Revenues collected are credited to each town. Given the availability of federal (Section 18) and state aid, the local share is 25 percent of the total operating deficit. The portion of this local share to be paid by each town is estimated by using the following equation:

$$D_A = 1/4 \left\{ GC_T \left[\frac{(VH_A/VH_T) + (VT_A/VT_T) + (P_A/P_T)}{3} \right] - R_A \right\} \quad (1)$$

where

D_A = local share of operating deficit allocated to town A,

GC_T = total systemwide operating costs (excludes capital and RTA administrative costs),

VH_A = vehicle hours within town A,

VH_T = total systemwide vehicle hours,

VT_A = vehicle trips through town A,

VT_T = total systemwide vehicle trips through all towns,

P_A = passengers that board in town A,

P_T = total passengers that board systemwide, and

R_A = revenue paid by passengers that board in town A.

The above procedure was adopted by FRTA member towns in 1979 when the service began on a permanent basis. Prior to this, the local share of the deficit was paid by the county because the county administered the program during its demonstration phase.

Although state law 161B requires the local share of the operating deficit of an RTA system to be allocated on some basis of level of service available to each town, the multivariable structure was chosen due to the different perceptions by the RTA members regarding the concept of equity. Some members felt that the allocation to each town should be based on the amount of service available, whereas others believed that costs should be allocated with respect to the amount of service each town actually uses or consumes. Consequently, the proportion of vehicle hours (VH_A/VH_T) and vehicle trips (VT_A/VT_T) was used to reflect availability, and the ratio of passengers to total passengers (P_A/P_T) was used to measure use or consumption. Other considerations made in the design of the procedure were the costs of data collection and processing. Because such costs were estimated to be relatively low, the procedure was considered to be viable. The

data required to determine vehicle hours and vehicle trips are obtained directly from route maps and schedules, and the number of passengers that board in each town is estimated periodically by means of an on-board survey. It has been estimated that 20-30 person-h are needed to obtain the necessary information from routes and schedules. The revenues generated within each town (R_A) are also estimated as part of the survey.

According to an FRTA official, the member towns are satisfied with the procedure. In 1981, the procedure was used for the first time. If some towns feel that their allocations are too high, the FRTA official believes that some changes in the procedures might be suggested.

Pittsfield, Massachusetts

The Berkshire Regional Transit Authority (BRTA) allocates the local share of the total operating deficit by using vehicle miles and vehicle hours. As in the case of the FRTA procedure, revenue is credited to each town as shown in the following equation:

$$D_A = 1/4 \left\{ GC_T \left[\frac{(VH_A/VH_T) + (VM_A/VM_T)}{2} \right] - R_A \right\} \quad (2)$$

where VM_A is vehicle miles within town A, VM_T is total systemwide vehicle miles, and the other terms are as defined in Equation 1.

This procedure is the first ever used in allocating costs of fixed-route, fixed-schedule services of BRTA and has been used for about five years. The impetus for adopting such a procedure was the state law (161B) mentioned previously. Consistent with the law, the allocations are based on two measures of the level of service available to each town--vehicle hours and vehicle miles. When this procedure was proposed to BRTA, it was considered fair. The procedure is relatively inexpensive to use, since the necessary data regarding vehicle miles and hours can be determined from route maps and schedules and revenues from periodic on-board surveys.

All participating towns are satisfied with the present procedure, although some staff members of BRTA have expressed the view that the procedure be made simpler. Some regional officials feel that a single-variable procedure probably will be adequate to satisfy state law as well as the views of RTA member towns with respect to the equity issue.

Demand-Responsive Services

Greenfield, Massachusetts

A fare-free, shared-ride service is provided to the

elderly and the handicapped by FRTA under contract with the Mt. Grace Regional Transportation Corporation. The contractual agreement has been in effect for about a year. Allocations to towns and HSAs are based on a measure called on-board vehicle miles (OBVM). The following hypothetical example (shown in Figure 1) describes measurement by the OBVM procedure. As shown in Figure 1, a van leaves the garage to pick up two residents of town A who want to travel to town C; on the way to town C the van picks up three residents in town B who are also going to town C; all five persons get off the vehicle in town C, and the vehicle returns to the garage. Given that the average systemwide operating cost per vehicle mile is \$1.25, the costs would be apportioned to each town as follows:

$$\begin{aligned}\text{Total operating cost} &= (1+6+5)\$1.25 = \$20.00, \\ \text{OBVM traveled by town A} &= 10, \\ \text{OBVM traveled by town B} &= 4, \\ \text{Average systemwide cost/OBVM} &= \$20 \div (10+4) = \$1.43, \\ \text{Cost to be paid by town A} &= 10(\$1.43) = \$14.30, \\ \text{and,} \\ \text{Cost to be paid by town B} &= 4(\$1.43) = \$5.72.\end{aligned}$$

As can be seen from the example, a town is charged for the number of miles its residents are on board a vehicle regardless of the number of riders. The motivation for this allocation procedure is to encourage better use of available vehicles by providing savings to a town whose residents share rides and to groups of towns who share the use of a vehicle. The procedure can be illustrated as follows:

$$D_A = (1/4)[GC_T(OBVM_A/OBVM_T)] \quad (3)$$

where $OBVM_A$ is on-board vehicle miles traveled by residents of town A not eligible to receive HSA funding (costs to transport HSA clients are paid from various HSA sources, including Titles 3, 6, and 20) and $OBVM_T$ is total systemwide on-board vehicle miles.

The OBVM procedure is the second procedure used to allocate the costs of this type of service. The previous procedure, in use from the beginning of the service in 1975 until 1979, was based on the elderly population. The transportation service was then a small demonstration program under the direction of a private nonprofit board. FRTA was not yet created; as a result, state law 161B was not applicable. Those towns being served believed that this simple allocation procedure was fair.

Two major reasons were responsible for the change to the present OBVM procedure. The first was the concern of towns and HSAs for an allocation that reflected level of use. The second was the requirement of the HSA funding source as well as state law 161B. Another concern that influenced the choice of the current procedure is the need to encourage group

riding and not penalize towns that have high group-riding rates. As stated before, group riding also fosters efficient use of vehicles, and this means a more effective service as demand increases.

Considerations of simplicity and cost of using the procedure were of secondary importance in the decision to change to the current procedure because the procedure is definitely more complex and costs considerably more to use (2 percent of monthly budget) than the previous one based on elderly population. It is worth noting that the complexity is such that some board members of FRTA are not completely familiar with the working of the procedure. Although not completely satisfied, these members are prepared to reserve judgment, since it addresses their major concerns regarding equity, and they are prepared to work with the procedure in the hope that enough experience can be gained to make it better understood.

One major shortcoming of the procedure is that miles traveled by riders are determined from odometer readings. This penalizes riders on the vehicle if the driver has to make a diversion away from the direct route to their destinations. A solution envisioned by the FRTA staff is the development of a standard origin-destination distance matrix that represents the shortest distance between the towns being served.

Pittsfield, Massachusetts

Two different demand-responsive services are provided in Berkshire County, one by BRTA and the other by the Berkshire Community Action Council (BCAC). BRTA provides dedicated service to the elderly and the handicapped residing in its member towns. BCAC operates countywide services to the elderly and the handicapped as well as to low-income residents. Only BRTA allocates costs to its member towns. BRTA uses the following single-variable procedure:

$$D_A = (1/4)[GC_T(VH_A/VH_T)] \quad (4)$$

This procedure is the first ever used by BRTA in allocating costs of demand-responsive service to towns. The major impetus for the adoption of this allocation procedure is the requirement of state law 161B. The variable, vehicle hours, is used to measure the level of service available to each town. The procedure adopted was a simple one, which indicates that simplicity was also a concern. The towns are satisfied with this procedure, and therefore no changes are anticipated in the near future.

Barnstable, Massachusetts

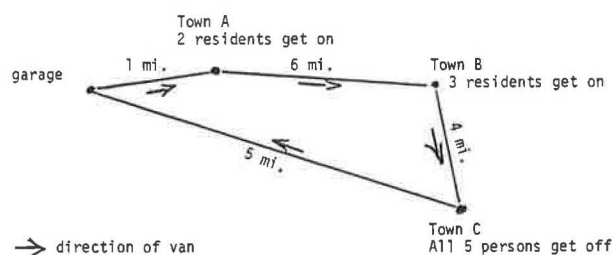
The Cape Cod Regional Transit Authority (CCRTA) provides a countywide shared-ride service to the general public and also an exclusive-ride service to the elderly and the handicapped. The authority allocates the operating deficit of the shared-ride service by using the following equation:

$$D_A = 1/4 \{ GC_T [0.75(PM_A/PM_T) + 0.25(PT_A/PT_T)] - R_A \} \quad (5)$$

where PM_A is passenger miles traveled by residents of town A, PT_A is passenger trips traveled by residents of town A, and PM_T is total systemwide passenger miles.

The variables, passenger miles and passenger trips, are weighted to reflect the different costs associated with each. The costs of dispatching and the administrative costs, which were 25 percent of the total operating cost, were assigned to passenger trips, and all other costs were assigned to passenger miles. The overriding objective of CCRTA

Figure 1. Example of use of on-board vehicle miles to allocate costs.



members in selecting this procedure was to adopt what was referred to as a "pay-for-what-you-get" approach. Procedures based on population, or elderly population, were rejected because they did not measure the quantity of service consumed by participating towns. One factor in the decision to adopt a use-based procedure was the current existence of rider identification passes, which allowed for the ease in the collection of passenger data. A computerized system has been developed to use these data to allocate costs among towns as well as to monitor and evaluate system performance. The cost of this system is approximately \$700/month.

In determining how to measure consumption levels for cost-allocation purposes, CCRTA decided that trip length should be incorporated into the procedure along with the number of passenger trips. Passenger trips alone, though easier to determine, were not viewed as an adequate consumption measure due to the extreme variability in trip length by residents of each town. The average trip length for town residents had been shown to range from 5.1 miles (Barnstable) to 21.2 miles (Bourne). This variability is caused by the elongated nature of the service area and the fact that many of the trips, regardless of origin, terminate in Hyannis, a major activity center. It was believed that many of the major costs of providing the service vary proportionately with trip length rather than being associated with the number of trips.

Although the procedure has been acceptable, two suggestions for improvement have been made. The first concerns a review of the weighting scheme to assure that cost elements (drivers' wages and benefits, fuel, oil, maintenance, etc.) are judiciously assigned to the two variables. The second suggestion is that a standard origin-destination matrix be developed from which passenger miles would be determined, instead of determining them from odometer readings. This is to prevent unfair charges to passengers taken on a circuitous route when the vehicle deviates to pick up additional passengers.

Portland, Maine

The Regional Transportation Program (RTP) of Portland provides fare-free, demand-responsive service to the elderly, the handicapped, and low-income residents throughout Cumberland County. RTP employs a single variable--passenger miles--as an allocation measure. The formula is represented as follows:

$$D_A = GC_T(PM_A/PM_T) \quad (6)$$

This procedure was adopted in 1973 in compliance with the requirement of Title 20 funding, which was then the sole funding source. Also, the argument of the towns supporting the transportation program was that the allocations should be based on use. The data required to employ this procedure are obtained from driver log forms without the use of a computer.

At present, no changes are anticipated because the procedure in use satisfies both the funding source requirements and the equity concerns of the participating towns. Issues of simplicity and cost of use were of secondary concern.

Bangor, Maine

The Eastern Task Force on Aging (ETFA) administers a fare-free, demand-responsive service similar to the RTP program in Portland (described above), and costs are allocated in an identical manner. This single-variable procedure was the first used by ETFA and was adopted in 1973 at the beginning of its transit program.

The main issue in the adoption of the program was the concern of ETFA board members for equitable allocation of cost based on some measure of service consumed by the elderly population in each participating town. The data are processed under contract with a private computer firm. The data-processing costs in 1978 were approximately \$9100. It should be noted that the data processing is required as part of other functions of ETFA that share these processing costs. Simplicity was not a consideration in the choice of the procedure, though the procedure is considered simple and easy to understand.

All participating towns are very satisfied with this allocation procedure, and no changes are anticipated in the near future.

CONCLUSION

Although the initial motive in considering a cost-allocation procedure might have been the need to satisfy the requirements of a funding source, the concerns of towns participating in the transit program are reflected in the structure of the procedure finally adopted.

The predominant concern in all cases was to allocate costs on the basis of availability of service, use, or both. It might even be argued that the motivation of all funding requirements and of state law governing allocation of transit cost has its basis in the need to satisfy equity as a way of encouraging the participation of different political jurisdictions in cooperative regional transit systems.

A pertinent observation about the choice of procedures in the case-study regions is that nearly half the procedures have only one variable. Although this is not necessarily an absolute measure of simplicity, it does indicate that simplicity was considered, even if as a secondary issue. An example of how complex a single-variable procedure may get is illustrated by FRTA's use of OBVM in allocating the costs of its service. The trade-off between simplicity and the need to assure equity is, however, very dependent on the particular procedure and the type of service to which it is being applied.

The fact that the fixed-route, fixed-schedule services of both FRTA and BRTA use multivariable procedures, whereas only one of the five demand-responsive services uses a multivariable procedure, might suggest that using a multivariable procedure within the context of shared-ride, demand-responsive service is a more complex proposition. This is certainly the case for demand-responsive, shared-ride service, which accounts for four of the five demand-responsive services. The process of applying these procedures, which includes data processing, is certainly more complex and more costly than that for fixed-route, fixed-schedule services for which necessary data can be culled largely from route maps and schedules.

The cost of using a procedure was not a primary concern in the design of the procedures in each region, since it was recognized from the outset that such costs could be kept to a small percentage of total costs so long as the procedures did not exceed a certain level of complexity and data requirements. Also, implicit in the choice of a single-variable procedure or a procedure in which the data collection and/or processing is necessarily performed as part of other functions is the cost savings involved.

For each case-study region, a satisfactory balance seems to have been reached between the main issues of equity, simplicity, and cost in the use of the current procedure. One major change did occur

in the procedure previously used by the Mt. Grace shared-ride service, and a number of suggestions to improve the procedures now being used in Barnstable and Pittsfield have been made.

The issues involved in the choice and implementation of cost-allocation procedures have been explored. Some or all of these issues might need to be considered by a transit system about to design and implement a cost-allocation procedure. It is hoped that the experience from these five case studies will be helpful in this design and implementation process.

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Minor Rural Roads: Finance Trends and Issues

THOMAS W. COOPER AND ANTHONY KANE

The local rural road problem is primarily one of finance. The purpose of this paper is to examine the sources and trends in local rural highway revenues and expenditures, to identify issues, and to explore solutions. Revenue for local rural roads (\$3.1 billion for 1979) is generated equally by the local jurisdictions and by state and federal grants-in-aid. Local jurisdictions rely almost entirely on property taxes and general revenues for local support for highways. However, road-user charges provide a substantial portion of the local road burden via shared state user-tax revenue. Because of the role of the local rural road, some claim that this shared financial burden (user and nonuser support) is justified. Others argue that users should cover all highway costs. County roads programs are oriented toward routine maintenance of conditions. In fact, local road maintenance has increased in real dollars since 1970, whereas capital road improvements have dropped by one-fourth. Consequently, local road conditions are judged to be declining. The conclusions reached are that (a) existing local rural road revenue sources are imperiled by energy conservation and voter demands for fiscal restraint, (b) local road programs are basically maintenance operations and user charges ought to cover the cost, and (c) revenue sources are available. Specifically, local governments should expand road-user tax revenues by redefining existing taxes as user fees and dedicating them to highway use and by exploring the creation of new user revenue instruments and mechanisms such as a local gasoline tax that piggybacks the state tax. Finally, local governments need to articulate the condition of local roads and what that means in terms of costs to government, local economy, and road user.

For the most part, local rural governments are responsible for the largest block of road mileage in America--some 2.2 million miles. The higher functional classes of rural mileage serve the important interregional and interstate movements of goods and people and to a lesser degree serve trips from farm to market. Local rural roads provide primarily private and public intracommunity and intracounty movement of people (via buses or private vehicles) and accommodate the movement of trucks that are critical to rural areas (1). Local rural roads are also profoundly affected by the recent changes in rural demographics and economics. Nonmetropolitan population growth has exceeded metropolitan growth

in the decade of the 1970s. This movement of people and industry to rural areas has altered the rural economic base and has placed added strain on local roads. Shippers complain about the condition of rural roads and bridges, which is dramatized by the revelation that about three-fourths of all rural bridges were constructed prior to 1935 and had a life expectancy of 50 years.

County and other rural governments control the greatest mileage of rural roads in America, 70 percent. However, these roads account for only 13 percent of all rural travel. Although our knowledge of the performance characteristics and the condition of local roads is lacking, the 1972 National Highway Needs Report stated that about one-half of the total mileage had been judged inadequate by reason of surface type and safety deficiencies, such as lane width or lack of shoulders (2). In addition, it has been estimated that 115 000 bridges off the federal-aid highway systems require replacing or rehabilitation (3).

The existence of an inferior road or bridge in rural areas could effectively isolate residents, communities, and economic activities. In some cases, school buses, service vehicles, and commercial trucks are rerouted to avoid inadequate facilities (particularly structures), which inconveniences residents, jeopardizes the security of rural communities, and adds an element of cost to goods moved over the highway network.

Because of their service nature, local rural roads are constructed to minimal design standards and for a variety of reasons have received minimal funding. While these practices may have been justified in the past, changing conditions raise the question of justification. For example, when truck travel increases rapidly, heavier loadings are permitted, larger school bus or farm equipment is