that coordinate different funding sources.

COMMON COST-ACCOUNTING SYSTEM

Common cost definitions and categories, units of service, and performance measures are being developed. Common definitions are essential to ensure that agencies and providers are talking about the same thing. Cost categories include (a) administration, (b) operations, and (c) maintenance (consistent with the Urban Mass Transportation Administration Section 15 prescribed system of accounting). Costs reflect total real costs; i.e., costs include such items as depreciation schedules for capital acquisitions, donated resources, and volunteer time. These data should provide the foundation for sound decision making between grantor and grantee, between grantee and grantee, and between the grantee and the private sector.

The four basic units of service selected are (a) total vehicle distance traveled, (b) vehicle distance traveled in revenue service, (c) vehicle hours, and (d) one-way passenger trips. These units were selected on the basis of the ease with which records can be maintained and their usefulness in terms of contracting, reporting, and management analysis. As the system becomes more sophisticated, it may become necessary to go beyond these minimums.

Performance measures will relate units of service to costs—e.g., operating cost per vehicle hour.

TESTING THE COST SYSTEM

In 1978, the uniform cost-accounting system was tested on two rural transportation projects—one in Missouri and the other in Area 15 in Iowa.

PROPOSED FUTURE ACTIONS

Developing a common cost-accounting and reporting system for passenger transportation service is a first step. Many more measures are needed to maximize the potential for coordination. For example, credit cards and coupons are being used in an increasing number of systems. These have the advantage of minimizing data collect by the provider while allowing the agency to collect the information it desires. Computers also appear to be useful and efficient in tabulating and summarizing ridership, travel patterns, and costs. PRCs play a special role because they have the potential for coordinating the cost and reporting systems used by different agencies, providers, and states.

REFERENCE

1. Hindrances to Coordinating Transportation of People Participating in Federally Funded Grant Programs, Volume 1. General Accounting Office, Oct. 1977.

Data Recording and Evaluation: The Barnstable County Experience

Robert P. Warren, Cape Cod Regional Transit Authority, Barnstable, Massachusetts
John Collura, Civil Engineering Department, University of Massachusetts

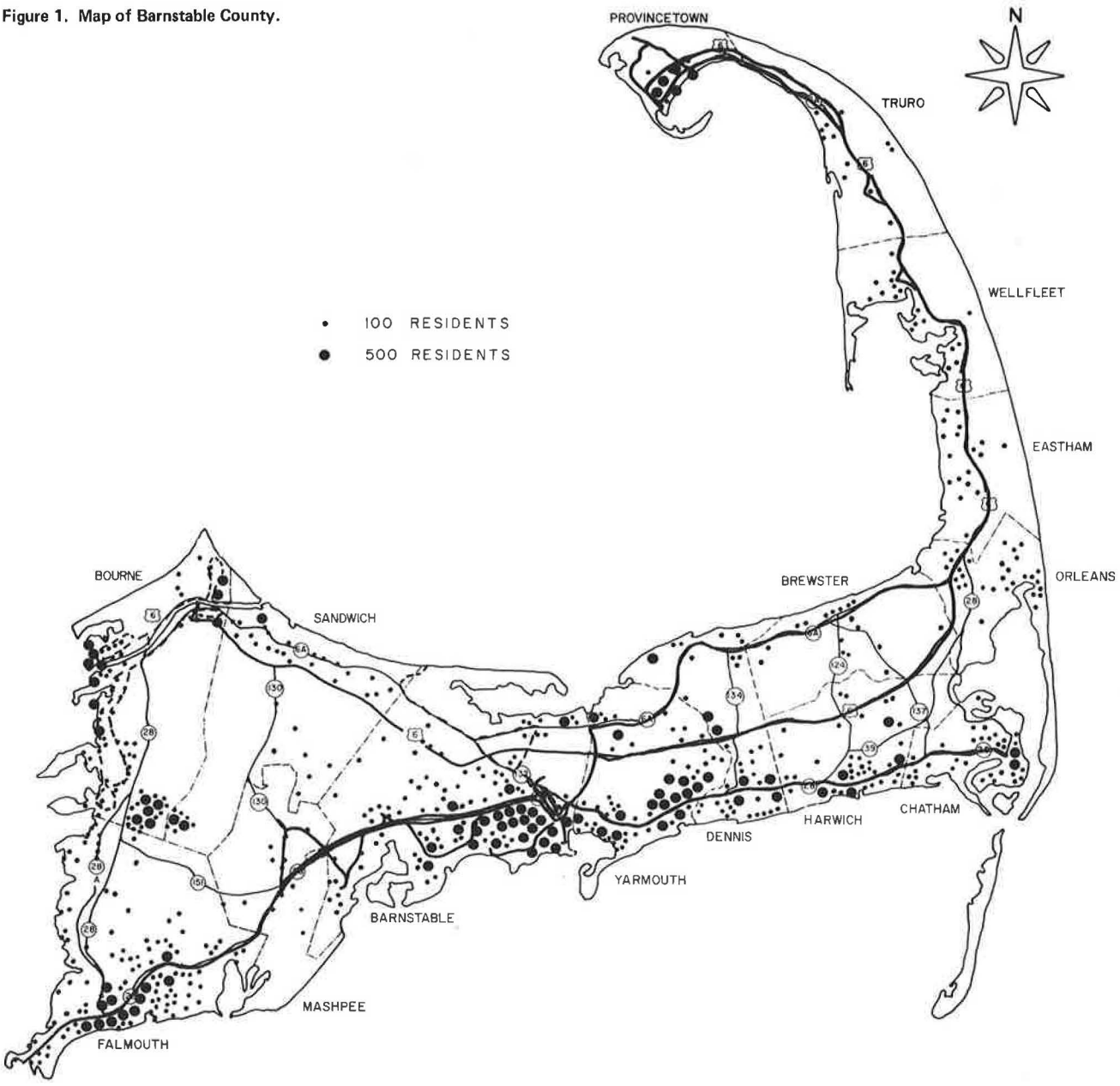
A mechanism for collecting data on rider and operating characteristics of regionwide public transportation services is described. The mechanism, a serially numbered rider identification pass, is being tested as part of an ongoing demonstration project in Barnstable County, Massachusetts. Service is provided on a prearranged demand-responsive basis by use of ten 12-passenger vehicles. Passengers acquire passes in advance and complete a questionnaire on their socioeconomic characteristics and physical disabilities. When passholders telephone to schedule a trip, the dispatcher records their pass number, pickup time, trip purpose, and origin and destination. Special attention has been given to minimizing the data to be collected by the bus driver: The driver records only on and off odometer readings for each trip. By using the passholder questionnaire and the daily driver log forms, socioeconomic and trip data are collected for all riders. These data may be used to (a) evaluate vehicle productivity and efficiency, (b) examine the impacts of local policy decisions, (c) assess the portion of a deficit to be paid by each town, (d) develop user charges and contractual agreements for use by social-service agencies, (e) identify those persons who are eligible for the services of a social-service agency, and (f) describe user characteristics. The uses of the pass in fare collection and marketing are discussed, and capital and operating costs of the pass are estimated.

Many persons living in rural and small urban areas do not have adequate transportation (1, 2, 3). These persons include the elderly, the handicapped, the young, those with low incomes, and other individuals who do not have access to a private automobile. This lack of transportation is significant because it contributes to the problems of social isolation, cultural deprivation, inadequate health care, and poverty.

In response to this need for public transportation in nonurbanized areas, major government actions have been taken (4, 5, 6). One federal action was the passage of the Federal-Aid Highway Act of 1973. Section 147 of the act provided $25 million to finance the capital and operating costs of public transportation demonstration projects in rural and small urban areas. Another federal action was the setting aside of $500 million of Urban Mass Transportation Administration (UMTA) funds for assistance to transit in nonurbanized areas.

A number of factors will determine whether these federally funded projects will be successful and continue on a permanent basis. One is the amount of financial support committed by local governments. Another factor is the willingness of social-service agencies to participate in a coordinated regionwide

Figure 1. Map of Barnstable County.



program. A third factor is the extent to which the services being provided are cost-effective and equitable. Questions that will be of considerable interest to local governments planning and implementing regionwide public transportation services are the following:

1. How should the deficit to be paid by each town be assessed?
2. How should the user charge to be paid by social-service agencies be determined?
3. How should the services being provided be evaluated to ensure that they are effective, efficient, and equitable?

Answers to these questions will not be simple because of complex institutional and political issues. However, the availability of a comprehensive set of data on the users and operating characteristics of such services will provide information for use by public officials in addressing these questions.

The purpose of this paper is to describe a mechanism for collecting these data. The mechanism, a serially numbered rider identification pass, is being tested as part of an ongoing Section 147 project in Barnstable County, Massachusetts. The paper includes (a) a description of Barnstable County, (b) a discussion of the Barnstable County transit development plan (TDP), (c) a description of the rider identification pass, (d) an evaluation of the various uses of the data collected by means of the pass, and (e) a summary.

DESCRIPTION OF BARNSTABLE COUNTY

Barnstable County is the governmental boundary of Cape Cod, a peninsula that extends seaward 129 km (80 miles) from the southeastern Massachusetts coastline (Figure 1). The county is in the shape of

a flexed arm that covers 1010 km^2 (394 miles^2) of flat or gently rolling terrain. The climate includes mild winters and cool summers. The proximity of the Gulf Stream to the south creates a warm-air influence on the winter air masses, and the same sea area provides gentle offshore breezes to relieve the heat of the summer sun. These climatic conditions make Barnstable County a choice location for vacations and retirement.

According to the 1975 official state census, the 15 towns in the county have a total year-round population of approximately 130 000. The average population density is 125 persons/km^2 (321 persons/mile^2). The highly populated areas are in the Barnstable-Yarmouth and Falmouth-Bourne regions (Figure 1). During the summer months—June through August—the population increases to approximately 450 000.

The focal points of activity are in the towns of Barnstable, Falmouth, and Orleans. These three towns are the major employment and shopping centers in the county. Barnstable and Falmouth also maintain complete hospital facilities. It should be noted, however, that, because of the elongated geography of Cape Cod [116 km (72 miles)] and its decentralized community structure, smaller shopping and employment districts do exist in the towns of Bourne (location of county hospital and cancer clinic), Yarmouth, Dennis, Chatham, and Provincetown (7).

Many residents are unable to own or operate a private vehicle for reasons of age, income, and health. According to a 1974 report of the National Clearinghouse on Aging, persons 60 years of age or older comprise 26.5 percent of the total year-round population of the county—almost twice the national average. Analyses show that the greatest concentrations of elderly persons stretch from the town of Barnstable to Harwich along the south side of the cape and across the south side of Falmouth. The 1975 median family income was $9242, or 15 percent less than the state average. This problem has been exacerbated by chronically high levels of unemployment. For example, in February 1976 (according to information obtained from the Massachusetts Division of Employment Security), the unemployed totaled 18.4 percent of the population—more than twice the national average.

The existing intercity bus and taxi services provided by private carriers do not meet the year-round needs of many persons who are without private transportation. The darker lines in Figure 1 show the private intercity bus service available in the county. Relatively low levels of service exist from September to May; for example, during this 9-month period only two round trips are provided daily from Barnstable to Provincetown. Limited taxi service is also available from September to May.

COUNTY TRANSIT DEVELOPMENT PLAN

In June 1976, the Cape Cod Planning and Economic Development Commission submitted its Five-Year Countywide Transit Development Plan to UMTA. This program was approved by UMTA in January 1977. Countywide demand-responsive service began on June 6, 1977. The total estimated cost of this service is $868 750. The service is being financed by the Federal Highway Administration (FHWA), UMTA, the Barnstable County Commission, and the Comprehensive Employment and Training Act (CETA). The two primary goals of the demand-responsive service are

1. To meet the special transportation needs of the elderly and handicapped residents of Barnstable County and
2. To determine the feasibility of providing countywide demand-responsive service in a low-density, decentralized regional area with 15 towns, a population of 130 000 persons, and a land area of 1010 km^2 (394 miles^2).

Service is provided by ten 12-passenger vehicles between 8:00 a.m. and 4:00 p.m. Monday through Friday. Each vehicle is equipped with a hydraulic lift for persons in wheelchairs. Garfield and Sargent, a private bus company, operates the service under a contractual agreement with the county commissioners. The policy board that oversees the demonstration is the Cape Cod Regional Transity Authority (CCRTA). The members of CCRTA are town selectmen.

RIDER IDENTIFICATION PASS

An integral part of the Barnstable County demand-responsive service is the use of a serially numbered rider identification pass. The pass is acquired in advance at various local town halls at designated times during the week. Each pass contains a four-digit identification number. Each person who obtains a pass can purchase a sticker that, once placed on the pass, allows the passenger to make an unlimited number of trips for any purpose during a 3-month period. A sticker for elderly and handicapped persons costs $10; for other persons, the cost is $14. Elderly and handicapped passholders may travel without a sticker, but on health-related trips only. The table below gives the number of passes and stickers purchased in the first two quarters of service:

Item	First Quarter (June-Aug.)	Second Quarter (Sept.-Nov.)
Number of passes acquired	1759	444
Number of stickers purchased for first time	1052	307
Number of stickers revalidated	–	494
Number of passholders with stickers	1052	801
Percentage of passholders with stickers	59.8	36.4

Finally, it should be pointed out that each person who acquires a pass completes a questionnaire on his or her socioeconomic characteristics and physical disabilities (Figure 2). When a passholder telephones to schedule a trip, the dispatcher records his or her pass identification number and trip data such as trip purpose and origin and destination (Figure 3). The bus driver records on and off odometer readings for each trip.

USES OF THE PASS

Evaluating Vehicle Productivity and Efficiency

The daily driver logs and the operator's monthly cost invoices generate data that can be used to evaluate the productivity and efficiency of each vehicle. Typical measures of vehicle productivity are trips per hour and passenger kilometers per hour. Efficiency measures include cost per vehicle hour, per vehicle kilometer, per passenger kilometer, and per trip.

These measures are being calculated by using a computer. All driver-log data are keypunched and analyzed at the University of Massachusetts Computer Center.

Figure 2. Pass application.

HOME ADDRESS _____ PHONE NO. _____
(Street and Number)

(Village) (Town) (Zip Code)

☐ In order to improve service to our patrons, we need to know certain information which will only be used for statistical purposes.

☐ 1. Have you purchased a pass before? ☐ Yes ☐ No

☐ 2. How many persons, including yourself (total adults and children) are in your household? _____

☐ 3. What is your sex? ☐ Male ☐ Female

☐ 4. How many vehicles (autos, pick-up trucks, vans and motorcycles) are there in your household in running condition?
☐ None ☐ One ☐ Two ☐ Three ☐ More than Three

☐ 5. Is a car available to you during the day to make your trips? ☐ Yes ☐ No

☐ 6. Do you have a current driver's license? ☐ Yes ☐ No

☐ 7. What is your age? _____

☐ 8. What is your employment status?
☐ Retired ☐ Unemployed ☐ Employed Full-Time ☐ Employed Part-Time ☐ Housewife

☐ 9. Do you have any problem or conditions which make it difficult for you to walk or use certain types of transportation?
☐ No ☐ Yes If yes, please specify _____

☐ 10. What is your residence status?
☐ Year-Round Resident ☐ Summer Resident ☐ Tourist

☐ 11. What is your total annual family income?
☐ 0–$4,999 ☐ $5,000–$9,999 ☐ $10,000–$14,999 ☐ $15,000 or More

Thanks for your help.

Issuing Agent _____

Location _____
(Village) (Town)

Date _____

PASS NUMBER ☐☐☐☐☐

STICKER NUMBER ☐☐☐☐☐

QUARTER NUMBER ☐

It should be noted that these measures could also be calculated manually on a monthly or quarterly basis for all trips. The total trips and hours of service for each vehicle can be taken directly from the log form. The average cost per vehicle can be determined from the operator's monthly invoice. Passenger kilometers per vehicle can be estimated by multiplying total trips per vehicle by average trip length per vehicle. Average trip length can be estimated by taking the difference of the on and off odometer readings for a random sample of trips on each vehicle.

These productivity and efficiency measures provide the operator and CCRTA administrator with a means of continuously monitoring the performance of each vehicle. This will assist the CCRTA administrator in making recommendations to CCRTA, regarding potential changes in operations. In addition, these measures could be used by state and federal departments of transportation (DOTs) in allocating operating subsidies.

Examining Effects of Local Policy Decisions

Data from the driver log forms and the passholder questionnaire can be used to examine the effects of local policy decisions. For example, in the third quarter of service the price of the sticker was doubled. At the time this paper was written, analyses were being done for CCRTA to determine the effects of the price increase on (a) revenues, (b) sticker revalidation among various socioeconomic segments of the population, and (c) trip frequency of individual passholders. The analysis of revenues was done manually; the other analyses were done on a computer.

The effects of other local policy decisions (e.g.,

Figure 3. Driver log.

DRIVER NAME _____ DRIVER NO. 1 2 VEHICLE NO. 3 4 DATE 5 6 Month 7 8 Day 9 10 Year SECTOR 11

START TIME 12 13 14 15 FINISH TIME 16 17 18 19 START MILES 20 21 22 23 24 25 26 FINISH MILES 26 27 28 29 30 31

TRIP NO.	NAME	PASS NO.	LOAD	PICK – UP MILEAGE	STOP NO.	SCHEDULE TIME	PICK – UP LOCATION	DROP – OFF MILEAGE	STOP NO.	DROP – OFF LOCATION	Trip Purpose	CODE	COMMENTS
32 33		34 35 36 37 38 39 40		41 42 43 44 45 46		47 48 49 50	51 52	53 54 55 56 57 58		59 60	61	62 63	
							Street and Number Village Town			Street and Number Village Town			
							Street and Number Village Town			Street and Number Village Town			
							Street and Number Village Town			Street and Number Village Town			
							Street and Number Village Town			Street and Number Village Town			
							Street and Number Village Town			Street and Number Village Town			
							Street and Number Village Town			Street and Number Village Town			
							Street and Number Village Town			Street and Number Village Town			
32 33		34 35 36 37 38 39 40		41 42 43 44 45 46		47 48 49 50	51 52	53 54 55 56 57 58		59 60	61	62 63	

TRIP CODE: 1 = Scheduled, 2 = No Show, 3 = Flag Stop, 4 = Cancelled, 5 = Out of Service

extending daily hours of service from 7:00 a.m. to 6:00 p.m.) can also be examined by means of the passholder questionnaire and driver-log data. Whether a computer may or may not be required would depend on the effects being examined.

Assessing the Local Deficit

At the present time, CCRTA is addressing the following question: If services are to continue beyond the demonstration period, how should the local share of the deficit be financed? Should a countywide tax be imposed? Should town tax sources be used? If so, should each town pay on a per capita basis or should some formula be developed based on each town's level of use? If so, should level of use be measured in terms of trips, passenger kilometers, or some other parameter? The use of such formulas may require certain data that are provided by the passholder questionnaire and driver logs.

Consider a formula based on trips by residents of each town:

$$D_A = D_T(T_A/T_T) \quad (1)$$

where

- D_A = annual deficit to be paid by town A,
- D_T = total annual deficit to be paid by all towns,
- T_A = number of trips yer year made by residents of town A, and
- T_T = total number of trips per year.

Use of Equation 1 requires the number of trips by residents of each town. This information can be obtained for all trips by using the questionnaire and driver-log data. Figure 4 provides a breakdown of trips by residents of all 15 towns for September, October, and November. This breakdown was obtained from a computer analysis. Such a computer analysis could be done annually, and each town could be billed accordingly.

A similar formula could also be considered by substituting $\overline{PK}_A/\overline{PK}_T$ for $\overline{T}_A/\overline{T}_T$ where $\overline{PK}_A$ is the passenger kilometers traveled by residents of town A and PK_T is the total passenger kilometers traveled. Passenger-kilometer data could also be derived from the questionnaire and driver logs by use of a computer.

It should be noted that only two possible formulas have been identified. Obviously, other formulas can be developed for which a computer may or may not be needed. The major purpose of discussing these formulas is to demonstrate how the data collected by using the questionnaire and the log form can be used to assist CCRTA in assessing the local deficit to be paid by each town.

Developing User Rates and Contract Agreements for Social-Service Agencies

Another question that has been addressed by CCRTA is, What steps can be taken to encourage coordination among social-service agencies? One step is to ensure that social-service agencies pay fair and equitable rates for transportation services. One way of doing this is to charge social-service agencies for that portion of operating costs that are in-

Figure 4. Percentage of riders by town.

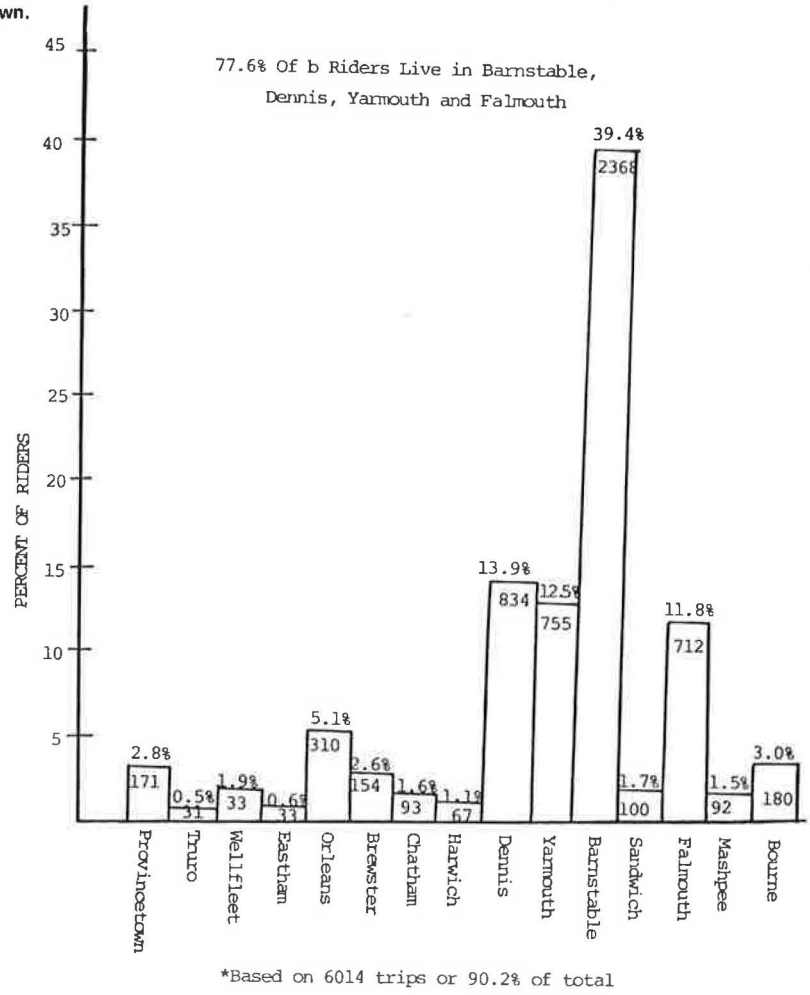


Table 1. Socioeconomic characteristics of passholders and riders.

Characteristic	Percentage of All 1970 County Residents	Percentage of All Passholders		Percentage of All Riders	
		First Quarter	Second Quarter	First Quarter	Second Quarter
Female	52.0	77.1	76.6	78.8	79.4
60 years of age or older (25.4 percent in 1975)	22.9	84.3	83.4	59.5	59.4
Annual family income less than $5000	49.4	55.8	58.7	63.1	74.3
Retired (aged 65 or older receiving Social Security)	11.8[a]	65.2	64.0	47.6	45.1
Living alone or with one other person	31.7	85.5	85.5	68.6	67.2
No vehicle in household	8.7	42.2	43.9	66.8	75.5
No driver's license	NA	51.7	53.5	76.5	82.2
Physical disabilities	9.0	29.8	29.9	30.8	44.5

[a]Or 69.7 percent of all aged 65 or older.

curred by services provided to their clients only. For example, a social-service agency could pay for transportation services per trip or per passenger kilometer. The information needed to use such rates could be obtained manually from the questionnaire and the driver log. State and local social-service agencies could be billed quarterly. Other rates that could be used with the driver-log data include services per vehicle hour and per vehicle kilometer. These rates will encourage group riding. Efforts are being made to develop such rates to increase the use of such services by clients of social-service agencies.

Another step that is being taken to encourage social-service agencies to participate in the project is to develop lump-sum agreements with the agencies. For example, passholder and driver-log data have shown that about 60 percent of CCRTA riders are elderly. It is hoped that such evidence may get agencies with elderly clients to develop annual lump-sum agreements. For example, assume that a council on aging has $15 000 to spend on transportation for its 100 clients. By using a cost per trip of $3, CCRTA and the council on aging would develop an agreement whereby each client would be allowed to make 50 one-way trips/year. The analysis required to monitor such an agreement could be done manually.

Identifying Those Eligible for Social Services

Many Barnstable County passholders are elderly, low-income, or handicapped persons. Such persons are eligible for financial assistance for transportation purposes through various social-service agencies. The use of the passholder questionnaire allows

CCRTA to identify those potentially eligible for social services and to inform them about available financial assistance. Steps have also been taken by the administrator of CCRTA to make it easier for persons to receive such financial assistance. For example, CCRTA has gotten the Massachusetts Department of Welfare to reimburse eligible welfare recipients for the full price of a sticker.

Table 2. Estimated costs of issuing passes and selling stickers.

Cost Category	Amount ($)
Operating per quarter	
Salaries	
Clerical (1.5 person weeks)	255
Treasurer's office[a]	-
Supplies	
Envelopes (2500)	20
Enclosures (cover letter, mailing address card, self-addressed envelope)	45
Stickers (800 at $0.0225/sticker)	18
Postage (two mailings: one bulk, one first class)	120
Passes [$0.50/pass × 3000[a] passes × (1/20)]	75
Council on Aging facilities and labor[a]	-
Total per quarter	533
Capital (five cameras at $916.80/camera[b])	4584

[a]In-kind services. [b]Excludes rental costs of cameras incurred in first quarter.

Describing User Characteristics

The use of the questionnaire and the driver log also allows comprehensive analyses to be carried out on all riders and passholders. For example, the socioeconomic characteristics and physical disabilities of riders and passholders can be monitored regularly. Table 1 gives the typical characteristics of passholders and riders. A majority of riders and passholders are female, are 60 years of age or older, have an annual income of less than $5000, live alone or with one other person, and have no driver's license. No significant change from the first quarter to the second quarter is indicated in the passholder characteristics. However, there are differences between quarters in income, vehicle availability, and physical disabilities of riders. These differences are largely a result of the group rides by handicapped, low-income individuals, which started in the second quarter.

Computer analysis of user characteristics does not necessarily have to be done for 100 percent of all riders. Manual analyses based on a small on-board survey may be adequate.

Collecting Revenues

The stickers are purchased from the county treasurer

Table 3. Potential uses by various agencies of pass identification data.

	Local			State		Federal	
Potential Use	Operator	Regional Transit Authority	Social-Service Agency	Department of Transportation	Social-Service Agency	Department of Transportation	Social-Service Agency
Evaluating vehicle productivity and efficiency	X	X		X		X	
Determining effects of local policy decisions (such as fare changes)		X					
Assessing the local deficit		X					
Developing user rates and contract agreements for social-service agencies		X	X		X		X
Identifying those eligible for social services		X	X		X		X
Describing user characteristics		X	X		X		
Determining user attitudes	X	X					
Collecting revenues	X	X					

Table 4. Data requirements, sources, and type of analysis for each use of the pass.

Potential Use	Typical Data Required	Data Source	Type of Analysis Required
Evaluating vehicle productivity and efficiency	Daily vehicle trips	Driver log	Manual
	Daily vehicle passenger kilometers	Driver log	Manual
	Daily vehicle hours	Driver log	Manual
	Vehicle operating cost	Operator's invoice	Manual
Examining effects of local policy decisions (such as fare changes)	Stickers sold before and after price change	Sticker validation sheets, driver log, passholder questionnaire	-[a]
Assessing the local deficit	Daily trips by residents of each town	Driver log and passholder questionnaire	Computer
	Daily passenger kilometers by residents of each town	Driver log and passholder questionnaire	Computer
	Population by town	State census	Manual
Developing user rates and contract agreements for social-service agencies	Daily trips by clients of each agency	Driver log and passholder questionnaire	Manual
	Daily passenger kilometers by clients of each agency	Driver log and passholder questionnaire	Computer
	Daily vehicle kilometers by clients of each agency	Driver log and passholder questionnaire	Manual
	Age, income, trip purpose, trip frequency	Driver log and passholder questionnaire	Manual
Identifying those eligible for social services	Age, income, handicap	Passholder questionnaire	Manual
Describing user characteristics	Age, income, automobile availability, trip purpose, trip frequency	Driver log and passholder questionnaire	Computer[b]
Determining user attitudes	Attitudes toward service hours, bus driver, telephone operator; physical condition of bus	Attitudinal questionnaire	Manual

[a]Depends on the effects being examined. [b]Manual analyses based on a small on-board survey may be adequate.

through the mail. After a person receives a pass, he or she mails to the treasurer's office a check or money order for the sticker. Three weeks before the end of the quarter, passholders are sent a notice that reminds them that their stickers will become invalid and encourages them to acquire their new stickers. A self-addressed return envelope is provided to facilitate revalidation of stickers. Such a mailing process eliminates the need for the persons who distribute the passes to handle cash or checks and reduces the potential of pilfering and theft of fare-box revenues.

Acquiring Information for Marketing Program

As mentioned previously, 3 weeks before the end of the quarter, each passholder is sent a letter that encourages him or her to purchase a sticker for the upcoming 3-month period. Enclosed in this letter are brochures on the service. In addition, the letter explains that a survey questionnaire is enclosed and requests that the questionnaire be completed. The questionnaire is returned, along with the check for the sticker, to the county treasurer in a self-addressed envelope.

The questionnaire obtains information on the attitudes of passholders concerning the services being provided. The results of this survey have led to proposed system changes. For example, it was found that 36 percent of respondents felt that the existing daily hours of service (8:00 a.m. to 4:00 p.m.) are inadequate. Consequently, the following steps have been taken to explore the possibility of extending daily hours of service:

1. A request has been made for funding from several sources: FHWA ($10 000), the Yarmouth CETA Consortium ($20 000), and Barnstable County ($5000).
2. Discussions have been carried out with the operator to identify necessary operational changes.
3. A marketing approach has been developed to inform the general public of new hours of service with the intent of penetrating new markets, particularly for the work trip.

In short, the mail-back nature of the pass system provides a useful way to acquire information on user attitudes and to disseminate information on the program.

COSTS AND USE OF THE PASS

The costs of issuing passes and selling stickers are given in Table 2. The costs are divided into two categories—capital and operating. The capital costs of $4584 include the costs of purchasing cameras and related equipment. The quarterly operating costs of $743 include the costs of clerical assistance, supplies, stickers, passes, and postage. Excluded from these costs are the in-kind services of issuing passes provided by town councils on aging. Also excluded is $5400 in rental costs for eight additional cameras that were needed during the first quarter when over 1800 passes were acquired.

SUMMARY

Table 3 gives the primary uses of the pass, and Table 4 summarizes the data requirements, data sources, and types of analyses required for each use. It should be pointed out that a more comprehensive evaluation of the pass system is to be carried out at the end of the demonstration in early 1979. This evaluation will compare the use of the pass to the use of other fare-collection mechanisms.

ACKNOWLEDGMENTS

We sincerely thank Douglas J. McKelvey of the National Transportation Policy Study Commission and Robert L. Smith, Jr., of the University of Wisconsin—Madison for their constructive comments in the preliminary preparation of this paper.

We appreciate the excellent technical assistance provided by the following persons: transportation program manager Toivo Lamminen, transit planner Dennis P. O'Leary, Jr., and cartographer Curt Slocum of the Cape Cod Planning and Economic Development Commission (CCPEDC); general manager John Hunter and data analyst Robin Murphy of Garfield and Sargent; and research assistants Ronald Bukoski, Michael Hornbrook, James Ryan, Sara Warner, and Michael Yacyshyn in the Civil Engineering Department, University of Massachusetts, Amherst. Special gratitude should also be expressed to other members of the CCPEDC staff, especially Beverly Campbell, Doris Lorch, Barbara Grenier, and Wendy Rose for their exceptional clerical, editing, and typing assistance.

We would like to acknowledge the data collection efforts of the bus drivers and dispatchers involved in the demonstration program. In addition, the support of Barnstable County town councils on aging as well as that of other social-service agencies and the entire Barnstable County community has been invaluable.

The preparation of this paper was financed in part by the Section 147 Rural Highway Public Transportation Demonstration Program of FHWA.

REFERENCES

1. Rural Passenger Transportation: State-of-the-Art Overview. Transportation Systems Center, U.S. Department of Transportation, May 1976.
2. A. Saltzman, M. Blair, J. Johnson, and J. Burkhardt. Predicting Rural Public Transportation Effectiveness. North Carolina A&T State Univ., Greensboro, 1974.
3. J. T. Barnett. Why Rural Public Transportation? Conference Proc., Local Mass Transit in North Carolina, North Carolina State Univ., Raleigh, Feb. 1976.
4. J. Coliura and L. Corum. The Need for a State Public Transportation Program. Southern Engineer, North Carolina Engineer Council, North Carolina State Univ., Vol. 45, No. 4, April 1974.
5. A Report on Rural Transportation. Expanded Metro Mobility Task Force, Southeastern Federal Regional Council, July 1974.
6. D. McKelvey. The Rise and Fall of Transportation Demonstrations for the Transportation Disadvantaged. Paper presented at 5th Annual Florida Conference on Improving the Quality and Quantity of Transportation, Orlando, Dec. 1975.
7. Barnstable County Monograph. Massachusetts Department of Commerce and Development, Boston, Jan. 1974.