

inal monthly cost, a fully equipped maintenance facility, a radio-equipped maintenance truck, and a furnished office trailer;

3. The state district engineer, at the request of the county commissioners, agreed to join the six-member transit authority policy board;

4. Underwriting a portion of the system's net operating deficit as long as the funds were matched by the three counties;

5. Helping to set up proper record and bookkeeping procedures and prepare a realistic project budget. Over the last year, the budget has been within 2 percent of actual expenditures; and

6. Hiring and training a new project director, after getting the project back on its feet. The new director has gradually taken over the management of the project, with the state remaining available on an as-needed basis.

The efforts of these and the many other state and local groups have led to viable rural public transportation operations. The many new initiatives at the state level to provide ongoing funding assistance to these operations are also encouraging. But perhaps the most pleasing success of these projects is in providing for the needs

of the transportation disadvantaged—be they young, old, handicapped, poor, or simply without ready access to automobiles.

Statistics are beginning to show improved economic efficiencies over time, to the point that several operations (especially those financially supported by state and local governments) look like they will be able to continue operations with little or no outside federal financial support. Several other equally worthy projects, which are supported to a lesser extent by local funds, are also providing cost-effective and needed service, but they have to rely more heavily on the one-shot section 147 funding for operating support.

As more and more projects approach the end of their demonstration life during this year and next, FHWA is hopeful that Congress will make available in timely fashion an ongoing program of rural and small urban transportation assistance. The demonstration program has shown the need for rural public transportation and has demonstrated a variety of ways to provide for that need at affordable costs. FHWA is committed to working closely with UMTA and the Secretary of Transportation to help implement the new program as quickly as possible after authorization by the Congress.

Morehead, Kentucky, School Bus Demonstration Project

Bruce S. Siria, David E. Smith, and William A. Smith II, Kentucky Department of Transportation

Recent public policy has demonstrated increased concern for the effectiveness of existing transportation systems as a cost-efficient alternative to major capital expenditures. One such program in Kentucky uses a single school bus to provide transit service in the community of Morehead. A 36-passenger school bus operates hourly along a 12.1-km (7.5-mile) route from 8:30 a.m. to 4:30 p.m. on weekdays and from 9:30 a.m. to 2:30 p.m. on Saturdays. Service is provided to Morehead State University, several public housing projects, the central business district, a principal manufacturing house, and the hospital. The one-way fare is \$0.25. The Kentucky Department of Transportation, the Rowan County Board of Education, and the city of Morehead all share in the management of the project. Net operating costs during the 12-month demonstration period are shared between the department of transportation and the city of Morehead (75-25 percent, respectively). To date, farebox revenues have equaled 8.78 percent of the total operating costs. Initial patronage during the first 5 months of the demonstration program was low, increased drastically during severe winter weather, and moderated somewhat when warmer weather arrived. Weekday patronage averages 33.6 persons/d and Saturday patronage averages 16.8 persons/d.

Recent public policy has demonstrated concern for increasing the effectiveness of existing transportation systems as a cost-efficient alternative to major capital expenditures. Both the Traffic Operations Program to Increase Capacity and Safety (TOPICS) and the more recent transportation system management (TSM) emphasis are examples of federally directed programs of this nature. There are countless examples of specific projects initiated at the state or local level directed at achievement of this same objective. This paper describes one such program in Kentucky.

In early 1974 it became apparent to consumers of specialized transportation services that certain transportation demands were not being served and potential mechanisms to provide such service were not being utilized. The 1974 Kentucky General Assembly concurred and enacted a new section of the Kentucky statutes to permit the Kentucky Department of Human Resources to contract with a local board of education for the use of school buses to transport persons 62 years of age or older, persons who were physically or mentally handicapped, or other persons designated by the department of human resources during those periods when the vehicles were not needed for school-related transportation. The department of human resources was to use existing appropriations for costs incurred in provision of such service. The program was thus (a) the responsibility of the state human services agency, (b) programmatically and budgetarily permissive rather than mandatory, and (c) designed to be beneficial to a specifically defined client group.

Perhaps as a result of the absence of a specific legislative appropriation and the permissive rather than mandatory nature of the legislation, only two projects were proposed during the 2 years following legislative enactment. One project lasted only briefly in an urban area, and the other provided transportation services to a nutrition site in a mountainous rural county.

The 1976 Kentucky General Assembly reacted by enacting legislation that required implementation of some projects. Discretion regarding who constituted eligible beneficiaries of these services was transferred to the

Kentucky Department of Transportation, which now also assumed responsibility for financing such projects. Costs were to be borne by the department from existing appropriations. The program was then (a) the responsibility of the state transportation agency, (b) program-matically mandatory but budgetarily permissive, and (c) meant to be beneficial to a more broadly defined group of users.

The Kentucky Department of Transportation was thus faced with administrative responsibility for a program not initiated by the department. The department's first action was the development of a policy for program implementation. A school bus program had obvious consistencies with several facets of the department's policy.

1. The department's policy was that specialized transportation services designated for a certain market segment not be restricted only to that market segment. The language of the legislation appeared to have transferred the discretionary designation of eligible program beneficiaries from the department for human resources to the department of transportation, thus implying legislative intent that there be a broader base of program participants. The department declared a policy that the services to be provided by such a program were not to be client restricted.

2. The department did not and does not provide general public transportation operating assistance. Since the urban areas of the commonwealth (those with a population in excess of 50 000 persons) were well served by both general and specialized transit and paratransit services, any project using school buses would probably operate in an area not eligible for general federal operating assistance. Thus, for any demonstration project to continue beyond the demonstration period, local funds would be required to finance the inevitable difference between operating costs and fare revenues. Local funding was thus deemed a necessary requirement during the demonstration period. A local 25 percent share of the demonstration project costs, phased in increasing increments during the demonstration period, was required of project participants. Further, because of limited funds available and a desire that demonstration projects not be misinterpreted as the general provision of operating assistance, it was determined that demonstration projects were to have a defined time span of 12 months.

3. The legislation did not require nor did it allow the actual transfer of ownership of any piece of equipment from a school board to the department. Thus, any project would of necessity involve the use of equipment to which title would still be held by the school board. Therefore, any proposed project must carry the expressed endorsement of the particular school board concerned.

SITE SELECTION

Interest in possible participation in the program was expressed to the department before the legislation that transferred the program to the department of transportation had been signed into law. The first potential candidate for a demonstration project came from a community in the Appalachian foothills. An ongoing public transportation study by the department had identified a probable unsatisfied daily demand for public transportation of about 40 trips/d, a level that could potentially strain the capabilities of the single local taxi operator but could hardly justify large expenditures on capital equipment. The local school superintendent was the project's staunchest local supporter. The city had an ongoing program whereby a portion of the taxi fare for senior citizens was provided by the city, thus the city

had a history of financial commitment to transportation service. This project was stopped short of implementation, however, when city officials, in reaction to objections from the local taxi operator, voted not to implement the program.

The department was first approached about a possible school bus demonstration project in Morehead when the school superintendent contacted the department of transportation during a review of the recently passed legislation. Subsequent discussions led to approval by the local school board and solicitation of the city council for support and funding. The local taxi operator was approached and indicated no feelings one way or another about the project. The city council authorized the funding. Certification to operate under a city bus certificate was obtained. On December 1, 1977, Morehead Area Transit (MAT) began operation.

There were several specific purposes of the project:

1. To see if administrative barriers, which apparently hampered development of an otherwise obvious solution to a problem set, could effectively be overcome;
2. To determine the level of demand for public transportation in Morehead that could be served by the demonstration project; and
3. To test the validity of demand estimation methodologies.

LOCAL ADMINISTRATIVE MECHANISMS

The three parties in the demonstration project (the Kentucky Department of Transportation, the Rowan County Board of Education, and the city of Morehead) have all shared in the management of the project. The department provides assistance in the areas of technical planning and transit management. The initial route; schedule; and promotional program, including newspaper and radio advertisement, schedule brochures, and posters, were the primary responsibility of the department. The department's project manager has maintained close contact with local authorities to provide additional management assistance as needed.

The superintendent's office of the Rowan County Board of Education has the major responsibility for the day-to-day operation of the demonstration project in Morehead. The school bus used in the demonstration project is fueled, stored, and maintained at the board of education's bus barn by school system employees. The driver was hired and trained by the board of education.

An information center was set up in the superintendent's office to handle all inquiries about the system, including route and schedule information. Independent tabulations of daily revenue and ridership are kept. Monthly statements showing expenses and revenues are prepared by the superintendent's staff and forwarded to the department for payment.

The city of Morehead planning aide assists the department's project manager in securing and maintaining local support for the project. With the city's assistance, contacts were made with the Chamber of Commerce, Morehead State University, St. Clair Medical Center, various human service agencies, and local senior citizen groups. The city has also assisted in the evaluation of the system's performance, and informal ridership and community surveys.

SERVICE CHARACTERISTICS

Service began on Thursday, December 1, 1977. The vehicle chosen for use in the demonstration project was a new 36-passenger school bus, which the board of educa-

Table 1. System patronage.

Week of Operation	Days Operated	Ridership			
		Weekday	Saturday	Weekly Total	
1	Dec. 3	3	49	18	67
2	Dec. 10	6	125	37	162
3	Dec. 17	6	73	22	95
4	Dec. 24	6	57	15	72
5	Dec. 31	5	35	1	36
6	Jan. 7	5	74	8	82
7	Jan. 14	5	106	25	131
8	Jan. 21	6	304	28	332
9	Jan. 28	6	209	17	226
10	Feb. 4	6	293	29	322
11	Feb. 11	6	228	26	254
12	Feb. 18	6	247	7	254
13	Feb. 25	6	167	20	187
14	March 4	6	235	20	255
15	March 11	6	255	6	261
16	March 18	6	89	10	99
17	March 25	6	137	11	148
18	April 1	6	168	17	185
19	April 8	6	165	15	180
20	April 15	6	174	6	180
21	April 22	6	139	13	152
22	April 29	6	153	8	161
23	May 6	6	177	27	204

Table 2. Costs of system operation.

Item	Actual	Total (¢)	Proportioned	Total (¢)
	5-Month Cost (\$)		Monthly Cost (\$)	
Operators ^a	4 102.85	37.63	820.57	39.61
Secretary	1 000.00	9.17	200.00	9.65
Fringe benefits	306.93	2.82	61.39	2.96
Advertising	978.36	8.97	195.67	9.44
Insurance	932.00	8.55	77.67	3.75
Vehicle operation ^b	3 583.36	32.86	716.67	34.59
Total	10 903.50	100.00	2071.97	100.00

^a\$3.85/h plus time and one-half for overtime.

^bVehicle leased at 27.9 cents/km (45 cents/mile).

tion had planned to use only for after-hours, extra curricular events. Based on an analysis of socioeconomic data and a windshield survey of Morehead, a 12.1-km (7.5-mile) route was selected at the start of the project. Service was provided to Morehead State University, all the public housing projects, central business district, a principal manufacturing firm, and the hospital.

Service was provided on 1-h headways, from 8:30 a.m. to 4:30 p.m. on Monday through Friday and from 9:30 a.m. to 2:30 p.m. on Saturdays. Based on experiences in other communities similar to Morehead, a one-way fare of \$0.25 was established.

Estimates of Potential Patronage

The potential number of system users was derived from assumed modal split factors for all trips made during the time the system was to be operational and for those trips for which the proposed routing served both trip origin and destination. Trip generation and trip distribution techniques were applied to Morehead demographic data on a zonal basis. Interzonal transfers that coincided with the location of the route and the proposed time of operation were then identified. A potential modal split capture by the transit system was estimated and applied to the subset of interzonal trips.

Trip generation equations were synthesized from data in a series of small urban areas in Kentucky, using stepwise multiple linear regression techniques. The resultant productions and attractions were distributed by the gravity model. A modal split factor of 1 percent was

assumed. The result of this process was an estimate of 85 users/d on weekdays.

Initial Ridership Trends

Except for the first full week of operation, weekly patronage for the first 6 weeks of operation was discouragingly low. During the first week and a half, weekday ridership averaged 25 persons and patronage for the two Saturdays was 18 and 37 persons respectively (Table 1). For the next 4 weeks, the novelty of MAT seemed to disappear and with it the patrons. Weekday ridership averaged just over 13 persons/d and Saturday ridership averaged 11 persons/d. These results were especially discouraging since this was the period immediately prior to Christmas and a coupon for a free trip, redeemable at participating merchants, appeared in the newspaper.

Week seven of operation was marked by a weekly patronage level 60 percent higher than that of the previous week and 84 percent higher than that for the average of the previous 4 weeks. This increased patronage level occurred during the week that MAT experienced its only day of missed service during what was to be the worst winter in recorded history for the area.

During weeks 8 through 15, weekday ridership averaged 48 persons and Saturday ridership averaged 19 persons, increases of 269 and 73 percent respectively over the low 4 weeks in December.

This period coincided with the period of very severe winter weather. Thus, the weather succeeded where human efforts had failed—in getting patrons past the critical transition from potential rider to first-time rider. Another factor was the apparent success of promotional activities directed toward students at the university, since ridership increases coincided with the start of the spring semester.

The combined effects of student patrons and weather continued to be evident in weeks 16 through 23 of the project. (Week 23 ended May 6, 1978, and marks the end point of activity reported in this paper.) During week 16 (spring break for the university), weekday and Saturday ridership decreased by 62 and 47 percent respectively when compared to the average of the previous 8 weeks.

The remaining 7 weeks in the reporting period indicate that MAT has retained some but not all of its patronage. Weekday ridership during this period is 32 persons/d; this compares to figures of 48 during the bad weather and 18 before the bad weather. Saturday ridership remained more consistent throughout the demonstration period. During this last 7 weeks, Saturday ridership has averaged 14 persons; this compares to figures of 19 during the bad weather and 11 before the bad weather. Patronage from one Saturday to the next has shown the most variance without a predictability to the variation.

COST AND REVENUE

Costs for operation of the demonstration project have been calculated for the first 5 months of operation. This period corresponds to the first 22 weeks of operation shown in Table 1. These costs are shown in Table 2 in two forms: actual expenditures for the 5-month period and prorated monthly expenses. This latter reporting procedure allows proportionate incorporation of lump sum expenditures, such as payment of the annual insurance premium.

Examination of the latter two columns points out several facets where the demonstration project differs from more traditional transit systems. Personnel costs account for only slightly more than 52 percent of total

cost. This relatively low figure reflects the comparatively low total cost per hour of the operator (\$4.41/h including benefits) and the absence from inclusion in these figures of administrative costs. A complete accounting for administrative costs would probably increase personnel costs to approximately 65 percent of system operating cost.

Advertising expenditures expressed as a percentage of the total operating cost are high. This is caused by higher than normal levels of expenditure at the outset of system operation. Subsequent expenditures for advertising are expected to approximate 5 percent of total system cost.

Revenue for the first 5 months of operation has been derived from only three sources: fare receipts, state funds, and local funds. As indicated previously, the local share of subsidy during the whole demonstration period was 25 percent, phased in increasing percentages quarterly. During the first quarter of the project the local share of needed subsidy was 0 percent; during the second quarter the local share was 10 percent.

During the first 5 months, fare revenue totaled \$957.75 (8.78 percent of operating cost). Net public costs of \$9945.75 were divided between the department of transportation (\$9186.40) and the city (\$759.35). Total cost was \$2.84/passenger and net cost was \$2.59/passenger.

COMMUNITY REACTION

The community of Morehead has reacted very positively to the project. The city and the school board have been active participants in spite of the fact that ridership levels have never reached predicted levels. This probably is a result of a feeling on the part of local Morehead officials that estimates by the department of transportation of potential users were too high. The school board assisted with the initial arrangements for use of the bus, provision of a driver, preparation of cost estimates, route planning, and several hours of staff time. The city became more involved as the project developed, coordinating the citizen involvement and advertising campaigns. Several other civic groups who have supported MAT are the Kentucky Bureau of Social Services, Morehead Housing Authority, the Morehead Chamber of Commerce, Rowan County Fiscal Court, St. Clair Medical Center, Morehead State University, the Bureau of Manpower Services, the Rowan County senior citizens, and the downtown merchants association.

At the beginning of the project, there were several perceived problems with the use of school buses as transit vehicles. These perceptions were based on both intuitive feelings and reported prior experiences and were concerned with the physical limitations of the vehicles, e.g., high steps, rough ride, and the absence of air conditioning.

Consumer research conducted during the early phases of the demonstration period showed that these initial perceptions of potential problems were essentially unfounded. Actual problems with the use of school buses have been more a matter of psychological rather than of physical limitations. School bus vehicles must, by law, have certain distinctive marking and lighting schemes. The purpose of these requirements are to visibly highlight the school bus vehicle as such, both to the user and to the motor vehicle operator. As a result, the school bus has become a readily identifiable element of the visual scenery. Habitual perceptions

must be altered in order to enable potential patrons of the project to be psychologically comfortable using a school bus. In this project, candidate techniques for altering perceptions could not include permanent alterations of the required vehicle signing and marking.

MONITORING AND EVALUATING THE PROJECT

During January 1978, a survey of Morehead State University students was conducted as part of spring registration to make students familiar with MAT and also to get some ideas for additional service. As a result of that initial survey, a university trailer park 6.4 km (4 miles) from the campus was surveyed to determine the potential level of demand for transit service. In addition, meetings were scheduled with business groups and human service agency staffs to solicit support and potential patronage for the service.

An on-off survey, on-board survey, and a trail check were conducted during the 12th week of service to get specific information on the system's performance.

A decision was then made to expand the service area and the hours of service. The service was extended to the university trailer park, service was started an hour earlier in the morning, and a portion of the route was reversed to better serve the hospital and other established trip patterns.

Another result of continued discussions with local agencies was two additional sources of ridership and revenue. Both the board of education and the Kentucky Bureau for Social Insurance have instituted a ticket system for trips on MAT. As part of a community education program, involving cooperative work experiences for high school students, the school system issues tickets to students to use on MAT for travel to work.

The Bureau for Social Insurance has started to issue tickets to clients eligible under Title XIX of the Social Security Act of 1974 for nonemergency transportation. MAT will be reimbursed monthly by each program at \$0.25/ticket collected.

The Morehead City Council has reaffirmed its support for MAT by voting to continue the project and finance the city's share of net costs for another 6 months. (Although the project was scheduled for 12 months, the city had the option to cancel its participation and hence the project at the end of 6 or 9 months.)

During the next 6 months the Kentucky Department of Transportation will assist the community in further evaluations of MAT and the feelings of the community about MAT. As the demonstration period moves to a close, the community will face the decision of whether to continue MAT without state financial aid. The popularity of MAT and the willingness of the community to support the system will bear heavily on this decision.

In addition, a more in-depth evaluation of MAT ridership is planned to ascertain information about trip purpose, trip frequency, and whether the trip was generated by or modally shifted to MAT.

The results of this demonstration project will enable the department of transportation to better plan and administer future demonstration projects, which may or may not relate to the use of school buses. More importantly, however, the citizens of Morehead will know what a public transportation system can and cannot do in Morehead and whether this public service is worthy of local public financing.