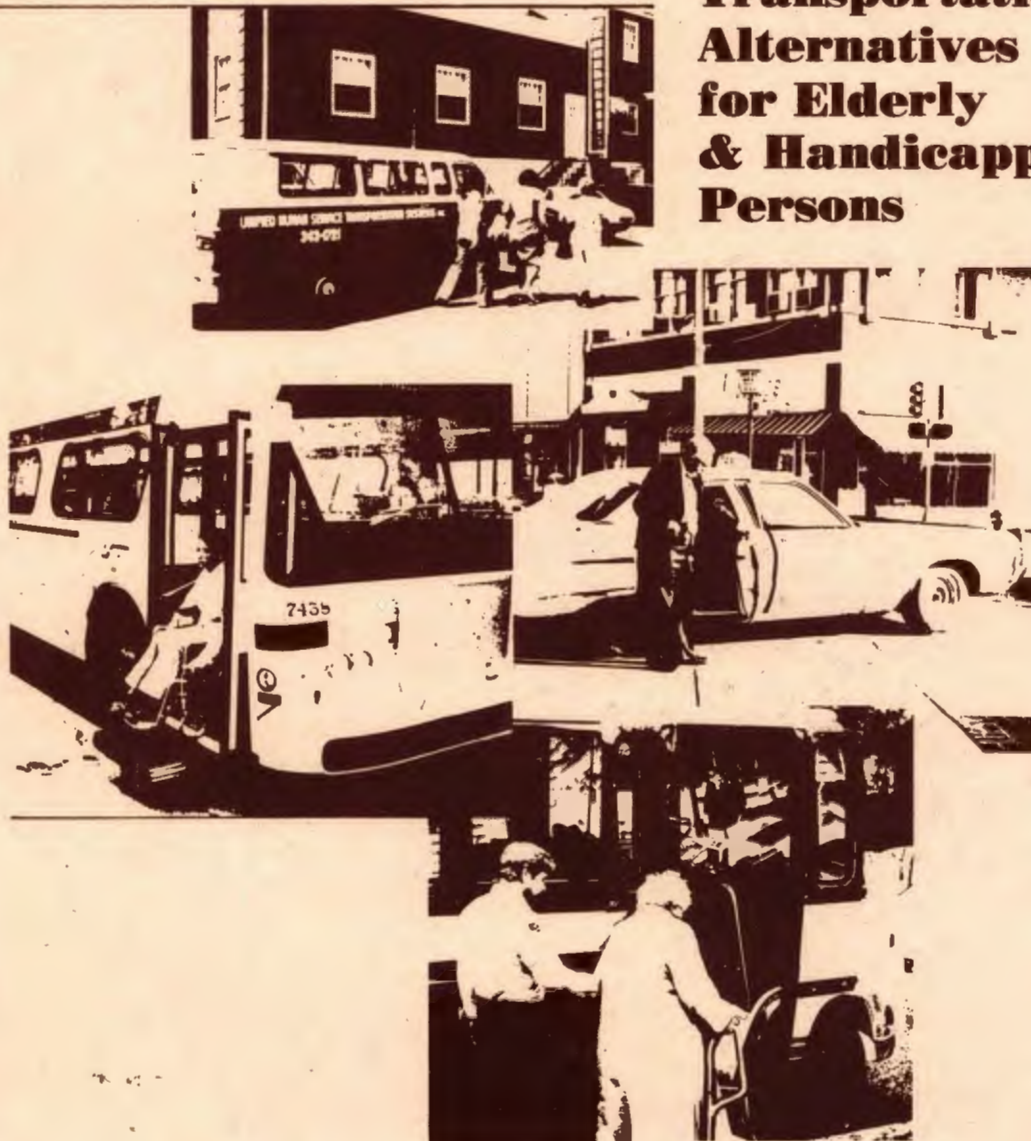


Making the Difference:

Transportation Alternatives for Elderly & Handicapped Persons



U.S. DEPARTMENT OF TRANSPORTATION
Urban Mass Transportation Administration
Research and Special Programs Administration
Transportation Systems Center

AUGUST 1979

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16. Abstract <p>This report contains project summaries of four examples of public transportation services for Elderly and Handicapped persons: The LIFT Project in Portland, OR; Roanoke Agencies Dial-A-Ride (RADAR) in Roanoke, VA; the Reduced Taxi Rate Program (RTR) in Danville, IL; and the Bi-State Accessible Bus program in St. Louis, MO. Each summary contains a description of the setting, the service concept, project evolution, institutional factors, cost and service characteristics and project impacts. These four projects appear in the UMTA documentary film, <u>Making the Difference</u>, as examples of the variety of approaches available for serving the travel needs of individuals who are unable to use conventional transit services. The summaries in this report are intended to serve as supporting documentation for the film.</p>			
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PREFACE

This report, which describes four examples of transportation services for elderly and handicapped persons, is intended to serve as supporting documentation for the UMTA film, Making the Difference. Each of the services depicted in the film are described in more detail here, including numerical information such as cost and service characteristics that are not readily communicated in a film.

Both the film and this report were produced for the UMTA Service and Methods Demonstration Program by the Urban and Regional Research Division of the Transportation Systems Center. Assistance in the preparation of this report was provided by Multisystems, Inc. and Crain and Associates, Inc. The Portland LIFT and St. Louis summaries were authored by TSC; the Portland summary was condensed from an interim evaluation report prepared by Tom Cooper, Pamela Bloomfield, and Sydwell Flynn of Crain and Associates. The Roanoke Project summary was authored by Joan Walker of Multisystems, Inc. and the Danville project summary was written by David Koffman of Crain and Associates.

The authors gratefully acknowledge the cooperation of local officials and operators at the four cities and the assistance provided by Vera Ward in preparing this manuscript.

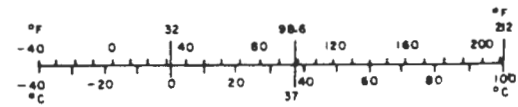
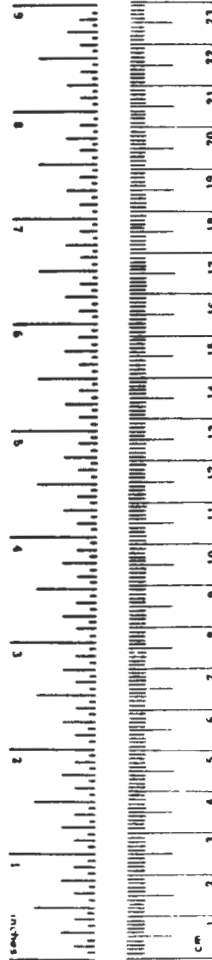
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
VOLUME				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
AREA				
cm ²	square centimeters	0.16	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares (10,000 m ²)	2.5	acres	
MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
VOLUME				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m ³	cubic meters	36	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³
TEMPERATURE (exact)				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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INTRODUCTION

This report contains project summaries of four examples of public transportation services for Elderly and Handicapped persons: The LIFT Project in Portland, OR; Roanoke Agencies Dial-A-Ride (RADAR) in Roanoke VA; the Reduced Taxi Rate Program (RTR) in Danville IL; and the Bi-State Accessible Bus program in St. Louis MO. Each summary contains a description of the setting, the service concept, project evolution, institutional factors, cost and service characteristics and project impacts.

These four projects appear in the UMTA documentary film, Making the Difference, as examples of the variety of approaches available for serving the travel needs of individuals who are unable to use conventional transit services. The summaries in this report are intended to serve as supporting documentation for the film.

Three of the projects - Portland, Danville, and St. Louis - are being evaluated as part of the UMTA Service and Methods Demonstration Program. The information included here was summarized from the interim findings available, or, in the case of Danville, from the final evaluation report. References to detailed project evaluation reports for these cities are included at the end of each summary. The Roanoke project is not being evaluated; consequently there is less data available on operations, costs and impacts than for the other sites. It must be stressed, therefore, that these are project summaries and not evaluations. They are intended to expand on the information conveyed in the film, providing some financial and statistical data as well as a more detailed description of how these projects evolved. It is hoped that this report will be a useful resource for those who, after viewing the film, were sufficiently interested to seek more information on the services depicted.

CHAPTER ONE

THE LIFT: SPECIAL NEEDS TRANSPORTATION IN PORTLAND, OREGON

Overview

All residents of Portland, Oregon who are physically or mentally unable to use the regular fixed route bus system without great difficulty are eligible for door-to-door service on one of a fleet of minibuses equipped with wheelchair lifts. The LIFT is a demand responsive transit service for transportation handicapped persons that is operated by the local public transit authority, Tri-Met.

A key feature of the LIFT program is that it is providing rides to human service agency clients for agency authorized travel in addition to serving eligible members of the general public. Agency clients ride free; the agency is billed on a per trip basis. General passengers (or agency clients using LIFT for non-agency sponsored trips) pay a flat fare of \$0.50 per ride. The combined provision of service is seen as an efficient means of coordinating the demand among residents and human service agency clients spread over a large area. By aggregating this demand, the program is in a position to make more productive use of vehicles and drivers than would be possible in a situation where each agency is operating its own transportation service. Moreover, those individuals who are not affiliated with an agency have a low cost accessible transportation service available for travel anywhere within the city limits.

Service Area Characteristics

Portland is the largest city in Oregon, with a population of 385,000 and an area of about 93 square miles. It is located on the Oregon/Washington border, 65 miles inland from the Pacific Ocean. There are a number of hills in the city and a major river, the Willamette, dissects Portland and can be crossed at any of five bridges leading into the downtown area.

The local mass transit system is operated by the publicly owned Tri County Metropolitan Transportation Authority (Tri-Met), which provides bus transportation throughout the three counties (Clackamas, Multnomah, and Washington) in the Portland Metropolitan area. Tri-Met operates 515 buses on 66 routes. Fares are \$0.40 per trip,

and those who are over 65 or disabled pay only \$0.10 during weekday off-peak periods and ride free on weekends and evenings. In addition, a 288 square block downtown area has been designated "Fareless Square"; passengers boarding and departing buses within this area may ride free of charge at all times.

Project Description

Persons with physical or mental disabilities who have difficulty using, or cannot use the regular fixed route bus service, are eligible to ride on the LIFT buses. (The functional criteria for eligibility is shown in Table 1-1.) A household survey conducted during the planning phase of the project revealed that there are 22,000 people, or about 5.75 percent of the general population in this target group. About two-thirds of this group are over 65 years of age, and almost two-thirds have household incomes under \$5000, compared with a median income of about \$14,000 for the general population.

In order to use the LIFT service, eligible persons must register to obtain a plastic bus pass, which is shown to the driver upon boarding the vehicle. Agency sponsored clients are registered by the contracting agency; other (general) passengers send for a registration application, fill it out and have it verified by either a medical professional (doctor, therapist, or nurse), agency representative, teacher, or case worker. General passengers are issued a blue card and agency clients receive an orange pass. Some agency clients also obtain a blue card to use for any trips which are not sponsored by the agency.

All requests for travel must be made at least 24 hours in advance. General passengers call Tri-Met directly to arrange for service. Agency sponsored clients call their agency, which in turn contacts Tri-Met dispatchers on a regular basis, requesting a number of trips for individual and group purposes. Rides are manually scheduled by a staff of dispatchers at the LIFT Control Center, with the aid of a communications console and a wall map with magnetic tour and vehicle status markers. Trip requests, regular tour schedules, and registration files are also maintained in the control center.

The vehicle fleet consists of 15 Mercedes-Benz diesel buses equipped with wheelchair lifts, tie downs and a retractable lower step. Twelve of the minibuses accommodate eight passengers and two wheelchairs; three vehicles

TABLE 1-1. ELIGIBILITY CRITERIA FOR LIFT PASSENGERS

Registration will be limited to those mobility disadvantage persons of all ages who are physically or mentally unable to access the regular transit system and cannot use an automobile, and who meet both of the following criteria. (Those persons who need a wheelchair, walker, or crutches in order to travel are automatically eligible.)

- A. Are transportation disadvantaged in one or more of the following categories:
 - a. Unable¹ to get on or off a regular public transit bus;
 - b. Unable to walk from home to the nearest bus stop;
 - c. Unable to wait standing for more than 10 minutes;
 - d. Unable to move in crowds;²
 - e. Unable to read information signs;³
 - f. Unable to grasp coins, tickets or handles;
 - g. Unable to understand and follow transit directions;
 - h. Unable to utilize a regular public transit but in the performance of life-sustaining activities; and
- B. Are unable to drive a car or do not have access to a vehicle for transportation.

¹The word "unable" means that performing the function is absolutely impossible or causes severe and continuing pain. It does not mean discomfort or occasional pain.

²Difficulty keeping balance in a regular transit bus is not considered a transit disadvantage since federal regulations require seats for the handicapped near the entrance of all buses.

³This does not include foreign language problems.



TRIP requests and vehicle dispatching are handled in the LIFT control room with the aid of a map of Portland and markers denoting bus locations and tours.



The Portland Citizen's Advisory Group meets once a month to discuss operations and policy.

accommodate six passengers and four wheelchairs. All of the buses are equipped with two-way radios.

Where possible, passengers are assigned to buses in such a way as to form a tour, which may include a number of origins and destinations. Those trips which cannot be conveniently assigned to one of the Tri-Met minibuses, such as an immediate request from an individual returning home from a medical clinic, or an origin in a remote part of the city, are dispatched to local taxi operators who bill Tri-Met for the cost of the trip. Two taxi companies and a private wheelchair transportation firm are under contract with Tri-Met to provide this supplemental service. However, the Tri-Met/union agreement prevents allocating more than about 20 percent of the operating budget for privately provided transportation, and thus constrains the number of trips that can be served by taxis.

LIFT began operating in December 1976, and is currently providing approximately 8000 trips per month. Registration has grown to over 5000 persons, or approximately one fourth of the estimated eligible population. Nineteen human service agencies have contracted with Tri-Met for client transportation and contracts with other agencies are actively being sought.

Historical Background

In July 1973, Tri-Met adopted a resolution to "undertake planning efforts to consider provision of special transportation services for the disadvantaged elderly and handicapped residents of the tri-county area." Providing service to the handicapped and elderly population of Portland had been a concern of the city for some time. In 1972, the City Council approved funds to study the problems of the mobility disadvantaged. Based on the results of the study, the City Council appropriated \$20,000, which was combined with a grant from the State of Oregon early in 1974; this grant became the basis for a Special Transportation Unit within the city of Portland's Human Resources Bureau (HRB). The unit began to study the problem of coordinating the efforts of 40 agencies that had been identified as providing transportation to handicapped and elderly persons. Initially only nine agencies were involved in the consortium; this number eventually increased to 15 agencies.

In October 1974, the Human Resources Bureau, in keeping with its policy to operate as few programs as possible, made the decision to contract out services then being provided by

the city's Special Transportation Unit. The contract was awarded to Special Mobility Services (SMS), a private non-profit transportation project. SMS was not able to provide all the necessary transportation and another non-profit provider, Metro Mobility (MM) came into being.

It was within this context of fragmented transportation services to the elderly and handicapped that Tri-Met, with the cooperation of Portland's Bureau of Human Resources, stated their intention in a proposal to UMTA to "demonstrate the viability of transit company operated, demand-responsive special transportation...combining the resources and transit expertise of Tri-Met with the resources and social service expertise of the Bureau of Human Resources of the city of Portland."* After a public hearing in February 1975, at which representatives of state and local governments, human service agencies, and elderly and handicapped groups pledged support for the proposed service, a proposal was submitted to UMTA in March 1975. A 3 year grant for a total of \$917,000 was awarded in July by the Office of Service and Methods Demonstrations. Within the SMD Program, the Portland project is viewed as an exemplary application of publicly provided demand responsive transportation for the transportation handicapped in a medium sized city. From the federal perspective, the major purposes of the project were to:

1. Test a public transit operator's ability to provide special transportation for those who have difficulty using the fixed route bus system, and to act as coordinating agent in contracting with human service agencies and deliver transportation to their clients
3. Test the cost effectiveness and value of an automated fare collection system which permits third party billing of agencies for authorized client travel. (This element was eventually discontinued.)
4. Determine the impact of this service on the target group

The service model, with the key features noted above, was unique enough to be viewed as the first major attempt at serving agencies and eligible members of the general population in this fashion in a city the size of Portland.

*From Demonstration Grant Proposal, March 1975.

Project Implementation

During the first year of the project, from the fall of 1975 to December 1976, intensive planning was conducted. A work program was established, vehicle specifications were developed and the design of automatic fare collection devices to read and record trip data was completed, leading to bids for vehicles, fare collection equipment and a billing/management information system. Eligibility criteria, registration procedures, and content of agency contracts were established. Tri-Met contracted with a consultant to develop a dispatching procedure and train the drivers and dispatchers.

The service policies relating to scheduling and coverage were based on market research. In February and April of 1976, a comprehensive "before" household survey* was conducted to measure the incidence rate of transportation handicapped people, their pre-demonstration transportation behavior, and their perceptions and problems relative to traveling within Portland. Results from this survey were used in the design of the demonstration system and the development of a functional definition of transportation handicapped (TH) persons.

A Citizen's Advisory Committee was formed to assist Tri-Met in the planning and policy decisions. Five of the eleven member committee are handicapped and/or senior citizens. The other members represent organizations that work with the target population. The Committee first met on August 12, 1976 and continues to meet monthly.

A fare structure was developed, such that the trip cost would be shared by Tri-Met and the sponsoring agency or Tri-Met and the passenger. Sponsoring agencies contracted to pay the estimated cost of \$3 for each trip taken by a client. This cost was calculated from estimates of the total operating cost, vehicle utilization, and demand that were made during the planning phase. Agencies would be billed monthly for all client trips, and general passengers pay the \$0.50 fare when they board the bus. The \$0.50 trips were to be subsidized from project funds.

*Results of this survey are contained in "Incidence Rates and Travel Characteristics of the Transportation Handicapped in Portland, Oregon," April 1977, Report No. UMTA-OR-06-0004-77-1, prepared by Crain and Associates for the Transportation Systems Center.

Publicity regarding LIFT services had, at this point, been primarily channeled to potential contracting public agencies or non-profit organizations, not to the general public. This was in keeping with Tri-Met's policy of developing LIFT ridership in a controlled, gradual manner to insure that promised service was delivered reliably and professionally.

As a result of the agency-directed publicity, the first contract was signed in September between Tri-Met and the city of Portland Human Resources Bureau to provide service for eight Area Agency on Aging (AAA) contracting agencies throughout the city.* Tri-Met's Special Needs Coordinator conducted a training session for personnel of these eight agencies on how to register their clients for LIFT service.

The first edition of a Special Needs Newsletter -- prepared to inform any interested parties of the current status of the project -- was distributed in September to over 120 public and government officials, local organizations and individuals concerned with the handicapped and elderly, the media and any private citizen who requested it.

By September 1976, the control room equipment had been specified and purchased, and a computer software contractor was selected to design the system for processing of billing and management information. In November 1976, Tri-Met invited competitive bids from taxi companies and companies providing wheelchair transportation to provide supplemental transportation for any trips which would be non-productive or uneconomical for the LIFT buses to serve. The taxi contract was awarded to Portland's two largest companies, who had submitted their bid as a joint venture. The contract for supplemental wheelchair transportation was awarded to the only company to submit a bid.

The first five of fifteen wheelchair accessible buses arrived in October and the dispatch room was readied for operation. An additional nine buses arrived in November and the Citizens Advisory Committee was invited for a pre-demonstration ride on one of the buses and a tour of the dispatching facilities. The training of 18 drivers and five controllers was conducted during the second and third weeks

*The eight AAA centers within the city of Portland provide information, referral and counseling services to persons over 60, for the purpose of promoting client independence. Centers with group facilities sponsor such activities as dances, dinners, card games, craft programs and tours.

of December, and LIFT operation began Monday, December 20th, 1976. At this time, 1315 agency clients were registered for LIFT service.

Elderly clients of AAA agencies were the first to obtain LIFT transportation. During January, contracts were signed with four other agencies: Volunteers of America, Department of Vocational Rehabilitation, Goodwill Industries and the Crippled Childrens Division of the University of Oregon Health Science Center. Four additional agency contracts were subsequently signed with the Muscular Dystrophy Association, the State of Oregon Welfare Division Child Neurology Clinic and Westside Schools (for mentally retarded adults), bringing the number of agencies that had contracted for LIFT service as of May 1977 to nine.

The marketing of LIFT services to general passengers, those eligible individuals that are not human service agency clients, began in March. Interested parties could write or call Tri-Met or come by in person to pick up a registration packet which contained a description of the lift, eligibility criteria, and an application form. By the end of April, 4000 registration packets had been mailed; however, only 450 general passengers had been registered as eligible for service. This initial low return rate may have been caused, in part, by the requirement for verification of disability. Potential passengers reported that they did not have difficulty filling out the forms.

General passengers were integrated into the system in May, and during that month the LIFT provided 731 trips for general passengers, 16 percent of the total trips provided in May. To stimulate additional registration of general passengers, a special promotional campaign was initiated by the Special Transportation Coordinator. The campaign consisted of a direct mailing of 15-20,000 brochures and 1500 posters to local agencies and social organizations whose clients might be eligible for LIFT services. Registration began growing steadily, and by February 1978, demand for trips by general passengers reached and surpassed the number of trips sponsored by agencies.

Organizational Structure

The LIFT project is a self-contained adjunct to Tri-Met fixed route operations. Its operating staff spends full time on LIFT activities. Marketing activities and data processing are performed by the respective Tri-Met functional departments. Agency coordination, registration,

and scheduling activities are the responsibility of the LIFT personnel.

The Special Transportation Coordinator is the chief planner of the LIFT project. He has been responsible for negotiating agency contracts, working with agency personnel on client/service related problems, meeting with the citizen's advisory group, and acting as the grantee representative of the demonstration project.

The operating staff consists of a controller/supervisor, three controllers, eleven drivers, and an administrative/clerical person, all of whom are members of the local transit union. Originally there were five controllers and a superintendent of operations; however, in the second year of service, the operating staff was cut to reduce costs and the superintendent position was abolished, with the duties transferred to a working supervisory position. In addition, the number of controllers was reduced from five to four and the number of drivers from 12 to 11. LIFT drivers are selected from the Tri-Met driver pool and specially trained to serve transportation handicapped persons. The supervisor, controllers and drivers report to the Director of Operations and the Special Transportation Coordinator is a member of the Planning and Development Department.

Coverage and Level of Service

Service is provided on weekdays between the hours of 6:30am and 6:30pm. Driver schedules are staggered so that the number of buses in service varies from a low of one bus between 6:30-7:00pm to 11 buses during the 2:00-3:00pm period. On the average, there are eight vehicles in service at any one time. Therefore, the average distribution of buses over the area is about one vehicle per 12 square miles. To supplement this rather limited coverage, taxis are used to 1) help meet peak load situations when the LIFT is behind schedule and 2) to serve those trips where the origin or destination was out of the way and/or could not be easily grouped with other trips. Taxis are used for slightly over 20 percent of the total trips.

Requests for service are made at least 24 hours in advance. However, if the return time is unknown, passengers will call the control room when they are ready to return home. Taxis are frequently used to provide these trips. Reliability of delivery times has been better than pickups. The mean delivery time is about 8 minutes early. This suggests that controllers are scheduling pickups well in

advance of the clients requested arrival time to avoid making them late for a job or an appointment.

On the average, the LIFT pickups have been 12 minutes later than the requested time. This wait time varies with demand over the day from a low of 6 minutes in late afternoon to a high of 20 minutes between 9:00 and 10:00am, when fewer vehicles are employed.

Average travel time has been about 22 minutes; however, the range in trips lengths, and hence travel times, vary widely around this mean. Trip lengths average about 4-5 miles, indicating the effective speed of LIFT buses is about 12 mph.

Project Registration and Ridership

About 5000 persons have registered to use the LIFT. According to the pre-demonstration survey, this is only about 25 percent of the transportation handicapped population. However, as will be discussed later, many persons identified as transportation handicapped are able to provide for their own transportation and thus do not require LIFT service.

Of those registered, 73 percent are agency clients and 27 percent are general passengers. Table 1-2 shows client agency affiliation. Area Agency on Aging Clients (AAA) comprise the largest segment of registrants (44 percent) followed by Public Welfare (25 percent). All other agency clients combined account for only about 3 percent of the total registrants. A breakdown of registered persons by age, sex, health problem, mobility aids used, and physical difficulties preventing use of fixed route transit is contained in Tables 1-3 to 1-6. Three out of four registrants are over 65 years of age and females outnumber males by more than two to one. These characteristics of the registered population reflect the profile of the general population of transportation handicapped as determined by the pre-project survey. In the case of mobility aids, however, the registered group has a higher incidence of wheelchair users than the general transportation handicapped (TH) population.

When a sample of TH persons who had not registered were asked about their reasons for not registering, lack of awareness of LIFT and difficulty understanding eligibility criteria or sign up procedures were reasons given by almost 30 percent of the respondents. However, it is not yet known

TABLE 1-2. AGENCY CLIENTS REGISTERED WITH THE LIFT

CONTRACTING AGENCY OR ORGANIZATION*	# CLIENTS REGISTERED	% OF TOTAL REGISTRATION
Area Agency on Aging	1897	44.3
Metropolitan Family Services	58	1.4
State of Oregon Vocational Rehabilitation Division	26	0.6
University of Oregon Health Sciences Center	21	0.5
Volunteers of America, Inc.	4	0.1
Good Samaritan Child Neurology Clinic	2	-0-
State of Oregon Public Welfare Division	1096	25.4
Muscular Dystrophy Association	22	0.5
General Passengers	1151	26.9
	4277	99.8

* As of mid-October, 1977. Note that some agencies and organizations under contract for LIFT service have no clients registered with the LIFT.

TABLE 1-3. REGISTERED CLIENTS BY AGE AND SEX

AGE GROUP	<u>AGENCY-SPONSORED</u> n=3134	<u>GENERAL</u> n=1143	<u>ALL CLIENTS</u> n=4277	<u>PRE-DEMO SURVEY (4/76)</u> n=522
Under 10	0.2	2.5	0.9	*
10-15	0.2	0.9	0.4	0.8
16-20	0.4	1.0	0.6	1.2
21-59	12.0	18.0	13.6	20.3
60-64	8.4	6.0	7.5	8.7
65 and over	78.9	71.7	77.0	68.9
Mean Age	72.5	68.5	71.4	
<u>Sex</u>				
Males	29.8	28.2	29.4	31.7
Females	70.2	71.8	70.6	68.3

* Children under 10 were not interviewed in the pre-demonstration survey.

TABLE 1-4. HEALTH PROBLEMS (%)*

HEALTH PROBLEM	AGENCY-SPONSORED	GENERAL	ALL CLIENTS
Orthopedic Problem	20.1%	26.3%	20.8%
Visual Impairment	20.2	19.7	19.9
Heart Ailment	17.2	17.9	17.6
Arthritis	12.6	17.9	15.6
Emotional and Mental Problems	14.3	5.5	9.4
Hearing Problems	7.0	7.9	7.4
Stroke	6.6	6.9	6.7
Respiratory Problems	7.0	5.3	6.1
Spinal Cord Injury	4.7	5.3	5.0
Diabetic	4.7	4.8	4.9
Speech Impairment	3.6	2.8	3.2
Cancer	3.2	3.3	3.2

*All other health problems had incidence rates below 2.0%. Columns total more than 100% because some clients listed more than one health problem.

TABLE 1-5. MOBILITY AID USED (%)*

TYPE OF MOBILITY AID	AGENCY-SPONSORED	GENERAL	ALL CLIENTS
No aid used	63.2%	54.3%	60.8%
Accompanied by escort	14.5	18.1	15.4
Walker or crutches	7.8	7.4	7.7
Wheelchair	8.4	8.4	8.4
Wheelchair & escort	6.1	11.7	7.6

TABLE 1-6. REASONS WHY REGISTRANTS CANNOT USE REGULAR TRANSIT

REASON	% OF TOTAL PASSENGERS	% OF AGENCY PASSENGERS	% OF GENERAL PASSENGERS	PRE-DEMO SURVEY*
1. Unable to get on and off bus	61	60	62	34
2. Unable to walk to bus stop	60	56	65	42
3. Unable to wait standing for 10 minutes	46	46	47	40
4. Unable to use bus for life-sustaining activities	27	34	18	NA
5. Unable to move in crowds	18	20	15	35
6. Unable to read information signs	14	12	17	13
7. Unable to understand or follow transit directions	11	12	8	13
8. Unable to grasp coins, tickets, handles	5	5	5	9

*Of the persons classified as transportation handicapped in this survey, figures in this column indicate the percentage of persons who stated they had "great difficulty" with or were unable to perform this function.

what segment of this group would become users in the future. Most of the remainder of those who did not register already have adequate transportation: 82 percent of the trips they reported taking were either in their own car, as a passenger in another, or by bus.

Those who take more than three project trips per month report that they rely on the LIFT for over half of their trips. The low reliance on other modes by this group can be attributed to a number of factors:

- 1) Many of the trips are either of a regular nature such as work and school or are agency provided.
- 2) LIFT users have fewer people (friends, relatives) to call on for rides.
- 3) Disabilities of LIFT users limit their alternatives.
- 4) LIFT users are more independent and do not like to rely on others.

In addition, the survey information revealed that persons registered for the LIFT have lower incomes, are less likely to own a car, to have a car available or possess a drivers license.

Figure 1-1 shows the growth in monthly ridership over the first 20 months of operation. Ridership increased fairly steadily during the first ten months and began to level off after that. When the advance reservation requirement was reduced from 48 to 24 hours, ridership began to climb again and is currently about 350 trips per day. About 20 percent of these trips are provided by taxis. As was mentioned earlier, there is a ceiling on the number of taxi trips that can be delivered each month; according to the Tri-Met/union agreement, a maximum of \$100,000 per year can be used for taxi trips, which corresponds to about 1700 trips per month or about 80 per day.

Slightly over half of the approximately 350 trips per day are made by general passengers. Some of these riders may also hold an agency card, but are making a trip which is not sponsored by the agency.

The distribution of trips in terms of mobility aids used parallels the percentages in the registered population of people requiring each type of mobility aid. For instance, 61 percent of registered persons do not require any aid (crutches, wheelchair, etc.) and 65 percent of trips in a

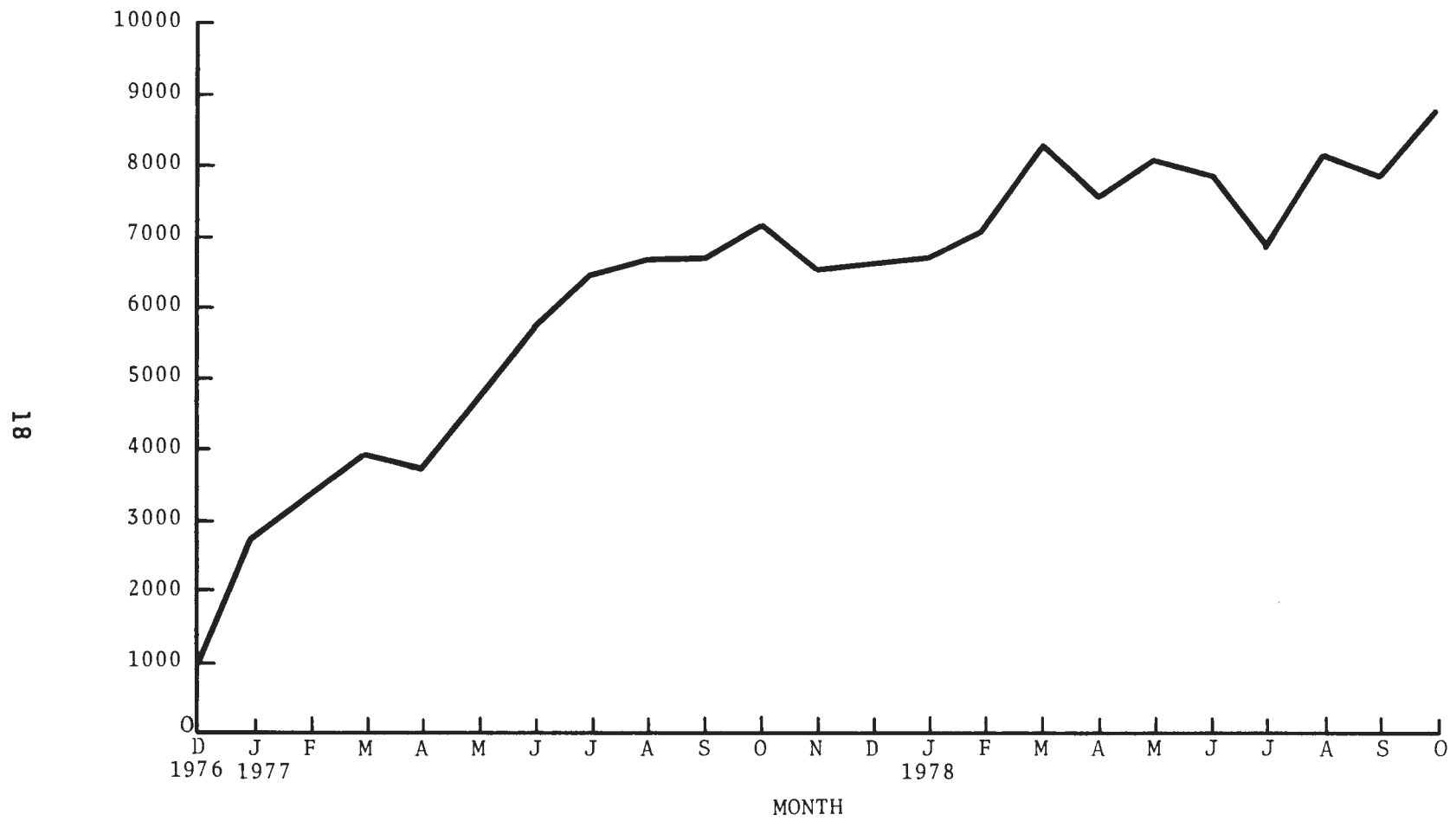


FIGURE 1-1. LIFT RIDERSHIP (MONTHLY)

selected month were made by this group. Similarly, persons in wheelchairs who made 17 percent of all trips comprise 16 percent of the registered population.

The distribution of trip purposes of LIFT clients is shown in Table 1-7, which also distinguishes between agency sponsored and general passenger trip purposes. The breakdown of trips by purpose has been shifting over the duration of the project, both as a result of the changing ratio of agency sponsored to general passengers served and as registrants adapt to and rely upon the LIFT for a broader range of their travel needs.

Characteristics of Users and Non-Users

About 25 percent of the total registrants use the LIFT during a given month. These users make an average of approximately three one-way trips per month and over 90 percent of them take less than 15 trips per month. Frequent users tend to be more handicapped, younger and have higher incomes than the other registrants. This is probably due to the fact that 35 percent of this group are students or are employed.

Considering the fact that about 42 percent of all registrants have made fewer than three trips over a three month period, it appears that many persons registered in order to have a back-up option for times when their usual modes of transportation are unavailable. This raises questions regarding the availability of alternative modes, other reasons for not using LIFT (or not needing it), and the characteristics which distinguish LIFT riders from non-users. When non-users (registered non-users and eligible persons in the community who didn't register) were asked to give the primary reason for not riding LIFT, many different reasons were given. The most frequent were: ride with others (17 percent), don't travel much (15 percent), drive self (11 percent), and use regular bus (10 percent). Six percent found the scheduling too difficult, and another 6 percent were too handicapped to use it. These responses seem to indicate that non-use had nothing to do with cost or convenience of the ride, but rather stemmed from their ability to travel as much as they needed by other means. Another important finding is the fact that about 35 percent of the registered non-users and infrequent users travel rarely or are too handicapped to use the service.

Penetration of the population who use wheelchairs is much higher than the overall TH population. About 83 percent of this group are registered and 70 percent of these ride at least 3 times over a 3 month period compared with 58

TABLE 1-7. TRIP PURPOSES

Trip Purpose	All Passengers*	% Agency Passengers*	% General Passengers*
Medical/Dental	40	40	40
School**	18	10	23
Social/Recreational	15	18	14
Shopping	11	23	4
Personal Business	10	7	11
Work	5	1	8
Other	1	2	1

*Columns may not total 100% due to rounding.
 **Includes Adult Day Car Center

TABLE 1-8.

PREDICTED TRAVEL BEHAVIOR
 IF LIFT WERE NOT AVAILABLE
 BY TRIP PURPOSE

Trip Purpose	% Who Would Make Trip	
	First Year	Second Year
Medical/Dental	71	68
Work	63	72
Personal Business	53	67
Shopping	53	57
School*	50	48
Social/Recreational	30	38

*Includes Adult Day Care Center.

percent of the total registered group. Apparently these people need the LIFT service more than those who have less difficulty getting in and out of a car.

These data reveal that the target market for a special transportation service such as the LIFT is a fraction of the total eligible, transportation handicapped population, and that there are a variety of characteristics--demographic and disability oriented--to be considered in predicting the extent of participation in such a project. In Portland, an estimated 22,000 persons are transportation handicapped. If the 54 percent who, according to the pre-demonstration survey, always or usually have an auto available, are subtracted from the total, about 10,000 people are left. Therefore, the 5000 registered persons represent a market penetration of about 50 percent of those who don't have immediate access to an auto. The actual target market appears to consist of those who do not have other convenient transportation and this group is further reduced by those who don't travel often enough (because of their age or disabilities) to register for LIFT service.

Project Funding and Costs

The LIFT project in Portland is funded under a U.S. Department of Transportation, Urban Mass Transportation Administration (UMTA) Service and Methods Demonstration Grant. Funding for the demonstration period, from award of the grant in July 1975 until December 1978 is as follows:

Federal Share	\$916,768
Tri-Met Share	510,000
City of Portland	
State of Oregon	349,848
Agency Contracts	
TOTAL	1,776,616

These funds are used for planning, operation, data collection, finance, and depreciation costs. Total monthly operating costs vary depending primarily upon the number of service days, ridership, and allocation of pay periods. The average is about \$50,000.

A breakdown of operating expenses reveals that 76 percent are labor and overhead costs, 17 percent is used for depreciation and finance charges, and 8 percent for maintenance, insurance and fuel. Operating cost per vehicle hour of service ranges between \$23-26. This figure varies

with the number of vehicles and drivers in service and is independent of demand. The operating cost per trip by a LIFT vehicle is about \$7.30. Project trips served by taxis cost an average of about \$5.60 per trip, which is based on the meter fare. Taxi trips tend to be slightly longer, averaging about 5 miles per trip compared with about 4 miles for LIFT vehicles. Consequently, the cost per vehicle mile to operate LIFT buses is about one and seven-tenths times the cost per mile for taxi service.

Since vehicle utilization (expressed as passengers per vehicle per hour) is a crucial determinant of the economic efficiency of the service, whenever a 16 passenger minibus is being used to carry one passenger, the cost per trip will be substantially higher than if a taxi were used. Regular group trips, to and from a shopping center or nutrition program represent more efficient use of the minibuses.

Vehicle utilization has varied between three to four passengers per vehicle hour. This is considered low for demand-responsive service; however, it is limited by a number of factors:

- 1) The size of the service area (93 sq. miles) results in a coverage of only one bus per 12 square miles, making it difficult to arrange tours and group passengers because of the widespread distribution of origins and destinations and the low density of the target population. Also, the size of the service area results in longer trip lengths.
- 2) Only a small number of regular group trips (many-to-one) such as subscription shopping trips and group trips to agency programs are being served.
- 3) Boarding times are longer due to the special assistance required by disabled passengers.

Of the contributing factors mentioned above, only the extent of group trips is likely to change in such a way as to bring about increases in productivity which, in turn, decrease the cost per trip. Steps have been taken to encourage more group travel and use taxis more for those trips which result in underutilization of the minibuses.

Revenues from LIFT operations steadily increased with ridership during the first year, but have decreased somewhat in recent months due to the growing ratio of general passenger trips (\$0.50 fare) to agency sponsored trips (\$3 fare). Currently monthly revenue is about \$11,000,

resulting in a revenue to operating cost ratio of about 22 percent for a monthly operating cost of \$50,000. For comparison, the Tri-Met fixed route bus system has an operating ratio (revenue to cost) of about 30 percent.

Project Impacts

In discussing the impact of the LIFT project, the following groups and organizations are considered:

- 1) Registered clients
- 2) Human service agencies
- 3) Tri-Met
- 4) Local private providers

Each of these groups has been affected by the project, and the impacts have been assessed in terms of measurable effects, perceptions, and attitudes.

The impact of the project upon the eligible persons who became LIFT users has been identified from user surveys and analysis of trip records. Most of these people appear to use the LIFT infrequently, i.e., for one or two round-trips per month. About 35 percent use it more frequently, and for these regular passengers, who use the LIFT for over half of their trips, it is a convenient means of getting to medical, shopping, social, and work destinations.

Attitudes toward the LIFT service have generally been quite favorable. The only aspect which was considered unsatisfactory by more than one-third of the user population during the first year was the noise level on the buses. Timeliness of the service--waiting to be picked up--was considered unsatisfactory by 25-30 percent of the riders surveyed. About the same percentage were unhappy with the comfort of the ride--apparently a reflection of the stiff suspension and seat cushions on the buses. Overall, riders have been very pleased with most aspects of the service, especially the courtesy and helpfulness of the drivers.

Of those who have ridden both LIFT buses and taxis dispatched in lieu of a LIFT bus, 43 percent preferred taxis for reasons of reliability, shorter travel time, and better ride comfort. Thirty-four percent of this group had no preference and the remaining segment preferred LIFT buses because of the driver courtesy, assistance and the ease of boarding in a wheelchair.

An important indication of the need for the service is the percentage of riders who reported that they would not



Handicapped passengers are assisted by LIFT bus drivers.



The Wheelchair Lift is located at the rear of the minibus.

have been able to make the trip if the LIFT was not available. Forty-six percent of wheelchair passengers surveyed on LIFT vehicles reported that they would have foregone trips, because of the expense and difficulty of using other modes. Of the overall sample of riders, the portion who would have still made the trip by another mode depended on the trip purpose, or importance of the trip, as shown in Table 1-8. For example, 68 percent of those traveling to a medical/dental appointment would still have made the trip, most likely by taxi, bus, or other agency-provided vehicle.

Perceived benefits of the LIFT service included cost savings, lessened reliance on friends and relatives, and increased access to goods and services. These benefits can be translated into improved quality of life, as evidenced by clients reporting that they are more independent, have more money for other necessities because of the cost savings (compared with the cost of using taxis before the LIFT project), are able to eat better, take better care of themselves, become more involved in the community, and are "not as lonesome any more".

The impact of the LIFT upon human service agencies in Portland is reflected in the extent of their participation and the results of interviews with agency representatives regarding benefits, advantages and disadvantages of the LIFT compared with their previous transportation arrangements.

During the first year, 19 agencies and organizations contracted with TRI-Met for LIFT service. However, only two organizations--Area Agency on Aging (AAA), which has eight participating agencies, and the Public Welfare Division have used LIFT service to an appreciable extent. Many human service agencies have not yet contracted with Tri-Met. Reasons for not contracting with Tri-Met include availability of agency vehicles and drivers, the advance scheduling requirement, uncertainties as to actual pick up or delivery time, and the fact that LIFT policy does not permit clients to call Tri-Met directly to request service (they call the agency, and the agency contacts the Tri-Met dispatcher).

Prior to the LIFT demonstration, the majority of AAA trips were contracted to private non-profit providers at a slightly higher cost than the \$3 charged by Tri-Met. The number of trips provided by agency vehicles is about half what it was, and about 70 percent of AAA trips are being served by the LIFT, with the remainder provided by volunteers, agency vehicles, and some by one of the two non-profit providers. Other agencies, such as Public Welfare,

appear to be using their own vehicles to the same extent as they did before. However, their usage of taxi service to transport clients has been largely supplanted by the LIFT.

While agency representatives interviewed generally expressed appreciation and support for the LIFT service, most of them indicated that the LIFT had not fundamentally altered their clients usage of the core services. However, a few agencies reported that client participation in their programs has increased, and three agencies stated that the LIFT was transporting clients who otherwise would have been unable to take advantage of their core services.

Overall, agency attitudes toward the cooperation of LIFT Personnel and the procedures for registering and scheduling have been favorable. Complaints tend to relate to lateness of pickups, especially for return trips, difficulties in scheduling trips made during peak demand periods, and confusion over whether or not LIFT drivers are to escort clients to their door. The level of dissatisfaction has increased as ridership has grown, making it more difficult to accommodate desired departures and returns. More advance coordination between the agencies and Tri-Met controllers might increase the extent of group travel and thereby improve the overall level of service. Regular communication between agencies and Tri-Met is necessary, since caseworkers must call the LIFT to schedule client trips. This form of coordination imposed a new burden on caseworkers, who had previously authorized clients to call directly for taxi service.

Regarding the impact of the LIFT on Tri-Met, areas which have been investigated include driver experiences and attitudes and the impacts on Tri-Met accounting and administration operations.

LIFT drivers were selected from among many who volunteered, based upon their previous performance; e.g., safety record, absenteeism, passenger complaints, etc. While they were motivated to work in a situation requiring special assistance on a much more personal level, they were totally unaccustomed to dealing with handicapped people on a full time basis, and some had difficulty maintaining their morale in the presence of so many riders who are severely disabled. On the other hand, these same drivers also expressed satisfaction with other aspects of their job, including their passengers' appreciation of the assistance provided and a less pressured work situation compared with operating large fixed route buses.

Driver concerns relate to equipment problems and confusion regarding communications between Tri-Met and sponsoring agencies. Agencies often fail to notify Tri-Met of ride cancellations, causing drivers to waste time on unnecessary trips. The wheelchair lift and air conditioning system often fail to operate correctly, and they sometimes have to perform maintenance on the bus they regularly drive.

A more complex problem affecting drivers is the confusion about the curb-to-curb service, which is often at odds with client needs and actual driver behavior. Official Tri-Met policy calls for curb-to-curb assistance only, because of insurance restrictions. However, drivers often escort passengers into their home, sometimes carrying packages, even though they are not required to do so. This assistance can have an unexpected impact on the schedule, creating delays which may result in the driver being rebuked for lateness by other passengers.

Impacts of the LIFT on Tri-Met administration and accounting have been related to initial difficulties in establishing procedures for integrating the operating data into the Tri-Met data processing system. Initial problems and conflicts were resolved and some might have been avoided by more coordination during the planning phase of the LIFT operation.

Automated fare collection equipment was intended to be a major innovation in the Portland demonstration. Automatic fare identification recorders (AFIRS) were designed and installed on the buses to record passenger identification (from the plastic I.D. card, which is inserted upon boarding and departing the vehicle), travel time, trip length, date and other information used by Tri-Met for billing and analysis of client trip making. However, this equipment never achieved sufficient reliability; frequent malfunctions prevented their use in routine fare collection. Instead, the dispatchers and drivers have been manually recording the necessary trip information.

Two taxi companies and one wheelchair van company are under contract to provide back-up service to LIFT clients. All were selected by a competitive bidding process (only one wheelchair van company submitted a bid, however). The taxi operators have stated that, while they have experienced some problems complying with the bookkeeping and billing procedures, the new business has exceeded whatever demand was lost due to client shifts from taxis to the LIFT. The company providing wheelchair van service has suffered a decrease in demand because they have not been needed except occasionally, amounting to only a few trips per month.

Prior to the LIFT project, two private non-profit providers were satisfying some of the demand for agency client transportation. As a result of the LIFT operation, most of the trips currently being delivered by these providers are outside of the city limits. These surrounding areas generate a significant amount of agency-sponsored travel that cannot be served by the LIFT because it is restricted to operating within the city limits.

Summary

The public transit authority in Portland has been operating an advance reservation/demand responsive service that provides transportation for all transportation handicapped persons in the city. Contractual agreements have been reached with many human service agencies in the city which enable them to request trips for their clients instead of providing the transportation themselves or reimbursing the client for a taxi trip. The LIFT system has been operating for about 2 years, delivering 300-400 trips per day to registered citizens and agency clients.

Only about 20-25 percent of all registered persons, or less than 6 percent of the total eligible population, use the LIFT at least once during a given month. The remaining registrants are infrequent users who rely on the LIFT service only when their usual modes of transportation are unavailable.

While the LIFT service is operating satisfactorily at the current demand levels, some important concerns do exist which impact the viability of the concept:

1. At an operating cost of \$1.90 per vehicle-mile, the minibuses are not cost effective compared with taxis (\$1.10/mi.) or vehicles operated by private non-profit providers (\$0.85/mi). A major reason for the higher cost of LIFT trips is the higher labor rates paid by the public transit system.
2. As a result of fewer group trips (subscriptions and special charters) and the size of the service area, vehicle utilization has been lower than expected (three instead of five to six pax/vehicle hour). This has had a detrimental impact on the cost per trip and the system capacity.
3. Late pickups resulting from buses falling behind schedule at periods of high demand have caused dissatisfaction on the part of both agencies and

clients. If more group tours could be arranged and if more escort assistance were provided by agencies for clients who need help getting to and from the vehicle, reliability would be less of a problem.

4. Many agencies that provide client transportation have elected not to contract with Tri-Met--the reasons for not participating include availability of lower cost transportation, scheduling constraints, and service reliability.

In order to improve the efficiency of the operation, efforts are being made to coordinate more with agencies and jointly schedule the trips into more productive tours. Negotiations with the union to permit allocating a larger share of trips to taxis have led to increases in the number of persons carried by taxis. If minibuses are used primarily for group travel and taxis for individual trips, the system would be much more cost-effective.

Before the LIFT began operating, special transportation was only available to agency clients for agency sponsored travel. Now that a public system is available to the entire transportation handicapped population, many more people are benefitting from accessibility to medical attention, employment, shopping, and other activities. This has had a profound impact on the health, independence, and quality of life for that segment of the handicapped population who previously had to rely on others to transport them or pay the full cost of taxi service.

From a national perspective, the Portland approach is an example of the centralized provision of high quality public transportation for agency sponsored trips and general travel requirements of transportation handicapped persons. Because of the extensive data collection and evaluation efforts underway, the LIFT experience is providing valuable information on the size and characteristics of that segment of the TH population that rely on low cost public transportation to attain a level of mobility essential to meeting their day-to-day travel needs. In Portland, the LIFT has raised the level of public awareness concerning transportation problems of the transportation handicapped, and by centralizing the special needs transportation function, Tri-Met has demonstrated a public commitment to this problem.

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CHAPTER TWO

ROANOKE AREA CONSOLIDATED AGENCY TRANSPORTATION

Overview

Transportation is a critical element in the successful delivery of human services in the areas of health, employment training, nutrition, education, and vocational rehabilitation. In recognition of this fact, many Federal and state social service programs operate a small fleet of vehicles to enable their clients, who are mostly elderly, handicapped, or poor, to avail themselves of the services provided. The high cost of providing transportation and the inherent duplication and inefficiency of separate operations has led to a recent effort to consolidate or coordinate mobility programs.

The Roanoke Agencies Dial-a-Ride (RADAR) is an example of a consolidated human services transportation system. RADAR was planned in 1974 through the cooperative efforts of local interested human services agencies who agreed to pool their transportation resources and establish a separate non-profit organization to manage the formerly independent transportation services as one system. Both coordination and consolidation imply a cooperative sharing of resources for the mutual benefit of the participants. The major difference between the two concepts, as applied in this context, is the degree of autonomy retained by the individual agencies under the new arrangement. Coordination suggests the smooth interaction of separate transportation fleets which function as one system while preserving each unit's identity. Consolidation implies a fully integrated system in which the identity of individual resources is no longer possible.

Service Description

RADAR was organized for the purpose of providing a more efficient and effective transportation service for the elderly, handicapped, poor, and other individuals in the service area who require the provision of specialized transportation. The original organizers successfully overcame the frequently quoted barriers to coordination/consolidation and worked to establish RADAR as a prototype that could be duplicated in other areas of Virginia. It was one of the earliest systems of this type to be implemented in the country. RADAR began operations in

1975 and currently operates 21 vehicles in a service area which includes four counties in southwest Virginia. Ridership for the fiscal year 1978 was approximately 103,000.

At the present time, to be eligible to utilize RADAR, one must be affiliated with a participating human service agency. Most of the service is regularly scheduled, flexible fixed-route many-to-one and one-to-many tours conducted to transport clients between their homes and agency activities. A limited amount of many-to-many dial-a-ride service is provided for medical appointments, volunteer service work, and other trip purposes.

About 95 percent of the total RADAR passenger trips are provided for clients of programs administered by three umbrella agencies: The League of Older Americans (LOA), Total Action Against Poverty (TAP), and the Roanoke Manpower Consortium. A complete list of all programs served by RADAR and a description of each is presented in the Service Characteristics section. Transportation is provided free of charge to passengers. Contracting agencies are responsible for screening their clients for eligibility and for defining the type of service they wish to purchase.

The Setting

The City of Roanoke, with a population of 101,000 is located in the southwestern part of Virginia and is surrounded by rural counties and a few urbanizing towns. Most of the area is mountainous and undeveloped, with only 12 percent of the total land area devoted to urban use. Although RADAR's services are centered in the Roanoke metropolitan area, RADAR's objective is to improve transportation service for eligible residents of Roanoke County, Botetourt County, Crain County, Alleghany County, the Town of Vinton, and the cities of Roanoke, Salem, Covington, and Clifton Forge. This large service area encompasses 1640 square miles and had an estimated 1976 population of about 241,000. The population density varies from 10.5 persons per square mile in Crain County to 3446 persons per square mile within the Roanoke city limits. Due to the rural nature of much of the region, many areas receive no public transportation service.

According to the 1970 U.S. Census, the elderly comprise 15 percent of the population of the service area. Seventy-seven percent of the total elderly population in the area lives within the urbanized Roanoke area. A recent study of elderly and handicapped persons conducted by the Fifth

Planning District Commission* estimated that approximately 2900 individuals in the urbanized Roanoke area cannot use transit and another 3100 use transit with difficulty.

The number of families in the RADAR service area with incomes below poverty level (\$3000) in 1970 was 9.4 percent or slightly above the national average. The 1970 U.S. Census reported that the median income for the Roanoke area was \$8200, and that approximately 24 percent of the households had no car available.

Public mass transit is supplied by the Greater Roanoke Transit Company (GRTC) which is wholly owned by the city of Roanoke. The Roanoke City Council serves as the Board of Directors. Day-to-day management of the system has been contracted to ATE management and Servie company, a private transit management firm. Currently, GRTC operates 41 buses over 22 routes and provides service seven days a week between the hours of 5:00a.m. and 9:30p.m. The regular fare is \$0.40.

The GRTC was formed in July 1974 to take over the declining private bus operation. In 1971, 5.5 million passengers were served by buses which traveled 2.1 million vehicle miles annually. By 1975, patronage had dropped to 2.8 million passengers and the total vehicle miles had been trimmed to 1.6 million. The city assumed public operation of the system in March 1975.

In April 1976, GRTC discontinued all service which was being supplied outside the Roanoke city limits due to the refusal by other municipalities to pay an equitable share of the cost. In Virginia, cities and towns incurring operating deficits for transit operations receive little support from the state. This implies that one-half the net operating cost must be covered through local funds. The only mass transportation available today outside the Roanoke city limits is provided by a private bus company which operates several routes.

Program Evolution

The concept of a consolidated transportation system for the Roanoke Valley can be traced to an August 1974 regularly

*Transportation Needs of the Elderly and Handicapped in the Roanoke Metropolitan Area, Fifth Planning District Commission, 1976.

scheduled meeting of the director of various human service agencies in the area. This meeting had been convened by the Roanoke Valley Council of Community Services, Inc., a planning and social policy body. One item on the agenda was a discussion of potential areas of service delivery coordination and the possibility that Roanoke apply for pilot project designation under the recently passed Virginia Senate Bill 517 (SB 517). The purpose of SB 517 was to encourage the integration of human service delivery through research and demonstration grants which would allow recipients to study, develop, implement, and evaluate improved approaches to coordination. The discussion which ensued at the August meeting, identified transportation for clients as one of the most pressing problems faced by agencies, and a service which is crucial to the success of many programs.*

A subsequent resource inventory and needs assessment survey of the agencies documented the levels of transportation demand, supply, funding, and vehicle utilization. Many of the problems experienced by agencies, such as a shortage of sufficient numbers and types of vehicles, were caused by insufficient funding. Some agencies had need for transportation services but were unable to provide them for their clientele. In other cases, duplication of effort was identified. The decision was made to submit a SB 517 application proposing the integration of existing transportation resources in the Greater Roanoke Area into one cooperative system. The hope was that through consolidation, sufficient economies of scale would be realized to generate additional capacity.

The remaining months of 1974 were devoted to working out the details of the proposed system. The planning staffs from the Roanoke Valley Council of Community Services, Total Action Against Poverty, and the Fifth Planning District Commission were instrumental in developing the initial idea and enlisting support from other agencies. An alternative which was considered was for one of the three major transportation providers to absorb the transportation resource of the other agencies and operate a consolidated system. This idea was rejected since the participating

*Earlier that year (1974), the League of Older Americans had hired a consulting firm to study the transportation problem they were experiencing. The consultant's report recommended a unified transportation system similar to the one eventually implemented, but for the exclusive use of the elderly.

agencies felt it was important that the project be identified with the community and not with one lead agency.

Eventually, 24 agencies cooperated to form a non-profit transportation organization known as the Unified Human Services Transportation Systems, Inc. (UHSTS), the purpose of which was to implement and manage a consolidated system to be called RADAR. A complete list of the sponsors is given in Table 2-1.

TABLE 2-1

ORIGINAL SPONSORS OF RADAR

Fifth Planning District
League of Older Americans
Roanoke City Social Service Bureau
Roanoke City Public Health Department
Welfare Incentive Program
Greater Roanoke Transit Company
Easter Seal Society
Senior Citizen Advisory Council
TAP - Emergency Aid and Services
Roanoke Area Association for Retarded Citizens
Council of Community Services
Roanoke City Department of Civic Enrichment
Redevelopment and Housing Authority
Mental Health Services
Total Action Against Poverty
American Red Cross
Opportunities Industrial Center
Roanoke Consortium for Manpower Services
Virginia Commission for the Visually Handicapped
Goodwill Industry
Muscular Dystrophy Association
Roanoke County Recreation Department
Salem Recreation Department
Shenandoah Homes
Family Service - Travelers Aid

In January 1975, the demonstration application was submitted to the Virginia State Office of Human Affairs by the Roanoke City Council, which enthusiastically endorsed the Unified Human Services Transportation System's project RADAR. Support from the city was necessary since Senate Bill 517 authorized the Governor of Virginia to designate certain cities and counties to develop, implement, and administer the integrated programs. The application proposed that the transportation funds, resources, equipment, and personnel of all participating agencies be

combined and operated as a unified network. At that time RADAR's goals were:

- 1) to provide demand-responsive transportation to agency clients,
- 2) to reduce expensive and wasteful duplication resulting in more efficient services,
- 3) to provide transportation to agencies which lacked a transportation capability, and
- 4) to provide a wide range of coverage.

One month after submitting the application, the city of Roanoke was designated a Senate Bill 517 pilot project and awarded a one-year grant which had the potential to be renewed for the next two years. (SB 517) was partially funded through Federal funds which the State needed to request separate each year.) Roanoke was one of nine localities which received funds under SB 517 and one of the two which utilized the grant to test a new concept in transportation delivery. The city of Roanoke elected a subcontractor the demonstration funds to the UHSTS, Inc. which utilized the money to hire staff, set up a central office, and initiate operations.

Prior to implementation of the service, by-laws were developed, contracts with agencies were negotiated, and procedures were established for transferring resources and operating the consolidated system. The key to this phase of RADAR's development resided in securing contractual agreements with participating agencies. Under the terms of the general agreement, agencies with transportation budgets were required to transfer their transportation budgets and equipment to UHSTS, Inc. and in return were guaranteed they would receive, as a minimum, the same level of service being provided at that time.

The first task was to convince those agencies with vehicles to lease them to RADAR. For various reasons a number of the twenty-four original sponsors of RADAR did not have vehicles available. For Example, the Fifth Planning District Commission and the Council of Community Services are planning agencies and therefore do not administer services. A number of other agencies either had limited transportation budgets or had no funds available for transportation even though they had transportation needs. Still others had a sporadic need. All these agencies were interested in the formation of RADAR, participated in the planning phase and became sponsors. Some anticipated

purchasing service in the future. Initially, clients from non-integrated agencies were not permitted to utilize the service, since the first priority was to establish a system which could offer integrated service comparable to that provided individually.

RADAR began operations in October 1975 with the pooled resources from four programs which are administered by two agencies: Total Action against poverty (Community Action Agency) and the League of Older Americans (Area-wide Agency on Aging). These agencies are two of the largest human service transportation providers in Roanoke, and both had actively participated in the planning process. The four programs together contributed thirteen vehicles and twelve drivers. The standard contractual agreement provides that operating monies be turned over, but that vehicles be retained by the original agency and leased to RADAR at \$1 per year. A Department of Health, Education and Welfare (HEW) letter of authorization was requested to transfer Head Start funds; likewise a waiver was required from ACTION for pooling resources and funds LOA has obtained through ACTION programs.

In the beginning, some agencies were reluctant to consolidate their operations with RADAR and chose to wait until the system was operative. A year later, in November 1976, the Roanoke Manpower Consortium, which operates the local CETA program, signed a contract with RADAR and leased eight vehicles they had been operating to the consolidating system. Other agencies without vehicles to contribute, such as the Roanoke Department of Human Services (Title XX), which provides limited transportation to certain welfare recipients, also purchased service once RADAR had been established.

In the second and third years, RADAR expended its service delivery to include new clients. Marketing has been carried out through personal contacts and through a newsletter published by the Council of Community Services. Awareness of RADAR's capabilities is widespread among the potential participants, most of whom contributed to RADAR's formation.

Service Characteristics*

When the RADAR system was planned in 1974, three service formats were envisioned: demand-responsive transportation, scheduled routes, and special trips. To some extent, all three types of service have been provided, although the demand-responsive component as originally planned still remains to be developed. Implementation of a complete dial-a-ride service has been hindered by the lack of adequate funding. To date, most of the transportation has been regularly scheduled contract service which is delivered on a daily or weekly basis to agency clients. RADAR currently operates Monday through Friday from 7:00 a.m. to 5:00 p.m. Limited evening and weekend service is also provided upon request.

The service contracts negotiated by RADAR commit the consolidated system to supply the contracting agencies' transportation needs in return for their budget resources. In the first two years of the project, no attempt was made to adjust the fee paid per passenger to correspond to the type or level of service provided. The human service orientation of the system and the promises of the alleged benefits of consolidation motivated the early organizers to structure contracts in an informal way. This approach later resulted in financial difficulties. More recently, service contracts have been negotiated on an hourly basis.

Service Subscribers

In the three years that RADAR has been operating, only four agencies have contributed vehicles. The transportation demands of these four agencies have consumed a large portion of the fleet capacity. Any remaining capacity is open for purchase by other agencies.

A list of all agencies which have contracted with RADAR for service and the programs which utilize the transportation service is given in Table 2-2. Those programs which were served in FY78 are listed first; additional agencies which are participating in FY79 are also identified.

*For the most part, the service description and statistics included in this report are for fiscal year 1978, which ended June 30, 1978. Beginning in FY79, a few service contracts were terminated and RADAR's staff was reduced. The staff reduction is temporary and will be reversed when adequate funding can be secured.

TABLE 2-2
RADAR SERVICE CONTRACTS

Fiscal Year 1978

TAP - Head Start Program
TAP - Senior Program
TAP - Summer Youth Program
TAP - Summer Head Start Program
LOAS - Nutrition Program
LOA - Foster Grandparents Program (FPG)
LOA - Retired Senior Volunteer Program (RSVP)
Roanoke Manpower Consortium - CETA Programs
Roanoke County Occupational Youth Program
Virginia State Department of Education
City of Roanoke - Title XX
Roanoke County - Title XX
Mental Health Services of Roanoke County

Additional Contracts for Fiscal Year 1979

Virginia Commission for the Visually Handicapped
Roanoke Neighborhood Alliance

About 95 percent of RADAR's passenger trips are provided for programs administered by three umbrella agencies: LOA, TAP, and the Roanoke manpower consortium. The clients of these agencies, the major trip purposes being served, and the principal funding source of each program are identified in Table 2-3.

TABLE 2-3
DESCRIPTION OF RADAR'S MAJOR CLIENTS

League of Older Americans

Nutrition Program - Under the Older Americans Act of 1965 as Amended, Title VII, elderly persons are transported to nutrition centers. Between 500 and 800 trips per week are provided to or from five centers.

Foster Grandparents Program(FGP) - The transportation is provided to day care centers for the elderly who serve as "foster grandparents". FGP, an ACTION Program, is funded through the Domestic Volunteer Service Act of 1973, Title II.

Retired Senior Volunteer Program (RSVP) - Retired volunteers are transported to work sites under ACTION's RSVP program. RSVP is funded through the Domestic Volunteer Service Act of 1973, Title II.

Total Action Against Poverty

Head Start Program - Transportation is provided to day care centers for children (some of whom are handicapped) for low-income families. Head start funds are provided under Title V of the Community Services Act of 1974 and are administered through HEW's Office of Human Development. During the FY78 school year about 100 trips per week were provided to or from ten day care centers. One van is utilized to deliver food to the centers.

Fincastle/New Castle Senior Program - This program provides transportation mostly for medical appointments for qualifying seniors.

Summer Youth Program - Transportation to employment and recreational sites is provided for teenagers.

Roanoke Manpower Consortium

CETA - Job Training Programs

Roanoke	The Opportunities Industry Center (OIC) provides job assigning and employment opportunities for unemployed, underemployed, and economic disadvantaged persons under the Comprehensive Employment and Training Act (CETA). RADAR provides daily transportation to and from the center for about 90 percent of the 321 OIC participants. OIC also operates an employment agency under CETA Title VI to help youth and senior citizens secure part-time employment.
Covington	A CETA job training program located in the city of Covington also contracts for RADAR's services.

CETA - Health Care

Health care is a supportive service funded through CETA for participants of job training programs. RADAR supplies transportation to medical appointments.

Job Orientation and Motivation Program -
Funding is provided by the Roanoke Department of Human Services for transporting program participants.

Most agencies contract for service on an annual or monthly basis. RADAR has also accommodated special one-time contracts and seasonal requests. Examples of the latter are the summer programs run by TAP and Roanoke County. Two agencies, the Virginia Commission for the Visually Handicapped and the Roanoke Department of Human Services (Title XX) pay on a per trip basis. The fare per trip has varied over the last few years in response to changing costs; it presently is \$2.05. Most of these trips are delivered in a many-to-many service pattern as are the trips for the Fincastle/New Castle Senior Program, and medical job interview trips funded through the CETA program. The many-to-many trips, however, account for less than 5 percent of the total trips carried by RADAR. The remaining service is delivered in a many-to-one pattern.

Vehicle Fleet

None of the twenty one vehicles which comprise the consolidated system are owned by RADAR. Nineteen of the vehicles are leased for \$1 per year from the respective participating agencies which originally secured them. If or when the contracts are terminated, the vehicles will be returned to the owner agency. The remaining two vehicles are leased at market rates from a private leasing company.

The fleet consists of 11 vans and 20 buses of various sizes. Two of the buses, both are from LOA, are lift-equipped and were obtained from the Urban Mass Transportation Administration (UMTA) through Section 16(b)(2) funds.* Two vans have been retrofitted with manual ramps. UMTA funds were used to equip ten vehicles with a communication system. Table 2-4 summarizes the characteristics of the RADAR fleet.

*Section 16(b)(2) of the Urban Mass Transportation Act of 1964 as amended authorized Federal grants to private non-profit corporations and associations to assist them in providing mass transportation services meeting the special needs of elderly and handicapped persons.

TABLE 2-4

RADAR VEHICLE FLEET

TAP Vehicles

- (4) 25-passenger buses
- (2) 60-passenger school buses
- (1) 40-passenger bus
- (1) van

LOA Vehicles

- (3) vans
- (2) 14 passenger buses (lift-equipped)

Roanoke Manpower Consortium (CETA) Vehicles

- (5) vans

Mental Health Services of the Roanoke Valley Vehicle

- (1) van

Private Leasing Company vehicles

- (1) van
- (1) 36-passenger bus

Until recently, all vehicle maintenance and repairs have been performed by local garages. In FY79, the Greater Roanoke Transit Company will provide preventative maintenance repairs at no cost to RADAR. Replacement parts will be furnished at cost. The total annual value of the maintenance services to be provided by GRTC is about \$10,000.

Staff Functions

RADAR is managed by an executive Director who is responsible for carrying out the decisions of the board of directors and for negotiating contracts with clients. The transportation coordinator oversees the daily operation of the transportation services and directly supervises the twenty-two drivers. The planner-evaluator performs analytic tasks, assists the Executive Director in RADAR's public relations efforts. Other office staff members include an administration bookkeeper, an assistant book keeper, and two clerk typist/receptionists.



Vehicles used by RADAR are donated by participating Human Service Agencies in Roanoke: Wheelchair Lift-Equipped bus (top) and a van (bottom).

System Performance*

The records available indicate that RADAR's ridership for the last two years (FY79 and FY78) has remained relatively constant at 103,000 trips annually or about 410 trips per day. Of these passenger trips, an average of 175 per day were provided for elderly and transportation handicapped individuals. The ridership figures for the first half of FY79 show a substantial gain over the last two years. Approximately 575 trips per day were provided during this 6-month period; this represents a 70 percent increase over the same time period for FY78. The passenger trips for elderly and handicapped persons have increased to about 200 per day.

The total vehicle mileage per passenger trip is relatively short, although it has been steadily increasing over the last few years. This fact is mostly due to the expansion of RADAR's services to serve programs located in Allegheny, Botetourt, and Craig Counties. The total mileage per passenger trip served in FY77 was 1.2 miles, in FY78 it was 1.5 miles, and for the first half of FY79 it had increased to 1.8 miles. The cost per vehicle mile was \$1.60 in F77 and \$1.87 in FY78.

The average cost per trip cannot be reported due to the deficiencies in the data. Instead, the average price per trip paid by each of the three major participating agencies for the service they purchased during FY78 will be quoted. Records were kept on these three agencies and it is assumed that the data is reliable. The League of Older Americans paid an average of \$0.66 for each of the 44,000 trips supplied by RADAR. Total Action Against Poverty paid an average of \$1.66 per trip for 42,000 trips and the Manpower Consortium paid \$5.05 for each of their 15,000 trips.

*The statistics reported in this section are based on the data which were available. The type of transportation provided by RADAR requires that the drivers accurately count and record the number of passenger trips carried each hour for each agency in order for the ridership data to be reliable. The data records were found to be incomplete. Ridership was recorded for the larger contracts, but not always for the smaller ones, and no trip records were kept for one-time contracts. Also, no data could be found for some months. Therefore, the decision was made to calculate only those performance measures which involved calculations with the data which appeared to be reliable. The other performance measures have been omitted.



RADAR vehicles are used primarily for group travel: Passengers en-route to a Training Center for the Visually Handicapped (top) and two passengers arriving at the Senior Citizen's Nutrition Program Center (bottom).

The disparity between these rates can be explained by considering several factors. The average distance between the clients' homes and the program site varies for different programs. For example, the CETA job training program draws people from a much wider service area than does a nutrition site or a head start program. Also, each of the three major agencies purchase service from RADAR for several programs, some of which involve more group loadings than others. However, the major reason the discrepancy in trip rates is so great, is probably due to the principles on which RADAR was founded. The agencies were asked to contribute their existing transportation budgets in return for comparable service.

The costs per trip quoted above, which were paid by the contracting agencies, do not represent the true cost of supplying the transportation. Funds RADAR received during FY78, for which no service was expected in return, supplied an average subsidy of \$0.70 per reported trip. This subsidy, however, was not adequate to cover the total cost. A deficit of \$0.25 per reported passenger trip was incurred.

Institutional Structure

The founders of RADAR established a private non-profit organization called the Unified Human Services Transportation System, Inc. to administer the project. This organization is governed by a Board of Directors which according to the by-laws shall consist of a maximum of 30 members comprised of representatives of the following groups: local governments, social service agencies, actual or potential riders, and at-large representatives from the community. At present, the board numbers 25 and spans a wide range of interests. In addition to representatives from both participating and non-participating human service agencies, the board includes: planners from the city of Roanoke, Roanoke County, and the Fifth Planning District Commission; the Director of the Senior Citizens Advisory Council; the Manager of the Greater Roanoke Transit Company; and the owner of the local private ambulance service. Representatives of the taxi companies were also invited to join the board, but they declined.

There are two standing committees of the board: an Executive Committee and an Advisory Committee. The Executive Committee is comprised of the four officers of the board and the Executive Director. The Advisory Committee consists of 10 to 20 people who are either agency clients served by RADAR or voluntary advocates for the interests of the transportation deprived. The Advisory Committee reviews

policies, actions, and plans of the board and makes recommendations.

RADAR has become recognized as the major supplemental specialized transportation service in the area. In 1976, when the public transit system was required by UMTA to exhibit "special efforts" in planning for the elderly and handicapped individuals in order to receive Federal assistance, the decision was made to utilize and expand RADAR's capability to serve the semi- and non-ambulatory individuals who are unable to use regular transit service. To this end, three actions will be or have been taken. First, beginning in FY79, GRTC will lease two lift-equipped mini-buses to RADAR for \$1 per year. Second, the preventative maintenance service described in the Service Characteristics section is an in-kind contribution offered by GRTC in partial satisfaction of the "special efforts" requirement. Third, the city of Roanoke has and will contribute revenue sharing funds to RADAR. The amount assigned for FY78 was \$11,000; a comparable amount has been slated for FY79. Relationships between the city, GRTC, and RADAR was facilitated by the fact that the City Council also performs the role of the Board of Directors for GRTC.

Sufficient capacity and operating funds required to implement a general purpose dial-a-ride service for transportation handicapped persons are not presently available. However, steps are being taken towards this goal. This service would differ from those which have been provided by RADAR, since individuals who qualify would be able to call and schedule their trips. Theoretically this many-to-many service is available, but the limited resources have prevented it from being marketed to the general public. Those individuals who are being served are generally referred through agencies.

A general purpose dial-a-ride service is available to the elderly through a program operated by the Senior Citizen's Advisory Council, Inc. This community-wide non-profit organization consists of 15 neighborhood groups which work for improved transportation, housing, health, nutrition, income, and recreation for senior citizen. A primary function of the council is to provide transportation services, not only for their members, but to any senior needing assistance. Medical trips are given priority. In the past, RADAR has purchased individual passenger trips from the council for Title XX clients who could not be accommodated on the RADAR system due to a lack of available vehicle capacity at the required time.

The Council operates seven vehicles between the hours of 6:30 a.m. and 5:00 p.m. The number of passenger trips served per month is about 4000. Twenty-four hour advanced reservations are necessary due to the lack of communications equipment. No fare is charged, but donations are accepted. The vehicles were bought with funds the Council has raised and are operated with CETA employees and volunteered service. The City of Roanoke donates about \$10,000 a year from revenue sharing funds in support of the transportation service the Council provides. This money is contributed in partial satisfaction of UMTA's "special efforts" requirements for the transportation of elderly and handicapped persons.

Project Funding Sources

The 3-year Virginia Senate Bill 517 Demonstration grant, which launched RADAR in 1975, ended in June 1978. This grant amounted to \$24,100, \$26,500 and \$36,800 respectively for the three years and was awarded as seed money to implement the program. The demonstration program administered by the State was partially funded through Federal funds. In July 1975, HEW'S Social and Rehabilitation Service awarded a grant to the Virginia Office of Human Affairs for an integrated human services project. The grant was authorized under Title XI, Section 1115 of the Social Security Act. Virginia added some state and local funds to the Section 1115 funds and matched the total amount with a 75 percent share from Virginia's Title XX allocation. Title XX funds enable states to provide social service to public assistance recipients and other low- and moderate-income persons.

RADAR was designed to be self-supporting. Over its 3-year history the percent of its revenues that has been provided by the participating agencies has increased steadily from about 50 percent the first year to about 75 percent for FY78. In addition to the SB 517 grant, other funds have been contributed by local governments. Starting with FY77, the city of Roanoke has annually allocated about \$11,000 in revenue-sharing funds. Last year the county of Roanoke donated \$1000.

RADAR has also benefitted financially from hiring employees whose salaries are paid by outside sources. From the beginning, RADAR has employed one or two CETA employees; in FY79 the number will increase to three. Assistance in the form of staff persons has been supplied under the Work Incentive program.

The total budget of FY78 was about \$272,000 of which \$71,800 was donated and the remainder was paid by participating agencies in return for services. A breakdown of the revenue into the major sources is displayed in Table 2-5. These funds were not adequate to cover expenses and RADAR experienced a net deficit of \$22,000 for FY78. The approximate percentages of the total cost that were expended for each of the major categories are also shown in Table 2-5.

TABLE 2-5
RADAR REVENUE AND COSTS FOR FY78

Revenue

Purchase of Service Contracts-Agencies

TAP - Headstart	\$ 60,000
TAP - Senior & Summer Programs	12,050
LOA	29,000
Roanoke Manpower Consortium	75,600
Department of Human Services (Title XX)	2,500
Virginia State Education Department	2,960
Mental Health Services of Roanoke County	16,750
Demonstration Funds (SB 517)	36,825
Public Service Employment (CETA)	21,450
City of Ronake	11,000
County of Roanoke	1,000
Easter Seal Society	500
TOTAL	\$271,985

Expense Categories

Labor	53%
Repairs, Maintenance, Vehicle Leasing, Tires	25%
Fuel and Oil	12%
Insurance and Vehicle Licenses	3%
Fixed Expenses (rent, utilities, etc.)	7%
TOTAL	100%

RADAR encountered financial difficulties in mid-fiscal year 1978. Expiration of the three-year state demonstration grant on June 30, 1978 further exacerbated RADAR's financial condition. Over the last few years, both the state grant funds and the city of Roanoke contribution have been

deposited in the general operating fund and absorbed by the cost of delivering the services which had been promised to the contracting agencies. In the summer of 1978, when the cash flow problem became severe, driver and office staff reductions were necessary. From hindsight, local board members have concluded that the financial problems stemmed from the lack of technical and administrative skills in financial management.

RADAR is anticipating a better financial situation in FY79. A new Executive Director has been hired and future contracts are being written to reflect the true cost of delivering the service. For FY79 this cost has been computed to be \$8.75 per hour. All agencies will eventually be paying the same rate per hour for service purchased instead of vastly different rates as is the case now. As existing contracts expire, they will be renewed on a cost per hour basis. To further equalize the cost structure, those agencies which have leased vehicles to RADAR will be given a credit based on the number and age of the vehicle.

Two other changes will help balance the budget in FY79. A third employee (a driver) will be paid through CETA's Public Service Employment funds, and the preventative maintenance agreement with the GRTC will reduce the cost of maintenance. RADAR is aware of the need for additional service contracts and is pursuing new clients as a means to regaining financial health. Some vehicle capacity is available now and more will become available when the two new vans are obtained from GRTC.

To date, no direct Department of Transportation monies have been used to fund RADAR's activities, although RADAR has benefitted indirectly from UMTA's funding programs. Two of the vehicles currently being used were originally obtained through Section 16(b)(2). Likewise, the communications equipment was secured through the same program. During FY79, two additional vehicles obtained by GRTC through a Section 3 grant* will be leased to RADAR for a nominal fee. Fifty-percent of the preventative maintenance arrangement between RADAR and GRTC, which will commence

*Section 3 of the Urban Mass Transportation (UMT) Act of 1964 as amended authorizes Federal grants to States and local public agencies for financing mass transit facilities and equipment.

during the current fiscal year, is funded through Section 5 operating funds.*.

Project Impacts

Advocates of coordination/consolidation claim that the potential benefits include the elimination of duplication, greater service capacity, higher productivity, and greater operating efficiency. At this point in time, no evaluation of the before/after situation has been performed on RADAR's operation to either support or refute these claims. Therefore, this section will discuss the impacts of benefits of RADAR as perceived by the agencies, other transportation providers, and the community at large.

The general opinion is that the organizers and administrators of RADAR have succeeded in establishing a consolidated system which meets the basic expectations of the original plan. There are some complaints, but most of the agencies which have purchased service from RADAR have been satisfied. Those that previously supplied their own transportation, now are able to purchase comparable service at the same cost. Since transportation is a service rendered in support of a program's primary function, many agencies find it more desirable to contract for service. There are several advantages to having a larger, diversified fleet available. Agencies now have access to varying size vehicles, and sufficient back-up capacity makes vehicle disablement less of a problem than was usually experienced under former in-house operations. Agencies or programs with transportation needs which are too infrequent to warrant the purchase of a vehicle, now have an available option. Some programs, such as Title XX, do not permit the purchase of vehicles with money allocated for transportation; therefore they were dependent on the more expensive taxi alternative before RADAR was established. Other programs which operate seasonally (summer youth programs) have a transportation service available.

RADAR's drivers have received training in Red Cross first aid, coronary resuscitation, care of the blind, and defensive drivings approved by the National Safety Council. These programs would not have been practical for small

*Section 5 of the UMT Act authors Federal grants to urban areas (> 50,000 pop.) for capital and operating assistance. The amount each area receives is determined by using a formula

operations and thus represent a benefit of a consolidated system.

The fixed contract nature of the service provided by RADAR has prevented it from having a negative impact on other transportation providers. Scheduled group transportation needs cannot be served well by bus or taxi. The bus company is pleased that RADAR is filling a gap in the transportation system. The taxi companies are less happy and fear that RADAR will at some point move into their domain. At the time that the RADAR vehicles were equipped with communications gear, the taxi companies protested. The conflict was resolved when RADAR agreed not to interfere with the taxi companies Title XIX (Medicaid) business. At that point, the taxi companies were invited to join the Board of Directors and participate in decisions concerning RADAR.

RADAR began operations just 3 years ago. Its full potential benefit to the community at large is yet to be realized. RADAR represents an alternative transportation resource for the Roanoke community which can be developed further to serve the needs of the transportation disadvantaged. The basic structure has been established and is available for expansion as additional funding is secured. Two programs which are being planned for the near future are discussed in the last section of this report, entitled Future Plans. One program is a demand-responsive evening service; the other is a daytime service for handicapped individuals. Both of these programs represent expansions of the existing service and may benefit the community not only through the service they will provide, but also through the economies of scale which will be realized by building on an existing administrative structure and capital investment.

Issues/Problems

The planners of RADAR successfully overcame many of the frequently discussed barriers to coordination/consolidation. A state official familiar with RADAR's formation stated that the actual problems encountered were not as difficult as had been anticipated. RADAR organizers were assisted in the area of regulatory/statutory constraints by the Virginia General Assembly's legislation (SB 517) which served as a catalyst to RADAR's formation. Sections of this legislation:

- empowered the Governor and state agencies to revise the rules and regulations of any state

agency to assure the proper functioning of the pilot program, and

- empowered the Governor, on behalf of any state agency or locality, to request any Federal agency for exceptions to or variances from rules and regulations governing the administration of the use of Federal funds for human service programs.

Waivers which were required were readily obtained. These were necessary in order to use vehicles and drivers paid through one program to transport clients of another program.

Another frequently cited obstacle to consolidation, turf protection, was not a critical issue in Roanoke because most of the potential participants took an active part in the planning process. As a result, RADAR was structured to generate the maximum benefit for the participating agencies. The choice of establishing a third-party provider insured greater impartiality in the treatment of clients. Since drivers as well as vehicles were pooled, the service, in many cases, appears to the client to be the same after consolidation as before. The wide representation of the Board of Directors offers the opportunity for agencies to influence decisions and maintain control over the service provided.

The use of prescheduled routes enable RADAR to dedicate a vehicle to one agency's needs at any given time and thereby avoid any problems which would arise through mixing clients. Due to the high volume being transported for certain programs, many vehicles are utilized exclusively to serve one agency's clients.

RADAR circumvented the problem of per trip or per hour accountability by structuring annual contracts which committed RADAR to delivering the requested services in return for the program's transportation budget. This was the simplest arrangement that could be made in the beginning, given no operating experience on which to base a unit of service rate. These terms proved acceptable to many programs and encouraged them to participate. A major problem with this arrangement is that it does not accurately take into account the actual cost of delivering the service purchased. In addition, this arrangement does not readily provide agencies with any potential savings from consolidation. Until recently funds were contributed for which no service was required (e.g, SB 517) and these helped subsidize the operation.

One of RADAR's major needs at the present time is to devise a pricing mechanism which takes into account such factors as distance, time, and level of service provided. Once developed, it may not be feasible to charge all users accordingly, since not all programs have transportation budgets that could cover the true cost of service delivery. For example, transportation funding for the RSVP program is limited by Federal regulations to \$2.75 per volunteer per day or \$0.87 per trip. The present system of allowing one program to cross-subsidize another in terms of shared resources can work and can result in greater benefits to the community. What is needed is better fiscal management.

Another problem confronting RADAR is finding the sources to provide transportation in the rural community. Much of RADAR's service is sparsely populated and has no available public transportation service. The operating cost of transporting people to services greatly increases in rural areas due to the long distances involved and the smaller number of clients. To help solve this problem, two RADAR vehicles are garaged in and operate from Covington, a city located about 50 miles from Roanoke in Alleghany County. These vehicles support CETA training programs in Covington. Seniors in two other outlying areas (Botetourt County and Crain County) receive demand-responsive service a few days a week for trips to supportive services. This service is supplied through Community Action Agency funds.

RADAR's success is dependent on the continued financial support of the human service agencies, the local government, and the transit operation. RADAR has the experience, the capability, and the willingness to play a larger role in providing more comprehensive transportation to the transportation disadvantaged citizens in the community. Additional contracts and funds are needed. One possibility is to expand RADAR's function to provide transportation for all citizens with special needs and not just for those attending agency programs. RADAR has explored the possibility of providing such a service under the support of Section 5 UMTA funds. This service could form the basis of continued funding and eliminate some of the problems RADAR now experiences from the fluctuating level of funding. However, so far this idea has not received support from the unionized drivers of the GRTC, who believe this development would reduce the amount of Section 5 funds available to support the fixed-route bus operation.

Future Plans

Beginning FY79, RADAR will implement a dial-a-ride evening service for the elderly and handicapped which will be funded by \$64,000 from the Law Enforcement Assistance Agency (LEAA). The Roanoke Neighborhood Alliance, a coalition of five low income neighborhoods whose goal is to improve the quality of life through communication, applied for and recently received the grant from LEAA. The evening transportation service is one part of the \$210,000 18-month grant awarded to the Roanoke Neighborhood Alliance to sponsor crime detection and prevention activities. The Neighborhood Alliance considered a number of alternatives before deciding to specify RADAR (in the grant application) as the provider who would deliver the transportation. The sole source approach was used because of the RADAR's experience in catering to the needs of those requiring specialized transportation and because no other provider has the necessary quantity of lift-equipped vehicles. The \$64,000 will be used to cover operating costs since the RADAR fleet is available in the evening.

RADAR also plans to implement a day-time handicapped dial-a-ride service in the near future. The system has sufficient lift-equipped vehicles with available capacity and dispatching equipment. RADAR is currently seeking funds to subsidize the operation of a demand-responsive system.

CHAPTER THREE

DANVILLE REDUCED TAXI RATES PROGRAM

Overview

In the Danville, Illinois User-Side Subsidy Demonstration Project, special groups were provided with fare discounts on privately operated, shared ride taxi services. The project was named the Reduced Taxi Rates, or RTR program, and operated for two years and seven months, between December 1975 and June 1978, after which the city elected not to continue the project on a locally funded basis. All Danville residents who were either handicapped or 65 years of age or older were eligible for the RTR program.

A "user-side subsidy" is one which is given to users of a service on a per-trip basis, as opposed to the conventional method of covering the total deficit (operating costs less revenues) encountered by the service providers.

Transportation services were provided in the traditional shared-ride taxi mode by the local taxicab companies in Danville: Red Top/Yellow Cab Company (20 vehicles), Courtesy Cab Company (10 vehicles) and Brown Cab Company (one vehicle). All three initially signed contracts; Courtesy Cab Company subsequently ceased all taxi operations in Danville during the fifth month of the demonstration, leaving only two suppliers.

Project Operation and Administration

RTR registrants requested taxi service by telephone, on the street, or by appointment, in the same way as other taxi users. At the end of a taxi trip, on showing an RTR identification card, users paid 50 percent (25 percent the first year of the project) of the standard fare with cash. The remainder of the fare was charged to the project. Each trip was recorded on a specially designed charge slip. Both the ID number and signature of the user were required on the charge slip, a copy of which was given to the user. The remaining charge-slip copies were then turned in by the drivers to the taxi operators, who in turn, were reimbursed by the city on a weekly basis. The charge slips were keypunched and data-processed to verify invoices from the taxi cab companies and to monitor monthly use of the project by individuals. Various management reports were also



Plastic I.D. cards for taxi discounts under the RTR program are obtained at the Danville City Hall.



All Danville residents over 65 years of age and handicapped persons at any age are eligible for the discount taxi service.

generated with the data. A few items of data on total volumes and driver hours for each month were requested of the companies.

Discount Policy - The Danville taxi fare structure is zone-based with four zones covering the whole of the city. Each zone is associated with a fare; the charge for a trip is the fare associated with the starting zone or the ending zone, whichever is greater. There are additional charges for mileage beyond the city limits and various extra service items. All items of service, other than tips to the driver, were covered by the discount policy. Trips were at the discretion of the user and were paid in full.

During the first 13 months of the project, the user-side subsidy discount was approximately 75 percent; the zone-based user payments ranged from \$0.25 to \$0.50. In January 1977, regular taxi fares were increased by approximately 12-13 percent and the RTR discount was lowered to 50 percent. Table 3-1 summarizes the fare changes by zone, and indicates the average RTR project trip fares before and after the price change.

TABLE 3-1. RTR FARE CHANGES

Zone	BEFORE PRICE CHANGE		AFTER PRICE CHANGE	
	Regular Fare	RTR Fare	Regular Fare	RTR Fare
1	\$0.75	\$0.25	\$0.85	\$0.45
2	1.25	.30	1.40	.60
3	1.50	.40	1.70	.85
4	1.75	.50	2.00	1.00
Average fare per trip	1.39	.37	1.52	.74
Average fare per rider	1.16	.31	1.27	.62

If RTR users rode with non-RTR taxi riders, the basic zone fare was discounted, but an undiscounted \$0.15 charge for extra passengers was collected for the non-RTR riders. This policy resulted in some cross-subsidy of non-RTR riders who travelled with RTR riders. However, this was determined to be the only practical solution given the myriad possible combinations of RTR and non-RTR members group-riding. A

simplified and easily understood discount policy was sought for the sake of drivers and riders alike.

A limit of \$20 was set on the face value (regular fare) of rides each RTR member was permitted to receive at a discount each month; participants agreed to this rule when signing up for the program. Computer processing of the charge slips allowed monitoring of this limit by individual ID number. In cases of group-riding by RTR members, the total fare was split among all ID numbers recorded on the charge slip, thereby extending each person's ability to use the service within the \$20 limit.

Certification - Elderly persons were certified on the basis of age, regardless of whether or not they were handicapped. A permission slip signed by the applicant allowed the project to verify age through the local Social Security Office. Handicapped persons under 65 were certified on the basis of eligibility criteria, which were based on similar criteria drawn up by the San Francisco Bay Area Task Force on Handicapped Definitions. A one-page form was filled out and signed by a doctor or social service agency counselor. Participants were not required to come into the Project office; all certification and processing of ID cards could be done by telephone and mail. Different-colored ID cards were used for the elderly, the permanently handicapped, and the temporarily disabled in order to help drivers prevent illegal use of cards by the wrong persons.

Project Funding - The Danville project was funded under a U.S. Department of Transportation, Urban Mass Transportation Administration (UMTA) Services and Methods Demonstration (SMD) grant. The Urban Institute assisted in the initial conceptualization, site selection and grant application. The project was staffed and implemented by the Planning Department of the city of Danville, Illinois. The project funding for two years was \$348,554, of which \$34,024 was provided by the city of Danville in the form of staff time, and the remainder by UMTA. The project was originally scheduled to consist of a 3-month planning phase and a 21-month demonstration phase, but was extended for ten more months to overlap with a period when newly initiated bus service was operating. At the end of the demonstration, \$70,000 of the federal funds allocated to RTR remained unspent.

Service Area Characteristics

Danville, Illinois, is a self-contained, small urban community located approximately 130 miles south of Chicago

and 80 miles west of Indianapolis. It covers an area of 12.9 square miles, 67 percent of which is developed; the population in 1970 was 42,600. The 1973 population estimate for Danville was the same, indicating no present growth in population. The region is characterized by relatively low density, single family housing and widely dispersed development. Industrial activities are concentrated in industrial parks.

The number of people eligible for the RTR program was estimated at 5600 persons 65 years of age and over, and 1900 handicapped persons who are under 65. The total target market of 7500 persons amounts to 18 percent of the total population of Danville. Thirteen percent of the total population is 65 years of age or older, which is higher than the national average of 10 percent. Approximately half of all eligible persons in the target group (handicapped and elderly over 64 years of age) have driver's licenses and the use of an automobile. State driver-licensing policy requires persons over 69 years of age to pass the regular driving tests every 3 years.

During most of the demonstration, no form of regularly scheduled public transit service operated in the city of Danville. Danville had been without bus service since November 1970. During the last 7 months of the RTR project, from December 1977 until June 1978, the project competed with the Runaround, a fixed-route transit system also funded by the UMTA Service and Methods Demonstration Program.

The taxicab companies in Danville are regulated on a franchise basis by the City Council, which approves changes in fares and other items of service; they operate in the traditional taxicab mode, with calls being handled by a dispatcher and assigned to drivers. At the outset of the RTR project, approximately 3 percent of all taxi riders were Danville residents under 65 years of age who have noticeable handicaps. Including those 65 and over (17 percent), approximately 20 percent of daytime taxi ridership was already comprised of the handicapped and elderly target groups before the demonstration began.

In addition, eleven social service agencies provided their clients with paratransit services amounting to 3000 one-way passenger trips per week during school months; this service level dropped to 1500 trips per week during the summer. The services were provided in vehicles owned by the agencies and through purchase of transportation services from the local cab companies. The total number of paratransit vehicles operated by the agencies at the start

of the demonstration was 8 automobiles or station wagons, two vans without lifts and one van with a lift.

Project Evolution

Late in 1973, officials of the city of Danville met with representatives of the Illinois Department of Transportation to discuss methods for restoring transit service to Danville. This eventually led to a Federal grant for a transit study and for the preparation of a Transit Development Plan (TDP) to provide comprehensive transit planning. The TDP was finalized in the winter of 1976 and called for the city to apply to the state and Federal governments for capital and operating funds to support a fixed-route bus system with 10 conventional buses. Surveys and comparisons with other downstate Illinois cities indicated that sufficient need and demand for such services exist. Public opinion on the part of the citizenry favored some form of public transit service with subsidy.

In the midst of preparation of the TDP, the city of Danville was approached by UMTA as a potential site for a user-side subsidy/taxi-discount project; one advantage of the site was the lack of any form of public transit other than taxis. Another was the existence of shared ride taxi operations and a zone fare structure. With the understanding that the demonstration would take place before another bus system could be implemented, the city and UMTA proceeded with the experiment. The project was originally planned to serve elderly, handicapped, and youth. However, the ease with which the new service could be used (taxi service being a known commodity to the public) and the high discount (70-75 percent) raised concerns that demand might build up too fast to be adequately handled by the cab companies, the project staff, and the budget for subsidies. Therefore, eligibility for the service was restricted to persons 65 years of age or older as well as all handicapped persons under 65 years of age. This group comprised approximately 7500 persons. The eligibility criteria for the system were purposely broad; for example, no restrictions were put on the income of those who could participate and no restrictions were placed on the type of trip served. The city project staff and Federal officials viewed the project as a cost-effective type of public transit service for particular transit-dependent sub-groups and not as a social welfare program to serve particular types of trips.

All three taxicab companies in Danville contracted with the city to honor the use of the RTR ID cards and charge

slips. In all other respects, taxi service remained the same as traditionally franchised by the city. Public acceptance of the project was mostly favorable, as indicated by telephone calls to City Hall, letters to the local newspaper, editorials, and other coverage by newspapers and radio stations. The prospect of serving youth on taxis through the project met with the greatest opposition; interestingly enough, the cab operators themselves were not enthusiastic at the prospect of serving youth under the project, due to fears of being "overrun" by demand of a sort that was undesirable for business purposes. "Youth" were associated with crank calls, no-shows, vandalism, and low tipping; consequently, the youth market was the least desirable as seen from the standpoint of the operators.

An advertising program was developed with the local newspaper. Through advertising, word-of-mouth, and newspaper coverage, the project received wide exposure from the outset. During 1 week in January 1976, radio advertisements for the service were aired four times a day; in February, approximately 50 posters were distributed in low income neighborhoods and senior-citizen centers.

Project registration, which began on November 10, 1975, was very high from the beginning. During the first three weeks, a total of 1200 persons signed applications, were given ten-minute certification interviews (to survey socio-economic/demographic characteristics and "before" travel behavior), and were issued ID cards. As many as twelve different persons worked on registration in the initial weeks; workers included volunteers from the eligible groups who had, themselves already registered. Another 500 persons were registered during the month of December. The first batches of ID cards were mailed out during the last week of November, and the first project trip took place on December first.

System Performance and Economics

Coverage - Before the demonstration, three taxi companies operated in Danville. Red Top/Yellow Cab Company had 19 licensed vehicles and carried slightly over 70 percent of the city's taxi trips; Courtesy Cab Company had 10 licensed vehicles and slightly over 25 percent of the taxi patronage; and Brown Cab Company operated one vehicle and carried less than 5 percent of the ridership. The total of 30 licensed cabs for the three companies served a total population of 46,500 in three communities (Danville, Tilton, and unincorporated Central Park) over a service area of 15.9 square miles. This coverage averaged out to one active taxi

vehicle per 1550 persons and 1.9 square miles, which is comparable to taxi coverage in communities of similar size as surveyed by the International Taxicab Association: one licensed taxicab per 1800 persons.*

The only significant change in coverage of taxi service during the demonstration period occurred when Courtesy Cab Company discontinued operations during the fifth month of the project, eliminating one dispatcher and ten licensed vehicles. During the following three months, Red Top Cab Company gradually restored previous coverage, which was continued during the rest of Phase I. Brown Cab Company did not significantly change its mode of operation during this time period, except to add one licensed vehicle in the thirteenth month. During the period of time when all three taxi companies were operating, Red Top Cab Company carried approximately 69 percent of all project passengers, Courtesy Cab Company carried 30.5 percent of all project passengers, and Brown Cab Company carried .5 percent of the total. These proportions were roughly the same as for all taxi riders, with Courtesy proportionately carrying slightly more project passengers. After Courtesy Cab Company discontinued operations, Red Top carried 97 percent of all project passengers and Brown carried 3 percent.

Level of Service - On the whole, project levels of service were good: the service was available 24 hours per day, seven days per week. passenger wait times averaged 9.2 minutes, and total travel times (including wait times) averaged 19.7 minutes; these figures are not significantly different from non-project taxi wait times and total travel times. As explained above, the combined problems of decreased dispatcher hours and decreased vehicle availability did cause a serious decline in the levels of service during daytime periods in May 1976, as reflected by an immediate drop in project demand on the part of the target group and other riders in response to the decreased level of service.

Project Costs - The front-end design and implementation costs associated with the RTR Service totaled approximately \$14,000. Administrative costs were \$1500 per month, and user-side subsidy costs over the entire project amounted to \$176,757. Thus, approximately \$237,000 in federal funds and local staff time was spent on the RTR project, exclusive of federal evaluation activities.

*Economics Characteristics of the Urban Public Transportation Industry, Institute for Defense Analysis for the U.S. Department of Transportation, February 1972, pp. 2-39.

The total cost per one-way passenger trip, including fares and project overhead, was approximately \$1.41, while vehicle productivity averaged four and five-tenths passenger per vehicle hour. Tables 3-2 and 3-3 below show the breakdown of project costs and the source of payments per passenger trip. The cost of RTR passenger trips was quite low in comparison with most publicly operated dial-a-ride systems and even with most taxi operations. Two reasons may be hypothesized to account for the low cost of RTR: 1) the administrative efficiency of the user-side subsidy mechanism, and 2) the efficiency and low cost of Danville's taxi operations. The RTR productivity figure of four and five-tenths passenger per vehicle hour is high for shared ride taxi service, yet low in comparison with the goals set by publicly operated dial-a-ride systems. However, it should be noted that higher operating costs associated with dial-a-ride systems necessitate obtaining higher productivities, even though this can result in lower levels of service (higher wait and travel times). Therefore, it may be that four and five-tenths is a desirable productivity level for an operation such as the Danville RTR project.

TABLE 3-2. PROJECT COSTS PER PASSENGER TRIP
(Actual Fares and Costs Incurred by Users and Project)

	Cost Per One-Way Trip
Total Fare per Passenger Trip	\$1.16
Administrative Monthly Operating Cost	<u>.18</u>
TOTAL OPERATING COST	\$1.34
Administrative Front-End Cost	<u>.07</u>
TOTAL COSTS	\$1.41

TABLE 3-3. SOURCE OF PAYMENTS PER PASSENGER TRIP

\$1.41	TOTAL COST
<u>-.31</u>	User Payment
\$1.10	Total Project Subsidy
	\$0.85 User-Side Subsidy
	.18 Monthly Administrative Subsidy
	.07 Front-end Administrative Costs

Project Demand

Registration and Use - After fourteen months of registration, 3000 persons had registered to use the RTR service; of these, approximately 2500, or 83 percent of those registered, had used the project discount at least once. By the end of the demonstration in June 1978, the registration figure had increased only slightly to 3370. Figure 3-1 shows the total number of project registrants, by month, and the number of project users during any one month, over the course of the demonstration.

The total target population eligible to use the RTR service was estimated at 7500 persons. Thus, the market penetration achieved by the project can be summarized as follows:

1. Forty-five percent of the eligible population (8 percent of the total population of Danville) registered for the RTR Service.
2. On average, 16 percent of the eligible population (3 percent of the total population of Danville) used the service during any one month.

During the first year of the demonstration, project demand rose from 4000 to almost 8000 trips per month, as shown in Figure 3-2. The fare increase in January 1977 caused a drop in demand; then, project trips began to increase again, stabilizing around 6000 per month through November 1977. The introduction of bus service in Danville in December 1977 caused another drop in demand for RTR service, which leveled off at around 4000 trips per month through the end of the demonstration.

Reasons for Not Registering - Slightly over two-thirds of those who had not registered by August 1976 (10 months into the project) reported that they did not need the project because they had sufficient alternative transportation for their trips. Three percent reported that they did not travel very much and might be presumed to have sufficient transportation for those trips. Another three percent reported that they were not interested in being subsidized for their trips. And an additional three percent had not signed up due to physical barriers in using taxis. In sum, approximately three-fourths (77 percent) of those not registered by August had specific reasons for not registering that primarily had to do with availability of alternative transportation resources for the trips they took. Of the remaining one-fourth, half were persons who reported that they were just about to sign up or would have

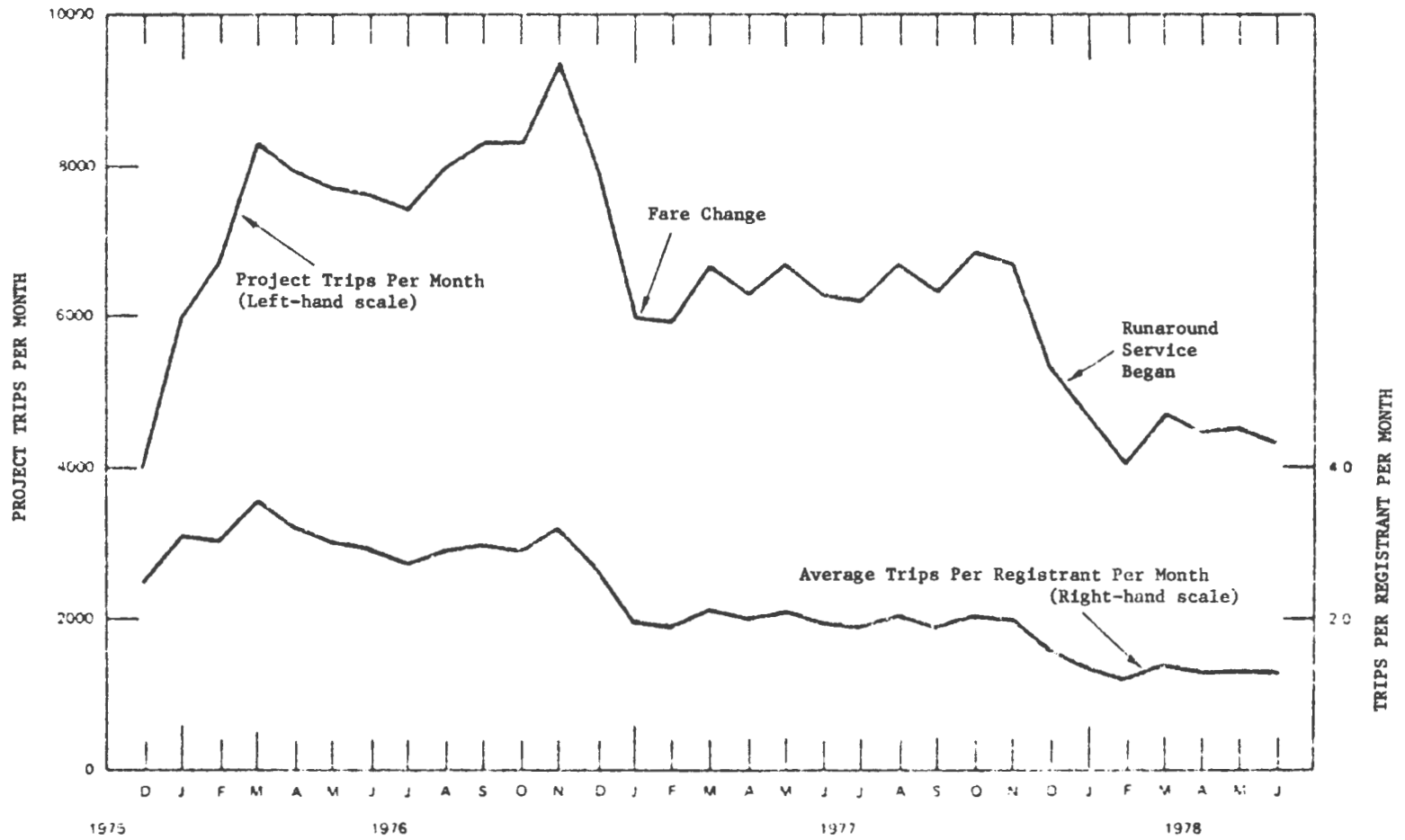


FIGURE 3-1. RTR REGISTRATION AND USE

already if they had known about the project; the reasons for the other half are unknown.

Usage Rates - Project use was most strongly related to the availability of alternative transportation: those with the fewest transportation alternatives, i.e., predominantly poor persons, used the project the most. On the other hand, average project trips per user,* four per user per month, was only moderate and amounted to considerably fewer trips than the monthly limit permitted. For those who used the project during any one month, mean project use ranged from five and one-tenth to seven and one-tenth passenger trips per person per month. An insignificant number of people use the project in excess of the monthly limit. Figure 3-2 shows the average number of trips per registrant by month. Use of the RTR service by various subgroups is shown in Table 3-4 below.

TABLE 3-4 MEAN PROJECT USE BY TYPE OF USER
(before price increase)

	Fraction of Total Users	Trips per User Per month
Age/Handicap:		
65 & Over, Handicapped	.18	3.7
65 & Over, Not Handicapped	.62	3.1
Under 65, Handicapped	.20	6.1
Alternative Transportation Available:		
Not Driver/Receive No Rides	.18	5.9
Not Driver/Receive Rides	.60	4.1
Driver/Auto Available/Rides	.22	1.3
Household Income Per Persons:		
Less than \$2,500 Per Person	.28	4.1
Less Than \$5,000 Per Person	.62	3.8
\$5,000 to \$10,000 Per Person	.09	3.3
Over \$10,000 Per Person	.01	3.6

*A user is defined as anyone who used the project at least once -- roughly 80 percent of those registered, based on data through December 1976.

Table 3-5, below, shows on-board survey data concerning the trip purposes of RTR riders.

TABLE 3-5. RTR TRIP PURPOSES

	<u>% of Total</u>
Shopping	33
Personal Business	21
Visit/Social	17
Medical/Dental	15
Work	7
Church	3
Other	<u>4</u>
	100

Effects of Bus Service - In December 1977, the first month of Runaround bus service, RTR project user per registrant dropped and continued to decline over successive months in 1978, stabilizing at an average reduction of seven-tenths person-trips per registrant per month from 1977 levels. (See Figure 3-2.) While the initial drop in December may have been largely attributable to bad weather - since the preceding year showed a similar drop -- the longer-term decline in project use through June 1978 was clearly due to the availability of the Runaround. This finding is corroborated by a survey of bus riders, whom 19 percent were RTR registrants: of these registrants, 49 percent indicated that they would have made the surveyed trip by taxi (RTR) if there were no Runaround service.

Project Impacts

Users - By all accounts, the project's impact on the travel behavior of users was small: total trip-making on the part of users did not increase significantly, nor did a significant mode shift from other modes to the RTR service occur. It is estimated that the project increased trip-taking on the part of users by less than 1.5 percent. Less than 3.5 percent of user trips were shifted to the project mode; the amount of money saved by users on all subsidized taxi trips was less than \$4 per person per month.

The findings regarding usage suggest that low cost taxi service will not lead to substantial increases in tripmaking on the part of handicapped and elderly population. This does not preclude the possibility that demand, and therefore

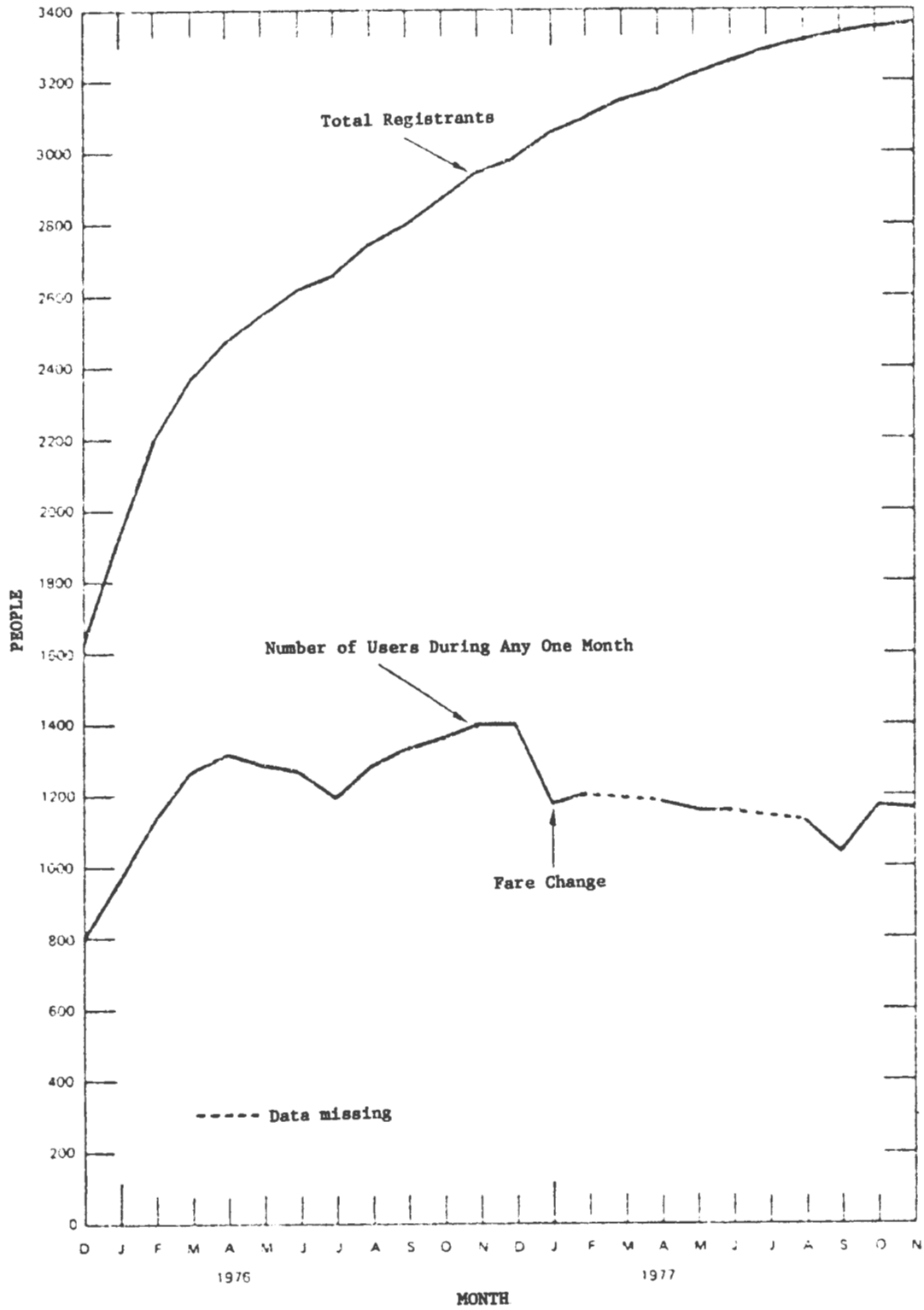


FIGURE 3-2. RTR PROJECT TRIPS

the impact of such improvements, might continue to grow over time. Since the project provided a very high level of service, the availability to eligible persons of other transportation options (even in the absence of any bus service) seems to be the most important reason for the project's minor impact on travel behavior.

Taxi Operators - The impact on the taxi operators has amounted to an estimated 15 percent increase in overall business as a result of project trips, which are as profitable as non-project trips. At the same time, the city of Danville has obtained demand-actuated, door-to-door transit service at a much lower cost per passenger than on most publicly operated dial-a-ride systems.

Social Service Agencies - Coordination and consolidation of the RTR project and agency paratransit services were hindered to varying degrees by the following factors:

- 1) the RTR limit on individual use of the subsidy;
- 2) the disparity between the partial RTR discount and the 100 percent discount desired by agencies;
- 3) the inability of the agencies to reimburse their clients directly for trips to that agency;
- 4) the unwillingness of the RTR project staff, agency personnel, or cab company operators to lead a negotiation effort on third-party payments; and
- 5) the disparity in emphasis of the RTR project and the agencies: RTR focused on all types of trips, whereas agencies were concerned primarily with client trips to agency services and activities.

In light of these realities, the agencies chose to view the RTR project as a new, additional resource enabling their clients to take non-agency or discretionary trips, and were enthusiastic in their outreach efforts to make their clients aware of the new resource.

Summary of Findings

The Danville demonstration set out to test a limited application of a user-side subsidy which provides additional transportation options for handicapped and elderly persons with one project mode -- traditional door-to-door taxi service. The user-side subsidy mechanism proved to be a

very workable one for that purpose. The project suggests that a user-side subsidy is as administratively workable as other forms of public support for special transportation services, through provider-side subsidies or publicly operated systems. Specifically, the following findings can be stated about the RTR Program in Danville:

1. The certification and registration of eligible target-group persons in Danville was very successful. It was possible to establish a set of criteria for handicapped and elderly persons and to apply those criteria in determining eligibility for subsidy on taxi services.
2. In general, the charge-slip system worked in the Danville demonstration. Less than 2 percent of project users reported problems in registering for the project, using their ID card or signing the charge slips. Taxi operators as well as project staff were generally satisfied with the reimbursement and accounting system. Administrative costs averaged less than 14 percent of the total operating cost per trip.
3. The Danville demonstration encountered no serious problems with regard to fraud control. Some project users did consistently charge more trips than the monthly limit allowed; a remedy was available for such infractions of the rules. The local project staff concluded that there was no incentive for drivers to create fictitious RTR trips or to forge charge slips on their own.
4. In Danville, a competitive, private-enterprise environment had already produced taxi services at a low total cost per passenger; the project utilized these existing services on a per-trip basis, thereby avoiding major capital outlays for equipment and personnel training.
5. The average project use of about 4 trips per person per month was moderate, and considerably lower than the monthly limit of \$20 would have allowed. The availability of discount taxi service has not had much of an impact on the frequency of tripmaking for most of those who registered.
6. Larger numbers of low-income persons than other income groups registered with the project; very few persons who lived in households with over

\$10,000 annual income registered with the project. Registrants with higher-income used the project slightly less, on the average, than those with lower-income. These data suggests that income restrictions may not be necessary or desirable for the sake of controlling program costs.

7. Approximately three-fourths of all targeted persons (both those who registered and those who did not) reported that they had experienced no problems using buses. Thus, while 18 percent of Danville's population were eligible for the project subsidy on taxis, perhaps only 5 percent of the total population required door-to-door service at all times. Approximately one-fourth of the project costs were spent on trips taken by persons who reported that they would have difficulty using buses. The remaining subsidy costs were consumed by those who reported that they might be able to use buses.
8. Project demand climbed rapidly from 4000 trips per month in December 1975 to 8000 trips per month in December 1976, after which the RTR price increase in January 1977 and the introduction of bus service in December 1977 caused successive drops in demand. The number of RTR trips per month stabilized at around 4000 from December 1977 through the end of the demonstration.
9. Forty-five percent of all project trips were taken outside the hours of 9:00 AM to 5:00 PM, indicating the desirability of the 24-hour per day, 7 days per week level of service furnished by the RTR project.
10. Danville city officials as well as the community at large were very pleased with the success of the RTR project. In December 1977, a fixed-route transit system called the Runaround began service in Danville. This service, also funded by the UMTA service and Methods Demonstration Program, constitutes a test of the user-side subsidy mechanism in creating a market for fixed-route bus service; it is scheduled to operate through August 1979.

Implications for Transferability

The transferability of the user-side subsidy concept to settings where local private suppliers and a governmental or private agency are interested in subsidizing travel on the part of all persons or subgroups appears to be very great. The administrative workability of the user-side subsidy may be affected by the size of the community in question. For example, in large cities, the relationships between government, private providers, and the public are not as close as they are in Danville; consequently, the cooperation among all parties may not be as great, and contract negotiations may be influenced by greater mutual distrust. Similarly, more fraud controls may be required in larger settings. Tickets may be required to assure that cab companies don't create false charge slips. On the other hand, a large distribution system for tickets creates the possibility for large-scale theft or forgery. However, there are no data that suggest that a user-side subsidy mechanism is any more vulnerable to mismanagement than any provider-side subsidy program.

The cost-effectiveness of the user-side subsidy should be transferable to other settings. In this regard, the specific characteristic of shared riding was an important factor contributing to the productivities realized in Danville and is a requirement for Federal subsidy.

The total project demand and impact on target-group users is a product of demographics, travel needs, service levels, availability of alternative transportation, and social attitudes. Danville has an above average proportion of elderly and handicapped, who travel as much as the national average for such persons. The RTR service levels were very good, and there was no competing bus system during most of the project; the availability of alternative transportation for the target group in Danville was only average. On the basis of these variables, the Danville project could be expected to generate a project use per person that would be equal to or greater than that generated in another setting. It is possible that settings may differ considerably in terms of the willingness on the part of the target-group persons to use such a service. For individuals, this involves attitudes toward the use of "special" subsidy and the shift from dependence upon relatives and friends for rides.

Reference

FitzGerald, P. G. (Crain and Associates), User-Side Subsidies for Shared Ride Taxi Service in Danville, Illinois: Phase I, U.S. Department of Transportation, Transportation Systems Center, Cambridge MA, June 1977. Final Report, Report No. UMTA-IL-06-0034-77-1.

CHAPTER FOUR

ACCESSIBLE FIXED ROUTE BUS SERVICE IN ST. LOUIS, MISSOURI

Introduction

The Bi-State Development Agency, which operates the Bi-State Transit System in the St. Louis, Missouri metropolitan area, has initiated a program of accessible fixed route bus service. This service is designed to increase the mobility of persons with physical disabilities who are unable to use conventional buses. The accessible buses have a wheelchair lift and are also equipped with the kneeling feature,* handrails on the doors, and additional posts to hold on to while standing in the aisle.

Provision of accessible bus service was undertaken by Bi-State as a pilot program to test the concept by measuring the response to the service, gathering actual operating experience, and evaluating the costs and benefits. The Bi-State system is of particular interest at this time because it was the first transit authority in the country to implement a sizeable number of lift-equipped fixed route buses and has had over a year of operational experience with these buses.

The Setting

The city of St. Louis is the center of one of the country's major urban metropolitan areas. It is located in the eastern part of Missouri, beside the Mississippi River. Part of the urbanized area lies on the eastern side of the Mississippi River in the state of Illinois. St. Louis city, and St. Louis County in Missouri, and Madison, St. Clair, and Monroe Counties in Illinois combine to form the transit service area, which had a population of about 2.1 million in 1970. The distribution of the metropolitan area population by age closely approximated the national distribution in 1970.

The St. Louis area mass transit system is operated by the Bi-State Development Agency (BSDA). The BSDA transit

*The kneeling feature means that the right front corner of the bus can be lowered several inches to make boarding easier for disabled passengers.

system owns 1022 vehicles, of which 973 (including accessible buses) are in regular fixed route service and 49 are used in other services. The vehicle requirements for the AM peak period are 724 line-haul buses (including accessible) and nine Orbit or Scooter* vehicles. Base period requirements are 327 line-haul and 22 Scooter/Orbit vehicles. Currently, the system provides 2.2 million annual total platform hours and 28.9 million annual vehicle miles.

Annual ridership of the BSDA transit system is now about 68 million. The BSDA system includes 100 local routes, 50 rapid or express routes, three park and ride routes, and six shopper/express routes. The FY79 budget projects total operating revenues at \$14 million and a deficit of about \$49 million.

Regular fares on the BSDA system are \$0.25, with a \$0.10 transfer charge. In Illinois there are also zone charges imposed due to the smaller amount of local subsidy provided. The fare structure for the elderly and handicapped is \$0.15 in the peak period and \$0.10 in the off-peak, with no transfer or zone charges.

Wheelchair Users

There is very little data available on the number of wheelchair users in the St. Louis area. Estimates shown in Table 4-1 were made by using incidence rates from a study of the transportation handicapped in the Buffalo, New York area. Using these rates, there are about 4000 non-institutionalized wheelchair users in the BSDA transit service area, of which about 1800 are non-elderly. It was also estimated that about 1000 wheelchair users reside within 1/4 mile of the accessible bus routes. Hence, the primary target market for the wheelchair lift service is about 1000 persons.

Organization and Historical Background

Transportation planning in the St. Louis Metropolitan area is largely concentrated in two agencies, the Bi-State Development Agency and the East-West Gateway Coordinating Council (EWGCC). Historically, the BSDA has been involved in short-term project developments, whereas the EWGCC has concentrated on general long-range policies. Both have

*Special neighborhood circulation services.

TABLE 4-1. ESTIMATES OF WHEELCHAIR USERS

	NON-INSTITUTIONALIZED WITH CHRONIC CONDITIONS	INSTITUTIONALIZED IN LONG-TERM CARE FACILITIES	TOTAL
PREVALENCE RATE	.0019 ¹	.0016 ²	
<u>TRANSIT SERVICE AREA</u>			
Total Wheelchair Users	4,007	3,374	7,381
Elderly	2,204	2,362	4,566
Non-Elderly	1,803	1,012	2,815
<u>17 ACCESSIBLE ROUTES SERVICE AREA (1/4 MILE)⁵</u>			
Total Wheelchair Users	1,011	851	1,862
Elderly	556	468	1,024
Non-Elderly	455	383	838

¹Prevalence rate based on a study conducted for the Niagara Frontier Transportation Authority.

²Estimated prevalence rate for wheelchair users residing in nursing homes and other institutions in the Niagara Frontier Region.

³Estimated 55% elderly.

⁴Estimated 70% elderly.

⁵Based on an estimated population of 532,331 within 1/4 mile of all 17 accessible lines.

played a major role in planning for the elderly and handicapped.

The planning of the program for accessible buses in St. Louis was not a rigorous or formal process. Decisions were based upon random events and the participation and encouragement of the public.

The EWGCC provided input directly through studies conducted in cooperation with BSDA, and indirectly through its Elderly and Handicapped Technical Advisory Committee, which was formed in November 1975 to conform to UMTA planning requirements. In May 1977, EWGCC published its Transportation Plan for the Elderly and Handicapped.

The Technical Advisory Committee as originally constituted had approximately 33 members, of whom one-third were handicapped and 40 percent were elderly. In March 1976, the Advisory Committee formally voted support for Bi-State efforts to procure totally accessible full-size vehicles for fixed route services and a phased plan for demand-responsive service.

Public input arose mainly through the hearings on grant applications. On January 21 and 22, 1976, hearings were held on the application for a grant to purchase 200 standard buses and related equipment. At this hearing the subject of accessible fixed route buses was raised from the floor. The plans for accessible buses in Los Angeles and Seattle were cited, excerpts from the UMTA and Rehabilitation Acts quoted, and the possibility of seeking injunctive relief was mentioned.

After these public hearings, Bi-State began looking into accessible fixed route service. Consideration of demand-responsive special services, as an alternative, had already begun and continued in conjunction with EWGCC. Bi-State studied vehicle specifications, extra staffing requirements, potential problems, and weighed the pros and cons of total accessibility.

The critical point in public input appears to have occurred at a second set of public hearings on August 16 and 17, 1976, regarding applications for two more grants for the purchase of an additional 180 buses and other equipment, including 13 vans. At this time the specifications for the 200 buses to be procured through the previous grant application had not been released. Twenty-four people spoke in favor of making the Bi-State fixed route system totally accessible. It appears that at least two County Commissioners also favored the concept. As was the case at

the previous hearings, consumer groups suggested that legal action could be taken to compel Bi-State to purchase accessible buses.

The actual decision to implement the accessible bus program was taken on November 12, 1976 when Board authorization was given for Phase I and Phase II of the service implementation. Phase I was the authorization to purchase 200 buses, of which 120 were to be 102 inches wide. One half of these (60 buses) were to be accessible. Phase II included specifications for 210 additional buses, of which all 97 of the 102-inch wide buses were to be accessible.

As a result of in-house studies of vehicle requirements, Bi-State had determined that the space available in the entryway and aisle of the 96 inch wide bus would make it difficult to accommodate wheelchairs. Therefore, the wheelchair lift specification was confined to the 40-foot bus, which was 102 inches wide. Because of its width, this bus is more difficult to maneuver, a factor impacting route deployment. All the transit vehicles, including the 96-inch wide buses were, in fact, specified with the wide door and kneeling feature, which, subject to the space considerations above, would allow for retrofitting at a later date.

Implementation

The first 60 accessible vehicles were scheduled for delivery in March of 1977. This would have allowed for a service start-up in May subsequent to the spring schedule change. However, because of delays, Phase I service was not inaugurated until Monday, August 15 and lasted until November 28, when the remaining 97 vehicles were put into service. The Phase II accessible fleet contained 157 buses deployed on seventeen major routes in the area.

As with any schedule revision, new route schedules were printed and distributed. On the schedules, routes with accessible buses were distinguished by:

- the international accessibility symbol in the top left-hand corner;
- red printing instead of black; and
- accessible runs marked with a star (*).



Boarding and alighting wheelchair passengers on accessible fixed route buses: Bi-State Transit System; St. Louis, Missouri.





Wheelchair Lift in front door step position (left) and in platform position at curb level for loading at handicapped passenger (right)

These schedules were packaged in a brochure explaining the use of the system.

The primary concerns in developing the initial accessible route structure were to provide the best overall coverage with the resources available while serving the largest potential ridership. Self-identification surveys to determine the size and location of the handicapped population were widely distributed and published in local newspapers. However, the response was minimal, and Bi-State instead had to resort to other criteria for planning the accessible coverage. Consideration was given to the number of elderly residing within 1/8 of a mile on either side of the route and to likely origins and destinations of trips by wheelchair users.

Since the accessible runs would be part of the normal operators' route selection, it was necessary to provide training for all of Bi-State's bus operators (approximately 1250). The training was regarded as compulsory prior to operating the buses, and paid overtime was given. A key ingredient in the staff training was a 15-minute synchronized audio-visual presentation developed by Bi-State to sensitize the drivers to the problems of the handicapped. Each driver was also given 45 minutes of instruction on the bus covering operation of the lift and procedures in emergency situations.

Two separate manuals were produced containing instructions on the operation of the lift system and procedures for assisting the elderly, wheelchair users, the blind, the deaf, and the mentally handicapped, including information on what to do about medical problems, such as seizures. In particular, the drivers were instructed as follows:

- Use kneeling only for boarding from street level.
- Wheelchair passengers should be the last to board or alight.
- Use the lift only for wheelchairs. Persons standing on the lift could be seriously injured due to lack of headroom at outer end of platform.
- If wheelchair positions are full, advise waiting passengers, and give an approximate time until the next accessible bus will arrive.

- At obstructed stops give handicapped passengers the option of alighting in the street or remaining on board.
- The driver is not expected to physically assist the wheelchair passenger in boarding or alighting while on the bus.

All lift buses are radio-equipped, and each wheelchair boarding and alighting is reported to the dispatcher. It was decided that in-service rectification of a lift malfunction should also be handled through the radio system whenever possible. Each malfunction is reported and described to the dispatcher. Remedial action is suggested; if it fails, a road supervisor is dispatched to the scene.

Prior to start-up, some 35 demonstrations of the wheelchair buses were conducted at agencies and public places such as shopping centers. The latter was conducted on weekends for maximum exposure to the general public as well as potential patrons. It is estimated that some 150 people in wheelchairs tried the buses during this period.

Media advertising via newspapers, TV and radio was used. Paid advertisements with a total cost of over \$11,000 were taken in about 40 newspapers, including three main and 16 local St. Louis area publications. TV exposure was essentially public information spots. As elsewhere, Bi-State obtained TV time in exchange for transit on-board advertising.

The new fare structure for the elderly and handicapped - \$0.15 peak fare, \$0.10 off-peak fare, with free transfer and no zone charges - has proven to be very popular. Eligibility for the new fare requires possession of either a senior citizen, blind person, or a new handicapped identification card. The sign-up program for the reduced fare card continues at a steady rate with over 200 certifying agencies participating. At the start of the accessible service 25,000 cards were issued; about 75 to persons using a wheelchair, and approximately 300 to severely disabled persons. By the end of February, 1978 there were 35,000 cards issued, including an estimated 100-150 to wheelchair users.

Level of Service

During Phase I the average route was about 60 percent accessible on weekdays. During Phase II, this increased to about 71 percent. Although BSDA operates a total of about



Each accessible transit bus has two Wheelchair Securement Areas.



Mechanics repair the lift mechanism from a pit underneath the bus.

160 different routes, those selected for accessible service were the 17 major lines that carry almost half of all system ridership. As a result, a fairly significant portion of the area and of the major activity centers was provided with accessible service.

Table 4-2 shows the scheduled level of service for each line during Phase II, including percent of trips to be operated with accessible equipment for five different time periods and the accessible headways for three different periods. This table shows that although the average percent of trips scheduled to be accessible for all 17 lines was 71 percent, this percentage varied by time of day and by line. In general, evening service could have a much higher rate of accessibility (91 percent) because of the longer headways operated at that time. The afternoon peak period schedule called for only 56 percent of all trips to be accessible. Since most wheelchair users traveled between the hours of 7:00am to 6:00pm, the average percent accessibility overstates the scheduled level of service to wheelchair users.

Generally, the scheduled headways of the accessible buses were fairly consistent throughout the day, on each line, and did not drop substantially during the peak periods. This was, of course, due to the limited numbers of accessible buses and the desire to have as many buses as possible scheduled at all times. During the 7:00am to 6:00pm period, scheduled accessible bus headways ranged from 12 to 60 minutes, with most in the 15 to 30-minute range.

These schedules, however, were often not adhered to because of the unavailability of lift-equipped buses. In some cases wheelchair users were known to have waited for two, three, or more scheduled accessible buses before a bus came along which was actually accessible. Consequently, the actual level of service provided was significantly less than the scheduled level of service. Out-of-service accessible buses or buses with inoperable lifts often totaled 40 to 50 percent of the accessible fleet.

The lift failures can be categorized into three general areas--electrical, hydraulic and mechanical. In the electrical category, most failures have involved the control box circuit board assembly and the five micro-switches which control the movement of the lift. The control box failure rate is significant but not serious. The data for the micro-switches showed a high initial failure rate. The ramp extend micro-switch was the most prone to failure, a condition which can be attributed to its exposure to dirt and moisture. The installation of mud flaps which more

TABLE 4-2. ST. LOUIS ACCESSIBLE BUS LEVEL OF SERVICE (PHASE II)

LINE	PERCENT OF TRIPS HAVING ACCESSIBLE BUSES					HEADWAY BETWEEN ACCESSIBLE BUSES			TOTAL ACCESSIBLE TRIPS	
	Before 7	7-9	9-3:30	3:30-6	After 6	7-9	9-3:30	3:30-6	No.	%
FOREST PARK	100	91	89	59	100	12	13	15	74	86
ALTA STA	82	62	64	41	100	24	28	21	41	65
LEE	75	58	68	50	100	17	23	25	47	69
BROADWAY	86	75	95	78	100	20	19	21	48	89
TOWER GROVE	100	86	89	54	74	20	23	21	43	78
CARONDELET	57	57	58	60	71	30	26	25	39	31
KINGSHIGHWAY	80	54	46	50	93	17	21	15	54	57
OLIVE	75	71	61	58	73	24	21	21	48	66
CHEROKEE	53	62	92	60	83	12	16	17	66	73
BELLVILLE- ST. LOUIS	64	24	58	48	93	24	21	15	54	54
GRAND	100	59	74	54	94	12	13	12	76	72
NATURAL BRIDGE	56	62	96	85	100	15	16	14	60	83
DELMAR-FORSYTH	50	55	58	55	87	20	21	25	47	62
CITY LIMITS	60	25	62	33	90	60	39	50	27	56
McKINLEY BRIDGE	75	80	87	42	100	30	28	30	39	76
CROSS COUNTY	33	100	92	83	100	30	32	30	24	86
ST. LOUIS AVE.	100	60	100	60	100	40	43	50	18	82
	70	58	74	56	91					71

¹As originally scheduled in November of 1977.

effectively protected the ramp extend micro-switch, reduced these failures considerably.

Hydraulic system components prone to failure included the ramp extend cylinder, and the hydraulic manifold. The ramp extend cylinder failures can be attributed primarily to two problems: 1) accidental damage caused when the positive stow lock failed to disengage, and 2) excessive load transmitted through the skid pan when it was damaged. The stow lock portion was corrected with a design modification involving installation of another micro-switch, but the accidental skid pan damage which leads to ramp extend cylinder failure appears to be an inherent lift design and installation problem.

The leaking of the hydraulic manifolds was another serious hydraulic problem particularly during early operations. Replacement of the manifolds has significantly reduced, but not completely eliminated this malfunction.

The major problem in the mechanical systems area was the drifting of the ramp and step sections of the lift. The ramp section was supposed to remain in a stored or stowed position under the steps when the lift was not in use. The outward drifting movement of the section constituted a definite safety hazard since it projected out from the bus. The downward drifting presented a potential road hazard due to grounding and a passenger hazard due to the increased step height created in the bus. A number of design modifications were made to try and solve this problem, none of which have proved entirely successful.

Another significant mechanical problem involved the failure of the extending slides which support the outer platform. The rear slides were much more prone to failure than the front slides due to their increased exposure to dirt and moisture. Design modifications to solve this included installation of mud flaps and a change in lubricant. These modifications have reduced but not eliminated the problem.

Repairs involving the skid pan have been a major item. However, there has been a progressive decline in repair frequency. This improvement is attributed to the installation of a micro-switch on the stow lock which is intended to prevent accidental damage if the stow lock fails to disengage.

As the discussion of lift problems indicates, the corrective measures implemented have had a positive effect. Over the last 7 months of Phase II, the number of monthly

repairs needed has declined steadily to a level of about one-half of that required during the prior 7 month period.

Ridership

The Bi-State dispatcher is responsible for keeping a log of each person in a wheelchair riding the system. Drivers are instructed to call in each time a passenger in a wheelchair gets on and off the buses. Comparison of the dispatcher's trip log with travel diaries filled out by a sample of bus riders in wheelchairs indicates that only about half the boardings were actually recorded by the dispatcher. Thus, the actual ridership by wheelchair users is uncertain. Table 4-3 contains the figure reported by the dispatchers and the most reasonable estimate of total wheelchair ridership that can be made with the data available. Over the five-month period May through September 1978, this ridership averaged slightly over five boardings per day.

There are other elements of uncertainty in assessing the actual transit travel demand of wheelchair users. A number of boardings have been denied to wheelchair users due to unavailable or inoperable lift equipment. The percentage of these trips that are completed by waiting for the next accessible bus is unknown. It is likely that some of these trips are foregone or made by another mode. Here again, the actual number is unknown.

One fact concerning ridership is quite clear: winter weather had a dramatic effect on the number of transit trips taken by wheelchair users. Ridership for January and February was less than half the average of the previous months. The amount of snow which fell during the winter of 1977-78 in St. Louis was much greater than the normal average, and snow accumulation is one of the most restricting of all barriers to travel by wheelchair users.

Even though a concentrated effort was made to identify all riders in wheelchairs, only about 40 could be identified. This is not a complete count of all wheelchair users who have ever used the bus system, but it is indicative of the small number of riders. Further evidence of the limited impact of the service is manifested by the fact that two individuals accounted for nearly 41 percent of the wheelchair boardings; the twelve most frequent wheelchair riders made 80 percent of the trips.

Sixty non-institutionalized wheelchair users were surveyed to determine their sociodemographic characteristics

TABLE 4-3. MONTHLY TRANSIT RIDERSHIP BY WHEELCHAIR USERS

<u>Month</u>	<u>Reported* Boardings</u>	<u>Estimated Boardings (2x Reported)</u>
August 1977	93	186
September	79	158
October	94	188
November	91	162
December	97	194
January 1978	41	82
February	35	70
March	59	118
April	123	246
May	79	158
June	60	120
July	91	182
August	74	148
September	76	152

*By dispatchers.

and travel patterns. They were asked to rate the importance of possible reasons for non-use of the accessible bus service. The reasons rated most important were the inability to go out without help, the availability of another mode, and the difficulty of getting to the bus stop. Reasons listed as moderately important included: the accessible bus routes did not serve their trip origins or destinations; the trip time was much greater by transit than by automobile; schedule information was difficult to obtain; there were severe weather conditions; and there was the fear of having difficulty in getting on and off the bus. Reasons rated least important were the dislike of being out in public, the crowdedness of the bus, an unsafe feeling on the lifts or buses and the unreliability of the lifts and the scheduled accessible bus service. These findings seem to indicate that, regardless of the reliability of accessible bus service, there are a number of other reasons which tend to limit the extent that wheelchair users will be able to use fixed route transit.

Economics

The price of the accessible buses was \$5000 more than buses without the lift on the first order, and \$6315 more on the second order. The total cost of the 157 lifts plus installation was \$912,555. With respect to the impact of accessible service on the operating cost, some components of the increased cost are easy to determine, others are not. Bi-State instituted accessible bus service at the same time as other schedule changes, which precluded a direct calculation of the cost of operating an accessible bus service. Nevertheless, Bi-State estimated the accessible bus program costs from April 1977 through June 1978 as shown in Table 4-4.

The basic service cost (service hours) would be recurring annually. The major components of this marginal service cost were a reduction in interlining, increased layover time on some of the accessible routes, and the ferrying of drivers out to the routes to pick up the accessible buses. The reduction in interlining, i.e., the use of a bus on more than one route, occurs when an accessible bus completes its run but the route on which it would normally continue is not scheduled for an accessible vehicle. It could be interlined and the lift not used if there were an excess of lift vehicles, but this is not the case in St. Louis. When interlining is reduced, greater bus service hours generally result. The increased layover time was scheduled on some routes in order to insure adequate recovery time if wheelchair boardings and alightings

TABLE 4-4. ACCESSIBLE BUS PROGRAM COSTS

CAPITAL COSTS		
Accessible Bus Equipment	\$912,555	
Maintenance Facility Modification	5,250	
TOTAL CAPITAL COSTS		\$917,805
START UP COSTS		
Marketing and Publicity	\$35,174	
Maintenance Preparation	31,010	
Driver Training	16,322	
Administrative	14,040	
		\$96,546
DIRECT OPERATING COSTS		
Service Hours	\$213,182	
Lift Maintenance and Repair	244,798	
Preventative Maintenance	84,563	
SUB-TOTAL		\$542,543
INDIRECT OPERATING COSTS		
Accident Liability	\$11,444	
Support Staff	68,183	
SUB-TOTAL		\$79,627
TOTAL OPERATING COST (INCLUDING START-UP)		\$718,716
TOTAL OPERATING COST (EXCLUDING START-UP)		\$622,170

increased the run time. Given the low ridership by wheelchair users this probably was not necessary. Ferrying of drivers out to the buses was employed to keep operable accessible buses in service to the maximum extent possible instead of returning the buses to the garages as drivers completed their runs.

In the future, the maintenance costs will decrease as the reliability of the lifts is improved, and fewer mechanics and less frequent inspections are needed. Other costs are expected to decrease as less driver training and less advertising are required. Potential cost increases include higher driver wages (for helping wheelchair passengers or merely for operating the accessible buses) and for the payment of claims by passengers in wheelchairs that are injured while boarding or riding the buses or by other passengers suffering injury due to lift equipment malfunctions.

Project Impacts

Wheelchair riders who use the accessible buses will benefit from lower travel costs. Riding a bus at a 10 or 15 cent fare is cheaper than driving a car or taking a taxi or medi-cab. The cost is also lower than that of being driven by a friend or relative if the time and travel cost of the other persons are considered.

The fact that there are only a small number of wheelchair user transit trips per day and that the majority of these trips are taken by a handful of persons, indicates that, to date, there has been very little overall change in mobility or travel mode among the wheelchair-using population. A few individuals, however, have achieved a much greater degree of mobility.

The decision of Bi-State to provide accessible service has resulted in increased maintenance requirements. A major difficulty has been keeping enough accessible buses operable to provide the service published in the schedule. During 1978, on an average day, 66 of the 157 accessible Bi-State buses were unavailable for service. With only 31 spares planned for, this leaves a shortage of 35 buses. Bi-State developed a priority system for covering the most important routes when shortages occurred. A larger number of spare lift buses appear to be required to meet the schedule than are normally required for the rest of the fleet.

The number of on-the-road breakdowns of the lift buses was sufficiently large that two more road supervisors were

hired to deal with these breakdowns and assist any wheelchair passengers stranded on the buses. These supervisors not only help the stranded wheelchair passengers off the bus but also take them where they are going.

The impact on travel time for non-wheelchair users will be minimal until wheelchair ridership builds up. Lift operation for two or more passengers during a single bus run would definitely impact other riders and bus operations. However, this has not been a problem to date because of the low ridership.

Whether the lifts are used or not, there is a loss in seating capacity on the accessible buses. With two wheelchair tiedown positions installed, eight permanent seats are removed. If the wheelchair positions are not occupied, the fold down seats will accommodate four people. Seating capacity for ambulatory riders is, consequently, reduced by four to eight seats, depending on whether either or both of the wheelchair positions are occupied.

The present use of accessible buses is such that there are minimal effects on private operators such as taxis or medi-cab type services. This could change, however, if wheelchair ridership on the accessible buses increases substantially.

The labor unions have, so far, not negotiated extra pay for the operation of lift buses. Whether this will hold true for the future is not known.

The boarding of wheelchair passengers has resulted in two injuries. In both instances, the wheelchair user fell backwards off the lift platform. One accident was caused by a lift malfunction and the other was caused by operator error. The financial repercussions of these injuries have not yet been determined. The importance of driver training and the verification of driver competence in operating the lift cannot be stressed strongly enough.

Summary

The Bi-State Development Agency has been operating fixed route accessible buses in the St. Louis Metropolitan Area since August 15, 1977. Frequent malfunctions of the wheelchair lifts have plagued the service, and the reliability has been relatively poor.

Bi-State currently has 157 fully accessible buses. These were purchased in two increments, and were deployed in

two stages. The scheduled service for Phase I required 51 lift-equipped buses on the 10 accessible lines. Phase II required 126 lift buses on the 17 accessible lines. Since the number of out-of-service accessible buses consistently exceeded the spare capacity, the full scheduled service was rarely, if ever, provided during Phase II. A priority scheme was devised to cover the lines which attracted most of the wheelchair trips when there were shortages of accessible buses.

Although it is estimated that 1000 persons in wheelchairs reside within 1/4 mile of the accessible bus routes, utilization of the lift bus service by these people has been slight. The number of wheelchair boardings reached a high of eight per day during April 1978 but leveled off to slightly over five per day from May through September. Only about 40 different users could be identified. Analysis of the reported transit trips taken by wheelchair users during the first year revealed that two individuals accounted for over 40 percent of all boardings and that 80 percent of the boardings were made by the 12 most frequent riders.

Reasons for not using the accessible buses were solicited in a home interview survey of people in wheelchairs who did not use public transit. The reasons ranked as most important were the inability to go out without help, the availability of another mode, and the difficulty of getting to the bus stop. Unreliability of the lifts and the scheduled service ranked among the least important reasons for not using the service.

Because of the current low utilization of the fixed route accessible buses by wheelchair users, the service has probably not had a discernible impact on the travel habits of most wheelchair users or the extent of their utilization of other transportation services. Likewise, the infrequent boardings of wheelchair passengers has not impacted the travel time of other bus passengers.

The cost of providing accessible bus service begins with purchase of the equipment. The cost of the lift and its installation averaged slightly over \$5800 for the two purchases. Of more importance is the marginal operating cost of this type of service compared to non-accessible bus service, since this will be a recurring annual expense. Bi-State estimated that the marginal cost of operating and maintaining/repairing the accessible buses was \$542,543 over the period April 1977 to June 1978. Added to this are the costs of the support staff, driver training, advertising and marketing, and accident claims, which totalled \$176,173 over the same period. Given the low wheelchair user ridership,

some of the operational changes implemented, which added substantially to the service cost, may not have been necessary.

The major problem with the provision of the accessible bus service to date has been the lack of reliability of the lift equipment. It is hoped that reliable lift operation will be established in the near future. Operating costs should decrease as the lift problems are solved and the service operates more smoothly.

Reference

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