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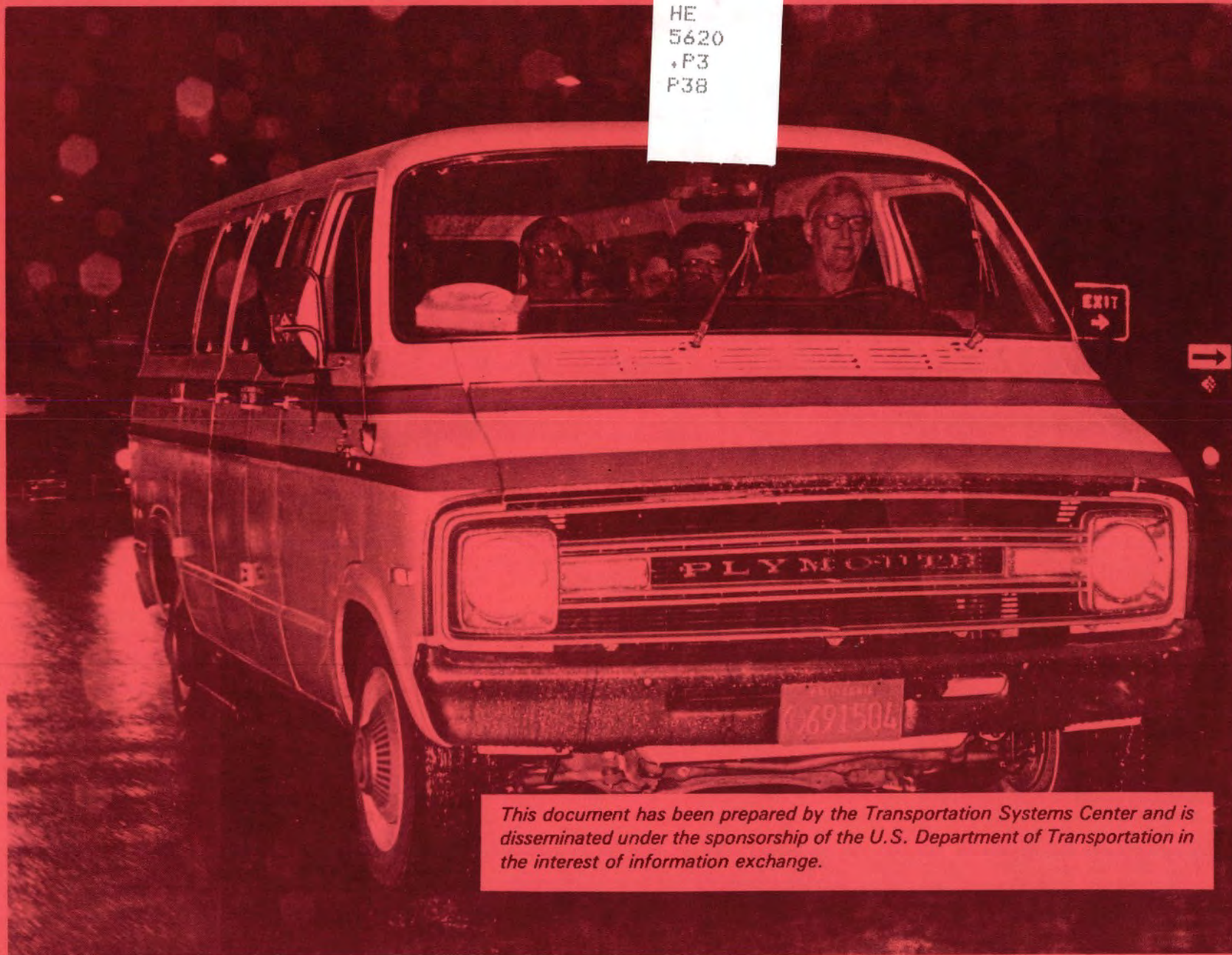
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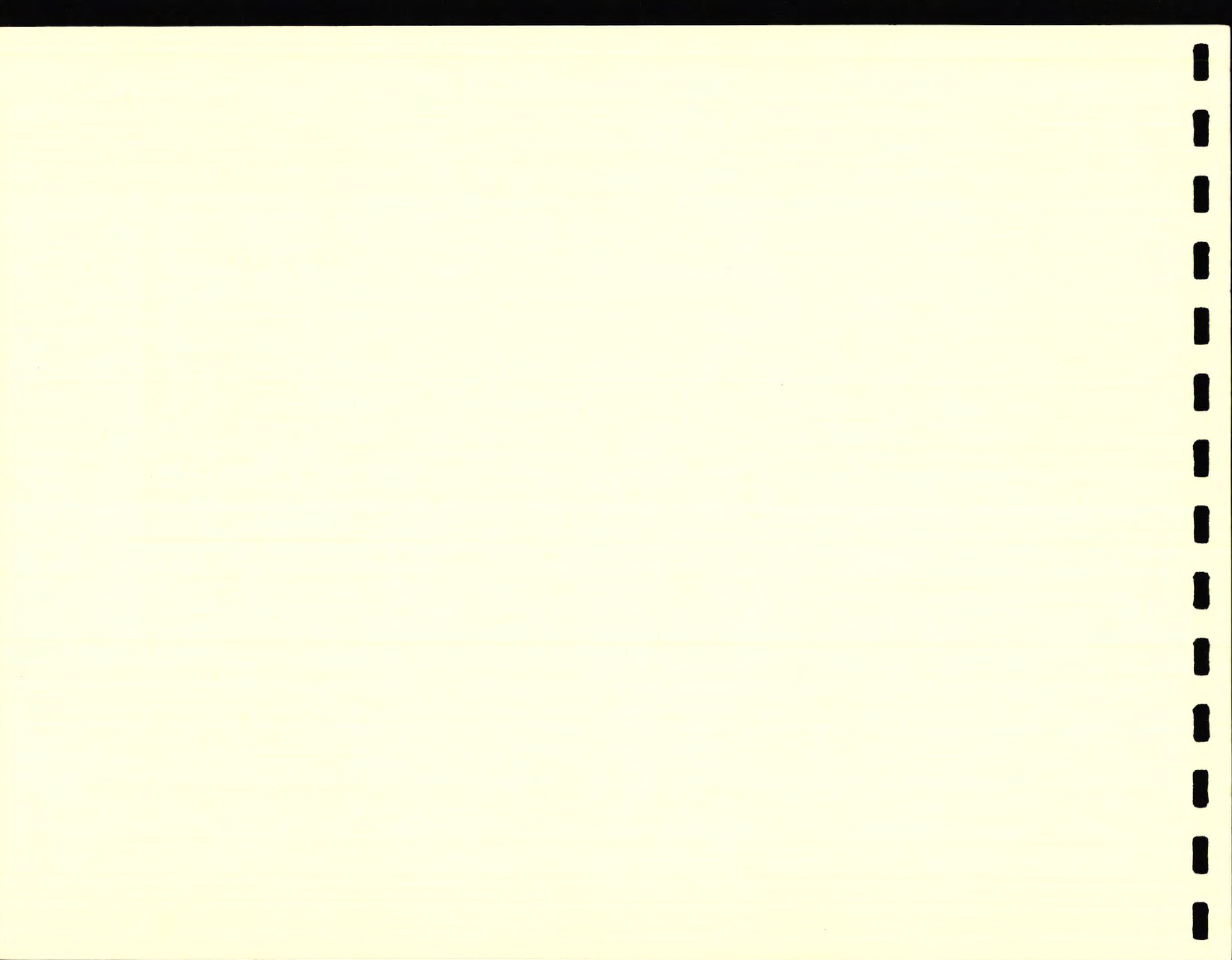
FOREWORD

As a part of its ongoing commitment to the principle of technology sharing, the U.S. Department of Transportation has initiated a series of publications based on research and development efforts sponsored by the Department. The series comprises technical reports, state-of-the-art documents, newsletters and bulletins, manuals and handbooks, bibliographies, and other special publications. All share a primary objective: to contribute to a better base of knowledge and understanding throughout the transportation community, and, thereby, to an improvement in the basis for decision-making within the community.

PARATRANSIT STATE-OF-THE-ART OVERVIEW presents both an updated and an expansion of a 1974 Technology Sharing document on demand-responsive transportation. This update emphasizes paratransit experiences from 1975 to 1980. It presents information not only on demand-responsive services such as dial-a-ride and shared-ride taxi, but also on prearranged ride-sharing services such as carpooling, vanpooling, and subscription bus.

The information contained in this document is drawn from over 190 sources. It is intended to be used as a guide to assist community and state planners, transportation providers, social service agencies, employers, and the general public in assessing the feasibility of paratransit service for their community or organization. If an affirmative decision is reached, this document will also be useful in planning, implementing, and managing the paratransit service that is selected.

Existing paratransit providers will also find useful information on marketing and employee training techniques, potential computer applications, paratransit service evaluation, and institutional issues.



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PARATRANSIT STATE-OF-THE-ART OVERVIEW INCLUDES:

Demand-Responsive



Dial-A-Ride



Shared-Ride Taxi

Prearranged Ridesharing



Carpools



Vanpools



Subscription Buses

I | **AN OVERVIEW OF PARATRANSIT**

what is paratransit?

TODAY NEARLY EVERYONE requires some form of motorized transportation because most employment centers, schools, and shopping areas are beyond walking distances from their homes. Mobility requirements have most often been met by the private automobile. However, a sizeable segment of the population does not own or cannot use an automobile—for example, the elderly, the very young, the handicapped, and in many cases, the one-car family. In addition, energy prices, urban congestion, and environmental concerns have resulted in increased dependence on and utilization of various forms of public transportation. Urban areas usually have some form of conventional fixed-route public transportation—such as buses, streetcars, or subways—that meets some of this need; yet in many suburbs, small towns, and rural areas, public transportation does not exist at all or does not meet individual local transportation needs. Taxi service, generally available in both rural and urban areas, has played a significant role in meeting both urban and rural transportation needs. However, taxi fares are often prohibitively high for those who really need this type of personalized, door-to-door service, particularly the elderly and handicapped.

In the early 1970's, to help fill transportation needs not met by these available services, alternative transportation services began to be implemented, many through Federal funding of demonstration programs.* These new forms of transportation have come to be known as "paratransit," from the prefix "para," which means "closely related to," and "transit," the conventional public transporta-

*For a historical perspective on paratransit, see the following sources: Para-transit: Neglected Options for Urban Mobility; Demand-Responsive Transportation State-of-the-Art Overview, 1974; and Paratransit Handbook, A Guide to Paratransit System Implementation, Volume I, 1979.

tion services. An alternate characterization of paratransit is a transportation service which falls somewhere between the private automobile and fixed-route public transportation. Whereas conventional public transportation has predetermined schedules, fixed routes and stops, and is available to the general public, paratransit services lack one or more of these characteristics.

There are many forms of paratransit offering a wide range of services and a variety of ownership and operation patterns. Five forms of paratransit will be discussed in this report; these have been chosen to reflect the direct interests and activities of its target audience—transportation planners and providers and individuals considering paratransit as an alternative form of transportation. These five paratransit forms are grouped into two categories: demand-responsive paratransit and prearranged ridesharing.

Demand-responsive paratransit includes:

- Dial-a-ride or dial-a-bus
- Shared-ride taxi

Prearranged ridesharing includes:

- Carpools
- Vanpools
- Subscription buses

Subsequent chapters of this report will describe these paratransit forms in greater detail; give examples of where they can be used; show how they are managed and operated; and discuss various regulatory and institutional issues associated with their implementation.

paratransit's service roles

Paratransit services can meet a wide variety of our mobility needs. Demand-responsive service—dial-a-ride and shared-ride taxi—can operate during both peak and off-peak travel times, and provide transportation for both the general public and limited mobility user groups. Prearranged ridesharing services—carpools, vanpools, and subscription buses—operate mainly during peak times and provide commuters who have predetermined work schedules the opportunity to share vehicles.

If the intent of paratransit service is to provide fast, efficient transportation as an alternative to the automobile for commuting, the service offered should be almost as convenient as using an automobile. Certain paratransit services only work for particular markets. The approach used in paratransit is to develop a "family of services" to meet the variety of market needs. The services are not interchangeable between markets. Carpools, vanpools, and subscription buses are logical transportation choices for many commuters. Other demand-responsive services, such as dial-a-ride and shared-ride taxi, however, are not as attractive for the commuter market because of their less predictable wait times and longer travel times.

If the goal is to increase transportation options for everyone in a community, demand-responsive services can play a significant role.

The mobility needs of special users such as the elderly or handicapped can also be served by a demand-responsive paratransit system. Although some vehicles in conventional public transportation systems are currently equipped with wheelchair lifts, ramps, and specially designed interiors, demand-responsive transportation vehicles are more likely to contain these features (see page 83 for a discussion of Section 504 requirements). In addition, demand-responsive paratransit designed for these users provides door-to-door service, which is an advantage.

In an area where fixed-route conventional public transportation exists, demand-responsive paratransit may be used as a feeder system to a transfer point where passengers can then take the bus or train. In an area where transit service is radially routed into a city, demand-responsive paratransit can provide a time-saving way to make cross-town trips.

Of course, paratransit is not the solution to all the transportation problems a community faces, but then no single type of service is likely to meet all the transportation needs in a community. It is important that the service characteristics of any new system match the requirements of a sufficient number of users; otherwise ridership will suffer and the service will not realize its objectives. Therefore, it is imperative to recognize situations in which paratransit can be utilized best, as shown in Table 1.

TABLE 1. POTENTIAL PARATRANSIT ROLES

	SITUATION	POTENTIAL PARATRANSIT ROLE
Conventional Fixed-Route Systems Exist	A sparse fixed-route bus or rail system exists with a perceived need for feeder service.	Paratransit may provide feeder service.
	A fairly dense fixed-route system exists, but is radially oriented and does not serve cross-town trips which are not radial.	Paratransit may serve cross-town trips.
	A fixed-route system exists but contains a number of very lightly used routes.	Paratransit may be used to replace lightly used fixed routes or to determine promising patterns for a modified fixed-route system.
	A fixed-route system exists but does not provide equitable coverage to the entire political jurisdiction paying the transit bill. Although political forces may be demanding "transit equity," expansion of the fixed-route system is not perceived as being cost-effective.	Paratransit may be used to increase system coverage in a more cost-effective fashion.
Conventional Transit May Or May Not Exist	There is a perceived need for service in areas expected to provide fairly low trip densities.	Paratransit may prove to be more cost-effective than conventional transit.
	There is a perceived need to provide transit service to elements of the population such as the elderly and the handicapped who either have no alternative form of transportation or who would benefit from door-to-door service.	Paratransit may be a cost-effective means of providing target market service to special population groups.
	Heavy commuting causes peak traffic congestion or air pollution, or a social goal exists to reduce vehicle miles traveled (VMT).	Subscription service may be introduced as a component of the existing service to reduce peak-period congestion.
	Many paratransit services are operated in an uncoordinated fashion by social service agencies.	Paratransit may be used to consolidate separate services, or a brokerage system may be introduced to coordinate existing demands.
No Transit Service	No transit exists in an area of fairly high population density where a high potential demand is perceived, although there is little knowledge of promising transit patterns.	Paratransit may be used to test the transit market, perhaps, as a prologue to a fixed-route system or an integrated system composed of both conventional and paratransit services.

Source: Reference 12.

paratransit users

There are two main groups of paratransit users:

- Those who require demand-responsive paratransit, such as suburban shoppers, the elderly, and rural residents.
- Those who require prearranged ridesharing paratransit, such as school children and commuters.

DEMAND-RESPONSIVE USERS. Some communities that have little or no public transportation have developed demand-responsive paratransit for those whose access to either private automobiles or public transportation is limited. These "limited mobility users" are the elderly, the handicapped, the poor, the young, and the unemployed—or various combinations of these groups.

The original intent of this document was to cover all demand-responsive users, such as shoppers, carless individuals, young children on local trips, as well as limited mobility users. However, the demand-responsive user most often identified in reference material and in conversations with knowledgeable individuals, was the limited mobility user. Therefore, much of this document's demand-responsive content focuses on the issues confronting these limited mobility users.

A 1977 Urban Mass Transportation Administration (UMTA) study (42)* estimated that approximately 7.4 million transportation handicapped people were living in the United States. For these people, most conventional public transportation systems are inaccessible because of physical barriers such as high steps on buses, steep stairways in stations, and the necessity of walking to stations and standing while waiting for buses or trains.

Many demand-responsive paratransit systems have developed criteria for identifying limited mobility users. The San Francisco Bay Area Task Force, for example, developed an index of six "skills" to help identify handicapped paratransit users; inability to demonstrate one or more skills classified the user as one who had limited mobility. The index included the ability to use stairs, escalators, and ramps; to board and alight from a conventional public transportation vehicle; to stand in a moving vehicle; to see and comprehend signs; to hear announcements; and to walk more than 200 feet. This type of identification criteria is being used by an increasing number of paratransit organizations (140).

The Ride, a demand-responsive paratransit service in Boston, MA, discharges a handicapped woman.



*Numbers appearing within the parenthesis denote references listed at the end of the document.

The poor are another limited mobility group.* The approximately 24 million non-rural poor often have no access to an automobile, yet their transportation needs are comparable to those of people with higher incomes (151). The rural poor have special transportation problems. Poor farm families and those in rural small towns are often isolated and are unable to travel to essential services (157). Unlike poor people in urban areas, most of whom are able to use public transportation at a reasonable cost, the rural poor often must depend on friends or relatives who have automobiles.

In recent years, the Federal and state governments have identified the transportation disadvantaged in rural areas and have begun to provide transportation services for them. The Transportation Remuneration Incentive Program (TRIP) in West Virginia, for example, has established a network of rural transportation and provides state-funded discount transportation tickets to low-income elderly and handicapped users (171).

Young people between the ages of 14 and 17 are another limited mobility group. These approximately 16 million young people have less mobility than adults and are often dependent on family members or friends for transportation (151). Because of its potential ridership, this group should not be overlooked when a paratransit service is being considered for implementation.

In addition, there are approximately six million persons 16 years old and over who are not employed and who are seeking employment each month; this is another significant group of potential users of paratransit (151). There remain other potential users of paratransit services whose numbers cannot be as readily estimated; e.g., housewives and shoppers.

*In 1979, the U.S. Department of Labor defined "the poor" as 1) non-farm families who earn less than \$3,400 annually for a one-person household, or less than \$3,400 plus \$1,100 for each additional family member for larger households and 2) farm families who earn less than \$2,910 for a one-person household, or less than \$2,910 plus \$930 for each additional family member for larger households.



A group of vanpoolers are getting ready to board their van at Honeywell General Offices in Minneapolis, MN.

PREARRANGED RIDESHARING USERS. Commuters and students are the largest users of prearranged ridesharing paratransit. Of the approximately 77 million people who commuted from home to work and back on a regular basis in 1977, 52 million drove alone in private automobiles, 15 million rode in carpools, 4 million used public transportation (which includes bus, streetcar, subway, elevated train, railroad, or taxi), 3 million walked, and 1 million used other means, such as motorcycles or bicycles (151). The National Association of Vanpool Operators estimated that in June 1980, approximately 8,500 vanpools were operated by employers (126). If each of these vans carried 8 passengers and a driver, then about 76,500 commuters used vanpools in that year. No nationwide data exists on subscription bus users.

paratransit providers

Paratransit services are operated by a variety of public and private non-profit and profit-making organizations that offer the services either to the community at large or to single individuals or groups of individuals. As an example, Table 2 illustrates the diversity of demand-responsive paratransit providers and guidelines for their selection.

PUBLIC-SECTOR PROVIDERS. There are two main types of public-sector paratransit service operating authorities:

- Local governments.
- Regional transit authorities, providing service for groups of communities, or several states.

Many of the demand-responsive paratransit services in the small cities of Michigan are examples of local government providers because they are owned and operated by the individual cities. The Brockton (Massachusetts) Area Transit (BAT) is a regional transit authority that operates dial-a-ride transportation services. Another example of a larger, regional transit authority is the Delaware Authority for Specialized Transit (DAST), which provides statewide demand-responsive paratransit services for the elderly, the handicapped, and other limited mobility groups. The DAST system coordinates requests for transportation from social service agencies rather than from the passengers themselves, as specified in the legislation that provided for the system (12).

TABLE 2. DEMAND-RESPONSIVE GUIDELINES FOR PROVIDER SELECTION

	Local Public Agency	Public Transit Authority	Existing Private Operator	Experienced Management Firms	Non-Profit Organizations
Cost (Labor)	More costly than private, less costly than public transit authority.	Most costly (union labor); may resist competitive service.	Least costly; non-union bus usually more costly than taxi but 1/2-3/4 less than public transit authority.	Costs vary, but are typically similar to non-union private bus operators.	Varies; potentially least costly due to charitable contributions & volunteers; least reliable.
Implementation Ease	Longer and more difficult implementation as personnel need to be located, hired and trained. New capital investment also required for vehicles and equipment.	Quickest and easiest implementation using established authority whose personnel and capital commitment exist; if no existing authority, has longest implementation period.	Fairly rapid and easy implementation using existing entity, where skilled staff and capital commitment exist.	Moderately easy implementation using experienced firm with skilled staff.	Faster than public agency implementation, yet probably most difficult.
Funds	Directly eligible for a variety of Federal and state funds.	Directly eligible for many Federal and state funds.	Ineligible for many Federal and state funds; subsidies must be funneled through public body.	Ineligible for many Federal and state funds; subsidies must be funneled through public body.	Ineligible for many Federal and state funds unless publicly-owned.
Control	Greatest degree of public control.	Moderate to high amount of public control.	Least degree of public control.	Moderate to small degree of public control.	Moderate degree of public control.
Market	Can operate for limited mobility and/or general public service; probably best suited for the latter.	Best suited for general public service; difficult to tailor service for limited mobility users.	Provides economical travel to the limited mobility user; expensive to subsidize for the general public. Difficult for severely disabled to use taxis.	Can operate service to meet the limited mobility user and/or general public markets; constrained only by public sponsor.	Best suited for the limited mobility user segments of population; not suited for the general public.

Source;Adapted from Reference 12.

PRIVATE SECTOR PROVIDERS. Within the private sector, several types of organizations operate paratransit services:

- Non-profit social service agencies.
- Profit-making, nonsubsidized organizations.
- Profit-making transportation providers that have local government contracts and subsidies.
- Employers and employee organizations.

The most common form of paratransit is probably the demand-responsive transportation offered by social service agencies to their clients, who, for one reason or another, would otherwise not be able to use the service provided by that agency. (For the purposes of discussion in this document, social service agencies are private non-profit organizations that sometimes receive funds from Federal, state, and local governments. Examples of social service agencies include certain health clinics, mental health organizations, elderly councils, poverty organizations, handicapped organizations, community action programs, and head start centers for pre-school children.) Transportation is often provided for clients in locations where no public transportation is available, or for clients, such as very young children, elderly persons, or handicapped persons, who are unable to use public transportation. In other cases, the agency's own transportation service may simply be the best way to transport its clients.

A survey taken in the nine-county San Francisco Bay area revealed several hundred social service agencies operating transportation services for their clients (85). The vehicles for such services included specially equipped vans and buses, as well as private automobiles owned by volunteers or staff.

The Black and White Cab Company of Little Rock, Arkansas, is an example of a private, profit-making company operating demand-responsive transportation without subsidy. Other providers of demand-responsive paratransit services are profit-making organizations acting as consultants, management, and/or operators in the paratransit field. These organizations' vehicles are usually owned or leased by a local government. Many of the dial-a-ride services in California are operated in this manner.

The most common arrangement for shared-ride taxi services is for a municipality to subsidize rides for people from a private, profit-making taxi company. Shared-ride taxi services, such as those in LaMesa, California, are managed and operated by a private cab company using vehicles leased from the city.

Employers and employee organizations are most often the providers of prearranged ridesharing services. Private employers sometimes organize carpools, vanpools, and subscription buses for the mutual convenience of themselves and their

workers. Typically, the employer or employee organization will lease the equipment to the workers, provide insurance coverage, and offer certain incentives to the employee who uses carpools, vanpools or subscription bus services. The Tennessee Valley Authority and its employee credit union in Knoxville, Tennessee, is an example of an employer and employee organization providing prearranged ridesharing incentives to its employees or members. These incentives include, for example, preferential parking privileges and reduced parking fees.

II | A CLOSER LOOK AT PARATRANSIT

THIS CHAPTER EXAMINES the characteristics of various types of demand-responsive and prearranged ride-sharing paratransit systems. The examination also includes case studies of dial-a-ride, shared-ride taxi, carpooling, vanpooling, and subscription bus services.

A request for dial-a-ride service in Ann Arbor, Michigan's downtown area.



demand-responsive transportation

Demand-responsive transportation is characterized by the flexible routing and scheduling of relatively small vehicles that provide door-to-door, personalized transportation on demand, on a shared-ride basis, and at a modest cost to the rider. Demand-responsive transportation combines the economic efficiency of conventional public transportation with the flexibility, convenience, and security of private taxis.

The two main types of demand-responsive transportation, dial-a-ride and shared-ride taxi, will be investigated in greater detail in this chapter, and case studies will demonstrate how each of these demand-responsive services operates.

DIAL-A-RIDE SERVICES. Dial-a-ride services are one of the best-known forms of paratransit. UMTA's demonstration programs in Rochester, New York, and Haddonfield, New Jersey, gained recognition and public acceptance in the early days of paratransit development. During the late 1970's, similar systems were being implemented in many other areas of the country.

Dial-a-ride is a demand-responsive service in that the vehicles are scheduled according to the needs of the users. For example, instead of waiting at a public transportation stop, one simply telephones a dial-a-ride dispatcher and arranges to be picked up either shortly after the call or at another specified time. Service is usually somewhat restricted during peak times or rush hours. A 24-hour notice may be necessary for pickup, or requests may be restricted to emergency situations. Nonetheless, dial-a-ride offers considerable flexibility.

Although many of the well-known dial-a-ride demonstration projects have been quite large—the Ann Arbor Transportation Authority's dial-a-ride service used 48 vehicles—most dial-a-ride systems operate in small communities of 10,000 to 25,000 people, use fewer than five vehicles, and serve an area of only eight square miles

TABLE 3 GENERAL PUBLIC RIDER CHARACTERISTICS FOR DIAL-A-RIDE TRANSPORTATION

Variable	Ann Arbor Michigan	Rochester New York	Watts- Los Angeles California	Fairfield California
Sex: Male	48.0%	17.7%	24.4%	15.0%
Female	52.0	82.3	75.6	85.0
Age: Under 18	28.0	31.6	4.4	37.0
18 - 44	41.0	32.4	55.6	27.0
45 - 64	20.0	22.1	13.3	23.0
65 & Over	11.0	14.0	26.7	12.0
Cars 0	7.0	27.3	35.5*	36.0
in 1	52.0	44.7	—	33.0
House-2	41.0 (2+)	20.5	—	22.0
Hold: 3+	—	7.6	—	7.0
Purpose of Trip:				
Work	34.0	38.3	31.1	18.0
School/Soc. Serv.	23.0	6.8	14.4	4.0
Medical	—	1.2	23.3	15.0
Shopping	22.0	30.9	11.1	20.0
Recreation	8.0	9.3	20.0	20.0
Other	13.0	13.6	—	29.0
Alternate Mode:				
Bus	10.0	10.4	56.7	4.0
Walk	19.0	13.4	12.2	36.0
Taxi	13.0	10.4	5.6	27.0
Drive	19.0	4.5	—	8.0
Be Driven	31.0	29.1	18.9	13.0
No Trip	5.0	30.6	6.7	20.0
Other	3.0	1.5	—	9.0

*Figure derived from entire service area, not ridership.

Source: Reference 12.



A passenger boards the PERT dial-a-bus which serves several suburban Rochester, NY, areas.

(12). In fact, most systems operate in areas that have population densities below 4,000 people per square mile. The typical dial-a-ride system operates 12 hours a day, with reduced service on weekends. Nearly all dial-a-ride systems in the country are operated by some type of public authority, whether the systems serve the general public or only special groups.

People use dial-a-ride systems for a variety of reasons, although studies have found that most of the riders are people who do not own automobiles or have drivers licenses (86). Women and senior citizens are the most frequent users of dial-a-ride. Table 3 shows the characteristics of riders in four different dial-a-ride systems that serve the general public; Table 4 shows the characteristics of riders in four dial-a-ride systems in which services were offered to limited mobility users.

Dial-a-ride systems found in large cities complement conventional public transportation services and sometimes serve as feeders to them. Urban dial-a-ride services are often confined to a particular geographical section of the city or are restricted to serving only limited mobility users, such as the elderly and handicapped. For example, Los Angeles, California, had several dial-a-ride systems operating within city limits in 1977, but each system was restricted to one section of the city, and none had more than nine vehicles in service. The San Diego, California, dial-a-ride system, which serves an estimated 101,000 elderly and handicapped, is also restricted to a single section of the city.

Many dial-a-ride systems, however, are found in smaller cities or towns where there is little or no other public transportation, and the population is not dense enough to make conventional public transportation economically feasible. In Lompoc, California (population 31,000), dial-a-ride has replaced conventional public transportation, which became too expensive to operate (12). In Dover, Delaware, a city of about 27,000, the five-van Senior Surrey provides service for the city's estimated 3,000 elderly and handicapped citizens.

Dial-a-ride service is adaptable to rural areas where no other public transportation exists. Michigan's East Upper Peninsula Transportation Authority's Rural Busing Transportation Project provides dial-a-ride service to a rural area that has a population density of only ten people per square mile. A similar system in Michigan's Crawford County covers a service area that has a density of only five people per square mile.

Another dial-a-ride service is the Senior Handibus in western Nebraska, which serves an 800-square-mile-area with a population density of eight people per square mile. It has had some financial problems, but with the support of several of the small towns in the service area, it continues to carry elderly, handicapped, and low-income people.

TABLE 4. LIMITED MOBILITY USER CHARACTERISTICS FOR SPECIAL DIAL-A-RIDE TRANSPORTATION

Variable	Cleveland Ohio	Syracuse New York	Dade County Miami Florida	Baton Rouge Louisiana
	(Mixed)	(DAB)	(Mixed)	(DAB)
Sex: Male	8.0 %	14.9 %	N/A	48.0 %
Female	92.0	83.9	N/A	52.0
Age: Under 18	0.0	N/A	2.9 (Under 21)	43.4 (Under 21)
18 - 44	5.5 (20-59)	13.1 (Under 60)	25.0 (21-49)	26.4 (21-39)
45 - 64	6.0 (60-64)	6.8 (60-64)	28.8 (50-64)	23.9 (40-64)
65 & Over	88.5	80.1	43.3	6.3
Cars 0	N/A	59.9	N/A	12.7
in 1	N/A	N/A	N/A	42.4
House- 2	N/A	N/A	N/A	37.4
Hold: 3+	N/A	N/A	N/A	7.5
Purpose of Trip:				
Work	N/A	2.3	12.7	N/A
School/Soc. Serv.	N/A	N/A	11.4	N/A
Medical	49.5	46.8	24.0	87.0
Shopping	47.5	0.9	19.0	N/A
Recreation	32.0	7.3	17.7	N/A
Other	14.0 *	42.7 *	15.2	13.0
Alternate Mode:				
Bus	33.0	11.1	9.0	20.4
Walk	42.0	0.6	N/A	2.5
Taxi	8.0	21.9	28.0	2.5
Drive	7.0	1.2	N/A	5.7
Be Driver	38.5	15.8	49.0	45.2
No Trip	10.0	22.3	N/A	2.5
Other	8.0	16.1	N/A	18.5

*Figure includes multi-purpose trips.

Source: Reference 12.



The Merrill-Go-Round in Merrill, WI, is a point deviation paratransit service.

AN EXAMPLE OF A DIAL-A-RIDE SYSTEM

MERRILL-GO-ROUND*

Introduction: The Merrill, Wisconsin, transit system, known as "Merrill-Go-Round," began in 1975 as a demonstration project funded primarily by a State of Wisconsin Urban Mass Transit Demonstration Grant. Still in operation today, Merrill-Go-Round is an innovative type of demand-responsive transportation called "point deviation," which combines features of dial-a-ride and fixed-route service. In a point deviation system, vehicles are scheduled to stop at designated checkpoints on a regular basis, but are free to respond to requests for doorstep service between checkpoints.

Merrill-Go-Round serves ten passengers per vehicle-hour, including a large number of senior citizens and students, two groups whose transportation needs had previously not been well met in the city. According to projections for 1980, students will comprise approximately 43 percent of the ridership, and senior citizens, approximately 27 percent.

The success of the Merrill transit system is due to a combination of citizen involvement from the very beginning, careful planning by professionals, effective marketing, regular evaluation of the service through surveys and questionnaires, and implementation of necessary changes.

Background: Merrill, a small city of 9,500 in central Wisconsin, has been a harbinger of urban transportation trends since 1891, when it became the first city in Wisconsin to implement an electric street railway system. Since that time, Merrill has experimented with both privately and publicly owned bus systems, a publicly subsidized taxi service, and a federally funded dial-a-bus service for the elderly and handicapped.

In 1973, with a reduced prospect for continued funding of the dial-a-bus system beyond two years, and with the taxi company experiencing increasing losses, Merrill officials approached the state for aid to supplement the operating cost of the taxi system. While this request was denied, Merrill officials were informed of another type of funding possibility, namely through the Wisconsin Department of Transportation (WISDOT). At this time, WISDOT was interested in testing the concept of demand-responsive transportation. Since Merrill had already briefly experimented with this concept with elderly and handicapped service, the city seemed a logical

*Information for the Merrill case study comes from the following sources: State of Wisconsin Urban Mass Transit Demonstration Program: Merrill Project Final Report, 1977; and a conversation with Richard Martin, Wisconsin Department of Transportation (WISDOT), Office of Planning, March 18, 1980.

location for a further demonstration. The project in Merrill could demonstrate the integration of various transportation subsystems into a cohesive demand-responsive transportation system. A transit feasibility study, conducted by a private transportation consulting firm, began in September 1974.

After a period of market analysis and review of four alternatives, a form of demand-responsive transportation called point deviation was finally recommended for Merrill, to be developed and implemented under a demonstration grant. The final Merrill system design addressed the following objectives:

- To provide an improved level of transit service to the Merrill community *at no increase in cost* to the city.
- To demonstrate the ability of specialized service concepts and special equipment to meet the needs of the elderly and ambulatory handicapped.
- To demonstrate the feasibility of demand-responsive transportation in a community of less than 10,000 persons.
- To test the concept of point deviation.

Following an intensive pre-service marketing effort, the new Merrill transit system, Merrill-Go-Round, began operating on April 21, 1975. The service began smoothly, and no major operational problems were encountered during the course of the demonstration, which ended on June 30, 1976. For the first year of the demonstration, 77,000 passenger-trips were made on the system. This level was 160 percent higher than the ridership of 29,440 recorded in 1970 for the fixed-route bus system that had served Merrill until that year. Projected ridership for 1980 is 90,500.

How The System Operates: A point deviation system offers increased coverage over conventional fixed-route systems and an improved level of service for persons utilizing the doorstep pickup or delivery option. Vehicles are scheduled to make stops at fixed checkpoints (ten, in the case of Merrill-Go-Round), but they are free to follow any path between checkpoints to service passenger requests. When no requests for doorstep service are received, the buses follow the most direct path between checkpoints. Buses responding to doorstep service requests need not return to that path, but can proceed directly to the next checkpoint.

Merrill-Go-Round utilizes three 23 passenger minibuses. To improve the accessibility of the vehicles to the elderly and handicapped, the vehicles are equipped with extra handrails and retractable first steps. Each vehicle is also equipped with a mobile telephone to be used for communications when a dispatcher is not on duty. Based on a series of tests, the mobile telephones did not appear to be sufficiently reliable to be used on a full-time basis.

Two vehicles operating on 30-minute headways make scheduled stops at each checkpoint. (The third vehicle is used as a spare and for charters or other special



Another view of an easily identified Merrill-Go-Round vehicle.

trips.) Passengers can board at any checkpoint and be taken to any other checkpoint for a base fare of 35 cents, or they can ask to be taken to any other location in the city (checkpoint to doorstep) for 50 cents. Persons not within an easy walk of a checkpoint can call in and request doorstep pickup. Doorstep-to-checkpoint service costs 50 cents, while doorstep-to-doorstep service costs 60 cents. When two or more persons are traveling together, the extra fare for doorstep service is charged only once. Elderly and handicapped persons are eligible for reduced fares: 15 cents for checkpoint-to-checkpoint, 25 cents for checkpoint-to-doorstep, and 30 cents for doorstep-to-doorstep.

Results and Conclusions: The Merrill-Go-Round system has performed to expectations. During the first year of the demonstration project, both ridership (77,000) and cost (\$89,149) exceeded the projected levels by about 10 percent. Total revenue (\$19,537) exceeded the projected level by nearly 4 percent. The net cost of the system (\$69,612) was within 12 percent of the anticipated level. By 1979, ridership had climbed to 84,128. During that year, per passenger revenue was 33 cents, while the operating cost per passenger was \$1.69. The \$1.36 per passenger deficit was absorbed by Federal, state, and local subsidies.

Besides meeting the above expectations, Merrill-Go-Round has achieved its stated objectives. Operating at twice the frequency of the old fixed-route system and providing service times comparable to the previous taxi service, it offers 100 percent coverage for all persons in Merrill at no additional cost to the city. Secondly, Merrill-Go-Round has been used extensively by senior citizens and has responded to the particular needs of that group by offering special shoppers' service and the doorstep pickup and delivery option. Finally, the success of the project, indicated by its high productivity and level of service, further demonstrates 1) that demand-responsive transportation is feasible in small communities and 2) that point deviation is a workable transportation concept.

Communities interested in developing a similar type of demand-responsive transportation should keep in mind some of the key factors in Merrill-Go-Round's success:

- Flexibility of the service in adapting to a diversity of local needs.
- Anticipation of problems and incorporation of provisions for dealing with them.
- Provision of a high quality, reliable service.
- Implementation of an operating assistance program to help continue the service following the demonstration period.
- Effective marketing to inform the public of the new service and to encourage them to use it.



A shared-ride taxi in operation.

Shared-ride taxi service from Logan International Airport Boston, MA, is a convenient and economical alternative to regular taxi service.



- Availability and use of professional planning expertise.

The Merrill-Go-Round system can serve as an example of a way in which high quality public transportation can be provided in a small community.

SHARED-RIDE TAXI SERVICES. The shared-ride taxi uses regular size passenger cars or station wagons to pick up several passengers at various times and at different locations, and deliver them to different destinations. Most shared-ride taxi services are located in small cities, serve the entire area, and have an average of six vehicles that carry up to 260 riders each day (12). The service is usually provided by a private taxi operator who receives a subsidy or operates under contract to a public transit authority or other public organization. Shared-ride taxis have several advantages over regular exclusive-ride taxis, especially in small cities, because more people can be carried at once; vehicle productivity rates for shared-ride taxi services are often 50 to 100 percent higher than for the typical exclusive-ride taxi (142). Acting as a feeder to fixed-route public transportation services, shared-ride taxi can integrate taxi and these services. Shared-ride taxis are more fuel efficient and economical to operate on a per passenger basis than buses which operate at low passenger levels.

There are several problems inherent in shared-ride taxi service that should be considered. Dispatching can be much more difficult in shared-ride systems. While one competent dispatcher in exclusive-ride taxi companies can handle the dispatch of up to 100 vehicle fleets, in a shared-ride taxi system, the efficiency of a single dispatcher begins to decrease when over ten or fifteen vehicles are dispatched.

In addition, taxicab company owners are often reluctant to adopt shared-ride service, even in the absence of regulations prohibiting them, primarily due to apprehension about new services and the financial risks involved. The taxicab company owners also fear that service levels may deteriorate for passengers using shared-ride services. This deterioration in service could lead to a loss in ridership. Finally, passengers themselves may object to riding in the close confines of an automobile with a stranger.

AN EXAMPLE OF A SHARED-RIDE TAXI SYSTEM

COLONIAL TAXI*

Introduction: Colonial Taxi is a profit-making taxi and paratransit company operating in the southern part of Pittsburgh, Pennsylvania, and its suburbs. A nationally recognized leader in demonstrating taxi opportunities in paratransit, Colonial Taxi currently operates a fleet of about 185 vehicles and offers exclusive and shared-ride taxi service to the general public and taxi, van, and bus services by contract to local school districts and to government and social service agencies. Most contract services are for the transportation of children, the handicapped, and the elderly, but some contracts provide for general public vanpool and dial-a-ride services.

Background: A major industrial center in western Pennsylvania, Pittsburgh had a population of 450,000 in 1978. The rough terrain and the rivers trisecting the metropolitan region challenge the transportation network. The principal transportation operator in the region is the Port Authority of Allegheny County (PAT), which serves Pittsburgh and urban sections of Allegheny County, an area of about 400 square miles.

The two principal taxicab companies in Pittsburgh are Yellow Cab and Colonial, each operating in a geographic franchise area defined by the Pennsylvania Public Utility Commission. Colonial Taxi serves a 100 square mile area having a population of roughly 350,000.

When the current management assumed leadership of Colonial Taxi in 1955, approximately 95 percent of its business was exclusive-ride taxi service. The taxi management, which believed in diversified, large volume service, promoted the rapid development of shared-ride services for children, the elderly, and the handicapped, as well as a variety of contractual and subscription paratransit services. In 1977, shared-ride taxi service accounted for only 9 percent of Colonial's total revenue. By 1979, that figure had climbed to 36 percent.

Although the company's history reveals that private enterprise can operate a broad range of profitable paratransit services, it also points out the problems of competition and conflict of interest between private and public sectors. During the mid-1970's for example, both government agencies and non-profit organizations subsidized by the government for similar services indicated that they would attempt to jeopardize Colonial's shared-ride paratransit services. The enforcement of government regulations meant that Colonial had to go to court to defend its operations.

*Information for the Colonial Taxi case study comes from the following sources: Colonial Taxi Co. of Bethel Park, PA: Private Enterprise in Paratransit, 1978; and a conversation with William A. Knaus, president of Colonial Taxi, March 17, 1980.

How the System Operates: In 1978, approximately 50 percent of the users of Colonial's shared-ride taxi service were elderly and handicapped. Since then, Allegheny County's Access Program, funded under an UMTA grant, has enabled limited mobility persons to subscribe to reduced-fare taxi services.* During 1979-1980, Colonial's limited mobility ridership increased to 67 percent of the total for the shared-ride service. On the average, 465 direct-paying passengers use the shared-ride service each day; and about 940 elderly and handicapped persons daily use the service under subscription rates.

Persons qualifying for the Access Program can subscribe to shared-ride service by purchasing a \$10 book of tickets for \$2.50. All others pay according to a zone fare schedule, set by the Pennsylvania Public Utility Commission (PUC) and based upon a 30 percent discount of the average meter rates between zones. Savings over an exclusive ride can be illustrated by comparing the cost of a 7 mile ride (the average distance trip for this shared-ride service) under the two modes of service. Exclusive ride service would cost 80 cents for the initial fee plus 60 cents per mile, or a total of \$5.00. The same distance by shared-ride taxi would cost \$3.50, a savings of \$1.50 (the 30 percent discount of the \$5.00 meter rate fare).

Non-subsidized passengers do not have to call in advance for shared-ride service. Persons subscribing to shared-ride service under the Access Program, however, must schedule rides by calling in by 4:30 p.m. a day in advance. Dispatchers are utilized for communications and dispatch record keeping, and each Colonial vehicle has 2 two-way channel radios with dispatch broadcasting on one channel and driver response communication on the second.

The waiting period for shared-ride service is, on the average, between 20 and 25 minutes. Route deviation is generally limited to 3 to 5 blocks without passenger permission. During foul weather, Colonial offers only shared-ride taxi service, which adds another 5 minutes to a passenger's waiting time. In order to ensure time to organize for increased shared-ride service, Colonial subscribes to a commercial weather forecasting service which gives them 16-hour early warning of pending bad weather.

In 1977 Colonial used 50 seven-passenger Checker cabs for both its exclusive-ride and shared-ride taxi services. Since that time, the company has added 14 vans to accommodate the increased number of limited mobility riders. Each of these vans is equipped to hold two wheelchairs and can accommodate 12 passengers.

*Persons qualify for the Access Program if they are over 60, or if they cannot walk up regular bus steps or are unable to walk a quarter mile. Non-profit organizations and certain profit making organizations such as Colonial Taxi participate in this regional demonstration program.

Results and Conclusions: Colonial Taxi has been a leader in the development of shared-ride taxi service. Because of the high quality of its service at a reasonable cost, Colonial has been able to withstand competition from government subsidized programs offering similar services. Colonial's shared-ride service has remained cost-effective for a number of reasons, all of which are related to the company's total paratransit operations:

- Tight management practices.
- Economies in scale of operation, which permit interchangeability of vehicles.
- A highly trained and sensitive paratransit driver staff.
- Well-maintained vehicles and equipment.
- Management's dedication to responding to service calls and meeting commitments.

prearranged ridesharing transportation

Prearranged ridesharing transportation is characterized by services in which a driver and a number of travelers make an agreement to travel together at specified times, on a regular basis (73). These services involve some route deviation to pick up and drop off individual riders. However, route deviation is usually confined to minor collection and distribution patterns at the beginning and end of the trip. One disadvantage of prearranged ridesharing, especially to workers on flexible or variable work hours, is that schedules, once set, may be quite difficult to alter. Various difficulties in implementing prearranged ridesharing include:

- Lack of knowledge concerning ridesharing.
- Lack of a favorable attitude toward ridesharing.
- Legislation and regulatory barriers.
- Insurance barriers.

The three main types of prearranged ridesharing transportation services—carpools, vanpools, and subscription buses—are discussed below, accompanied by a case study that demonstrates how each of these prearranged ridesharing services works.

CARPPOOL SERVICES. Carpool services are an arrangement between two or more people who regularly ride together in order to share traveling expenses and/or the actual driving. Carpools are often fairly informal arrangements of family, friends, or working acquaintances who live or work near one another and find it convenient and economical to share commuting costs. Most carpools are of this "shared-cost"



Carpooling is an effective way to save commuting costs as well as reducing congestion in urban areas.

type, which tends to have fewer riders and covers shorter distances than the shared-driving type of carpool (118).

The shared-driving type of carpool gives each participant the chance to occasionally have a car at work for midday errands. Unfortunately, this type of arrangement is less reliable than shared-cost carpools, given the day-to-day or week-to-week routing differences.

Carpooling programs have met with enthusiasm from planners and transportation experts, who see them as means of reducing gasoline consumption, traffic congestion, and air and noise pollution. In addition, carpools do not call for massive public investment and involve few if any public employees.

While the public may be interested in carpooling for economic reasons, certain disadvantages prevent carpooling from gaining the wide acceptance it would seem to warrant.

Some of these disadvantages stem from the fact that carpooling is generally inflexible. People who work irregular shifts, frequently work overtime, or need a car for midday travel may find it difficult to carpool. There may be difficulty finding other people with whom to share rides, and even when other riders are found, personalities may conflict.

Most programs initiated to increase carpooling have concentrated on finding compatible matches for potential carpools. These are typically large-scale efforts to match home and work locations and travel schedules. Very often the most successful carpool matching programs have been arranged through employers. This is because work schedules are more likely to be compatible and the potential carpools can usually find out something about one another before starting to carpool.

Studies have indicated that people have a strong need to know with whom they will be carpooling before setting up a carpool. Many people are very reluctant to contact strangers whose names appear on a location and time schedule matching list. One study showed that only about 6 percent of the people interested in carpooling actually used the list of potential carpools given them, and only a very small percentage of carpools were formed as a result (142).

A widely publicized areawide carpooling program instituted in Boston, Massachusetts, in 1973 demonstrated the difficulty associated with such programs. Less than 25 percent of the employees in the area in which carpools were to be arranged responded to the program, and less than a quarter of these found suitable carpool arrangements. It is not known how many of the employees who were matched eventually began carpooling (46).

When carpooling can be made attractive, however, the public responds. Phoenix, Arizona, has significantly increased ridesharing in private automobiles through its carpooling program, mainly through the active support of the business community and public officials.

AN EXAMPLE OF A CARPOOL PROGRAM

SEATTLE/KING COUNTY COMMUTER POOL*

Introduction: The Seattle/King County Commuter Pool program in Washington was begun in 1974. Started as an energy crisis carpool matching service, Commuter Pool has become an extensive urban paratransit development organization dealing primarily with the problem of commuter peak hour traffic congestion.

Energy conservation, reduced air pollution, and improved use of the existing transportation system are major goals of Commuter Pool, but its emphasis is on reducing traffic congestion by encouraging ridesharing and accommodating high occupancy vehicles. The Commuter Pool is just one component of a larger ridesharing program.

Several paratransit alternatives have evolved in Seattle via Commuter Pool activities:

- Ride matching and subsequent employer survey and consulting activities.
- Access incentives.
- Development of other paratransit services.
- Traffic monitoring.
- Reducing commuter peak hour congestion.

Background: Before Commuter Pool was established, two carpool matching programs in 1973 and 1974, respectively, had been initiated with varying success. Both carpool matching programs responded to an air quality improvement mandate from the U.S. Environmental Protection Agency, which had ruled that the Seattle central business district was polluted by automobile emissions. The Seattle Traffic Engineering Division managed the first program directed at city, county, and local Federal government employees. About 1,800 out of 8,400 responded to the program, and 150 carpools were formed.

*Information for the Seattle/King County case study comes from the following sources: The Seattle/King County Commuter Pool Program: Paratransit and Rush Hour Congestion, 1978; and a conversation with John Shadoff, Associate Transportation Planner, Seattle/King County Commuter Pool, February 29, 1980.

The present carpool matching program, begun in 1974, offers a free computer match service which is an ongoing element basic to the Commuter Pool program. In 1977, 4,900 match applications were processed with about 7,500 names maintained in an active applicant file. Currently, there are 17,000 names on file as a result of the computer matching by street address. However, these names are also utilized in other paratransit services.

How The System Operates: Commuter Pool ride matching is accomplished by a computer match system based on street addresses, which are updated every six months. After a computer match, a letter is sent, but it is also possible for the public to telephone in for an immediate match.

Promotion of carpooling is accomplished through an effective marketing program that reaches 200 of the largest employers in the Seattle metropolitan area via billboards along highways, a recently begun newsletter, and the media. The ridesharing portion of the budget - \$141,000 - pays for about 1-2 staff people, computer time, and ridesharing activities.

Employee transportation surveys conducted at major employment centers consist of questionnaires to gather information on employees' names and addresses, work and commuting patterns, and interest in carpooling and other paratransit services. One such survey of a medical complex resulted in increased carpool applications from 2 percent to 20 percent.

Several incentives for carpooling have also been initiated by Commuter Pool. Some of these are special parking rates for sports and cultural events at the Seattle Center, suburban park-and-pool lots, preferential access to bridges and ferries, and discounts on tolls.

Results and Conclusions: The Commuter Pool program, with its emphasis on ridesharing for employees working in the Seattle metropolitan area, has been meeting its overall goals for carpool matching, public vehicle carpool (vanpool), canvassing employers, employee surveys, and incentives for ridesharing.

Some of the findings of employee surveys have been the following:

- Applicants traveled farther to work than regional commuters on the average . . . and most had a car available for commuting.
- 80 percent of the applicants started work between 7:30-8:30 a.m.
- 16 percent of the applicants formed or added to an existing carpool.
- Carpools are usually formed by two fellow workers who share the driving.
- Most applicants previously drove to work alone.
- Economic savings are the main reason for carpooling.

Over 60 companies report vanpooling is easy



Vanpooling is very popular with employers and employees as evidenced by the number of employers participating in such transportation programs.

Employers can encourage vanpooling among their employees by reserving parking places for vanpools such as the lot shown above at a California employment center.



Significant savings have been demonstrated to commuters who participate in ridesharing in the form of carpools and public vehicle carpools. In turn, incentives such as preferential access on freeways at peak hours, decreased bridge and ferry tolls for carpools, and preferential parking have continued to promote the advantages of ridesharing. An estimated 3,700 vehicles have been removed from commuter traffic as a result of the Commuter Pool program.

Incentives to and advantages of ridesharing have also encouraged the wider adaptation of flexible work hours in the Seattle metropolitan area.

VANPOOL SERVICES. These are usually arrangements through which a number of people share the costs of commuting to work every day by using a van that can carry up to 15 passengers.

Vanpools are organized in one of four ways:

- Employer sponsorship.
- Employee organizations.
- Individuals who own vans.
- Third party lease operations.

Most vanpools are arranged by employers for the mutual convenience of the company and its employees. An employer buys or leases vans, and organizes and administers the program. The employees who ride pay for the capital and operating costs of the vanpool through their fares. Because these employer-sponsored vanpools are limited to employees of a single company, systems of this kind are usually limited to companies that have over 1,000 employees; a sizeable number of employees are needed in order to match potential riders with vans that have routes that would accommodate the employees. The Digital Corporation in Maynard, Massachusetts, is an example of an employer-sponsored vanpool program. The company operates 64 vanpools for its employees (133).

Employee organizations that sponsor vanpools are similar to the employer-sponsored type, except that the employees of the company make all the arrangements themselves through their organization. The Tennessee Valley Authority's (TVA) vanpool service, which is operated by the joint efforts of the employee credit union and TVA management, has a less common type of organization.

Individually owned vanpools are most like the larger, shared-cost carpools. The vanpool's driver and passengers negotiate an acceptable fare structure and decide upon pickup and delivery locations. One rather unique example of an individually owned vanpool is the Knoxville (Tennessee) Commuter Pool project. In 1978, 18 months after the pool began leasing vans to drivers who had a sufficient number of passengers, 50 of the vanpool drivers purchased their vehicles (33).

Third party vanpool lease operators provide new 12-passenger vans and the overall administrative services required to efficiently maintain a vanpool program. The lease operators organize groups into vanpools, select drivers, structure the fares, and maintain centralized record keeping. Persons interested in joining the program need only fill out an application form and return it to their company transportation coordinator or the vanpool lease operator. When nine individuals have been matched in one neighborhood, a vanpool will be initiated. Fares are determined by distance and the number of persons per van, with each passenger sharing equally in the cost.

Drivers in third party vanpools are responsible for the maintenance and care of the vans, the delivering of passengers from their area, and the collection of fares. In return drivers ride free of charge and have limited personal use of the van for a nominal charge per mile.

An example of a third party vanpool lease operation is the Greenway Plaza vanpool program in Houston, TX. Greenway Plaza is the first commercial developer in the country to provide vanpool leasing to its tenants and their employees (41).

AN EXAMPLE OF VANPOOLING

TVA VANPOOLING PROGRAM*

Introduction: Early in the 1970's, the Tennessee Valley Authority (TVA) developed an innovative transportation incentive plan to help its employees get to work. Among other things, the plan included incentives for use of public transportation, express buses, vanpooling, and carpooling. The plan was developed in response to a parking shortage and the congested highways around TVA headquarters in Knoxville.

A highly successful element of this transportation plan was a vanpooling program, which has proved so popular and beneficial that the TVA has since expanded the program to its 40 outlying locations and 16 power plants. By the end of 1980, the TVA will have over 600 operating vanpools throughout the organization, illustrating that vanpooling not only is a way to deal with specific commuting problems, but is also an effective response to rising gasoline prices.

*Information for the Knoxville-TVA case study comes from the following sources: Knoxville, TN, Commuter Pool, 1978; "Have van will travel," Planning, February 1980; Urban Transport Service Innovations, 1979; and a conversation with Stanley R. Stokey of TVA's Employee Transportation Unit, February 29, 1980.



The TVA is one of the country's largest vanpool-sponsoring employers.

Background: Commuting to work has always been a problem for many of the 3,400 employees of Knoxville's largest employer, the TVA. The city, which has a population of 180,000, suffers from a shortage of parking. That difficulty worsened during construction of TVA's new twin-tower office complex in downtown Knoxville in 1973; the land taken for construction removed over 1,000 parking spaces. In addition, traffic along the city's main artery, I-40, is extremely congested during commuting hours. The existing public transportation system was not equipped to handle the transportation needs of all of TVA's employees. Finally, the oil embargo of 1973, making gasoline harder to come by, intensified commuters' problems.

TVA management considered two solutions to this transportation problem: building more parking facilities for its employees, or subsidizing a transportation program designed to encourage ridesharing and more efficient use of existing transportation resources. The first alternative would have cost TVA over one-half million dollars and never addressed the congestion or oil embargo problems.

Instead, in January 1975, the TVA initiated a multi-faceted incentive program promoting many forms of ridesharing, including express buses, vanpools, and carpools. Earlier, TVA employees, working in cooperation with the city of Knoxville, had laid much of the groundwork for improved commuter transportation using public transportation; now the TVA encouraged its use through employee discounts on commuter bus tickets, special rates for carpool parking, and other incentives.

Six TVA vanpools were in operation by the end of 1974 in Knoxville, and this has grown to over 75 active vanpools transporting over 850 commuters every day. The number of vanpools is expected to increase to over 100 by the end of 1980.

How The System Operates: The TVA vanpool program is operated through the employees' credit union, which purchases the vehicles, and in turn leases them to employees who wish to drive them. The costs of operating the vanpools are covered by the leasing rates plus a subsidy from the TVA. The leasing rates are based on the round-trip travel distance the van covers commuting every day; this amount is divided up among the passengers and becomes the cost of their fares.

The actual cost to users is reduced by a 35 percent subsidy by the TVA of the direct operating costs of the vans, including purchase price, maintenance, gasoline, and oil. In 1977, the subsidy, although administered differently, averaged out to about \$1,500 per van per year. The overhead costs of the transportation coordinator and insurance are also borne by the TVA.

Vanpool fares fall between 2 and 3 cents per mile for each passenger. Everyone in an individual vanpool pays the same fare; the lowest monthly rate for van



TVA vanpools carry between 10 and 15 employees on the average; a few are smaller.

passengers is \$15. In 1980, TVA will begin a system of fare payment through bi-weekly deductions. Originally, drivers were responsible for collecting fares, but with the rapid expansion of the program, the payroll deduction was considered a more efficient method of fare collection.

Drivers receive no compensation other than a free ride to and from work. No specific training is provided for the drivers, although the TVA provides a short orientation class. Drivers are also responsible for seeing that vehicles are maintained and kept clean. Maintenance, gasoline, and oil costs are billed directly to the credit union.

The vans themselves are 10-15 passenger vehicles; most of the vehicles can carry 12 passengers. They are replaced after 100,000 miles or six years of service. Backup vans are provided to maintain service in case of breakdowns.

Results and Conclusions: The vigorous ridesharing promotion by the TVA has resulted in a sharp decrease in the number of employees who regularly drive to work alone. In 1973, 65 percent of TVA employees drove to work alone; now less than 18 percent do. Vanpoolers now make up almost one-quarter of the Knoxville TVA employees traveling to work. Vanpooling at Knoxville's TVA headquarters has spurred other vanpool development. It has proven beneficial to the TVA, to its employees, and, indirectly, to thousands of others living and working in Knoxville.

Although the entire transportation incentive program costs the TVA about \$50,000 per month, program director Stanley R. Stokey estimates that the TVA has saved at least \$20 million in capital outlay projected for parking and roads that would otherwise be necessary.

TVA commuters save substantial amounts of money by vanpooling rather than driving to work alone. Assuming an average commute of 50 miles per day round trip, a 22¢ per mile cost, and 50 work weeks per year, it would cost a commuter \$2,750 to drive to work over the course of a year. The same trip by vanpool, based on a mileage fare of 2.5¢, would cost \$312.50, a savings of \$2,437.50 per year. Other advantages are reductions in accident risks, an increase in convenience, and the resulting availability of the family car to other members of the family.

An earlier study showed that in 1974 six vans operating in TVA pools saved about 280,000 gallons of gasoline annually over gas consumption by commuters driving alone. Given the increase in vanpooling since that time at TVA, the gasoline savings is now estimated to be over a million gallons annually in Knoxville alone.



Workmen board a subscription bus at a TVA work site.

TVA's employees leaving for their subscription buses and vanpools at the end of a workday.



SUBSCRIPTION BUS SERVICES. Another form of paratransit that is designed to accommodate the commuting needs of a specific group is the subscription bus, sometimes called a buspool. This form of ridesharing is usually organized for people who need to commute over longer distances to and from work. Subscription buses generally operate along routes where conventional public transportation is either not offered or is inconvenient.

Subscription bus services are formed by private groups or by employers as a way of making commuting faster, more economical, and more convenient for themselves or others. Special features of subscription bus service include guaranteed seating, door-to-door service, an express ride for most of the trip, and regular route and schedule adjustments in response to changes in passenger demand. Fares for subscription buses are usually paid in advance.

Subscription buses can also be very attractive to the communities they serve. The service can result in less traffic congestion, pollution, and fuel consumption. Employers benefit from reduced parking requirements, and improved accessibility for some workers who might otherwise have to seek work elsewhere. Subscription bus service is also attractive because it requires little or no public subsidy and can be a profitable venture for a private operator.

Three important factors determine the feasibility of operating a subscription bus service:

- A large concentration of people making trips on a regular basis with compatible routes and schedules.
- A dedicated organization to formulate the service and to manage it on a continuing basis.
- A local provider of buses and drivers that can offer reliable service.

Subscription bus services obtain drivers and vehicles in a number of ways: by contracting with a transit authority or a private bus company for vehicles and drivers, or by purchasing their own vehicles and hiring their own drivers. A subscription bus service is typically a peak-hour operation; buses and drivers are necessary only during the travel periods.

Reston Commuter Bus (RCB) is an example of a subscription bus serving the Reston, Virginia, and Washington, D.C., area employment centers. A non-profit corporation developed by a group of community volunteers in Reston, RCB began operating in 1968. Its 75 daily bus runs are supplied by the Washington Metropolitan Area Transportation Authority. RCB ridership was 56,230 during the month of August in 1979 (129).

Another subscription bus service, operating for over 15 years, is located in Bremerton, Washington, a small city of 35,000 people. A private bus carrier

operates the subscription bus service for Bremerton residents who are employed at a local shipyard, the city's main employment center. The cost of operating the service has been kept down by maintaining older buses, rather than purchasing new ones, and by employing part-time drivers who are employees of the shipyard. Maintenance costs on these older buses have been minimal because the buses only make one round trip per day. Fares on this system are collected daily, although riders can purchase weekly books of tickets for their convenience (62).

AN EXAMPLE OF SUBSCRIPTION BUS SERVICE - COM-BUS*

Introduction: The Southern California Commuter Bus Service, Inc., better known as COM-BUS, is a privately owned subscription commuter bus service in operation since 1968. COM-BUS serves approximately 2,000 commuters per day on 47 routes in Ventura, Los Angeles, and Orange counties in California. Passengers pay or subscribe on a weekly pay-in-advance reservation basis for COM-BUS service. COM-BUS operates with a minimum of capital outlay because it leases its buses from private charter bus operators. Volunteers help manage the COM-BUS operation.

Background: In 1968, the McDonnell Douglas Astronautics Company transferred many of its employees from its Santa Monica, California, facility to its new headquarters in Huntington Beach, California, some 40 miles to the southeast. Approximately 80 percent of the employees working at the Santa Monica plant lived near it. Employees making the transfer without moving their households were confronted with driving 40 or more miles each way daily. After assessing various options—such as using private automobiles, establishing carpools, and using public transportation—a group of 45 employees decided to explore the possibilities of chartering a commuter bus on a regular basis. This group chartered a bus which became subscribed to capacity.

Within three months of the initiation of the first charter bus, four others were independently organized, utilizing the same charter bus provider. However, service from the original bus provider deteriorated, and commuters agreed to switch to

*Information for the COM-BUS case study comes from the following sources: COM-BUS: A Southern California Subscription Bus Service, 1977; and a conversation with Ronald J. Hoffman, President of Science Applications, Inc., Huntington Beach, CA, February 29 and March 5, 1980.

another bus company. The owner of the new bus company requested that one member of COM-BUS be selected to deal with the bus company management, and a fee would be paid to compensate for the coordination of service. The current owner of COM-BUS was selected because of his continuing involvement since 1968.

COM-BUS operates in a service area of over 1,200 square miles. Population density for this portion of the Los Angeles urbanized area is between 3,700 and 7,700 people per square mile. People in this area currently have the following options for commuting to work: public transportation, COM-BUS, and the private automobile. Public transportation, which does not cover the most widely used long-distance routes to work, is not an acceptable alternative to the private automobile for many people. COM-BUS, which has contracts with eight of the twenty available charter bus companies, promotes healthy competition and has a consistently high level of service.

How COM-BUS Operates: COM-BUS has determined that for a route to be economically viable it must:

- Have between 3 and 5 stops.
- Travel a direct route.
- Pick up the most people at the last stop in the morning so that the fewest people are inconvenienced by delays.
- Drop off the most people for work at the first delivery point so that the fewest people are inconvenienced by delays.

When patronage growth allows for an additional bus to be put into service, the new bus is not added as a second unit on an existing route. Instead, all routes which might be affected by the addition of another bus are surveyed by COM-BUS and several new routes are formulated to serve all of the riders in a particular region.

COM-BUS management recognizes the need for reliable service. In 1976, 98 percent of the COM-BUS trips arrived at their destinations on time or ahead of schedule, and less than 2 percent arrived more than 10 minutes late.

In 1979 fares per person ranged from:

- A low of \$16.00 per week for 44 miles round trip.
- A high of \$22.00 per week for 136 miles round trip.

In 1979 the average fare was \$18 per week for 90 percent of the routes, while the average yearly cost per passenger mile was 4.2 cents. Travel times in 1980 are between 40 minutes to 1 hour and 30 minutes.

Initially, an informal route management organization consisting of "Bus Captains," passenger representatives for each of the five early bus routes, was in-

stituted. The organization continues today with a more formal structure. In exchange for free transportation, the Bus Captains are required to:

- Collect fares.
- Enforce passenger safety rules.
- Coordinate appropriate vehicles with passenger schedules for the particular route.

COM-BUS has two full-time clerical support persons. Fees of between \$30 and \$65 per week, depending on the number of routes served, are paid to Area Coordinators. Responsibilities of Area Coordinators include supervising the Bus Captains, dealing with operating problems, coordinating COM-BUS services with employers, and keeping COM-BUS management aware of potential problems. All operating funds are obtained from the fares which passengers are charged.

To service its 47 routes, COM-BUS owns two minibuses which carry 13 to 16 passengers, and it charters buses which carry 38 to 47 passengers. The minibuses satisfy short-term shifts in the levels of demand, replacing large charter buses when the given ridership for a route decreases, or when new routes are introduced.

COM-BUS management has found that the most effective way to communicate with passengers is through the Bus Captains, who verbally inform them about new decisions. Group meetings at which COM-BUS management attempts to answer questions from potential riders have also proved useful. A final method of communications has been the distribution of bulletins, published by COM-BUS management, which cover topics of general interest to commuters.

As COM-BUS grew to serve many employers, the California Public Utilities Commission (PUC) took notice of it and required that it operate under PUC laws. In the opinion of COM-BUS management, understanding and complying with PUC regulations is a difficult and time consuming problem. COM-BUS management estimates that approximately 16 percent of its operating costs are directly attributable to compliance with PUC regulations.

Results and Conclusions: In 1979, it was estimated that on 47 daily routes, COM-BUS was making approximately 700,000 passenger trips annually with over 2,300,000 passenger miles. COM-BUS continues to:

- Operate at a profit, without any form of subsidy.
- Have high subscription rates, in excess of 90 percent of capacity.
- Operate with a minimum financial capital outlay.
- Be managed with a minimum of administrative and overhead expense.

COM-BUS currently transports approximately 2,000 passengers per day to and from work in an area which, compared to other metropolitan areas, has a high percentage

of workers utilizing the private automobile as their chief means of transportation.

COM-BUS travel times are competitive with the private automobile. For a weekly fare of \$16.00 for a 44 mile per day round trip, the cost to a COM-BUS passenger would amount to \$800 per year, assuming 50 work weeks. The same round trip at 22 cents per mile would cost a commuter driving to work by private automobile \$48.40 per week, or \$2,420 per year.

The personal involvement of the current owner from the beginning, coupled with the existence of Bus Captains and Area Coordinators, all having a personal stake in seeing COM-BUS succeed, have been the key elements in COM-BUS's growth.

Before considering or planning for a subscription bus service similar to COM-BUS in other areas of the country, it is important to understand the following basic service area characteristics for COM-BUS:

- Fairly high-density residential areas.
- Concentrations of major work destinations.
- Proximity of most major residential and employment areas to freeway interchanges.
- Work trip distances ranging from 22 to 68 miles one way, which allow the development of a service with travel times competitive with private automobiles.
- Fairly stable commuter travel patterns.

Further proof of COM-BUS's continuing viability is demonstrated by its recent application to the California Public Utilities Commission for two new subscription bus routes in 1980.

III | **PLANNING PARATRANSIT SERVICES**

TABLE 5. FACTORS USED TO RATE TRANSPORTATION

Passenger	Provider	Community
Availability	Area Coverage	Passenger Attraction
Punctuality	Frequency	Long Range Impact
Speed-Travel	Speed	Environmental/ Energy Aspect
Time	Reliability	Economic Efficiency
User Cost	Cost	
Comfort	Capacity	
Security	Safety	
Convenience	Side Effects	
	Passenger Attraction	

Source: Reference 12.



An employment center in California with vanpools in the parking area.

identifying unmet transportation needs

IDENTIFICATION OF UNMET transportation needs is the first step toward planning paratransit services. There are many ways to identify such needs. One approach is to determine how different segments of a given community view their existing transportation services. Table 5 lists some of the factors passengers, providers, and the community at large mention when asked to rate transportation. These factors can be used as a checklist to identify satisfactory and unsatisfactory aspects of an existing transportation network. A needs assessment may be conducted by asking various groups of transportation users and representatives of geographic areas how well existing transportation meets their specific needs, given the amount of funding and community interest. Any number of sources can be used to identify transportation needs: surveys, questionnaires, transportation studies, and community meetings.

Before a new paratransit service is initiated, all types of existing transportation services must be documented. The potential for transportation consolidation is then analyzed, particularly for social service agencies, many of whom provide specialized transportation for their clients.

Both the transportation needs of limited mobility users and their travel requirements, and the travel needs of the general public during peak and off-peak hours are then identified. Places where people frequently travel (shopping centers, centers of employment, medical facilities, etc.), as well as common points of departure, are noted.

Two types of surveys are useful for predicting transportation needs:

- A survey of health and social service agency-oriented trips.
- A survey of work-oriented trips.

The director of each social service agency providing transportation is usually inter-

viewed for answers to the following typical questions (43):

- How many clients come to the agency per month?
- How many clients are having difficulty with transportation? How many clients must be driven to and from the agency by the agency's staff?
- How many people must depend on their neighbors for transportation to and from the social service agency? (Agency directors should have a general knowledge of where their clients live and be able to estimate the number of persons who are having problems reaching the agency.)
- How many people are not making use of the agency because of the lack of transportation services? Are there people who seek the agency's services less frequently because of transportation problems?
- How many people who have access to private automobiles would stop driving if there were a new paratransit system?

During the planning stages of a paratransit program, transportation information gathered from social service agencies, census materials, or secondary sources can provide rough, but functional estimates of potential ridership, especially the transportation handicapped. For instance, estimates of the number of elderly can be obtained directly from the latest U.S. population census. In 1975, the portion of non-institutionalized handicapped residing in metropolitan areas was estimated at 3.8 percent (12). The number of non-institutionalized individuals can be added to the number of institutionalized individuals, as recorded in local census data, to produce estimates of the transportation handicapped population within any Standard Metropolitan Statistical Area. Welfare departments, hospitals, clinics, and senior citizen centers can also provide information on the travel patterns and the transportation needs of certain limited mobility users.

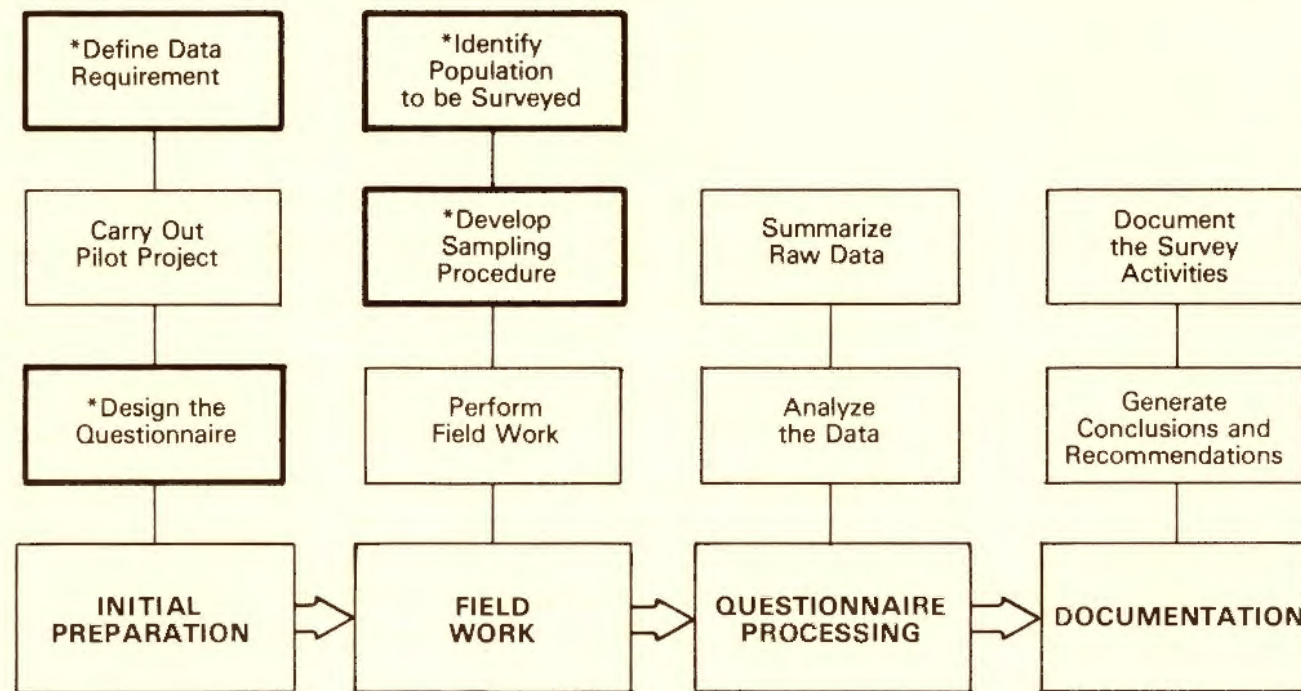
Surveys can also be used to gather information of this type. The essential elements of a survey are:

- Defining the data requirements.
- Designing the questionnaire.
- Identifying the population to be surveyed.
- Designing the sampling procedure.
- Conducting the survey.

Surveys may generate more detailed information suitable for paratransit system design work, as travel patterns and the transportation needs of limited mobility users can be quite different from those of the general population. A survey procedure is shown in Figure 1.

Surveys of limited mobility users groups can be distributed through social service agencies. Availability of automobiles, an important factor in determining the

Figure 1. Block Diagram Representation of the Survey Procedure



Source: Reference 172.

need for paratransit services, should be included in such sampling. Questionnaires are an inexpensive, efficient means for obtaining desired information. Figure 2 provides a sample transportation ridership survey questionnaire.

Similar surveys of work-related transportation needs should be developed to determine the need for prearranged ridesharing paratransit. Again, census data and information from city, county, and regional planning agencies should be available to generate total employment figures. The location of major employers should be pinpointed within the service area. Individual surveys and interviews with employers are also necessary to determine a company's interest in organizing prearranged ridesharing.

An employer or an employee organization can conduct an employee commuter survey to identify commuter transportation needs and to determine what opportunities are present for either prearranged ridesharing or some type of demand-responsive transportation.

Small communities can adopt a similar approach when assessing transportation needs. Two such communities developed a variety of paratransit operations based on a needs assessment. Schaumburg and Hoffman Estates, in Illinois, had low population densities and lacked central business districts, yet required transportation services. Advisory groups for the two communities surveyed the residents and determined that a dial-a-ride operation would best meet off-peak transportation needs. For peak-hour travel, the communities chose a variety of carpools, vanpools, and subscription bus arrangements, as well as some conventional forms of public transportation (139).

In Knoxville, Tennessee, a transportation needs assessment identified commuters and limited mobility users in order to define a potential market for paratransit. Each target group was divided by demographic characteristics or by usual purpose of transportation. Commuters were identified by surveying employers.

Knoxville classified limited mobility users by the degree to which they were restricted from using existing transportation services, as shown in Figure 3. For example, the first segment in Figure 3 represents those who use an automobile. The last segment includes those people with the most severe restrictions. Demand-responsive and prearranged ride-sharing paratransit services in Knoxville have been tailored to meet the transportation needs for each market segment (33).

Figure 2. Ridership Survey

Sponsored by the Massachusetts Executive Office of Transportation and Construction

Please answer the following questions and help us to provide you with a better transportation system. You need not identify yourself.

PLEASE CHECK THE APPROPRIATE SPACE _____

1. How did you first become aware of this service?

- radio/TV friend or relative
- newspaper service organization

2. What problems did you have in making this trip before this service was available?

- I had no problems
- I could not make this trip as frequently as I would like
- I could not make this trip on the day or at the time of my choosing
- It was expensive for me to make this trip
- I could not make the trip at all

3. How did you make your trips before this service was available?

- I drove
- I was driven
- I took a bus or subway
- I took a taxi
- I walked
- I could not make the trip

4. Do you have any difficulty walking more than one block?

- No problems
- I can manage with difficulty
- I cannot manage at all

5. Do you have any of the following disabilities?

- I must use a cane or crutches
- I have a heart condition
- I must use a walker
- I must use a wheelchair
- I am blind
- I cannot walk any distance
- I have arthritis

6. How often do you use this service?

- every day
- 1 to 4 times a week
- a few times a month
- once a month
- less than once a month

7. What is the purpose of this particular trip?

- medical facility
- nutrition site
- shopping
- recreational
- social visit
- personal business
- work
- school
- other (specify)

8. Do you use this service for more than one type of trip purpose?

- yes no

If "yes," please name trip purpose(s) _____

Source: Reference 172

Figure 2. Ridership Survey (Cont.)

9. What was the fare you paid for this service? \$ _____

10. Is your fare paid by a State or local social service agency?
____ Yes ____ No If "Yes," which one? _____

11. How far in advance do you schedule your trips?
____ same day
____ one day in advance
____ 2 days in advance
____ one week in advance
____ your trip is prescheduled and is always the same time
____ other _____

12. Do you have problems making reservations?
____ Yes ____ No ____ Sometimes _____

13. Are you picked up on time? ____ Yes ____ No ____ Sometimes _____

14. Is it difficult for you to board the vehicle?
____ Yes ____ No ____ Sometimes _____

15. Is the fare reasonable? ____ Yes ____ No _____

16. Do you intend to continue using the service? ____ Yes ____ No _____

17. If you have comments, please make them here: _____

FOR STATISTICAL PURPOSES, PLEASE ANSWER THE FOLLOWING QUESTIONS. THANK YOU.

a. Sex: ____ Male ____ Female

b. Do you have a valid driver's license? ____ Yes ____ No

c. Do you or anyone in your household own a car? ____ Yes ____ No

d. Is there a car available for your use? ____ Yes ____ No ____ Sometimes

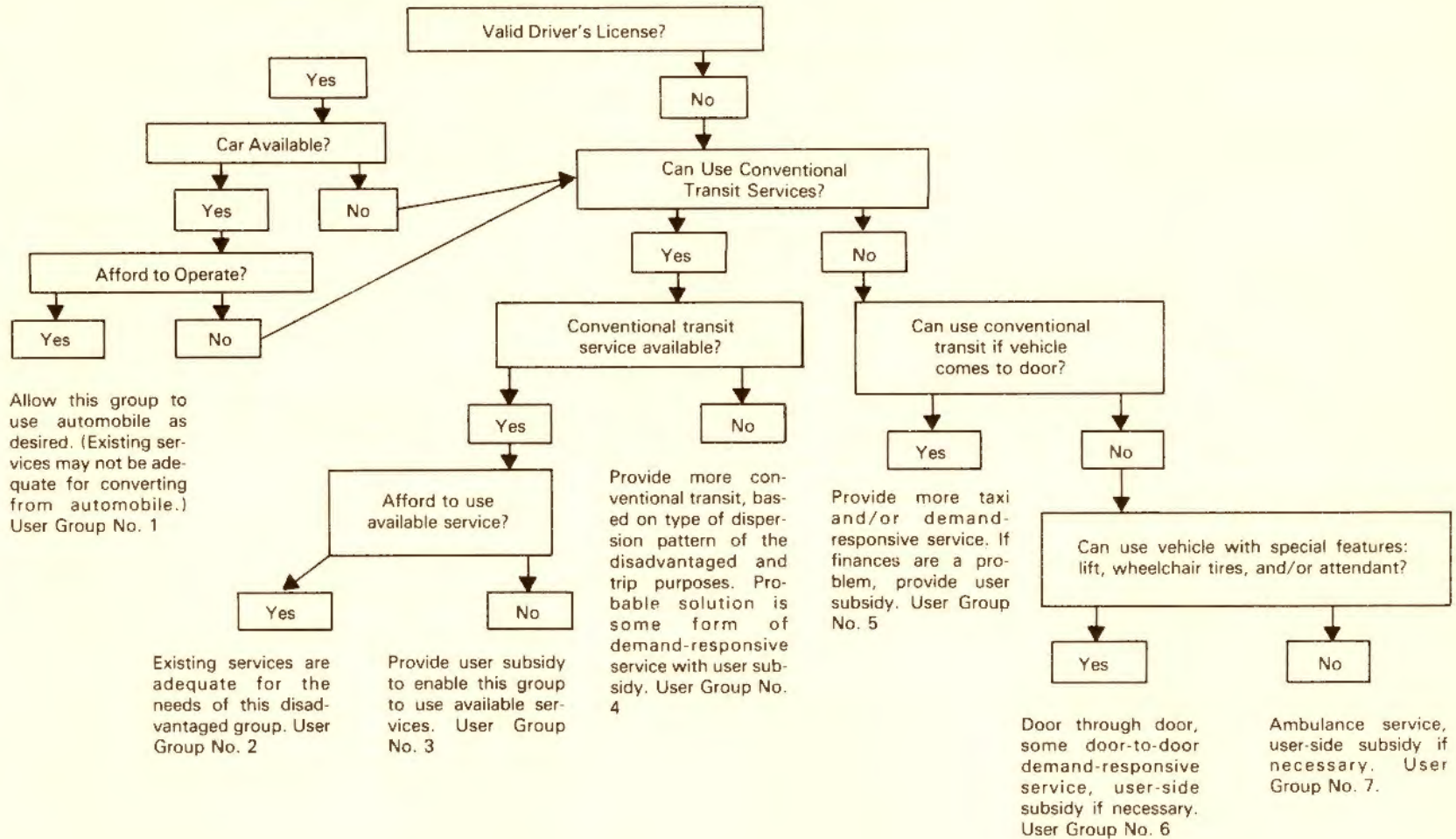
e. To what age group do you belong?
____ 65 to 69 ____ 55 to 59
____ 5 to 69 ____ 20 to 54
____ 60 to 64 ____ under 20

f. Which category indicates your yearly income?
____ under \$2000 ____ \$7000 to \$10,000
____ \$2000 to \$4000 ____ \$10,000 to \$14,000
____ \$4000 to \$7000 ____ over \$15,000

g. What is your employment status?
____ full-time employment
____ part-time employment
____ looking for employment
____ not employed
____ retired

THANK YOU FOR YOUR COOPERATION. WE HOPE THAT YOUR ANSWERS WILL RESULT IN CONTINUED IMPROVEMENT TO YOUR TRANSPORTATION SERVICES.

Figure 3. Identifying Knoxville's Transportation Needs for Limited Mobility Users (Elderly, Handicapped, and Low Income)



Source: Reference 33.

TABLE 6.
DATA AVAILABLE THROUGH TRANSPORTATION
INVENTORY SURVEYS

Information Requirements	Data Sources
Patron location, trip characteristics	Agency surveys Operator surveys
Passenger volume	On board surveys
Passenger attitude	Case studies
Verification of on board survey results	Non-user survey
Identification of eligible persons and their reasons for not using the service	

Source: Reference 12.

assessing existing public transportation services

An assessment of existing transportation services in the proposed service area is the basis for determining the impact a future system may have on a community. Such an assessment or inventory identifies existing fixed-route transportation and may reveal opportunities for expanding or modifying existing services, or implementing new ones, such as one of the forms of paratransit. To conduct an inventory of transportation services, a questionnaire is sent to transportation providers. Detailed schedules, operating routes, and fares for all transportation services in the area are requested and assembled. Taxi service boundaries are clearly identified, as well as taxi rate structures, fares, and transfer and waiting stations. Transportation services offered by social service agencies are surveyed, noting service areas, schedules, fares, clients and special services or equipment such as wheelchair lifts or ramps.

Earlier inventories made by agencies, operators, users, and non-users, may provide a good inventory which may be easily updated. Table 6 shows the kinds of data available through transportation inventories.

Past inventories may not provide the planner with all the desired data, and attempting to fill these gaps may be costly and time consuming. Yet needs can be kept quite simple, and significant amounts of time, money, and effort need not be expended preparing transportation inventories (100).

establishing goals and objectives

Experience has shown that one of the first steps in planning any paratransit service is to draw up a statement of goals relating the aims of the service to the identified transportation needs of the community. A comprehensive set of goals will broaden the perspective that a given community has toward transportation. This perspective will include many possible alternatives. An example of a general goal would be "to enable people and goods to move safely, efficiently, and economically within the community" (100).

To be truly useful, however, a paratransit service's goals will reflect community values. For example, reducing energy consumption might be a specific, value-related goal; improving mobility for the elderly and handicapped might be another. Increasing or improving paratransit services could be one way of improving mobility

TABLE 7. PARATRANSIT OBJECTIVES CITED BY EXISTING SYSTEMS

- Provide expanded service into areas not well-covered by conventional transit
- Replace marginal bus routes
- Feed express buses or other fixed-route systems
- Increase ridership on express buses or other fixed-route systems
- Provide more efficient off-peak service
- Identify promising patterns for conventional fixed-route service
- Improve overall system efficiency and productivity
- Provide additional peak-period capacity
- Minimize capital investment
- Test use of new equipment and techniques
- Achieve and maintain low operating subsidy

Source: Adapted from Reference 12



Paratransit planning should involve the entire community, especially those who particularly need transportation services, such as the handicapped.

for the elderly and handicapped, although other approaches might be considered and found more effective.

An advisory committee in Fairfield, California (population of 44,146), identified a number of community goals related to transportation. One was to provide a transportation system within the city that would offer a convenient and viable alternative to the private automobile and would also service the transportation needs of limited mobility users. The service provided should be the best possible at the lowest price. In addition, the transportation system should support the Fairfield business community, as well as developers in the area.

Once goals are defined, objectives must be delineated. Like a goal, an objective is an end toward which an effort is directed, but an objective, as used in this document, is more specific and may be seen as supporting a goal.

The wording of the objective of a paratransit service requires careful thought. It should be specific enough to suggest how the goal can be or will be achieved by the service that is finally implemented. If the goal is to create a new transit system which is economically viable, for example, two objectives might be to minimize the capital investment and to maintain a low operating subsidy.

The wording of objectives should also allow for alternate means of accomplishing them. For example, if the goal is to ensure the social and physical welfare of all community residents, an objective might be to provide handicapped persons with access to health and medical services in the community. Two methods of accomplishing this objective would be to 1) transport these individuals to the services, or 2) bring the services to the individuals. Had the objective been solely to provide handicapped persons with a means of transportation to health services, the second method probably would not have been considered.

When objectives are formulated, the likely economic and social impact of the new paratransit service on the community should be evaluated. For example, it is important to estimate the economic impact of the new paratransit service upon existing transportation services, especially taxis.

Table 7 contains a list of paratransit objectives taken from actual system implementation.

involving the community

Planning and implementing any paratransit service that is truly responsive to the transportation needs of a community means involving community represen-



One way to obtain vital community support for a paratransit service is to involve the public in the planning and system design through citizens' meetings.

tatives from the beginning and throughout the life of the program. Too often paratransit services have been planned and put into place, and then have failed because potential riders had not expressed their needs at the initial planning stage. At times, paratransit services have been selected without sufficient consultation and realistic estimates of the actual numbers of riders. Other paratransit services have been based on Bureau of Census figures for elderly and handicapped residents—without, however, checking to see whether this group needed or would actually use a new form of transportation. Careful planning *with*, as well as for, people who will actually use a system results in the most successful, on-going paratransit service.

Task forces or advisory committees composed of different community groups have been used successfully not only to identify existing transportation needs and deficiencies, but also to offer continuing community input during the subsequent development of a paratransit service (12). For instance, the city of Fairfield, California, developed a paratransit system after first establishing an advisory committee to identify community goals. In Ann Arbor, Michigan, a citizens' committee met with representatives of Ford Motor Company in April 1968 to explore the feasibility of dial-a-ride service. Two years later, Ann Arbor directed Ford to develop a plan implementing demand-responsive service (17).

If Federal assistance is sought for capital investment and operating assistance in a public transportation system, citizen involvement is mandated by the joint planning regulations for urbanized areas issued by the Federal Highway Administration (FHWA) and UMTA, as set forth in the Federal Register of September 17, 1975. Any applicant for capital and operating assistance in rural areas must provide an adequate opportunity for public hearings with adequate prior notice.

All available communication channels (for example, workshops, seminars, and public meetings) should be utilized to involve the community. The importance of good public relations during the planning process cannot be overemphasized.

Obviously, a paratransit system designed to suit the transportation needs of a community requires as much citizen participation as possible, particularly from the affected riders. Without such overall support, funds for paratransit services are not likely to be committed, since such decisions are usually somewhat political. No elected official is likely to request funds for projects not desired by a large portion of the community.



Local transportation officials can use community meetings to make the public aware of various transportation options.

determining operating patterns

SERVICE AREA SIZE. When determining the service area of a paratransit system, planners usually look at the transportation needs as well as various characteristics of the area. Transportation needs are reviewed, with areas of high and low demand noted, so that service can be targeted. Other factors which must be taken into account are the terrain, the political and geographical boundaries, the configuration of the existing streets and highways, the centers of population, the location of existing fixed-route services, and the location of the most common destinations. Local regulations, or the tax support structure for paratransit services are also considered, since they may contribute to the development of a coordinated area-wide service or may inhibit its development.

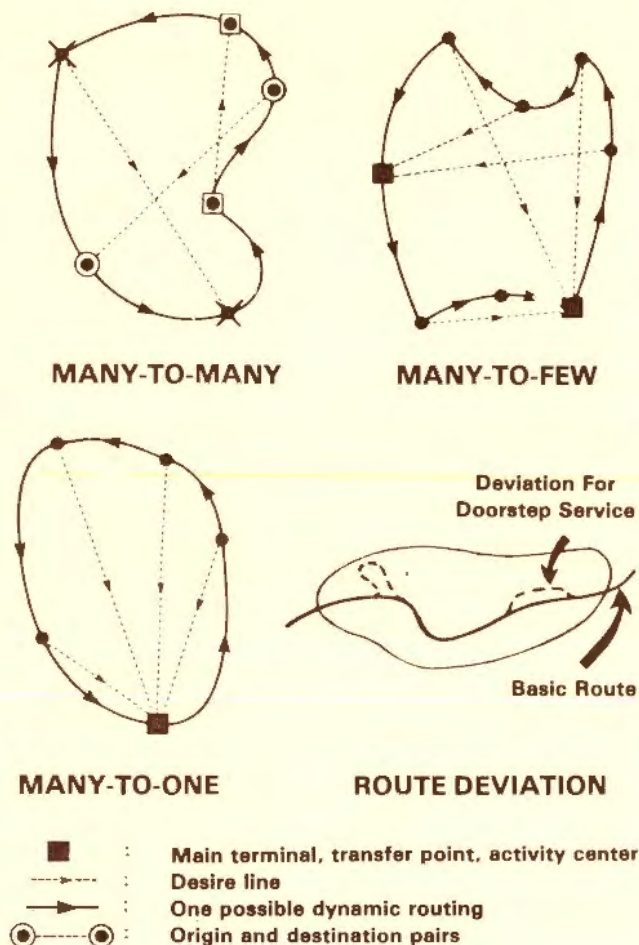
After a thorough review of all pertinent factors, a service area is usually selected. This tentative service area is then presented to the community, public transportation and taxi operators, public officials, business groups, and others for their comments and criticisms. As discussed earlier, a community may be more likely to support a paratransit system of its own design.

NUMBER OF VEHICLES. The number of vehicles a paratransit service should operate depends upon demand. In the early planning stages, the experience of other paratransit systems is used to help predict demand. Later, when the service is being designed, these early estimates can be refined once the vehicle type to be used is known, and field-test routes and tour speeds have been determined. Similarly, information on vehicle repair times and the availability of back-up vehicles from other parts of the service system influences the number of vehicles used. It has been found that dial-a-ride systems for the general public operate most effectively within a limited range of fleet sizes (12). Dial-a-ride services with less than three vehicles have not been found to be cost-effective because administrative and dispatching costs are higher per passenger (12).

Travel demand or ridership depends heavily on the quality of service. In conventional fixed-route public transportation, service quality is relatively independent of ridership, except when the capacity of the system is approached. However, quality of service in a paratransit system may suffer if ridership increases, since paratransit vehicles generally have limited seating capacity and can be delayed by an increased number of stops.

No single modeling technique or methodology for estimating travel demand has been developed with enough consistency to warrant its exclusive use in predicting demand levels. Costly approaches for demand estimation have fared no better than

Figure 4. Routing Configurations



Source: Reference 164.

simple approaches (12). In a small paratransit system, extensive data collection may not be warranted in the design stage. Simple demand estimating techniques include:

- Inference from other paratransit projects.
- Extrapolation from conventional public transportation ridership, trips, and users.

Existing paratransit systems provide a means of estimating the range of likely ridership levels within a specific population area. By comparing existing public transportation systems with those paratransit services being planned, and then approximately matching actual and expected service characteristics, it has been possible to narrow the wide range of demand levels.

ROUTING CONFIGURATIONS. Paratransit vehicles follow a variety of routing configurations in providing their specific services. Demand-responsive systems, such as dial-a-ride and shared-ride taxis, generally use what is called a dynamic routing policy. This means that as pickup and dropoff points are called into the dispatcher, the dispatcher will design a route for a particular vehicle that will be the fastest and most convenient, with no back-tracking. If there is no limitation on where the pickup and dropoff points can be, other than within the service-area boundaries, the paratransit service is called "many-to-many" (see Figure 4).

"Many-to-few" service picks up passengers at their homes or other logical starting points, but discharges passengers only at certain pre-established points, such as health centers, shopping centers, or regular transit stations.

"Many-to-one" service also picks up passengers from a variety of places but has only one dropoff point. Social service agency client transportation typically offers this kind of service. A clinic may pick up patients from locations all over the city, but will transport them only to the clinic.

Of course, these patterns may be reversed. For example, a van may pick up passengers at one nursing home, and the passengers' destinations may be scattered over the service area. This is a "one-to-many" service.

Route-deviation is a type of routing configuration whereby vehicles make scheduled stops at certain checkpoints, but may leave the fixed-route upon request to serve patrons not on that route.

Shuttle and loop configurations are also common for paratransit services. Shuttle services operate exclusively between two fixed stops. Vans or small buses, for example, often carry passengers from a shopping center to a fixed point that may be centrally located or at a regular transit station, and vice-versa. A loop con-



Automated dispatch monitors assist dispatchers in larger paratransit systems.

Vocal dispatching, as is seen here in Westport, CT, is the more commonly used form.



figuration means that a vehicle operates continuously along a fixed, circuitous path, picking up and discharging passengers along the way. This type of route is common on college campuses.

Carpools and vanpools usually pick up riders at their homes or at mutually convenient, prearranged spots. Usually, though not always, the riders have the same general destination. Subscription buses, like express buses, usually have a limited number of pickup points in order to offer the fastest service. Like carpool and vanpool riders, subscription bus riders are often transported to a single place of employment or an office or factory complex.

financial planning

Before any paratransit service can be initiated, system costs are estimated and revenues projected. Determining these projections demands both research and calculation.

Each of the five paratransit service types discussed in this document differs in its cost components and sources of revenue. However, all services share some common cost components and revenue sources.

COSTS. The costs of a paratransit service are usually divided into capital and operating costs (see Table 8).

Capital Costs: These are the purchase costs for vehicles, facilities, and equipment needed to make a system operational. The majority of capital expenditures occur during the implementation stage (169).

1. Vehicle Costs

Vehicles are generally the major cost item. The great variety of vehicles used for paratransit reflects the diverse needs for each paratransit type; examples are the system's budgetary limitation and operating environment.

Estimates of vehicle prices can be determined after consultation with suppliers and other service providers. For non-standard vehicles which are made to order, for example, modified vans, small buses and school buses, the submission of a bid is required to determine the exact vehicle price.

Vehicle options can substantially increase the final vehicle purchase price. Usually wheelchair lifts and air conditioners are the most expensive options.

- 1979 prices for modified vans ranged from approximately \$14,000 to \$25,000.
- 1979 prices for a small bus ranged from \$16,000 to \$30,000.
- 1980 prices for school buses ranged from \$18,000 to \$25,000 (162).

TABLE 8. CAPITAL AND OPERATING COST ITEMS

Capital Cost Items

- Vehicle and options
- Maintenance facilities and equipment
- Communications equipment
- Fare collection equipment
- Dispatching equipment
- Scheduling equipment
- Office furniture
- Buildings and land
- Shelter and signs

Operating Cost Items

- Labor
- Fuel, oil
- Maintenance (preventive and repair)
- Depreciation on vehicles and equipment
- Parking fees
- Tolls
- Rent, leasing
- Insurance
- Public relations and marketing
- Utilities
- Taxes
- Financing costs
- Licensing, registration

Vehicle passenger capacities are listed in Table 9.

The procedures required to purchase paratransit vehicles will depend on the requirements set down by the funding source. Figures 5 and 6 display vehicle procurement flow charts for U.S. Department of Transportation funding for both urbanized and non-urbanized areas. These figures also present approximate time frames to complete each step of the vehicle procurement process. It is important to note, however, that the changing environment for regulations and procedures may result in differing time frames in the future. Generally, governmental funding sources require a formal advertisement that bids are being accepted and also a competitive bid process (4,182). The governmental unit, whether local, state, or Federal, may also require specific clauses and provisions in the advertisement and in the contract documents between the buyer and seller. Identifying potential bidders may not be an easy task. Continual contact with other service providers seems to be a major source of information.

Both suppliers and buyers indicate that the lowest bidder may produce vehicles which meet the minimum technical specifications, but are of lower quality than the buyers intended. Problems have arisen from the warranty agreements, particularly for van conversions and small buses (20, 55). These vehicles have chassis and bodies which are usually manufactured by different companies, and each manufacturer warrant only their own product. Unfortunately, the responsibility for a particular maintenance problem is not always clear, and the conflict between manufacturers has resulted in delays in repairs.

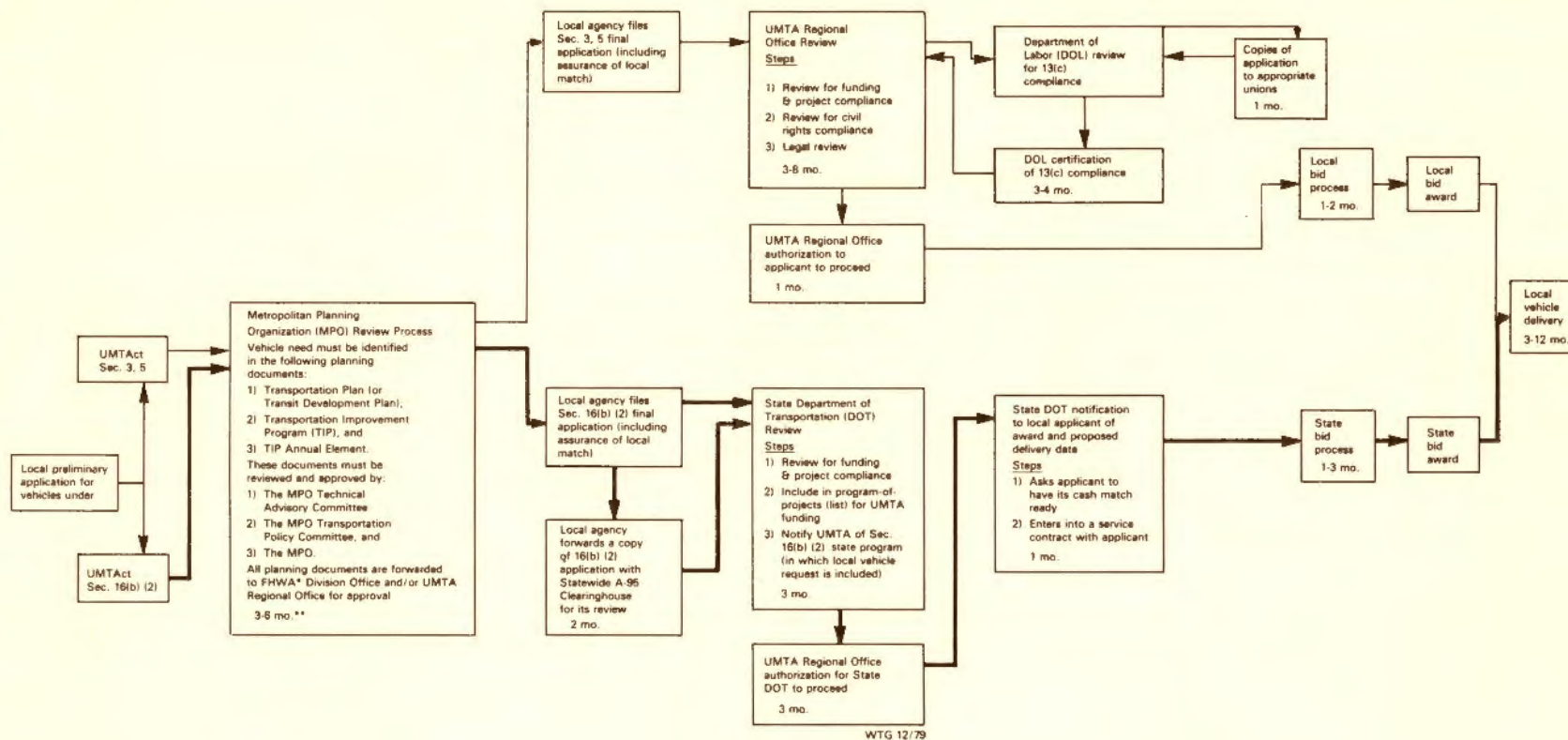
Two other choices exist for paratransit system providers. They can either charter or lease vehicles from another provider. Chartering vehicles appears to be more common with subscription bus services. A provider charters the vehicle (including fuel and maintenance), together with the driver, for only those times of the day when the service is provided.

Leasing vehicles is more common with other types of paratransit services. The provider leases the vehicle, but employs its own driver to operate it. Maintenance, licensing and vehicle insurance may be taken care of by the lessor. Although leasing eliminates some of the problems of owning one's own vehicle, it is often more expensive. Some providers have found leasing to be a means of offering service while they are waiting for capital grant assistance to purchase their own vehicles.

2. Non-Vehicular Costs

Two other major capital cost items are facilities and equipment. Facilities refer to office space, garage space, and parking areas. Very little cost information is available for facilities used in paratransit. Many providers use the facilities of other organizations through sharing, rent, or lease agreements. In some cases (for exam-

Figure 5. Vehicle Procurement Flow Chart
 Urbanized Area Grant Programs (Sec. 3, 5 and 16(b)(2))



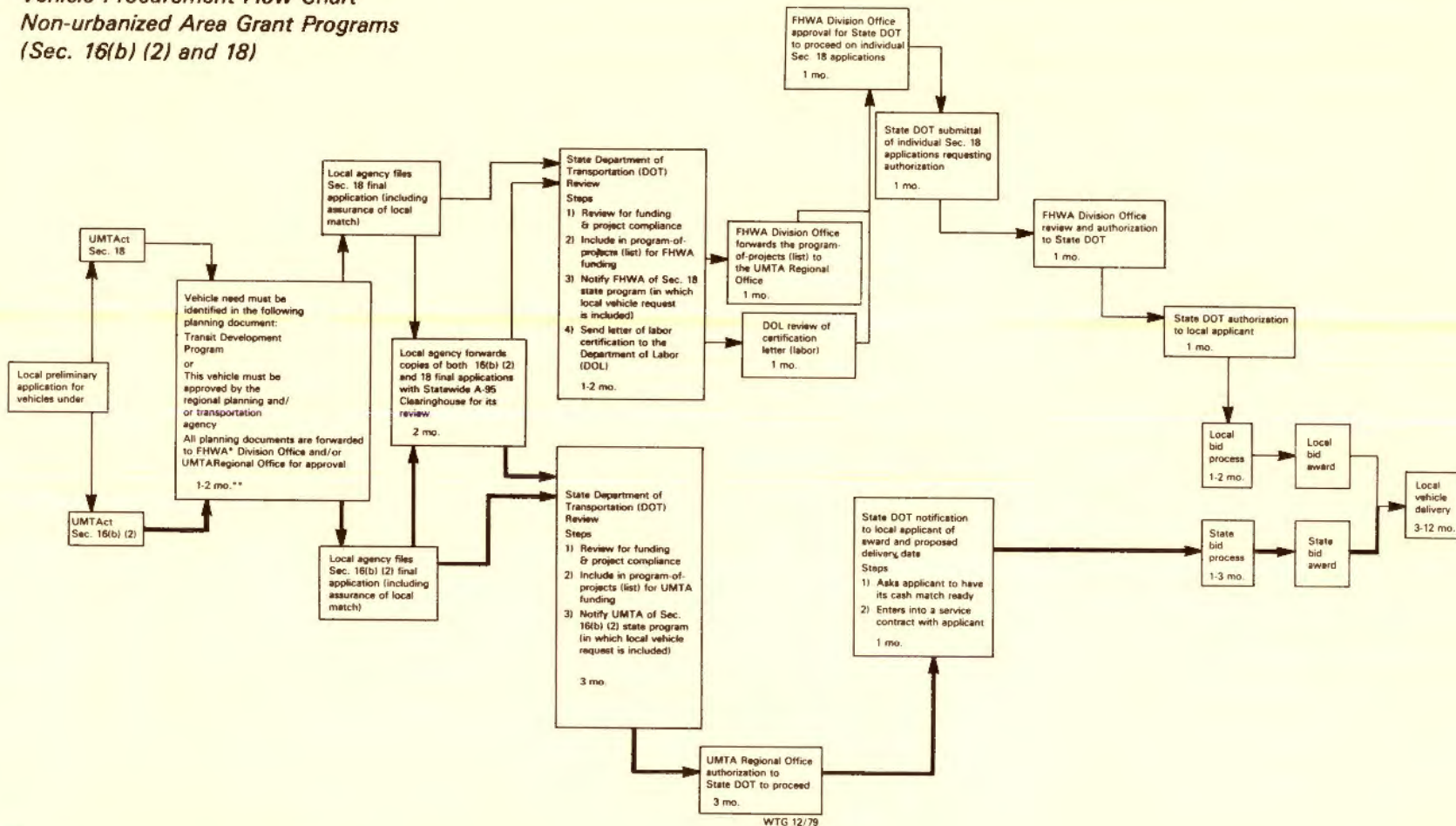
* FHWA = Federal Highway Administration

** This represents the approximate (minimum and maximum when two numbers are given) time frame in months for completing a step.

For Sec. 3 and 5 the time frame from preliminary application to vehicle delivery is 11-29 months. For Sec. 16(b) (2) the time frame from preliminary application to vehicle delivery is 14-28 months. The maximum times will be required as vehicles requested are customized to meet special needs.

Figure 6

**Vehicle Procurement Flow Chart
Non-urbanized Area Grant Programs
(Sec. 16(b) (2) and 18)**



* FHWA = Federal Highway Administration

** This represents the approximate (minimum and maximum when two numbers are given) time frame in months for completing a step.

For Sec. 18 the time frame from preliminary application to vehicle delivery is 12-23 months. For Sec. 16(b) (2) the time frame from preliminary application to vehicle delivery is 12-24 months. The maximum times will be required as vehicles requested are customized to meet special needs.



A dial-a-ride vehicle.

TABLE 9. VEHICLE PASSENGER CAPACITIES

Vehicles	
Van	seats 5-14 passengers
Modified Van	seats 9-16 passengers
Small Bus	seats 12-21 passengers
School Bus	seats 22-44 passengers

Source: References 150 and 162.

ple, demand-responsive services for social service, or employer-run prearranged ridesharing), transportation is only one activity of a larger organization. Thus, the organization may have existing facilities available.

Like facilities, equipment can be bought, shared, rented or leased. Table 10 lists some cost ranges for equipment used in three systems.

Operating Costs: These include the day-to-day costs of running a paratransit system. The major components of a paratransit system's operating costs are vehicle operating and maintenance costs, labor, management and administrative costs, and depreciation.

1. Vehicle Operating and Maintenance Costs

Fuel, oil, cleaning, and maintenance (preventive repair) are all vehicle-related operating costs. A number of studies show that these costs vary with the number, type, and age of the vehicle, the mileage driven, and the operating environment. An analysis of several demand-responsive systems concluded that maintenance costs were between 8 and 20 percent of total operating costs (12).

2. Labor

Labor costs, particularly drivers' wages, can be substantial, especially for demand-responsive services. In order to minimize these costs, some systems use part-time workers, retirees, Comprehensive Employment and Training Act of 1973 (CETA) employees, and volunteers. A number of sources indicate that labor unionization is a major factor in wage levels. (For further discussion, refer to Labor in Chapter 5.)

3. Management and Administrative Costs

Included are rent, equipment, leasing, insurance, public relations and marketing, utilities, taxes, financing costs, and licensing. These costs reflect the size and type of paratransit system and also the extent of outside management involved. This outside involvement can exist through subcontracting or when a paratransit system is part of larger transportation, governmental, social service, or commercial enterprise which covers many overhead costs. Prearranged ridesharing services differ from the demand-responsive services in that a significant difference may exist between the start-up costs and the ongoing operating costs. Carpooling is a good example of this difference. Once a company-sponsored carpooling program has been set up, the operating costs may be negligible (possibly the use of one staff member). However, in an areawide carpooling program run by a governmental or private agency, operating costs may be more substantial if participation levels are maintained (118).

4. Depreciation

Depreciation refers to the natural process over time of an asset (such as



This prototype taxi developed by UMTA is accessible to handicapped people.

TABLE 10. EQUIPMENT COSTS FOR PARATRANSIT SYSTEMS

Telephone Equipment (usually not purchased, leased from local telephone companies - prices vary)	
Installation costs, plus	
Annual operating costs = monthly service charge x 12.	
Monthly service charges can range from negligible base rate (\$10-15/line) up to about \$2,000 for automatic call distribution system.	
Estimate approximately 1-2% of total operating costs.	
Radio Equipment (if leasing, prices will vary, service and maintenance costs can be included in leasing contract)	
Base Radio (transmitter & receiver)	\$2500 - 6000
Base Antenna	\$500
Mobile Radio Transmitter, receiver & receiver)	\$500 - 1500/vehicle
Fareboxes	\$250/vehicle
Digital Equipment	
Base Station	\$10,000 - 20,000
Mobile	\$3000 - 10,000/vehicle

Source: Reference 12

vehicles and equipment) wearing out and anticipates the cost of its replacement. In accounting practices, depreciation is the fraction of the cost of an asset which is properly chargeable as an expense for each period in which the asset is used (87). It is beyond the scope of this document to discuss the sometimes complicated accounting practices related to depreciation. However, the annual cost of depreciation for any transportation system will usually vary depending upon the accounting practices of the system and the number and types of vehicles and equipment owned by that system.

FINANCING. An essential consideration in both planning and operating a paratransit system is funding. Funding sources and assistance programs continually change, and maintaining an even flow of money to administer and operate a system is a complicated task.

The major sources of funds—fares and Federal, state, and local public assistance—are discussed below. Table 11 lists other sources.

Fares: Most demand-responsive systems do not rely on fares alone to cover system costs. On the other hand, prearranged ridesharing systems have been self-supporting in many instances (168, 80, 62, 77). However, two 1977 surveys of car-pool and vanpool programs revealed that:

- Carpool program costs (for example, promotion, administering incentives, etc.) are rarely reflected in fares and represent a carpool subsidy (118).
- Fares cover vehicle capital and most operating costs in vanpool programs, but some administrative and promotional costs are not generally recovered from fares (58).

Fares charged for paratransit services vary greatly and reflect many factors including:

- Fare policies by the appropriate governing body (see Table 12).
- Total system costs.
- Patronage levels.
- Subsidy levels.
- Reliance on other revenue.
- State and local regulations.
- Federal grant restrictions.

These factors determine the basic fare structure options illustrated in Table 13.

In addition, UMTA has also experimented with an alternative fare method for encouraging the use of demand-responsive paratransit. This fare method is called user-side subsidy, and it gives the subsidy to the system *user*, thus allowing the user to purchase transportation at reduced rates. In a user-side subsidy fare program, the service provider accepts tickets or vouchers from user and redeems them from the

TABLE 11.

Other Sources of Funds

- Membership Dues
- Advertisement Sales
- Contracting Out Services or Equipment
- Contributions
- Volunteer Labor

TABLE 12. FARE POLICIES

Policies	Description Definition
Cost-Recovery	Each route or service supports its own total costs
Cross-Subsidization	Offsetting the deficits incurred from one service with the profits from another service or route within the system
Community Service	Providing subsidies in order to attain certain social objectives or induce ridership
Value of Service	Relates fares to what user feels service is worth compared to other sorts of purchases
Combination	Different policies applied to different services or system users (i.e., provide subsidized fares to target markets and set general market fares according to value of service.

Source: Reference 12.

subsidizing agency for a value established in advance. A recent study shows that user-side subsidies for taxi travel are a cost-effective alternative to publicly operated demand-responsive service (59).

Federal assistance: In 1977, the General Accounting Office identified 114 programs within 11 Federal departments which provide operating or capital assistance for transportation (179). Most of the programs designate either who is eligible or the site to which people can be transported. These sites are usually health, education, social service, rehabilitation, or vocational centers. The U.S. Department of Health and Human Services and the Community Services Administration sponsor the majority of the assistance programs. Some employees may be provided to paratransit providers by the Comprehensive Employment and Training Act of 1973 (CETA) Program. Although the paratransit services which these funds support are limited to specific groups of the general public, there are examples of larger paratransit systems developing from the coordination or consolidation of various systems. These larger systems can be run by one grant recipient organization or by a local transit operator acting as a transportation broker (104, 28, 4, 25).

Funds for prearranged ridesharing services are available from the U.S. Department of Transportation's (U.S. DOT) Federal Highway Administration (FHWA). These funds are distributed to grant recipients by the state governments. Funds for general public transportation and special transportation services are available from U.S. DOT. FHWA funds capital and operating assistance to nonurban areas (population less than 50,000 people), and the Urban Mass Transportation Administration (UMTA) funds capital and operating assistance to urban areas (population greater than 50,000 people). UMTA's discretionary capital grant program provides capital assistance to both urban and nonurban areas. Rules were not finalized on Section 18 as of this writing.

Not all organizations are eligible for Federal assistance. In many cases a private organization contracts with a public agency in order to utilize government monies. **State assistance:** State governments are becoming increasingly involved in paratransit programs. Most states provide capital and operating assistance generated from general revenue sources (e.g., state gasoline sales and property taxes) (81). Some states provide all or a portion of the money necessary to match Federal grants.

Michigan is an example of a state involved in assisting paratransit services (87). Under the state's General Transportation Fund Program, 40 dial-a-ride systems had been instituted by mid 1978. The program covers nearly the entire cost of a dial-a-ride system's first year. After the first year, the state provides a subsidy to the public body which carries the financial obligation of running the service.

TABLE 13. FARE STRUCTURE OPTIONS

OPTIONS	DESCRIPTION/ DEFINITION	WHEN IS FARE COLLECTED?	HOW TO USE	ADVANTAGES	DISADVANTAGES	EXAMPLES
BASIC FARE: Flat Fare	All passengers pay same amount for trip anywhere in service area.	-Upon entering vehicle.	-Small service areas. -Relatively uniform trip distances. -Limited mobility user services.	-Easy to install/administer. -Easy for riders to use. -Minimize accounting and stop-time.	-Recipients of Federal grants must offer 1/2 fare to E & H. -Inequitable. -Encourages long, yet discourages short distance riders.	Topeka, KS Dial-a-ride
Mileage Fare	Passengers pay according to distance travelled.	-After completion of trip.	-Base on direct point-to-point distance when detours are necessary for shared ride. -Supplement with flag drop and/or live clock charge. -Popular taxi structure.	-Most equitable. -Other features can be added (e.g. flag drop/live clock). -Different amounts charged for different trip lengths.	-More complex calculation. -Cost-automated equipment required.	Palo Alto, CA Shared-ride taxi
Zonal Fare	Incremental fare increases as rider crosses designated zone boundaries.	-After completion of trip.	-Relate boundaries to break points in passenger volumes, trip characteristics, natural boundaries or route configurations. -Overlapping/flexible borders may eliminate short trips costing 2-zone fares. -Keep number of zones to minimum.	-Low cost service for short trips. -Different amounts charged for different trip lengths. -2-zone structure easy to install/administer.	-Creates anomalies near zone boundaries. -Multi-zones confusing for passengers.	Western, NE Dial-a-ride Madison, WI Shared-ride taxi
SPECIAL FARE: Transfer Charge	Passengers pay surcharge for moving from one service and/or vehicle to another, less than 2 separate fares.	-Upon entering first service vehicle, obtain transfer slip.	-Coordination/integration of services. -Large psychological barrier greater than actual time/level of service required in transfer.	-Reduce total charge to rider. -Assist integration efforts.	-Increases fare complexity. -Discourages transfers. -Decrease ridership.	Midland Co., MI Dial-a-ride St. Bernard Parish, LA Shared-ride taxi
Express Charge (Commuter)	Passengers pay surcharge for faster service; eliminates intermediate stops.	-Upon entering vehicle.	-Integration with feeder service. -Provide higher level of service for those willing to pay. -Limited operating experience.	-Equitable-riders pay for higher level of service.	-Increases fare complexity. -Decreases ridership by eliminating number of stops. -Decreases potential revenue.	
Group Fares	Reduced price for several riders travelling together.	-After completion of trip; billing/charter option.	-Social service organizations. -Usually prearranged. -Economical option for riders desiring same trip (e.g., shopping).	-Increase ridership.	-Increases fare complexity. -Increases monitoring, accounting problems.	Grand Rapids, MI Dial-a-ride El Cajon, CA Shared-ride taxi
Target Market Fare	Special identified users pay reduced or no fare.	-Flexible (e.g., upon entering, after completion, prearranged, later billing).	-Elderly, handicapped, low-income or youth. -General public pays full cost; assist limited mobility user fares are at a marginal cost for providing service.	-Increase limited mobility user market ridership. -Achieve social objectives. -Federal grants must offer 1/2 fare to elderly and handicapped.	-Increases fare complexity. -Decreases revenues. -Riders paying full fare are subsidizing service that should be provided by broader fiscal support.	Free, Tucson, AZ Half fare Marshall, MI
Off-Peak Fares (Weekends Owl Fares)	Lower fares charged during periods of decreased demand.	-Upon entering or exiting vehicle.	-Simple, low-cost mobility for unemployed, handicapped, elderly, low-income, students, etc. who do not have to travel at peak hours. -Peak riders bear marginal costs of additional high-demand services.	-Increase off-peak ridership. -Equitable. -Improve utilization and cost.	-Increase fare complexity. -Decrease revenue. -Difficult to establish size of fare differential.	Worcester, MA Dial-a-ride Claremont, CA Shared-ride taxi
Flexible	Passenger purchases scrip/tokens from variety of sources at different prices. Sponsor agencies buy scrip/tokens at full price, underwrite their patrons/customers.	-Upon entering vehicle.	-Gives operator fixed revenue per ride. -Any business, agency can subsidize its customers. -Could have two-ride categories. -Limited operating experience.	-Any agency can support use. -Security control outside transit agency. -Easy for operator, driver.	-May be awkward to buy tickets. -No good mechanism for peak/off-peak fare differential. -Passengers need to seek out scrip supplier.	Portland, OR
Pass	Card allowing rider to take unlimited number of trips for specific period.	-Once when pass is purchased.	-In any type of system.	-Provides operator with advance cash flow. -Easy for both driver and passenger.	-Some potential for abuse; passengers may have to purchase passes at special locations.	Westport, CN Shared-ride taxi

Source: Adapted from Reference 12

Local assistance: Local public funds currently being used for paratransit services include property taxes, sales taxes, special district taxes, and other sources. Some localities have also used part of their discretionary Federal grants, such as their community development block grants and revenue sharing (69).

A recent study found that paratransit systems using local funds tend to have a greater degree of local commitment, community control, and support than systems which rely solely on state and Federal support (12).

IV | **IMPLEMENTATION AND MANAGEMENT OF PARATRANSIT SERVICES**

IMPLEMENTING AND MANAGING a paratransit operation is a direct reflection of the complexity of the system itself. In general, once the system has been designed and the vehicle procurement process has been established, management will be concerned with the implementation, continuation, and evaluation of operations. A review of the state-of-the-art indicates that major concerns will include the following:

- Hiring, supervising, and training personnel.
- Marketing.
- Investigating new management techniques.
- Pretesting the system.
- Evaluating the system.

staffing and training

To the users of a paratransit system, the people who operate it *are* the system. The drivers and employees who answer the telephones are the public's main contact with the system, and as such are crucial to its success. An indifferent driver can lose more riders than an aggressive marketing campaign can attract.

STAFFING. Either under or overstaffing a paratransit system can be equally disastrous; it can make the service difficult to operate competently or contribute to high labor costs, respectively. Staffing requirements for demand-responsive paratransit will include the drivers, control center staff (schedulers, dispatchers, telephone operators), support staff (bookkeepers, clerks, marketing and maintenance personnel), and management staff. In small demand-responsive systems, many of these staff functions can be combined. A demand-responsive service operating only one or two vehicles, for instance, may have a driver who maintains the vehicle; another person who answers the phone, schedules, and dis-

A good dispatcher is vital to the smooth, efficient operation of a demand-responsive paratransit system.



patches; and a manager who performs bookkeeping and runs the operation. At the other extreme, in a large system that has automated dispatching, computer and telephone operators, and staffs for vehicle maintenance, a multilevel management structure will probably be necessary.

There is a definite correlation between fleet size and the number of people needed to operate a system. After a review of many operating dial-a-ride systems, the following formula was developed:

$$1.4 \times (\text{fleet size}) + 2.9 = \text{total number of employees (12)}.$$

Thus, for a paratransit system with 12 vehicles, the equation $[1.4 \times (12) + 2.9 = 19.7]$ would suggest that approximately 20 employees were needed.

Drivers make up the largest part of a demand-responsive staff. To operate efficiently, demand-responsive systems must have enough drivers to operate each vehicle used in the fleet's peak operating period, plus enough personnel to cover driver absences. One study recommends that one full-time and one part-time driver should be scheduled to cover each vehicle in operation for a twelve-hour period (12).

Control center personnel for demand-responsive services include telephone operators, schedulers, and dispatchers. One experienced operator can handle from 30 to 120 calls per hour in existing dial-a-ride systems, but new operators in a newly established system could find that hourly range of telephone calls too high to handle. In a new system, not only will the operator most likely be inexperienced, but also the calls will probably take longer; many people will be calling not simply to arrange transportation, but to obtain basic information about the system. One example was the Santa Clara, California, system where phone calls for information averaged six to nine minutes (139).

Schedulers and dispatchers in demand-responsive systems can handle between 75 and 200 requests per day, depending on how responsibilities are assigned in particular systems (12). The following are other operating characteristics that affect the number of trip requests which schedulers and dispatchers can handle:

- More requests can be handled in a geographic area divided into zones.
- Fewer requests can be handled in many-to-many types of dial-a-ride service (139).

In a small system, the scheduling and dispatching are often done by the person who answers the telephone.

The number of support staff needed in demand-responsive operations is not well documented. Although all systems need some sort of general manager, assistants and secretarial help are usually not needed when:

- The system is transporting less than 500 passengers per day.
- The system has less than 10 vehicles in service.
- The system operates less than 16 hours per day (12).

It has been estimated that two to four mechanics are needed for a 15-vehicle operation, unless maintenance has been contracted out or is part of a larger maintenance operation.

Prearranged ridesharing services usually require little or no staffing. The only exception is the possible administrative time invested by an employer and employee organization in a carpool, vanpool, or subscription bus service. If a subscription bus service operates its own vehicles, the service would have to hire drivers, mechanics, and more administrative support staff than a service utilizing charter vehicles.

TRAINING. To ensure efficient operations, regardless of the size of a paratransit system, a sound training program is necessary. Many new demand-responsive paratransit systems have a training period of several weeks to acquaint employees with their specific duties as well as with the system as a whole. In some cases, employees will learn to perform a number of tasks; this allows them to assume responsibility elsewhere if the need arises.

Proper training of drivers is particularly important in demand-responsive systems that carry elderly and handicapped passengers. If drivers are not properly trained in ways to assist such passengers, the chance of injury increases. Besides helping passengers in and out of vehicles, drivers may have to contend with medical emergencies such as heart attacks (172). It is commonly felt that such drivers should be required to take a defensive driving course, a senior first aid class, and an additional class in cardio-pulmonary resuscitation (172). Equipment especially developed to help transport elderly and handicapped passengers, such as wheelchair lifts, may require training to operate.

For general public demand-responsive paratransit, drivers need to develop a sensitivity to passenger needs. The very nature of demand-responsive service requires this, since waiting times can vary more than with fixed-route systems. Patience is required to deal with passengers who do not understand the nature and constraints of the system.

Training takes time. In Ann Arbor, Michigan, it was estimated that dispatchers and schedulers took four to five months to become proficient in performing their duties. New drivers in the same system took six to seven months before becoming fully trained. However, Ann Arbor's system was more complex than many other dial-a-ride systems; computers were used in dispatching procedures and dial-a-ride service was fully integrated with fixed-route transit. As a result the system's training program became more complex (12).

A paratransit system is not a guaranteed success simply because it is planned to operate efficiently and productively. The system must have riders. A successful marketing program is the key to attracting and holding those riders. This is true regardless of paratransit system size or type, although paratransit systems with fewer than five vehicles cannot be expected to have large advertising budgets and sophisticated marketing programs. Often, small paratransit systems do not have the personnel, financial means, or expertise to undertake a thorough marketing campaign. However, in spite of these restraints, volunteers, technical assistance from other transportation providers, and good relations with the local press and media can go a long way in helping to market a small paratransit system. In addition, small paratransit systems have been marketed simply by having the community spread the word about the worthwhile service.

Many systems have used marketing as it is most commonly, yet narrowly defined: direct advertising. Although advertising is important in attracting ridership, marketing paratransit involves much more than that.

Marketing is the broad name under which many activities are carried out. These activities include the following:

- **Market research**, which is used to determine who needs what type of transportation as well as when and where.
- **Paratransit service design**, which helps to formulate an operations plan and a service which meets the needs of the consumer.
- **Promotion**, which includes public information, customer relations, market development, advertising, and driver training as it relates to dealing with the public.

MARKET RESEARCH. A good marketing program not only offers and sells quality service, but is "a good listener" to the needs of the consumer. Because market research both gives and receives information, it has become important in planning paratransit services.

Market research has been used successfully in many communities to determine specific travel needs of particular groups within the population. Subsequently, paratransit systems have been designed to serve those needs. In turn, consumers have responded by using the systems. The dial-a-ride system in Ann Arbor, Michigan, offers a good example of how market research can be used to develop a successful paratransit system (139).

Ann Arbor's dial-a-ride system carried out on-board surveys to determine the

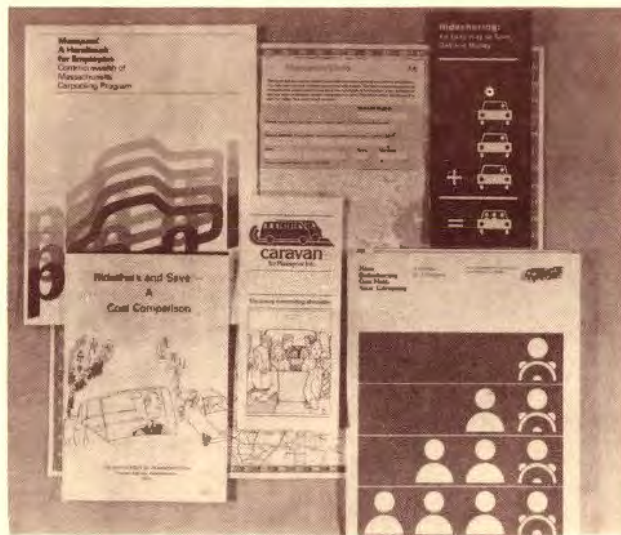
characteristics and needs of its customers. In addition to obtaining a good deal of other information, the survey uncovered the fact that on any given day, approximately 7 percent of the riders were using the system for the first time. This information indicated that although the system had good potential for growth, a comprehensive, ongoing information program to further increase ridership was needed. In addition, information about the riders helped the marketing program to direct both the system's operations planning and its advertising campaign to specific segments of the population. This focusing effort had a positive impact on ridership, at the lowest possible cost.

In addition to on-board surveys, the Ann Arbor system used several other market research techniques including direct door-to-door surveys. Mail-in cards for passenger comments were available on the vehicles. Public meetings were held to get the community's response to plans and proposed changes, and individual groups such as social service agencies and business groups were also consulted. In addition, attention was given to the opinions offered informally by customers, drivers, civic leaders, and the business community.

The findings of the market research study, together with an analysis of the community, the political climate, the funding situation, and the organizational structure of the transit agency itself, are used by the paratransit operator to help develop a market plan. The marketing plan is a step-by-step written work plan.

The marketing plan includes specific goals and objectives of the transit agency which give focus and direction to the marketing program. Then the transit agency can establish specific promotional activities that ensure that its advertising or printing dollars are directed where they will do the most good.

PARATRANSIT SERVICE DESIGN. The marketing program must be coordinated with the operations program in order to design a paratransit service that operates when the consumer needs transportation to and from certain areas. There are many examples of paratransit systems that were tailored to meet the needs of specific segments of the population. In Westport, Connecticut, a dial-a-ride system was established originally to transport commuters between their homes and the commuter rail station (39). The shared-ride taxi systems in Marysville and Yuba City, California, were designed to serve the needs of the areas' large percentage of retired citizens (12).



A sample of prearranged ride-sharing brochures and material.

ADVERTISING AND PROMOTION. After paratransit service has begun, the service must be promoted. This promotion takes the form of public information, customer relations, and advertising.

Public information: This activity describes for the public how the paratransit system operates, where it goes and when, how to get on it, and how much it costs. This information can be distributed through:

- Newspaper ads and articles:
- Home delivery of brochures.
- Information centers.
- Telephone information services.
- Timetables.
- Route maps and destination route signs on vehicles.
- The drivers themselves.

Samples of some of these information pieces can be found in Figures 7, 8, 9, and 10.

One of the best methods of transmitting information about paratransit service, however, has been word of mouth. Riders can be very helpful in spreading the word about competent, professional service. On the other hand, bad service or unpleasant employees can undo the work of the most sophisticated and professionally designed marketing campaign.

Customer Relations: This is the area in which attitudes of the consumer are affected by contact with employees of the system, particularly the drivers. The positive attitudes and helpfulness of drivers in providing information and transporting people to and from their destinations can be a great promotional feature in itself. In fact, the care shown by drivers to customers in the Danville, Illinois, subsidized taxi program has been widely credited as a major factor in making that system as well-used and respected as it is (36).

George Washington University's Rehabilitation and Training Center is developing a training program to sensitize drivers to deal with the needs of elderly and handicapped customers. When the program is completed, final guidelines will be made available for driver training programs throughout the country (64).

Advertising: It is very important that advertising be a consistent, ongoing program, keyed to specific market groups to inform, encourage, and convince them to use the paratransit service. An example is the use of radio advertisements during the morning and evening rush hours to attract commuters presently driving to work. As another example, a representative of the paratransit system might speak before the residents of a retirement community to encourage them to use the service during off-peak hours for shopping or recreational trips.

Following the lead of larger transit systems, paratransit systems may outfit their drivers with standard uniforms having a color scheme coordinated with that of the

Figure 7. Public Information, Example A

Here comes the commuter Minny.



effective June 1, 1979

Here comes the late commuter maxityxy with a discount!

If you arrive on any train after the 6:07 out of New York, up to and including the night owl 11:05, you can use the shared-ride maxityxy at a discount with your regular commuter minnypass. It will be at the station weekday nights meeting these later trains.



New annual pass prices effective June 1, 1979

To make the most use of minny and maxityxy services at the most economical cost, get your annual pass now.

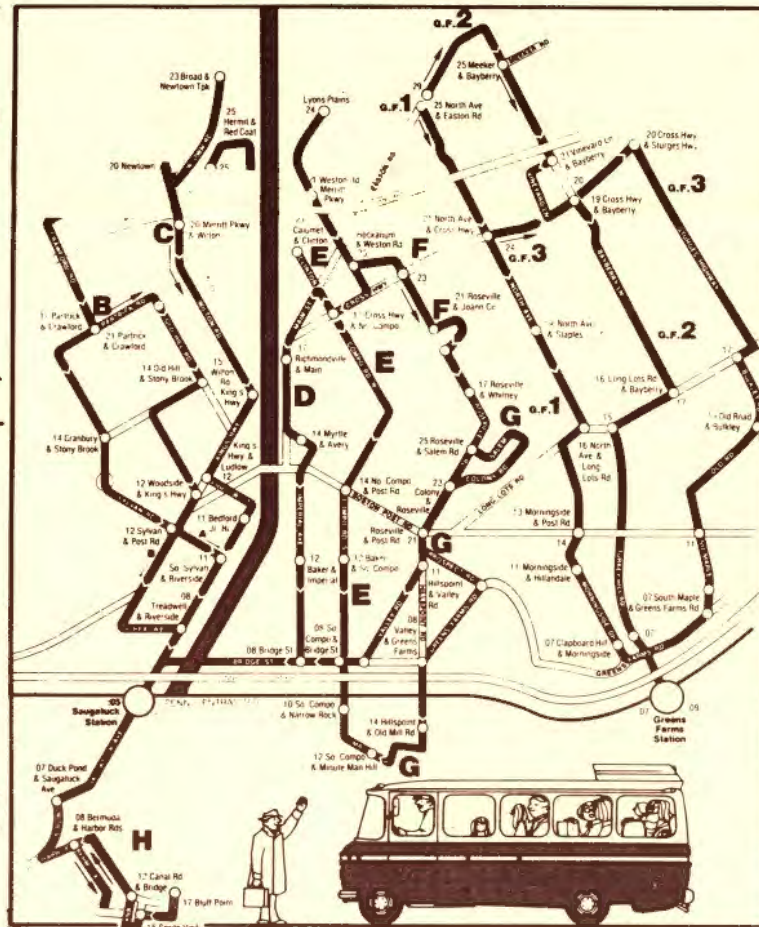
Non-Commuter Adult	\$50
Commuter	78
Single Child	40
Elderly (non-commuter)	20
Handicapped	20
College Student away	25
Monthly Pass	10

Individual minnyride cash fare, 50¢
Individual minnyride elderly cash fare, 25¢
Ten-trip minny ticket, \$4



Here's how to get your Minny Pass.
Stop in at the Minny Office, Community Youth Center.
Monday-Friday 1 to 5, Saturday 10 to 4
It takes only two minutes to snap your picture and produce your personal i.d. Minny Pass.

minnybus
WESTPORT TRANSIT DISTRICT
304 Post Rd., East
Westport, Conn. 06880
Phone 226-7171 for information



Note:

To find the time Minny will be at your stop in the morning, "count down" or subtract the indicated number of minutes from train time. If evening trains are late — we'll wait at least til 8 p.m.

Services in red meet only the 7:09, 7:51 and 8:28 in the morning, 5:20 and 6:07 in the evening.

Commuter minny and maxityxy meeting trains shown in red travel their full routes as well as the new extensions also shown in red on the map.

Commuter Minny timetable:

Saugatuck Trains	Greens Farms Trains
7:09 AM	7:04 AM
7:32	7:27
*7:51	*4:40 PM
*8:28	*5:20
*5:02 PM	*6:07
*5:20	
*6:07	

*Leaves Grand Central **Routes A, C, D, E, F, G only
No service on route H

Obtained from the Westport Transit District, Westport, CT.

Figure 8. Public Information, Example B

SEMTA

Van Pools

Your Friendly Neighborhood Van Pool

What it is and how to join it.

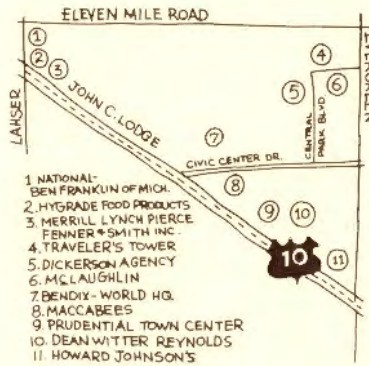


What is a SEMTA Van Pool?

Our van pools operate on the same principle as a car pool, using comfortable 12-passenger vans instead. We organize groups of riders who live in the same general area, and who work in the Southfield Civic Center district (see map). Every working morning, a van picks up passengers at their homes and takes them to their jobs. Every evening the process is reversed. Riders pay a monthly fare... and sleep, read, or make friends on the way to work. Everybody saves a bundle of money (see "Benefits"). Driver/co-ordinators save even more (see "Driver/Co-ordinators").

SEMTA van pool services are provided through Van Pool Services, Inc., a subsidiary of Chrysler Corporation. Dodge Sportsman and Plymouth Voyager wagons are used.

If you work anywhere within this area, you are eligible to join the Southfield Computer Van-Pool Program.



Benefits

- Save gas. Each van saves about 5,000 gallons of gas yearly.
- Save money. Compared to the cost of running your car, van pool fares represent monthly savings of up to \$60 (depending on car size and distance traveled.)
- Eliminate auto maintenance and parking headaches.
- Enjoy door-to-door, dependable service.
- Ride to work in leisure, and skip the bad weather and rush-hour driving.
- Make your car available to the rest of the family.
- Improve the environment, reduce gas consumption, air pollution, and traffic congestion.
- Employers! If you help us form van pools, you will be participating in a nationally-recognized energy conservation effort. You will also reduce traffic congestion at your building, and cut down demand for employee parking.

How do you join?

You must work within the Southfield Civic Center area (see map). If you do, mail the coupon to the address on the back of this brochure. We will organize your group by matching you with about nine other commuters who live near you. A driver/co-ordinator will be chosen from your group. If you meet our qualifications, you might want to be that person (see "Driver/Co-ordinators").

When we have put together a group and a driver, we'll arrange a get-acquainted meeting, help map the route, and explain the monthly fare. Your group gets a van and hits the road. That's all there is to it.

Why is SEMTA involved?

We're involved with van pools because there are transit problems that regular-route buses and trains can't solve. Until recently the private auto was the sole available answer. Not any more. We're filling in the gaps in the transit picture, and van pools are one more way to do it.

If you're a handicapper...

Vans can be made wheelchair-accessible at your request.

Van Pooling... The Easy Way to Work!

Figure 8. Public Information, Example B (Cont.)

Driver/Co-ordinators

What's in it for you?

You can be a driver/co-ordinator, or a back-up driver, if you're qualified. Here's what's in it for you:

- We supply, insure, and help maintain your vehicle.
- You ride to work free of charge.
- We pay all work-trip operating expenses. You get 150 miles a month free for your own personal use; all you pay for is the gas. You are charged a small mileage fee for personal use over 150 miles.
- We help you locate up to 10 riders for your group. If you find the 11th and 12th, you keep part of their fare.

Qualifications

- You must have a good driving record.
- You must be able to obtain a chauffeur's license (easy and inexpensive in Mich.)
- Be willing to receive safe driving instruction from us.
- Be able to pick up and deliver passengers promptly, every day.
- Help us maintain at least nine paying passengers in the pool.
- Furnish a secure place to keep the van at night.

Check the box on the coupon in this brochure if you want to drive. We make the final selection.

Other SEMTA services

Call one of the following numbers for information about SEMTA regular or small bus services in your area:

Toll-free from the suburbs: 1-800-462-5161

In Detroit: 962-5515

**Van Pool Information
552-0310**

How do you find out more about Van Pooling? Whether you would like to be a driver or a passenger or just want to learn more about how the service works,

Fill in the attached response card and mail it to the Van Pool Services' Project Manager, or call 552-0310.

Van Pool Services, Inc.
Project Manager
Mt. Vernon Quadrangle, Suite 101
23777 Greenfield
Southfield, Michigan 48075

SEMTA
There's a lot riding on us

Southfield Commuter Van Pool Program

I am interested in joining a Commuter Van Pool. I would like to:

Drive Ride Either

I hereby authorize Van Pool Services, Inc., to release necessary personal information to others interested in forming a van pool in my neighborhood.
You will be notified when matching is completed, or if it is not feasible.
Call 552-0310 if you have any further questions.

Name _____ Zip _____
 Address _____ City _____
 Nearest major cross streets _____
 Employer (must be in Southfield) _____
 Office phone _____ Home phone _____
 Work (and leave) _____



Van Pool Services, Inc.
Project Manager
Mt. Vernon Quadrangle, Suite 101
23777 Greenfield
Southfield, Michigan 48075

Place
Stamp
Here

From

Obtained from the Southern Michigan Transportation Authority, Detroit, MI.

Figure 9. Public Information, Example C

Birmingham Dial-A-Ride

SEMTA Small Bus

Weekdays 7:00 am-6:00 pm
Saturday 10:00 am-6:00 pm
Sunday 10:00 am-2:30 pm

Phone 642-0770



Birmingham Dial-a-Ride

What is it?

It is a system of small buses for Birmingham residents, sponsored by SEMTA and the city of Birmingham. One Birmingham Dial-a-Ride bus is fully outfitted with a lift and other special facilities for wheelchair users.

Where does it go?

Anywhere inside Birmingham community boundaries (see map), and certain selected points outside. Take it to work or shopping. Take it to the SEMTA train station. Take it to William Beaumont Hospital. During golf season you can take Dial-a-Ride buses to the Lincoln Hills and Springdale golf courses. Or you can hook up with SEMTA commuter trains and big buses to downtown Detroit. In Birmingham, Dial-a-Ride goes where you want to go.

How does it work?

Call the dispatch center at 642-0770 at least 30 minutes before you expect the bus to pick you up. Tell the dispatcher where you want to go, and when you want to get there. Together you will work out which bus is the most convenient one, and reserve a seat on it.

If you need a wheelchair lift, tell the dispatcher at the time you reserve your seat.

You can expect to share your ride with others, so allow for a longer ride on the bus than in a car. Please don't keep other people waiting. Be ready when the bus comes.

The service is "curb-to-curb." It is not "door-to-door." Dial-a-Ride buses will pull up in front of your house or building, but regulations prevent our drivers from leaving the vicinity of their buses. They will be happy to help you on and off the bus, but from then on you're on your own.

Regular Stops

Hail the bus without a prior telephone call at two points in downtown Birmingham: at Standard Federal Savings and Loan, and at the Wabeek Building (see map). Buses pass these locations frequently.

How much does it cost?

- 50¢ one way, plus a 25¢ surcharge outside Birmingham city limits.
- 25¢ one way for seniors 65 and over, and handicappers.
- Free for children 5 and under if accompanied by an adult, and for people assisting the handicapped.
- Transfers are available. See the "Transfer" section of this brochure.
- Please travel with exact change. Drivers do not carry cash.

You can also pay—and save money—with a monthly SEMTACARD pass, or SEMTA strip tickets. Get passes and tickets with a check or money order from SEMTA Fare Sales, PO Box 333, Detroit 48231. You can also buy them at selected Hudson's and banks all over the tri-county area, or call 256-8700 and use your Master Charge or Visa cards. Call the SEMTA information number for details.

Transfers

If you need to travel outside Birmingham Dial-a-Ride boundaries, transfers are available for other SEMTA services. Ask the driver for one when you board the bus. Transfers have no cash value, and are not good for the return trip.

Seniors and handicappers

A lift-equipped vehicle is available for wheelchair passengers. If you need it, ask for it at the time you reserve your seat.

If you're a handicapper being assisted by a friend, relative, or an attendant, that person rides free.

If you're travelling beyond Birmingham boundaries, call 399-3222 for information on OCART. OCART is a system of small buses in Oakland County specifically designed for handicappers and seniors.

Figure 9. Public Information, Example C (Cont.)

Other SEMTA services

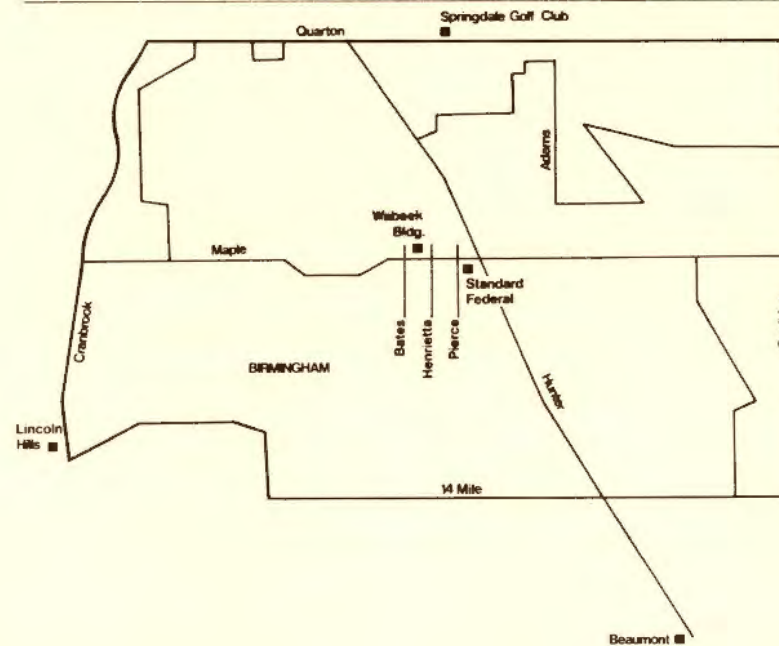
During rush hours, buses are scheduled to and from the SEMTA train station. Service is timed to coincide with commuter trains to and from downtown Detroit. Call the SEMTA information number for route and schedule information.

For other big bus trips in Oakland County and beyond to downtown, call the SEMTA information number.

We'd like to hear from you.

In order to improve bus service tomorrow, we need to know how we're doing today. You're the ones who ride the buses, so you're in a good position to offer suggestions. Call the Birmingham City Hall at 644-1800, or write SEMTA Small Bus, PO Box 333, Detroit 48231.

General Information



Telephone numbers and hours

Dial-a-Ride hours

Weekdays 7:00 am-6:00 pm
 Saturday 10:00 am-6:00 pm
 Sunday 10:00 am-2:30 pm

Telephone numbers

- Birmingham Dial-a-Ride: 642-0770
- OCART: 399-3222
- SEMTA information:
 1-800-462-5161 toll free from the suburbs
 962-5515 in Detroit

SEMTA
 PO Box 333
 Detroit 48231



Obtained from the Southern Michigan Transportation Authority, Detroit, MI.

Figure 10. Public Information, Example D

What? Who? How?

Answers to your questions
on the new service from the
Manchester Transit Authority.



What?

"Stepsaver Service" is a special service, provided by the Manchester Transit Authority, to improve the mobility of handicapped individuals unable to use the regular route busses.

After you have obtained your I.D. card, all you have to do is call the MTA at 623-8801, 8 a.m. to 5 p.m., Monday through Friday, 24 hours in advance of when you wish to use the Stepsaver Service. We will ask you for your special I.D. card number and when and where you wish to be picked-up. We suggest that both your departure and return trips be reserved at this time. We will meet you at your location, at which time your 40¢ one-way fare will be collected. Then you're off to any desired destination within the City of Manchester. Stepsaver Service may be used for medical, social, shopping or business purposes.

That's all there is to it!

The MTA driver will offer help, however, handicapped individuals must have sufficient strength and mobility to move to and from the curb, and to board the van.

Who?

Individuals who can not use the regularly scheduled Manchester Transit Authority's busses, without extreme difficulty, are eligible for our Stepsaver Service. Below is a list of qualifying disabilities:

- 1) Legally blind, unable to obtain a driver's license due to impaired vision.
- 2) Hearing deficiency, unable to hear, even with a corrective device.
- 3) Speech impediment, whereby communication is difficult.
- 4) Mobility impaired, unable to negotiate steps without aid, or the use of a cane or walker.
- 5) Mental impairment, receives special training or lives in a special community.

There is no age limit for the use of the Stepsaver Service. Generally, persons must be 18 years of age in order to receive an I.D. card.

In all cases, the issuance of a Stepsaver I.D. card is on an individual basis. It is the desire of the MTA to transport as many people as possible.

How?

First, a Stepsaver I.D. card is needed. You may call the MTA at 623-8801 and we will send you an application. It must be completed by the individual and then endorsed by a physician or authorized agency.

On the last Friday of each month, I.D. cards will be issued by the MTA at the East-Side Smile Center, 24 Pleasant Street, Manchester. The individual, by whom the I.D. card is to be used, must go to the Smile Center to have a photograph taken. A fee of 50¢ will be charged for the first card issued. Mislaid or lost cards will be reissued at a cost of \$1.00.

The Manchester Transit Authority will send a representative, with a portable camera, to nursing homes, agencies, or social groups when a minimum of 30 I.D. cards are to be issued.

Individuals without an I.D. card may be transported once, from their place of residence to the East-Side Smile Center, for the purpose of obtaining their I.D. card.

Each Stepsaver I.D. card is specially numbered. This number must be given when ordering the service from the Manchester Transit Authority.

Computers are expected to play a larger role in paratransit systems in administrative and clerical functions, as well as aiding in dispatching.



vehicles. Graphics may be utilized to give the system a professional image. Such techniques are often as effective as direct advertising in attracting and holding riders (175). The impression a community receives from the physical appearance of the vehicles and from paratransit personnel can create either good or bad publicity for the system.

MARKETING BUDGETS. The marketing program is an important part of the whole paratransit system. Experience gained in rural public transportation demonstration projects sponsored by the FHWA Section 147 program found that marketing budgets averaged about 3 to 5 percent of the total cost of operating the system (158).

Many paratransit systems use outside help—such as market research, advertising, and design firms—to supplement and support the expertise of their own staff. Generally, outside firms offer high quality, professional work and provide a service to the system that warrants the additional expense.

Marketing programs don't have to be expensive. Much of the work, especially in smaller systems, can be carried out by using volunteers. In certain instances, marketing classes at local colleges have conducted surveys, and art classes have developed advertising campaigns and materials. Local businesses have also been helpful in design and printing work—sometimes at no cost to the system.

The marketing budgets for selected paratransit systems operating in communities ranging from 16,000 to 90,000 persons are presented in Tables 14, 15, and 16.

emerging paratransit management techniques

COMPUTER APPLICATIONS. The purpose of computer applications in demand-responsive paratransit systems is to improve driver and staff productivity, thus providing higher levels of service and better management and planning data. However, computer applications are not being implemented, largely because automated systems are still being developed and most demand-responsive systems are still small enough to be adequately controlled manually. At the present time, computer applications are generally being confined to dispatch record keeping.

A smooth dispatching operation is a major management concern in any demand-responsive paratransit service. The dispatching operation involves:

- Receiving requests for service.
- Assigning a vehicle or vehicles to transport individual riders.

**TABLE 14. PROPOSED BUDGET FOR ONE-YEAR MARKETING PROGRAM
FAIRFIELD DIAL-A-RIDE TRANSIT, 1977-1978**

Employee	Rate	1. Newspaper Ads		2. Vehicle Displays		3. News Releases		4. Comment Cards	5. Service Org. Contact	6. Newcomer Contact	7. Tele-marketing		8. Brochure Distribution		9. Other Promotions		10. Liaison/Program Coordination	
		Hrs.	Cost	Hrs.	Cost	Hrs.	Cost	Cost	Cost	Cost	Hrs.	Cost	Hrs.	Cost	Hrs.	Cost	Hrs.	Cost
Marketing Consultant	8.00	48	384.			24	192.				8	64.	8	64.	96	768.	80	640.
Drivers	3.50			60	210.													
Overhead @ 45%			172.		95.		86.					29.		29.		346.		288.
Travel/Living			30.				30.					30.						60.
SUBTOTAL:			586.		305.		308.					123.		93.		1114.		988.
Fee @ 10%			59.		31.		31.					12.		9.		111.		99.
Outside Purchases:														1050.				
Brochure Reprint																		
Newspaper Contract			562.															
Service Club Membership									325.									
Ch. of C. Membership									95.									
Promotional Supplies																300.		
TOTAL:			\$1207.		\$336.		\$339.	0	\$420.	0		\$135.		\$1152.		\$1525.		\$1087. \$6201.

Source: Reference 12.

TABLE 15. SAMPLE MARKETING BUDGETS

Location	Population Served	First Year	
		Operating Cost	Marketing
Ann Arbor, Michigan Pilot Program	16,000	\$ 35,000	\$ 3,151
Michigan DART Program	20-30,000 (typical)	96,000	2,000 start-up funds 200 per month, ongoing
Westport, Connecticut (demo)	30,000	466,071	18,000 (contract to private firm)
Fairfield, California	40,000	162,000	1,400 start-up funds 500 per month, ongoing
El Cajon, California (shared-ride taxi)	60,500	120,000	5,000 city funds
Greece, New York (pre-demo)	69,000	304,000	28,000 start-up funds 1,167 per month, ongoing 4,240 per month, ongoing
Syracuse, New York	90,000	208,000	4,643

Source: Adapted from Reference 12.

•Specifying the sequence in which pickups and dropoffs are made.

In a manually dispatched system, there may be telephone operators to receive the requests and a central dispatcher to assign the vehicles, and the drivers may decide the routing and sequence of stops. A computer may be used for any of these steps. What is necessary for automation of dispatching is the development of an algorithm (a set of computer instructions) to assign patrons to vehicles and to route vehicles. In a purely manual dial-a-ride or shared-ride taxi system, studies have indicated that good dispatchers can handle up to approximately 12 vehicles effectively. Beyond this point, effective control becomes more difficult; assignments may not lead to the greatest efficiency in dispatching, and more vehicles may be used than are really required.

In the case of advanced reservation paratransit services or subscription bus services, the control problems are not as pronounced as those of demand-responsive service. Even so, the manual development of schedules and routes may not be the most efficient method of dispatching. Manual systems could be inefficient and/or very costly when different paratransit services are coordinated.

The Rochester-Genesee Regional Transit Authority in New York used a fully automated computerized dispatching system for its dial-a-ride operations. In Orange County, California, a demand-responsive system is considering the utilization of a computer system for dispatching. Experience in carpool, vanpool, and subscription bus service computer applications is currently limited to record keeping and potential rider matching.

Another dispatching mechanism which can be computerized or manually operated is the pulsed schedule system, also called the timed-transfer system. The pulsed schedule system means that local and regional transit vehicles arrive at the same point at the same time (116). This simultaneous arrival allows for quick and convenient transfers to other vehicles. Such arrivals increase the number of destinations that can be reached easily by public transportation. This pulsed schedule will synchronize, e.g., the arrival of fixed-route buses with paratransit vehicles (116).

A taxi control system, designed for higher communications capacity and more efficient dispatching of vehicle requests, will be introduced in three major cities in Sweden in 1981 (184). The taxi control system consists of a (doubled) computer with display screen terminals for the control center operations, radio equipment with base, and mobile units with printers. The computer keeps track of the location of each vehicle's position and availability. For each request the optimum vehicle is selected by the computer. Fleet scheduling and redistribution of available vehicles by the computer allows for the maximum performance of the fleet.

A customer's phone request is received by an operator who enters the person's

TABLE 16. BREAKDOWN OF MARKETING BUDGETS

State of Michigan DART Program (Cities of 25,000-30,000 People)	
Initial Expenses	
Preparation of literature and graphics 20 hrs. @ \$5/hr.	\$100
Printing: 10,000 brochures	120
10,000 telephone stickers	100
5,000 "second-level" bulletins	60
100 posters	90
5,000 free ride tickets	30
Telephone answering/brochure addressing Temporary help, 20 days @ \$25/day	500
Postage, 3,000 mailings @ \$0.10	300
Telephone book advertising	50
Free rides, 1,000 @ \$0.50 each	500
Additional for paid advertising and miscellaneous	150
	\$2,000
Monthly Expenses	
Printing (as needed)	\$50
Postage, 500 mailings @ \$0.50	50
Telephone book advertising	40
Free rides, 100 @ \$0.50 each	50
Miscellaneous	10
	\$200

Assumptions

- * Marketing is the responsibility of the project director and the cost of his time spent in marketing is paid as a regular budget item.
- * Distribution of materials is covered under training or done by volunteers.

Greece, New York (Suburb of Rochester) (City of 69,000 people)	
PRE-DEMONSTRATION PROJECT	
Initial Expenses	
Preparation and initial marketing with slide show presentation	\$500
Preparation and printing of information folders	3,000
Direct mailing of 20,000 general information brochures and special interest brochures; preparation costs	7,250
Outdoor advertising; 12 boards for 3 months each; production costs	5,800
Newspaper advertisements: six 4 x 10 ads in local newspapers, two ads in major metropolitan papers; production costs	3,450
Production and distribution of counter displays	1,000
In-plant industrial promotion	2,000
Press releases, news conference-luncheon, etc.	750
First-day-of-service activities	2,250
Contingencies	2,000
	\$28,000
Monthly Expenses	
Similar to start-up expenses; mostly mailings	\$1,167

DEMONSTRATION PROJECT	
Total Budget (27 Months)	
Direct mailings	\$35,500
Newspaper ads	40,022
Brochures	18,325
Miscellaneous	6,875
Staff	13,750
	\$114,472
An additional \$23,062 was set aside for marketing experimentation	or \$4,240/month

Source: Reference 12.

name and address on a keyboard which is connected to the computer. The computer searches for available vehicles within the customer's area or in nearby areas. The operator is informed by the computer that a vehicle is available and can tell the customer that a vehicle is on the way. Meanwhile, the computer schedules the vehicle which is longest on the waiting list, and the order is then dispatched to the vehicle driver. The computer commands are sent via radio waves to the mobile unit printer in each vehicle. Figure 11 shows the taxi control system schematically.

When the customer boards the vehicle, the drivers use their mobile equipment's keyboard to enter the area code for the customer's destination. As the vehicle approaches its destination, the mobile unit also registers from the meter whether or not the vehicle is occupied. When the computer radios the mobile unit, the mobile unit radios back an answer automatically with its status and area code. This way the computer always knows which vehicles are available, and also where they are located.

Pre-bookings are stored in the computer and are retrieved automatically for processing on the time requested.

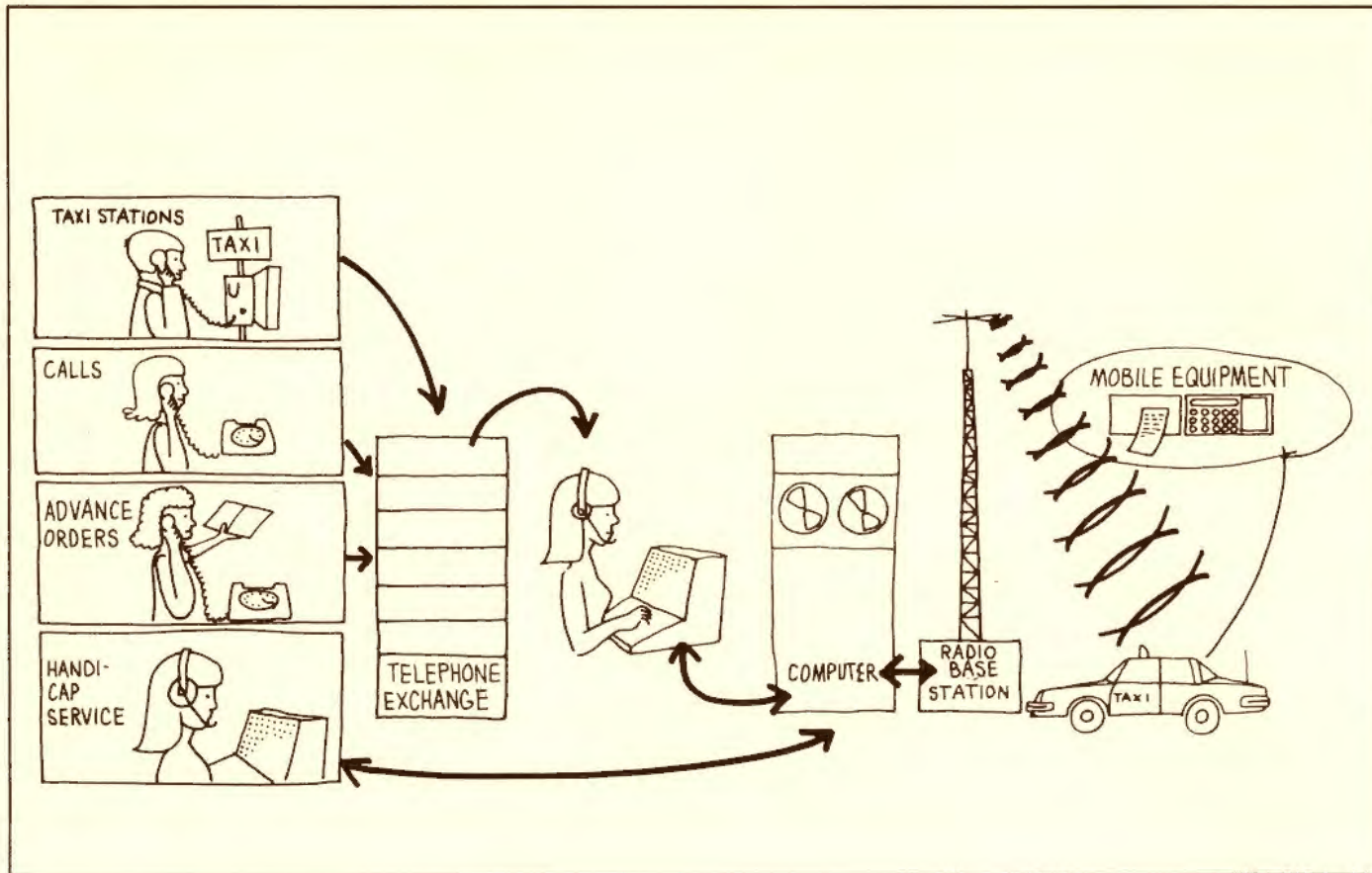
The taxi control system's mobile unit improves driver security. Within 5 seconds of emergency call from a driver, the call will reach the operator who will provide whatever assistance is needed. The system's capacity is limited only by the number of operators and the number of available radio channels. Each operator can handle three or more customers per minute at peak hours. The radio capacity is approximately 300-400 vehicles per channel with 75 percent of the trips being handled via the control center. If no assignment is available, the computer will recommend where a vehicle should go on the basis of predicted demand and the location of other vehicles (184).

The taxi control system is available in different versions for both large and small vehicle fleets. This system could be adapted for demand-responsive paratransit services such as dial-a-ride services and shared-ride taxi services.

COORDINATION OF PARATRANSIT SERVICES. The coordination of any new paratransit operation with existing services, equipment, and facilities is an important institutional issue. Coordination is one potential way to provide more transportation service for the same level of funding, since it will likely reduce duplication of service, increase service capacity, promote operating efficiency and productivity, and reduce the cost of purchasing supplies and materials. Personnel needs may be kept down since the following tasks might be coordinated: grant application and monitoring, public relations, trip scheduling and dispatching (50).

When services are coordinated, a number of specific benefits may be realized.

Figure 11. Volvo/SRA Communication's Taxi Control System



Source: Reference 184.



A dial-a-bus vehicle connects with a conventional fixed-route bus service.

There is a reduction in the vehicles' idle time. By purchasing in bulk, coordinated systems can often get discounted prices for operating supplies, as well as "package deals" on the vehicles themselves.

Coordinated systems will nonetheless have their share of problems. Although no Federal regulations prohibit coordination between different demand-responsive services, the wording of Federal grant regulations is often vague on this point and has sometimes prevented coordination. The Federal government has made an effort to facilitate transportation coordination, yet localities have been left to interpret regulations in which coordination is neither expressly forbidden nor expressly allowed (179).

Federal funding programs emphasizing coordination include Title III of the Older Americans Act, Community Action Programs, Developmental Disabilities, and UMTA Special Efforts Programming. However, many of the regulatory requirements related to funding, planning, and service delivery could impede coordinated transportation at the state and local levels (141). Federal requirements themselves might not pose barriers, but misinterpretation of the regulations at state and local levels could inhibit coordination.

Often, the statutory and regulatory requirements governing funding, planning, services, and coordination are often at odds with each other. Although some regulations governing a given program may include incentives to coordination, other regulations may pose obstacles (141). For example, UMTA guidelines permit section 16 (b) (2) vehicles to be used by client groups other than the elderly and handicapped, but a state or local certificate of public convenience may not (179).

The use of state and federal funds in coordinated projects can be troublesome, and providers must be careful not to mix funds designated for different client groups. Bookkeeping, therefore, must be accurate and accounts must be maintained in such a way that they can be readily inspected and understood.

There are also state or local rulings, policies, or procedures that can adversely affect coordination of transportation services (141). The attitudes of some social service agency directors providing demand-responsive services can be a barrier to initiation of coordinated service. In some coordination projects, the agency with the largest number of clients, vehicles, and facilities may assume the coordinating functions. Other agencies included in the project may feel the operating agency will give preferential treatment to its own clients. Certain agencies have felt that coordination would result in loss of control of transportation necessary to serve their clients, or that their clients could not be mixed with others. In fact, there are some social service agencies for which coordination of service is not applicable (50).

Administrative problems also pose barriers. Under some funding programs, paratransit expenses are reimbursed to the agency providing the service. Agencies have felt that, given the complexity of the reimbursement situation, some of the funds spent in coordinated paratransit would be disallowed in their claims (179). It is important, then, to plan for the considerable amount of paperwork involved in publicly funded coordinated projects.

Obstacles to coordination can be overcome by varying degrees of time and patience, but any one obstacle can cause a substantial delay in the beginning of coordinated paratransit services (141).

BROKERAGE. Paratransit brokerage is a relatively new management technique used to assess supply and demand, and then to match them effectively. Brokers work to bring people in need of transportation (agencies or riders) together with a transportation provider. A good transportation brokerage service also develops new transportation alternatives to meet the demands of riders as well as to increase the productivity of underutilized transportation services.

Brokerage is a way of providing better information to all paratransit users and providers about schedules, needs, and other features that can improve access to transportation as well as enable the provider to offer better services. The broker also acts as a clearinghouse for information on all prearranged ridesharing services. Using modern data processing techniques, the broker can match the transportation mode that is most cost-efficient per passenger with what is acceptable to the individual rider (32).

Several elements are necessary for a successful brokerage system:

- Accurate information on all existing forms of transportation.
- Information on private owners willing to carpool or vanpool.
- A good means of getting information out to the public.
- An adequate number of vehicles.
- A proper administrative structure for the brokerage service.

The administrative structure could be a transit authority, a coordinating agency, or another arm of local government which has adequate jurisdiction in the area it serves. The administrative structure should also have a provision for regular funding and staff to ensure a continuing operation that does not have to rely on volunteer workers (32).

A broker can be active in establishing paratransit in areas where unmet transportation needs exist. For example, the brokerage demonstration project in Knoxville, Tennessee, which is the best known example of its kind, has been instrumental in establishing vanpools and carpools for commuter work trips.

pretesting the system

Taking the necessary time to assess operational readiness before actually starting service is essential. Pretesting a demand-responsive system gives the operator a chance to work out difficulties in advance, whether they be operational, or administrative in nature. Pretesting can range from simulations on paper to elaborate "full dress rehearsals."

For paper simulations, sample trip origins and destinations are generated, and trips are then assigned to specific vehicles by dispatchers. (Sample trips can be determined by using potential riders' addresses and randomly selecting daily routes.) The trips are traced on a service area map, and average vehicle speeds are used to determine time-in-transit for riders, with expected delays. The following averages were typical for a simulated dial-a-ride operation for the general public:

- Running time: 4.5 minutes per mile.
- Boarding time: 50 seconds per passenger.
- Dropoff time: 20 seconds per passenger.

Averages for boarding time and dropoff time of simulated target market systems were longer (12).

The paper simulation can be expanded to field-test operations, which provide training for dispatchers and drivers. Dispatchers may direct buses and drivers in response to randomly generated trips, thus becoming familiar with route selection and response times. Drivers may travel to a designated address, wait a prescribed amount of time for an imaginary "pickup," and then proceed with the remainder of the trip. This exercise familiarizes drivers with routes and allows them to anticipate future trip times.

When a road test for demand-responsive services is being performed, the public should be notified in order to diminish any ill-will which the sight of empty buses on the roads might cause. In Santa Clara County, California, citizens complained of "wasted tax money" following a series of preliminary test runs using empty buses (12). Buses used in tests should carry signs explaining the exercise.

The difference between a simulation and a "full dress rehearsal" for demand-responsive services is that a sample user group actually tests the system in the latter instance. Aspects of the road test are combined with telephone request simulation, in which the actual number of calls expected at various times of the day are received. This tests both telephone lines and dispatchers, showing whether the number of telephone lines are adequate and whether separate lines are needed for information and requests for rides.

Information announcing the start of paratransit services should also be tested in advance of actual operations. A group of local citizens without any special knowledge of transportation can review the materials that have been prepared for prospective patrons. If any information is not clear, it should be revised and tested again.

For systems operating for limited mobility users and the general public, a break-in period prior to full implementation of demand-responsive services might be advisable. During this period, the system designed for limited mobility users could be available to a small number of users determined by the transportation provider. For demand-responsive systems serving the general public, operations may be limited to a few zones of the total service area during a break-in period. Over-promoting paratransit services too early could lead to the breakdown of the system, as in the case of Santa Clara, California.

Pretesting of a prearranged ridesharing system can be accomplished on an informal or formal basis, depending on the drivers' familiarity with routes and the specific number of prearranged pickup and dropoff destinations.

evaluation

Evaluation procedures are essential in measuring system performance in:

- Achieving cost-effective operations.
- Assuring that transportation services are meeting designated objectives.
- Determining whether unforeseen circumstances are identified quickly so that system changes can be made (53).

An evaluation involves more than the daily monitoring of paratransit services. It provides management with statistical support for long range planning, and implies a commitment to changing and improving operations. In addition, performance evaluations give other cities an idea of what to expect when introducing similar systems.

Simplified techniques and data requirements distinguish smaller system evaluations from larger ones. Although evaluation procedures must be tailored to the specific paratransit system, a general procedure is presented here which can be adapted for both large and small paratransit systems. The evaluation contains:

- Specific objectives.
- Measurement criteria.
- Standards (172).

Specific objectives contain quantifiable statement of purpose. Objectives are measured using criteria such as cost per vehicle hour or passengers per vehicle mile. By implying no minimum or maximum levels, measurement criteria are distinguished from standards. Standards are specific levels above or below which a system's efficiency can be determined (see Table 17) (40).

After the specific objectives, measurement criteria, and standards of a paratransit system have been established, it is necessary to collect data in order to compare system performance with established standards. The data can be obtained from a ridership or user questionnaire, shown in Figure 2. Management data collected by the system will also be necessary, for example ridership statistics, costs, revenues, salaries and mileage.

Table 17 shows the objectives, measurement criteria, and standards that were developed by the Massachusetts Executive Office of Transportation and Construction (EOTC) as part of an evaluation of statewide specialized transportation services. EOTC utilized two questionnaires, one for ridership and the other for the transportation program administrators, to obtain the evaluation data. Tables 18 and 19 compare EOTC's measurement criteria and standards for two objectives. Both tables indicate whether systems are operating above or below standards. In this way, the data suggests areas to improve or to maintain at a consistent level. Such evaluations can be conducted annually and the results compared over the course of time.

More examples of the types of measurement criteria which are utilized in an evaluation are provided in Table 20. One way to select measurement criteria is presented in Table 21.

Data for measurement criteria are collected continuously so that the performance of a paratransit system can be compared with its record from previous years. When an evaluation is conducted annually, the paratransit system returns to the specific objectives of the service. Reviewing these objectives and standards has been shown to be the key to an effective evaluation, and, in turn, an effective paratransit system.

TABLE 17. OBJECTIVES, MEASUREMENT CRITERIA AND STANDARDS

<u>Objective 1</u>	<u>Measurement Criteria</u>	<u>Standard</u>
To provide the elderly and handicapped with a means of public transportation that will improve and increase their mobility	-% of eligible population being served/month	5% with no group being excluded
	-% of passengers that would not make the trip if this service were not available	10%
	-% of passengers who are from non-car owner households	60%
	-% of passengers who are below poverty level	75%
	-% of passengers who are handicapped	70%
	-% of passengers who have difficulty or cannot walk more than one block	50%
<u>Objective 2</u>	<u>Measurement Criteria</u>	<u>Standard</u>
To insure that the system provides a convenient, safe, and reliable mode of transportation for the eligible population	-% of passengers who are picked up on time	85%
	-% of passengers who have no problems making reservations	85%
	-Maximum % of passengers who have difficulty boarding the vehicles	15%
	-Drivers qualifications	Drivers sensitivity trained as well as trained in Red Cross procedures and cardio pulmonary resuscitation
	-Vehicle equipment	Vehicles equipped with low steps, lifts, 2-way radios, comfortable seats and high roof
<u>Objective 3</u>	<u>Measurement Criteria</u>	<u>Standard</u>
To insure that fares charged for this service are reasonable for those that use it without being an unreasonable burden on the taxpayer	-Ratios of fares to cost/trip	0.1 - 0.2
	-% of cost social service agencies should pay if their clients are being served	> 50% of the actual cost of the service
<u>Objective 4</u>	<u>Measurement Criteria</u>	<u>Standard</u>
To insure the cost and productivity are kept within reasonable limits in order to increase the chance for a viable operation .	-Number of passenger trips/vehicle hour a system should complete if serving a high proportion of handicapped in a local operation	2.5 passenger trips/vehicle/hour
	-Number of passenger trips/vehicle hour a system should complete if serving the general elderly and handicapped population in a local operation	5 passenger trips/vehicle/hour
	-The maximum amount it should cost to operate for a system using van-style equipment	\$14.00/vehicle hour

Source: Reference 172.

TABLE 18. MEASUREMENT CRITERIA, OBJECTIVE 1

To provide elderly and handicapped with a means of public transportation that will improve and increase their mobility.

Measurement Criteria:	1	2	3	4	5	6
Standard:	5%	10%	60%	75%	70%	50%
Agawam	7%	17%	65%	89%	74%	47%
Amherst	8%	19%	60%	68%	73%	45%
Easthampton	5%	6%	44%	100%	65%	44%
E. Longmeadow	6%	3%	70%	78%	70%	50%
Longmeadow	5%	5%	44%	25%	59%	37%
Northampton	3%	13%	71%	71%	57%	49%
South Hadley	6%	14%	46%	90%	57%	46%
Springfield	0.05%	11%	62%	77%	85%	77%
Westfield	7%	13%	72%	95%	89%	72%
West Springfield	2%	15%	73%	70%	72%	41%
Wilbraham	3.5%	3%	58%	88%	68%	53%

Measurement Criteria 1: Serve 5% of the eligible population per month without excluding any group.

Measurement Criteria 2: At least 10% of the passengers would not be able to make the trip if this service were not available.

Measurement Criteria 3: At least 60% of the users should belong to a household with no automobile.

Measurement Criteria 4: At least 75% of the ridership should be below poverty level.

Measurement Criteria 5: Handicapped persons should be at least 70% of the passengers served.

Measurement Criteria 6: At least 50% of the passengers have difficulty or cannot walk more than a block to regular route service.

Source: Reference 172.

TABLE 19. MEASUREMENT CRITERIA, OBJECTIVE 2

To insure that the system provides a safe, convenient, and reliable mode of transportation for the eligible population.

Measurement Criteria:	1	2	3	4	5
Standard	85%	85%	<15%		
Agawam	77%	90%	18%	No	Van with 2-way radio and low step.
Amherst	91%	98%	13%	Yes	Van with radio, lift, raised roof and low step; stationwagon with radio.
Easthampton	89%	78%	34%	No	Van with radio.
E. Longmeadow	75%	80%	5%	No	One Stageway Airporter with radio.
Longmeadow	100%	100%	4%	No	One Checker Aerobus, radio and air conditioning.
Northampton	89%	94%	23%	Red Cross or EMT	Van with lift; van with radio and air conditioning.
South Hadley	92%	92%	10%	No	2 vans, both with lowered stair, one has air conditioning and high ceilings.
Springfield	73%	82%	26%	Red Cross	3 vans, 2 equipped with radio, lift, raised roof, low stair.
Westfield	84%	81%	23%	Yes for driver of lift veh.	Van with lift, raised roof and low stair; 1 stationwagon.
West Springfield	97%	65%	13%	Red Cross	1 van.
Wilbraham	68%	74%	21%	No	Airport limousine.

Measurement Criteria 1: 85% of those using the service should always be picked up on time.

Measurement Criteria 2: 85% of those using the service should have no problems making reservations.

Measurement Criteria 3: Less than 15% of those using the service should have difficulty boarding the vehicle.

Measurement Criteria 4: Drivers should be sensitivity trained as well as trained in Red Cross procedures and cardio pulmonary resuscitation.

Measurement Criteria 5: Vehicles should be equipped with high roofs, low step, lifts, comfortable seats, air conditioning, seat belts, and 2-way radios.

Source: Reference 172.

TABLE 20. PERFORMANCE MEASURES

Cost per:	vehicle hour revenue passenger
Passengers per:	trip driver vehicle-mile driver man-hour vehicle-hour cab trips per day per 1000 service area residents trips per square mile of service per hour
Revenue per:	revenue-mile passenger
Revenue-miles per:	trip passenger vehicle-mile
Gallons of gas per:	passenger passenger-ride trip cab by vehicle
Vehicle-miles per:	trip driver driver-hour driver-day employee man-hour cab cab-day shift-hour gallon of gas
Miscellaneous:	Response times ride times wait times transfer times auto travel time

Source: Adapted from References 12 and 40.

TABLE 21. MEASUREMENT CRITERIA SELECTION

KEY VARIABLES FOR DEMAND-RESPONSIVE TRANSIT IMPACT ASSESSMENT	
Evaluation Criteria	Variables
Level-of-Service Measure:	
Coverage	Service area population (demand-responsive services); population within 1/4 mile of bus route (fixed-route services); activity centers served (shopping centers, schools, employment centers, hospitals, other public services); operating hours; vehicles/square mile.
Service Availability	Percent of valid requests unable to be served.
System Response Time	Mean time between calling for service and pick-up; advance reservation notice requirement.
Ride Time	Mean passenger on-board time; passenger travel speed (trip distance/on-board time).
Access/Egress	Mean access and egress time; mean access and egress distance.
Total Travel Time	Random access for door-to-door services = system response time + ride time; planned access for door-to-door services = pick-up deviation + ride time; random access for fixed-route service = access time + 1/2 headway (wait time) + ride time + egress time; planned access for fixed-route service = access time + arrival time variance factor (wait time) + ride time + egress time variance factor (wait time) + ride time + egress time.
Transfer Time	Mean and standard deviation of transfer time.
Safety	Accidents per million vehicle-miles.
Headways	Mean time between buses on fixed-route services.
Service Reliability	System response time standard deviation; mean and standard deviation of pick-up deviation; mean and standard deviation of schedule deviations.
Demand Response:	
Ridership	Weekday and annual ridership.
Market Penetration	Ridership/capita; ridership/eligible population.
Demand Density	Demands/square mile/hour.
Demand Response: (continued)	
User and Trip Characteristics	Distribution of riders according to: age, sex, automobile availability for trip, household automobile ownership, household income, trip purpose, alternative modes if service didn't operate, usage frequency for different travel modes, time trips taken; percentage of trips to or from major activity centers.
Mode Shares	Distribution of trips by different modes.
No-Shows	No-shows as a proportion of all trips.
Operating Efficiency	Vehicle-miles/vehicle-hours (operating speed); dwell times at pick-up and drop-off points.
Revenue Recovery	Revenue/passenger; revenue/passenger-mile; revenue/costs.
Other Social Impacts:	
Environmental Effects	Change in vehicle-miles traveled.
Financial Subsidy	Operating deficit/passenger; operating deficit/capita.
Efficiency and Economics:	
Equipment Performance	Out-of-service time/total operating time; mean time between failures; mean time to repair failures; in-service breakdowns.
Vehicle Utilization	Service-miles and service-hours/vehicle; peak service requirement/fleet size.
Labor Productivity	Service-hours/pay-hours; service-miles and service-hours/worker.
Operating Costs	Operating cost components: operator salaries, maintenance, fuel and oil, control room salaries, administration and marketing, depreciation, and other; driver wage scale.
Cost Efficiency	Costs/vehicle-hour; costs/passenger; cost/passenger-mile.
Service Utilization	Passengers/vehicle-hour; passenger-miles/vehicle mile (average load factor).
Source: Reference 12.	

V | **INSTITUTIONAL ISSUES**

IN RECENT YEARS, a number of institutional issues and problems have been cited by paratransit operators. The issues most often mentioned are:

- Regulations.
- Legal Issues.
- Insurance.
- Labor.

Each of these institutional issues will be explained in this chapter and particular examples will be cited. Confronting these institutional issues has been shown to be important before a service is selected, while a service is being planned, and as a service is operating.

regulations

Regulations affecting paratransit operations are usually established by the funding agency involved, and are designed to govern the daily operation of the recipient paratransit service. Many of the existing transportation regulations were derived from laws established before World War II, when various forms of paratransit were not recognized or defined.

It has been said that "paratransit services suffer from both over-regulation and under-regulation" (140). Over-regulation takes the form of restrictive statutes, while under-regulation results from a lack of precise legal definitions. Local taxi regulations frequently illustrate the first problem, and the ambiguous restrictions on van-pools exemplify the second.

Most paratransit systems which are eligible for Federal funding must comply with Sections 3(e) and 13(c) of the Urban Mass Transportation Act of 1964. Section 3(e) states that private enterprise must be used to the maximum extent feasible. Section 13(c) protects transportation employees from a worsening of their positions as a result of Federal financial assistance to a public transportation authority. In the forthcoming labor section of this chapter, Section 13(c) will be discussed in greater

detail.

In order for paratransit programs to develop and become more integrated with comprehensive transportation systems throughout the country, a number of regulatory and institutional issues have been brought up by paratransit providers:

- The relationship of Section 13(c) labor protection provisions to paratransit systems.
- The eligibility requirements for the funding of paratransit services.
- The criteria for determining standards of service for providers.
- The definition of the roles and relationships in transportation between private enterprise and the public service sectors.
- The establishment of the appropriate institutional structures for the delivery of paratransit services (49).

Some attempts to address these regulatory issues have been made, and both UMTA and FHWA have issued regulations encouraging local governments to include paratransit systems in their transportation improvement and transportation systems management programs (TIP and TSM).

Another regulatory issue involves the accessibility of public transportation to the elderly and handicapped. Section 504 of the Rehabilitation Act of 1973 requires that all federally funded transportation facilities become accessible, and further, that individual Federal agencies delineate specific programs for compliance with the law. The DOT. (U.S. Department of Transportation) regulations issued in 1979 require each transportation program to be accessible to the handicapped, "when viewed in its entirety" (161). "If extraordinarily expensive structural changes to, or replacement of, existing facilities would be necessary to achieve program accessibility, and if other accessible modes of transportation are available, the Guidelines permit DOT to establish, by regulation, a deadline for compliance that is more than three years after the effective date of this rule" (161). DOT's handicapped regulations cover public transit buses, paratransit services, rapid rail facilities, commuter rail systems, and light rail systems. The regulations direct that interim accessible transportation be provided where transportation systems cannot comply within a reasonable time.

The complexity of the regulatory framework within which paratransit programs operate is illustrated in Table 22. In addition, individual localities may have ordinances and regulations affecting transportation. It has been shown to be important for those who are developing paratransit programs to review local ordinances and state and Federal regulations relating to transportation in order to take appropriate action to avoid later conflicts.

Regulatory bodies include Federal, state, county, city and metropolitan governmental agencies (see Table 22). They regulate paratransit services in the following

TABLE 22. PROFILE CHART OF REGULATORY FRAMEWORK

Regulatory Body	Areas Subject to Regulation								
	Rates and Fares	Insurance	Equipment	Drivers	Route	Licensing and Taxes	Fees	Accounting	Entry Control
Federal									
Interstate Commerce Commission	X	X			X			X	X
Federal Safety Standards			X						
Airport Commission	X	X	X	X	X		X	X	X
State									
Public Utility Commission or State Corporation Commission	X	X	X		X	X	X	X	X
Department of Motor Vehicles		X	X	X					
Airport Commission	X	X	X	X	X		X	X	X
Secretary of State	X	X	X	X	X	X	X	X	X
Department of Transportation	X	X	X	X	X	X	X	X	X
County									
Department of Motor Vehicles		X	X	X		X			
Public Utility Commission	X	X	X	X	X	X	X	X	
Airport Commission	X	X	X	X	X		X	X	X
Department of Transportation	X	X	X	X	X	X	X	X	X
City									
Department of Motor Vehicles		X	X	X		X	X		
Police Department			X	X		X			
Taxi Commission		X	X	X		X	X		X
Airport Commission		X	X		X		X		
Department of Transportation	X	X	X	X	X	X	X		
Joint Metropolitan Commission									
Port Authority	X	X	X		X		X	X	X
Area Transit Commission	X	X	X		X		X		X
Airport Commission	X	X	X		X		X		

Note: X indicates the area that is subject to regulation by the regulatory body.

Source: Reference 140.

areas: rates and fares, insurance, equipment, drivers, routes, licensing, taxes, fees, accounting, and entry control. Not all forms of paratransit are regulated by each governmental agency listed in Table 22. Similarly, not all nine of the regulatory areas shown in this table are subject to regulations. For example, the taxi industry is most often regulated by the municipality in which it is located. However, shared-ride taxi services are not allowed by some municipal taxi commissions.

Dial-a-ride and subscription bus services are usually regulated by a state public utility commission which oversees state-imposed motor carrier regulations (73). The Interstate Commerce Commission would become involved in regulating these paratransit services, as well as taxi operations which cross state borders.

Carpooling does not usually come under any regulations except those regulating normal auto usage. By its nature, carpooling is difficult to regulate. Vanpools are sometimes required to seek state public utility commission approval depending on specific state requirements. In Knoxville, Tennessee, the Knoxville Commuter Pool was successful at changing a state law that required vehicles with paying passengers (both carpools and vanpools) to file with the Tennessee Public Service Commission as a common carrier.

legal issues

As paratransit systems are developed, legal issues are being raised and legal precedents established. Several legal issues are described below, accompanied by the decisions reached by the courts.

Compliance with UMTA grant requirements. In Westport, Connecticut, a taxi firm argued that a demonstration project (using UMTA Section 6 funds) should be subject to the stricter UMTA capital grant conditions (UMTA Section 3 funds) which recognize the more permanent effect of such funds on the community. The decision in this case was that since the service was being offered as a demonstration, the Section 3 provisions did not apply. This decision was appealed, and in January 1978, the U.S. Court of Appeals also ruled against the taxi company but disagreed with the lower court's findings. The appeals court ruled that the Westport Taxi Service was not a mass transportation company because it operated under a taxi ordinance allowing shared-ride only with the consent of the first rider. The taxi company was therefore not eligible for protection under Section 3. Although significant, this decision does not completely define when a taxi company offers a mass transportation service.

License provisions granted by a municipality. In Ann Arbor, Michigan, a taxi company argued that the city, by granting it a license to provide taxi service, implicitly agreed not to engage in competitive services such as the new dial-a-ride system. The court ruled that there was no exclusive franchise granted to the taxi company.

In Westport, Connecticut, the taxi company argued that the "certificate of public convenience and necessity" guaranteed it freedom from competition from the government. The court decided that, as there was no explicit guarantee in the certificate, no violation occurred.

Equal protection under the law. This issue was based on whether paratransit services and taxis should be regulated in the same way. In Ann Arbor, the taxi company argued that dial-a-ride service was the same as the service offered by the taxis. The court ruled that dial-a-ride was not an exclusive-ride service since passengers could not control the vehicle's route, and this excluded dial-a-ride from taxi licensing requirements.

Unfair competition. The issue of unfair competition in Ann Arbor was decided when the court ruled that it was not the intent of the transit district to market its services as being comparable to those of the taxi company.

Buy-out provisions of transit enabling statutes. A buy-out provision is a clause written into the enabling statutes for some publicly owned transportation systems. If a publicly owned provider competes with a private company, the publicly owned provider must offer to buy the private system, or that portion of the system which would suffer from competition, at a fair price. In many cases, the private system must first qualify as a transit or a mass transit system as defined by state, county, or municipal laws.

In Santa Clara, California, legislation that created the county transit district included a buy-out provision for existing transit systems in the district. The taxi companies in the district qualified both as an "existing" transit system—since they were already providing service within the district—and as a "transit system"—since transit was defined broadly as "transportation of passengers and their incidental baggage by any means."

In Orange County, California, legislation creating the transit district used a narrow definition of existing mass transit systems: transportation by vehicle of passengers only, and their incidental baggage, on an individual fare-paying basis. When a taxi company sued the transit district for not complying with a buy-out provision for competing services, the court ruled that since (1) the taxis were hired for a flat fare independent of the number of passengers, and (2) 1 percent of the taxi business came from delivery of packages and telegrams, the taxi company did not

fall within the definition of a mass transit system (12).

insurance

In the past, insurance regulations and the high cost of obtaining insurance coverage were enough to keep many proposed paratransit systems from being established (12). Today, insurance problems continue to be a stumbling block to implementing paratransit service in many areas, although recent developments in the insurance industry and its regulatory agencies are relieving some of the difficulties.

Depending on the type of paratransit system involved, several kinds of insurance may be needed. Liability, workmen's compensation, property damage, group insurance, theft bond, and general business insurance are some of the more common insurance needs. The most difficult insurance problems arise in liability coverage for demand-responsive systems (34), although prearranged ridesharing services are not without insurance problems of their own. (190).

The following are insurance problems associated with demand-responsive systems:

- Insurance is sometimes difficult to obtain.
- Insurance coverage, if available, is often very expensive.
- Insurance coverage sometimes involves a number of restrictions that can curtail the level of service that had been planned.
- Insurance policies are not automatically renewed, even though no accidents occurred.

These insurance problems have some of their roots in state laws and regulations that were written long before paratransit became of major interest, and before governmental and charitable institutions were subject to legal suits (34).

For insurance purposes, most state laws identify two categories of transportation: private transportation, such as the family car, and common carriers. A common carrier is usually defined as a provider of transportation which is open to the general public, and for which a fare is paid (34). The legal basis for determining the amount of liability derives from this categorization. Because common carriers are expected by law to provide the "highest standard of care" in transporting passengers, common carriers have virtually no defense in case of injury to a passenger, and their insurance rates are consequently very high (34).

Most demand-responsive services do not fit easily into either the common carrier or the private transportation categories. Demand-responsive paratransit systems

available to the general public have been assigned the same insurance rates as common carriers. However, demand-responsive paratransit systems for limited mobility users by definition are not common carriers because they are not available to the general public. On the other hand, because some of these systems accept money for their services, they cannot be classified as private transportation either. Similarly, demand-responsive services operated by a social service agency cannot be accommodated under the regulations because they are neither private transportation nor common carriers by definition.

Such classification difficulty has made some insurance companies reluctant to write policies for these types of demand-responsive paratransit systems. In addition, insurance companies base premium rates on an assessment of the risk exposure of the patrons of a system. A system that carries 50 passengers per hour per vehicle, for example, will have higher premiums than one that carries five passengers per hour per vehicle. Some feel, however, that this rating system is designed neither to cope with the wide variety of paratransit configurations nor to predict risk in paratransit accurately (34).

Insurance companies also base their assigned risk rates on data they have collected on the various modes for various parts of the country. Because paratransit systems are relatively new, there are relatively little real data on which insurance companies can base their rates.

All of these factors contribute to making insurance difficult to obtain. Those companies which are willing to write policies do so only at very high rates in many cases.

The high cost of insurance is also attributed to the high cost of vehicles, maintenance, medical treatment, out-of-court settlements, and the increasing amounts awarded in liability cases. In some shared-ride taxi systems, insurance costs can range as high as \$5,000 per vehicle per year (12).

Insurance companies may also place restrictions on the operation of some paratransit systems as a condition of coverage. These restrictions can involve such things as limiting the age of drivers, prohibiting a fare to be charged, limiting the service area size, and specifying who may be transported. These limitations can severely restrict the kinds of service the paratransit system can offer as well as hinder transportation coordination among different agencies.

A January 1979 conference held at the White House and attended by representatives of the insurance industry, social service organizations, the transportation community, and Federal and state governments, resulted in a number of recommendations to deal with these insurance problems.

The conference recommended:

- That regulations and classifications be modified to recognize paratransit modes.
- That changes be made to allow greater flexibility in using volunteer drivers and to allow for coordination among agencies.
- That laws be drafted to prevent duplicate insurance payments for the same injury, thus allowing lower insurance rates.

These recommendations have been filed with the insurance commissions in most of the states, and legislation is being drafted in many states to address these difficulties (154).

Other solutions to the insurance problem have also been successfully developed at the state level. In 1977, the Oregon Special Service Association (OSSA), formed by non-profit corporations to provide demand-responsive paratransit service to the elderly and handicapped, devised a program which lowered many of its members' insurance rates. One of these members saved \$7,000 in annual premium costs (172). OSSA established policies and procedures for its members which would keep premiums at a lower level, but would also provide safer, more comfortable service for its elderly and handicapped clients.

OSSA was then able to work out an arrangement with an Oregon insurance company for coverage of all members. Rates for individual members varied according to the age and value of the vehicles, number of drivers, type of agency programs, and physical location of facilities. Although basic rates have not varied greatly in all cases, coverage and selection were greater than they had been under each member's previous insurance coverage.

At the same time, others in Oregon were trying to develop legislative solutions to the insurance problem. One option explored was for the state to insure all vehicles used in the transportation of the elderly and handicapped. This option was never adopted because it essentially meant that the state would assume control of the vehicles used by these non-profit corporations, and it was unwilling to accept this responsibility. Although this option was rejected in Oregon, it might be applied successfully in other areas of the country.

When providing a system with coverage, insurance companies are concerned with the selection and training of drivers, the condition of vehicles, the types and numbers of passengers carried, and the extent of service each day (101). Convincing the insurance company that the individual paratransit system is less risky than originally assessed may reduce the assigned risk.

On an individual, case-by-case basis, some paratransit systems have been able to obtain insurance at reasonable rates. City or county operated dial-a-ride systems, for example, have often been able to arrange coverage under "umbrella policies" that also provide insurance for the vehicles of other government agencies, such as public works departments or school departments. In many cases, transit authorities that operate fixed-route bus systems are allowed to include dial-a-ride buses in their fleet insurance policy coverage (12).

Vanpools organized by employers are often covered under the employer's master policies (88) and the participating employees are sometimes covered by workmen's compensation; therefore, employer vanpools are somewhat easier to insure than vanpools organized in other ways. Employee organizations and third party lease operation vanpools have recommended insurance ratings slightly higher than employer vanpools while individually owned vanpools are treated similar to carpools.

Carpools, in practice, have not been assessed at higher premium rates than those assigned to private automobiles, although the liability risk is higher with a greater number of people riding in the car (118). It has been suggested that carpools who share costs rather than driving should carry higher bodily-injury coverage in case of accident, as the risk is more concentrated.

For insurance purposes, subscription buses are assessed as common carriers when services are chartered from privately owned public transportation or a public authority.

labor

In the nineteenth century, after several railroad mergers and acquisitions had displaced employees, Congress intervened to prevent further layoffs of unionized personnel by passing Section 5(2)(f) of the interstate Commerce Act of 1887, as amended. Section 5(2)(f) states that no railroad employees who are affected by a merger or acquisition will be financially harmed in their employment as a result of the merger or acquisition during the four years following the effective date of the final transaction (146). When Congress began considering a public transportation financial aid program in the 1960's, the unions representing public transportation workers sought the inclusion of a labor protection provision similar to that of Section 5(2)(f).

The unions representing public transportation employees recognized the follow-

ing areas of concern that arose as public financial aid spurred changes in the transit sector:

- As private transit companies were being taken over by public authorities in the early 1960's, many labor rights (for example, work rules and vested pensions) were not carried over to the public operation, nor were the employees of the private company guaranteed employment.
- As publicly subsidized operations proliferated, continuing private operators found the competition with subsidized operators severe, which created a diminishing financial base for them and resulted in labor layoffs (141).

In order to prevent further deterioration of labor rights, Congress included Section 13(c) in its financial aid program to public transportation, the Urban Mass Transportation Act of 1964. Section 13(c) states that:

"It shall be a condition of any assistance under Section 3 of this Act that fair and equitable arrangements are made, as determined by the Secretary of Labor, to protect the interests of employees affected by such assistance" (178).

These "equitable arrangements" include the continuation of pension rights and benefits under existing collective bargaining agreements. Furthermore, employees of mass transportation systems are assured of employment or reemployment, as well as paid training and/or retraining programs, if they are laid off or terminated. Section 13(c) provides benefits which are equal to Section 5(2)(f) of the older act affecting the railroads (178).

According to the Department of Labor's (DOL) criteria for applying Section 13(c) protection to transportation employees, the employer must provide accepted mass transit services, and the employees must be more than incidentally involved in these services. DOL actually sets forth minimum employee protection: identification of affected employees, compensation levels for adverse impact, and appeal or arbitration procedures for disputes between affected parties. DOL bases Section 13(c) approvals on the existence of actual agreements that are the product of local bargaining and negotiation. In practice, this has meant that unions representing potentially affected transportation employees may contest any Federal grant using UMTA funds except for the Section 16(b)(2) grants. Where no organized union exists, such as where service is being initiated for the first time, the Secretary of Labor issues the terms and conditions of protection that are then incorporated into the grant.

Under Section 18 of the Surface Transportation Assistance Act of 1978, each state agency which has the responsibility of allocating these nonurbanized area grants must certify to the Department of Labor that each paratransit service applying for funds accepts the terms of the Section 13(c) provision. However, those ap-

plying for funds under Section 18 may request a waiver from the Secretary of Labor, when

“... it is clear that there are no employees of the recipient or of any other surface public transportation provider in the transportation service area who could be potentially affected by the project” (156).

Some of the most difficult issues to be resolved in paratransit development are whether, and under what conditions, employees of private, for-profit companies, e.g., taxicab companies, can be considered as “affected” employees under Section 13(c). DOL has interpreted “affected” to apply only to employees of transportation systems falling within the UMTA definition of mass transportation. The term “mass transportation” means transportation by bus, or rail, or other conveyance publicly or privately owned, which provides general or special service (not including school bus, charter or sightseeing service) on a regular and continuing basis (141).

The normal objective of Section 13(c) bargaining is to ensure that labor is not adversely affected by the introduction of UMTA funds. If it is determined that an additional group of employees may be affected by a special project—the involvement of this group in Section 13(c) bargaining prior to the award of a grant would be required.

As taxi operators begin providing paratransit services that fall within the definition of “mass transportation,” Section 13(c) will extend to at least a portion of the private taxi labor force.

In addition to guaranteeing that wage levels will not be reduced, Section 13(c) entitles employees of both public and private companies to equal rights. It does not create new rights for employees or extend existing ones. Binding arbitration is not considered an existing right under Section 13(c) legislation.

The guiding principles under Section 13(c) are that the burden of proof for harming mass transportation labor is on the grant recipient, and the recipient is liable if the project is found to bear any part of the blame for harming these employees.

Recent examples of Section 13(c) negotiations are important because they create important precedents for future issues.

The Rochester (New York) UMTA Service and Methods Demonstration Grant (1977) is an example of union and management negotiating a Section 13(c) agreement which permitted the expansion of dial-a-ride services into three neighboring towns. The Amalgamated Transit Union (ATU) agreed to renegotiate its current Section 13(c) agreement to allow competitive bidding for the provision of services in new areas. However, before agreeing to competitive bidding, the ATU insisted that

union work rules be employed and union jobs in original paratransit service areas be protected.

In June 1977, a private taxi company operating in Akron, Ohio, attempted to block an UMTA Section 5 grant for paratransit service to the Metropolitan Regional Transit Authority (141). The taxi company requested DOL to rule on whether its employees would be harmed by the grant. The taxi company was providing exclusive-ride taxi services as well as shared-ride services under contract with the authority. Since the predominant business of that taxi company was exclusive-ride service, which is not considered by UMTA to be mass transportation, the Department of Labor ruled that no Section 13(c) coverage should be afforded to the taxi company's employees.

In another Section 13(c) case in 1978, the Port Authority of Allegheny County in Pittsburg, Pennsylvania, sought an UMTA demonstration grant to support a coordinator of human service agency funds for transportation assistance of the elderly and handicapped. The grant was certified by DOL on the condition that certain taxicab drivers, those who were engaged in elderly and handicapped services of the type to be coordinated in the projects, would be protected by Section 13(c). Also in 1978, DOL approved a grant for operating assistance for similar elderly and handicapped demand-responsive transportation services in New Haven, Connecticut.

Both of these Section 13(c) certifications by DOL were based on the determination that a minimum amount of the taxi operator's revenue, similar to that which would be provided under the proposed UMTA grants, has to be obtained from paratransit service (141). If this minimum level of an operator's revenue is not obtained from paratransit service, the individual employees of an operator may file for Section 13(c) protection based on the fact that they have spent a majority of their time providing paratransit service similar to and competitive with the service under the proposed grant.

In the 1976 Norfolk, Virginia, and the 1977 Knoxville, Tennessee, vanpool demonstration projects, the cities, in order to obtain a Section 13(c) union agreement and DOL approval, contracted with the transit union for major maintenance work and agreed not to compete with conventional public transportation.

The Greater Cleveland (Ohio) Regional Transit Authority (GCRTA) negotiated with the union to win Section 13(c) approval for its community-responsive-transit (CRT) program for the elderly and handicapped, funded under UMTA Section 5. The GCRTA made several important concessions as part of a broader labor agreement:

- Approximately 67 percent of the services were to be provided by the unionized

transit property personnel, and 33 percent were to be provided by taxi operators under contract to GCRTA.

- A new driver job classification was created within the transit property for CRT operators. These drivers received a wage 31 percent lower than the normal prevailing wage for fixed-route bus drivers.
- The prevailing terms and work conditions of the fixed-route drivers were generally extended to the CRT drivers.
- CRT drivers were given rights of first opportunity to fill any job openings in the existing fixed-route system.
- The 40-hour work week requirement was relaxed to 30 hours (141).

In an unusual Section 13(c) negotiation case, the Delaware Authority for Specialized Transportation (DAST) had been willing to agree to basic protective arrangements for its employees. The local union, however, fearing the long-run competition of DAST service with conventional transit, refused to agree to any arrangements. The case was finally decided by DOL, which approved DAST's application for a grant on the basis that it did in fact comply with Section 13(c) labor protection provisions (141).

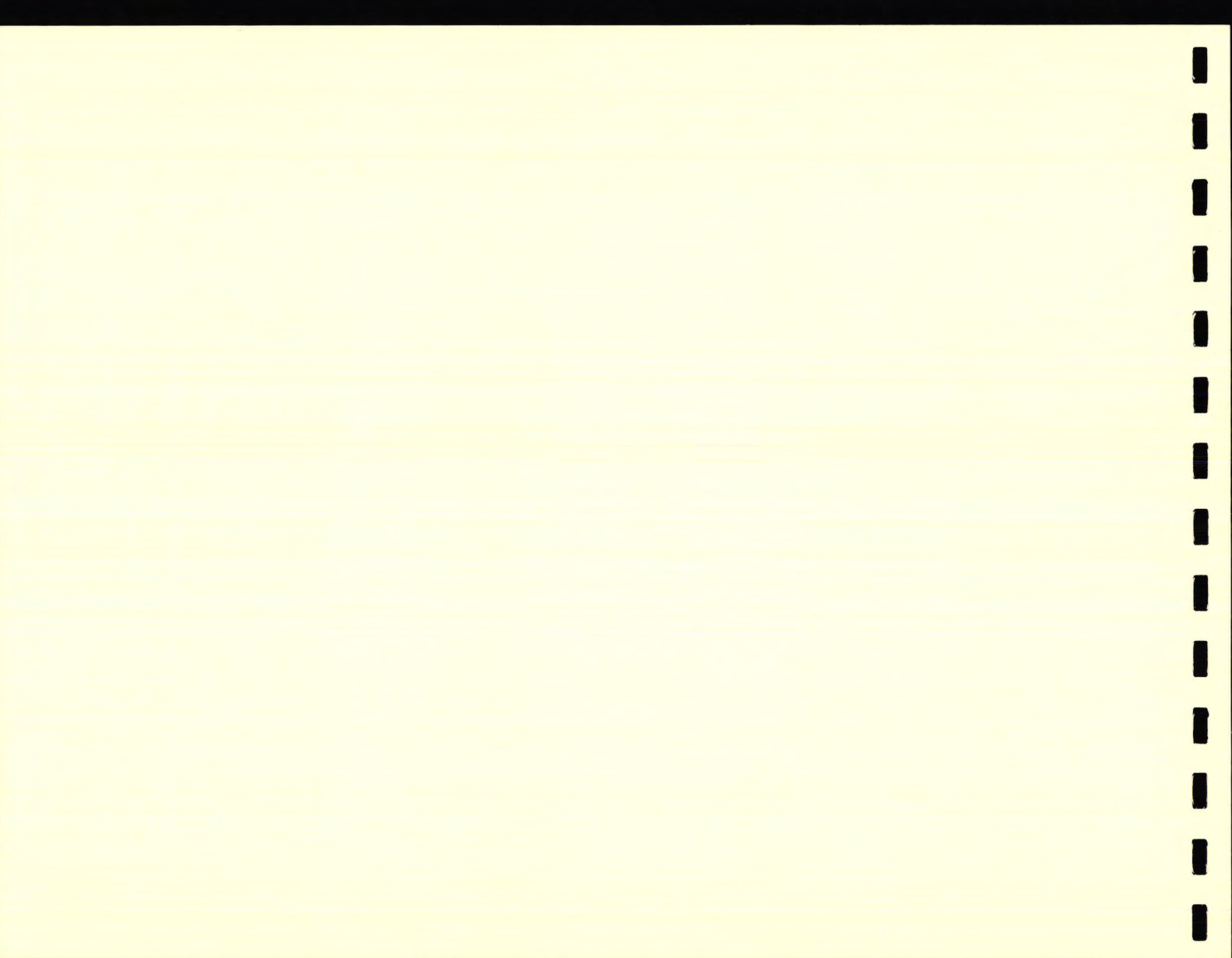
The position of organized labor with respect to the assurances they seek in Section 13(c) agreements for paratransit operations is becoming fairly clear and consistent:

- All work is retained within the union shop at prevailing wage rates and work rules.
- Contract paratransit operations shall not compete with, nor substitute for, conventional public transportation services.
- All maintenance work on vehicles participating in the paratransit project shall be performed by union employees at the maintenance facilities of the public transportation property.
- Project services will be limited strictly to those persons described in the project application whose daily trips are not served by public transportation routes (141).

Several conclusions can be drawn from these recent experiences in negotiating Section 13(c) agreements with conventional transit labor:

- Organized labor has been willing to talk about any project, but has been apprehensive about projects presented to them in their final state. In most UMTA demonstration projects where union leadership was involved in the early planning stages, satisfactory arrangements were developed.
- The successful negotiation of Section 13(c) protection for paratransit projects requires the support of conventional public transportation management.

- When paratransit projects are designed to complement rather than compete with conventional public transportation markets, Section 13(c) negotiations are facilitated (141).
- Because of the legal complexity of the process, some jurisdictions have opted to do without Federal funds and thereby avoid the 13(c) problem. The Ride-On bus system serving Montgomery County, Maryland, is a good example of this.



SUPPLEMENTARY MATERIAL

APPENDIX A: References

APPENDIX B: Glossary

APPENDIX A

REFERENCES

NOTE: The following references may be obtained from technical or university libraries. PB numbers indicate availability for purchase from the National Technical Information Service; 5285 Port Royal Road; Springfield, VA; 22161.

1. Abkowitz, Mark, et al, EVALUATION OF SERVICE AND METHODS DEMONSTRATION PROJECTS: PHILOSOPHY AND APPROACH, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, May 1977. DOT-TSC-UMTA-77-26. PB271005.
2. American Academy of Transportation, MAXI-CAB COMMUTER CLUB, Prepared for U.S. Department of Transportation, May 1972. PB220903.
3. Applied Resource Integration, Ltd., PLANNING GUIDELINES FOR COORDINATED AGENCY TRANSPORTATION SERVICES, Prepared for U.S. Department of Transportation and U.S. Department of Health, Education and Welfare, April 1980.
4. Ashford, Norman, and William G. Bell (editors), MOBILITY FOR THE ELDERLY AND HANDICAPPED, Loughborough University of Technology, Proceedings of the International Conference on Transport for the Elderly and Handicapped, Cambridge, Great Britain, April 4-7, 1978.
5. Au, Tung, RIDE-SHARED VEHICLE PARATRANSIT SYSTEM, Carnegie Mellon University, Prepared for U.S. Department of Transportation, Office of University Research, July 1977, PB284167.
6. Barb, Charles E., Jr., COLONIAL TAXI CO. OF BETHEL PARK, PA: PRIVATE ENTERPRISE IN PARATRANSIT, University of Oklahoma, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, June 1978.
7. Barb, Charles E., Jr., THE SEATTLE/KING COUNTY COMMUTER POOL PROGRAM: PARATRANSIT AND RUSH HOUR CONGESTION, University of Oklahoma, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, June 1978.
8. Bartol, J.A., LOW LIFE-CYCLE COST DESIGN STUDY FOR PARATRANSIT VEHICLES, ASI Engineering, Inc., Prepared for U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, July 1978. DOT-TSC-UMTA-78-14. PB295080.

9. Beeson, John D., KNOXVILLE COMMUTER POOL: ANNUAL REPORT 1977-78, Knoxville Commuter Pool, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, November 1978. UMTA-TN-06-0006-78-2. PB295046.
10. Bell, Theodore, and John Sparbel, "NEVADA TRANSIT STUDY FOR SMALL URBAN AND RURAL AREAS," *Public Works*, V.106 N.10, October 1975, pp.95-96.
11. Bell, William G. (editor), IMPROVING THE QUALITY AND QUANTITY OF TRANSPORTATION FOR THE ELDERLY AND HANDICAPPED: PROCEEDINGS OF NATIONAL TRANSPORTATION CONFERENCE, DECEMBER 10-12, 1975, ORLANDO, FL, Florida State University at Tallahassee, et al, 1975.
12. Billheimer, J.W., et al, PARATRANSIT HANDBOOK, A GUIDE TO PARATRANSIT IMPLEMENTATION, 2 Volumes, SYSTAN, INC., Prepared for U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, January 1979.
13. Bloomfield, Pamela, and David Koffman, THE DANVILLE RUNAROUND: USER-SIDE SUBSIDY FOR FIXED-ROUTE TRANSIT, Crain Assoc., Prepared for U.S. Department of Transportation, No date.
14. Brail, Richard K., et al, TRANSPORTATION SERVICES FOR THE DISABLED AND ELDERLY, Rutgers University, Center for Urban Policy Research, 1976.
15. Brandon, Carter, PARATRANSIT LABOR ISSUES, Harvard University, Prepared for U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, February 1978, DOT-TSC-UMTA-78-11. PB280206.
16. Bronitsky, Leonard, et al, SMALL CITY TRANSIT: MERCED, CA, DIAL-A-RIDE TRANSIT IN AN AGRICULTURAL COMMUNITY, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, March 1976. DOT-TSC-UMTA-76-5, 10. PB251510.
17. Cambridge Systematics, Inc. and Multisystems, Inc., INTEGRATED DIAL-A-RIDE AND FIXED-ROUTE TRANSIT IN ANN ARBOR, MI, Prepared for U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, March 1977. DOT-TSC-UMTA-77-7. PB267941.
18. Cambridge Systematics, Inc. and Multisystems, Inc., METHOD FOR ESTIMATING PATRONAGE OF DEMAND-RESPONSIVE TRANSPORTATION SYSTEMS, Prepared for U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, December 1977. DOT-TSC-UMTA-77-52.

19. Carlson, Robert C., "DIAL-A-RIDE: FAILURE IN SANTA CLARA," *Metro*, V.72 N.3, May-June 1976, pp. 15-22.
20. Carter, Goble and Roberts, Inc., PLANNING AND COORDINATION MANUAL, Prepared for U.S. Department of Health, Education and Welfare, Region 4 and U.S. Department of Transportation, Urban Mass Transportation Administration, Region 4, Reprinted by U.S. Department of Transportation, Technology Sharing Office, January 1979.
21. Casey, Robert, SMALL CITY TRANSIT: EL CAJON, CA, CITY WIDE SHARED-RIDE TAXI SERVICE, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, March 1976. PB251507.
22. Casey, Robert SMALL CITY TRANSIT: SUMMARY OF STATE AID PROGRAMS, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, March 1976. DOT-TSC-UMTA-76-5, 15. PB251515.
23. Casey, Robert, and Charles Cofield, SMALL CITY TRANSIT: XENIA, OH, TRANSIT SERVICE FOR REBUILDING A COMMUNITY, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, March 1976. PB251514.
24. Cook, Allen R., THE DIAL-A-BAT PARATRANSIT SERVICE OF BROCKTON, MA, AREA TRANSIT: PUBLIC TRANSIT IN COORDINATED HUMAN SERVICES, University of Oklahoma, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, June 1978.
25. Cook, Allen R., PARATRANSIT RESOURCE GUIDE, University of Oklahoma, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, Office of the Secretary, July 1979.
26. Cook, Allen R., and Charles E. Bach, KNOXVILLE, TN, COMMUTER POOL, University of Oklahoma, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, December 1978.
27. Cooper, Tom, COMMUNITY BROKERAGE OF TRANSPORTATION SERVICES FOR THE ELDERLY IN MOUNTAIN VIEW, CA, Crain Assoc., Prepared for U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, February 1978. PB285234.
28. Cooper, Tom, et al, THE LIFT: SPECIAL NEEDS TRANSPORTATION IN PORTLAND, OR, Crain Assoc., Prepared for U.S. Department of Transportation, Transportation Systems Center, Service and Methods Demonstration Program, Cambridge, MA, June 1978. PB294711.

29. Crain Assoc., SUBSIDIZED TAXI PROGRAMS FOR ELDERLY AND HANDICAPPED PERSONS IN THE SAN FRANCISCO BAY AREA, Prepared for U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, September 1977.
30. Cutler, Delores A., and Sue F. Knapp, COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED, Volumes I & II, Ecosometrics, Inc., Prepared for U.S. Department of Transportation, Office of Environment and Safety, January 31, 1979.
31. Cutler, Delores A., and Sue F. Knapp, EXECUTIVE SUMMARY: COORDINATING TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED, Ecosometrics, Inc., Prepared for U.S. Department of Transportation, Office of Environment and Safety, January 31, 1979.
32. Davis, Frank W., et al, INCREASED TRANSPORTATION EFFICIENCY THROUGH RIDESHARING: THE BROKERAGE APPROACH, University of Tennessee, Prepared for U.S. Department of Transportation, Office of University Research, January 1977. PB267546.
33. Davis, Frank W., J.D. Beeson, and F.J. Wegmann, THE KNOXVILLE TRANSPORTATION BROKERAGE PROJECT, 3 Volumes, University of Tennessee, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, November 1978. PB292592. PB282248. PB292593.
34. Davis, Frank W., et al, THE SOCIAL SERVICE INSURANCE DILEMMA: PROBLEMS, ANALYSIS AND PROPOSED SOLUTIONS, University of Tennessee, Prepared for U.S. Department of Transportation, Office of University Research, March 1979. PB296348.
35. Fielding, G.J., et al, THE SHARED-RIDE TAXI SYSTEM REQUIREMENT STUDY, Dave Systems, Inc., Prepared for U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, May 1979. PB299231.
36. Fitzgerald, Peter G., USER-SIDE SUBSIDIES FOR SHARED-RIDE TAXI SERVICE IN DANVILLE, ILLINOIS: PHASE I, Crain Assoc., Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, June 1977. UMTA-IL-06-0034-77-1. PB292805.
37. Flusberg, M., et al, BENEFIT-COST ANALYSIS OF INTEGRATED PARATRANSIT SYSTEMS, Multisystems, Inc., Prepared for U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, September 1979.

38. Furniss, Robert E., EVOLUTION AND OPERATIONS OF THE RESTON, VA, COMMUTER BUS SERVICE, CACI Inc., Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, August 1977. PB275792.
39. Furniss, Robert, E., PRE-DEMONSTRATION ACTIVITIES OF THE WESTPORT INTEGRATED TRANSIT SYSTEM, CACI Inc., Prepared for U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, July 1977. DOT-TSC-UMTA-77-33. PB271998.
40. Gilbert, Gorman, et al, ESTABLISHING INNOVATIVE TAXI CAB SERVICES: A GUIDEBOOK, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, August 1977. PB278647.
41. "GREENWAY PLAZA'S VANPOOL PROGRAM A 'FIRST'", *Vanpool Activities Newsletter*, V. IV N.4, July-August 1980, P.4.
42. Grey Advertising Co., INCIDENCE COUNTS OF TRANSPORTATION OF HANDICAPPED PEOPLE, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, 1977.
43. Gunderson, Richard, ANALYSIS OF LITIGATION INITIATED TO PREVENT PARATRANSIT IMPLEMENTATION, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, May 1978. DOT-TSC-UMTA-78-34.
44. Hart, Kathy, HOW TO SET UP A LOCAL PUBLIC TRANSPORTATION SERVICE IN YOUR COMMUNITY, Council of Fresno County Governments, Fresno, CA, September 1975.
45. Hart, Kathy, MANUAL FOR PLANNING PUBLIC TRANSPORTATION SERVICES IN SMALL URBAN AND RURAL AREAS, Council of Fresno County Governments and California Department of Transportation, Division of Mass Transportation, 1977.
46. Heaton, Carla, CASE STUDY EVALUATION OF THE BOSTON AREA CAR-POOLING PROGRAM, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, May 1976. PB255976.
47. Higgens, Tom, "DEMAND RESPONSIVE TRANSPORTATION: AN INTERPRETIVE REVIEW," *Transportation*, V. 5, 1976, pp. 243-256.
48. Holoszyc, M., and D. Newman, IMPLEMENTING THE ROCHESTER COMMUNITY TRANSIT SERVICE DEMONSTRATION, SYSTAN INC., Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, May 1979, UMTA-NY-06-0048-79-1. PB298979.

49. Huie, W. Stell, URBAN MASS TRANSPORTATION, Litigation and Administrative Practice Series, Criminal Law and Urban Problems, Course Handbook Series, Number 98, Practising Law Institute, 1978.
50. Institute of Public Administration, COORDINATING TRANSPORTATION FOR THE ELDERLY AND HANDICAPPED: A STATE-OF-THE-ART REPORT, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, November 1976. PB265079.
51. Institute of Public Administration, DIRECTORY OF TRANSPORTATION PROJECTS FOR OLDER AMERICANS AS OF JULY 1974.
52. Institute of Public Administration, FINANCING TRANSIT: ALTERNATIVES FOR LOCAL GOVERNMENT: EXECUTIVE SUMMARY, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, Office of Policy and Program Development, Office of the Secretary, July 1979.
53. Institute of Public Administration, PLANNING HANDBOOK: TRANSPORTATION SERVICES FOR THE ELDERLY, Prepared for U.S. Department of Health, Education, & Welfare, Administration on Aging, November 1975. PB247958.
54. Iowa Department of Transportation, Public Transit Division, MARKETING MANUAL FOR TRANSIT OPERATORS, Reprinted by U.S. Department of Transportation, Technology Sharing Division, February 1979.
55. Jastrzab, Gary, et al, SYNTHESIS OF MANUFACTURER AND STATE AGENCY RESPONSES CONCERNING THE 16(B)(2) VEHICLE PROCUREMENT SPECIFICATIONS, Applications Research Corp., Prepared for U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, September 1978.
56. Jefferson Assoc., ADMINISTRATION OF SECTION 13(c)—URBAN MASS TRANSPORTATION ACT, Prepared for U.S. Department of Labor, January 1972.
57. Jennings, Kenneth, et al, STUDY OF UNIONS, MANAGEMENT RIGHTS AND THE PUBLIC INTEREST IN MASS TRANSIT, University of North Florida, Prepared for U.S. Department of Transportation, Office of University Research, January 1977. PB273035.
58. Johnson, Chris, et al, RIDE SHARING AND PARK-AND-RIDE, VOLUME 2: THE VAN POOL PLANNING MANUAL, University of Illinois, Prepared for U.S. Department of Transportation, Office of University Research, November 1977, PB282409.

59. Kendall, Donald C., A COMPARISON OF FINDINGS FROM PROJECTS EMPLOYING USER-SIDE SUBSIDIES FOR TAXI AND BUS TRAVEL, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, Paper presented at Urban Mass Transportation Administration Regional Seminars on Interim and Specialized Transportation for Handicapped and Elderly Persons, August 1979.
60. Kendall, Donald C., SMALL CITY TRANSIT: EUGENE/SPRINGFIELD, OR EXTENSIVE COUNTY WIDE TRANSIT COVERAGE, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, March 1976. PB251508.
61. Kendall, Donald C., and Carla Heaton, SERVICE AND METHODS DEMONSTRATION PROGRAM, ANNUAL REPORT EXECUTIVE SUMMARY, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, April 1978.
62. Kendall, Donald C., and Joseph Misner, SMALL CITY TRANSIT: BREMERTON, WA, PRIVATELY OPERATED SUBSCRIPTION BUS TO AN INDUSTRIAL SITE, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, March 1976. DOT-TSC-UMTA-76-5, IV. PB251504.
63. Kendall, Donald C., et al, CARPOOLING: STATUS AND POTENTIAL, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, June 1975. PB244609.
64. Kendall, Donald C., et al, MAKING THE DIFFERENCE: ALTERNATIVES FOR ELDERLY AND HANDICAPPED PERSONS, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, August 1979.
65. Kendall, Donald C., et al, SERVICE AND METHODS DEMONSTRATION PROGRAM, ANNUAL REPORT, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, April 1977. PB270673.
66. Kendall, Donald C., et al, SERVICE AND METHODS DEMONSTRATION PROGRAM, ANNUAL REPORT, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, July 1978. PB292008.
67. Kendall, Donald C., et al, SMALL CITY TRANSIT CHARACTERISTICS: AN OVERVIEW, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, March 1976. DOT-TSC-UMTA-76-5, 1. PB251501.

68. Kidder, Alice E., SOURCES OF NON-FEDERAL SUPPORT FOR PUBLIC TRANSPORTATION PROGRAMS IN NON-URBANIZED AREAS, North Carolina A&T State University, Prepared for U.S. Department of Transportation, Office of University Research, June 1978. PB284410.
69. Kidder, Alice E., USAGE OF REVENUE SHARING FOR PUBLIC TRANSPORTATION IN RURAL AREAS, North Carolina A&T State University, Prepared for U.S. Department of Transportation, Technology Sharing Office, July 1979.
70. Kirby, Ronald F., GUIDELINES ON THE OPERATION OF SUBSCRIPTION BUS SERVICES, Urban Institute, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, August 1974. PB237076.
71. Kirby, Ronald F., and Francine Folson, SUPPORTING MASS TRANSPORTATION IN SMALL URBAN AREAS THROUGH USER-SIDE SUBSIDIES: A DEMONSTRATION IN DANVILLE, IL, Urban Institute, December 1978.
72. Kirby, Ronald F., and Gerald K. Miller, PLANNING SHORT-RANGE PUBLIC TRANSPORTATION IMPROVEMENTS, Working Paper: 1409-5-1, The Urban Institute, April 1980.
73. Kirby, Ronald F., et al, PARA-TRANSIT; NEGLECTED OPTIONS FOR URBAN MOBILITY, Urban Institute, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, Federal Highway Administration, 1974.
74. Knighton, Robert G., FORECASTING FARE-SENSITIVE DIAL-A-BUS WITHOUT SURVEYS, Preliminary Research Report 104, New York State Department of Transportation, Planning Research Unit, July 1976.
75. Koffman, David, USER-SIDE SUBSIDIES FOR FIXED ROUTE TRANSIT IN DANVILLE, ILLINOIS: PHASE II, Crain Assoc., Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, August 1978. UMTA-IL-06-0034-78-1.
76. Lam, Terry N., PUBLIC TRANSPORTATION AND MOBILITY IN RURAL AND SMALL COMMUNITIES, University of California at Davis, College of Engineering, No date.
77. Lave, R.E., et al, PARATRANSIT INTEGRATION: STATE-OF-THE-ART, SYSTAN Inc., Prepared for U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, December 1978.
78. Lieb, Ronald C., LABOR IN THE TRANSIT INDUSTRY, U.S. Department of Transportation, Office of Transportation Systems Analysis and Information, U.S. Government Printing Office, May 1976. 050-000-0119-2.

79. Massachusetts Department of Education, DRIVER TRAINING MANUAL FOR SPECIAL NEEDS TRANSPORTATION, No date.
80. McCall, Chester H., Jr., COM-BUS: A SOUTHERN CALIFORNIA SUBSCRIPTION BUS SERVICE, CACI, Inc., Prepared for U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, May 1977. DOT-TSC-UMTA-77-13. PB272470.
81. McCall, Chester H., Jr., et al, SPECIAL TRANSPORTATION SERVICES FOR THE ELDERLY AND HANDICAPPED IN BATON ROUGE, CACI Inc., Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, November 1976. UMTA-LA-06-0001-76-1. PB263904.
82. McKelvey, Douglas J., EVALUATING RURAL PUBLIC TRANSPORTATION, North Carolina A&T State University, Prepared for U.S. Department of Transportation, Office of University Research, February 1977. PB269287.
83. McKelvey, Douglas J. (editor), PROCEEDINGS OF THE FIRST NATIONAL CONFERENCE ON RURAL PUBLIC TRANSPORTATION, North Carolina A&T State University, Prepared for U.S. Department of Transportation, Office of University Research, February 1977. PB262808.
84. Mergel, Joseph, SMALL CITY TRANSIT: MERRILL, WI, POINT DEVIATION SERVICE IN A SMALL COMMUNITY, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, March 1976. PB251511.
85. Metropolitan Transportation Commission, SOCIAL SERVICE AGENCY SURVEY FOR THE NINE-COUNTY SAN FRANCISCO BAY AREA, July 1977.
86. Michigan Department of State Highways and Transportation, DIAL-A-RIDE TRANSPORTATION: MICHIGAN DART PROGRAM STATUS REPORT, June 1975.
87. Michigan Department of Transportation, Bureau of Urban and Public Transportation, MICHIGAN SMALL BUS PROGRAM MANAGEMENT HANDBOOK, Reprinted by U.S. Department of Transportation, Technology Sharing Program, September 1979.
88. Miller, Gerald K., and Melinda Green, GUIDELINES FOR THE ORGANIZATION OF COMMUTER VAN PROGRAMS, Urban Institute, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, February 1976.
89. Miller, William, and William Kline, OPERATING COSTS AND CHARACTERISTICS OF SELECTED SPECIALIZED TRANSPORTATION SERVICES FOR ELDERLY AND HANDICAPPED, PENNSYLVANIA DEPARTMENT OF TRANSPORTATION, 1975.

90. Minnesota Department of Transportation, MINNESOTA PARATRANSIT DEMONSTRATION PROGRAM OPERATIONS PLAN: METRO AREA ELDERLY AND HANDICAPPED TRANSPORTATION DEMONSTRATION, February 1979.
91. Minnesota Department of Transportation, PARATRANSIT DEMONSTRATION GRANT PROGRAM REPORT, March 1979.
92. Misner, Joseph, SMALL CITY TRANSIT: EVANSVILLE, IN, A LOW SUBSIDY TRANSIT SERVICE, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, March 1976, PB251509.
93. Misner, Joseph, SMALL CITY TRANSIT: WESTPORT, CN, COMPREHENSIVE TRANSIT SERVICE IN AN AFFLUENT SUBURBAN COMMUNITY, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, March 1976. DOT-TSC-UMTA-76-5, 13. PB251513.
94. Motor Vehicle Manufacturers Association, MVMA MOTOR VEHICLE FACTS AND FIGURES '78, 1978.
95. Motor Vehicle Manufacturers Association, MVMA MOTOR VEHICLE FACTS AND FIGURES '79, 1979.
96. Multisystems, Inc., STATE OF WISCONSIN URBAN MASS TRANSIT DEMONSTRATION PROGRAM: MERRILL PROJECT FINAL REPORT, Prepared for Wisconsin Department of Transportation, July 1977.
97. Multisystems, Inc., TAXIS, THE PUBLIC AND PARATRANSIT: A COORDINATION PRIMER, Prepared for International Taxicab Association, April 1978.
98. Paaswell, Robert, and Wilfred Recker, PROBLEMS OF THE CARLESS, State University of New York at Buffalo, Prepared for U.S. Department of Transportation, Office of University Research, June 1976. PB275260.
99. Page, Elizabeth, "UMTA'S SERVICE AND METHODS DEMONSTRATION PROGRAM: SOCIAL SERVICE AGENCY COORDINATION PROJECTS," Paper presented at UMTA Regional Seminars on Interim and Specialized Transportation for Handicapped and Specialized Transportation for Handicapped and Elderly Persons, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, August 1979.
100. Peat, Marwick, Mitchell, and Co., ANALYZING TRANSIT OPTIONS FOR SMALL URBAN COMMUNITIES, 3 Volumes, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, 1978. PB291450. PB291451. PB291452.

101. Pickrel, Luther J., and William C. Rogers (editors), PARATRANSIT: THE IDEA MAY BE NIFTY BUT . . . PROCEEDINGS OF A CONFERENCE ON MAY 18-20, 1977, MINNEAPOLIS, University of Minnesota, Agricultural Extension Service, Special Report 68, 1978.
102. Poage, James, NORFOLK VANPOOL AND CONTRACT HAULER DEMONSTRATION PROJECT, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, August 1977.
103. Public Technology, Inc., ELDERLY AND HANDICAPPED TRANSPORTATION: CHIEF EXECUTIVE'S SUMMARY, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, Office of Service and Methods Demonstration, Office of the Secretary, September 1979.
104. Public Technology, Inc., ELDERLY AND HANDICAPPED TRANSPORTATION: EIGHT CASE STUDIES, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, Office of Service and Methods Demonstration, Office of the Secretary, September 1979.
105. Public Technology, Inc., ELDERLY AND HANDICAPPED TRANSPORTATION: INFORMATION SOURCE BOOK, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, Office of Service and Methods Demonstration, Office of the Secretary, September 1979.
106. Public Technology, Inc., ELDERLY AND HANDICAPPED TRANSPORTATION: LOCAL GOVERNMENT APPROACHES, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, Office of the Secretary, March 1979.
107. Public Technology, Inc., ELDERLY AND HANDICAPPED TRANSPORTATION: PLANNING CHECKLIST. Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, Office of Service and Methods Demonstration, Office of the Secretary, September 1979.
108. Public Technology, Inc., INSTITUTIONAL FRAMEWORK FOR INTEGRATED TRANSPORTATION PLANNING, Prepared for Urban Consortium for Technology Initiatives, October 1976. PB265459.
109. Public Technology, Inc., INTEGRATION OF PARATRANSIT WITH CONVENTIONAL SYSTEMS, Prepared for Urban Consortium for Technology Initiatives, October 1976. PB262254.
110. Public Technology Inc., TRANSPORTATION FOR ELDERLY AND HANDICAPPED PERSONS (Information Bulletin), Prepared for Urban Consortium for Technology Initiatives and U.S. Department of Transportation, October 1976. PB258734.

111. Remak, Roberta, POTENTIAL FOR FLEXICAB SERVICES: INNOVATIVE USES OF TAXIS AND JITNEYS FOR PUBLIC TRANSPORTATION, Interplan Corp., Prepared for U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, December 1975. PB248783.
112. Sacramento, CA, Regional Area Planning Commission, THE TRANSPORTATION NEEDS OF LOW INCOME AND MINORITY PERSONS, August 1973.
113. Saltzman, Arthur, COORDINATION OF TRANSPORTATION BY HUMAN SERVICE AGENCIES: AN INTER-ORGANIZATIONAL PERSPECTIVE, University of California at Irvine, Reprinted by U.S. Department of Transportation, Technology Sharing Program, January 1980.
114. Santa Clara County CA Transit Authority, "WHAT HAPPENED TO DIAL-A-RIDE?" (Internal Memorandum), June 20, 1975.
115. Schmenner, Roger W., OPERATING SUBSIDIES FOR BUSES: THE CASE OF CONNECTICUT, Yale University, Institution for Social and Policy Studies, Prepared for U.S. Department of Transportation, August 1974.
116. Schneider, Jerry B., et al, INCREASING TRANSIT'S SHARE OF THE REGIONAL SHOPPING CENTER TRAVEL MARKET: AN INITIAL INVESTIGATION, University of Washington, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, August 1979. PB80-131360.
117. Schneider, Philip H., LOW LIFE-CYCLE COST PARATRANSIT VEHICLE DESIGN STUDY, Dutcher Industries, Inc., Prepared for U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, August 1978. DOT-TSC-UMTA-78-14. PB295080.
118. Sen, Ashish K., et al, RIDE SHARING AND PARK-AND-RIDE, Volume 1: CAR POOL PLANNING MANUAL, University of Illinois, Prepared for U.S. Department of Transportation, Office of University Research, November 1977. PB282408.
119. Siskind, Frederic B., and Ernest W. Stromsdorfer, THE ECONOMIC COST IMPACT OF THE LABOR PROTECTION PROVISIONS OF SECTION 13(c) OF THE URBAN TRANSPORTATION ACT OF 1964, 2 Parts, U.S. Department of Labor, May 1978. PB279918. PB280072.
120. Skinner, Louise E., COMPARATIVE COSTS OF URBAN TRANSPORTATION SYSTEMS, U.S. Department of Transportation, Federal Highway Administration, June 1978.
121. Skorneck, A.J., EVOLUTION OF THE KNOXVILLE TRANSPORTATION BROKERAGE SYSTEM, CACI, Inc., Prepared for U.S. Department of

- Transportation, Transportation Systems Center, Cambridge, MA, October 1976., DOT-TSC-UMTA-77-10. PB270103.
122. Smerk, George, et al, HANDBOOK FOR MANAGEMENT PERFORMANCE AUDITS, Volumes I & II, Institute for Urban Transportation, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, October 1979.
 123. Soot, S., et al, RIDE SHARING AND PARK-AND-RIDE, VOLUME 4: THE SERVICE AREA IDENTIFICATION METHODOLOGY, University of Illinois, Prepared for U.S. Department of Transportation, Office of University Research, November 1977, PB282411.
 124. Stewart, Carl, SMALL TRANSIT VEHICLE PERFORMANCE SURVEY, California Department of Transportation, Division of Mass Transportation, July 1978.
 125. Systems Architects, Inc., PARATRANSIT INTEGRATION WORKSHOP PROCEEDINGS, OCT. 12, 13, 1977, Prepared for U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, August 1978. DOT-TSC-UMTA-78-16.
 126. Telephone Conversation with Ed Marks, Executive Director of the National Association of Vanpool Operators, Knoxville, TN, August 29, 1980.
 127. Telephone Conversation with John Shadoff of Seattle/King County Commuter Pool Program, Seattle, WA, February 29, 1980.
 128. Telephone Conversation with John W. Hall of the Black and White Cab Co., Little Rock, AK, March 14, 1980.
 129. Telephone Conversation with Mrs. Head of the Reston Commuter Bus, Reston, VA, March 11, 1980.
 130. Telephone Conversation with Richard Martin of the Wisconsin Department of Transportation, Madison, WI, March 18, 1980.
 131. Telephone Conversations with Ronald J. Hoffman of COM-BUS, Huntington, CA, February 29, 1980 and March 5, 1980.
 132. Telephone Conversation with Stanley R. Stokey of the Tennessee Valley Authority's Employee Transportation Unit, Knoxville, TN, February 29, 1980.
 133. Telephone Conversation with Steven Leonard of the Digital Corp., Maynard, MA, March 7, 1980.
 134. Telephone Conversation with William A. Knaus of the Colonial Paratransit and Taxi Co., Bethel Park, PA, March 17, 1980.

135. Transportation Development Agency, DIAL-A-BUS MANUAL, 2 Volumes, Montreal, Canada, 1974.
136. Transportation Management Assoc., COORDINATION OF SPECIAL TRANSPORTATION SERVICES IN WACO, TX, Prepared for Waco Department of Transportation, March 1978. SHR-0022756.
137. Transportation Research Board, DEMAND RESPONSE TRANSPORTATION, Special Report 147, Proceedings of a Conference held October 3-5, 1973, at Rochester, NY, 1974.
138. Transportation Research Board, DEMAND-RESPONSIVE TRANSPORTATION SYSTEMS, Special Report 136, Proceedings of a Conference held July 12-14, 1972, at Ann Arbor, MI, 1973.
139. Transportation Research Board, DEMAND-RESPONSIVE TRANSPORTATION SYSTEMS AND OTHER PARATRANSIT SERVICES, Record 608, 1976.
140. Transportation Research Board, PARATRANSIT, Special Report 164, Proceedings of a Conference held November 9-12, 1975, in Williamsburg, VA, 1976.
141. Transportation Research Board, PARATRANSIT: 1979, Special Report 186, Proceedings of a Workshop held February 11-14, 1979, in Williamsburg, VA, 1979.
142. Transportation Research Board, PARATRANSIT SERVICES, Record 650, 1977.
143. Transportation Research Board, PROCEEDINGS OF THE FOURTH NATIONAL CONFERENCE ON RURAL PUBLIC TRANSPORTATION, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, Office of the Secretary, September 1979.
144. Transportation Research Board, URBAN TRANSPORT SERVICE INNOVATIONS, Special Report 184, 1979.
145. Twichell, John, "HAVE VAN, WILL TRAVEL," *Planning*, V. 46 N. 2, February 1980, pp. 16-18.
146. UNITED STATES CODE ANNOTATED, Title 49 Transportation, Section 11347, October 17, 1978, pp. 251-252.
147. U.S. Congress, House of Representatives, Committee on Government Operations, NATIONAL ENERGY ACT: FEDERAL VAN-POOLING PROGRAM, June 8-9, 1977.
148. U.S. Congress, Senate Committee on Agriculture and Forestry, Subcommit-

- tee on Rural Development, THE TRANSPORTATION OF PEOPLE IN RURAL AREAS, February 27, 1974.
149. U.S. Department of Agriculture, Economic Research Service, PRELUDE TO LEGISLATION TO SOLVE THE GROWING CRISIS IN RURAL AMERICA, 2 Parts, U.S. Government Printing Office, February 1975.
 150. U.S. Department of Agriculture, Farmers Home Administration, RURAL RIDES: A PRACTICAL HANDBOOK FOR STARTING AND OPERATING A RURAL PUBLIC TRANSPORTATION SYSTEM, 1978.
 151. U.S. Department of Commerce, Bureau of the Census, STATISTICAL ABSTRACT OF THE UNITED STATES, 1979, September 1979.
 152. U.S. Department of Energy, Office of Transportation Programs, *NEW APPROACHES TO SUCCESSFUL VANPOOLING*, May 1979. DOE/CS-0096.
 153. U.S. Department of Health, Education and Welfare, Office of Human Development Services, NATIONAL WORK PLAN TO RESOLVE THE TRANSPORTATION INSURANCE PROBLEMS, September 1979. 18-P-00188/4-01.
 154. U.S. Department of Health, Education and Welfare, Office of Human Development Services, NEW INSURANCE PROGRAMS FOR HUMAN SERVICE TRANSPORTATION PROVIDERS, August 1979. 18-P-00188/4-01.
 155. U.S. Department of Health, Education and Welfare, Office of Human Development Services, WHITE HOUSE WORKSHOP ON TRANSPORTATION INSURANCE PROCEEDINGS, September 1979. 18-P-00188/4-01.
 156. U.S. Department of Labor, GUIDEBOOK ON THE CONTENTS AND USE OF THE SPECIAL SECTION 13(c) WARRANTY FOR APPLICATION TO THE PUBLIC TRANSPORTATION FOR NON-URBANIZED AREAS PROGRAM, August 19, 1979.
 157. U.S. Department of Labor, "LABOR DEPARTMENT RAISES INCOME LEVELS DEFINING POVERTY," *Office of Information News*, April 9, 1979.
 158. U.S. Department of Transportation, Federal Highway Administration, Urban Mass Transportation Administration, Office of the Secretary, MARKETING RURAL PUBLIC TRANSPORTATION: A SECTION 147 DEMONSTRATION PROGRAM, August 1979.
 159. U.S. Department of Transportation, Office of Intergovernmental Affairs, THROUGH THEIR EYES: PART IV—PROVIDING TRANSPORTATION FOR RURAL AMERICANS, May 1979.
 160. U.S. Department of Transportation, Office of Public Affairs, Federal Highway

Administration, THE SURFACE TRANSPORTATION ASSISTANCE ACT OF 1978.

161. U.S. Department of Transportation, Office of the Secretary, "NON-DISCRIMINATION ON THE BASIS OF HANDICAP IN FEDERALLY-ASSISTED PROGRAMS AND ACTIVITIES RECEIVING OR BENEFITING FROM FEDERAL FINANCIAL ASSISTANCE," *Federal Register*, Part 2, V. 44 N. 106, May 31, 1979, pp. 31442-31483.
162. U.S. Department of Transportation, Transportation Systems Center, TRANSPORTATION EQUIPMENT FOR THE ELDERLY AND THE HANDICAPPED, April 1980 (Work in progress).
163. U.S. Department of Transportation, Transportation Systems Center, VAN-POOL RESEARCH: STATE-OF-THE-ART REVIEW, April 1979.
164. U.S. Department of Transportation, Transportation Systems Center, Technology Sharing Office, DEMAND-RESPONSIVE TRANSPORTATION: STATE-OF-THE-ART OVERVIEW, Cambridge, MA, 1974.
165. U.S. Department of Transportation, Transportation Systems Center, Technology Sharing Office, ENERGY CONSERVATION IN TRANSPORTATION, Cambridge, MA, January 1979.
166. U.S. Department of Transportation, Transportation Systems Center, Technology Sharing Office, GLOSSARY OF TRANSPORTATION TERMS FOR SMALL SYSTEMS, Cambridge, MA, No date.
167. U.S. Department of Transportation, Transportation Systems Center, Technology Sharing Office, INNOVATION IN PUBLIC TRANSPORTATION, 1979.
168. U.S. Department of Transportation, Transportation Systems Center, Technology Sharing Office, INNOVATION IN PUBLIC TRANSPORTATION, 1978.
169. U.S. Department of Transportation, Transportation Systems Center, Technology Sharing Office, RURAL PASSENGER TRANSPORTATION, Cambridge, MA, October 1976.
170. U.S. Department of Transportation, Transportation Systems Center, Technology Sharing Office, RURAL PASSENGER TRANSPORTATION PRIMER: SELECTED TRANSPORTATION TOPICS, Cambridge, MA, January 1977.
171. U.S. Department of Transportation, Transportation Systems Center, Technology Sharing Office, SELECTED STATE TRANSPORTATION PRO-

GRAMS: TEN CASE STUDIES, Cambridge, MA, February 1980.

172. U.S. Department of Transportation, Transportation Systems Center, Technology Sharing Office, TRANSPORTATION FOR THE ELDERLY AND HANDICAPPED: PROGRAMS AND PROBLEMS, Cambridge, MA, December 1978.
173. U.S. Department of Transportation, Urban Mass Transportation Administration, EXTERNAL OPERATING MANUAL: SECTION 3(c), THIRD PARTY CONTRACT ADMINISTRATION, March 11, 1974.
174. U.S. Department of Transportation, Urban Mass Transportation Administration, FEDERAL ASSISTANCE FOR URBAN MASS TRANSPORTATION, April 1979.
175. U.S. Department of Transportation, Urban Mass Transportation Administration, NATIONAL TRANSIT MARKETING CONFERENCE PROCEEDINGS, Arlington, VA, July 9-11, 1975.
176. U.S. Department of Transportation, Urban Mass Transportation Administration, PARATRANSIT SERVICES, *Federal Register*, Part 2, V.41 N. 204, October 20, 1976, pp. 46412-46413.
177. U.S. Department of Transportation, Urban Mass Transportation Administration, THE 16(B)(2) PROGRAM, No date.
178. U.S. Department of Transportation, Urban Mass Transportation Administration, URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED THROUGH DECEMBER 1978, AND RELATED LAWS.
179. U.S. General Accounting Office, HINDRANCES TO COORDINATING TRANSPORTATION OF PEOPLE PARTICIPATING IN FEDERALLY FUNDED GRANT PROGRAMS, Volumes 1 & 2, October 1977.
180. U.S. Office of Management and Budget, COMPARATIVE COST ANALYSIS FOR DECISIONS TO LEASE OR PURCHASE GENERAL PURPOSE REAL PROPERTY, *Office of Management and Budget Circulars*, N.A - 104, No date.
181. U.S. Office of Management and Budget, GRANTS AND AGREEMENTS WITH INSTITUTIONS OF HIGHER EDUCATION, HOSPITALS AND OTHER NON-PROFIT ORGANIZATIONS, *Office of Management and Budget Circulars*, N. A-110, No date.
182. U.S. Office of Management and Budget, UNIFORM ADMINISTRATING REQUIREMENTS FOR GRANTS-IN-AID TO STATE AND LOCAL GOVERNMENTS, *Office of Management and Budget Circulars*, N. A-102, No date.

183. Virginia General Assembly, THE USE OF SCHOOL BUSES FOR NON-PUPIL TRANSPORTATION (Report to the Governor and the General Assembly), House Document, N. 2, September 1974.
184. Volvo Transportation Systems and SRA Communications, VOLVO/SRA TAXI CONTROL SYSTEM (Brochure), Gothenburg, Sweden, No date.
185. Voorhees, Alan M., and Assoc., Inc., STUDY OF FUTURE PARATRANSIT REQUIREMENTS, Prepared for U.S. Department of Transportation, Urban Mass Transportation Administration, January 1977. PB264082.
186. Wagner, Marie S. and Larry Newlin, "RURAL TRANSIT, THE HANDICAPPED AND SECTION 504," *Rural Public Transportation*, V.1 N.5, November 1979, pp. 1-3.
187. Waksman, Robert, SMALL CITY TRANSIT: ANN ARBOR, MI, PILOT DIAL-A-RIDE PROJECT IN A SECTOR OF THE CITY, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, March 1976. PB251503.
188. Ward, Donald, A THEORETICAL COMPARISON OF FIXED ROUTE BUS AND FLEXIBLE ROUTE SUBSCRIPTION BUS FEEDER SERVICE IN LOW DENSITY AREAS, U.S. Department of Transportation, Transportation Systems Center, March 1975. DOT-TSC-OST-75-2, PB240808.
189. Ward, Jerry and Norman G. Paulhus, Jr., SUBURBANIZATION AND ITS IMPLICATIONS FOR URBAN TRANSPORTATION SYSTEMS, U.S. Department of Transportation, Office of Research and Development Policy, April 1974. PB231819.
190. Womack, James P., REGULATING AND INSURING PREARRANGED RIDE SHARING, Massachusetts Institute of Technology, Center for Transportation Research, Prepared for U.S. Department of Transportation, Office of University Research, September 1976, PB269574.
191. Ziegler, Eldon, PARATRANSIT AND TRANSIT INTEGRATION AREA-WIDE DEMAND RESPONSIVE TRANSPORTATION SYSTEM: PROGRAM SYNOPSIS, U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA, April 1977. DOT-TSC-UMTA-77-16.

APPENDIX B

GLOSSARY

average cost per passenger

The average total costs per vehicle-hour divided by the average number of passenger trips made per hour.

average ridership

The total number of passenger trips divided by the total number of service days (usually determined on an annual basis).

brokerage

A management technique which brings people in need of transportation (agencies or riders) together with a transportation provider. The broker coordinates the transportation services for clients and for providers.

carpool

A group of people who share their automobile transportation to designated destinations, usually alternating drivers and vehicles.

checkpoints

In a point deviation system of paratransit, a set number of regularly scheduled stops distributed throughout a geographical area, with which a vehicle must touch base during each run.

common carrier

A provider of transportation which is open to the general public, and for which a fare is paid.

CETA

The Comprehensive Employment and Training Act of 1973, as amended, provides job training and employment opportunities for economically disadvantaged, unemployed, or underemployed persons, and also funds for transportation to training centers, work sites, and educational and counseling centers.

demand-responsive paratransit

A public transportation service characterized by the flexible routing and scheduling of relatively small vehicles to provide shared occupancy, door-to-door personalized transportation on demand for a modest fare.

dial-a-ride services

A demand-responsive type of service whereby a person can telephone a dispatcher and arrange to be picked up by a vehicle either shortly after the call or at another specified time. Nearly all dial-a-ride systems in the country are operated by some type of public authority, whether the system serves the general public or only special groups.

dispatch

The relaying of service instructions to drivers.

door-to-door service

A demand-responsive transportation service whereby a person can be picked up at his door and delivered to his exact destination.

doorstep service

In a point deviation system, a delivery or pickup service to or from the exact point designated by a rider. Riders have the following service options: doorstep-to-doorstep (otherwise called "door-to-door" service); doorstep-to-checkpoint; and checkpoint-to-doorstep.

dynamic routing

The process of modifying a vehicle route to accommodate service requests received after the vehicle has been dispatched.

express service

An operation designed to make a limited number of stops between relatively long distances along a given route.

FHWA

Federal Highway Administration.

feeder service

A local transportation service which provides connections with a major public transportation service.

fixed-route

A regularly scheduled transportation service operating over a set route.

headway

The time required for successive vehicles travelling at the same speed and direction to pass the same point (used to plan orderly dispatch of vehicles).

"journey-to-work" zone

A geographical area subdivision which is used by the U.S. Census Bureau for locating residential and work sites.

lift

A device which raises and lowers a platform to accommodate the entrance and exit of wheelchair users and others with disabilities.

limited-mobility users

Those persons for whom access to either private automobiles or public transportation is limited: the elderly, the handicapped, the poor, the young, and the unemployed, for example.

loop configuration

A fixed, circuitous path along which a vehicle operates continuously, picking up and discharging passengers along the way.

"many-to-few" service

A demand-responsive transportation service which picks up passengers at their homes or other logical starting points, but discharges passengers only at certain pre-established points, such as health centers, shopping centers, or regular transit stations.

"many-to-many" service

A demand-responsive transportation service in which passengers are collected from

multiple locations (origins) and transported to their individual destinations; generally, service offered between any combination of origin-destination points in the service area.

"many-to-one" service

A demand-responsive transportation service which picks up passengers from a variety of places, but has only one dropoff point.

mass transportation

Transportation by bus, or rail, or other conveyance publicly or privately owned, which provides general or special service (not including school buses or charter or sightseeing service) on a regular and continuing basis.

"one-to-many" service

A demand-responsive transportation service having only one pickup point for passengers, but several delivery points scattered over the service area.

paratransit

Flexible transportation services, operated publicly or privately. Typically, small scale operations using low-capacity vehicles closely related to public transportation, e.g., dial-a-ride, shared-ride taxi, carpools, vanpools, and subscription buses.

passenger trip

One person traveling one way from origin to destination.

peak hours

Specified time periods during which the volume of traffic and/or the number of passengers is greater than at other periods.

prearranged ridesharing

A paratransit service whereby riders sign up in advance and travel with a group of people on the same route every day. Services are provided mostly between a residential neighborhood and a particular employment area with some route deviation for minor collection and distribution patterns at either end of the trip. Examples include carpools, vanpools, and subscription buses.

private transportation

The personal automobile.

provider

The agency, organization, or company that operates, manages, or is otherwise responsible for providing transportation services.

public transportation

A common term for mass transportation.

pulsed schedule system

A dispatching technique in which local and regional transit routes arrive at the same point (transfer station) at the same time. It allows for quick and convenient transfers between vehicles, and it increases the number of destinations that can be reached.

route-deviation

A demand-responsive transportation service pattern in which a fixed-route bus will leave the route upon request to serve patrons not on the fixed route.

service area

The geographical area within which transportation service is offered.

shared-ride taxis

A type of demand-responsive service in which taxis are allowed by the regulatory authorities to carry at any one time several unrelated passengers with different origins and destinations.

shuttle service

A transportation service operating exclusively between two fixed stops.

subscription bus service

A service provided through advance reservations for regular trips over a specified period of time.

transfer station

A location or facility in or near a major activity center, where passengers can transfer quickly from local to other local or regional transit routes.

TDP Transit Development Program

Formerly a requirement for funding under Section 3 of the Urban Mass Transportation Act. It identified existing or expected needs for public transportation in the area; the capital and operating costs to meet these needs; and the existing and proposed sources of local financing. It has been replaced by the Transportation Plan.

TIP Transportation Improvement Program

A detailed plan for implementation of short term (5-year) transportation programs as described in the area's TSM and Transportation Plan. It contains an annual element which lists all transportation projects requesting Federal funding. TIP is required in all urbanized areas.

Transportation Plan

A 10 to 20 year plan for meeting an area's transportation needs. Regulations jointly issued by UMTA and FHWA require a long-range element and a short-range or transportation system management element in the plan. It is required in all urbanized areas.

TSM Transportation Systems Management

A program or plan to maximize the efficiency of the existing transportation system through maintenance and improvement of resources and operations, excluding new transportation facilities. Regulations jointly issued by UMTA and FHWA require the development of a TSM in all urbanized areas.

UMTA

Urban Mass Transportation Administration.

urbanized area

An area with a city of over 50,000 persons so designated by the Bureau of Census, within boundaries which shall be fixed by responsible state and local officials in cooperation with each other, subject to the approval by the Secretary of Transportation.

user-side subsidy

Discount or free tickets or vouchers for transportation acquired by users and redeemed from the subsidizing agency by the service provider for a value established in advance.

vanpool

Ride-sharing services by van for eight or more travelers with routes and schedules carefully tailored to meet their travel needs.