

Implementation of Service Routes in the United States

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The passage of the Americans with Disabilities Act of 1990 (ADA) signified a new era of mobility for elderly and disabled passengers. There have been many debates about fixed-route versus door-to-door demand-responsive services. While the United States has been discussing the issue, Sweden has been experimenting since 1983 with a concept called service routes. Madison Metro (in Wisconsin) is very close (April 1992) to implementing the first two service routes in the United States. The planning activities leading up to implementation and, subject to availability, preliminary results are discussed. The service-route concept and the unique planning consideration necessary to design successful routes is reviewed, as are the process used in defining desirable origins and destinations, the public participation process, the development of alternatives, the refinement of alternatives, and the selection of routing details. In addition, the discussion will include detailing of operating guidelines (i.e., driver selection/training and fares), the integration with other Metro service including Metro+Plus, the estimation of demand, the development of costs and revenues, and finally the establishment of a monitoring and evaluation plan. This concept when applied to small cities or selected small communities within a larger urban area has the potential to satisfy ADA requirements with a small capital investment and potentially lower operating costs. The addition of minivans with low floors and ramps could provide the door-to-door service needed by a minority of users. Most important, this design can provide significantly better mobility and flexibility for the transportation-disadvantaged residents of our communities.

The Swedish government has adopted goals and policies that enable elderly and persons with disabilities to live in their home environment. These policies initially created a separate transportation system for the elderly and persons with disabilities. During the late 1970s this thinking changed, and today's Swedish policy can be summarized in two words: integration and normalization.

The United States government has followed somewhat the same path as far as transportation is required. The passage of the Americans with Disabilities Act of 1990 (ADA) has required that most services and facilities—including transportation—be accessible to persons with disabilities. All transportation systems must be fully accessible, and complementary paratransit services must be provided.

The general manager of Madison Metro in Madison, Wisconsin, saw a presentation by Agneta Stahl, who originated the service-route design, on the Swedish Service Routes and

thought that such a service could improve mobility and control some of the escalating costs of Metro+Plus, a service for the elderly and disabled. This paper discusses the concept, the first design effort, and the results of the Madison implementation.

SWEDISH SERVICE ROUTES

Sweden's goals emerged during the 1970s and 1980s in national discussions about the situation of persons with disabilities. Extensive research and development efforts were also made to arrive at practical solutions to facilitate travel for people with disabilities. Sweden, like most other countries in the Western world, offered special transportation services (STs) as an initial approach to solving the transportation problems of persons with disabilities. STs were introduced in Sweden at the end of the 1960s. Initially, STs were conducted on a volunteer basis, but municipalities gradually assumed responsibility for providing them. The concept spread rapidly during the 1970s, and since 1979 all Swedish municipalities have offered STs. In 1974 parliament decided to introduce national subsidization, which today reimburses a maximum of 35 percent of a municipality's total costs.

The purpose of ST is to make transportation available to people who have difficulties using conventional public transit. Thus, at the outset Swedish policy created a separate transportation system for the elderly and persons with disabilities. During the late 1970s, however, this thinking changed. Today the goal of the Swedish policy can be summarized in two words: integration and normalization.

On the basis of experience gained from research into public transportation as well as from various local initiatives during the past decade, a new philosophy has been developed in Sweden for providing overall public transportation in urban areas. Today transit authorities believe that public transportation must be adapted to the market. Applying this concept means that the bus company cannot offer the same route network to all consumer groups. Different groups make such different demands on public transportation that a differentiation of the route is necessary. The transportation service must be adapted to each individual community, with specific attention paid to a passenger's physical limitations, origin and destination, and required care and attention.

This recognition resulted in, among other things, the development of service-route traffic. The service-route network places priority on bringing bus service as close as possible to the residents, whereas the conventional basic-route network is usually constructed in the form of straight radical lines that

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quickly connect different residential areas with downtown centers. This means that the service routes wind through different residential areas, so the same distance to the bus stop (and hence the bus) is rather short. In addition, the bus drives to the entrance of service centers and various health facilities. Thus, service routes become an attractive means of transportation for people with various disabilities and constitute an important part of a differentiated, and community-responsive, public transportation route network.

As far as the elderly and persons with disabilities, the developments during the past decade have produced a Swedish policy that assumes that no community can be fully served with a single transportation mode. Two important assertions can be made. First, some people are so seriously handicapped that they require special services. Second, people with less serious disabilities can travel by public transportation if equipment and facilities are adapted to their needs.

Therefore, Swedish policy today also recognizes that adapting the existing 40-ft buses with lifts and other facilities is not the best and only solution for all persons with disabilities. The difficulties encountered by people with a mobility handicap vary so much that different solutions are necessary: it is not enough to adapt the public transportation system solely by making technical improvements in vehicles. Easing the problems faced by people with mobility handicaps requires being aware of what it means to grow older or suffer disabilities, difficulties that create the need for a little extra time for coping with the system. In other words, besides technical improvements, better service is needed. It is also important to consider all the problems that one might encounter along the entire route when using public transportation: on the way to and from and at the bus stop, boarding and alighting from the vehicle, and during the ride.

Such recognition has resulted in a new design, a community-responsive public transportation for urban areas, in which specific attention is paid to the needs of the elderly and persons with disabilities; it consists of the following:

1. Traditional fixed-route service: The service, using standard 40-ft buses designed according to Swedish law, supports the needs of mass transportation for people with little or no mobility limitation. To facilitate getting on and off, these vehicles, under Swedish law, are relatively accessible if some service-oriented measures are introduced.

2. Service routes: A regular transportation system is operated with smaller 20- to 26-ft buses fully accessible with a low floor of 12 to 14 in. This system serves mainly the elderly and persons with disabilities who cannot cope with public transportation involving large vehicles, long distances to the bus stop, and the stresses encountered during the trip. These people either do not use public transportation or can use it only with great difficulty.

3. Special transportation services: STSs will be available for people who are so seriously handicapped that they require door-to-door transportation services and more personal assistance. This service is operated with taxis or vans (low-floor vehicles) fully accessible to wheelchair passengers.

A community-responsive public transportation system means that each system can better meet the varying needs of individuals with impaired physical strength or mental capacity. It

also makes it possible for people to be integrated in the public transportation system to a larger extent and to a greater age. This paper describes the Swedish service-route concept as it is being introduced in the United States.

SERVICE-ROUTE TRAFFIC

The second level of the community-responsive public transportation system implies an introduction of new regular public transportation network: service routes. It should be pointed out that service-route traffic is one regular route network among others in a market-adapted public transportation system and thus is not a separate STS wherein one must meet eligibility requirements and prebook trips.

The service-route concept appeared in 1983 when the Borås Transportation Company introduced a public transportation called service routes. Planning a service-route network requires particular care because it should bring the buses near the residents.

The service routes usually operate from 8:00 or 9:00 a.m. to 6:00 or 7:00 p.m. daily. There is hourly service on weekdays, which is often reduced to one departure every hour on Sundays. The planning of a service route must include route layout, operating times, trip intervals, vehicles, and service to meet the conditions and needs of the elderly and persons with disabilities. The following is a brief characterization and description of important parts of service-route traffic:

- Service-route traffic implies a compatible public transportation system that fulfills the requirement of integrating and accommodating the elderly and persons with disabilities. Service-route traffic is available to all presumptive bus passengers and is accessible to all people with functional impairments.

- Service-route traffic is a regular transportation system with fixed trip intervals. It is a flexible transportation system wherein one does not need to plan or book a trip in advance. The timetables are adjusted to allow the traveler the time required for boarding and alighting, finding a seat, and so forth.

- Service-route traffic uses a route layout that assigns particular consideration to the locations of the homes of elderly and disabled persons and of important destinations such as care centers, clinics, hospitals, and shops.

- Service-route traffic features easy-access bus stops. Buses stop at the entrances to hospitals and care centers. The distance to bus stops in residential areas is minimized. One may even hail the bus outside one's door.

- Service-route traffic uses thoroughfares that other traffic does not serve, such as pedestrian malls, broad bicycle paths, and even market squares.

- Service-route traffic incorporates small and fully accessible vehicles with a capacity of about 20 seated passengers. The vehicle must be a low-floor bus without any height deviations inside, such as steps or platforms. The bus must also be able to kneel down to 8 or 9 in. and have a ramp (not a lift) to accommodate wheelchair passengers. According to evaluations and tests on various bus types, the Orion II basically fulfills such requirements and is also the vehicle most used for this traffic in Sweden.

Experiences from service-route transit in Sweden indicate that service routes can be introduced to complement regular traffic and to provide an opportunity for many more people to use public transportation. Service-route traffic thus creates conditions that generally improve the public transportation network for all inhabitants. By late 1991 more than 50 cities in Sweden had introduced service-route traffic.

The achievements of service-route traffic have also been recognized internationally and, by late 1991, implemented in other European countries (Denmark, Finland, Norway, and Holland) and in Canada (Toronto, Oakville, Welland, and Calgary).

For the transportation company, new customers start to use public transportation, and the number of passengers increases continuously. During a 2- to 3-year period the number of travelers on a service route usually more than doubles.

In Boras, where service-route traffic was introduced 7 years ago, the number of passengers per vehicle hour has increased from about 8 during the introduction period to more than 22 in 1991 (the average of the 10 routes covering the whole city). The service routes operate from about 8:00 a.m. to 5:00–7:00 p.m.

Service-route traffic has turned out to be a cost-effective form of public transportation in Sweden: general cost-recovery for traditional mainstream public transit service is between 45 and 50 percent. The rest is paid with tax money from the municipality and the county (each normally pays half of the required subsidy). Again, figures from Boras show that the cost-recovery for service-route traffic is 60 to 65 percent. The main reason is the high number of travelers per hour on the service routes, a number that increases over time.

On the regular fixed-route service, the large average number of passengers per mile traveled is 2.9 to 3.1, compared with 3.8 to 4.0 passengers per mile for the service-route traffic. So in Boras, service-route traffic appears to be about 25 percent more cost-efficient than the regular fixed-route service.

For the municipality and government, the establishment of a service route in an area substantially reduces dependence on STS; it also reduces the costs for this special service by up to 40 percent. The experiences from service-route traffic are positive in most places where it has been introduced. Service routes are now operating in cities of different sizes in Sweden. In Boras (population 85,000), where the whole city now is covered by service routes, 25 percent of the passengers are registered to use STS. In Stockholm—Sweden's largest city (population 1.2 million)—two service routes have been running for 2 years and six others have been introduced. On one of the Stockholm routes, 50 percent of the passengers are registered to use STS; on the other, more than 30 percent.

Service-route traffic is a profitable form of public transportation—which is even more remarkable when considering that this system has also

- Increased travel opportunities and improved comfort not only for those entitled to STS, but even for others who find traveling difficult;
- Given people entitled to STS better transportation alternatives (by their own accounts) with greater freedom of choice than STS; and
- Contributed to increasing activity levels and breaking down the isolation of many elderly people.

The experiences from service routes clearly imply that the Swedish goals of integration and normalization in public transportation have become a reality for more people in the society and for the elderly up to a greater age than before.

MADISON SERVICE ROUTES

The development of service routes in Madison was based on the process used in Sweden. This market-oriented process required the team members to rethink some traditional transit planning procedures. In summary, the process included the following steps:

1. Identify and plot major origin and destination points,
2. Locate concentrations of elderly and disabled residents,
3. Analyze Metro+Plus and Group Access Service travel patterns,
4. Develop corridors of concentrations,
5. Develop design parameters (policies, service, and operation),
6. Conduct ridership estimates,
7. Develop cost estimates,
8. Refine alternatives, and
9. Develop implementation guidelines.

Many decisions were made as the process continued; as a group, these decisions are called design parameters. The discussion that follows includes primarily the decision process, not the manner in which the city arrived at it.

Operating Guidelines

Five operating guidelines were developed: form of service, vehicle stops, fare level, driver assistance, and eligibility. These guidelines were instrumental in designing the service.

1. Form of service: The form of service is primarily fixed route, although both routes enter parking lots and drives that full-sized fixed-route buses can not enter. Route deviation by calling ahead to the driver was not included.
2. Vehicle stops: Vehicles stop in designated areas where the density and congestion are high. Flag stops are permitted in low-density residential areas.
3. Fare level: The fare level was set as the same cost as a senior Metro fare, which is 50 percent of the full fare. If the passenger wants to transfer to a Metro route, full fare is required.
4. Driver assistance: The service is curb-to-curb, not door-to-door. This will vary by driver, location, and passenger, but the general policy is curb-to-curb.
5. Eligibility: Madison will require all Metro+Plus users that live on a service route and have designations on a service route to use the service and not be eligible for Metro+Plus.

Service Parameters

Two routes will operate Monday through Friday from 9:00 a.m. to 5:00 p.m. Round trip will be 30 route-mi with 60-min headways.

An important consideration in the design of the service routes was the integration with Metro/Metro+Plus service. The West service route was designed to coordinate with the planned Metro transfer centers. This facilitated a smooth transfer with fixed routes for when the Metro becomes fully accessible. No mainline routes were eliminated, but service planning for the new service might enable Metro to become more direct and less circuitous. It was also part of the design to reduce Metro+Plus trips and move some trips to service routes at a much lower cost.

Once all of the design issues were identified, demand and cost estimates were developed. Using Metro's cost-allocation model and a complete line-by-line budget analysis, the cost per trip was estimated to be between \$3.70 and \$7.40/passenger, depending on ridership. Because the service is fixed, the more riders, the lower the cost per trip. Metro+Plus costs approximately \$12.00/trip.

The biggest issue that Madison Metro faced in implementing service routes was to redefine the role of the transit operator. The routes will be operated by the fixed-route transit operators of Madison Metro. This will be the first time that the fixed-route operators transport elderly and disabled passengers with mobility impairments. As a result, the operators who drive service routes will require extensive training. The labor union, the local affiliate of the International Brotherhood of Teamsters, will be a major participant in operator training and selection. Transit system management will develop the operational procedures, requirements, and work rules for the service routes, but the labor union must be extensively involved in determining which operators are best qualified to serve the targeted clientele.

Marketing is essential to the success of Madison's service-route project. Because this is a new routing concept, potential users must be taught how the route will operate and how to use it. There is a great difference between the service route and paratransit and fixed-route transit. Marketing efforts must remove passenger fears about the service. Most important, marketing efforts must recognize that the target user group generally has the greatest difficulty accepting and understanding change. This calls for clear, concise, and understandable marketing materials. Such efforts included using public meetings, distributing printed materials, offering fare incentives, and working with advocacy groups of the elderly and of persons with disabilities.

The last major implementation issue was the development of a monitoring system. The transit system must develop a mechanism to determine whether it is serving the needs of its target user groups. The system must develop a customer feedback system to measure whether users want more or less service, whether the service goes where the people want to go, whether the people understand the service, and whether the transit system is providing a high-quality service that is responsive to customer needs. From the perspective of the transit system, the monitoring system must measure the productivity and effectiveness of the service routes.

Above all, the transit system must be flexible in its approach to providing service routes. If information received from marketing and monitoring calls for change, the change should be made. To be successful, the routes must serve the needs of the elderly and persons with disabilities.

The ADA will require a major shift in Madison's approach to providing transportation to the elderly and persons with

disabilities. Because capital and operating resources are strained, passenger use of accessible fixed-route transit must be maximized. The highly desirable Metro+Plus service will no longer be available in large quantity to a broad spectrum of elderly and disabled people because some paratransit resources will be used to provide accessible fixed-route service. Although the ADA addresses accessibility, it is silent on mobility. The city of Madison has always sought to provide the highest level of mobility for its residents. The ADA presents a dilemma in achieving this goal.

The service routes, however, give the city a way to bridge the gap between accessibility and mobility. The growing demand for paratransit service can be addressed with service routes while neighborhood circulators are provided for the first time. Through the use of service routes, the city can meet special transportation needs in a cost-effective and efficient manner. The first two routes are seen as the start of a complete service-route network.

The concept of improving mobility for the elderly and persons with disabilities should be foremost in the minds of transportation planners and operators. Unfortunately, many transportation providers serve single purposes (e.g., large transit authorities, human service agencies, and taxi companies) and miss the need for full-service integration. The need for full-service integration requires a vehicle mix, including small taxi-type accessible vehicles, and cooperation between all agencies. The ultimate goal of all transportation companies is to move people in an efficient and effective manner. It is imperative that all providers work to that end.

IMPLEMENTATION RESULTS

On April 20, 1992, Madison Metro implemented two service routes, the first of their kind to be implemented in the United States. Madison's interest in this new service concept has two aspects: to supply an alternative that provides a high degree of accessibility and mobility for persons no longer eligible for paratransit under ADA guidelines, and to shift as many paratransit trips as possible to service routes in order to increase operating efficiency.

Since the mid-1970s, Madison Metro has provided paratransit service to the elderly and persons with disabilities. Popularity of the service grew rapidly during the 1980s, but so did its cost. In recent years, ridership and cost growth have exceeded budgetary projections, causing concerns about how to continue meeting the travel needs of elderly and disabled persons while finding a more cost-effective means to do so. At the same time, the ADA was passed, mandating that accessible fixed-route transportation be the primary means of service for all individuals. Service routes, which combine the scheduling efficiency of fixed routes and enhanced accessibility features of paratransit, appeared to be one way to achieve lower service costs while bridging the gap between accessibility and mobility for the elderly and persons with disabilities.

Metro's service routes have been in operation for 6 months. Experience to date is that passengers who use the service do so frequently and are very pleased with the service. However, ridership potential is not being achieved, mainly because of service areas that are much smaller than the urban area and therefore do not encompass all destinations and travel patterns. This finding has implications for service-route design

in American cities. Madison Metro is currently modifying the design to address this situation.

Operating Features

Route and Schedule Design

Madison Metro operates two service routes in areas of the city that have the greatest concentrations of residential complexes for the elderly and disabled, medical facilities, activity centers, and shopping centers. One of the areas is in the central city; the other is more decentralized and has been characterized as a naturally developing retirement neighborhood. The routes operate similarly to a circulator, connecting the major residential complexes with the primary destinations in the service area. The routes were not connected initially.

The operating characteristics of the routes are as follows:

- Length of Route 1: 7.5 mi;
- Length of Route 2: 7.75 mi;
- Average operating speed: 8.8 mph;
- Average stop time: variable (for planning purposes, an average stop time of 45 to 60 sec was used. Metro refined this method by incorporating factors estimating a stop's potential use rate, the likelihood of wheelchair loadings, and delay related to ease of access to a bus stop);
 - Headways: 1 hr;
 - Service hours: 8:30 a.m. to 4:30 p.m., Monday through Friday;
 - Fare: \$0.25 for seniors and persons with disabilities and \$0.50 for adults and students. A transfer fee amounting to the difference between the service-route fare and fixed-route cash fare is charged; and
 - Vehicles: Orion II buses (capacity for 22 ambulatory passengers and 3 wheelchairs).

In designing the service routes, several features have been particularly important:

- Picking up and dropping off passengers on the same side of the street. This means inbound and outbound route patterns will be different.
- Transporting passengers between origins and destinations in both directions. This is especially important for minor and major destinations; otherwise, trips lengths will be excessive.
- Operating headways at intervals of 30 or 60 min for schedule simplicity.

Bus Stop Policies

Door-to-door service is an important aspect of service routes, so one major design objective was that of maximizing the number of bus stops close to accessible building entrances. Because this would entail establishing bus stops on private property, easements were obtained from property owners. All property owners who were approached about being a bus stop location agreed to the on-site bus access despite concerns about already-congested drive aisles and parking areas. In some cases, owners were willing to discuss adapting the facility to improve the connection between buses and buildings. Bus

stops on private property are identified by a decal placed in a window near the accessible entrance. In total, Metro's service routes have 82 bus stops, including 22 on-site stops. The average distance between stops is 0.36 mi.

Driver Selection and Training

Recognizing that driver interaction with passengers is a major part of service-route success, Madison Metro requires that drivers undergo special training on passenger assistance and customer relations. The training module includes instruction on appropriate terminology, communication guidelines, and instruction about symptoms associated with different disabilities and passenger assistance.

Integration with Mainline Service

Madison's service routes were implemented in areas of the city that have high levels of fixed-route service. Because of the potential for transfer, coordinating the schedules between service routes and fixed routes was one of the objectives recommended in the original plan. The plan also recommended possibly reducing fixed-route service where routes overlap with service routes. These objectives have not been realized, primarily because of service-level incompatibilities.

Schedule Coordination

Schedules between the service routes and fixed routes are not coordinated because the 1-hr headways on the service routes will not enable bidirectional coordination of transfers, especially with multiple lines converging at major timepoints. In many cases, transfers would have required crossing major streets.

Also, without mainline accessibility, the potential for transfers was deemed to be low. A recent on-board survey found that about 25 percent of existing riders are transferring to mainline routes. The most commonly cited reason for the majority who are not transferring are the steps onto fixed-route buses. Not explored as possible reasons were lack of schedule coordination, eligibility to use paratransit for trips beyond the service-route area, or barriers such as crossing streets.

Duplication of Service

Metro has not attempted to restructure fixed routes to either reduce the level of service or consolidate (or eliminate) mainlines in the service-route areas. The primary difficulty with restructuring fixed-route service to reduce duplication is related to the linear nature of Madison and the through-routing concept used by Metro. Routes begin at either end of the city and operate through the other end. Thus, reducing or eliminating service along fixed-route segments covered by service routes would force transferring and increase travel time for fixed-route passengers, a situation viewed as having a high potential for losing riders.

Six-Month Evaluation

After 6 months, ridership growth has been lower than expected, mainly because the service routes serve only a few destinations within the overall transit service area. Route design is being altered to improve this situation; the changes include connecting the routes and adding a shuttle service to destinations beyond the service areas of the routes.

Ridership Trends

Weekly ridership on the service routes since implementation on April 20, 1992, through September 11, 1992, has fluctuated within a range of 262 to 412 passengers. This compares to a "low" ridership projection of about 1,000 weekly trips. Average weekly ridership on Route 1 is 145; on Route 2 the average ridership is 181. Productivity per vehicle hour is 1.81 for Route 1 and 2.26 for Route 2. Paratransit productivity is about 2.1 passengers per hour.

Weekly Ridership

Weekly ridership for the same period is shown in the following table:

Ridership	Route 1	Route 2
High	201	245
Low	96	122
Average	145	181
Passengers per vehicle hour	1.81	2.26

One major reason for lower-than-anticipated growth is a low capture rate for potential riders and trips. Only a quarter

of the paratransit riders who can use service routes do so, and then for only a small portion of total trip making. The most common reason that riders and nonriders cite for not using service routes is a lack of desired destination.

Another reason is that fixed-route riders, particularly the elderly, are not switching to service routes as initially predicted. Interviews with several elderly persons using the fixed routes found that they are continuing to use them because of greater convenience.

Trip Purposes

A survey of current riders found that trip purposes tend to be split equally between medical appointments and shopping (Figure 1). Driver observations, however, support a prevalence of shopping trips. Drivers have also observed that some passengers do not ride for specific trip purposes but often ride for the entire day, an indication of the social function that transit often provides.

Consumer Reactions

Figure 2 shows the results of passenger ratings for various aspects of service. Overall, passengers have rated the service highly, with 66 percent of those surveyed giving the highest rating to driver courtesy. A large majority (62 percent) also gave very high ratings to destinations served and quality of printed schedules. Response was more mixed regarding schedule times and vehicle comfort. Comments on survey forms indicate that passengers find the bench seats in the Orion IIs uncomfortable. In terms of schedule times, the lower ratings correlate with many suggestions for service on Saturday.

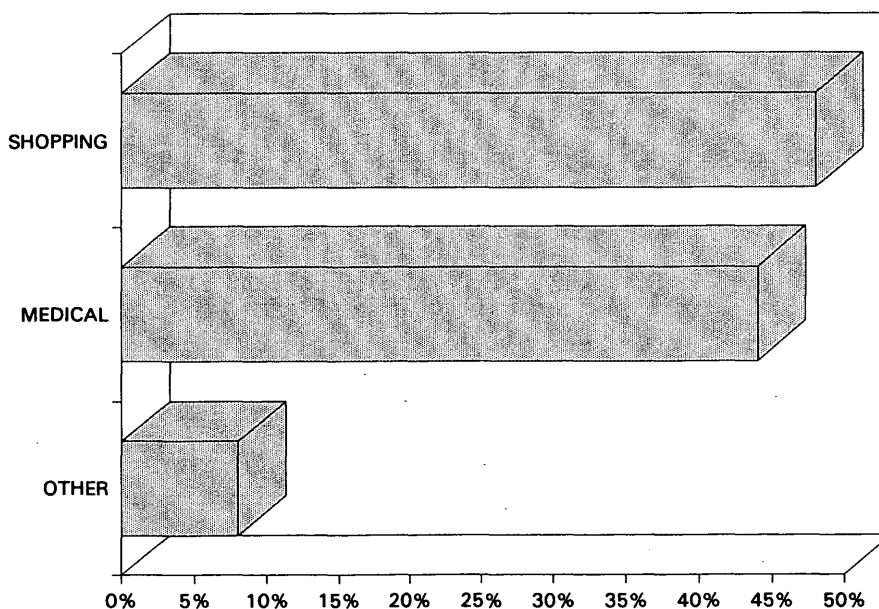


FIGURE 1 Trip purposes.

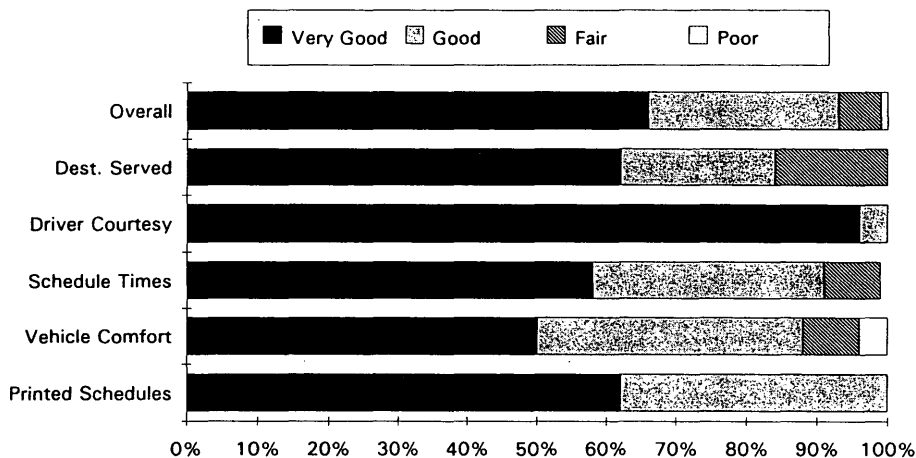


FIGURE 2 Service ratings.

Effects on Paratransit

Because of the low capture rate for potential riders and trips along the service routes, a noticeable reduction in paratransit rides has not been experienced. Moreover, if trips being taken on service routes resulted in a proportional decrease in paratransit trips, a decrease of 12 percent would have occurred. However, since this has not happened, it appears that trips on the service routes are mostly new trips generated by the availability and convenience of a new service.

In an effort to determine why more potential riders are not using the service, a mail-out survey was conducted. The most commonly cited reason was that routes do not go to desired destinations. The next major reason was difficulty in reaching the bus stop.

Service Changes

The slow ridership growth and low capture rate of potential users along the service routes has led Metro planners to conclude that most travel patterns of elderly and disabled persons tend to be broader than the "neighborhood" service-route areas, a phenomenon related to the more dispersed development patterns of our cities. As a result, Metro is changing the service routes to increase the number of destinations served.

One of the major changes is to link the two routes. During implementation, several hospitals and clinics, which tend to be concentrated along one of the routes, expressed concern about the lack of connectivity between routes since many

clients reside along the other route. This deficiency has been borne out in surveys and suggestions from passengers who not only want service to destinations on the "other" route, but also access to destinations not currently being served, primarily other major shopping areas. The routes will be connected in the central business district and interlined in order to minimize transferring. Doing so will increase travel time to some destinations, but minimizing transfers was considered to be more important.

Another major change will be an expansion in service area to include more destinations identified by passengers. This will be accomplished by adding several "shuttle" trips to other major shopping centers and grocery stores with an available paratransit vehicle. These trips will be coordinated from a major activity center on one of the service routes.

SUMMARY

The Madison experience has helped define the service-route concept in the United States. Although it is too early to draw many conclusions, there do appear to be some cultural and environmental differences between Sweden and the United States that will require refinement of the Swedish service-route concept for it to work in the United States. The intermediate level of service between fixed-route mainline buses and curb-to-curb paratransit vehicles does have attractive features. More research and experimentation is necessary to better define and determine the applicability of the service-route concept in the United States.