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16. Abstract

This report documents the results of a project exploring the use of advanced technologies to improve specialized transportation service delivery. The project examined the benefits of METROLift's paratransit scheduling system, which uses the PASS software by Trapeze®, and analyzed available capacity or slack time in the METROLift vehicle manifests. Three options for expanding METROLift capacity were examined: filling usable slack time, shifting some paratransit trips to fixed-route transit through trip-by-trip eligibility, and integrating paratransit trip segments with fixed-route segments. Of these options, trip-by-trip eligibility appears to offer the greatest potential for increasing the number of METROLift passengers carried on a daily basis, without compromising service quality.

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ASSESSMENT OF METROLIFT PARATRANSIT SCHEDULING SYSTEM

by

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Research Report 01/02
Research Project: METROLift Phase II Assessment

Sponsored by the
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September 2000

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SUMMARY

This project, conducted under the Texas A&M Intelligent Transportation Systems (ITS) Research Center of Excellence (RCE), is the second phase of a project focusing on the use of ITS technologies to improve specialized transportation service delivery. This portion of the project examined the benefits of METROLift's paratransit scheduling system, which uses the PASS software by Trapeze®. The project was funded by the Federal Highway Administration (FHWA) and by the Metropolitan Transit Authority of Harris County (METRO). The objectives of the project are as follows:

- to verify the gains in service efficiency METROLift has experienced since the implementation of the AVL and advanced scheduling systems;
- to look for possible additional efficiency gains, through the elimination of excess slack time generated by same-day changes, and to compare METROLift service efficiency with that of other paratransit providers;
- to examine possible technology/software options for integrating paratransit and fixed-route transit service; and
- to examine possible technologies, and existing policies and experiences, in trip-by-trip eligibility for paratransit service.
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METROLift and ITS Technologies: METROLift provides an average of 3,809 trips per day to individuals with special needs in the Houston area. Ridership has increased steadily since the service began in 1979. The service area has also been expanded over time and currently comprises 570 square miles. Riders phone one day in advance for trip reservations, which are scheduled on METROLift's 117 vans and 92 sedans using the PASS scheduling software. On the day of service, METROLift dispatch operators and dispatchers monitor vehicle manifests for late vehicles and enter trip cancellations, reports of no-show passengers, "ready-early" return trip requests, and other changes to the pre-arranged schedules.

An automatic vehicle location (AVL) system is used to track the locations of METROLift vehicles and to help dispatchers select vehicles that can pick up a new trip or a changed travel itinerary. METROLift maintains up to twenty protection routes to handle overflow trips from the manifests and uses taxicabs as backup when necessary to ensure on-time service. Protection routes are spare vehicles and drivers, which are available to replace existing revenue service. In all, approximately 750 real-time changes are made per day. Although dispatchers use both the PASS software and the AVL system to make these changes, the systems are separate.

Since the implementation of the AVL system in 1994 and the PASS software in 1995, METROLift's service efficiency has increased some 10.3 percent, from 2.13 passengers carried per

revenue hour to 2.35 passengers per revenue hour. This improvement has occurred despite a approximately 27 percent increase in the service area during that time.

Assessing Potential to Maximize Service Efficiency: *Slack time* refers to times during the service day when a vehicle is not carrying passengers. High percentages of slack time in vehicle manifests indicate inefficiencies that, if eliminated, would increase the total passenger-carrying capacity of the METROLift fleet. Some slack time may be created during initial scheduling, depending on how closely different trips can be accommodated on vehicle manifests. Cancellations and no-show passengers on the day of service create holes in the pre-arranged schedules, resulting in additional slack time.

Before this same-day slack time can be analyzed, "false" slack time must be eliminated. False slack time can appear on a PASS-generated report when a trip is removed or "unassigned" from a vehicle that is running late or experiencing difficulties. Also, some slack is "real" but unusable, either because it is too short a time slot to accommodate another trip or because the slack period opens with insufficient advance notice for the dispatcher to assign a trip to fill it. Finally, the location of a vehicle will determine whether it will be a match for a moved or added trip.

Researchers examined dispatcher logs for three consecutive Wednesdays and three consecutive Saturdays for real slack time, false slack time, and to identify causes of reported slack time. All available slack time was identified first. Time slots that were at least 40 minutes long and identifiable at least 40 minutes prior to when they occurred were examined in more detail. This analysis indicated that the usable or true slack time available for reassignment on these six days represented a very small fraction of total service time, ranging from 0.3 to 4.5 percent. This amount represents a similar percent increase in the number of potential trips per day that might have been moved to routes, providing the appropriate vehicles could be assumed to be in the right geographical locations for the trips in question.

Automated Scheduling in Other Paratransit Systems: A survey was mailed to 50 paratransit providers in North America to gain information on their scheduling software, scheduling practices, and service efficiencies. Twenty-two responses were received. The survey results indicate that METROLift has one of the highest levels of passengers carried per revenue hour. METROLift also rates as one of the highest-ranking paratransit providers in the amount of same-day scheduling changes it provides.

Linking Paratransit with Fixed-Route Service: In addition to the 22 providers responding to the survey, a few paratransit systems are planning or implementing fixed-route options for paratransit passengers. Further, several systems use or plan to start trip-by-trip eligibility, moving paratransit riders to fixed-routes when service is available to accommodate trip origins and destinations. A few other systems are planning integrated services that will allow paratransit to feed into fixed routes, shortening the paratransit portion of a trip. Of the responding paratransit providers, only the Santa Clara Valley Transit Authority (VTA) is currently scheduling paratransit trips that link

with the light rail system. The agency staff responding indicated that these trips are more difficult to schedule and execute, and represent only a small amount of their paratransit service.

Conclusions and Recommendations: Researchers examined three options for expanding METROLift capacity in this study: filling usable slack time, shifting some paratransit trips to fixed-route transit through trip-by-trip eligibility, and integrating paratransit trip segments with fixed-route segments. Of these options, trip-by-trip eligibility appears to offer the greatest potential for increasing the number of METROLift passengers carried on a daily basis, without compromising service quality. However, the survey results indicate that trip-by-trip eligibility has not been implemented by any large transit system. To do so will require integration of software to allow METROLift dispatch and reservation operators to view both paratransit and METRO fixed-route schedule information when scheduling trips.

CHAPTER ONE—INTRODUCTION

Background

Providing public transportation services that are accessible to individuals with special needs has been an ongoing concern of federal, state, and local governments, transit operators, and advocacy groups. Current federal regulations require that transit systems provide both main-line-accessible service and paratransit or other specialized service to individuals with special needs. Many transit agencies in the United States are working to improve the responsiveness and timeliness of paratransit systems, while at the same time maximizing the efficiency of these services.

Advanced paratransit scheduling and routing technologies represent one approach being implemented by paratransit systems. Benefits of these technologies include enhancing service productivity, responding to changes in client travel schedules, and improving adherence to trip schedules. Furthermore, when combined with automatic vehicle location (AVL) systems and other Intelligent Transportation Systems (ITS) technologies, advanced paratransit scheduling systems may allow transit operators to provide dynamic, real-time paratransit scheduling and other service enhancements, further increasing efficiency by restoring capacity lost to last-minute changes.

This study was conducted under Texas A&M's ITS Research Center of Excellence (RCE), with funding from the Metropolitan Transit Authority of Harris County (METRO) and the Federal Highway Administration (FHWA). It represents the second phase of a project focusing on the use of ITS technologies to improve specialized transportation service delivery. The first phase examined the use of an AVL system, AirTouch, with METROLift, METRO's specialized paratransit service. This report documents an assessment of the Trapeze® Automatic Scheduling software, an analysis of potential slack time and alternative approaches to fill available capacity, and a survey of other paratransit systems.

Organization of This Report

The remainder of this report is organized into five chapters. Chapter Two provides an overview of METROLift and the use of advanced technologies to enhance METROLift service. Chapter Three describes the procedures and results of the assessment of METROLift's service efficiency based on trip scheduling. Chapter Four summarizes the results of a survey of other paratransit systems and their experiences with advanced scheduling software. Chapter Five focuses on the experiences of paratransit systems with fixed-route integration. Chapter Six presents conclusions, suggestions for future activities at METROLift, and areas for further research.

CHAPTER TWO—METROLIFT AND ITS TECHNOLOGIES

This chapter provides an overview of the AVL system and Trapeze® Automatic Scheduling software programs used with METROLift. The benefits realized through the use of these advanced technologies are highlighted.

Automatic Paratransit Scheduling Systems

Paratransit services such as METROLift are a form of demand-responsive transit. Unlike conventional fixed-route service, paratransit vehicles make sequences of door-to-door trips determined by their riders' origins, destinations, and requested trip times. Where fixed-route service strives to adhere to a set schedule of arrival times along a predetermined route, paratransit service must meet standards for maximum ride times and maximum time "windows" for estimated arrival at origins and destinations that change daily. Scheduling paratransit trips manually is difficult, especially in major metropolitan areas like Houston and with large vehicle fleets like METROLift.

Automated scheduling software enables the reservation or dispatch operator to build and revise a vehicle's daily trip sequence, or "manifest", according to the paratransit system's capacity and available trip times. Automated scheduling can be used for pre-arranged trips and, in some cases, for real-time trip scheduling (1). The Trapeze® PASS paratransit software allows both advance-reservation and same-day trip scheduling. The system's functions include client registration and Americans with Disability (ADA) eligibility determination; trip reservations and dispatching; schedule adjustment assistance in response to cancellations and other same-day schedule changes; and tracking of customer complaints and comments.

METROLift's Use of ITS Technologies

METRO initiated METROLift in 1979 to provide specialized paratransit services to individuals with special needs. METROLift provides pre-scheduled, curb-to-curb transportation for individuals who are unable to ride accessible fixed-route buses. METRO provides approximately 3,802 daily trips in a 570-square mile service area using 117 vans, 92 sedans, and backup taxi services.

Like most transit agencies in the country, METRO has experienced a steady increase in demand for METROLift service. In 1985, the METROLift system averaged approximately 25,000 passengers per month. By 1992, monthly ridership had grown to some 50,000, and by 1999, approximately 93,700 riders per month were using the system.

Figure 1 illustrates the METROLift reservation process. METROLift customers call one day in advance to schedule trips. Based on these trip requests and on subscription trips or standing reservations, manifests are built for each of the METROLift vans and sedans. On the day of service, these manifests may be modified in response to customer calls and requests, which may include trip

cancellations, changes in pick-up times, driver reports of vehicle trouble or other problems, and other conditions that alter the pre-planned trip schedules. On average, 750 changes occur to vehicle manifests during the course of a service day. In addition to the regular METROLift vehicles, extra vehicles are kept on standby as "protection routes" to handle any overflow that occurs on the day of service resulting from service interruptions or late vehicles.

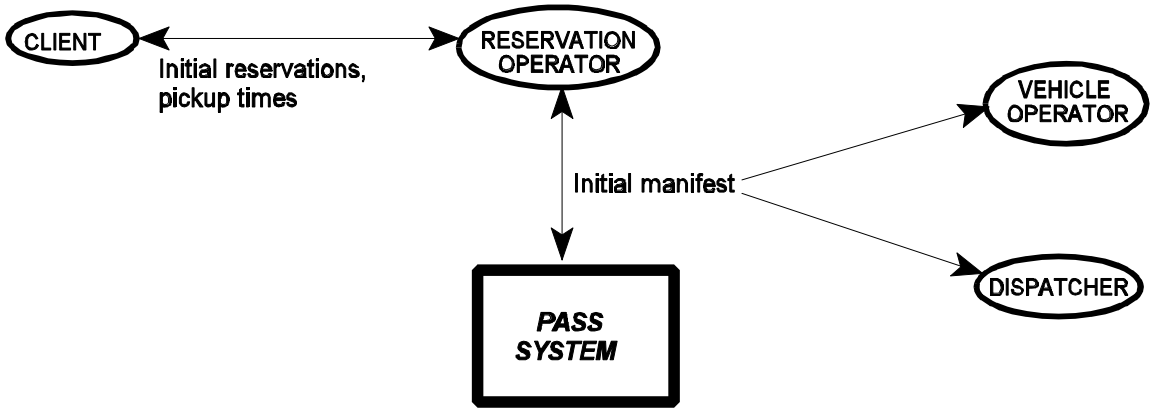

Figure 1. METROLift Reservation System

In 1995 , METRO implemented PASS, an automated paratransit scheduling system with the METROLift service, to enhance the efficiency of the METROLift system. The automated scheduling system was coordinated with the AVL system implemented in 1994. Both systems have become integral parts of METROLift customer information services; patrons are encouraged to call the dispatch center on the day of a scheduled ride to check on the status of their reservation, and on the status of the vehicle and its schedule and/or current location. The AVL system is also used to assist vehicle operators find addresses and to re-schedule or re-route vehicles as needed from the original manifest. The AVL system helps to provide the necessary "vehicle status" information for dispatchers to re-schedule rides in real-time. Vehicle operators and dispatch staff communicate changes, problems, and updates through radios, telephones, and Mobile Data Terminals (MDTs).

The PASS scheduling system also provides information, such as flagging of late vehicles, that the dispatch center uses to adjust vehicle manifests as needed. Currently, one operator in the dispatch center works full-time performing same-day scheduling and re-scheduling in response to telephoned requests. Another is a full-time "trouble shooter," examining the real-time information available from both the PASS and AVL systems and making adjustments to manifests to correct for late vehicles or other unforeseen difficulties in the manifests. Two dispatchers communicate with the vehicle operators over cellular telephones or radios, relaying information concerning schedule changes. Up to five dispatch operators take calls from patrons. Figure 2 shows the network of the dispatch operators, dispatchers, AVL and PASS systems, and vehicle operators during a service day.

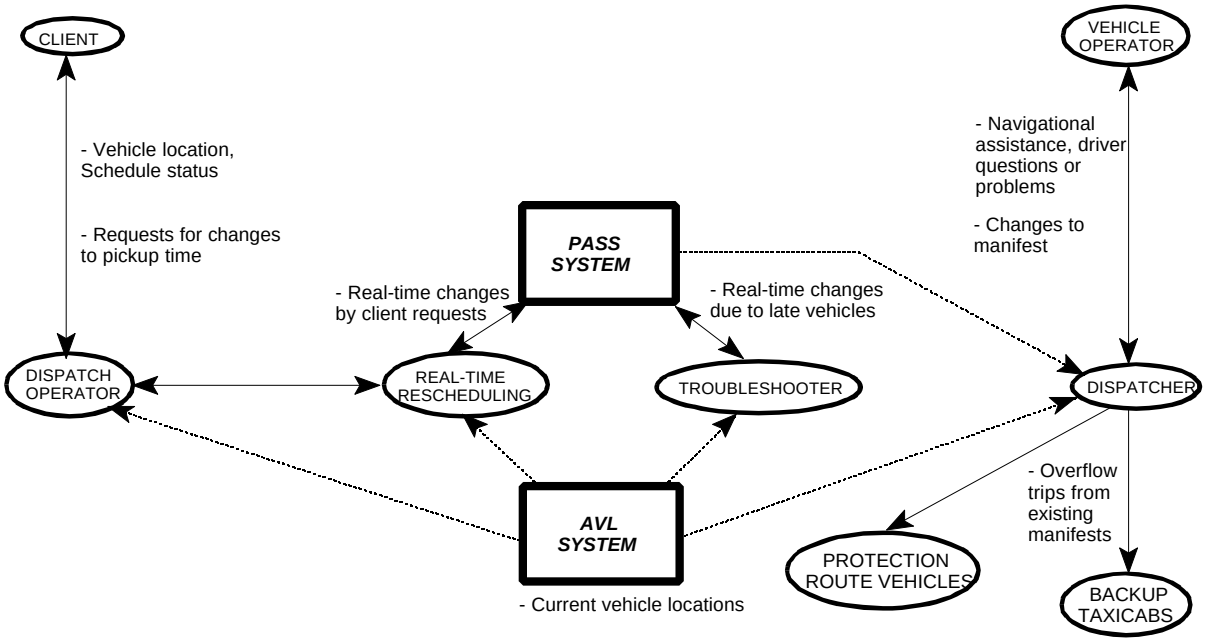

Figure 2. METROLift Information Network -- Day of Service

METRO plans to integrate the software of the AVL and PASS systems to verify the location of the vehicle when the vehicle operator pushes the "perform" button on the MDT. Since this function actually updates and recalculates the vehicle's schedule in the PASS system, it is imperative to verify that the operator pushes the "perform" button at the pick-up location shown on the manifest. A "perform" signal received from a location other than the one shown on the manifest will cause the schedule recalculation (predicting when the vehicle will arrive at its next pick-up) to be wrong. METROLift also plans to make more extensive use of the MTDs on METROLift vehicles, improving the communication of re-scheduling information to the vehicle operators. METROLift hopes to improve the capacity for same-day scheduling with these enhancements, which should further help to maximize the quality and efficiency of METROLift service by reducing service lateness and by reuse of vacant capacity from cancellations.

Impact of Technologies

As illustrated in Figure 3, overall efficiency of METROLift service has increased some 10.3 percent since the implementation of automated scheduling, from 2.13 passengers per revenue hour in Fiscal Year 1995 to 2.35 passengers per revenue hour as of Fiscal Year 1998. For METROLift vans and sedans, excluding taxicab service, passengers per revenue hour increased 9.3 percent, from 1.82 to 1.99 over the same period. METROLift achieved these increases despite an approximate 27 percent expansion of the METROLift service area during the same time period.

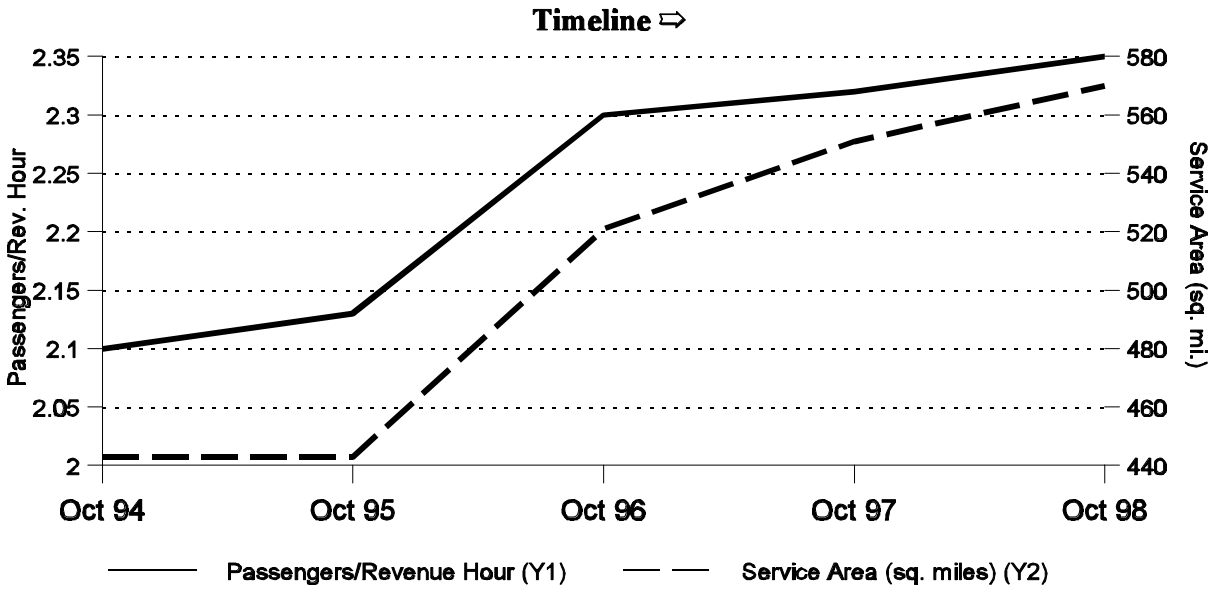

Figure 3. METROLift Service Efficiency and Service Area Changes, FY 1995-1998

CHAPTER THREE—ASSESSING THE POTENTIAL TO MAXIMIZE METROLIFT SERVICE EFFICIENCY

As reviewed in Chapter Two, gains have been realized in METROLift service efficiency since 1994, which can be attributed in part to the AVL and advanced scheduling systems. Areas for obtaining further service efficiencies were examined. This chapter describes the assessment of slack time and the exploration of the use of taxis for some of METROLift's shorter trips.

Slack Time in METROLift Service

Trip manifests are built from trip requests, using acceptable time windows for passenger pick-ups and drop-offs and the expected trip times in minutes. Trip times are calculated from trip lengths in miles, with coefficients to account for average traffic speeds at different times of the day.

Dispatchers schedule trips as closely together as possible without compromising on-time performance and maximum ride time for passengers. Depending on how closely individual trips fit together on a manifest, there are periods of slack time when a paratransit vehicle is not carrying passengers. Slack time can be as little as a minute or as long as several hours. To maximize service efficiency, measured in passengers per revenue hour, slack time must be minimized.

On the day of service, a number of real-world, real-time variables affect the execution of the pre-arranged vehicle schedules. Traffic and weather conditions, trip cancellations, passenger no-shows, and same-day trip requests or trip changes may create periods of slack time in a vehicle's schedule or may cause the vehicle to run behind schedule, necessitating the reassignment of some trips to maintain on-time performance.

METROLift created a report measuring slack before and after each day of service, listing each instance of reported slack time by time of day and by manifest/vehicle number. The slack report generated before the day of service shows how tightly trips are scheduled. The slack report generated after the day of service can be used to measure service efficiency over the course of the day's scheduling changes. However, the after slack report cannot be taken completely at face value. Some reported slack time actually reflects needed time added to a vehicle's schedule in the form of a trip unassigned from that vehicle's manifest and moved to another. Other slack time may be "real" but unexpected and therefore unusable for other trips, such as the minutes that a vehicle may spend waiting for a no-show passenger.

To eliminate false slack time, dispatcher logs from February 1998 were examined for unassigned trips and other incidents that could account for periods of reported slack time that did not actually represent idle vehicle time. Figure 4 illustrates the difference between uncorrected slack time as reported and true slack time for one of the six days examined. The total uncorrected slack time

for the day was 9,555 minutes, or approximately 10 percent of METROLift service time for the day. Appendix A contains slack time graphs for all six days that were examined.

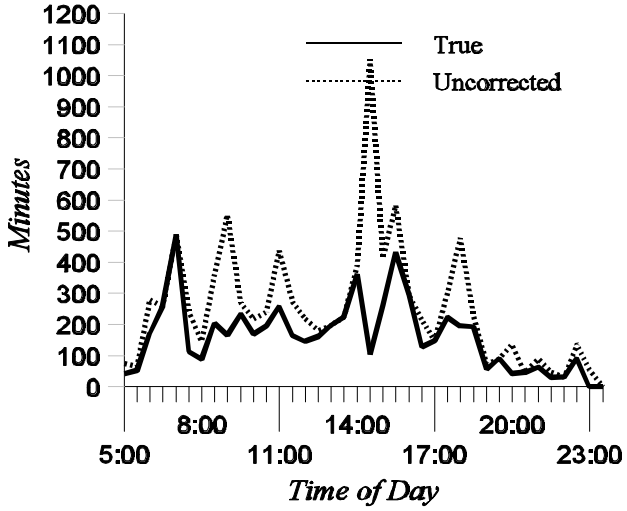

Figure 4. Uncorrected Slack Time versus True Slack Time: Total for All Vehicles, February 18, 1998

Slack time was examined for three consecutive Wednesdays and three consecutive Saturdays, all in February of 1998. Figure 5 shows slack time before and after the day of service for Wednesday, February 18. The slack time is shown in minutes, totaled over all METROLift vehicles. Total METROLift service time for the day was 1,606 hours; before slack time totaled 2,282 minutes (38 hours, or 2.4 percent of service time), and true after slack totaled 6,149 minutes (102.5 hours, or 6.4 percent of service time).

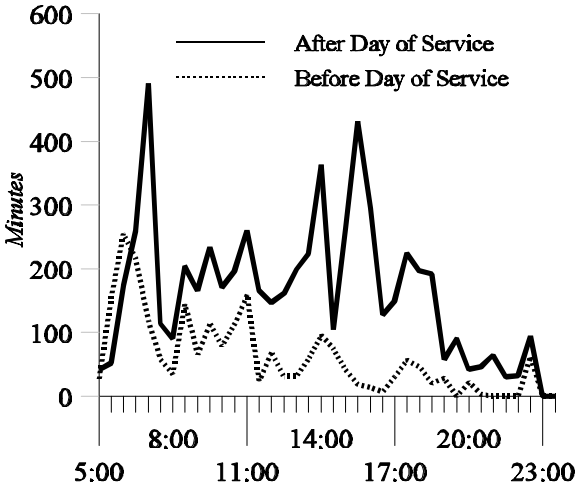

Figure 5. Total Slack Time for Wednesday, February 18, 1998: all METROLift vehicles.

Researchers examined the remaining true slack time to identify periods that could be filled with new trips. In order to be useful for this purpose, a slack time period must be long enough for a vehicle to reach a client's home or other point of origin, deliver the client to his or her destination, and arrive at the next previously-scheduled pick-up point on the manifest. From information on typical trip lengths, the time slot needed is at least 40 minutes long, and must open up with at least 40 minutes notice in order for the dispatch center to notify the driver.

Figures 6 and 7 show the usable slack time as compared to the total true slack time for Wednesday, February 18, and Saturday, February 14. Over the three Wednesdays, the portion of total daily slack time potentially usable for new trips ranged from 6 to 25 percent, for an average of 16 percent. Usable slack time on the three Saturdays represented 23 to 41 percent, for an average of 33 percent of the true slack time.

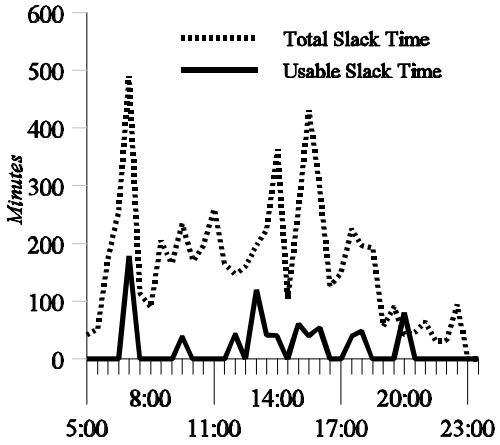

Figure 6. Total and Usable Slack Time for Wednesday, February 18, 1998: All METROLift Vehicles

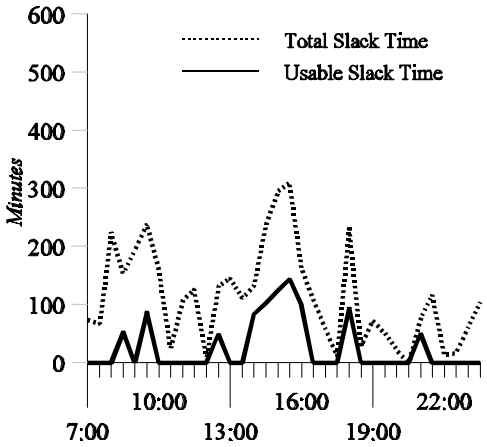

Figure 7. Total and Usable Slack Time for Saturday, February 14, 1998: All METROLift Vehicles

It is important to reiterate that slack time represents only a fraction of the total METROLift service time on the days examined. For Wednesday, February 18, the total slack time -- both true and false -- for vans and sedans over the course of the service day was 6,149 minutes (102.5 hours) out of 96,334 minutes (1,606 hours) of METROLift service, excluding protection routes and taxicab service hours. Total slack time accounted for only 6.4 percent of the time that METROLift vans and sedans were in service on February 18. Usable slack time for the day was 787 minutes, or 0.8 percent of the day's service time. Table 1 summarizes the slack time for each of the six days, examined as a percentage of each day's total service time.

Table 1. Slack Time as Percentage of METROLift Service Time

Day	METROLift Service Time (Minutes)	Total Slack Time		Usable Slack Time	
		Minutes	Percent of Service Time	Minutes	Percent of Service Time
Wednesdays:					
2-11-98	96645	5553	**5.7**	330	**0.3**
2-18-98	96334	6149	**6.4**	787	**0.8**
2-25-98	96496	7929	**8.2**	1981	**2.1**
Saturdays:					
2-07-98	37036	4096	**11.1**	1683	**4.5**
2-14-98	36794	3873	**10.5**	889	**2.4**
2-21-98	36476	4331	**11.9**	1566	**4.3**

Figure 8 shows the usable slack time slots that were reported on February 18. The time of day shown for each slot is the time that the slack was reported to the dispatcher. Since reports from the vehicle operators to the dispatchers tend to be clustered (e.g., at 11:30, a vehicle operator may report three passenger pickups and a period of slack time, all of which took place during the preceding two hours). Slack time reported by the operator and graphed below, therefore, took place before the hours shown. Usable slack time, in practice, will come from phoned-in cancellations and from real-time operator reports of no-show passengers. The usable time slots identified here serve as an example and as a rough approximation of how usable slack time was distributed throughout the day. Time slots available in sedan manifests are shown as white blocks in the chart; time slots available in van manifests are shown as grey blocks.

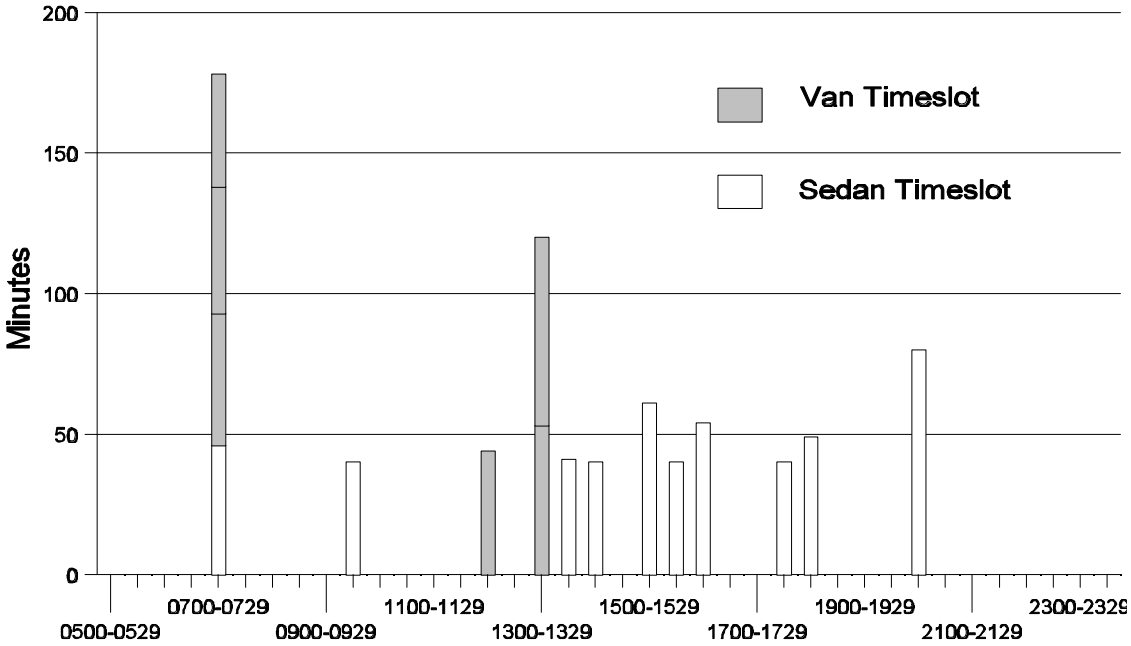

Figure 8. Usable Slack Periods, February 18, 1998

Moving Trips

As described in Chapter Two, numerous changes occur in METROLift trip schedules on the actual service day. On average, METROLift dispatchers make 750 same-day changes in response to cancellations, changes in return times, no-show passengers, and vehicles that fall behind schedule. When possible, dispatchers take advantage of the slack periods that become available in van and sedan schedules, filling them with trips moved from other METROLift vehicles. If a space is not found in a van or sedan manifest, these trips are moved to METROLift protection routes or to backup taxis.

Currently, METROLift maintains 20 protection routes on weekdays to handle overflow trips. Since use of backup taxis incur out-of-pocket costs and protection routes add to the overall cost of service, a goal of same-day rescheduling is to fill as much slack time as possible within the regular van and sedan manifests. Taking advantage of slack time is challenging, even with the help of the Trapeze® scheduling software, as dispatchers must make judgments about the real-time locations of METROLift vehicles, furnished separately by the AVL system, in relation to the trips that must be reassigned. Still, of the 1,512 trips added or moved over the six service days examined, 585 trips,

or 30 percent, were successfully placed in other routes. Table 2 shows the number of trips moved to existing routes, to protection routes, and to back-up taxis on Wednesday, February 18, and identifies the approximate number of potentially usable trip slots identified from van and sedan slack time. Appendix C includes similar tables for all days examined.

Table 2. Trips Moved on February 18, 1998

Wednesday 2-18-98	Early Morning and Rush Hour (5:00a.m.-10:00p.m.)		Mid-day (10:00a.m.-3:00p.m.)		Afternoon Rush Hour (3:00p.m.-7:00p.m.)		Evening (7:00p.m.-12:00p.m.)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Trips Moved to Routes or Other Vehicles	17	**29%**	84	**45%**	56	**43%**	13	**45%**
Trips Moved to Protection Routes	38	**64%**	83	**44%**	57	**44%**	10	**34.5%**
Trips Moved to Back-up Taxi	4	**7%**	21	**11%**	17	**13%**	6	**20.5%**
Potential trip slots from slack time	*5*		*5*		*5*		*1*	

Using this day as an example, researchers examined a potential scenarios for using available slack time. Table 3 examines the usable slack time slots identified as alternatives for some of the trips there were moved to back-up taxis at approximately the same times during the day.

Table 3. Potential for Additional Trips within Routes on February 18, 1998

Wednesday 2-18-98	Early Morning and Rush Hour (5:00a.m.-10:00p.m.)				Mid-day (10:00a.m.-3:00p.m.)				Afternoon Rush Hour (3:00p.m.-7:00p.m.)				Evening (7:00p.m.-12:00a.m.)			
Potential trip slots from slack time	*5*				*5*				*5*				*1*			
	actual		*possible w/ slack-time slots*		*actual*		*possible*		*actual*		*possible*		*actual*		*possible*	
Trips Moved to Routes	17	**29%**	22	**37%**	84	**45%**	89	**47%**	56	**43%**	61	**47%**	13	**45%**	14	**48%**
Trips Moved to Protection Routes	38	**64%**	37	**63%**	83	**44%**	83	**44%**	57	**44%**	57	**44%**	10	**34.5 %**	10	**34.5 %**
Trips Moved to Back-up Taxi	4	**7%**	0	**0%**	21	**11%**	16	**9%**	17	**13%**	12	**9%**	6	**20.5 %**	5	**17.5 %**

The total number of trips that could theoretically have been moved to slack periods on routes was 16 on this particular Wednesday, in which 2,671 total trips were completed. For similar scenarios on the other Wednesdays, potential taxi trips eliminated would have totaled 7 on February 11 and 24 on February 25. As discussed next, however, these are potential savings only.

Figure 9 illustrates the difference in the number of trips that are currently moved to existing van and sedan manifests compared with the potential number if all usable slack could be filled with trips. This graph is for Wednesday, February 18 only. Appendix B includes graphs for all days examined. Figure 10 shows the same information averaged over the three Wednesdays, and Figure 11 shows the average information for the three Saturdays.

The information presented in these figures is potential time slots that could be filled with trips. However, to maintain a high level of service quality, a vehicle with a usable slack-time slot must be in the right area to pick up and drop off the new trip without delaying the pick-up time of the next passenger on the manifest or unreasonably lengthening the ride time of any passenger. If and when the PASS and AVL systems are integrated so that the locations of METROLift vehicles with usable slack time are presented to the dispatcher automatically, the dispatcher will need to decide between moving an extra trip to a another METROLift vehicle or sending a back-up taxi, balancing efficiency with METROLift's criteria for on-time performance and maximum ride times.

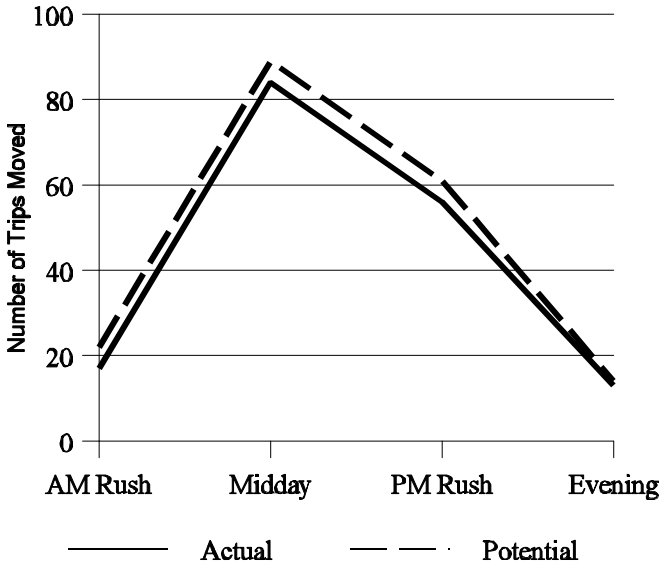

Figure 9. Trips Moved to Van and Sedan Routes, February 18, 1998

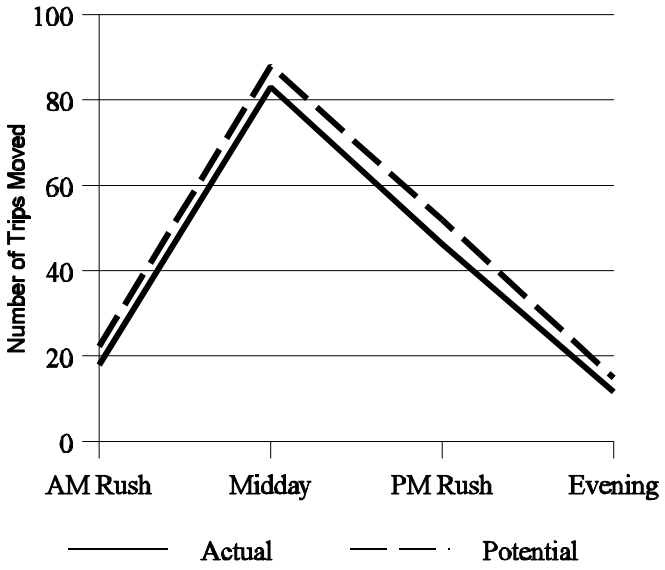

Figure 10. Trips Moved to Van and Sedan Routes (3-Wednesday Average)

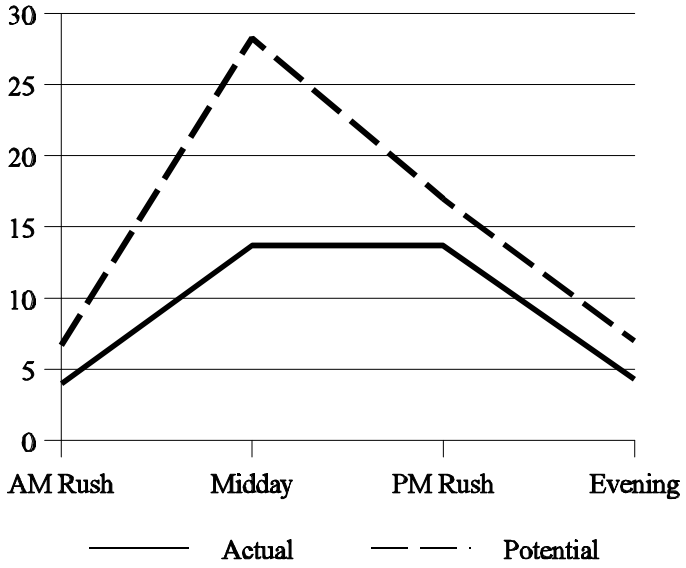

Figure 11. Trips Moved to Van and Sedan Routes (3-Saturday Average)

Note: METROLift has fewer subscription trips on Saturdays, which makes Saturday manifests more difficult to schedule efficiently.

CHAPTER FOUR—SURVEY OF OTHER PARATRANSIT SYSTEMS

To gather further information about the uses and benefits of advanced paratransit scheduling systems, researchers mailed a survey to approximately 50 transit systems in the United States and Canada. Information was requested on the use of different scheduling software, scheduling and reservation procedures, policies and practices for same-day reservations and trip changes, and any coordination or trip linking between paratransit and fixed-route services. This chapter presents the major highlights from the survey. Appendix D includes a copy of the survey.

General Information

Twenty-two transit systems, or 44 percent, responded to the survey. System sizes ranged widely, with annual budgets ranging from $650,000 at the St. Cloud Metropolitan Transit Commission in Minnesota to over $28 million at the Southeastern Pennsylvania Transportation Authority (SEPA) in Philadelphia. Annual ADA paratransit trips ranged from 6,991 at Manatee County Area Transit in Florida to 1.2 million at the Montreal Urban Community Transit Corporation. Regardless of size, the paratransit systems all reported trip-denial rates of 5 percent or less.

Cancellations and No-Shows

Reported cancellation rates ranged from 1 percent to 30 percent and passenger no-shows from less than 1 percent to 13 percent. Three of the responding transit systems currently have no program in place to offset the lost service due to late cancellations and no-shows. Five impose warnings and penalties for repeated no-show passengers, and one uses a call-back program to confirm reservations and is beginning an outreach program to educate and encourage passengers to book trips only when needed and to cancel promptly if their plans change. Fourteen systems use same-day scheduling, waiting lists, and/or extrabooking to fill slots left by cancellations and no-shows, using taxis or other backup service when needed to accommodate reserved or same-day passengers. Several systems apply a combination of the above methods to maximize service efficiency.

Scheduling Software

Fourteen of the 22 paratransit systems use either the DOS 3.9 or Windows 4.0 version of the Trapeze® PASS paratransit scheduling software. Two other systems also use Trapeze® software: Trapeze® QZ and Trapeze® NT. EMTRACK, Micro-Dynamics CADMOS, Midas by Multisystems, ACCES by Giro, Parapro by Intellitran, and proprietary software comprise the other scheduling systems used by survey respondents.

Scheduling and routing is done by the paratransit provider at 12 of the systems. The remaining systems hire contractors to perform these functions. Most of the paratransit systems have been using advanced scheduling software for approximately three to four years. The longest-running

scheduling system among respondents is EMTRACK at Manatee County, which was implemented in 1989. Trapeze® PASS has been in use as far back as 1992 at some paratransit systems.

Service Efficiency

Reported service efficiency ranged from 1.4 to 4.9 passengers carried per revenue hour. As reported in Table 4, METROLift's current service efficiency of 2.35 passengers per revenue hour ranked among the highest of paratransit providers of comparable size; providers reporting higher efficiencies provided far fewer yearly trips.

Most of the survey respondents did not have precise measurements of service efficiencies before and after implementation of the scheduling software, making comparisons of potential benefits difficult. For several, the software was implemented at the same time as the paratransit service. Of the six paratransit providers reporting information on service efficiency before and after introduction of the advanced scheduling software, three experienced service efficiency increases ranging from 30 to 78 percent. The remaining three had increased their service base during the same time frame and were thus unable to track efficiency increases, if any, due to the scheduling system. Table 4 summarizes the software used and the benefit, if any, reported by the responding paratransit providers. Paratransit providers experiencing an increase in passengers per revenue hour are shaded.

Table 4. Paratransit Scheduling Software and Reported Service Efficiency

System	ADA Trips per Year	Software Implemented (date)	Passengers per Revenue Hour			
			Before	After	Difference	Comments
Paratransit Providers using Trapeze®/PASS Scheduling Software						
Houston METRO	**1,076,611**	**1995**	**2.13**	**2.35**	**9.9%**	**Service area also increased**
SEPTA - CCT Division	794,000	1996	1.85	1.62	n/a	Changed from different scheduling software
Yellow Transportation	approx. 3000 per weekday	1997	n/r	n/r	n/r	
King County Metro Transit Division	712,677	1993	higher	1.64	0	
Orange County Transportation Authority	634,284	1994	n/r	n/r	n/r	
The Handi-Van	632,315	5/98	2.35 (FY 98)	n/a	n/a	Too soon to measure difference
Citizen Area Transit (CAT Paratransit Services)	555,783	1994	n/a	n/a	n/a	Began paratransit service with Trapeze® scheduling
Santa Clara Valley Transp. Authority	528,948	1995	1.3	1.7	31%	
Tri-County Metropolitan Transportation District of Oregon	445,250	1994	n/a	n/a	n/a	Policies and provider contracts were changed at the same time as the system was implemented
Denver RTD	410,500	1994	n/a	1.6	n/a	
RTA, New Orleans	250,000	1995	n/r	n/r	n/r	
C-TRAN	170,616	1992	n/a	n/a	n/a	
St.Cloud Metropolitan Transit Commission	82,252	11/98	4.9	n/a	n/a	Too soon to measure difference
Skagit Transit	58,000	1995	2.9	1.93	n/a	Service area expanded during this time

Table 4. Paratransit Scheduling Software and Reported Service Efficiency (continued)

System	ADA Trips per Year	Software Implemented (date)	Passengers per Revenue Hour			
			Before	After	Difference	Comments
Everett Transit	>52,000	1995	2.93	3.12	n/a	Increased service
NFT METRO Systems, Paratransit Access Line	28,426	1997	1.1	1.4	30%	
Kitsap Transit	20,263	1992	2.8	4.0	78%	Not all ADA service; also general-public dial-a-ride
Paratransit Providers Using Software Other Than Trapeze®						
Montreal Urban Community Transit Corporation (ACCES by Giro)	1,200,000	1984	n/r	n/r	50%	
MBTA (Multisystems - Midas)	1,168,052	1998	1.9, 2.5	n/a	n/a	
AC Transit and BART (Parapro by Intellitran)	575,459	1995	n/a	1.64 (FY98) 1.68 (FY99)		Have always used this software with paratransit
MetroAccess (D.C.) (Proprietary software)	353,453	1994	n/a	n/a	n/a	
Des Moines MTA — Paratransit (Micro Dynamics - CADMOS System)	18,386	1990	4.0	3.8	0	
Manatee County Area Transit (EMTRACK)	6,991	1989	n/r	n/r	0	
The T, Fort Worth (COMSIS)		n/a	n/a	n/a	0	

n/a – Not applicable
n/r – Information not reported

Same-day Service

Fourteen paratransit providers, or 64 percent of those surveyed, provide some form of same-day trip reservations. Most of these systems offer this service on a standby basis only, with no guarantee that a same-day request will be filled. A few systems allow same-day trip requests only for medical or other emergencies. Exceptions are the Montreal Urban Community Transit Corporation, which provides same-day service with no restrictions until the manifests reach capacity (about 80 percent of same-day requests are filled), and King County Metro Transit Division, whose non-ADA riders may call the taxi company of their choice, if paratransit service is not available, for a 50-percent user-side subsidy. Will-calls, ready-early, and ready-later refer to return previously-scheduled trips that are re-scheduled on the day of service to accommodate changes in the rider's return time. Table 5 summarizes the same-day service practices of these paratransit providers.

Table 5. Same-day Service among Paratransit Providers

System	Type of Same-day Service Offered	Lead Time for Same-day Service	Same-day Requests Filled per Day
Houston METRO	**Ready-early, ready-later, stand-by if space available, and emergency basis**	**1 hour**	**450 ready-early and ready-later; 50 stand-by**
King County Metro Transit Division	For non-ADA riders, 50% User Side Subsidy; rider calls taxi company of his/her choice	<= 1 hour (most taxi companies respond in less than 1 hour)	212
Regional Transit Authority (New Orleans)	Standby basis only if space available, no guarantee	1 hour	90
Kitsap Transit	a) Same-day service just like day-before, for will-call returns & general public dial-a-ride b) Standby only if space available, no guarantee, to make use of cancellation space	1 hour, for will-call returns and other same-day on space-available basis 2 hours, for same-day general-public use	85
MBTA	Standby basis only if space available, no guarantee	Less than 1 hour	84
Des Moines Metro Transit Authority — Paratransit	Will-calls and emergencies	Less than 1 hour	60

Table 5. Same-day Service among Paratransit Providers (continued)

System	Type of Same-day Service Offered	Lead time for Same-day Service	Same-day Requests Filled per Day
Montreal Urban Community Transit Corporation	Service offered based on capacity; no other restriction	1 hour	40
AC Transit and BART	For urgent medical requests; For "go-backs" when the rider is not ready; On standby basis only if space available, no guarantee	3 hours	30
Orange County Transportation Authority	Scheduled informally, for emergency situations only	1 hour	10
St.Cloud Metropolitan Transit Commission	Standby if space available, no guarantee	1 hour	5
Denver Regional Transportation District (RTD)	Standby basis only if space available, no guarantee	Less than 1 hour	5
Tri-County Metropolitan Transportation District of Oregon	Scheduled informally for emergencies only; "ready-now" return trips if possible and if at least 90 minutes before scheduled return time	< 1 hour	1
Everett Transit	Standby basis only if space available, no guarantee		Not tracked
Skagit Transit	Same-day service scheduled informally for emergencies only Non-emergency same-day service offered on standby basis, space available, no guarantee	1 hour	Not tracked
Santa Clara Valley Transportation Authority	(Starting 1-1-99) Standby basis only if space available, no guarantee	3 hours	Not tracked

CHAPTER FIVE—LINKING PARATRANSIT WITH FIXED-ROUTE SERVICE

One way to increase the number of paratransit trips available is to move some paratransit passenger trips to fixed-route or flex-route transit, where and when regular routes can be found that serve the origin and destination of the paratransit passenger and where/when a paratransit passenger can used fixed-route service. Another option is to link paratransit service with fixed- or flex-route service, using the paratransit vehicle as a means to fill the gap between a rider's trip origin and/or destination and the path of the regular transit vehicle. Both methods can potentially decrease the load on paratransit capacity and increase the total number of passengers accommodated. However, both methods present difficulties in feasibility, technical implementation, and passenger acceptance.

This approach was of particular interest to METROLift as a potential avenue for increasing service efficiency. The survey of other paratransit providers described in Chapter Four included questions concerning the technologies available to help implement trip-by-trip eligibility or fixed-route integration, as well as any experiences with either method.

Trip-by-trip Eligibility

Trip-by-trip eligibility identifies the paratransit trips for which fixed-route or flex-route options are available and determines whether the passenger is capable of executing that trip option. Trips that meet those criteria are scheduled for the passenger on the appropriate fixed-route transit service rather than on a paratransit vehicle. Very few large cities have implemented trip-by-trip eligibility successfully.

In addition to the software integration necessary to provide reservation operators with both paratransit and fixed-route options, moving paratransit riders to fixed-route transit can negatively affect customer satisfaction. To attract more paratransit passengers to fixed-route service and to mitigate a negative response to trip-by-trip eligibility, fixed-route service elements such as bus stop location and design will need to be considered with the needs of specialized passengers in mind. Additional training for fixed-route vehicle operators and travel training for passengers is also beneficial, as well as marketing efforts targeted specifically at paratransit riders (2).

The Orange County Transportation Authority in California has implemented trip-by-trip eligibility for paratransit trip scheduling; trips that are identified as available to the customer on fixed routes are noted on the scheduling screen, and the customer is considered ineligible for paratransit service for those trips. NFT METRO Systems in Buffalo, New York, and Skagit Transit in Burlington, Washington, use mobility trainers to educate and assist ADA customers in using fixed-route options where possible. Kitsap Transit in Bremerton, Washington, is also beginning to implement trip-by-trip eligibility, with operators manually identifying fixed-route options for some paratransit trip requests.

Other systems indicating future plans for trip-by-trip eligibility include King County Metro, Denver RTD, Citizen Area Transit, C-TRAN, MBTA, and the T in Fort Worth. METROLift is also planning to begin trip-by-trip eligibility.

Fixed-route Integration

A study performed in 1996 for the Transportation Research Board (TRB) investigated the effects of multi-leg trips, with transfers between vehicles and paratransit customer satisfaction. Of 41 transit service characteristics ranked by users and potential users of paratransit and fixed-route services, no transfers was ranked fourth overall in importance (2). Riders in Dallas ranked no transfers first among the desired characteristics, as did riders over 70 years old and the survey respondents with disabilities who do not normally use transit. Riders who use wheelchairs or scooters ranked no transfers second in priority.

An earlier study in New York also found transfers between vehicles to be perceived by paratransit riders as undesirable; significant percentages of survey respondents indicated that one or more transfers between vehicles during a trip would induce them to seek other means of transportation. In order to reduce the negative perception of vehicle transfers for paratransit riders, the transfers would have to be fast, with little or no wait time between vehicles for successive legs of the trip. Lighted, secure shelters provided at transfer points and aides to assist passengers during transfers were suggested by study participants as ways to decrease the negative impact of multi-leg, multi-vehicle trips (3). Climate also plays a major role in the feasibility of arranging trip transfers.

The survey described in Chapter 4 identified some paratransit providers that have or are considering implementing fixed-route links to paratransit service. Others were described in "Techniques for Scheduling Integrated Transit Service," a paper examining real-time scheduling algorithms (4); these transit systems were contacted again for updated information on their experience with fixed-route/paratransit integration.

- Pierce Transit in Tacoma, Washington, currently links between 7 and 9 percent of their 2,000 daily paratransit trips with fixed-route transit routes. These trip linkages are performed manually, with the aid of the PASS software and cooperation between fixed-route and paratransit dispatchers who now occupy the same dispatch center. Dispatcher discretion plays a large role in scheduling paratransit trips to feed into fixed-route transit; dispatchers must decide if a linked trip will take a passenger significantly out of his or her way en-route to the ultimate destination, compared to a paratransit-only trip. Transfers take place only at major transit centers and park-and-ride lots to maximize passenger security. While the system is currently using PASS, a search is underway for a software that will interface with the fixed-route scheduling software and the fixed-route time-keeping software, thus combining paratransit and fixed-route service under one Geographical Information System (GIS). A major factor contributing to the success of fixed-route integration at Pierce Transit was combining the dispatch centers; paratransit

and fixed-route dispatch staff, working together, have been able to improve the timeliness of transfers, and customer complaints have dropped.

- Santa Clara Valley Metropolitan Transit Authority currently links paratransit trips with fixed-route light rail, so that a passenger is delivered to and picked up from either end of the rail trip. However, a multi-leg, multimodal trip is more difficult to schedule and execute than a single paratransit curb-to-curb trip, so this scheduling option is used only occasionally.

- The City of Detroit DOT, Tulsa Transit, and King County Metro are in final implementation stages of automated paratransit/fixed-route integrated scheduling. Ann Arbor Transit plans a similar implementation in the near future. The City of Detroit and Kitsap Transit currently provide manual trip linkages where possible.

- The Potomac & Rappahannock Transportation Commission (PRTC) was the first transit provider to use Trapeze®'s flex-route scheduling software and now has three Trapeze® scheduling options available: flex-route, fixed-route, and paratransit. However, PRTC currently does not operate a paratransit service.

- The Los Angeles Smart Shuttle, as part of a demonstration program in conjunction with R&D Transportation Services, links zoned dial-a-ride buses to a flex-route service. The flex-route service uses Trapeze® Flex with wireless links to MDTs aboard the buses; two route-deviation pick-ups are permitted per hour per bus. The dial-a-ride service is for the general public rather than being an ADA paratransit service.

- The Denver RTD and Citizen Area Transit in Las Vegas are currently researching options for providing fixed-route trip linkages.

Table 6. Use of Fixed-route Linkage and/or Trip-by-Trip Eligibility by Paratransit Providers

System	Using Trip-by-Trip Eligibility?	Method of Fixed-route Linkages
Systems with Trapeze® Scheduling Software		
Kitsap Transit	Yes — doing some now	Manual — reservation operators provide information on fixed-route options and schedule ADA trips to interlink with fixed routes where possible
NFT METRO Systems, Paratransit Access Line	Yes — referred to ADA coordinator for travel training on applicable fixed routes if determined to be eligible on trip-by-trip basis	
Orange County Transportation Authority	Yes — trips that are known to be available to the user on fixed routes are noted on a scheduling screen; customer is considered ineligible for identified trips.	
SEPTA - CCT Division	Planned — fixed route software to interface with PASS	
Skagit Transit	Planned; recently hired a mobility trainer and are beginning to schedule bus/para “meets” to reduce long distance traveling for ambulatory and cognitively able passengers	
Citizen Area Transit (CAT Paratransit Services)	Planned	Currently researching; call centers for paratransit and fixed route are combined; any process implemented at this time would be manual; seeking an automated solution
C-TRAN	Planned	
King County Metro Transit Division	Planned	Fixed-route planning program in development phase
Denver Regional Transportation District (RTD)	Planned	Unknown; changing scheduling software in April 1999
Ann Arbor Transit Authority	Planned	Future implementation of Trapeze® software for fixed-route integration
Tulsa Transit	Planned	Future integration of Trapeze® CI (fixed route software) and Trapeze® PASS; currently debugging Trapeze® CI

Table 6. Use of Fixed-route Linkage and/or Trip-by-Trip Eligibility by Paratransit Providers (continued)

System	Using trip-by-trip eligibility?	Method of Fixed-route Linkages
Systems with Trapeze® Scheduling Software		
City of Detroit DOT	Planned	Manual trip linkages, with Trapeze® FX as fixed-route software and PASS for paratransit; future implementation of Trapeze® CI and automatic linkage
St.Cloud Metropolitan Transit Commission	No	Unknown (being installed at time of survey)
LA Smart Shuttle (scheduling by R&D Transportation Services)	No	Software facilitates transfers from zoned dial-a-ride buses (non-ADA) to flex-route buses
Santa Clara Valley Transportation Authority	No	Fixed-route light rail only, used for multi-modal trips: e.g., paratransit leg--light rail leg--paratransit leg
Transit Systems with Scheduling Software Other Than Trapeze®		
MBTA (Multisystems - Midas)	Planned — Once fixed-route info is formatted to communicate with the scheduling software, reservationists will suggest viable alternatives where applicable	Not at present; planned as future enhancement
The T, Fort Worth (COMSIS - Intellitran)	Planned — would need new software	Not at present for ADA paratransit; general-public "Rider Request" dial-a-ride allows for point-deviation from fixed routes; future goal is to link Rider Request and MITS (ADA) paratransit systems to allow for seamless links between fixed-route and paratransit
AC Transit and BART (Parapro - Intellitran)	Not in near future	None at present; planned as future enhancement for next-generation software (being purchased in 8-12 months)
Houston METRO	Planned 1st phase: review subscription (recurring) trips and select riders whose pickup and drop-off points are both on fixed bus routes; medical reviews may be used as necessary to determine which riders are able to ride fixed-route buses; travel training will be provided	Planned 2nd phase: select riders whose pickup OR drop-off points are on fixed bus routes; provide paratransit feeder service to connect with fixed route as needed

CHAPTER SIX—CONCLUSIONS

This project documented METROLift's past and current scheduling efficiency, examined scheduling practices and results from other paratransit providers, and investigated ways in which paratransit scheduling and METROLift service might be improved.

The project had four objectives:

- to verify the gains in service efficiency METROLift has experienced since the implementation of the AVL and advanced scheduling systems;
- to look for possible additional efficiency gains, through the elimination of excess slack time generated by same-day changes, and to compare METROLift service efficiency with that of other paratransit providers;
- to examine possible technology/software options for integrating paratransit and fixed-route transit service; and
- to examine possible technologies, and existing policies and experiences, in trip-by-trip eligibility for paratransit service.

Summary of Major Findings

The overall efficiency of METROLift operations is high. Researchers identified only a low level of non-productive slack time during a typical service day. AVL and automatic scheduling software systems have helped dispatchers and dispatch operators improve service efficiency by providing the information needed to make use of available vehicle time as changes and additions occur to trip schedules. These improvements have been realized even as the METROLift service area was expanded. A small percentage of excess vehicle capacity remains, varying from day to day, averaging 3 or 4 percent for Saturday service and 1 percent for weekdays. This small amount of excess capacity provides a needed cushion, along with existing protection routes, for same-day scheduling changes.

The survey results indicate that METROLift has one of the highest ratios of passengers per revenue hour among responding paratransit providers of similar size. In same-day scheduling, METROLift's stand-by trips, averaging 50 per day, were at the mid-point compared to same-day scheduling numbers provided by other paratransit systems. However, several of these providers also included "will-call" return trips, including ready-early and ready-later scheduling changes in their same-day scheduling numbers. If these numbers are included, METROLift provides an additional 450 same-day scheduling changes due to rider requests, indicating a degree of same-day scheduling that is notably high. In summary, the analysis indicates that there is not a great deal of potential for

additional service through use of slack time, due to the already high utilization of available vehicle hours.

Recommendations

Researchers investigated several options in this project to increase the number of passengers carried per revenue hour of METROLift service. The following actions, in order of likely effectiveness, may be pursued by METRO to gain further efficiency in the operation of METROLift services.

- ***Implement trip-by-trip eligibility (shifting some trips entirely to fixed-route service) and fixed-route integration for paratransit passengers (using paratransit vehicles as feeders to fixed-route service).*** This option would seem to have the highest probability of gaining additional capacity and, therefore, providing transportation to higher numbers of ADA-eligible riders.

  In order to accomplish trip-by-trip eligibility, the PASS software will need to be integrated with fixed-route scheduling information so reservation operators can determine whether a customer's trip request can be filled with a METRO fixed-route option. Additional efforts may be necessary in the areas of training, bus stop design, and marketing to increase the effectiveness of this approach.

  In order for METROLift reservation operators to schedule trips dynamically as a combination of paratransit and fixed-route segments, PASS software and fixed-route scheduling software would need to be integrated in a way that would allow all legs of a multi-vehicle trip to be scheduled, including connections between vehicles. The difficulty of scheduling these connections and the complexity of scheduling two or more vehicles for appropriate pick-up and drop-off times are disadvantages to this approach. Moreover, customer satisfaction is likely to be negatively affected by transfers between vehicles. The shared dispatch center (fixed-route and paratransit) used by Pierce Transit may be one way to address these disadvantages.

  Until the technology for dynamic scheduling becomes a reality for METRO, a two-level manual system can be implemented:

  Phase 1 — Review subscription (recurring) trips for riders whose pick-up and drop-off locations are on a bus route. Offer travel training to paratransit passengers who are learning to ride fixed-route transit. Medical evaluations of passengers may be used to help determine trip-by-trip eligibility.

Phase 2 — Widen criteria for fixed-route trips by identifying subscription patrons with either a pick-up or drop-off point on a bus route, and provide feeder service between the route and the passenger's origin/destination.

- ***Increase METROLift efficiency by making use of available slack time.*** As described in Chapter Three, the amount of available slack time that could be used productively for new trips is small, averaging 1 to 4 percent of total daily service time, and is highly variable from day to day. Therefore, it would not seem cost-effective to implement software or equipment in an attempt to fill this remaining slack time with trips; METROLift's current system of same-day trip re-scheduling is highly efficient.

Future Activities and Research

Possible future activities and research connected with METROLift service could include the following:

- monitoring trip-by-trip eligibility program and its effects on paratransit service,
- evaluating a fixed-route travel training program for ADA-eligible passengers, and
- evaluating an integrated fixed-route and paratransit scheduling system.

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3. Balog, John N.; Morrison, John B.; and Hood, Mark M. "Integration of Paratransit and Transit Services: Importance of Vehicle Transfer Requirements to Consumers." Transportation Research Record No. 1571, Transportation Research Board, Washington D.C., 1997 , pp. 97-108.

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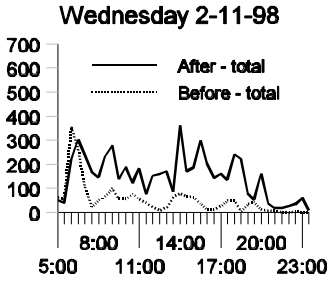
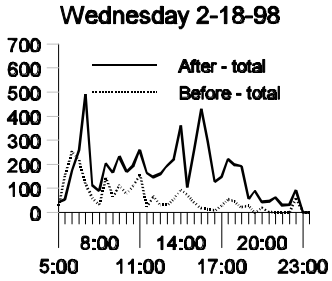
APPENDIX A—SLACK TIME GRAPHS

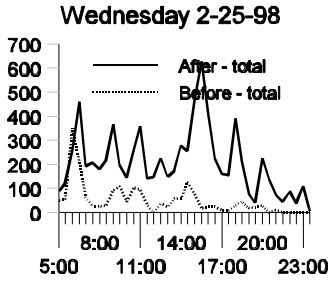
The following graphs show total reported slack time, in minutes, of the entire METROLift fleet before and after the days of service. "Before" slack time is built into the vehicle manifests during reservations and day-ahead scheduling of the trips. "After" slack time is based on actual trips and trip changes during the day of service.

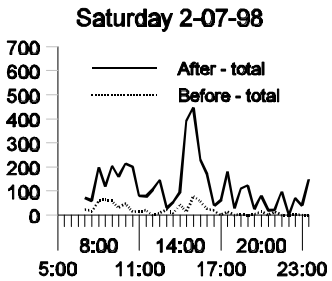
The second set of graphs for the three Wednesdays shows the amount of "after" slack time for METROLift vans versus METROLift sedans.

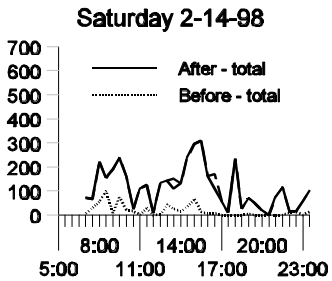
Slack Time

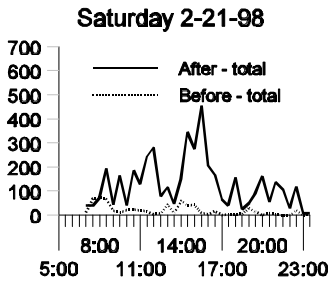


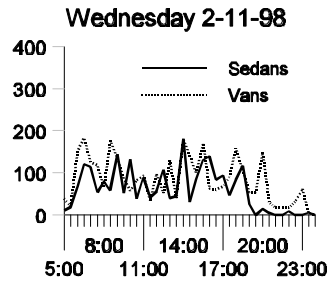


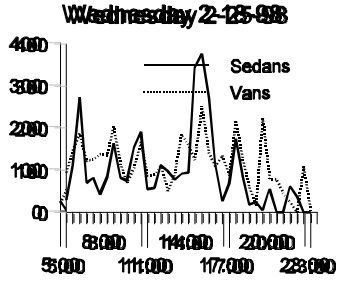






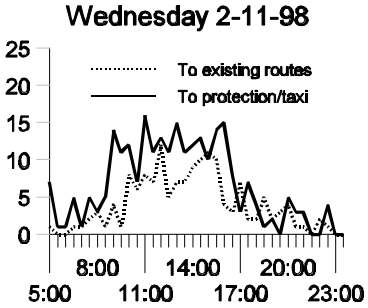


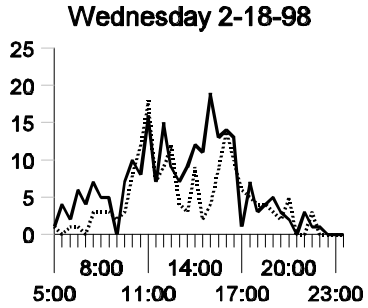


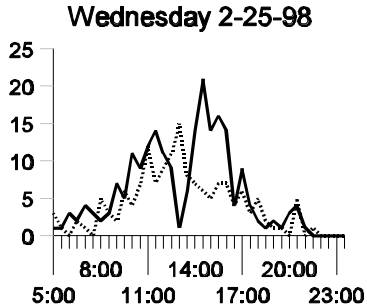


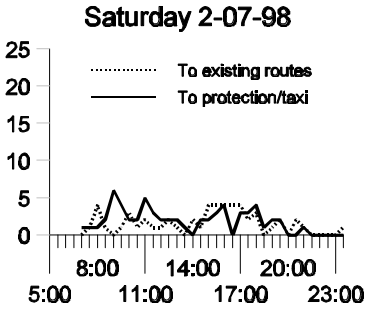
APPENDIX B—SAME-DAY SCHEDULING; TRIPS MOVED

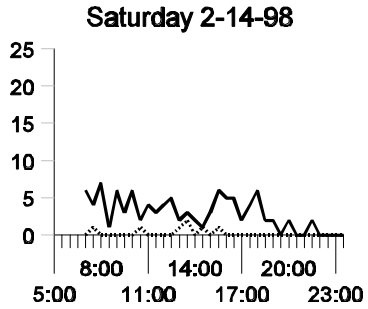
Trips Moved

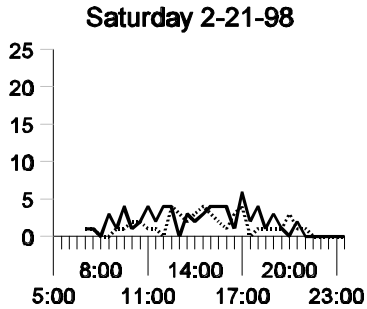












APPENDIX C—POTENTIAL FOR ADDITIONAL USE OF SLACK TIME

Potential Trip Slots — Tables

Wednesday 2-11-98	**Early Morning and Rush Hour (5:00-10:00)**				**Mid-day (10:00-3:00)**				**Afternoon Rush Hour (3:00-7:00)**				**Evening (7:00-12:00)**			
Potential trip slots from slack time	*2*				*2*				*1*				*2*			
	actual		*possible*		*actual*		*possible*		*actual*		*possible*		*actual*		*possible*	
Trips Moved to Routes	14	**21%**	16	**24%**	79	**39.5 %**	81	**40.5 %**	44	**41.5 %**	45	**42.5 %**	14	**45%**	16	**51.5 %**
Trips Moved to Protection Routes	37	**55%**	37	**55%**	86	**43%**	86	**43%**	52	**49%**	52	**49%**	10	**32%**	10	**32%**
Trips Moved to Back-up Taxi	16	**24%**	14	**21%**	35	**17.5 %**	33	**16.5 %**	10	**9.5 %**	9	**8.5 %**	7	**23%**	5	**16.5 %**

Wednesday 2-18-98	**Early Morning and Rush Hour (5:00-10:00)**				**Mid-day (10:00-3:00)**				**Afternoon Rush Hour (3:00-7:00)**				**Evening (7:00-12:00)**			
Potential trip slots from slack time	*5*				*5*				*5*				*1*			
	actual		*possible*		*actual*		*possible*		*actual*		*possible*		*actual*		*possible*	
Trips Moved to Routes	17	**29%**	22	**37%**	84	**45%**	89	**47%**	56	**43%**	61	**47%**	13	**45%**	14	**48%**
Trips Moved to Protection Routes	38	**64%**	37	**63%**	83	**44%**	83	**44%**	57	**44%**	57	**44%**	10	**34.5 %**	10	**34.5 %**
Trips Moved to Back-up Taxi	4	**7%**	0	**0%**	21	**11%**	16	**9%**	17	**13%**	12	**9%**	6	**20.5 %**	5	**17.5 %**

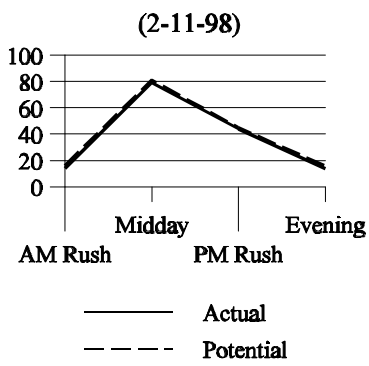
Wednesday 2-25-98	**Early Morning and Rush Hour (5:00-10:00)**				**Mid-day (10:00-3:00)**				**Afternoon Rush Hour (3:00-7:00)**				**Evening (7:00-12:00)**			
Potential trip slots from slack time	*6*				*8*				*11*				*7*			
	actual		*possible*		*actual*		*possible*		*actual*		*possible*		*actual*		*possible*	
Trips Moved to Routes	23	**42.5 %**	29		86	**44.5 %**	94		39	**38%**	50		8	**42%**	15	
Trips Moved to Protection Routes	28	**52%**	25		86	**44.5 %**	86	**44.5 %**	54	**52.5 %**	53		8	**42%**	4	
Trips Moved to Back-up Taxi	3	**5.5 %**	0	0%	22	**11%**	14		10	**9.5 %**	0	0%	3	**16%**	0	0%

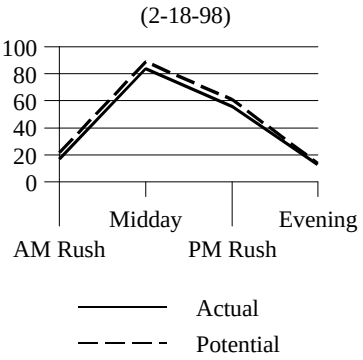
Saturday 2-07-98	**Early Morning and Rush Hour (5:00-10:00)**				**Mid-day (10:00-3:00)**				**Afternoon Rush Hour (3:00-7:00)**				**Evening (7:00-12:00)**			
Potential trip slots from slack time	*4*				*16*				*3*				*4*			
	actual		*possible*		*actual*		*possible*		*actual*		*possible*		*actual*		*possible*	
Trips Moved to Routes	7	**32%**	11	**50%**	14	**40%**	30	**86%**	25	**56%**	28	**62%**	6	**54.5 %**	10	**91%**
Trips Moved to Protection Routes	15	**68%**	11	**50%**	20	**57%**	5	**14%**	20	**44%**	17	**38%**	5	**45.5 %**	1	**9%**
Trips Moved to Back-up Taxi	0	0	0	0	1	3%	0	0%	0	0	0	0	0	0	0	0

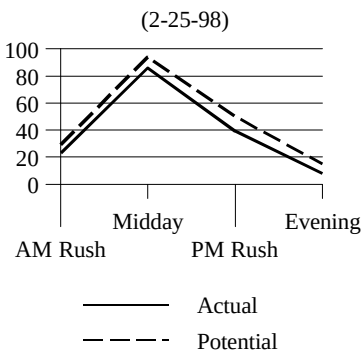
Saturday 2-14-98	**Early Morning and Rush Hour (5:00-10:00)**				**Mid-day (10:00-3:00)**				**Afternoon Rush Hour (3:00-7:00)**				**Evening (7:00-12:00)**			
Potential trip slots from slack time	*3*				*12*				*2*				*1*			
	actual		*possible*		*actual*		*possible*		*actual*		*possible*		*actual*		*possible*	
Trips Moved to Routes	1	**4%**	4	**14%**	5	**13.5 %**	17	**46%**	1	**3%**	3	**9%**	0	**0**	1	**17%**
Trips Moved to Protection Routes	23	**82%**	23	**82%**	31	**84%**	20	**54%**	33	**97%**	31	**91%**	6	**100 %**	5	**83%**
Trips Moved to Back-up Taxi	4	14%	1	4%	1	2.5 %	0	0%	0	0	0	0	0	0	0	0

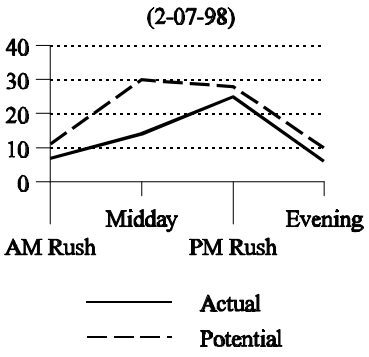
Saturday 2-21-98	**Early Morning and Rush Hour (5:00-10:00)**				**Mid-day (10:00-3:00)**				**Afternoon Rush Hour (3:00-7:00)**				**Evening (7:00-12:00)**			
Potential trip slots from slack time	*1*				*16*				*5*				*6*			
	actual		*possible*		*actual*		*possible*		*actual*		*possible*		*actual*		*possible*	
Trips Moved to Routes	4	**29%**	5	**36%**	22	**47%**	38	**81%**	15	**37%**	20	**49%**	7	**70%**	10	**100 %**
Trips Moved to Protection Routes	10	**71%**	9	**64%**	25	**53%**	9	**19%**	26	**63%**	21	**51%**	3	**30%**	0	**0**
Trips Moved to Back-up Taxi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

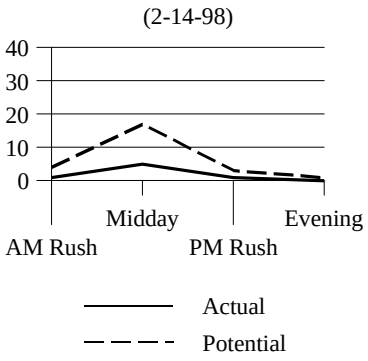
Potential Trips Moved — Graphs

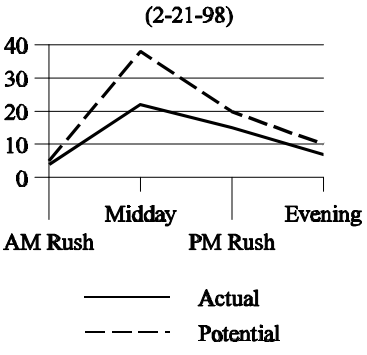












APPENDIX D—TRANSIT SYSTEM SURVEY

Survey: Paratransit Same-Day Scheduling and Fixed Route Planning

Your response to the following questions related to the use of paratransit scheduling software and same-day scheduling would be greatly appreciated.

Transit System: _____

Contact: **Name _____**

Address _____

_____

_____

Telephone _____ FAX _____
e-mail _____

System Statistics:

1) Do you currently have any trip denials on your ADA paratransit service? If so, what percent of your total trips are denied? _____%

2) What percentage of your daily passenger trips cancel? _____%

3) What percentage of your daily trips are No Shows? _____%

4) What is your average weekday ridership? _____

5) Do you have a program in place to offset lost service (i.e., cancellations and no shows) and maximize your service capacity? Please describe:
_____
_____
_____
_____
_____

6) How many ADA paratransit trips did you transport last year? _____

7) What was your total operating budget including administration, operations, and vehicle maintenance? Include vehicle depreciation if vehicles are not owned by your agency. _____

8) What is your average trip length? _____

Scheduling Profile

9) Who does your routing and scheduling?
   a) in-house
   b) under contract by _____
   c) other _____

10) Who does your dispatching?
   a) in-house
   b) under contract by _____
   c) other _____

11) Please indicate whether your paratransit system currently uses any of the following scheduling software:

__ Trapeze® PASS (DOS 3.9 ____ or Windows 4.0 _____)
__ Multisystems DISPATCH-A-RIDE
__ ATE EZRIDE
__ Other _____

12) How long have you been using the above-indicated scheduling system? _____

13) How much did the scheduling system improve your passengers per revenue hour, if any?
_____ %

14) What was your system's "passenger per revenue hour" before and after the scheduling system was implemented? _____ before _____ after

15) Do you currently provide same-day scheduling for all or part of your daily paratransit services?

Yes ____
No _____ if no, skip to question 21

16) Which of the following best describes the mode of same-day service:

   a) Same-day service scheduled just like day-before service, using primary fleet
   b) Service offered on standby basis only, will send cab if no space available
   c) Service offered on standby basis only if space available, no guarantee
   d) User Side Subsidy services with limited cost to the agency
   e) Same-day service scheduled informally, for emergency situations only
   f) Other, please describe _____
      _____

17) What lead time, if any, do you require for same-day scheduling?
   a) Less than an hour
   b) One hour
   c) Two hours
   d) Three hours
   e) Four hours
   f) Five hours
   g) More than five hours

18) How many same-day requests do you receive on an average weekday? _____

19) How many same-day reservation requests are you able to fill? _____ %

Fixed Route Scheduling Integration

20) Is your scheduling software able to suggest fixed route trip alternatives when scheduling an ADA paratransit trip?

__ Yes
__ No If no, skip to 24

21) Are the fixed-route suggestions automatically formulated, or does the paratransit operator have to look up possible trip linkages manually? Please describe how the system works.
_____
_____
_____
_____
_____

22) What percentage of (or how many) paratransit trips are shifted to fixed-route transit on a typical day/week? _____

23) Is your system considering implementation of trip-by-trip eligibility?

If so, how are you planning to offer fixed-route trip planning during the ADA reservation process?
_____
_____
_____
_____

___ Documents relating to this system's experience with same-day scheduling are enclosed or will be sent.

___ Documents relating to this system's experience with fixed-route trip planning are enclosed or will be sent.

___ I would be interested in receiving a copy of the report summarizing the results of this survey.

APPENDIX E—SURVEY RESULTS

System	Daily				ADA Trips last year	Ave. Trip Length (miles)	Annual Budget
	Trips Denied (%)	Trips Canceled (%)	No-Shows (%)	Ridership			
Montreal Urban Community Transit Corporation	2	25	2	5000	1,200,000	8.5	$22M
MBTA	2.42	13.6	3.77	4100	1,168,052	7.4	$19,281,888
SEPTA - CCT Division	2.3	23.0	13.0	5100	794,440	7.5	$28,218,635
Yellow Transportation	0	12.0	12.0	3000	780,000?	6.0	n/a
King County Metro Transit Division (Seattle)	2	21	4	3403	712,677	8.3	$22,351,816
Orange County Transportation Authority	0	15.8	2.15	2700	634,284	6.6	$14,963648
The Handi-Van (Honolulu)	n/a	10.5	7.0	1832	632,315	n/a	$10,692,000
AC Transit and BART	0	15	4	2012	575,459	8	$13,460,009
Citizen Area Transit (CAT Paratransit Services)	2.8	20	1.7	2019	555,783	6.9	13,910,300
Santa Clara Valley Transportation Authority	0	1	2	1738	528,948	5.6	$12,180,638
Tri-County Metropolitan Transportation District of Oregon	.25	19.6	2.5	2400	445,250	9	$10.2M
Denver Regional Transportation District (RTD)	5.0	17.0	4.0	1525	410,500	11.4 revenue 9.0 pass.	n/a
MetroAccess (D.C.)	4.5	12.0	3.0	1000	353,453	3.34	$10.1 M
Regional Transit Authority (New Orleans)	4.5	17.9	6.7	1100	250,000	5.34	$5 M
C-TRAN	0	16.0	>1.0	800	170,616	5.92	$4,200,000
St.Cloud Metropolitan Transit Commission	1.7	7.1	0.8	325	82,252	2.8	$650,000
Skagit Transit	.1	15.5	3	2.3pass/hr	58,000	20 minutes	n/a

System	Daily				ADA Trips last year	Ave. Trip Length (miles)	Annual Budget
	Trips Denied (%)	Trips Canceled (%)	No-Shows (%)	Ridership			
Everett Transit	<1	16.0	<1	180	>52,000	5.34	n/a
NFT METRO Systems, Paratransit Access Line	0	23.0	3.0	150	28,426	8.9	$1.2 M
Kitsap Transit	0	25-30	5.0	950	20,263	70% <30 min 23% 30-60 min 7% >60 min	$2,927,784
Des Moines Metro Transit Authority — Paratransit	0	6.8	4.0	450	18,386	4.15	$1,492,496
Manatee County Area Transit	0	1.0	2.0	365	6991	30-35 minutes	1,509,001

System	Offsetting Lost Service (cancellations, no shows)
Montreal Urban Community Transit Corporation	Available space is automatically allocated to another customer
MBTA	Each of 7 private contractors is responsible for reservations, scheduling, and dispatching; every effort is made to maximize productivity and backfill vacancies in schedules as they occur
SEPTA - CCT Division	More than 5 no-shows or late cancels suspends service for 2 weeks
Yellow Transportation	Overbook
King County Metro Transit Division	Of the two vehicle brokers/subcontractors that Metro uses, one uses a waiting list; after 7 p.m. the evening before the day of service, waiting list rides are inserted, as possible, into the schedule and the riders notified
Orange County Transportation Authority	Accept requests for same-day service, and provide same-day service for non-emergency medical trips
The Handi-Van	No program in place
AC Transit and BART	Same-day urgent medical trips = approx. 2% of total trips Suspension policy for no-shows
Citizen Area Transit (CAT Paratransit Services)	None
Santa Clara Valley Transportation Authority	Open returns Same-day pilot program to start 1-1-99 All of the above trips can often be more easily accommodated due to no-shows and same day cancellations
Tri-County Metropolitan Transportation District of Oregon	Overbook trips, creating an unassigned trip list; these unassigned trips are then worked into existing routes as cancellations come in; non-routable trips are assigned to cabs
Denver Regional Transportation District (RTD)	Batch schedule 2 days ahead; additional trips scheduled 1 day ahead as cancellations are made
MetroAccess (D.C.)	Late cancellation and no-show policy which imposes suspension of service for abusers
Regional Transit Authority (New Orleans)	Fill in cancellations and no-shows with same-day service
C-TRAN	Overbook
St.Cloud Metropolitan Transit Commission	No program in place

System	Offsetting Lost Service (cancellations, no shows)
Skagit Transit	Call-back program to confirm passengers' reservations; starting an outreach/education program to encourage people not to schedule rides unless they are needed, and to cancel (if necessary) as soon as possible
Everett Transit	Maintain an on-call standby list with no guarantees
Kitsap Transit	1) Suspended rides for no-shows 2) Allow 30-75 same-day trips for people who do not know their return time the day before service 3) Use cancellation space for same-day scheduling 4) Reorganize routes to be more efficient as a result of cancellations
Des Moines Metro Transit Authority — Paratransit	Fill in slots with will call trips and/or trips brokered to the taxi company
Manatee County Area Transit	Reserve the right to deny service temporarily for excessive no-shows or cancellations

System	Routing	Scheduling	Software	Imple-mented (date)	Passengers per Revenue Hour		
					Before	After	Differ-ence (%)
Montreal Urban Community Transit Corporation	In-house	In-house for minibus; taxi dispatch is done by taxi company	ACCES by Giro	14 years	n/a	n/a	50%
MBTA	7 private firms	Seven private firms	Multisystems - Midas (Windows)	May, 1998	1.9, 2.5	n/a	n/a
SEPTA - CCT Division	7 contractors	Seven contractors	Trapeze® PASS DOS 3.9	1996 (2 years)	1.85	1.62	n/a (diff. system)
Yellow Transportation	In-house	In-house	Trapeze®PASS Windows 4.0	1997 (1 year)	n/a	n/a	n/a
King County Metro Transit Division	2 contractors: Laidlaw & Multi-Service Center of N.E. King County	Contractors: 1) Seattle Personal Transit 2)Dave Transportation 3)ATC Vancom 4)Laidlaw 5)3A/EDJ	Trapeze®PASS DOS 3.9	Since 1993	Higher	1.64	0
Orange County Transportation Authority	In-house	Contract; Laidlaw	Trapeze®PASS	4 years	n/a	n/a	n/a
The Handi-Van	Oahu Transit Services, Inc. (OTS)	OTS	Trapeze® NT BIN 3.07	5/98	2.35 (FY 98)	n/a	n/a
AC Transit and BART	Paratransit broker	Sub-contractors	Parapro by Intelitran	2.5 years	n/a; always used		1.64 (FY 98) 1.68 (FY 99)

System	Routing	Scheduling	Software	Imple-mented (date)	Passengers per Revenue Hour		
					Before	After	Differ-ence (%)
Citizen Area Transit (CAT Paratransit Services)	In-house	In-house	Trapeze®PASS DOS 3.9	4 years (12/94)	n/a; began service w/Trp.		
Santa Clara Valley Transportation Authority	Contract, Outreach-VTA's transit broker	Contract, Outreach-VTA's transit broker	Trapeze®PASS DOS 3.9	3+ years	31%	1.3	1.7
Tri-County Metropolitan Transportation District of Oregon	Under contract; Laidlaw	Under contract; Laidlaw	Trapeze®PASS	12/94	n/a; policies and provider contracts were changed at the same time as the system was implemented		
Denver Regional Transportation District (RTD)	Laidlaw (contract)	Laidlaw (contract)	Trapeze® QZ	1994 (4 years)	n/a	1.6	n/a
MetroAccess (D.C.)	Paratransit System Manager	Paratransit System Manager	Proprietary software	early 1994 (4.5 yrs)	n/a	n/a	n/a
Regional Transit Authority (New Orleans)	Laidlow	Laidlow	Trapeze®PASS DOS 3.9	1995 (3 years)	n/a	n/a	n/a
C-TRAN	In-house	In-house	Trapeze®PASS DOS 3.9 F(?)	1992	n/a	n/a	n/a
St.Cloud Metropolitan Transit Commission	In-house	In-house	Trapeze®PASS Windows 4.0	11/98	4.9	n/a	n/a
Skagit Transit	In-house	In-house	Trapeze®PASS DOS 3.9	3.5 years	0 (n/a; service area expan-ded at this time)	2.9	1.93
Everett Transit	In-house	In-house	Trapeze®PASS; Mentor MDTs	1995 (3 years)	2.93	3.12	Un-known; increas ed service

System	Routing	Scheduling	Software	Imple-mented (date)	Passengers per Revenue Hour		
					Before	After	Differ-ence (%)
NFT METRO Systems, Paratransit Access Line	In-house	In-house	Trapeze®PASS Windows 4.0	1997 (18 mo.)	1.1	1.4	30%
Kitsap Transit	In-house	In-house	Trapeze®PASS	1992 (6 years)	2.8	4.0	78%
Des Moines Metro Transit Authority — Paratransit	In-house	In-house	Micro Dynamics - CADMOS System — Computer aided scheduling	1990 (8 years)	4.0	3.8	0
Manatee County Area Transit	In-house	In-house	EMTRACK	1989 (9 years)	n/a	n/a	0

System	Mode of Same-day Service	Lead time for Same-day Service	Same-day Requests per day	
			Received	Filled
Montreal Urban Community Transit Corporation	Service offered based on capacity; no other restriction	1 hour	50	80%
MBTA	Standby basis only if space available, no guarantee	Less than 1 hour	140	60%
King County Metro Transit Division	For non-ADA riders, 50% User Side Subsidy; rider calls taxi company of his/her choice	<= 1 hour (most taxi companies respond in less than 1 hour)	77,200 per year total	100%
Orange County Transportation Authority	Scheduled informally, for emergency situations only	1 hour	10	100%
AC Transit and BART	For urgent medical requests; For "go-backs" when the rider is not ready; On standby basis only if space available, no guarantee	3 hours	75	40%
Tri-County Metropolitan Transportation District of Oregon	Scheduled informally for emergencies only; "ready-now" return trips if possible and if at least 90 minutes before scheduled return time	< 1 hour	7	15%
Santa Clara Valley Transportation Authority	(Starting 1-1-99) Standby basis only if space available, no guarantee	3 hours	n/a	n/a
Denver Regional Transportation District (RTD)	Standby basis only if space available, no guarantee	Less than 1 hour	10	50%
Regional Transit Authority (New Orleans)	Standby basis only if space available, no guarantee	1 hour	100	90%
St.Cloud Metropolitan Transit Commission	Standby if space available, no guarantee	1 hour	10	50%

System	Mode of Same-day Service	Lead time for Same-day Service	Same-day Requests per day	
			Received	Filled
Skagit Transit	Same-day service scheduled informally for emergencies only. Non-emergency same-day service offered on standby basis, space available, no guarantee	1 hour	Not tracked	Not tracked
Everett Transit	Standby basis only if space available, no guarantee		n/a	n/a
Kitsap Transit	a) Same-day service just like day-before, for will-call returns & general public dial-a-ride b) Standby only if space available, no guarantee, to make use of cancellation space	1 hour, for will-call returns and other same-day on space-available basis 2 hours, for same-day general-public use	85	100%
Des Moines Metro Transit Authority — Paratransit	Will-calls and emergencies	Less than 1 hour	60	100%

System	Method of Fixed-route Linkages	% of trips shifted to fixed	Planning trip-by-trip eligibility
MBTA	Not at present; planned as future enhancement		Once fixed-route info is formatted to communicate with the scheduling software, reservationists will suggest viable alternatives where applicable
SEPTA - CCT Division			Fixed route software to interface with PASS
King County Metro Transit Division	Fixed-route planning program in final development phase		Yes-planned
Orange County Transportation Authority			Yes; trips that are known to be on available to the user on fixed routes are noted on a scheduling screen; customer is considered ineligible for identified trips
AC Transit and BART	Not at present; planned as future enhancement for next-generation software (being purchased in 8-12 months)		Not in near future
Citizen Area Transit (CAT Paratransit Services)	Currently researching; call centers for paratransit and fixed route are combined; any process implemented at this time would be manual; seeking an automated solution.		Yes
Santa Clara Valley Transportation Authority	Fixed-route light rail only, used for multi-modal trips: e.g. paratransit leg--light rail leg--paratransit leg	Used as a test pilot only	n/a
Denver Regional Transportation District (RTD)	Unsure; changing scheduling software in April 1999		Yes — planned
C-TRAN			Yes — don't know how at this time
St.Cloud Metropolitan Transit Commission	Unknown (being installed at time of survey)		No

System	Method of Fixed-route Linkages	% of trips shifted to fixed	Planning trip-by-trip eligibility
Skagit Transit			Yes — planned; recently hired a mobility trainer and are beginning to schedule bus/para "meets" to reduce long distance traveling for ambulatory and cognitively able passengers
NFT METRO Systems, Paratransit Access Line			Referred to ADA coordinator for travel training on applicable fixed routes if determined to be eligible on trip-by-trip basis
Kitsap Transit	Manual — reservation operators provide information on fixed-route options and schedule ADA trips to interlink with fixed routes where possible		Yes — doing some now

System	Contact	Software
MetroAccess (D.C.)	Glenn D. Millis 600 5th Street, N.W. Washington, D.C. 20001 (202) 962-1100 FAX (202) 962-2722 e-mail G.Millis@WMATA.COM	Paratransit System Manager
Des Moines Metro Transit Authority — Paratransit	Donna Grange 1100 MTA Lane Des Moines, IA 50309 (515) 283-8127 FAX (515) 283-8135 e-mail granged@dmmta.com	Micro Dynamics - CADMOS System — Computer aided scheduling
Manatee County Area Transit	Mark Mistretta 1108 26th Ave. East Bradenton, FL 34208 (941) 747-8621 FAX (941) 742-5992	EMTRACK
Kitsap Transit	Ellen Gustafson 234 So. Wycoff Bremerton, WA 98312 (360) 478-6228 FAX (360) 377-7086	Trapeze®PASS
MBTA	Mary Lou Daly, Manager OR Robert P. Rizzo, Asst. Manager Office for Transportation Access Ten Park Plaza, Room 4730 Boston, MOBILITY ANALYSIS 02116 (617) 222-5123 FAX (617) 222-6119	Multisystems - Midas (Windows)
C-TRAN	Colete Anderson P.O. Box 2529 Vancouver, WA 98668 e-mail ColeteA@C-TRAN.org	Trapeze®PASS DOS 3.9 F(?)
Denver Regional Transportation District (RTD)	Joe Mistrot 1600 Blake St. Denver, CO 80126 (303) 299-2152 FAX (303) 299-2992	Trapeze® QZ
Everett Transit	George Baxter 3225 Cedar St. Everett, WA 98201 (425) 257-8935 FAX (425) 257-8945 e-mail gbaxter@CI.everett.wa.us	Trapeze®PASS; Mentor MDTs

System	Contact	Software
Montreal Urban Community Transit Corporation	n/a	ACCES by Giro
AC Transit and BART	Doug Cross Accessible Transit Services Administrator AC Transit 1600 Franklin Street Oakland, CA 94602 (570) 891-4843 FAX (570) 891-4874 djcross@pacbell.net	Parapro by Intelitran
Tri-County Metropolitan Transportation District of Oregon	Bernie Kerosky 2800 NW Nela Portland, OR 97210 (503) 802-8213 FAX (503) 802-8229	Trapeze®PASS
Orange County Transportation Authority	Curt Burlingame 550 S. Main St. P.O. Box 14184 Orange, CA 92863-1584 (714) 560-5921 FAX (714) 560-5914 cburlingame@octa.net	Trapeze®PASS
Yellow Transportation	Carl Parr 2100 Huntington Ave. Baltimore, MD 21211 (410) 727-7300 FAX (410) 537-5221 e-mail cparrjr@aol.com	Trapeze®PASS Windows 4.0
St.Cloud Metropolitan Transit Commission	Tom Cruikshank — Transit Planner 665 Franklin Ave. NE St. Cloud, MN 56304 (320) 251-1499 FAX (320) 251-3499	Trapeze®PASS Windows 4.0
NFT METRO Systems, Paratransit Access Line	Kathleen Wagner 181 Ellicott St. Buffalo, NY 14203 (716) 855-7268 FAX (716) 855-6694	Trapeze®PASS Windows 4.0
The Handi-Van	Paul Steffens Public Transit Division, Dept. Of Transportation Services 711 Kapiolani Blvd., Suite 275 Honolulu, Hawaii 96813 (808) 523-4138 FAX (808) 596-2380	Trapeze® NT BIN 3.07

System	Contact	Software
Skagit Transit	Amber Villareal 380 Pease Road Burlington WA 98233 (360) 757-4433 FAX (360) 757-7983	Trapeze®PASS DOS 3.9
Citizen Area Transit (CAT Paratransit Services)	Sue Joseph Regional Transit Commission 301 E. Clark, Suite 300 Las Vegas, NV 89101 (702) 455-2225 FAX (702) 455-5151 joseph@co.clark.nv.us	Trapeze®PASS DOS 3.9
SEPTA - CCT Division	Richard Krajewski SEPTA — CCT Division 1234 Market St., 4th Floor Philadelphia, PA 19107 (215) 580-7576 FAX (215) 580-7715 e-mail RKRAJEWSKI@juno.com	Trapeze®PASS DOS 3.9
Santa Clara Valley Transportation Authority	David Ledwitz/Accessible Services 3331 North First Street San Jose, CA 95134 (408) 321-7034 FAX (408) 955-9754 david.ledwitz@vta.org	Trapeze®PASS DOS 3.9
Regional Transit Authority (New Orleans)	Karen Wilson Sider ADA Compliance Officer Regional Transit Authority 6700 Plaza Drive New Orleans, LA 70127 (504) 940-3157 FAX (504) 940-3105	Trapeze®PASS DOS 3.9
King County Metro Transit Division	Donna Moss King County Accessible Services, MS-134 821 Second Avenue, M.S. 134 Seattle, WA 98104-1598 (206) 689-3113 FAX (206) 689-3101 OR 689-4775 e-mail donna.moss@metrokc.gov	Trapeze®PASS DOS 3.9