TCRP SYNTHESIS 76

TRANSIT COOPERATIVE RESEARCH PROGRAM

Integration of Paratransit and Fixed-Route Transit Services

Sponsored by the Federal Transit Administration

A Synthesis of Transit Practice

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TRANSIT COOPERATIVE RESEARCH PROGRAM

TCRP SYNTHESIS 76

Integration of Paratransit and Fixed-Route Transit Services

A Synthesis of Transit Practice

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TRANSIT COOPERATIVE RESEARCH PROGRAM

The nation's growth and the need to meet mobility, environmental, and energy objectives place demands on public transit systems. Current systems, some of which are old and in need of upgrading, must expand service area, increase service frequency, and improve efficiency to serve these demands. Research is necessary to solve operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the transit industry. The Transit Cooperative Research Program (TCRP) serves as one of the principal means by which the transit industry can develop innovative near-term solutions to meet demands placed on it.

The need for TCRP was originally identified in *TRB Special Report 213—Research for Public Transit: New Directions,* published in 1987 and based on a study sponsored by the Federal Transit Administration (FTA). A report by the American Public Transportation Association (APTA), *Transportation 2000*, also recognized the need for local, problem-solving research. TCRP, modeled after the longstanding and successful National Cooperative Highway Research Program, undertakes research and other technical activities in response to the needs of transit service providers. The scope of TCRP includes a variety of transit research fields including planning, service configuration, equipment, facilities, operations, human resources, maintenance, policy, and administrative practices.

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Once selected, each project is assigned to an expert panel, appointed by TRB. The panels prepare project statements (requests for proposals), select contractors, and provide technical guidance and counsel throughout the life of the project. The process for developing research problem statements and selecting research agencies has been used by TRB in managing cooperative research programs since 1962. As in other TRB activities, TCRP project panels serve voluntarily without compensation.

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FOREWORD

Transit administrators, engineers, and researchers often face problems for which information already exists, either in documented form or as undocumented experience and practice. This information may be fragmented, scattered, and unevaluated. As a consequence, full knowledge of what has been learned about a problem may not be brought to bear on its solution. Costly research findings may go unused, valuable experience may be overlooked, and due consideration may not be given to recommended practices for solving or alleviating the problem.

There is information on nearly every subject of concern to the transit industry. Much of it derives from research or from the work of practitioners faced with problems in their day-to-day work. To provide a systematic means for assembling and evaluating such useful information and to make it available to the entire transit community, the Transit Cooperative Research Program Oversight and Project Selection (TOPS) Committee authorized the Transportation Research Board to undertake a continuing study. This study, TCRP Project J-7, "Synthesis of Information Related to Transit Problems," searches out and synthesizes useful knowledge from all available sources and prepares concise, documented reports on specific topics. Reports from this endeavor constitute a TCRP report series, *Synthesis of Transit Practice.*

This synthesis series reports on current knowledge and practice, in a compact format, without the detailed directions usually found in handbooks or design manuals. Each report in the series provides a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems.

PREFACE

By Donna Vlasak
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This synthesis highlights the experiences of transit agencies that have attempted to depart from the traditional binary model of separate fixed-route and paratransit services by seeking a variety of ways to integrate their services, including the provision of paratransit feeder services, community bus or circulators, connectors, fixed-route fare incentives, and route deviation. This study places greater emphasis on feeder services and community services, but where agencies included other approaches to shifting potential paratransit riders to less costly modes, these are also discussed. As the compelling reason for setting up integrated service seems to be the need to manage paratransit costs or reduce the need for separate paratransit service, this synthesis aims to help transit agency staffs understand how the appropriate use of integrated services may help them accomplish their mission.

Details about Northwestern states' transit agencies that appear to have taken a more proactive approach are explored. Telephone interviews with key stakeholders to obtain in-depth case studies and a site visit to an area in Oregon, rich with examples of successfully operating integrated service, yielded helpful information. One chapter holds case studies of eight transit agencies with integrated services and an appendix offers 14 other agencies' survey responses. One additional appendix holds a case study for Oahu, Hawaii, where feeder service was explored but not implemented.

This report was accomplished through a review of the relevant literature and surveys of transit agencies. Although more than 300 surveys were e-mailed and extensive follow-up efforts were undertaken, it was possible to confirm only 46 transit providers of integrated service; 21 transit systems located throughout North America, including 12 U.S. states and British Columbia.

Richard Weiner, Nelson/Nygaard Consulting Associates, San Francisco, California, collected and synthesized the information and wrote the paper, under the guidance of a panel of experts in the subject area. The members of the Topic Panel are acknowledged on the preceding page. This synthesis is an immediately useful document that records the practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As progress in research and practice continues, new knowledge will be added to that now at hand.

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INTEGRATION OF PARATRANSIT AND FIXED-ROUTE TRANSIT SERVICES

SUMMARY

As the cost of Americans with Disabilities Act (ADA) paratransit service continues to grow, transit agencies are exploring ways of integrating fixed-route and paratransit services that remain consistent with the spirit and the letter of the law. Various models for flexible services, as these hybrids of fixed-route and paratransit have sometimes been called, have been explored in other research studies, most notably *in TCRP Synthesis 53: Operational Experiences with Flexible Transit Services.* The current synthesis on integrated services complements that study by focusing on those services that either were designed with the disability community in mind or that have benefited riders with disabilities and served to reduce demand on ADA paratransit services.

The most common form of integrated service that has not received extensive attention in previous studies is feeder service. This study presents a number of variations on the traditional model of ADA paratransit feeder service, whereby people with disabilities are transported via paratransit to a bus or train station. In fact, as documented in this study, more feeder service is provided through a combination of general public demand-response and/or route deviation services, feeding into fixed-route, than through ADA paratransit feeder service.

For riders able to ride fixed-route service for at least some of their trips, the ADA allows transit agencies to limit trip offerings to feeder service. Yet only a handful of transit agencies nationwide have implemented this so-called mandatory form of feeder service. Notable examples are Pierce Transit in Tacoma, Washington, UTA in Salt Lake City, Utah, and ACCESS in Pittsburgh, Pennsylvania, and smaller systems such as those in Madison County, Illinois. This synthesis attempts to document why these systems have been able to implement this policy, while most transit systems in North America have resisted taking this step because of concerns about community reaction and other more practical considerations. The barriers that have prevented further expansion of feeder service are examined, and other models of integrated service that have been successfully implemented are identified.

Following a literature review that revealed very limited information on the subject of integrated services, a web-based survey was disseminated to more than 300 transit agencies and consultants throughout North America. Twenty-one completed responses were received from transit agencies that provide integrated services. Further research through telephone interviews and a site visit to an area rich in integrated services helped identify an additional 13 agencies, though detailed information only was available for a portion of these agencies.

The information gathered in this report includes documentation of policies and associated program features that have facilitated successful implementation of integrated services. These include eligibility screening processes, operational procedures, travel training, education and outreach, marketing, and technology. The experiences of systems that have explored the feasibility of integrated services and not proceeded with implementation, or have implemented and discontinued integrated services, also are documented.

Following are some key conclusions of the synthesis:

- The implementation of trip-by-trip screening for individuals found conditionally eligible under the ADA can result in significant cost savings. However, a number of elements

need to be in place for successful implementation, including having the fixed-route scheduling information conveniently available to paratransit reservations agents or schedulers, an accurate eligibility screening process, and sound information on environmental barriers. Most importantly, political will on the part of transit staff and decision makers, combined with involvement of the disability community, are critical to successful implementation.

- Fixed-route systems that deviate for people with disabilities have found this approach to be a valuable means of either avoiding the cost of complementary ADA paratransit service, or serving communities that otherwise would not receive service.
- Integrated services that connect to fixed-route locations, whether through community bus, route deviation, or paratransit feeder service, can be effectively implemented in locales with a variety of land use densities, from densely urban environments to rural areas.
- Geographically elongated and physically constrained service areas are particularly well-suited to feeder service.
- Feeder service has not experienced widespread application because of a variety of factors, including concern for the impact on the mobility of riders; a perception that this model is difficult to implement; and lack of consensus about the cost savings associated with feeder implementation.
- Educating paratransit staff, particularly eligibility screeners, schedulers, and drivers, is critical to the success of feeder service.
- While technology is not necessarily a prerequisite for the implementation of paratransit feeder service, the three most common scheduling software packages used in North America all include modules that can facilitate this process.
- Transit agencies that have offered feeder service on a voluntary basis have generated very little interest from consumers.
- Feeder service is generally well received in areas that have exceptionally frequent fixed-route service and avoided in areas that may result in long waits at transfer points.
- Educating consumers about the need for feeder service is a lengthy but essential element in building community acceptance, if not full support.
- Feeder service can be an effective means of complementing the effectiveness of travel training, and implementation of these two programs should be considered simultaneously.
- Besides the feeder model, integrating fixed-route and paratransit services can be achieved through a number of other forms, most of which have been documented elsewhere. However, exemplary approaches presented in this study include the offer of free fixed-route service to ADA paratransit registrants, promoting the use of neighborhood circulators through the ADA call-in center, locating staff at transit centers to facilitate transfers by people with disabilities between different modes, and alternating between fixed-route and demand–response modes at different times of the day.
- Engaging community-based organizations in the provision of innovative integrated services can be an effective way of containing ADA paratransit costs.

CHAPTER ONE

INTRODUCTION

BACKGROUND

The goal of the Americans with Disabilities Act (ADA) is to promote the independence, integration, and self-sufficiency of people with disabilities. Consistent with these goals, ADA complementary paratransit services were intended to serve as a safety net for individuals who, even when the fixed-route transit service in their area is fully accessible, are not able to fully utilize this service owing to a disability. As such, promoting the integration of fixed-route and paratransit services, besides accomplishing cost-efficiencies, is fully congruent with the principles of the ADA (see Appendix A for the ADA regulatory language pertaining to feeder service). And yet, 18 years after the passage of the ADA, almost all transit systems in the United States continue to provide service based on the binary model of separate fixed-route and paratransit services.

This study is intended to highlight the experiences of those systems that have attempted to depart from this model, by seeking a variety of ways to integrate their services. These include the provision of paratransit feeder services, community bus or circulators, connectors, fixed-route fare incentives, and route deviations. Since a previous synthesis study focused on the operational experiences with flexible transit services (Koffman 2004), this study places greater emphasis on feeder services and community circulators. However, where agencies have included other approaches to shifting potential paratransit riders to less costly modes, these also are discussed.

For the purposes of this synthesis, it is important to carefully define the terms included in the scope of the study to avoid duplication of previous efforts and examine more thoroughly those services that have thus far received limited attention. At the outset of the study it became clear that even commonly used terms such as paratransit required further clarification. In this study, paratransit service is defined as demand-response service that primarily serves people with disabilities as opposed to the general public. The study is focused on examples of integration that serve people with disabilities and general public riders, but the compelling reason for setting up the integrated service has been the need to manage paratransit costs or reduce the need for separate paratransit service. Examples of integration in which a shift in paratransit ridership has occurred, even when that was not the initial impetus for setting up the new service, also have been included.

The study addresses the following key issues:

- What cost savings can be accrued from the provision of feeder service and other alternatives to regular ADA paratransit service?
- What policies are associated with the effective implementation of feeder service?
- How have associated program features, such as travel training, fare incentives, and special amenities at transfer locations, facilitated the implementation of integrated services?
- Are feeder and other integrated services generally found in communities that share similar demographic and geographic features?
- What operational management approaches and policies have been adopted in those systems that have developed successful integrated services?
- How are transfers from paratransit to fixed-route service most effectively accomplished?
- Is specific technology required to implement service that requires transfers between modes?
- What barriers have prevented a greater integration of paratransit and fixed-route services?

This synthesis aims to help transit systems understand how appropriate use of integrated services may help them accomplish their mission. This has been accomplished through a review of the relevant literature in the field, surveys of transit agencies, telephone interviews with key stakeholders to obtain more in-depth information for case studies, and a site visit to an area of Oregon rich with examples of integrated service that are operating successfully. This report concludes with the key lessons learned from these efforts, and the presentation of suggestions for further research.

In the preliminary phases of the study, a search was conducted through the online version of the Transportation Research Information Service (TRIS). In addition to the nine articles and reports identified through this TRIS research, examples of integrated service were obtained from the study panel, previous studies that had been conducted by the study consultant, and a series of telephone interviews with leaders in the paratransit field.

In addition to developing a list of likely candidates of transit agencies that provide integrated services, the consultant was

assisted by APTA in the dissemination of the survey tool (Appendix B). The survey was placed on the web and a letter with a link to the website was sent via e-mail to members of the following APTA committees:

- Access
- Bus & Paratransit CEOs
- Bus Operations
- Human Resources
- Policy and Planning
- Small Operations

In total, the e-mail was sent to more than 346 committee members, covering a broad range of transit and paratransit operators and consultants. Follow-up reminders were sent two weeks after the initial e-mail. In addition, personal telephone calls were made to dozens of transit agency contacts to broaden the reach of the survey dissemination effort. Hard copy mail-outs also were offered as an alternative to the online version. Despite these efforts, a limited number of agencies (21) completed the survey. Additional responses were received from a number of transit systems, but their responses indicated that they did not provide integrated services as defined in the survey tool. The literature review and direct contact with a small number of transit agencies that had not completed the survey but nevertheless provide integrated service, expanded the number of examples that have been included in this study to 46.

REPORT ORGANIZATION

- Chapter two begins with an overview of the current status of integrated services, including the types of integrated services, lengths of experience, and the reasons for the limited application of services or the discontinuation of existing services.
- Chapter three describes design decisions that transit planners have made to assure the successful implementation of integrated services.
- Chapter four describes marketing efforts and the use of technology in the provision of integrated services.
- Chapter five presents case studies of successful integrated services.
- Chapter six provides conclusions and suggestions for additional study.

The appendixes contains the ADA regulatory language pertaining to feeder service (A), the survey tool that was used to obtain information about integrated services throughout North America (B), a brief summary of services reported by survey respondents (C), and the methodology used in one system to explore the feasibility of introducing feeder service (D).

CHAPTER TWO

STATUS OF INTEGRATED SERVICES

Based on the literature review, completed surveys, and later research, it was possible to confirm that at least 46 North American transit systems operate integrated services as defined in chapter one. This number includes systems for which no information (other than the existence of the service) was obtainable as part of this study. In the course of researching systems currently providing integrated services, a number of informants indicated that their system is considering implementing these services but has not yet taken the first steps. The web search also suggested that many paratransit programs include feeder service as an option in their riders' guides, even though they do not implement this service.

The 21 transit systems that responded to the survey with information about integrated services are located throughout North America, including 12 states and British Columbia. They operate in large urban, suburban, small urban, and rural areas. It is noteworthy that, despite the nation-wide reach of the survey dissemination and follow-up telephone research, western state transit systems, particularly in the northwest, appear to have taken a more proactive approach to integrating fixed-route and paratransit services than those in other parts of the country. Table 1 shows the transit systems, any abbreviations, acronyms, or shortened names used to refer to them in this report, the principal city of each operator, and a brief description of their integrated services. Appendix C provides additional details about each of the integrated services at the surveyed systems, apart from those that have been included as detailed case studies in the body of the report.

TYPES OF INTEGRATED SERVICE

Integrated service can be broadly defined to include all transportation models located on the transportation continuum between fixed-route services and paratransit. However, as stated in the Introduction, certain key modes within this continuum have been extensively covered in *TCRP Synthesis 53: Operational Experiences with Flexible Transit Services*. (Koffman 2004). These include route deviation, point deviation, demand-responsive connector, flexible route segments, and zone routes. In contrast to the present report, *TCRP Synthesis 53* did not focus on people with disabilities. However, the report did find that half of the flexible services included in the survey sample coordinated in some fashion with paratransit services. To avoid duplication and add to the body of knowledge on integrated services, this synthesis focuses on feeder service, while mentioning other services to the extent that they meet the study objectives. The reader is encouraged to use this synthesis as a complement to *TCRP Synthesis 53*.

There are a number of examples of feeder service that do not necessarily meet the study's objective of shifting paratransit riders. For example, in Orange County, California, the Orange County Transportation Authority (OCTA) provides route deviation for people with disabilities who live outside of the ADA paratransit service area. These riders are then transported to the ADA service area where they receive paratransit service. While this expands the mobility options of those who live outside the service area, it does not result in the containment of paratransit costs as it contributes to an increase in paratransit rides within the ADA paratransit corridor.

Many systems that cover large service areas require transfers between two paratransit operators, often at jurisdictional boundaries such as county lines. Finally, the literature provides numerous examples of general public feeder service into fixed-route, which is geared toward commuter trips. While presumably some number of commuters riding these services have disabilities, the absence of any planning with riders with disabilities in mind makes it difficult to quantify this market and determine any consequent reduction in ADA paratransit usage.

Even within this focused definition of integrated services, a variety of models were identified by service respondents, including:

- Paratransit feeder service. Paratransit service exclusively for people with disabilities that feeds into fixed-route service (variations can include additional legs of fixed-route and paratransit service).
- General public demand-response feeder service. General public demand-response service that feeds into fixed-route service at bus stops, park-and-rides, and light rail stations.
- Route deviation feeder service. Fixed-route bus that deviates for people with disabilities and older adults, and connects to the mainline fixed-route service.
- Community bus feeder/connector service. Community bus (service route model) in suburban and rural areas

TABLE 1
SUMMARY OF SURVEYED TRANSIT SYSTEMS

Agency/Principle City	Integrated Service Name	Brief Description of Integrated Service
Access Services, Inc. (ASI), Los Angeles, CA	**Other program:** Fare Free Program	Access Service clients can ride participating transit agencies for free. Access Services reimburses the transit agencies for the cost of the trip.
ACCESS Transportation Systems, Pittsburgh, PA	**Feeder Service:** ACCESS Transportation Systems **Demand Responsive Connector:** ACTA employer shuttles, ACTA "just in time" rides **Community Bus:** Work Link, Ship of Zion Route Deviation/Connector: Elder Express	**Feeder Service:** Paratransit feeder to or from a fixed-route stop. **Demand Responsive Connector:** ACTA Employer Shuttles - Fixed feeder route to fixed-route services from remote employer locations; ACTA "Just in Time" Rides - Picks up passengers at suburban bus stops and takes passengers where they need to go within 1.5 miles of the fixed-route service. **Community Bus or Circulator:** Work Link and Ship of Zion - circulate through neighborhoods to trip generators and to fixed-route transit stops. **Point/Route Deviation:** Elder Express - follows a fixed-route and schedule but will deviate upon request.
Madison County Transit, Granite City, IL	**Feeder Service:** Agency for Community Transit	**Feeder service in small urban area:** Paratransit service where passengers who are conditionally eligible or elderly are transported from a location not on a fixed-route to a transfer site to board a fixed-route bus.
Amador Regional Transit System, Jackson, CA	**Point/Route Deviation:** Amador Regional Transit System	**Point/Route Deviation:** All routes allow for route deviation of up to 1/2 mile from the fixed route by request.
Broward County Paratransit Services, Palm Beach, FL	**Community Bus:** Community Bus Service	**Community Bus:** 22 municipalities have partnered with Broward County Transit (BCT) for the provision of community bus service. All community buses connect to BCT fixed routes. The type of service provided (e.g., fixed-route, demand-response, deviated fixed-route, etc.), scheduled, routes, fares, etc. are determined by each city government.
Island Transit, Coupeville, WA	**Point/Route Deviation and Feeder:** Island Transit	**Point/Route Deviation:** All routes allow for route deviation of up to 3/4 mile from the fixed route by request for persons with disabilities and older adults.
Laketran, Painesville, OH	**Demand Responsive Connector:** Dial-a-Ride	**Demand Responsive Connector:** Dial-a-Ride passengers may book rides to park-n-rides and other bus stops to connect with commuter buses and local fixed-route buses.
RideSource, Eugene, OR	**Feeder Service:** RideSource (ADA paratransit) **Fixed-Route Feeder to Demand Responsive Connector:** Diamond Express **Point/Route Deviation:** Rhody Express	**Feeder Service:** ADA conditional riders can use the paratransit service to make connections to fixed-route service at bus stops or transit stations. **Fixed-route feeder to demand responsive connector:** Diamond Express operates as fixed-route commuter service from rural community to downtown Eugene, where it switches to demand-response for elderly and disabled. **Point/Route Deviation:** Local small community circulator following a fixed route and operating on an hourly headway. The route will deviate up to two blocks from the fixed route by request.
Mason Transit, Shelton, WA	**Demand Responsive Connector:** Dial-a-Ride **Point/Route Deviation:** Mason Transit	**Demand Responsive Connector:** Dial-a-Ride connects to regional fixed-route service to transfer passengers. **Point/Route Deviation:** Fixed routes deviate with two hour advanced notice.
Mass Transportation Authority (MTA), Flint, MI	**Demand Responsive Connector:** Your Ride	**Demand Responsive Connector:** Curb-to-curb paratransit service provides connections with fixed-route system at end of the lines and the downtown transfer center. The service is available to the general public who do not live near a fixed route.
Mountain Mobility, Asheville, NC	**Point/Route Deviation:** Black Mountain and Enka-Candler Trailblazers	**Point/Route Deviation:** When fixed-route service is not operating, passengers can request service from their location to connect to Asheville Transit routes for service outside of the Mountain Mobility service area.
Oahu Transit Service, Inc. (OTS), Honolulu, HI	**Point/Route Deviation:** Community Access Service	**Point/Route Deviation:** Community Access Service routes operate on a fixed route and perform curbside pick-up within a quarter to half mile of the route for disabled and elderly passengers.
Pierce Transit, Tacoma, WA	**Feeder Service: Demand Responsive Connector**: Bus Plus Mid-County **Point/Route Deviation:** Bus Plus	**Feeder:** Formal, mandatory, and extensive feeder program since early 1990's. Demand Responsive Connector: Dial-a-Ride service will connect passengers to fixed-route transit at transfer points. **Point/Route Deviation:** Deviated fixed-route services follow a fixed route and schedule but will deviate into neighborhoods upon request to provide curb-to-curb service.
Denver Regional Transportation District (RTD), Denver, CO	**Feeder Service on Access-a-Ride** **Demand Responsive Connector:** Call-n-Ride	**Feeder Service:** Access-a-Ride - The paratransit service occasionally connects with fixed-route transit services upon request by the passenger. **Demand Responsive Connector:** Call-n-Ride - Neighborhood based demand response service that connects with fixed-route services and other requested locations in the service area.
Sacramento Regional Transit District (RTD), Sacramento, CA	**Feeder Service:** Paratransit **Community Bus / Point/Route Deviation:** Neighborhood Ride	**Feeder Service:** Sacramento Regional Transit's paratransit service will provide connections to light rail stations upon request. The feeder service is not widely used or actively promoted, though light rail and bus usage by ADA paratransit certified is very significant. **Community Bus & Point/Route Deviation:** Nine general public fixed routes focused on neighborhood service are provided in Sacramento communities that provide deviations within 3/4 mile of the route for paratransit eligible individuals and seniors.
San Mateo County Transit District (SamTrans), San Carlos, CA	**Feeder Service:** RediCoast & Redi-Wheels **Community Bus/Point/Route Deviation:** Bayshore/Brisbane Shuttle	**Feeder Service:** Informal and limited feeder service upon request to BART and CalTrain. **Community Bus & Point/Route Deviation:** The Bayshore/Brisbane Shuttle operates on a fixed route and schedule but will deviate upon request.

(*continued*)

TABLE 1
(*continued*)

Agency/Principle City	Integrated Service Name	Brief Description of Integrated Service
San Joaquin Regional Transit District, Stockton, CA	**Point/Route Deviation:** Hopper	**Point/Route Deviation:** The RTD Hopper is a deviated fixed-route bus service connecting rural San Joaquin County communities to the urban and suburban communities. Most RTD Hopper routes will deviate up to 3/4 of a mile for ADA certified and elderly passengers
Sarasota County Area Transit (SCAT), Sarasota, FL	**Demand Responsive Connector:** SCAT-About	**Demand Responsive Connector:** SCAT-About provided curb-to-curb service to passengers in the SCAT service area and connected passengers to the main south county transfer point upon request. Discontinued because not enough paratransit riders shifted.
South Coast British Columbia Transportation Authority (TransLink), Vancouver, BC	**Feeder Service:** HandyDART (now Custom Transit)	Informal but extensive feeder service from paratransit to light rail, ferry, and bus.
Utah Transit Authority (UTA), Salt Lake City, UT	**Feeder Service:** Paratransit **Point/Route Deviation:** UTA Route F94, Brigham Lift	**Feeder Service:** ADA conditional riders are required to use the paratransit service to make connections to fixed-route service at bus stops or transit stations. **Point/Route Deviation:** Two deviated fixed-routes targeted to seniors, disabled, and general public passengers in areas where local fixed-route services were reduced. The route will deviate up to a 1/2 mile.
Whatcom Transportation Authority, Bellingham, WA	**Demand Responsive Connector:** Safety Net **Point/Route Deviation:** FLEX	**Community Bus:** Safety Net operates in rural, unincorporated areas of Whatcom County one or two designated days per week and connects passengers to main transit centers in Bellingham. **Point/Route Deviation:** FLEX is route deviation service with a fixed-route and schedule operated between Bellingham and several outlying communities in the county. The service will deviate upon request in specified areas.

that connects with fixed-route service and other community bus stops.

- Route or point deviations service. Fixed-route bus that deviates within specified corridors and at specified times of the day to pick up people with disabilities and older adults.
- Other integrated services. Assisted travel program that facilitates transfers between paratransit and fixed-route or two fixed-route modes at transit centers for those riders who would not be able to transfer unassisted; fare-free programs for paratransit registrants riding fixed-route service; shopping shuttles geared toward seniors and people with disabilities.

Table 2 summarizes the integrated service models found in the systems that responded to the synthesis survey. Some systems used specific terms or service names in their responses that have been changed for the purpose of this synthesis in order to maintain consistency in the report terminology. For example, some services known as Community Bus operate on a demand-response basis and connect with fixed-route stops; these are included in the demand-response feeder category in the table.

LENGTH OF EXPERIENCE

Most integrated services in this synthesis were initiated within the past decade. One notable exception is the feeder service in Tacoma, Washington, which has operated since the early 1990s. A possible explanation for the more recent introduction of integrated services could be the trend toward a number of associated developments that support these services. One key trend is the increase in more accurate eligibility screening processes, particularly in-person assessments. These assessments provide the data needed to make trip screening determinations for feeder service. Another trend is the increased availability of travel training, which allows more people with disabilities to consider using fixed-route and route deviation services for at least part of their trip. The continued

TABLE 2
TRANSIT SYSTEMS USING EACH TYPE OF INTEGRATED SERVICE

Type of Integrated Service	No. of Transit Systems
Paratransit Feeder	11
Demand-Response Feeder (or General Public Feeder)	9
Route Deviation Feeder	9
Community Bus Feeder/Connector	7
Route/Point Deviation	6
Other (Fare-Free Program, Transit Host, Shopper)	4
Total transit systems in Survey Sample	21
Total transit systems identified in study operating integrated service	34
Total service types reported	46

expansion of these trends suggests that more integrated service programs are likely to be implemented in the future. This is particularly true given that most transit agencies are experiencing severe budget pressures, and since they are already in compliance with the paratransit requirements of the ADA, they are seeking compliant methods of containing spiraling costs.

REASONS FOR INITIATING INTEGRATED SERVICES

A variety of reasons for integrating services were cited by survey respondents. To avoid the cost of providing separate fixed-route and ADA complementary paratransit services, a number of systems have chosen to provide fixed-route service that deviates for people with disabilities in compliance with ADA requirements. Those that have selected paratransit feeder service have partially been motivated by the cost savings accrued from shorter paratransit trips, but also to promote the independence of their paratransit registrants. Another reason for establishing integrated services occurs when transit agencies inherit pre-existing social service transportation programs and seek ways of consolidating the programs without disenfranchising existing riders. For example, Whatcom Transportation Authority (WTA) inherited a nonprofit operated transportation program for seniors and people with disabilities and, with the assistance of new sales tax funding, was able to maintain the essential deviated service elements while opening it to the general public.

REASONS FOR DISCONTINUING OR NOT PURSUING INTEGRATED SERVICE

In the course of researching possible feeder service case studies, a number of examples emerged in which transit systems indicated that they had explored and rejected the possibility of implementing feeder service, or implemented an integrated service that they were forced to discontinue. A sample of these systems is described.

Sarasota

Performance insufficient to justify expense: In 2001, the Sarasota County Area Transit (SCAT) implemented a new general public dial-a-ride (GPDAR) service in a suburban area of the county know as Venice Island that was designed to feed into the fixed-route service at a centralized pulse point on an hourly basis. One of the objectives of this service was to shift ADA paratransit and transportation disadvantaged riders to a higher productivity GPDAR service, which provided curb-to-curb service or service to the closest intersection. SCAT-About, as the service was called, provided approximately 5,000 annual trips. However, it was discontinued in 2006 because the proportion of ADA paratransit riders who shifted off of the ADA paratransit service was lower than expected. Even though approximately half did shift to SCAT-About, the productivity of three trips per hour and the resultant cost per trip were insufficient to justify running both programs simultaneously.

Calgary

Lack of interest from riders: In 2003, Calgary Transit conducted a pilot study to determine the feasibility of implementing feeder service. The plan was to identify paratransit riders in a specific geographic area and offer feeder service to a nearby CTrain (light rail) station. One hundred seventy-five customers were contacted by telephone to assess their suitability and interest in participating in the trial feeder project, and not one indicated an interest in participating. The primary reasons for this lack of interest were: a) they generally avoided traveling to the downtown destinations of the CTrain, b) customers felt unsure about how to ride the train, c) they were unable to walk long distances, d) variable health conditions and travel patterns were unpredictable, and e) they could not stand for long periods waiting for a train or while riding the train.

The agency concluded that to effectively implement feeder service in the future, the screening criteria would need to be changed to include the whole service area and all times of the day, and that feeder service will need to be offered on a mandatory basis. Access Calgary, the Calgary Transit paratransit provider, is considering exploring feeder again sometime in the future owing to the confluence of a number of trends. The city has recently annexed an additional 103 square kilometers, thus dramatically expanding the paratransit service area and requests for service from remote locations. Access Calgary also has overhauled the eligibility screening process to include an in-person component for most applicants. Finally, the agency is currently installing mobile data terminals on its paratransit vehicles. These factors are contributing to the reassessment of feeder feasibility. What remains to be seen is whether there is the political will to implement mandatory feeder service.

New York City

Implementation deferred: At the time of this report, Access-A-Ride had decided to hold off on implementation of feeder service after conducting extensive research with other programs. A small feeder pilot program between Brooklyn and Manhattan was implemented in the early years of Access-A-Ride service, but gradually was phased out as call takers found it easier to simply schedule a paratransit trip for the full length of the trip.

Whatcom Transportation Authority

Replaced by fixed-route service: WTA, which serves the north-west corner of Washington State, has discontinued one of its deviated services and replaced it with fixed-route service. A number of respondents indicated that these services

can serve as testing grounds to determine the feasibility of fixed-route service, and when the productivities reach a predetermined level, the agency replaces the integrated service with fixed-route.

Eugene

Schedule adherence issues as a result of deviations: In Eugene a local circulator service that also provides deviations for people with disabilities is being replaced by regular ADA paratransit service because the demand for deviations made it difficult to adhere to the schedule.

OTHER BARRIERS TO INTEGRATED SERVICE

Only a few integrated services included in the survey sample had to be discontinued, usually owing to funding constraints or lower-than-expected productivities. However, even those agencies that currently provide services discussed barriers that needed to be addressed or barriers they faced that prevented them from implementing integrated services even when these appeared appropriate. One of the challenges that a number of transit agencies report is the need to educate customers on how to use integrated services, since these varied from the more familiar fixed-route/paratransit models. Since the motivation for implementing these services was frequently fiscal constraints, agency staff had to educate the public about the tradeoffs they considered when designing new services.

Other challenges for transit agencies when implementing integrated services included:

- Developing a paratransit eligibility screening program that can accurately identify conditions that facilitate feeder service;
- Identifying transfer locations that are sheltered and safe;
- Ensuring that the deployment of paratransit vehicles to the integrated service did not impact the paratransit fleet capacity; and
- Explaining to consumers and policy decision makers why feeder service is consistent with the goals of the ADA.

As a means of addressing some of these barriers, one survey respondent emphasized the importance of involving advocacy groups early on in the process of designing integrated services.

CHAPTER THREE

SERVICE DESIGN, PLANNING, AND OPERATIONS

IDEAL ENVIRONMENTS FOR THE PROVISION OF INTEGRATED SERVICES

This chapter presents a range of elements generally conducive to the provision of integrated services in a community. They are summarized here:

- Disability community representatives are likely to be resistant to feeder service initially; however, early involvement in service design and educating consumers about the reason for implementing feeder or other integrated services usually leads to an overall acceptance in the community. In addition, agencies have found that consumers who are initially apprehensive about transferring to fixed-route become increasingly confident over time.
- Paratransit service areas that are geographically elongated or constrained, with a central arterial corridor running the length of the service area, and relatively frequent fixed-route service, are likely to be good candidates for feeder service.
- Feeder service should be offered as an exclusive option for conditionally eligible riders (i.e., mandatory option), depending on the characteristics of a specific ride request. Very few individuals are likely to use feeder on a voluntary basis.
- Feeder service drivers need to be trained to understand special codes that indicate the conditions under which a rider can use fixed-route service.
- Scheduling staff need to be educated about the value of providing integrated service, particularly feeder service. Since they would not necessarily be motivated to schedule a two-legged trip, which is more complicated and time-consuming than a direct paratransit trip, they need to understand what role integrated service plays in fulfilling the agency's mission.
- Integrated services are particularly effective in shifting paratransit riders when offered as part of a package of program revisions, including enhanced eligibility screening and recertification, travel training, and heavily discounted fixed-route fares.

Populations Served

The synthesis survey was intended to identify programs designed with people with disabilities in mind or benefited this population. Feeder services identified in the survey primarily serve riders with disabilities, whereas other integrated services often were open to the general public. Some paratransit programs offer feeder service only to riders with specific eligibility conditions; these are referred to as mandatory feeder in this synthesis. Apart from mandatory feeder services, the proportion of riders with disabilities varied significantly in these programs. The staff person from the route deviation service in Asheville, North Carolina, estimates that roughly 40% of the riders on the system are people with disabilities. In Portland, Oregon, Ride Connection estimates that 81% of the riders on the various shuttle services in the region are ADA paratransit eligible, even though they are open to the general public. In the employer shuttle program administered by SamTrans, 14% of the riders are people with disabilities, even though the service was not necessarily designed with this population in mind. In the deviated fixed-route system in Amador County, California, 39% of the riders are elderly or disabled. Other sources indicate that while they have not quantified these proportions, a significant proportion of passengers on their integrated services are people with disabilities.

Should Feeder Service Be Voluntary or Mandatory?

At a number of systems identified in this synthesis, such as Pierce Transit (Tacoma), ACCESS (Pittsburgh), and UTA (Salt Lake City), if the eligibility process has determined a registrant is able to use fixed-route under certain conditions and a requested trip meets the system's guidelines for feeder service, then the rider is offered only the feeder option. Pittsburgh also offers conditionally eligible riders an alternative if they would prefer to travel the whole trip on paratransit. This trip, known as convenience fare, costs twice the regular paratransit fare.

In principle, feeder also could be provided as a voluntary option for riders. Since, in most cases, a feeder trip will have longer travel time than a direct paratransit trip, few users would choose this option unless there was a substantial fare incentive. Based on the experience of transit agencies that have successfully implemented feeder service, making this service mandatory is the only option that will guarantee sufficient use of the service to justify the efforts needed for widespread implementation.

A number of transit agencies (e.g., Calgary, SamTrans, King County Metro) indicated they had offered feeder service on a non-mandatory (i.e., voluntary) basis, but had received

close to zero responses. One paratransit rider who volunteered for feeder service in King County found that the buses always were full when he got dropped off at the transit stop. Since he did not have a visible disability, the driver did not know to ask passengers in the front seat to vacate their places for this rider. Other agencies in the synthesis sample offer voluntary, informal feeder service, such as in Sacramento and San Mateo County. In these instances it is difficult to establish the volume of usage, short of conducting an analysis of trips to transfer locations for a specified time period. Staff at SamTrans indicate that the usage of transfers to the commuter rail system is probably quite limited. In comparison, in Sacramento, the volume of trips by ADA paratransit card holders on both the light rail and fixed-route bus service suggests there is likely heavy usage of voluntary feeder service. In FY 2007, 841,000 ADA paratransit registrants rode on Sacramento's bus system (4.8% of total ridership), and 354,000 registrants rode light rail (2.4% of the total). Part of the reason for this success is the package of services offered to people with disabilities, including extensive travel training, which is discussed in more detail in the Case Study section of this report. As a result of this package of services, paratransit registrants appear to be taking a portion of their trips on paratransit and some on fixed-route services.

Another possible exception to the ineffectiveness of the voluntary approach can be found in systems that have exceptionally short headways and poor quality paratransit service. For example, in Vancouver, British Columbia, where paratransit riders can transfer to a SkyTrain (elevated light rail) service that operates on less than two minute headways, many focus group participants indicated that they welcomed the opportunity to use feeder service. An analysis of paratransit drop-offs at SkyTrain stations in 2007 indicated that more than 6,000 riders used paratransit to get to SkyTrain, in addition to those who rode paratransit to bus stops and the accessible commuter ferry service (C. Maruyama, TransLink, personal communication, Nov. 15, 2007).

Eligibility Screening

Feeder programs generally serve paratransit customers who, according to the eligibility definitions in the ADA, could use fixed-route service but cannot access a bus or train stop because of their disability. An effective eligibility screening program is a necessary building block for determining which customers would be eligible for using feeder service. For those systems considering implementing feeder service, a critical first step may be to modify eligibility summary forms to provide more information about eligibility conditions. Because feeder service involves traveling between the registrant's home and a bus/train stop and between a bus/train stop and the destination, it is essential to know approximately how far the individual can travel unassisted, the impact of curb cuts and sidewalk conditions, and terrain and environmental issues. Knowing how far an individual can travel unassisted, combined with the characteristics of specific trip requests, can enable paratransit programs to assign some lengthy trips to feeder service.

The largest systems with formalized, mandatory feeder programs all include detailed information on riders' eligibility conditions. Some also conduct environmental assessments in locations used by frequent riders to determine if there are any barriers that would not be apparent from reviewing a map. In Salt Lake City, a transit supervisor visits the home of every conditionally eligible rider to identify features that may present barriers to accessing the bus or light rail stop from their home. Moreover, UTA is identifying specific accessible locations along each bus route, and is adding markers for those locations in their scheduling software to expedite the trip booking process for trips requiring transfers. In Tacoma and Pittsburgh, each trip requested by a conditionally eligible rider is reviewed to determine if a fixed-route alternative is available for feeder service or for the whole trip.

Fares and Multiple Transfers

Paratransit feeder service requires fare coordination between the fixed-route and paratransit programs. Of the 15 systems in the survey that provided information about fares on trips that require a transfer, five charged a fare for the feeder leg only, five for the fixed-route leg only, four charged both the feeder and the fixed-route fares, and one is entirely fare-free. While fares are clearly just one component in overall service design, it is noteworthy that the systems with the lowest cost to the rider (i.e., fixed-route only or fare-free) also are among the most successful feeder programs. For Pittsburgh the rationale for charging fixed-route fare only is that paratransit riders should be given an incentive to use fixed-route where possible, so it is preferable to charge the lower of the two fares.

Apart from the system in Vancouver, British Columbia, where paratransit service between areas is often very limited or inconvenient and the fixed-route service is sufficiently attractive to paratransit riders to override fare concerns, the three other systems that charge fares on both legs either have very limited usage or have been discontinued.

Most systems that provide feeder service limit this option to a two-legged trip, with paratransit feeding into fixed-route on the out-bound trip and vice versa for the return. In Tacoma, feeder service involving three legs—paratransit to fixed-route to fixed-route—is not uncommon. Occasionally, usually when passengers cross county lines, they are required to travel from paratransit to two fixed-route legs. Similarly, in Salt Lake City riders may be required to transfer between two fixed-route buses if such a transfer is required of the general riding public (exceptions are made for riders whose condition explicitly states "no transfers"). In Granite City, some passengers' three-legged trip involves paratransit to fixed-route to paratransit. However, in systems that use this model, the level

of coordination required usually implies that three-legged trips only occur on very long trips. In Pittsburgh these double feeders are generally provided for trips that are 10 to 15 miles.

Delays to Vehicles and Passengers

In most integrated services that require transfers, the paratransit driver does not wait for the fixed-route vehicle to arrive. Out of the 12 systems in the sample that responded to this question only two wait, and the remainder either do not wait or address this issue on a case-by-case basis. If the paratransit vehicle does not wait at the stop, that may be referred to as a drop and go transfer. Well-coordinated transfers and timely arrivals can increase the productivity on the paratransit system (one of the goals of a feeder program) while minimizing inconvenience to the customers. If paratransit vehicles wait for the transit vehicle to arrive, potential productivity gains can be negated if the vehicle has to wait a long time. Long waits are not unlikely considering the uncertainties of paratransit scheduling, and the need to ensure that the transfer is not missed.

Drop and go operations may lead to long wait times and safety issues for customers, which may render this option unacceptable to some transit agencies and their communities. Most systems have wait times in the 5 to 10 minute range. However, even in a system such as Pierce Transit, where 30 and 60 minute fixed-route headways are not uncommon, wait times generally range between 5 and 20 minutes. However, with the recent introduction of 15 minute headways on all trunk routes, the agency attempts to bring conditionally eligible riders into the trunk route corridors in order to minimize the amount of coordination required with fixed-route schedules. In Salt Lake City the average wait time for both the fixed-route and the paratransit vehicle is just 5 minutes. Under ideal conditions, such as those described in Vancouver, British Columbia, wait times are inconsequential owing to the frequency of fixed-route service.

Provision also must be made for the eventuality that the transfer is missed. In this case, if the next fixed-route bus is not due for more than 10 or 15 minutes, it may be necessary to provide a direct paratransit trip to the rider's destination. Agencies with comprehensive feeder programs provide paratransit-only guarantees for riders in the event that the bus is missed, which occurs infrequently.

A less well-defined situation exists when a rider is being picked up from a train station or a bus stop and the incoming train or bus is running behind schedule. If the delay is minimal, say five minutes, the paratransit vehicle can generally wait for the rider without unduly impacting schedule adherence. However, if the fixed-route service is significantly late, the rider cannot be stranded and the paratransit program needs to establish a protocol for returning to pick up the individual after the initial missed trip. A precedent for this situation may be found in the commonly used practice known as medical will calls, in which an individual whose medical appointment ended later than the paratransit pick-up time is required to wait until the next paratransit vehicle is available for this unscheduled trip. Transit agency staff indicate that with the increased use of cell phones and inter-modal radio communication these situations can generally be effectively addressed, particularly since they are rare occurrences. However, it is important that transit agencies that operate integrated services that incorporate transfers develop protocols to address these situations.

Transfer Locations

Most systems that require transfers to fixed-route use transfer points that are safe and sheltered (see example, Figure 1). In Tacoma, Pierce Transit primarily uses Transit Centers or major park-and-ride facilities. These generally have a shelter, seating, a telephone, and serve multiple routes. These locations are also priority areas for security. For systems in regions with more extreme weather conditions, such as Granite City, Illinois, heat and air conditioning are necessary elements at the transfer locations. Shopping malls or downtown transit centers, such as those used in Flint, Michigan, as transfer points, usually meet these criteria.

Productivities and Productivity Thresholds

Consistent with systemwide performance criteria for continuation of bus routes, productivity thresholds have been established for a small number of integrated services included in the survey. Establishing thresholds sometimes requires a paradigm shift for policy makers who may view integrated services as unproductive when comparing them to fixed-route services. However, in comparison to prevailing paratransit productivities, integrated services usually generate higher trips per hour. It is generally difficult to determine productivity

FIGURE 1 Call-n-Ride transfer point in the Denver Metro Area.

levels for both feeder services and route deviation services, as these are usually integrated into systemwide paratransit or fixed-route services, and it is not possible to isolate the portions of trips that can be attributed to the integrated service component. However, Table 3 indicates that a few programs have established three to four trips per hour as minimum productivity thresholds for continuation of their integrated services. Overall, productivities range from just over two in rural areas to almost 10 trips per hour in suburban Broward County, Florida, and where comparative information is available, the productivities of the integrated service almost always exceed that of the paratransit program in that area.

Staff Training and Driver Selection

Most systems indicate that training provided to integrated services staff is the same as that provided to paratransit staff. However, in Pittsburgh drivers are trained to read special codes in their manifests that include fixed-route bus time information. Schedulers also are trained about the mission of the various integrated service programs, and are provided specialized training on the importance of on-time performance and reliability, particularly when transfers to fixed-route are involved. In Broward County, drivers in the Community Bus Service are required to undergo both municipality and county trainings.

Overall, given that integrated services can contribute to an increase in fixed-route ridership by people with disabilities, bus drivers may need to receive additional sensitivity training if this is not already incorporated into the driver training curriculum. At the UTA system, the staff person explained the agency's approach to bus driver training as follows: When the free fare program was implemented, staff retrained the fixed-route drivers with the following message: "our vehicles are all 100% accessible, now your attitudes must be 100% accessible and inclusive. Either you as the fixed-route drivers can help passengers with the transition to fixed-route and make sure it's successful, or the paratransit department will have to take your operating money to continue providing transportation to our disabled population" (Cheryl Beveridge, personal communication, March 6, 2008).

Driver selection for integrated services is generally bid based on seniority. Drivers select their own assignments through the markup procedure outlined in the labor agreements. In Sacramento, all drivers in the regional transit system are hired into Community Bus first, with an option to move into "big buses" over time. In contrast to this approach, in Laketran, Ohio, drivers selected for integrated service are likely to have been with the agency for a few years and have a full understanding of the system and the customers' needs.

Vehicles Used in Integrated Services

Vehicles used in integrated services are almost invariably the same as those used in paratransit services, although many systems dedicate specific vehicles to these programs. While the same vehicle types may be used as in paratransit, vehicles in integrated services often are branded differently to distinguish them from other services. In Whatcom County, small vehicles (less than 29 feet) in the deviation service also are used as backup for paratransit, while those longer than 29 feet are used for deviated and fixed-route services.

COST SAVINGS

Since integrated service is often provided as part of a package of innovative service models, it is often challenging to isolate the cost benefits that can be attributed to these services. However, a number of interesting findings have been documented. In the in-depth analysis conducted as part of the *TCRP Web Document 2: Evaluating Transit Options for Individuals with Disabilities*, (Multisystems and Crain & Associates 1997) cost savings from feeder service were calculated at Pierce Transit and BC Transit (now known as TransLink). Annual operating savings from reduced paratransit vehicle time were estimated at $139,000 for BC Transit (1.3% of total paratransit budget) and $147,000 at Pierce Transit (1.2%). Since BC Transit operated in a non-ADA environment, feeder service provided travel opportunities that might not exist otherwise, and did not previously exist. Therefore there was no basis for calculating any savings from reduced demand. However, the reduction in demand at Pierce Transit resulted in a cost savings estimated at $709,000, which, combined with the savings from the reduced paratransit vehicle time, represented 7.5% of the total paratransit budget.

In the sample included in this synthesis, the San Joaquin Regional Transit District estimates that total transit service operating cost was reduced by 50% in the rural areas where route deviation services replaced separate fixed-route and paratransit service in San Joaquin County. A number of sampled agencies indicated that they assumed there were cost savings simply because of the lower costs per trips of the different modes, but have not documented this assumed savings.

UTA has introduced a package of measures to encourage fixed-route usage for its ADA paratransit registrants. The agency has documented very significant savings that can be attributed to the introduction of more accurate eligibility screenings, feeder service, free fixed-route fares for ADA paratransit eligible riders, and a buddy ride-along program. Annual savings accrued from the resultant decline in paratransit ridership have exceeded $350,000 four out of five years since 2002.

WTA serving northwestern Washington state, estimates that annual cost savings of as much as $350,000 have been accrued from the provision of FLEX service instead of fixed-route and complementary paratransit service in their rural areas. Route deviations account for about 9% of the total trips on this service, many for individuals who would be ADA paratransit eligible.

TABLE 3
RIDERSHIP AND PRODUCTIVITIES

System Name	Service Type(s)	Annual Integrated Service Ridership	Annual Paratransit Ridership	Current Productivity of Integrated Service (Boardings per Vehicle Revenue Hour)	Current Paratransit Productivity (Boardings per Vehicle Revenue Hour)	Productivity Threshold (Boardings per Vehicle Revenue Hour)
ACCESS Transportation Systems (Allegheny County)	Feeder Service	2,500	1.7 million		2.3	
	Demand-response local circulators which also serve major transit stops					3.8
Agency for Community Transit, Granite City IL	Feeder	approx. 30,000	120,000			
Amador Regional Transit System	Point/Route Deviation	106,042	N/A			
Broward County Paratransit Services	Circulator or Community Bus	2,178,863	834,204	9.5	1.7	5
Laketran	Feeder Service/Demand Responsive Connector	1,040	337,000			
Mason Transit, WA	Demand Responsive Connector	55,466		2.3		
Mountain Mobility, Asheville, NC	Point/Route Deviation	8,238, 40% disabled (est.)	113,961		2.2	
OTS (Honolulu, HI)	Point/Route Deviation	83,697, disabled 1,314	807,935	7.7	2.5	4
Pierce Transit	Demand Responsive Connector	19,600	363,000			
	Feeder	8,536				
	Point/Route Deviation	120,000				3
Regional Transportation District (Denver, CO)	Demand Responsive Connector	303,323 – 5,000 people with disabilities	596,384	4.7	1.2	3
Sacramento Regional Transit District	Circulator/Community Bus Route Deviation	397,311, about 15,000 disabled		12.3		
Stockton, CA Hopper service	Route Deviation Connector	135,000	84,000	4.6		3
Whatcom Transportation Authority	Circulator or Community Bus Route Deviation	1,446 95,754	159,177	2.3 9.6	3.1	
UTA, Salt Lake City	Feeder	N/A	484,000		2.2	
Lane Transit District	Feeder Service	404	121,074			
TransLink Vancouver	Feeder Service	over 6,000	1,087,000		2.1	

N/A = not available.

Another example that illustrates the substantial savings that can be accrued through shifting paratransit riders onto integrated service may be found in the Denver region Call-n-Ride program. By taking into account the difference between an ADA paratransit ride (approximately $50 per trip) and a Call-n-Ride trip ($15 per trip) and documenting the percentage of riders who board with an ADA card, the agency has estimated that annual savings in 2008 could reach $458,000. These estimates include both amortized capital as well as operating costs.

Fixed-route fare incentives represent another significant cost saving that is not based on service operations, but rather a policy that promotes integration of fixed-route and paratransit services. In Los Angeles, ASI offers paratransit riders a Free Fare Program to ride the various fixed-route systems in the county. ASI estimates that in 2007 1.3 million fixed-route trips were taken by ADA paratransit registrants, which represented a cost savings to the agency of $26 million.

CHAPTER FOUR

MARKETING AND TECHNOLOGY USED IN INTEGRATED SERVICES

MARKETING

With the exception of mandatory feeder services, integrated services have generally been quite proactive in publicizing their services. In Broward County, Florida, individual municipalities conduct their own marketing campaigns for the community bus service in their community. In addition, detailed Community Bus Service information is available on Broward County Transit's website or through the Customer Service help line. Finally, Community Bus Service is also included in all presentations or public outreach performed by the paratransit services staff, further enhancing the goal of shifting trips from paratransit to Community Bus Service where possible. In Asheville, information about the route deviation service is provided in brochures, route maps, and schedules. In San Joaquin County, the Hopper deviated routes are distinguished from regular bus routes through color coding of routes in printed schedules and maps and a unique route numbering system.

In Pittsburgh, the local Transportation Management Associations conduct extensive marketing of the employer shuttles, including on-board paratransit vehicles to attract riders with disabilities. The Elder Express—demand-response service available to seniors and people with disabilities that connects to fixed-route service—has been promoted through extensive public outreach. This includes special free days and partnerships with local businesses and faith-based communities.

To the extent that integrated services also can promote their programs in a manner integrated with the ADA paratransit program, they can be more effective in shifting some rides to the lesser cost alternatives. In the call-n-Ride program in Denver, if callers to the ADA paratransit call center request a trip that is fully located within one of the 20 call-n-Ride service areas, they are advised that this would be a free option for them. As a result, more than 13,000 ADA paratransit customers are projected to use call-n-Ride in 2008, an increase of almost 200% since 2006; the proportion of ADA eligible riders for February 2008 represented more than 2% of the total call-n-Ride boardings. In addition, Denver RTD has teamed with the local municipalities to advertise the program through utility bills, schools, libraries, and recreation centers.

Another effective means of promoting integrated services is through travel training programs. In Sacramento, where Paratransit Inc. has travel trained more than 9,000 individuals, publicizing the variety of accessible options available to individuals with disabilities has been a very effective contributor to the substantial number of disabled riders on fixed-route service.

Mandatory feeder programs generally do not market feeder service, but rather explain in the rider's brochures that service to those conditionally eligible may require a transfer to fixed-route service. ACCESS in Pittsburgh complements this information by providing details in the eligibility determination letter and in follow-up telephone calls with the registrant, in addition to a one page fact sheet and a personal trip planning service. Pierce Transit sends a DVD to all registrants found conditionally eligible for paratransit service, describing the range of accessible mobility options.

TECHNOLOGY

Apart from those integrated services that require transfers between modes, generally no specialized technology is necessary beyond the conventional scheduling software and Automated Vehicle Locators (AVLs) that have recently come into widespread use in fixed-route and paratransit modes. In some instances, such as the senior-oriented circulator shuttle in San Mateo County, simply the use of a cell phone allows systems to take trip requests in real time and allow for a demand-response component. Technology may play a role in the facilitation of feeder services, although as is evident in the early years of the Pierce Transit and BC Transit feeder services, it is not necessarily required. Various technology elements that are usually cited in feeder services include scheduling software that comprises an interface with fixed-route schedules, the use of Mobile Data Terminals (MDTs) and AVLs. In addition, transit agencies emphasize that having radio systems that can switch between paratransit and fixed-route channels can be particularly helpful. Finally, in order to minimize the stress associated with long wait times at bus stops, the use of estimated time of arrival technology can be particularly effective. This is particularly true in transit systems with infrequent service where paratransit drivers do not wait with the passenger for the bus.

The majority of paratransit programs in North America use three scheduling software applications: the PASS program offered by Trapeze, ADEPT offered by StrataGen (recently

purchased by Digital Dispatch Systems, Inc.), and RouteMatch TS, which tends to be used by smaller and medium sized systems.

In Pittsburgh and Tacoma until fairly recently (pre-2005), the paratransit programs routinely conducted trip eligibility screening without the use of technology, which frequently resulted in feeder trips. In Tacoma this was achieved as follows:

> When a rider designated as 3b (feeder) eligible requests a SHUTTLE trip, the call taker checks on a map to see if the distance from the rider's trip origin to the nearest transit center is less than to the rider's destination. If it is, and the trip is a repeat trip, then it is entered as a feeder trip in the daily trip schedule immediately. The trip reader then . . . refers to a binder with various trip plans to determine . . . how a feeder trip can be arranged and calls the rider back with a trip plan.

This manual approach, in which the reservationist relied entirely on maps, binders with trip information, and photographs from environmental assessments, generated roughly 600 feeder trips per month. Since the system purchased new scheduling software, the trip screening process has become more automated, but not entirely so. Pierce Transit elected not to purchase the Inter-Modal Trip Planner module that is available through the ADEPT software application, so individual trip plans are entered manually by the eligibility staff and viewed separately from the trip booking process by the reservationists.

In the detailed analysis of BC Transit's feeder service provided in the TCRP study, "all the schedulers who were interviewed agreed that, for two-legged trips, feeder trips required no more telephone scheduling time than direct paratransit trips (this could be due to the short fixed-route headways that precluded the need for coordination between modes). As for the three-legged trips, involving both a feeder and distribution leg on paratransit, these typically involve two different paratransit operators, and most of the operators require the riders to make arrangements with both operators. One paratransit operator that does coordinate with the other paratransit operator estimated that coordination with the other operator adds five to 10 minutes to the scheduler's time for a three-legged trip."

While these examples indicate that conducting trip screening to arrange feeder trips can be accomplished without the use of technology, the current trend is certainly toward the use of increased technology.

Trapeze's PASS scheduling software package provides a Coordinated Transportation module with two components relevant to this synthesis: a) multi-modal and b) feeder. This application can integrate fixed, flex, and paratransit service in the following ways:

- By performing behind-the-scenes fixed-route itinerary planning to determine the specifics of any available fixed-route alternative as a basis for determining eligibility for ADA paratransit service;
- By offering a flex or fixed-route solution as a lower cost alternative to paratransit service; and
- By offering flex or fixed-route service as part of a multimodal (e.g., feeder) solution in which a trip request is fulfilled through some combination of fixed, flex, and paratransit service linked by transfers at designated transfer points.

When using PASS for integrated service, the transit agency also must use Trapeze's fixed-route scheduling package to allow for the easy importing of fixed-route itineraries into the paratransit scheduling function. While this enhancement to the regular scheduling software only has been requested by a handful of agencies, even these largely have not used this function. The primary cause given by a software company representative is that policy makers and managers at these agencies may be unwilling to take the political heat of offering a paratransit ride that does not deliver the rider to their destination. However, given the increased demand for functions that make trip eligibility screening feasible, it is possible that the trend toward applying eligibility conditions will encourage use of feeder service in the future.

RouteMatch TS is another paratransit scheduling and routing application that enables integration between demand-response and fixed-route services. According to the vendor, the fixed-route display module allows the provider to visually see its fixed-routes, bus stops, time points, and display the 3/4 mile boundaries from bus stops. The user also is able to determine which customers are located within the ADA paratransit boundaries. By combining the fixed-route display module and associated ADA GeoSpatial features, the reservations agent or scheduler can conduct trip by trip determinations based on the customer's eligibility conditions. In addition, accessibility information about individual bus stops that can be used by the reservationist as part of the trip booking process can be provided through the Bus Stop Data Model.

The Inter-Modal Trip Planner module available through ADEPT performs similar functions to the paratransit/fixed-route interface described in the other two software applications.

For other integrated services, survey respondents described additional uses of technology. In Whatcom County's circulator service, WTA used the mapping platform in their former system (MIDAS-PT/TransCad) and their current system (Trapeze PASS/ARCView) to manage service conditions, such as days and hours of service, service area boundaries, and connections to fixed-route and paratransit. Some agencies in rural or mountainous areas indicated that they are unable to use AVL/MDTs because of restrictions on communications.

CHAPTER FIVE

CASE STUDIES

Eight transit systems with integrated services have been chosen for case studies. In addition to these case studies, Appendix C provides summaries of 14 other systems that responded to the survey. One additional case study for Oahu, Hawaii, where feeder service was explored but has not yet implemented, is presented in Appendix D. Included in this chapter are more detailed service descriptions, operating methods, some background, and operating results. These case studies listed here were chosen because of their innovative character, performance, and availability of information. Ridership numbers and financial information are for fiscal years 2006 and/or 2007, unless otherwise stated:

- TransLink (Vancouver, BC);
- Pierce Transit (Tacoma, WA);
- Utah Transit Authority (Salt Lake City, UT);
- Agency For Community Transit (Madison County, IL);
- ACCESS (Allegheny County, PA);
- Community Bus Services (Broward County, FL);
- Ride Connection (Portland, OR); and
- Lane Transit District (Eugene, OR).

TRANSLINK (CUSTOM TRANSIT), VANCOUVER, BC

Feeder Service

Custom Transit, formerly known as handyDART, is the name of the paratransit service operating in the greater Vancouver region. The region has a population more than 2 million. Custom Transit provides approximately 1.1 million annual trips, and has an overall productivity of 2.1 trips per revenue hour.

Custom Transit has been providing feeder service on an informal basis for more than a decade. Since this is not a formal program with specially designated codes for feeder trips, numbers of trips can only be estimated based on the volume of paratransit trips to SkyTrain, the elevated light rail system, and SeaBus, the local commuter ferry system. In 2007, more than 6,000 Custom Transit passengers were taken to these locations. An unknown number also were taken to bus stops. This system was the subject of a very detailed analysis in *TCRP Web Document 2* (Multisystems and Crain & Associates 1997). Following is a discussion of some key findings from that report.

Custom Transit service is provided by seven operators under contract to TransLink. Each operator provides its own call-taking, scheduling, and dispatching within a primary service area. Transfers between operators are common.

Feeder service evolved as a way to provide long trips between the suburbs and central Vancouver that would otherwise be too expensive or time consuming owing to traffic congestion. Travel between the suburbs and downtown is limited because of water barriers crossed by very few bridges, and because there are no freeways that provide connections to the downtown area. There are no formal criteria for determining which riders or trips are offered as feeder trips. According to the schedulers interviewed, three-quarters of the feeder trips provided are mandatory. That is, the rider is politely offered a feeder trip or no trip at all (trip denials are not illegal in British Columbia).

Typically, a feeder trip is offered if the eligibility information indicates that a rider can board SkyTrain and/or SeaBus; *and* the trip destination is close to a SkyTrain stop or can be easily coordinated with another operator whose primary service area is close to that stop, *and*:

- The requested destination would require a lengthy paratransit trip; or
- The requested trip occurs during peak hours; or
- The rider asks for a feeder trip.

Many riders have learned to ask for a feeder trip because they have learned that a direct paratransit trip to their destinations during specific service hours will not be available.

When a passenger transfers from Custom Transit to SkyTrain or SeaBus, the paratransit vehicle drops the passenger off without waiting for the train or ferry to arrive. The short headways on these two modes already have been mentioned elsewhere in this report, precluding the need for coordination with Custom Transit. Operators indicated that, more often than not, passengers already are waiting when the van arrives for the pick-up from the train or ferry.

Because of the reliability of the fixed-route modes, most feeder trips are for social/recreational and employment purposes. Focus group participants who use feeder service preferred feeder to direct paratransit service on a number of measures (travel time, schedule convenience, service availability, sense of independence). Direct paratransit scored better on personal effort and comfort level. Of the

49 respondents to a survey in the TCRP report, 63% indicated that they used wheelchairs, in contrast to 23% for the service as a whole.

The following excerpt from the Custom Transit Policy and Procedure Manual presents the fare policy for those who transfer between Custom Transit and conventional modes:

> Custom Transit passengers are entitled to use SkyTrain, SeaBus, West Coast Express (commuter rail) and buses, and may transfer between these conventional transit services and Custom Transit. When transfers between Custom Transit and these services occur, fares will be paid and collected as follows:
>
> - A passenger who begins a trip on conventional transit may use a transfer or validated FareSaver ticket as proof of payment in lieu of a Custom Transit fare. Transfers are date and time-stamped to allow 90 minutes of transit travel. When the passenger transfers to Custom Transit, the transfer should be accepted as long as it shows the correct date.
> - A passenger who begins a trip on Custom Transit will pay the correct fare to the transfer point. The Custom Transit driver will give the passenger a three-zone FareSaver ticket, as proof of fare payment, for continuation of the journey on conventional transit. Contractors are required to stock three-zone FareSaver tickets to use as transfers. Occasionally a driver may not have a FareSaver ticket to give the user, and in such cases the passenger shall be required to pay the applicable fare on conventional transit.
> - If the passenger transfers back to Custom Transit for a third leg of the trip, then the passenger can use the transfer or validated FareSaver that was issued on conventional transit.
> - If the client transfers between Custom Transit and the conventional transit modes on a high monthly frequency or subscription basis, the client should consider the purchase of a full fare monthly 3 Zone Fare card.
>
> A detailed analysis of the demand and cost implications of feeder service in the Custom Transit program revealed the following:
>
> - Paratransit trips that included a feeder portion averaged 12 miles, of which 4.9 miles was on the paratransit feeder leg(s);
> - Average trip time was 41 minutes, plus an unknown (but negligible) amount of wait time—the time was evenly split between paratransit and fixed-route;
> - Feeder trips cost less than half as much as a similar full trip would cost on paratransit, taking into account planning, booking, and operating costs; and
> - Overall cost savings from reduced paratransit mileage was estimated at $139,000, or roughly 1.3% of the annual paratransit budget at the time.

PIERCE TRANSIT, TACOMA, WASHINGTON

Feeder Service

Since 1995, Pierce Transit has provided mandatory feeder service to paratransit registrants designated 3B. This eligibility category signifies to the call taker that trip requests should be flagged to determine if the trip can be taken partially on fixed-route service. More detail is provided elsewhere in this report on the trip screening process, criteria for transfer locations, and cost saving estimates.

Of the 380,000 paratransit trips provided in 2007, more than 8,500 were provided as feeder trips. This number has remained relatively stable over the past decade. The paratransit fare is $0.75, half the fixed-route fare owing to Washington State regulations. Registrants who use feeder service pay the $1.50 fixed-route fare, unless they are being dropped off at one of the transit centers, in which case they only pay the feeder fare.

TCRP Web Document 2, which included a detailed analysis of feeder operations at Pierce Transit, included the following key findings:

- About 9% of ADA paratransit eligible riders can use feeder service for all of their trips, and another 10% can use it for some of their trips.
- Feeder trips are much longer than comparable direct paratransit trips, mainly because of the long wait times. In addition, the average feeder trip length of 11.1 miles can be done in 8.8 miles on direct paratransit. Owing to the effects of the longer distances and wait times, comparable trip times for these trips are 80 minutes on feeder versus 38 minutes on direct paratransit service.
- Requiring riders to use feeder service has reduced ADA paratransit usage by those riders by 54%. Of those feeder riders who have stopped using paratransit, 45% said they do not go out as often as before.
- The cost per trip savings on feeder trips was calculated at $16.38 in 1996.
- Taking into account pre-trip planning, it was determined that feeder will save the agency money as long as the average feeder trip is 0.5 mile shorter than the direct paratransit mileage for the same trip; in practice the average mileage difference is 5.7 miles.
- Only one-third of the 3B riders' trip requests resulted in feeder service.

Demand Responsive/Point Deviation Connector Service: Bus Plus Mid-County

Bus Plus Mid-County is a general public demand response service that has been in operation since 2003 and serves an area not well served by fixed-route transit. Designated stops are located throughout the service area (see Figure 2). To use the service, a passenger calls Bus Plus Mid-County and requests a ride from the bus stop located closest to the passenger's trip origin. Since the service area is limited, passengers who need to leave the Bus Plus Mid-County service area must transfer to the fixed-route bus service. Passengers wishing to use the service must call Bus Plus at least two hours in advance.

Bus Plus Mid-County is primarily used by people with disabilities, commuters, and youth. Ridership in 2007 totaled 19,600. Fares are $1.50 (adult), $0.75 (senior/disabled). Transferring to a fixed-route service is free. The productivity on this service is 2.97 passengers per revenue hour.

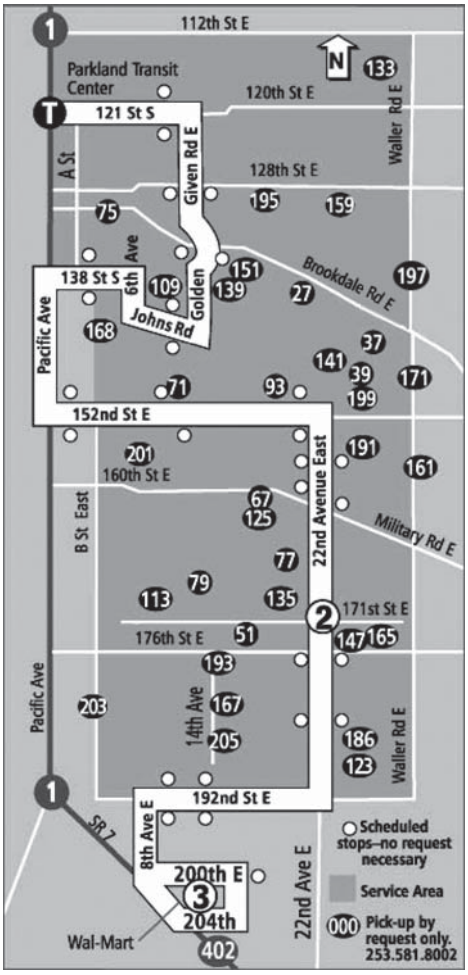

FIGURE 2 Route map from Pierce County's Bus Plus service.

Point/Route Deviation Service Name: Bus Plus

Bus Plus routes have a fixed route and schedule, but will deviate off the route upon request to designated Bus Plus off-route stops. Similar to the Mid-County mode, the principle users are people with disabilities, students, commuters, and youth. Ridership in 2006 was 120,000 for all Bus Plus routes. Productivity is three passengers per hour, and cost per trip $18.71. This compares with $4.50 per trip on fixed route and $34.00 on paratransit.

UTAH TRANSIT AUTHORITY, SALT LAKE CITY, UTAH

Feeder Service

Consistent with the heavy emphasis on inclusionary transportation services, UTA has taken a number of steps to support its mandatory feeder service. Feeder trips are based on the conditions determined in the in-person eligibility screening process. To determine conditional eligibility, a supervisor is sent to the rider's home to determine the environmental or physical barriers preventing the rider from accessing the fixed-route service. Factors that may lead to conditional eligibility can be environmental or architectural barriers, endurance, etc. UTA is currently in the process of identifying specific transfer points for the feeder service. Locations are chosen based on accessibility, amenities, and fixed-route service.

All conditionally eligible riders receive a DVD explaining how to use the fixed-route service. The scheduling staff also provides a buddy ride-along for first time fixed-route riders, and all ADA paratransit eligible riders can ride fixed-route services for free. As a result of a variety of measures, including the introduction of feeder service, paratransit ridership has declined from 538,000 in 2001 to 484,000 in 2007.

Fare: Paratransit—$2.25, Fixed-Route—$1.75 (adult), $0.85 (senior/disabled).
Transfers to fixed-route service from the feeder service are free.
Productivity (2006): 2.17 passengers per revenue hour.

Point/Route Deviation Service: UTA Route F94, Brigham Lift

UTA offers two deviated fixed-route services: Route F94 and Brigham Lift (Figure 3). These services have a fixed route and schedule, but allow up to three deviations of up to a one-half mile from the route per one-way trip. The services were designed to provide a more flexible service for seniors, persons with disabilities, and the general public.

Fare: $1.75 (adult), $0.85 (senior/disabled); deviated service costs $1.00 extra.

AGENCY FOR COMMUNITY TRANSIT, GRANITE CITY, ILLINOIS

Agency for Community Transit (ACT) is a nonprofit corporation that serves as the contractor for Madison County Transit (MCT). ACT operates the Runabout service as well as the entire MCT fixed-route bus service.

Feeder Service

Mandatory feeder service is provided to those who have conditional eligibility or elderly eligible passengers. Transfer sites are determined by passenger amenities including presence of a shelter. Transit stations are preferred locations and there are currently four in the service area. Once passengers are dropped off by the feeder service, the driver provides no additional assistance.

Passengers do not generally like using the feeder service, but the agency has deemed this necessary to conserve funds to accommodate all required trips. Before implementing a

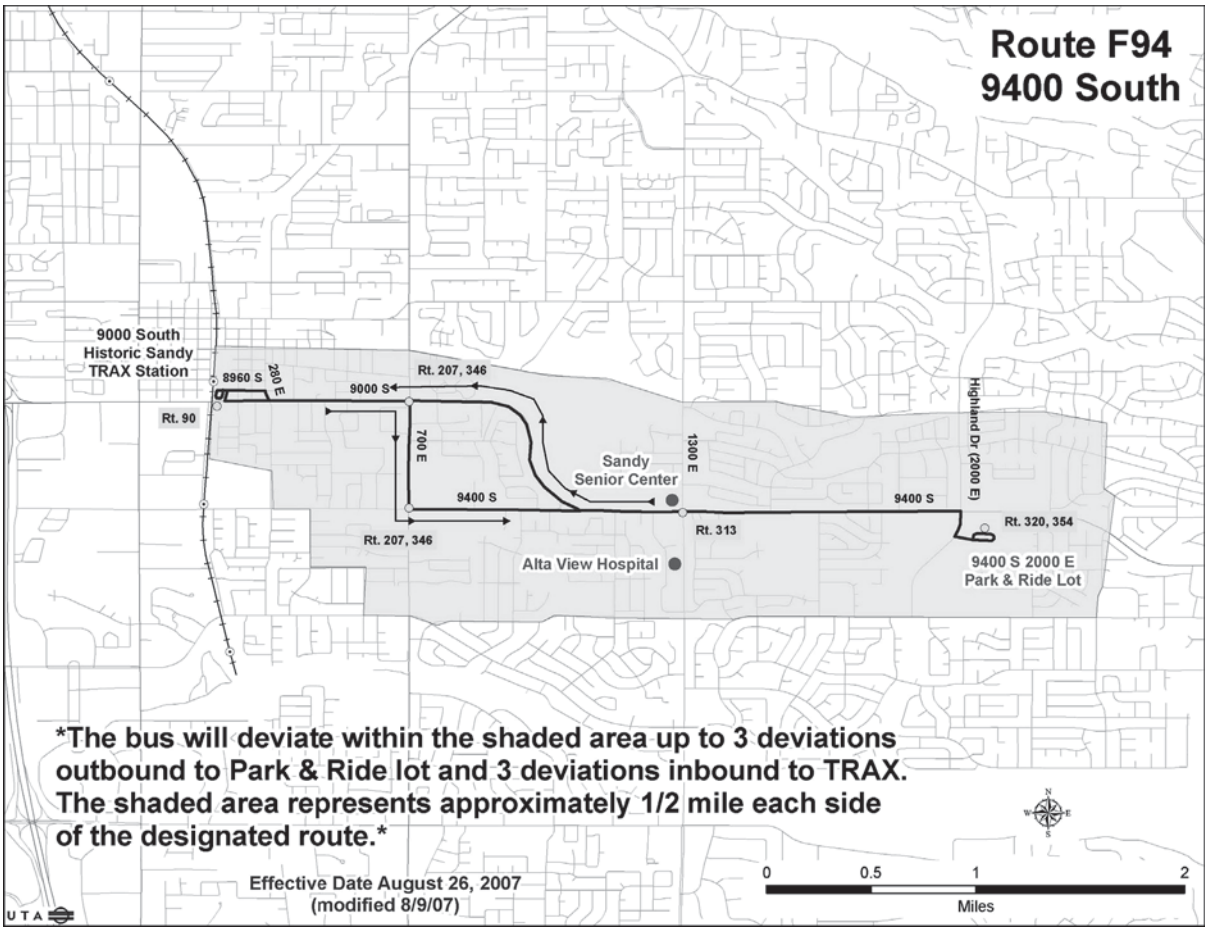

FIGURE 3 Route map for UTA's Route F94 service.

feeder service, staff recommends contacting senior and disability advocacy groups and users of the paratransit service. Opposition can be expected, but with more information and involvement the groups are more likely to support the service.

Approximately 25% of the 120,000 paratransit trips are provided on a feeder basis. A significant proportion of these trips are provided to students with cognitive disabilities attending the community college. Many of the feeder trips involve more than two legs.

Fares range from $1.50 to $4.50, depending on the number of zones. Transfers to fixed-route services are free. Paratransit productivity is 1.95 passengers per revenue hour.

ACCESS TRANSPORTATION SYSTEMS—PORT AUTHORITY OF ALLEGHENY COUNTY, PITTSBURGH, PENNSYLVANIA

Feeder Service

Conditionally, ADA eligible individuals who cannot get to and from transit stops as a result of a barrier are offered feeder service to or from fixed-route bus stops. Feeder stops are chosen for their amenities including accessibility, seating, and presence of a shelter. Designated transfer locations are located at park and ride facilities, malls, shopping centers, neighborhood business districts, police and fire stations, and busway and light rail stops (see Figure 4). The choice of feeder service is based on either a request from the customer or an evaluation of the customer's condition of eligibility, the path of travel,

FIGURE 4 Holly feeder service in Allegheny County.

and the travel time of the trip. Use of the service is mandatory unless passengers choose to pay double for a conventional paratransit trip. Tighter on-time paratransit windows are established for the feeder service. The customer is guaranteed a ride if their transit connection is missed owing to late paratransit feeder service.

During a transfer between the feeder service and the fixed route, drivers may wait with a passenger if necessary or, for trips to the airport, the driver will place the luggage on the other vehicle.

The service is usually unpopular with passengers initially. Passengers do not like to transfer and can be apprehensive about using the fixed-route service. With experience, however, confidence in the service improves. One interesting innovation is the use of feeder service as part of the agency's travel instruction program. The agency trains 16–21-year-old high school students with disabilities who are preparing to enter the workforce. If they live in areas not served by transit or there are barriers to their accessing transit services, they learn to take the trip using feeder service to the bus stop. This travel instruction serves to lower potential paratransit dependence for frequent travelers.

Ridership: The 2,500 paratransit feeder trips constitute a very small percentage of the overall annual ridership, which is 1.7 million.

Fare: Passengers pay the fixed-route fare for trip. 1 Zone—$1.00, 2 Zones—$1.30, 3 Zones—$1.60.

Demand Responsive Connector: Airport Corridor Transportation Association Employer Shuttles, ACTA "Just in Time" Rides

These are two types of free-fare shuttles located in Pittsburgh's western suburbs that are primarily geared toward commuters and students, but include a proportion of people with disabilities and were designed with the disability community in mind.

ACTA Employer Shuttles. ACTA works with developers and businesses to shuttle employees and customers from bus stops to their locations off the fixed-route service.

ACTA "Just in Time" Rides. An ACTA shuttle meets passengers at designated bus stops on the fixed-route system every 20 minutes and will take them to their requested stop within a three mile radius of the bus stop. Passengers can arrange for a pick-up time to return to the bus stop once on the vehicle.

While paratransit savings have not been realized by the service, fixed-route ridership has increased.

These services are partially funded by employers. Without employer support and funding, finding operating money can be a challenge and can lead to service cuts.

Community Bus Services: Work Link, Ship of Zion

Community bus routes circulate through neighborhoods on a fixed route and schedule in small vehicles where regular fixed-route is not available. The services link passengers to major trip generators and to the regular fixed routes for access to services, jobs, and schools.

The principal users of the services are low-income persons, students, commuters, and seniors. There is no charge for the service, although riders must first fill out an application before riding to obtain a free pass.

Route Deviation Service: Elder Express

Elder Express is a neighborhood-based service with fixed route and schedule, but deviates upon request with an advanced reservation. The shuttle serves major shopping centers, community centers, senior housing developments, and transit centers. Riders must be 65 or older or be ADA paratransit eligible to use the service. The service is sponsored with local community groups such as the United Jewish Federation Foundation and Ladies Hospital Aid Society.

The fare is $2.00. Ticket books are available for purchase. Transfers to fixed-route services are free. Productivity on this service is 3.8 passengers per revenue hour.

BROWARD COUNTY TRANSIT, PALM BEACH, FLORIDA

Community Bus Service

Twenty-two municipalities in Broward County have partnered with BCT for the provision of community bus/connector service. This service is designed to increase the number of destinations within city limits that residents can access through public transit. All community buses connect to BCT fixed-routes—this is one of the requirements of the program (Figure 5). Other requirements include that the community bus service must not duplicate BCT fixed routes, and that productivities of at least 5 trips per hour must be maintained. Owing to a recent tax-cutting measure, the county is being pressured to raise this level to 10 trips per hour. Productivity ranges from 2.7 to 25.1 passengers per hour, but the majority fall in the 8 to 12 trips per hour range. This is in contrast to the county's paratransit productivity of 1.74.

Ridership in 2007 was approximately 2.2 million, compared with 39.2 million for the fixed-route service in the county. The type of service provided (e.g., fixed-route demand-response, and deviated fixed-route), schedules, routes, fares, etc., are determined by each city government and differ by municipality. Some of the cities provide the service in-house, while others contract out their service. The routes are designed

The City of Dania Beach

Community Bus Service

The City of Dania Beach and Broward County Transit (BCT) are providing this community bus service to increase the number of destinations that can be reached through public transit.

This service is designed to work in conjunction with BCT Routes 1, 4, 6, 7, 12, and 17.

The City of Dania Beach Community Bus is air-conditioned and wheelchair accessible.

The service is free of charge, but riders making connections to BCT routes are expected to pay the appropriate fares.

PROTECTIONS OF TITLE VI OF THE CIVIL RIGHTS ACT OF 1964 AS AMENDED

Any person or group(s) who believes that they have been subjected to discrimination because of race, color, or national origin, under any transit program or activity provided by Broward County Transit (BCT), may file a Title VI discrimination complaint with the Broward County Mass Transit Division, Compliance Manager, 3201 West Copans Road, Bldg. 1, Pompano Beach, Florida 33069; telephone number 954-357-8481.

Hours of Operation

Monday - Saturday

East Route: 9:00 am - 5:44 pm

West Route: 9:00 am - 5:47 pm

Please refer to the timetable on the reverse side for times and destinations.

These routes will not operate when a hurricane warning has been issued.

This service operates as close to schedule as possible, although traffic conditions may cause the community bus to arrive slightly early or late. Please allow yourself enough time when traveling.

Holidays

There is no service on Sunday or on the following holidays observed by the City of Dania Beach:

New Year's Day
Thanksgiving day
Christmas Day

This publication can be made available in LARGE PRINT, tape cassette, or braille by request.

This public document was promulgated at a cost of $615.00, or $.246 per copy, to inform the public about community bus service between Mass Transit and the City of Dania Beach.
2/07

Information

For more information about the City of Dania Beach Community Bus Service routes and connections:

954.924.3601

Monday - Friday: 8:30 a.m. - 5:00 p.m.
Hearing-speech impaired/TTY:

954.925.1388

Visit the City of Dania Beach's web site
www.ci.dania-beach.fl.us

For more information about BCT routes, fares or connections, call:

BCT Rider Info
954.357.8400

Hearing-speech impaired/TTY
954.357.8302

Visit Broward County's web site
www.broward.org/bct

BROWARD COUNTY BOARD OF COUNTY COMMISSIONERS OFFICE OF TRANSPORTATION
An equal opportunity employer and provider of services.

DANIA BEACH East Route West Route

Community Bus Service Routes and Timetables

Effective: February 2007

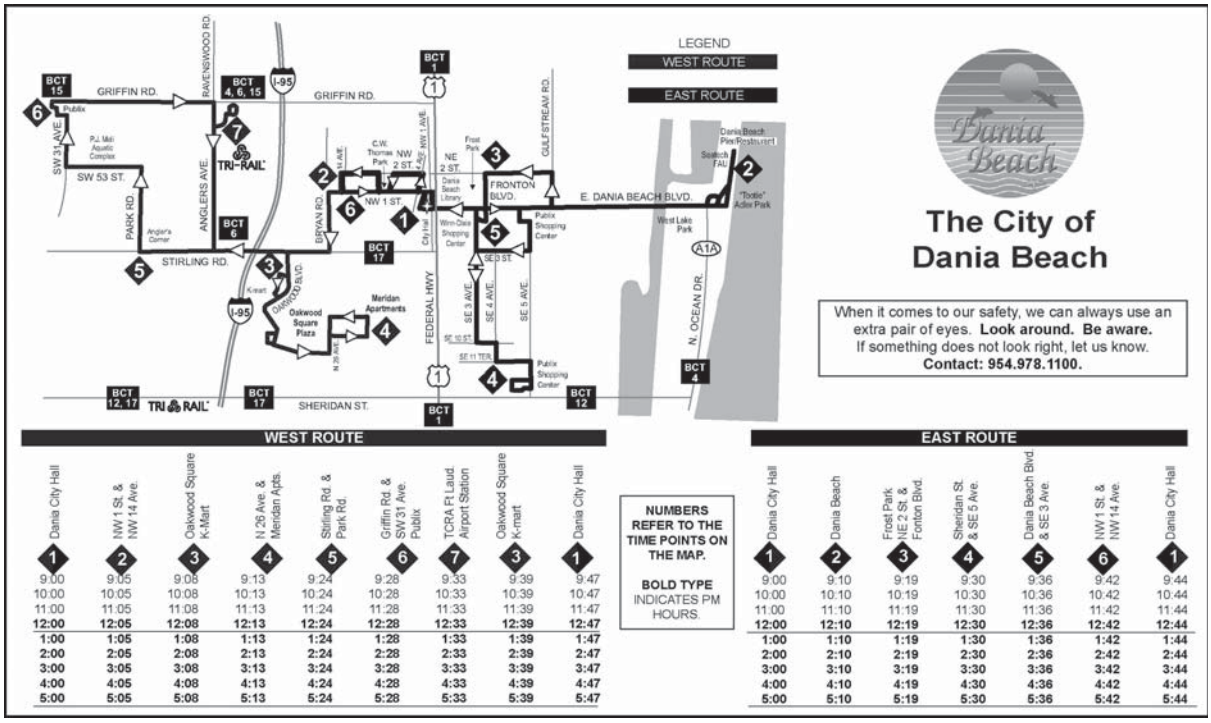

FIGURE 5 Sample brochure of community bus service in Broward Country.

to provide maximum access to grocery stores, medical facilities, and social services. BCT provides the vehicles and an annual operating stipend of $20 per vehicle service hour for each service. All vehicles are equipped with bicycle racks and wheelchair lifts. All but four of the cities charge no fare for the service.

INTEGRATED SERVICES IN PORTLAND AND EUGENE, OREGON

The metropolitan areas of Portland and Eugene are particularly rich in provision of integrated services, partially a result of the presence of nonprofit transportation providers in each area that predate the passage of the ADA by many years. The variety of services provided in these areas is showcased in the following discussion.

Portland and Surrounding Communities: Ride Connection

Ride Connection was established in the mid-1980s to coordinate existing volunteer driver programs serving people with disabilities and older adults. Ride Connection now has a network of 30 service providers and is a major partner to TriMet in the provision of service to this population in Clackamas, Multnomah, and Washington counties. TriMet provides partial funding for a range of Ride Connection programs that help reduce ADA paratransit demand, and even provides outreach for these programs to encourage individuals to use those services rather than TriMet's paratransit service. It has been estimated that approximately 80% of Ride Connection customers would be ADA paratransit eligible, and thus the organization plays a critical role in containing the costs of ADA paratransit services in the region. Ride Connection provides the following services:

- Information and Referral: Ride Connection's Service Center provides personalized trip planning that matches riders to the mode most suited to their abilities.
- Travel Training: this collaboration with TriMet ranges from trip planning assistance to one-on-one travel training.
- Community Transportation Services: more than 350,000 annual trips are provided over a service area of 3,700 square miles. These services include door-to-door service, shared-vehicle and retired–vehicle programs, and community shuttles.

Community Shuttles

To improve local mobility options for elders and people with disabilities and to create more cost-effective group options for rides to common destinations, Ride Connection developed a number of community shuttles, and two more are planned for 2008. These neighborhood circulators operate in designated communities, offering scheduled service to local shopping, grocery and activity centers. Some of these shuttles also provide connections to fixed-route transit stops, thus serving as Connectors or feeder service. To date, Ride Connection and TriMet have jointly created six community shuttles, of which four are consistent with the definition of integrated services:

- King City Shuttle (Figure 6);
- Northwest Portland Ministries Shuttle;
- North/Northeast RideAbout; and
- Catch-A-Ride.

These are described here in more detail.

Service began in 2001. This free, deviated route, general public shuttle service operated by the American Red Cross runs weekdays in the residential and commercial areas of King City/Summerfield in the Portland metro area. Customers can wave down the minibus from the sidewalk along the route or call the Ride Connection Service Center one day in advance to be picked up at their door. Connections to/from TriMet fixed-route service on Highway 99W average 28 per month; 7,149 rides were provided in FY 2007 at a cost of $5.56 each.

Northwest Portland Ministries Senior Shuttle

Service began in December 2005 when TriMet canceled the line 83 service. This free deviated route shuttle offers service to older adults and people with disabilities residing in high-rise buildings in downtown Portland. This service allows customers to connect with fixed-route service on every loop, as well as local shopping, medical, and personal trip destinations. Customers meet the shuttle at their door at posted one hour intervals, seven days a week. In FY 2007 3,853 rides were provided at a cost of $16.40 each.

North/Northeast RideAbout

Service began in 2004. Three minibuses operate on weekdays, serving older adults and people with disabilities in inner North/Northeast Portland. African–American Chamber of Commerce, American Red Cross, Metropolitan Family Service–Project Linkage, and the Urban League of Portland provide the service (Figure 7). Free local trips are offered for fixed-route connections, senior center, nutrition, medical, shopping, volunteer work, or any personal trip. Most service is demand response; however, a shopping shuttle service is offered weekly when customers can board a minibus at posted times at their building door. In FY 2007, 22,298 rides were provided at a cost of $7.13 each.

Catch-A-Ride

Dial-a-ride service to medical appointments and necessary errands is provided by Transportation Reaching People Program for seniors, people with disabilities, and low-income individuals. The Catch-A-Ride was established to assist people

King City Shuttle

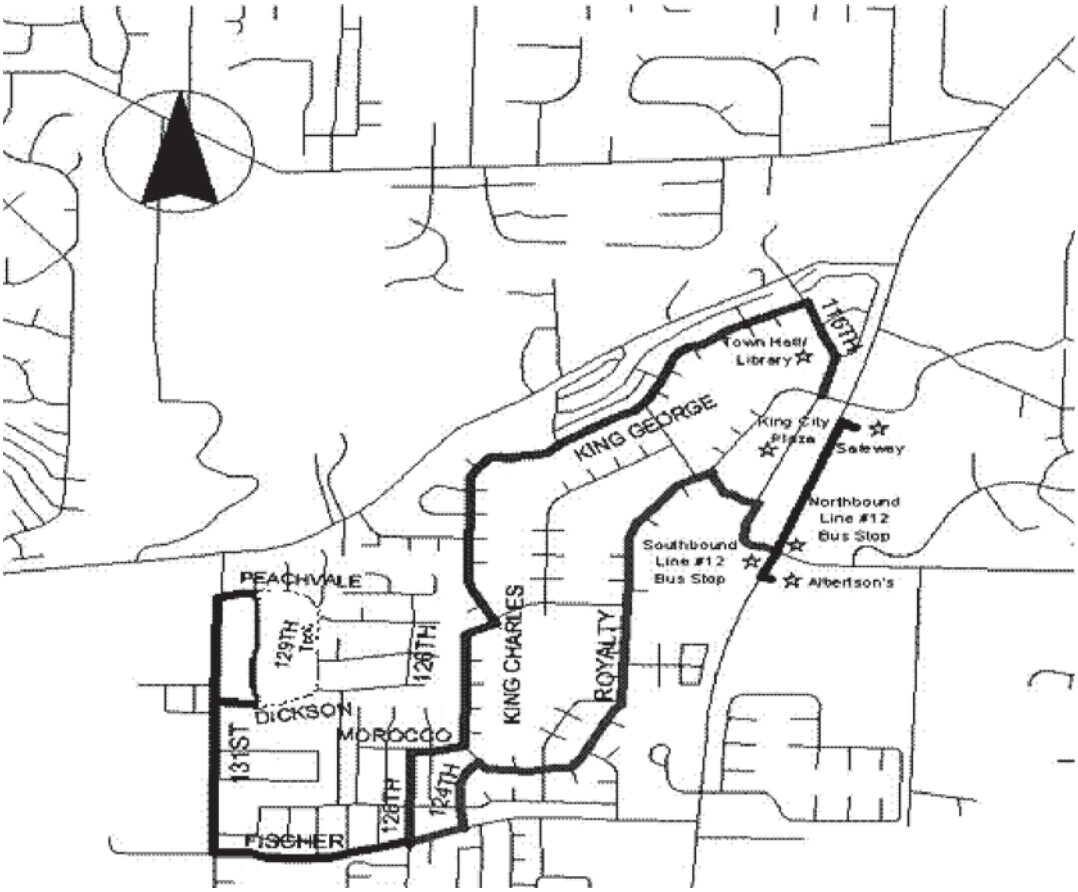

FIGURE 6 Shuttle route operated in King City, Portland metro area.

with disabilities and low-income individuals to employment-related destinations including college and workshops. This is also a driver training program for individuals to gain employment skills as drivers, dispatchers, and office support staff. One-third of the trip destinations are to fixed-route connections. Cost per ride is $16.76. More than 3,000 annual trips are provided through this program.

FIGURE 7 Ride Connection passenger transfers from TriMet bus to shuttle service, Portland, Oregon.

Demand-Response Feeder: Sandy Dial-A-Ride

Sandy is a rapidly growing community of 7,700, located approximately 23 miles east of Portland. In 2000, Sandy opted out of the TriMet system and decided to establish its own free fare, low-floor transit service. The current program provides demand-response service for people with disabilities in the town and takes them to a downtown fixed-route bus stop. Approximately 6,355 (or 32%) of the general public demand-response service in town is for disabled riders. An additional 3,684 (or 23%) is for older adults. About 3,000 of these trips for elderly and disabled riders involve a transfer to the fixed-route service downtown, from which riders are transported 10 miles to the nearest MAX (light rail) stop in Gresham. There are also nine TriMet bus lines that operate from this station, so riders have a range of options when they arrive. Most riders transported to Gresham continue their trips on the TriMet system.

LANE TRANSIT DISTRICT, EUGENE, OREGON

LTD contracts for a variety of transportation services targeted toward people with disabilities that serve to integrate fixed-route and paratransit services. These include paratransit feeder

service, a weekly shopper service that diverts a significant number of rides from the ADA paratransit service, a rural fixed-route service that feeds into a demand-response distributor service in downtown Eugene, and a program that facilitates transfers for people with disabilities at the downtown transit center.

RideSource, the paratransit program for people with disabilities in Eugene and Springfield, is provided by Special Mobility Services (SMS), a nonprofit transportation operator under contract to the Lane Transit District.

Feeder Service

RideSource provides limited mandatory feeder service to fixed-route bus stops and transit stations. Transfer points are determined on a case-by-case basis and are based on passenger needs, route connectivity, and bus stop amenities. Conditional eligibility is based on barriers to using fixed-route services such as distance from a fixed route, stamina, etc. The feeder service is described as more of a policy and practice than a regular service. Feeder riders pay only the fixed-route fare for the trip.

The feeder program has led to a reduction in the number of revenue miles, even though the number of feeder trips in 2007 was only 404 out of approximately 69,000 ADA paratransit ridership. The program appears to discourage paratransit usage, as some of those who have been offered feeder service have refused and found other alternatives.

Agency staff indicate that the low feeder usage compared with an area such as Tacoma is partially explained by the different land use development patterns. Whereas Tacoma has developed low-density residential areas that sprawl over a broad swath of Pierce County, the Eugene–Springfield metro area has tight urban growth boundaries. As a result, development is fairly concentrated and surrounded by farmland. Transit service within the growth boundary is relatively extensive and frequent for a small urbanized area. When LTD implemented strict paratransit eligibility screening in 2001, very few feeder candidates were identified, as most people who could use fixed-route service were located in areas accessible to fixed route.

To illustrate the degree of cost savings that may be accrued from providing feeder rather than direct service, RideSource conducted a cost analysis of two feeder riders. Both individuals transfer to the new free-fare rapid transit service, the EmX, which operates on 10 minute headways during peak hours (Figure 8). The annual reduction in paratransit travel for just these two individuals amounts to about 51 vehicle hours, or a cost savings of approximately $2,500.

Shopper Service

SMS operates a shopper service open to people with disabilities and individuals over 60. While the program does not require an application process and is based on self-declaration, it has been estimated that approximately 90% of the riders are ADA-eligible, since most hear about it through the ADA paratransit program. The program serves different neighborhoods each day of the week. The cost per trip is $9.45 compared with paratransit trip costs of $22.94. Productivity on the shopper service has averaged approximately 3.8 trips per hour during the past three years, compared with slightly over two for paratransit service.

FIGURE 8 Wheelchair user boarding EmX Bus Rapid Transit.

Since approximately 6,500 annual trips are provided on the shopper service, and approximately 5,300 are to predominantly ADA paratransit eligible riders, the transit agency accrues significant cost savings from the program. The shopper fare is $2, compared with $2.50 on the paratransit program.

Fixed-Route to Paratransit Feeder: Diamond Express

The Diamond Express provides commuter service three times daily in each direction from the rural community of Oakridge (population 3,800), located about 40 miles from Eugene, to the Eugene Downtown Station. During the off-peak trips, the service converts to a demand-response mode from the Eugene Downtown Station. This accounts for approximately two hours out of the 11 hour service day. Priority is given to people with disabilities or the elderly, who otherwise would likely be eligible for the ADA paratransit service, which costs almost twice the unit cost per trip. An LTD day pass is provided to riders who are able to use fixed-route bus service while in Eugene.

An estimated 10% of the 10,404 trips provided in 2007 were demand-response trips, presumably largely for people with disabilities.

Facilitated Transfers at Downtown Transit Center: Transit Host Program

LTD identified the difficulty for people with disabilities to transfer between buses as one of the greatest barriers to using fixed-route service. The Transit Host program was designed to address this need by stationing a staff member at the Eugene Transit Station to assist people with disabilities making their transfers. Without the Transit Host program, LTD estimates that 75% of those with travel training alone would not be able to use the fixed-route system.

The Transit Host program is staffed by two employees of Alternative Work Concepts (AWC), a nonprofit that helps people with disabilities find employment who share a 40-hour work week. At the beginning of each day, the hosts receive a list of AWC riders expected to pass through the transit center that day. The program assists with about 1,000 transfers each month, including people with disabilities who may not be associated with the agency. LTD has estimated that the program provides annual savings of $93,000 by shifting riders from RideSource to fixed route, and the combined savings for the Travel Host and Travel Training program is estimated at $195,000 per year. The LTD contract for both programs with AWC was $79,000 in 2005.

Point/Route Deviation: Rhody Express

The Rhody Express is a small community circulator operating in Florence, a coastal town in Lane County. The service has a fixed route and schedule, but deviates off the route up to two blocks to pick-up and drop-off passengers by request. Passengers, who are predominantly people with disabilities, may board and get off the vehicle at any point along the route and do not have to wait for marked bus stops.

CHAPTER SIX

CONCLUSIONS

Relatively limited applications of integrated services are being provided in transit agencies throughout North America. However, despite their limited use, they may be found in all geographic regions and in transit systems of all sizes operating in urban, suburban, and rural environments. Transit agencies operate integrated services to: (1) contain the costs of increasing ADA paratransit demand; (2) provide services in geographic areas that would not be possible otherwise owing to low densities that do not support fixed-route transit; (3) expand the range of options available to people with disabilities in a community; and (4) test the feasibility of implementing fixed-route service in a new service area.

VARIETY OF SERVICE DESIGNS

Integrated services can take a variety of forms. In this study the models have been limited to the following:

- Paratransit feeder service: Paratransit service exclusively for people with disabilities that feeds into fixed-route service (variations can include additional legs of fixed-route and paratransit service).
- General public demand-response feeder service: General public demand-response service that feeds into fixed-route service at bus stops, park-and-rides, and light rail stations.
- Route deviation feeder service: Fixed-route bus that deviates for people with disabilities and older adults, and connects to the mainline fixed-route service.
- Community bus feeder/connector service: Community bus (service route model) in suburban and rural areas that connects with fixed-route service and other community bus stops.
- Route or point deviations service: Fixed-route bus that deviates within specified corridors and at specified times of the day to pick up people with disabilities and older adults.
- Other integrated services: Assisted travel program that facilitates transfers between paratransit and fixed-route or two fixed-route modes at transit centers for those riders who would not be able to transfer unassisted; fare-free programs for paratransit registrants riding fixed-route service; shopping shuttles geared toward seniors and people with disabilities.

LENGTH OF EXPERIENCE

Apart from a few exceptions where paratransit feeder service has been integrated into the service since shortly after the passage of the ADA, most systems only recently have begun to implement feeder service, and usually after the implementation of an accurate eligibility screening process. Other integrated services also were implemented in recent years, and for the most part have not been discontinued.

POPULATIONS SERVED

Feeder services tend to serve ADA paratransit registrants exclusively; however, most other integrated services cited in this study serve the general public, in which people with disabilities and older adults are significant components. When a package of models is implemented simultaneously, for example the initiation of accurate eligibility screening, travel training, free fixed-route for people with disabilities, and community circulators that connect to fixed route, the volume of fixed-route disability ridership can increase dramatically.

BARRIERS TO IMPLEMENTATION, REASONS FOR DISCONTINUING OR NOT IMPLEMENTING INTEGRATED SERVICES

Transit systems tend to avoid implementing feeder service because of the perception that this is a difficult model to implement and it is not worth alienating members of the community who would prefer direct paratransit service. For some there is also the effort required to educate the community and consumers about nontraditional public transportation modes. Systems have discontinued integrated services because of the lack of expected ridership and productivities, lack of interest from riders, or the replacement of fixed-route service.

PROGRAM ELEMENTS

1. Voluntary or Mandatory. Paratransit programs that have offered volunteer feeder service have had very limited success. The most effective programs have offered individuals with the appropriate conditional eligibility the choice of a feeder trip or no trip at all. However, to avoid undue impact on the mobility of registrants, paratransit programs need to have well-substantiated information

about the individual's functional capabilities, as well as the environmental barriers associated with the specific trip request.

2. Transfer Locations. Common criteria for selecting transfer locations include shelter, seating, a telephone, staffing, and security.
3. Staff Training and Driver Selection. Most systems reported that no special training is given to drivers in integrated services, other than the training that would normally be given to paratransit drivers and extending some form of this sensitivity training to fixed-route drivers. To conduct efficient trip screening for feeder trips and integration of fixed-route and paratransit schedules, schedulers and dispatchers may require additional training. The most important form of training for transit staff is conveying the importance of providing integrated services and how these can help conserve budget in a constrained funding environment. Generating buy-in among all staff (including eligibility screeners, reservationists, and drivers) may be critical to the successful implementation of feeder service.
4. Marketing. Transit agencies employ a variety of approaches to marketing integrated services. These generally are intended to distinguish the service from either alternate modes of fixed route and paratransit. However, marketing is not generally practiced for mandatory feeder service, but rather efforts are focused on ensuring that the consumer understands when to expect a feeder trip and how to use it most effectively.
5. Technology. Transit agencies can adopt an incremental approach to using technology for integrating services, starting with a manual approach to scheduling. Scheduling software modules that can easily integrate scheduling and dispatching information from both fixed-route and paratransit services are helpful, but not essential in the implementation of feeder service. In addition, Automated Vehicle Locators, Mobile Data Terminals, and Estimated Time of Arrival technology can facilitate reduced wait times. Cell phones can be used effectively in the implementation of real-time demand-response service; however, safety concerns about their use while driving still require further research.

COST SAVINGS

A number of transit agencies have experienced significant cost savings as a result of the implementation of integrated services. For feeder service, the savings are largely a result of the reduction in paratransit demand and reduced paratransit distances as part of each trip is provided by fixed route. Despite the difficulty of isolating the cost savings specifically attributable to feeder service, these have been estimated at more than $700,000 annual savings in Pierce Transit and $139,000 for TransLink (formerly BC Transit). UTA has shown a significant shifting of trips off the ADA paratransit program as a result of the implementation of a package of services, including an enhanced eligibility screening process, feeder service, travel training, free fixed-route fares, and a buddy ride-along program. Annual savings are estimated at more than $350,000. Finally, Access Services Inc. estimates that the agency saves $26 million per annum as a result of the Free Fare Program, which entitles ADA paratransit registrants to ride fare free on fixed route.

SUGGESTIONS FOR FURTHER STUDY

Identifying the most effective ways of educating transit and paratransit staff about the need for integrated services would be helpful in the expansion of these services. In particular, documenting approaches that agencies have adopted to motivate scheduling staff to offer feeder trips rather than direct paratransit service would be valuable to share with the transit community.

Transit agencies that have implemented integrated services may be required to justify the continuation of such services during fiscally constrained times. Staff could survey their integrated service riders to determine the number who are ADA paratransit eligible. By translating these numbers into potential costs if these trips had been taken on paratransit service, the agency may be able to explain to policy makers why they should be continued.

Assuming that spiraling paratransit costs and recent trends in the expansion of in-person eligibility assessments and travel training could contribute to an increased interest in implementing feeder service, more formal documentation of the effectiveness of various elements of program implementation would be valuable. Examples of these elements include determining skills needed for schedulers and dispatchers to use the multi-modal modules of the scheduling software, and how they can work together to facilitate integration; establishing productivity thresholds that are operationally feasible and cost-effective for integrated services; documenting transfer location criteria that easily could be replicable in other systems; documenting the most effective policies and procedures for integrated services; and disseminating these as models for other transit agencies to adopt.

Transit agencies could benefit from wider dissemination of the economic benefits of fully engaging community-based transportation providers, such as those presented in this synthesis, in the implementation of innovative integrated services.

REFERENCES

Atlanta Regional Coordinated Human Services Plan, Atlanta Regional Commission, Atlanta, Ga., Feb. 2007.

Blume, K. and M. Hickman, *An Investigation of Integrated Transit Service*, Research Report SWUTC/01/472840-00023-1, Final Report, Southwest Region University Transportation Center, Texas Transportation Institute, College Station, 2001.

Cantor, R. and L. Darnall, *Paratransit to Fixed Route Transfers,* LYNX Central Florida Regional Transportation Authority, Board Audit Committee Agenda, July 27, 2006, pp. 24–26.

Cervero, R., T. Kirk, D. Mount, and C. Reed, *Paratransit in the San Francisco Bay Area: Providing Feeder Connections to Rail*, UCTC No. 252, Working Paper, National Transit Access Center, Institute of Urban and Regional Development, University of California Transportation Center, University of California at Berkeley, 1995.

Koffman, D., *TCRP Synthesis 53: Operational Experiences with Flexible Transit Services*, Transportation Research Board of the National Academies, Washington, D.C., 2004.

Local Rates of Fare and Regulations Governing the Furnishing of Passenger Transportation on Demand-Responsive Service: ADA Complementary Paratransit Program, Tariff No. 229, Supplement No. 5, Philadelphia, Pa., 2003.

MARTA Mobility Guide. Metropolitan Atlanta Rapid Transit Authority, Atlanta, Ga., 2007.

Multisystems, Inc. and Crain & Associates, Inc., *TCRP Web Document 2: Evaluating Transit Operations for Individuals with Disabilities*, TRB National Research Council, Washington, D.C., 1997.

Nelson\Nygaard Consulting Associates, *Paratransit Service Study, Task No. 4, Analysis of Service Alternatives and Policies*, City and County of Honolulu, Hawaii, June 2006, pp. 43–49.

Nelson\Nygaard Consulting Associates, *Flexible Community Transit Services: Planning Operations and Technology*, Instructor's Notebook, National Transit Institute, New Brunswick, N.J., May 2003.

Planners Collaborative, Inc., and TranSystems Corp., *Hampton Roads Transit: Compliance Review of ADA Complementary Paratransit Service,* Office of Civil Rights, Federal Transit Administration, Washington, D.C., 2005.

Special Services Handbook, Berks Area Reading Transportation Authority, Reading, Pa., 2005.

Transportation Coordination in the Paratransit and Demand Response Sectors: What Role Can Technology Play? RouteMatch Software, Inc., Atlanta, Ga., 2007.

Utah Transit Authority's Paratransit Rider's Guide, Utah Transit Authority, Salt Lake City, 2005.

APPENDIX A

ADA Regulatory Language Pertaining to Feeder Service

Sec. 37.129 Types of Service

(a) Except as provided in this section, complementary paratransit service for ADA paratransit eligible persons shall be origin-to-destination service.
(b) Complementary paratransit service for ADA paratransit eligible persons described in Sec. 37.123(e)(2) of this part may also be provided by on-call bus service or paratransit feeder service to an accessible fixed-route, where such service enables the individual to use the fixed-route bus system for his or her trip.
(c) Complementary paratransit service for ADA eligible persons described in Sec. 37.123(e)(3) of this part also may be provided by paratransit feeder service to and/or from an accessible fixed-route.

APPENDIX D TO PART 37—CONSTRUCTION AND INTERPRETATION OF PROVISIONS OF 49 CFR

Part 37:

Section 37.129 Types of Service

The basic mode of service for complementary paratransit is demand responsive, origin-to-destination service. This service may be provided for persons in any one of the three eligibility categories, and must always be provided to persons in the first category (e.g., people who cannot navigate the system). The local planning process should decide whether, or in what circumstances, this service is to be provided as door-to-door or curb-to-curb service.

For persons in the second eligibility category (e.g., persons who can use accessible buses, but do not have an accessible bus route available to take them to their destination), origin-to-destination service can be used. Alternatively, the entity can provide either of two other forms of service. One is on-call bus, in which the individual calls the provider and arranges for one or more accessible buses to arrive on the routes he needs to use at the appropriate time. On-call bus service must meet all the service criteria of Sec. 37.131, except that on-call buses run only on fixed-routes and the fare charged can be only the fixed-route fare that anyone pays on the bus (including discounts).

The second option is "feeder paratransit" to an accessible fixed-route that will take the individual to his or her destination. Feeder paratransit, again, would have to meet all the criteria of Sec. 37.131. With respect to fares, the paratransit fare could be charged, but the individual would not be double charged for the trip. That is, having paid the paratransit fare, the transfer to the fixed-route would be free.

For persons in the third eligibility category (e.g., persons who can use fixed-route transit but who, because of a specific impairment related condition, cannot get to or from a stop), the "feeder paratransit" option, under the conditions outlined above, is available. For some trips, it might be necessary to arrange for feeder service at both ends of the fixed-route trip. Given the more complicated logistics of such arrangements, and the potential for a mistake that would seriously inconvenience the passenger, the transit provider should consider carefully whether such a "double feeder" system, while permissible, is truly workable in its system (as opposed to a simpler system that used feeder service only at one end of a trip when the bus let the person off at a place from which he or she could independently get to the destination). There may be some situations in which origin-to-destination service is easier and less expensive.

APPENDIX B

Survey Tool

TRANSIT COOPERATIVE RESEARCH PROGRAM
SYNTHESIS TOPIC SB-16

OPERATIONAL EXPERIENCES WITH INTEGRATION OF PARATRANSIT AND FIXED-ROUTE SERVICES

QUESTIONNAIRE

Purpose and Background

Your cooperation is requested in documenting the current state-of-the-practice in integrating paratransit and fixed-route services in public transit. We are seeking information about situations where the compelling reason for setting up an integrated service has been the need to manage paratransit costs or reduce the need for separate paratransit services. This synthesis aims to help transit systems understand how the appropriate integration of paratransit and fixed-route service may help them accomplish their missions.

For purposes of this project, "paratransit service" is defined as demand-response service that primarily serves people with disabilities. The study is focused on examples of integration in which riders can include both those with disabilities and general public riders. Examples of integration in which a shift in paratransit ridership has occurred, even when that was not the initial impetus for setting up the new service, would also be of interest to the study. If your agency operates some form of integrated service, whether paratransit feeder to fixed-route or some other alternative, please complete this questionnaire on-line. If this presents a problem, please contact:

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Person completing this questionnaire
Name and Title: _____
Agency: _____
Address: _____
_____

PART 1: TRANSIT AGENCY DESCRIPTION

1. Please indicate annual ridership of your fixed-route system: _____
   Our agency does not provide fixed-route service _____ (survey skips to Part 2)
2. In what types of areas does your fixed-route system operate primarily?
   a. Urban
   b. Established suburban
   c. Low-density, recently developed suburban
   d. Small town
   e. Rural
3. Please describe the fares on your fixed-route system (including local, express, transfer, zone, senior discount)
   _____
   _____

Briefly describe your integrated service(s): (If you operate more than one example of integrated service, please list each of them separately)

Name of service: _____
Description: _____
_____
_____
_____
_____

Name of service: _____
Description: _____
_____
_____
_____

Which of the following best describes the operating method of your integrated service(s)? (check all that apply.)

a. Paratransit for people with disabilities that provides connections to/from fixed-route service ("feeder service").
b. General public dial-a-ride connecting to conventional fixed-route service in which providing service to people with disabilities was a prominent feature of service design ("demand-responsive connector").
c. "Circulator" or "Community Bus" services that were designed to serve people with disabilities (including older people) but also serve the general public.
d. Point/Route Deviation services that eliminated the need for separate ADA paratransit services or were designed to reduce the need for ADA paratransit services.
e. Other: _____

[*Depending on the response to the above question, survey will skip to the appropriate following model(s)*]

a. Feeder Service for People with Disabilities

PART 2: SERVICE DESIGN

In what year did your agency begin operating feeder service? _____

How do you determine which riders should be offered or required to use feeder service?

_____

Do you have a formal process for determining which paratransit trip requests should be considered as candidates for feeder service?

a. No
b. Yes, we use the following criteria to screen for feeder service _____
_____

Is feeder service provided on a voluntary or mandatory basis (i.e., offer feeder or no trip at all)?

a. Voluntary
b. Mandatory
c. Other/depends (please explain): _____

Do you have designated locations for transfer points between paratransit and fixed-route service?

a. No
b. Yes. Please describe: _____
_____

When dropping off a passenger for a transfer to fixed-route service, are paratransit drivers instructed to wait for the arrival of the fixed-route vehicle or do passengers wait without driver assistance?

a. Drivers wait with passengers
b. Passengers receive no additional assistance after being dropped off at transfer location
c. Other/depends (please explain): _____

What is the average wait time for passengers after being dropped off by the paratransit vehicle?

a. _____ minutes
b. Don't know

What is the average wait time from passenger drop-off from a fixed-route vehicle until arrival of the paratransit vehicle?

a. _____ minutes
b. Don't know

Do you offer services that require more than one transfer; e.g., paratransit to fixed-route to paratransit, or paratransit to fixed-route to fixed-route?

a. No
b. Yes. Please describe: _____
_____

Please provide the following fare information:

ADA Paratransit Fare _____
General Public Demand Response Fare (if available) _____

How do you handle fare coordination between the two modes?

a. Rider pays on the feeder leg but not on fixed-route
b. Rider pays only on fixed-route
c. Rider pays for both legs
d. Other: _____

Has your agency conducted any analysis to determine if feeder service is providing financial savings to your agency?

a. No
b. Yes. What were the results?

_____

Did your agency document any reduction in paratransit ridership once feeder service was introduced?

a. No
b. Yes. What were the results?

_____

PART 3: MARKETING

Please describe any special methods you have used to market this service and to educate the public about how it works.

_____
_____

PART 4: PERFORMANCE MEASUREMENT AND STANDARDS

Basic service statistics:

	Feeder	Paratransit (including feeder)
Annual ridership (unlinked boardings):	_____	_____
Annual vehicle revenue hours:	_____	_____
Peak vehicles operated:	_____	_____
Productivity (boardings/Veh.Rev.Hr):	_____	_____
Time period of this data:	_____	_____

What is the average operating cost per trip for feeder service, and how does this compare to similar measures for other services?

a. Feeder service: _____
b. Conventional fixed-route, local, bus: _____
c. General public dial-a-ride: _____
d. Specialized paratransit: _____

PART 5: OPERATIONS

Please describe the use of any technology that has facilitated the design and operation of feeder service in your system

_____
_____

Please describe any special training provided to personnel that operate feeder services that is different than the training provided to staff that operate other services.

a. Drivers: _____

_____
_____

b. Schedulers or dispatchers: _____

_____
_____

How are drivers selected to operate the feeder service?

_____
_____

PART 6: BARRIERS AND OPPORTUNITIES

Have you encountered any barriers that may have prevented you from implementing feeder service (e.g., internal resistance to a new specialized service, objections from other transportation providers, opposition from human service agencies or riders)?

a. No
b. Yes. Please describe: _____
_____
_____
_____
_____

Have you had to discontinue or limit your use of feeder service?

a. No
b. Yes. To what do you attribute this? _____
_____
_____

Is there anything else you would like to add that may be helpful to other transit systems considering feeder service? _____
_____
_____
_____

b. Demand-Responsive Connector Service

PART 2: SERVICE DESIGN

In what year did your agency begin operating demand-responsive connector service?

_____

Was serving the disabled riding public incorporated into your original service design?

a. No
b. Yes. Please describe: _____
_____
_____

How are the demand-responsive connector and fixed-route schedules coordinated?

a. Drivers wait with passengers
b. Passengers receive no additional assistance after being dropped off at transfer location

What is the average wait time for passengers after being dropped off by the demand-responsive connector vehicle?

a. _____ minutes
b. Don't know

What is the average wait time from passenger drop-off from fixed-route vehicle until arrival of the demand-responsive connector vehicle?

a. _____ minutes
b. Don't know

What is the average frequency on the fixed-route service that is used for meets with demand-connector service?

a. _____ minutes
b. Don't know

Please provide the following fare information

ADA Paratransit Fare (if provided) _____
Demand Response Connector Fare _____

How do you handle fare coordination between the two modes?

a. Rider pays on the connector leg but not on fixed-route
b. Rider pays only on fixed-route
c. Rider pays for both legs
d. Other: _____

Has your agency conducted any analysis to determine if connector service is providing financial savings to your agency?

c. No
d. Yes. What were the results? _____

Did your agency document any reduction in paratransit ridership once integrated service was introduced?

a. No
b. Yes. What were the results? _____
c. Paratransit didn't exist prior to introduction of connector service _____

Does your connector service tend to serve specific trip purposes?

a. No
b. Yes. Please explain: _____

PART 3: MARKETING

What types of riders are the principal users of the service? (check top two)

a. Commuters
b. Students
c. Seniors
d. Youth
e. People with disabilities
f. Other: _____

Please describe any special methods you have used to market this service and to educate the public about how it works.

_____
_____
_____
_____

PART 4: PERFORMANCE MEASUREMENT AND STANDARDS

Basic service statistics:

	Connector
Annual ridership (unlinked boardings):	_____
Annual vehicle revenue hours:	_____
Peak vehicles operated:	_____
Productivity (boardings/Veh.Rev.Hr):	_____
Time period of this data:	_____

What standards or performance targets do you use in evaluating demand-responsive connector service?

_____
_____

What is the average operating cost per trip for your connector services, and how does this compare to similar measures for other services?

a. Connector service: _____
b. Conventional fixed-route, local, bus: _____
c. General public dial-a-ride: _____
d. Specialized paratransit: _____

PART 5: OPERATIONS

Please describe the use of any technology that has facilitated the design and operation of connector service in your system

_____
_____

Please describe any special training provided to personnel that operate connector services that is different than the training provided to staff that operate other services.

a. Drivers: _____
_____
_____

b. Schedulers or dispatchers: _____
_____
_____

How are drivers selected to operate the connector service?

_____
_____

Which of the following describes the use of vehicles for connector service?

a. Specific vehicles are dedicated to connector service.
b. Vehicles used in connector service also used in other services. Which services? _____
_____

PART 6: BARRIERS AND OPPORTUNITIES

Have you encountered any barriers that may have prevented you from implementing connector services in places where it appeared to be appropriate?

a. No
b. Yes. Please describe: _____
_____
_____
_____

Have you had to discontinue or limit your use of any connector services?

a. No
b. Yes. To what do you attribute this? _____
_____
_____

Is there anything else you would like to add that may be helpful to other transit systems considering connector services? _____
_____
_____
_____

Circulator and Community Bus Services
(referred to as "circulator services" below)

PART 2: SERVICE DESIGN

In what year did your agency begin operating circulator service? _____

Was serving the disabled riding public a prominent feature of your original service design?

a. No
b. Yes. Please describe: _____
_____

Do you have data on the proportion of your service that is used by people with disabilities versus the general riding public?

a. No
b. Yes. Please provide data: _____
_____

Has your agency conducted any analysis to determine if circulator service is providing financial savings to your agency?

a. No
b. Yes. What were the results? _____

Did your agency document any reduction in paratransit service once circulator service was introduced?

a. No
b. Yes. Please explain: _____

Please provide the following fare information

a. ADA Paratransit Fare (if available) _____
b. Circulator Fare _____

Does your circulator service tend to serve specific trip purposes?

a. No
b. Yes. Please explain: _____

PART 3: MARKETING

What types of riders are the principal users of the service? (check top two)

a. Commuters
b. Students
c. Seniors
d. Youth
e. People with disabilities
f. Other: _____

Please describe any special methods you have used to market this service and to educate the public about how it works.

_____
_____
_____
_____

PART 4: PERFORMANCE MEASUREMENT AND STANDARDS

Basic service statistics:

	Circulator	Paratransit
Annual ridership (unlinked boardings):	_____	_____
Annual vehicle revenue hours:	_____	_____
Peak vehicles operated:	_____	_____
Productivity (boardings/Veh.Rev.Hr):	_____	_____
Time period of this data:	_____	_____

Is there a **minimum** ridership level that you consider necessary for retaining circulator services? If so, what is it? (If possible please state ridership in terms of boardings per vehicle revenue hour.)

_____

What is the average operating cost per trip for your circulator services, and how does this compare to similar measures for other services?

a. Circulator service: _____
b. Conventional fixed-route, local, bus: _____
c. General public dial-a-ride: _____
d. Specialized paratransit: _____

PART 5: OPERATIONS

Please describe the use of any technology that has facilitated the design and operation of circulator service in your system

_____
_____

Please describe any special training provided to personnel that operate circulator services that is different than the training provided to staff that operate other services.

a. Drivers: _____
_____
_____

b. Schedulers or dispatchers: _____

How are drivers selected to operate the circulator service?

_____

Which of the following describes the use of vehicles for circulator service?

a. Specific vehicles are dedicated to circulator service.
b. Vehicles used in circulator service also used in other services.
   Which services? _____

PART 6: BARRIERS AND OPPORTUNITIES

Have you encountered any barriers that may have prevented you from implementing circulator services in places where it appeared to be appropriate?

a. No
b. Yes. Please describe _____

Have you had to discontinue or limit the use of any circulator services?

a. No
b. Yes. To what do you attribute this? _____

Is there anything else you would like to add that may be helpful to other transit systems considering circulator services? _____

Point and Route Deviation Service
(referred to as "deviation services" below)

PART 2: SERVICE DESIGN

In what year did your agency begin operating deviation service? _____

Was serving the disabled riding public a prominent feature of your original service design?

a. No
b. Yes. Please describe: _____

Do you have data on the proportion of your service that is used by people with disabilities versus the general riding public?

a. No
b. Yes. Please provide data _____

Has your agency conducted any analysis to determine if deviation service is providing financial savings to your agency?

a. No
b. Yes. What were the results? _____

Did your agency document any reduction in paratransit service once deviation service was introduced?

a. No
b. Yes. Please explain: _____

_____

Please provide the following fare information

a. ADA Paratransit Fare (if available) _____
b. Deviation Fare (over and above regular fixed-route) _____

Does your deviation service tend to serve specific trip purposes?

a. No
b. Yes. Please explain: _____

_____

PART 3: MARKETING

What types of riders are the principal users of the deviation service? (check top two)

a. Commuters
b. Students
c. Seniors
d. Youth
e. People with disabilities
f. Other: _____

Please describe any special methods you have used to market this service and to educate the public about how it works.

_____
_____
_____
_____

PART 4: PERFORMANCE MEASUREMENT AND STANDARDS

Basic service statistics:

	Deviation	Paratransit
Annual ridership (unlinked boardings):	_____	_____
Annual vehicle revenue hours:	_____	_____
Peak vehicles operated:	_____	_____
Productivity (boardings/Veh.Rev.Hr):	_____	_____
Time period of this data:	_____	_____

Is there a **minimum** ridership level that you consider necessary for retaining deviation services? If so, what is it? (If possible please state ridership in terms of boardings per vehicle revenue hour.)

_____

What is the average operating cost per trip for your deviation services, and how does this compare to similar measures for other services?

a. Deviation service: _____
b. Conventional fixed-route, local, bus: _____
c. General public dial-a-ride: _____
d. Specialized paratransit: _____

PART 5: OPERATIONS

Please describe the use of any technology that has facilitated the design and operation of deviation service in your system

_____
_____

Please describe any special training provided to personnel that operate deviation services that is different than the training provided to staff that operate other services.

a. Drivers: _____

_____

_____

b. Schedulers or dispatchers: _____

How are drivers selected to operate the deviation service?

_____

Which of the following describes the use of vehicles for deviation service?

a. Specific vehicles are dedicated to deviation service.
b. Vehicles used in deviation service also used in other services.
   Which services? _____

PART 6: BARRIERS AND OPPORTUNITIES

Have you encountered any barriers that may have prevented you from implementing deviation services in places where it appeared to be appropriate?

a. No
b. Yes. Please describe: _____

Have you had to discontinue or limit the use of any deviation services?

a. No
b. Yes. To what do you attribute this? _____

Is there anything else you would like to add that may be helpful to other transit systems considering deviation services? _____

e. Other Integrated Services

PART 2: SERVICE DESIGN

In what year did your agency begin operating integrated services other than the service models indicated in the previous questions?

_____

Was serving the disabled riding public a prominent feature of your original service design?

a. No
b. Yes. Please describe: _____

Do you have data on the proportion of your service that is used by people with disabilities versus the general riding public?

a. No
b. Yes. Please provide data _____

Has your agency conducted any analysis to determine if your integrated service is providing financial savings to your agency?

a. No
b. Yes. What were the results? _____

Did your agency document any reduction in paratransit service once integrated service was introduced?

a. No
b. Yes. Please explain: _____

Please provide the following fare information

ADA Paratransit Fare (if available) _____
Integrated Service Fare _____

How do you handle fare coordination between the two modes?

a. Rider pays on the integrated service leg but not on fixed-route
b. Rider pays only on fixed-route
c. Rider pays for both legs
d. Other: _____

Does your integrated service tend to serve specific trip purposes?

a. No
b. Yes. Please explain: _____

PART 3: MARKETING

What types of riders are the principal users of the service? (check top two)

a. Commuters
b. Students
c. Seniors
d. Youth
e. People with disabilities
f. Other: _____

Please describe any special methods you have used to market this service and to educate the public about how it works.

_____
_____
_____
_____

PART 4: PERFORMANCE MEASUREMENT AND STANDARDS

Basic service statistics:

	Integrated Service	Paratransit
Annual ridership (unlinked boardings):	_____	_____
Annual vehicle revenue hours:	_____	_____
Peak vehicles operated:	_____	_____
Productivity (boardings/Veh.Rev.Hr):	_____	_____
Time period of this data:	_____	_____

Is there a **minimum** ridership level that you consider necessary for retaining integrated services? If so, what is it? (If possible please state ridership in terms of boardings per vehicle revenue hour.)

_____

What is the average operating cost per trip for your integrated service, and how does this compare to similar measures for other services?

a. Integrated service: _____
b. Conventional fixed-route, local, bus: _____
c. General public dial-a-ride: _____
d. Specialized paratransit: _____

PART 5: OPERATIONS

Please describe the use of any technology that has facilitated the design and operation of integrated service in your system

_____
_____

Please describe any special training provided to personnel that operate integrated services that is different than the training provided to staff that operate other services.

a. Drivers: _____
_____
_____

b. Schedulers or dispatchers: _____

_____

_____

How are drivers selected to operate the integrated service?

_____

_____

Which of the following describes the use of vehicles for integrated service?

a. Specific vehicles are dedicated to integrated service.
b. Vehicles used in integrated service also used in other services.
   Which services? _____

PART 6: BARRIERS AND OPPORTUNITIES

Have you encountered any barriers that may have prevented you from implementing integrated services in places where it appeared to be appropriate?

a. No
b. Yes. Please describe: _____

_____

_____

_____

Have you had to discontinue or limited the use of any integrated services?

a. No
b. Yes. To what do you attribute this? _____

_____

_____

Is there anything else you would like to add that may be helpful to other transit systems considering integrated services? _____

_____

_____

APPENDIX C

Summary of Surveyed Systems

ACCESS SERVICES INC., LOS ANGELES, CALIFORNIA

Service Area Type: Urban, Established suburban, Recently developed suburban

Fare Free Program

Description: Access Services Inc. (ASI) has a Free Fare Program that allows ASI certified clients to ride for "free" with participating municipal operators in the Los Angeles area. Participating fixed-route operators are then reimbursed by ASI at an agreed upon rate. The intent of the program is to encourage paratransit riders to use the more cost-effective fixed-route services for their trips when possible.
Principal users: Persons with disabilities
Ridership (2007): 1.3 million trips were completed on fixed-route services using the fare free program. Paratransit ridership was 2.4 million trips.
Fare: Fixed-route services are free for ASI certified passengers. The regular paratransit fare is $1.80 for trips under 20 miles in length.

AGENCY FOR COMMUNITY TRANSIT, MADISON COUNTY, ILLINOIS

Service Area Type: Rural

Paratransit Feeder Service

Description: Mandatory feeder service for conditionally eligible or elderly passengers. Transfer sites are determined by passenger amenities including presence of a shelter. Transit stations are preferred locations and there are currently four in the service area. Once passengers are dropped off by the feeder service, the driver provides no additional assistance.
Principal users: Seniors, persons with disabilities
Ridership (2007): Paratransit—104,000
Fare: $1.50–$4.50 depending on the number of zones. Transfers to fixed-route services are free.
Productivity (2007): 1.95 passengers per revenue hour

AMADOR REGIONAL TRANSIT SYSTEM (ARTS), JACKSON, CALIFORNIA

Service Area Type: Rural

Point/Route Deviation Service

Description: All ARTS routes allow for route deviation of up to ½ mile from the fixed-route by request. Twenty-four hour advanced request is required.
Principal users: Seniors, persons with disabilities
Ridership (2006): 106,042
Fare: $1.00 adults, $0.50 senior/disabled
Cost (2006): $9.91 cost per passenger trip

ISLAND TRANSIT, COUPEVILLE, WASHINGTON

Service Area Type: Small town, Rural

Point/Route Deviation Feeder

Description: Island Transit operates 13 deviated fixed-routes, which will deviate up to ¾ mile from the fixed-route to accommodate seniors and persons with disabilities upon request.
Principal users of deviation: Seniors, persons with disabilities
Fare: Free—All Island Transit fixed-routes are free of charge.

LAKETRAN, PAINESVILLE, OHIO

Service Area Type: Established Suburban

Demand Responsive Connector Service

Description: Laketran provides a general public dial-a-ride service to all county residents. Dial-a-Ride passengers may request a trip to park-and-ride locations to connect with commuter routes to Cleveland and with local fixed-routes. The feeder service program is voluntary. Since Laketran's paratransit operation covers the entire county, connector trips are only necessary for passengers who need to leave the county limits (i.e., travel to Cleveland).
Principal users: Seniors, persons with disabilities, students, commuters
Ridership (2006): Connector trips only—1,040, Dial-A-Ride—337,000
Fare: Dial-a-ride—$1.25 in-county (senior/disabled), $2.50 out-of-county (senior/disabled), $4.00 in-county (general public), $8.00 out-of-county (general public); Fixed-route—$0.50 (senior/disabled), $1.00 (general); $2.50 for commuter express routes; Passengers must pay full fare when boarding each mode.
Cost (2006): Dial-a-ride including connector—$23.24 per passenger trip; Fixed-route—$5.35 per passenger trip

MASON TRANSIT, SHELTON, WASHINGTON

Service Area Type: Small town, Rural

Demand Responsive Connector Service

Description: Mason Transit offers a general public dial-a-ride service for residents in their service area. Persons living off the fixed-route system or have difficulty accessing a fixed-route stop can request a trip at least two-hours in advance. The dial-a-ride service connects passengers with the fixed-route service.
Principal users: Seniors, youth, "persons who have difficulty using a regular fixed-route service"
Ridership (2006): Dial-a-ride including connector—55,466

Fare: In-county—free, Out-of-county—$1.00 (general), $0.50 (senior/disabled)
Cost (2006): Dial-a-ride including connector—2.3 passengers per revenue hour, $32.40 per passenger; Fixed-route—$7.05 per passenger

Point/Route Deviation

Description: Mason Transit fixed-route services will deviate a "limited" distance off the fixed-route to accommodate passengers who have difficulty getting to a bus stop. Route deviation depends on the road conditions in the area. Passengers requesting deviated service must call at least two hours in advance to request the trip.
Principal users: Seniors, persons with disabilities
Fare: In-county—free, Out-of-county—$1.00 (general), $0.50 (senior/disabled)

MASS TRANSPORTATION AUTHORITY (MTA), FLINT, MICHIGAN

Service Area Type: Urban, Established suburban
Demand Responsive Connector: Your Ride
Description: Your Ride is a curb-to-curb service operated in the city of Flint and Genesee County that provides connections to fixed-route service at the end of the lines and at the downtown transfer center. Your Ride is available to persons with disabilities and seniors within the city of Flint and to the general public in Genesee County not residing in Flint. Passengers must schedule a ride through a Your Ride Service Center one to seven days in advance.
Principal users: Seniors, persons with disabilities, students, commuters
Ridership (2007): 649,248
Fare: Your Ride—$2.50 (general), $1.50 (ADA certified); Fixed-route—$1.25 (general), $0.50 (ADA certified); Transfers—$0.10. Passengers pay for the first leg of their trip and present the transfer for the second leg.
Cost (2007): Your Ride—2.76 passengers per revenue hour, $7.96 per passenger trip; Fixed-route—$1.45 per passenger trip

MOUNTAIN MOBILITY, ASHEVILLE, NORTH CAROLINA

Service Area Type: Suburban, Rural
Point/Route Deviation Feeder: Black Mountain and Enka-Candler Trailblazers
Description: Mountain Mobility offers one fixed-route in Black Mountain and three fixed-routes in the Enka–Candler area. Passengers can flag down a bus anywhere along the route to get a ride. Enka–Candler routes make connections with Asheville Transit buses at Biltmore Square Mall and the North Carolina Division of Motor Vehicles. The Black Mountain route connects with Asheville Transit at Black Mountain Train Depot. Due to the limited service spans of the routes, Mountain Mobility may not be available at all times for passengers to connect to Asheville Transit. Passengers needing connections to Asheville Transit when Mountain Mobility routes are not available can request a ride to connect to the services. Passengers must call one to two days in advance to make a reservation.
Principal users: Seniors, persons with disabilities, students
Ridership (2007): Point/route deviation service—8,238, Dial-a-ride—113,961
Fare: $0.50
Productivity (2007): Point/route deviation service—2.31 passengers per revenue hour; Dial-a-ride—2.23 passengers per revenue hour

OAHU TRANSIT SERVICES, INC. (OTS), HONOLULU, HAWAII

Service Area Type: Urban, Established suburban, Rural
Point/Route Deviation: TheBus Community Access Service
Description: OTS provides point/route deviation service on four transit lines. These routes have a fixed-route and schedule but will deviate ¼ to ½ mile from the fixed-route (depending on the route) in order to accommodate Handi-Van eligible passengers. Deviation requests must be made at least 24 hours in advance. Community Access routes are operated using minibuses and vans painted with the TheBus color scheme along with the words "Community Access."
OTS has an agreement with the driver's union that states that deviated service will be limited to new routes and cannot exceed six routes.
Principal users: Seniors, commuters, youth
Ridership (2007): Community Access Service Routes—83,697, Paratransit—807,935
Fare: Fixed-route—$2.00 (general), $1.00 (senior/disabled); Paratransit—$2.00
Productivity (2007): Community Access Service Routes—7.72 passengers per revenue hour, Paratransit—2.5 passengers per revenue hour

SACRAMENTO REGIONAL TRANSIT DISTRICT (RT), SACRAMENTO, CALIFORNIA

Service Area Type: Urban, Established suburban, Recently developed suburban

Paratransit Feeder

Description: Paratransit passengers may request feeder service to light rail stations. Use of this type of service is voluntary, limited in use, and is not actively promoted. Paratransit eligible passengers may also use the fixed-route service at no charge.
Principal users: Persons with disabilities
Ridership (FY 2007): 310,480 total paratransit, no count of feeder trips available
Fare: $4.00
Productivity (FY 2007): 1.56 passengers per revenue hour, $44.00 per passenger
Point/Route Deviation: Neighborhood Ride
Description: RT operates nine general public fixed-routes focused on neighborhoods. The routes operate on a fixed-route and schedule but deviate off-route up to ¾ of a mile to provide curb-to-curb service. Deviated service is available to seniors age 62 and older and persons with disabilities who have a valid ADA/paratransit pass. Passengers requesting deviated service must schedule their trip at least one day in advance. Neighborhood Ride routes are operated using smaller vehicles than regular fixed-routes.
RT has encouraged use of the Neighborhood Ride service by paratransit users living near a Neighborhood Ride route on a limited basis.
Principal users: Seniors, persons with disabilities
Fare: $1.00 (general), $0.50 (senior/disabled); route deviation costs an additional $1.00
Cost (FY 2007): All fixed-route and Neighborhood Ride services combined—$4.81 per passenger trip, Paratransit—$44.00 per passenger trip

SAMTRANS, SAN MATEO COUNTY, CALIFORNIA

Service Area Type: Established suburban

Paratransit Feeder

Description: SamTrans provides an informal, voluntary feeder service for paratransit passengers who wish to schedule trips to connect to fixed-route services including buses, BART, and CalTrain. Paratransit passengers are encouraged to use rail services when possible due to their convenience for longer trips.
Principal users: Persons with disabilities
Fare: $2.50
Point/Route Deviation Feeder: Bayshore/Brisbane Shuttle
Description: The Bayshore/Brisbane Shuttle operates on a fixed-route and schedule but will deviate upon request. Passengers requesting a deviation must call the driver to request a trip. The driver attempts to fulfill the trip on the same day if possible. If the driver is unable to schedule for that day, he/she will offer a ride for the next day. The route serves the Brisbane CalTrain Station and Brisbane park-and-ride lot. Service to major shopping centers is provided on specified days.
Principal users: Commuters, seniors, persons with disabilities
Ridership: 14% of riders are persons with disabilities

SAN JOAQUIN REGIONAL TRANSIT DISTRICT (SJRTD), STOCKTON, CALIFORNIA

Service Area Type: Urban, Established suburban, Rural
Point/Route Deviation: Hopper
Description: SJRTD operates five Hopper routes connecting rural San Joaquin County communities to urban and suburban communities where services are concentrated. Hopper service operates along a fixed-route and schedule but will deviate up to 3/4 mile from the fixed-route to provide service to ADA certified persons with disabilities and seniors not able to reach fixed-route stops.
The service is actively marketed and uses smaller buses with a unique paint scheme.
Principal users: Seniors, persons with disabilities, students
Ridership (2007): Hopper—134,589, Paratransit—83,773
Cost (2007): Hopper—4.60 passengers per revenue hour, $19.92 per passenger trip; Paratransit—2.20 passengers per revenue hour, $68.67 per passenger trip; Fixed-route—$5.93 per passenger trip

SARASOTA COUNTY AREA TRANSIT (SCAT), SARASOTA, FLORIDA

Service Area Type: Urban, Established suburban, Recently developed suburban
Demand Responsive Connector: SCAT-About
Description: SCAT-About was a curb-to-curb service operated by SCAT. Reservations were required to use the service, except at the South County Transfer Point. The service was designed to curtail ADA paratransit trips and encourage use of the fixed-route system. The service was discontinued.
Principal users: Seniors, persons with disabilities
Ridership (2007): 5,036
Fare: Paratransit—$1.50; Fixed-route—$0.75 (general), $0.35 (senior/disabled)
Productivity (2007): SCAT-About—3.0 passengers per revenue hour, $32.00 per passenger trip; Fixed-route—$5.44 per passenger trip

WHATCOM TRANSPORTATION AUTHORITY (WTA), BELLINGHAM, WASHINGTON

Service Area Type: Urban, Established suburban, Small town
Demand Responsive Connector: Safety Net
Description: Safety Net operates in rural, unincorporated areas of Whatcom County that are beyond the ADA paratransit service area, one to two days per week. The lifeline service is open to the general public but due to the limited service span, the largest portion of riders is seniors and persons with disabilities. Safety Net connects passengers from their homes to the main transit centers in Bellingham. Persons requesting a trip can call between two hours from the scheduled departure time of the trip to one week before the trip. Passengers generally use the service to access shopping, medical, and adult day healthcare purposes. In order to limit costs, WTA actively observes service area boundaries and limits the number of days that Safety Net operates.
Principal users: Seniors, persons with disabilities, youth
Ridership (2006): 1,446
Fare: $0.75 (general), $0.35 (senior/disabled)
Productivity and Cost (2006): Safety Net—2.34 passengers per revenue hour, $30.97 per passenger trip (includes paratransit); Paratransit—3.15 passengers per revenue hour; Fixed-route—$4.66 per passenger trip
Point/Route Deviation: FLEX
Description: FLEX routes operate on a fixed-route and schedule but deviate off-route within a specified area by request. Passengers can request a route deviation from one week to two hours before their trip. Deviated service is available to the general public. WTA currently operates three FLEX routes.
FLEX was created to better serve areas where demand is not high enough for a regular fixed-route and to save costs by not having to operate both a fixed-route service and a complementary paratransit service. A mixture of both smaller cutaway vehicles and buses are used.
Principal users: Seniors, persons with disabilities, youth, commuters, students
Ridership (2006): 95,754
Fare: $0.75 (general), $0.35 (senior/disabled)
Productivity (2006): FLEX—9.69 passengers per revenue hour, $9.93 per passenger trip (estimated); Paratransit—3.15 passengers per revenue hour, $30.74 per passenger trip; Fixed-route—$4.21 per passenger trip

APPENDIX D

Honolulu: Methodology for Examining the Feasibility of Feeder Service

For those transit agencies that are contemplating implementation of feeder service, there are a number of steps that can be taken to determine the feasibility of this new service. The discussion below, extracted from a comprehensive evaluation of paratransit service on the island of Oahu in Hawaii, provides a framework for approaching this exercise that can be customized to suit the local conditions in other transit environments. This case study illustrates how, even in a context in which a number of desirable elements for feeder service are in place, namely frequent bus service on many lines, remote locations where ADA paratransit registrants are located, and clusters of social service agencies that are located in transit corridors, the economic feasibility of implementing feeder service remains an open question (Nelson\Nygaard Consulting Associates 2006).

METHODOLOGY

Consultants to the Oahu Department of Transportation Services (DTS) used a two-step approach to determine potential ways to provide feeder service on Oahu, where the city of Honolulu is located. The first step focused on common social service destinations to determine if feeder service might be a good option for the home locations of customers going to these destinations. Two criteria were used to identify potential candidates: 1) the agency should be located two blocks or less from a bus route; 2) and the bus route should provide weekday service at least every 20 minutes. Most of the social service destinations were found to be too far from a bus route, or not served frequently enough. For the destinations that met the criteria, home locations of customers going to these destinations were identified.

The second step focused on home locations that might be close to a fixed-route. Due to the mountainous terrain of the island, the distribution of home locations in remote areas outside of Honolulu but close to fixed-routes appeared to provide a good opportunity for feeder service. Routes serving these areas were identified, including frequencies of service, and numbers of paratransit customers living in these areas.

For all of these locations, analysis of proximity to fixed bus routes was conducted as a "reality check." This analysis provided a conceptual starting point to identify possibilities for feeder route service. Issues such as topography or inaccessible pathways were examined. Ideally, transfer locations would have shelters, benches, and accessible rest room facilities.

EXAMPLES OF POSSIBLE FEEDER SERVICE

Two feeder possibilities were identified:

1) Fixed-route from home locations to transfer points in the paratransit rich urbanized areas for the second leg of the trip. This type of feeder service could be provided for (a) customers who cannot be grouped to go to common destinations or (b) customers with subscription service going to social service agencies.
2) Another feeder option that was explored was providing paratransit service from the home origin for customers traveling to destinations that are well-served by transit. This model could work for (a) customers traveling to social service agency destinations or (b) customers living in Honolulu and working in a remote location.

COASTAL HOME LOCATIONS

The first group of potential feeder candidates included individuals who live on the geographically constrained shores of the island where residential locations are clustered tightly along the narrow coasts and near fixed bus routes. Individuals who were able to travel a few blocks to a bus stop would be able to ride the bus and transfer to paratransit feeder service for the second trip leg to their final destination.

SOCIAL SERVICE AGENCIES NEAR FIXED BUS ROUTES

The most common social service destinations were also examined to determine if any were accessible from a frequent fixed bus route. Paratransit could serve the home locations for the first, feeder leg of a trip to social service agencies, with the second leg being provided on fixed-route. Most of the destinations reviewed were not located within two blocks of a fixed bus route.

Many existing paratransit runs to agencies were already being provided very productively with optimal grouping of customers. This should be considered when weighing the economic benefits derived from feeder service to social service destinations.

HONOLULU TO REMOTE LOCATIONS

The last group of potential feeder customers examined were those who live in Honolulu and work at a remote destination that is on a fixed bus route with frequent service. The feeder trip leg would be relatively short, and the fixed-route transit leg would be longer but direct. This could offer costs savings by greatly reducing the length of the paratransit trip segment.

IMPLEMENTATION STEPS

1) Identify Trips with Cost Savings

If any of the previously identified examples were considered worth pursuing, the first step would be to locate trip pairs that could represent cost savings if provided as feeder trips. A full calculation of the economic impact of feeder service requires consideration of the following factors:

- Implementation and planning costs;
- Continuing added operational costs for scheduling, coordination, and trip planning; and
- Continuing operation cost savings resulting from reduced paratransit mileage per trip for feeder service compared to direct paratransit service.

Operational cost savings from reducing paratransit vehicle time can be estimated by calculating the average duration of the

paratransit portion of feeder trips and the average duration of direct paratransit trips between the same origin and destination. The resulting difference in passenger minutes can be adjusted by average vehicle occupancy. The cost per vehicle hour can then be applied to estimate the cost per trip savings. A threshold for cost savings should be established to determine which feeder trips would be cost effective.

2) Identify Individuals Who Could Use Feeder Service

Another important step in implementing feeder service is to identify who can use the service. Of those who are conditionally eligible, further review is needed to determine who has "distance" as a condition. For those individuals, enough information would be needed to determine if they would be able to get to a bus stop, including exactly how far they can travel. As stated previously, a detailed eligibility screening program is needed to determine who would be able to use feeder service. Until that is in place, a transit agency can examine in greater detail the conditions of the specific individuals whose frequent trips represent good feeder candidates.

OUTCOME OF THE FEASIBILITY OF FEEDER SERVICE ANALYSIS

Based on the initial analysis of potential feeder service on Oahu, it was decided that a limited scale pilot program may be the most effective approach to testing the effectiveness of this model, with a focus on those trips that most clearly meet the feeder criteria that had been established. At the time of this report, the lack of clearly cost-beneficial feeder candidates resulted in a postponement of further exploration of feeder service on the island of Oahu.

Abbreviations used without definitions in TRB publications:

AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	Air Transport Association
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation