

Appendix B

Best Practices Report





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Introduction

The purpose of this report is to provide a summary description of case studies and lessons learned from transit agencies' experiences with implementing flexible transit. Flexible transit is a relatively new type of transit service undertaken by public transit agencies to meet the growing demands of increasingly diverse user groups and markets. Although the concept and practice has been around for nearly 40 years, national attention and research has only recently begun. Additional national research is gradually debunking the conventionally held belief that flexible transit is not widely used. Research material is growing, but limitations on data and information exist, partly because the topic is still relatively new and also flexible transit is inherently more complex to design.

Transit agencies strive to provide efficient and effective services. However, changes have occurred over the last 40-50 years that create pressures and difficulties for transit agencies to provide that service with traditional methods. The state of transit service has begun evolving in response

to these pressures. First, responding with paratransit in order to meet Federal ADA requirements to provide mobility access for a growing diversity of user groups. Now, some agencies are experimenting with flexible transit in response to growing demand for paratransit and/or to markets that are inherently difficult for mobility.

Traditional bus service has been fixed-route, meaning buses follow fixed routes and fixed schedules. These services have worked efficiently for cities with high concentrations of residents and employment; however, economic growth and expansion have caused the shape and size of cities to change, making traditional bus service difficult. The change can be characterized by the decentralization of homes and employment into suburbia and satellite cities. These newer decentralized developments tend to cover larger areas at lower densities, homes and businesses are setback from the roadway and separated from each other, and local streets are circuitous and may not provide amenities such as sidewalks for non-motorized modes of travel.

Defining Flexible Transit

There appears to be no single pervasive term describing the range of flexible services employed by transit agencies. This can be attributed to the number of complex variations between services and the emerging interest in compiling and synthesizing information. With the exception of a few recent national studies, previous research has largely been limited to sporadic one-off reports of individual agencies or conceptually based reports with very little empirical data.

Among the variety of terms used, the term flexible transit appears to have become a prominent inclusive term for the range of hybrid service types from Operational Experiences with Flexible Transit Services in 2004. The term has been used in subsequent national studies including A Guide for Planning and Operating Flexible Public Transportation Services and Integration of Paratransit and Fixed-route Transit Services. Flexible transit is defined as all types of hybrid transit services that are not pure demand-responsive (including dial-a-ride and paratransit) or fixed-route services, but fall somewhere in between those traditional service models.

Flexible transit includes six general types (as defined by TCRP 53), listed in order of increasing flexibility:

Request Stops: Vehicles operate in conventional fixed-route, fixed-schedule mode and also serve a limited number of defined stops near the route in response to passenger requests. (Request stops differ from flag stops in that they are not directly on the route.)

Flexible Route Segments: Vehicles operate in conventional fixed-route, fixed-schedule mode, but switch to demand-responsive operation for a limited portion of the route.

Route Deviation: Vehicles operate on a regular schedule along a well-defined path, with or without marked bus stops, and deviate to serve demand-responsive requests within a zone around the path. The width or extent of the zone may be precisely established or flexible.

Point Deviation: Vehicles serve demand-responsive requests within a zone and also serve a limited number of fixed stops without any regular path between the stops.

Zone Routes: Vehicles operate in demand-responsive mode along a corridor with established departure and arrival times at one or more endpoints.

Demand-Responsive Connector (Feeder): Vehicles operate in demand-responsive mode within a zone, with one or more scheduled transfer points that connect with a fixed-route network. A high percentage of ridership consists of trips to or from the transfer points.

Defining Flexible Transit

Each of the six types of flexible transit is characterized by four operational characteristics. Each of these operational characteristics can vary in degree of flexibility to create a unique service design:

Where vehicles operate: Vehicles may operate along a defined route, as in fixed-route service, but also respond to service requests by diverting from the route. There may also be no route, but only a corridor or geographic area, in which case there is usually one or more fixed anchor points.

Schedule: The times when vehicles will be at boarding and alighting locations are some mix of pre-scheduled times and times determined by demand. If there is a route or there are established route endpoints, then the times at stops on the route and at end points will usually follow a fixed schedule. Times at other locations are variable, although they are constrained by the portion of the schedule that is fixed.

Boarding and alighting locations: Passengers may board and alight at established stops, which may be on a defined route or disbursed within a service area. Alternatively, or in addition, passengers may board and alight at other locations. For example, boardings may occur at any address that can be safely accessed by a bus or at street corners.

Advanced notice requirements: At fixed points served on a schedule, there is typically no need for passengers to provide advanced notice other than signaling the bus driver to stop. At more flexible points, some type of advance notice is needed. Such notice may take the form of a request to the driver at the time of boarding, a call to a dispatch center or directly to the driver, or a subscription that constitutes a standing order for the same trip every day or every week.

Case Studies

Overview

Information on flexible transit services is growing. Each subsequent research compilation discovers more transit agencies that operate some form of flexible transit service. In addition to case study compilations, Paradigm Planning conducted strategic outreach to agencies operating flexible transit for gathering information relevant to Salem-Keizer Transit. Strategic agency outreach was largely guided by the following criteria.

- Similar characteristics to Salem-Keizer, Oregon
- Comprehensive service design
- Flexible transit operational experience

Case Studies

Comparison of Transit Systems

Transit Agency	City/Area	Population	Median Household Income (\$2013)	Type of Flexible Service	Notes
Ben Franklin Transit (BFT)	Benton County, WA	222,392	57,920	Demand Responsive Connector	Also includes taxi-feeder service
Denver RTD	Denver, CO Region	2,619,000	61,897	Point Deviation, Demand-Responsive Connector, and General Public Dial-a-Ride	
Minnesota Valley Transportation Authority (MVTA)	Southern Portion of the Minneapolis-St. Paul Metropolitan area	223,442	66,454	Route Deviation	
Omnitrans	San Bernardino County, CA	1,470,000	57,034	General Public Dial-a-Ride	
Pierce Transit	Pierce County, WA	557,069	67,777	Request Stops	Discontinued in 2011
Potomac Rappahannock Transportation Commission (PRTC)	Three Counties in Northeastern Virginia	454,096	92,279	Route Deviation, Flexible Route Segments, and Request Stops	Replaces paratransit in areas with flexible service
SMART	Southeast Michigan			Point Deviation	
St. Joseph Transit	St. Joseph, MO	78,004	43,345	Route Deviation	
Winnipeg Transit	Winnipeg, Canada	664,000		Point Deviation	

Transit Agency		Pass./Mi.	Pass./Rev. Hr	Cost/Pass.	Farebox Recovery	Standards
BFT	Taxi Feeder Service	0.296	5.94			
	Finley Service	0.208	8.17			
Denver RTD (FY12)			4.4	15.88		2.0 Min Boardings & 26.09 Max Cost
MVTA(FY10)			5.3	15.99-16.04		
Omnitrans (FY12)			2.8		7.66 - 8.91	2.1-3.2
Pierce Transit			4.1			3.0 1 st year 5.0 3 rd year
PRTC (FY09)			16.1	5.59		
SMART (FY14)			3.75			
St. Joseph Transit (FY09)			7.22	10.46		
Winnipeg Transit						

Case Studies

Ben Franklin Transit

Ben Franklin Transit (BFT) provides a mix of services in Kennewick, Pasco, Richland, West Richland, Prosser, and Benton City in the Tri-Cities area of Washington State. There are five inter-city routes, 17 local routes, vanpool services, dial-a-ride paratransit, point-to-point flexible services, and a taxi-feeder service.

BFT's flexible service is a demand responsive connector type that makes stops at designated points within the service area. Services are provided in Benton, Prosser, and Finley areas with Finley being the largest and most prominent. The principle riders of the services are low-income rural residents in the area. Riders call a toll-free number specific to the service area and make trip arrangements at least a day in advance. Riders will be picked up within a couple minutes of the reservation time by a sub-contracted taxi. The taxi will take riders to a transfer point for connections to inter-city or local routes. In the Finley service area, connections are made at the Dayton Transfer Point. The Dayton Transfer Point also provides two scheduled pick-ups and drop-offs a day, at 3:00pm and 5:00pm. Riders do not need to make reservations to use the service at those times.

The flexible services provided by BFT do not use specific standards to evaluate performance. All flexible services are

generally evaluated by passengers per hour, passengers per mile, and cost per passenger trip. The average passengers per hour for flexible service in 2013 was eight passengers per hour. This was only slightly better than taxi-feeder services which was six to seven passengers per hour. Information on passengers per mile and cost per passenger trip were not available. Comparisons to previous types of service in these areas is not available, as these services were implemented at the time areas were annexed into BFT transit service area.



The type of vehicle BFT uses for their taxi-feeder service.

FINLEY SERVICE

Point-to-Point Service in the Finley Area &
Connection to the Dayton Street Transfer Point in Kennewick
Phone: (509) 544-8244

PICK-UP POINTS

- | | |
|--|---|
| 1 E. Finley & S. Pullman | 25 Bernath & Dague |
| 2 S. Finley & 50th Pl | 26 Finley Rd at Hwy 397 -
Instep Church |
| 3 S. Finley & E. Bryson Brown Rd | 27 Matzat at Finley Rd |
| 4 S. Finley at Fire Station 2 | 28 E. Finley at 2034 PR SE |
| 5 S. Finley & E. Cochran Rd | 29 Chemical Dr & Game Farm Rd
(School Dist. HQ) |
| 6 S. Finley & Game Farm Rd
by Finley Shopper | 30 E. 27th at Verbena |
| 8 S. Morton & Walter PR SE | 32 Meals Rd at Tierney PR SE
(Mailboxes) - Not on map. |
| 9 S. Morton & E. Riek Rd | 33 E. Perkins Rd at S. Ruff PR SE |
| 10 S. Finley & Main St | 34 E. 7th & Yew |
| 11 Parking Area of
Sandvik Special Metals | 35 E. 7th Ave & Havana
(Mailboxes) |
| 12 Longbranch Bar & Grill
on Chemical Dr | 36 10th & Havana |
| 13 Riverview High at Lemon | 37 E. 7th at Humane Society |
| 14 S. Haney & 361 PR SE | 38 E. 10th & Yew |
| 15 Cougar & S. Haney at
Finley Elementary | 39 N. Corner of Bryson Brown
& S. 2085 PR SE |
| 16 206508 E. Bowles Rd
(Small Mobile Home Park) | 40 206207 E Schuster |

Map of BFT's Finley Service.



FINLEY SERVICE Point-to-Point with connecti

Case Studies

Denver Regional Transportation District

Denver's Regional Transportation District (RTD) was created in 1969 and provides public transit in eight counties, serving more than 2.8 million people across 2,340 square miles. RTD provides a wide variety of services including local and regional bus service, light rail (FastTracks), complementary ADA paratransit (Access-a-Ride), flexible transit services (Call-n-Ride), and a number of other specialty services.

RTD's Call-n-Ride service is provided in 23 areas across the region and features a variety of flexible service types including point deviation, demand-responsive connector, and general public dial-a-ride. The Call-n-Ride service was implemented in 2000 to supplement fixed-route service by replacing inefficient routes and covering areas with low density. Nearly 74% of riders using Call-n-Ride were commuters according to a 2008 survey. Riders using Call-n-Ride services also span a variety of demographic and socio-economic groups, similar to riders for all RTD services.

Riders wishing to use the Call-n-Ride service first need to call the area's respective phone number, which will connect directly to the driver in the area. Subsequent ride requests can now be made online, once a driver has recorded the rider's information. All rides are provided on a first come,

first serve basis and nearly 40% of riders use Call-n-Ride subscription services. Riders are requested to provide at least two hours' notice, but shorter notice times are possible depending on the driver's schedule and availability. Reservations can be made up to two weeks in advance and recurring trips can be scheduled with bus drivers. Pick-up times with 15-minute wait windows are negotiated with the driver

RTD employs a unique set of evaluation standards for all of its services including Call-n-Ride. Routes that fit into the following parameters need to be evaluated for marketing, revision, or elimination: the least productive ten percent of routes by measure of subsidy per boarding or boardings per hour and/or routes for which both of these measure have fallen below 25% of the average for all routes. Calculations are made from annual, unweighted data (assuming the data have normal distribution) and by using appropriate formulas for standard deviation and confidence intervals. The 2012 performance standards for Call-n-Ride averaged 4.4 passenger per hour for all services. The ten percent minimum of performance was two passengers per hour and the 25% minimum was 3.1 passenger per hour.

RTD conducts extensive market research and outreach with community groups prior to implementing Call-n-Ride or any other services. In addition, RTD will form stakeholder committees comprised of local jurisdictions, schools, social services, and residents to determine size, locations, and operational characteristics. RTD generally relies on its website, printed brochures, direct mail, local promotions, and other standard marketing strategies to inform the public of its services. In addition, cities featuring Call-n-Ride will market the services on their own websites.



Example of an RTD route map.

Case Studies

Minnesota Valley Transportation Authority

The Minnesota Valley Transportation Authority (MVTA) is a transit agency based in Burnsville, Minnesota, that provides transit service to a number of towns in the region. MVTA currently has four flex routes (the 420, 421, 438, and 440), all of which use cutaway vehicles. MVTA flex routes are deviated routes. They have two kinds of fixed stops: Time Points and Flag Stops. Time Points are bus stops with set times. Flag Stops are stops between the Time Points that have no set time. The Flex Area represents the area in which the bus will deviate from the main line. MVTA flex buses will deviate around three-quarters of a mile from the main line. However, the Flex Area is flexible. Additionally, there are Flex Stops, which are stops outside of the Flex Area to which the bus will also deviate. Flex Stops are located at frequented destinations, such as shopping centers and community centers. Flex service is not available during rush hour. MVTA does not integrate their flexible service with paratransit.

In order to set up a reservation, riders call a hotline. The number of deviations allowed per trip differs by route. MVTA encourages riders to make reservations between two days and one week in advance. However, they will take same-day reservations if it fits into the schedule. A lot of customers have standing orders, which limits the number of new

customers that can be added. The wait window customers are given is five to ten minutes.

The flex service on average carries 155 passengers per day between its four routes. On average, there are 21 deviations a day. There are 20 to 40 calls for reservations a day. Sometimes people have to be turned away because there are too many deviations. A majority of the riders ride the 420 and the 421. The maximum number of people MVTA has had to turn away in one day is around ten.

MVTA uses an automatic vehicle location system called Route Match. However, they have not yet determined an easy way to make Route Match work to route deviated buses. MVTA has a dedicated flex route dispatcher. He uses Google Maps and route maps to create each route and types up the manifest for the following day for each driver. Any last-minute changes are communicated to bus drivers over radio.

MVTA is currently planning on moving away from flexible routing on the four lines where they currently have it. When flexible service was introduced, the service worked well. However, the communities have since grown a lot and the flexible service is not working for them anymore. There are too many people calling in to make reservations, and

there are a lot of people who have standing reservations. As a result, not many new people are able to call in to make reservations. Essentially, the flex buses have turned into a personal chauffeur service for those with standing reservations. MVTA has found their flex service in these conditions to be inefficient and expensive, and as a result MVTA is starting to transition their lines to fixed-route.

MVTA's flexible routes are listed as Flex Routes. However, MVTA has no dedicated marketing effort to get people to ride their flexible routes. This is a result of the overuse of the system and their future phase out of the system.

Bus drivers at MVTA who drive on the flexible routes are provided with about ten hours of additional training behind the wheel in order to get them comfortable with any deviation. They have to know the area well so they can respond to last-minute deviations. Early on when flexible service was introduced, bus drivers did not have much say in how the service was constructed and where the buses went. Lately, however, drivers have been asked what is working for them, what is not, and if there are any safety concerns, such as hills, parking lots, narrow streets, or residential neighborhoods that do not get plowed quickly when it snows.



One of MVTA's flex minibuses.



Case Studies

Omnitrans

Omnitrans was formed in 1976 through a partnership between the county of San Bernardino and 15 cities in order to provide standardized fares, a system of transfers, and expanded service. Featured transit services include local fixed route; sbX, a regional bus rapid transit; OmniGo circulator services in three areas; Access ADA paratransit; and OmniLink, a general public demand responsive service.

The general public dial-a-ride, OmniLink, provides curb-to-curb services in the Chino Hills and Yucaipa areas in the region. Principal users of the service are students and senior citizens. The service is designed to meet policy objectives to provide transit service in low density areas. Fares for OmniLink services are \$3.00 compared to \$1.50 for local routes. OmniLink fares cover transfers to all Omnitrans services. Discounted fares are available for seniors and youth.

There is one dispatcher for the two service areas that coordinates schedules for riders. Reservations can be made up to three days in advance. Subscription service is available for riders making at least three recurring trips a week. Same-day requests can be made as availability allows. All pick-up locations are scheduled with a 40-minute window.

OmniLink services are contracted with First Transit.

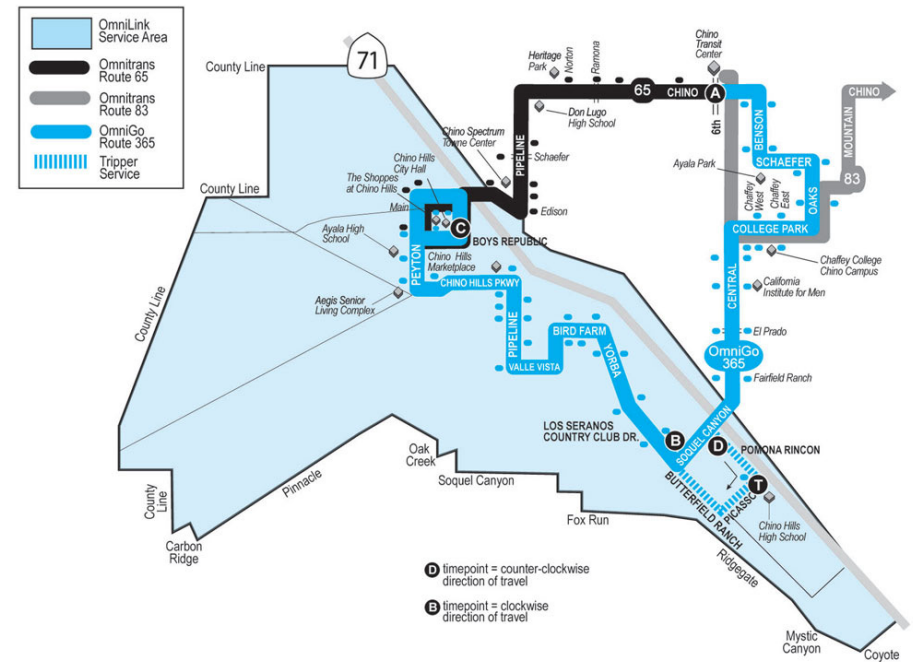
Omnitrans is responsible for providing service vehicles and facilities, scheduling hardware and software, service and policy planning, administrative oversight, customer relations, and budget planning. First Transit is responsible for hiring, training, and supervising all scheduling/dispatch and operations and maintenance staff, processing all trip requests, and maintaining and operating all vehicles in accordance with Omnitrans specifications.

Schedules are made via Mobile Data Terminals (MDTs) and cell phone voice dispatch. Trip assignments are often made one or two hours before the pickup time. Schedulers use Trapeze PASS software and, with a split screen individual trips are assigned to a particular route. Drivers update the electronic dispatch lists via the MDTs and maintain a paper trip sheet as backup. Vehicles are equipped with GPS, but it's not fully used in the trip assignment process.

Omnitrans uses passengers per revenue hour standards to evaluate the performance of OmniLink. Standards have been in decline by design because of complimentary OmniGo services. With rounding, OmniLink is expected to have a productivity measure of 2.8 passengers per hour. Productivity in OmniLink Yucaipa is expected at 3.2 passengers per hour and OmniLink Chino Hills is expected

to operate at 2.1 passengers per hour.

OmniLink is branded as a distinct service by Omnitrans. Buses feature different coloring schemes and logos to distinguish them from local service and Access ADA paratransit services. Omnitrans also markets information on OmniLink by providing information through “bus books”, specially designed brochures, and presentations to community groups.



OmniLink service area map.

Case Studies

Pierce Transit

Pierce Transit operated flexible transit routes from 2003 to 2011. The service was known as Bus PLUS and utilized the request stops model of flexible transit, with the optional stops located within three quarters of a mile of the fixed portion of the route. Bus PLUS was implemented in mostly rural areas of the agency's service area and replaced fixed-route transit. The change in service was largely due to budget cuts that prompted Pierce Transit to cut its least productive fixed route lines.

In areas covered by Bus PLUS routes, paratransit was replaced by this service. Among regular users of off-route stops, 22% were ADA clients. The performance targets for Bus PLUS were three passengers per vehicle hour for new routes (less than a year old) and five passengers per vehicle hour for routes over two years old.

Facing more budget cuts in 2009, the Pierce Transit Board of Directors called for the elimination of the least productive routes. This included many of the Bus PLUS routes. Additionally, Pierce Transit consolidated its service area, removing a number of unincorporated areas from the service area that had Bus PLUS routes. As a result, all Bus PLUS routes were out of service by the end of 2011.

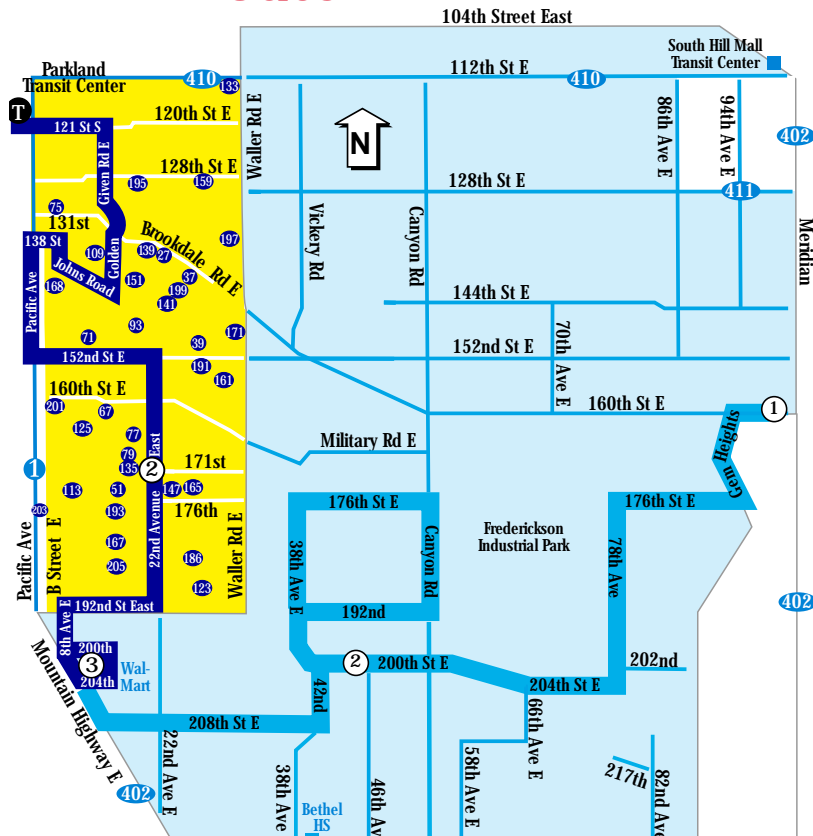


One of Pierce Transit's Bus PLUS shuttle buses.



Parkland-Spanaway Bus Stop Locations

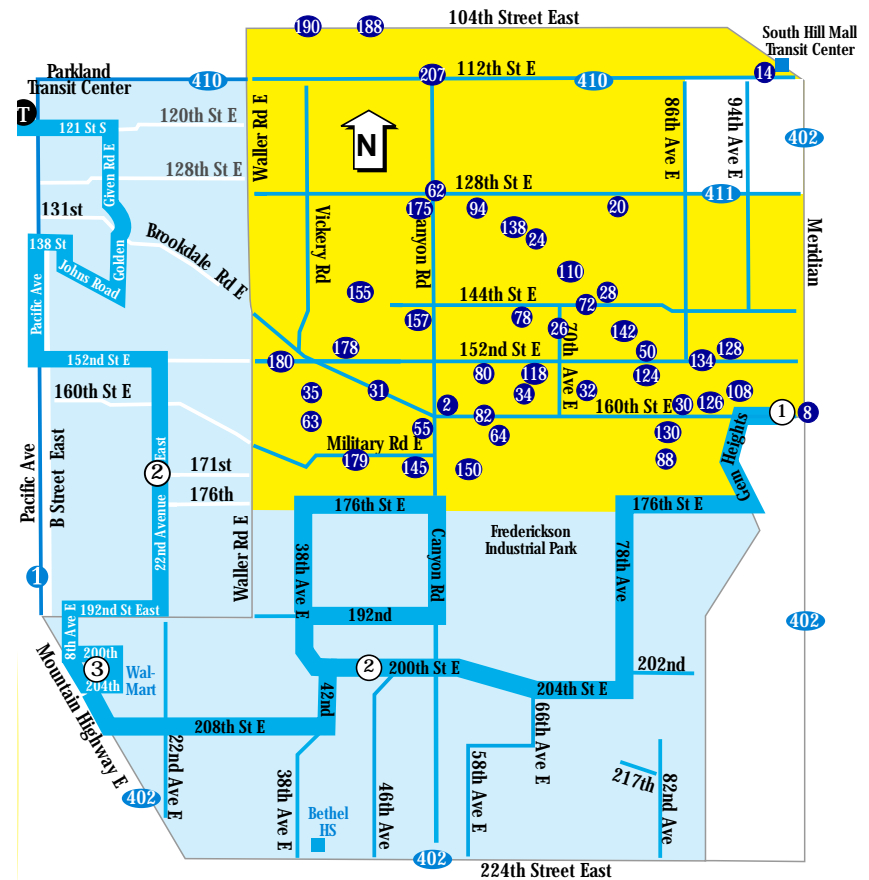
Route 444



Map of Pierce Transit's Bus PLUS service.

Mid-County Bus Stop Locations

NORTH Service Area



Case Studies

Potomac Rappahannock Transportation Commission

Potomac Rappahannock Transportation Commission (PRTC) is a multi-jurisdictional agency representing Prince William, Stafford, and Spotsylvania Counties and the cities of Manassas, Manassas Park, and Fredericksburg in Virginia. PRTC provides commuter bus (OmniRide & Metro Direct) and local bus services in Prince William County and the cities of Manassas and Manassas Park (OmniLink & Cross Country Connector).

PRTC's flexible service, OmniLink, was introduced in 1995 to provide service in communities that did not have local transit. Complementary ADA paratransit is no longer provided in areas served by OmniLink. Despite not having fixed-route service prior to OmniLink, PRTC estimates that it achieved 25-50% savings compared to operating fixed-route service with complimentary paratransit.

OmniLink consists of three types of flexible service: route deviation, flexible route segments, and request stops. OmniLink routes serve local communities by following a regular path and regular schedule. All OmniLink routes will deviate up to three-quarters of a mile with proper notice (limited to portions of flexible route segments for certain routes). Riders who can't make it to regular stops can call customer service up to two hours in advance and request

on off-route pick-up or drop-off for an additional \$1.30 surcharge. Riders eligible for reduced fares are exempt from surcharges. Deviations are made on a first come, first serve basis and buses may stop up to four blocks short of a destination to ensure on-time performance for fixed stops. Riders can also request standing reservations (subscription service) based on availability.

Several OmniLink routes have request stop features called on-demand stops. On-demand stops are pre-determined locations where riders can call customer service, and the next bus will be re-routed to that location. Unlike, route deviations, there is no minimum notice required for service to be provided. However, riders are still required to pay the fare surcharge. Activation frequency of on-demand stops are monitored periodically and if enough requests are made, PRTC will consider re-aligning the fixed-route portion of the route to incorporate it.

Bus drivers currently use mobile data terminals (MDTs) for communication with dispatch. If the MDT system malfunctions, bus drivers are responsible for contacting dispatch via two-way radios for schedule updates. PRTC is in the process of upgrading OmniLink with computerized automatic vehicle locators (CAVL), which will be able to

transmit updated schedules to bus drivers in real time.

OmniLink services are contracted with First Transit. Omnitrans is responsible for establishing service, fare, and other policies; providing vehicles and facilities; dispatch buses; market services; provide customer service and information; and oversee operations and maintenance. First Transit is responsible for hiring, training, and supervising all operations and maintenance staff, performing all scheduled service according to PRTC standards.

OmniLink is branded as a distinct service by PRTC. PRTC also markets information on OmniLink by providing information through “bus books”, specially designed brochures, PRTC’s website, paid newspaper advertisements, distributed targeted mailings, presentations to community groups, and cross-promoting services through email.



Potomac and Rappahannock
Transportation Commission



PRTC uses full-size buses for their flexible service.

Case Studies

SMART

The Suburban Mobility Authority for Regional Transportation (SMART) is Southeast Michigan's regional bus system. Along with its 234 fixed-route buses, SMART also has a flex route that provides service in the Groesbeck corridor. Known as the Groesbeck Flex Route, this flex service has three time points that are met each trip (two of which are major transfer points). In addition to the time points, the service offers curb-to-curb pick-ups for those with reservations.

The majority of riders on the Groesbeck Flex Route are full-fare riders who live outside of the service area. Among riders who live within the service area, the majority are also full-fare riders.

In order to make a reservation, riders can call the same day. All calls must be made at least 30 minutes before the departure from the time point associated with their trip. Passengers are told to be ready for the bus at the time the bus leaves the time point. If a bus leaves going north at 8:05 and the person is riding north, they are told to be ready at 8:05. Once the bus arrives at the location, the driver will wait one minute for the passenger.

SMART uses their paratransit vehicles for the Groesbeck Flex Route. They are able to carry anywhere from 10-18 passengers depending on the vehicle.

The cost of the service is highly variable each day. It is difficult to predict ridership from one day to another since the service is a same-day service. Riders pay the same fare for the Groesbeck Flex Route that they do for fixed routes.

In order to evaluate its flex service, SMART looks at on-time performance with regard to the time points, as well as their passengers per revenue hour. The Groesbeck Flex Route's passengers per revenue hour in FY14 was 3.75, as of mid-April 2014. SMART is currently evaluating this service to see if fixed-route service could be more efficient.

All of the buses used on the flex route are equipped with a GPS system, as well as the Vector 9000 mobile data terminal in order to communicate with dispatch and receive messages and pick-ups. Currently, there is no mobile app or text message service for determining when the next bus will be at each stop. Riders must rely on the schedules posted at the three time points as well as on the website.

SMART's website provides information on how to use the Groesbeck Flex Service. Additionally, SMART's drivers and other passengers play an important role in passing on information about the service to other riders.

Bus drivers are trained by spending a week training to operate the flex route. They learn efficient ways to reach the time points while also picking up the call-ins, all while staying on time.

Overall, it is unclear if the Groesbeck Flex Service is the best use of funds. It was originally created in order to service the businesses in the area, but most of those businesses have recently closed. SMART is also considering if its flex zone is too large. Of the riders that are currently being served, it might be possible to serve them better using fixed route.



One of SMART's buses used on the Groesbeck corridor.



GROESBECK FLEX ROUTE FARES		
	Fare	Transfer
Full (Ages 6-64)	\$2.00	25c
Reduced		
• Older Adults Age 65+		
• People with Disabilities	\$1.00	FREE
• Medicare Card Holders		
Under 6 Years of Age when accompanied by an adult	FREE	FREE

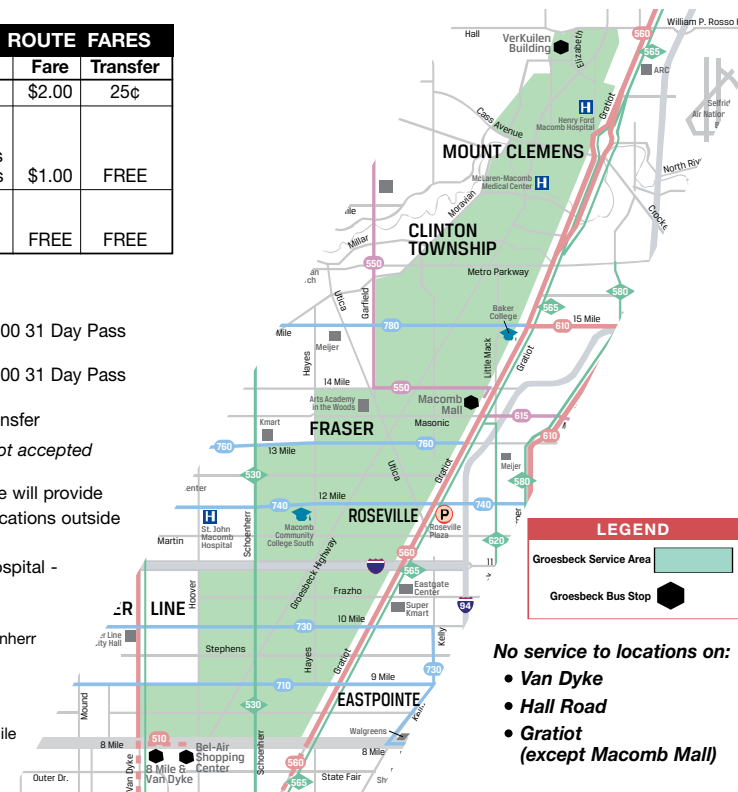
Payment Options*

- Cash
- Validated SMART \$2.00 31 Day Pass for Full Fare
- Validated SMART \$1.00 31 Day Pass for Reduced Fare
- Valid Fixed Route Transfer

*SMART Value Passes not accepted

The Groesbeck Flex Route will provide service to the following locations outside the service area:

- St. John Macomb Hospital - Hoover & 12 Mile
- Kmart - 13 Mile east of Schoenherr
- Meijer - 15 Mile east of Hayes
- Macomb Academy - Garfield north of 17 Mile



Map of the Groesbeck Flex Route Service.

Case Studies

St. Joseph Transit

St. Joseph Transit is a transit agency that operates in St. Joseph, Missouri. St. Joseph does not operate a separate paratransit service. Instead, their entire system is deviated fixed-route using 30 foot buses and is available to everyone. Riders of St. Joseph Transit buses are primarily lower-income and transit-dependent. St. Joseph publishes routes and schedules, including time points. They allow buses to deviate from the main route, but they do not have a set distance they will allow the bus to deviate. However, buses typically deviate four to five blocks from the route.

Riders can call in or go to St. Joseph's website to schedule a pick-up. Advanced notice of 30 minutes is required to request a deviation. Additionally, they can request that a driver deviate from the route when they get on the bus. St. Joseph bus drivers make a point to get back to the route as close to where they left it as possible. The base fare for riding a bus in St. Joseph is one dollar. Riders are charged an additional 50 cents for a deviation. If riders request a deviation on both ends of their trip, they are charged for each of the two deviations.

Headways for buses are one hour. Part of the reason for the large headways is the amount of time needed to be built into the schedule for deviations. Typically a route can

handle three to four deviations per trip, but it depends on the route. Most trips have at least one deviation. It is rare for St. Joseph to have to turn away a rider looking to make a reservation.

St. Joseph Transit uses RouteMatch for scheduling and dispatch. They also have three part-time dispatchers that rotate shifts. These dispatchers process reservation requests and help determine which route each trip should be on. Bus drivers have mobile computers on the buses that tell them where to go. If a deviation is requested while a bus driver is out on his or her route, a notification will be sent to the driver alerting them of the new deviation. Additionally, bus drivers will use the radio system to ask questions. There is a mapping feature built into the mobile computers. Typically, only newer drivers use this feature. Veteran drivers are familiar with all the roads along each route, since the community is fairly small.

They have an interactive voice response (IVR) system set up that calls riders the night before their reservation to remind them of the reservation and to give them an opportunity to cancel. They also get a call 30 minutes before their scheduled trip. Riders can opt out of these reminders if they want. St. Joseph does not get a lot of no shows. Typically

if there is a no show, it is because someone has become ill and they did not cancel their appointment. Reservations can be canceled up to 30 minutes in advance. Excessive no-shows will result in a loss of pre-scheduling privileges.

St. Joseph Transit has done route deviation since around 2008. Before that, they used point deviation. They made the switch because riders were not happy with point deviation. It was difficult for people who were not requesting a deviation to figure out where the bus was going to be and when. Only around 20% of riders on St. Joseph buses utilize deviations. Most rides are from people boarding the bus at fixed stops.

St. Joseph Transit has found that deviated fixed-route service is more efficient than typical paratransit, but far less efficient than traditional fixed routes. This is a result of the amount of time that needs to be built into the schedule for potential deviations. Deviated fixed-route drives down the number of passengers per hour. Because of this, it is difficult to compare performance indicators for paratransit or fixed route to that of flexible service because it is so different from both.

St. Joseph has limited marketing for their route deviations. The information is on their website and they have printed information available. Dispatchers explain the service to

people who call in and ask about it. Also, St. Joseph runs a few television spots that explain the basics of how the service works.

Bus driver training is not unlike that of paratransit training. Only so much can be done in the classroom. Much of the training is on-the-job as bus drivers need to get to know the roads. St. Joseph Transit has found that some bus drivers are good at learning streets and some are not, and that is a difficult quality to pinpoint when hiring drivers.

St. Joseph Transit chose to run a deviated fixed-route service because, although it is not as efficient as fixed-route, St. Joseph does not have to run a separate paratransit service. Additionally, the community wanted one system where everyone was together on the same buses. Since switching to route deviation, the community has been happy with the service.



Case Studies

Winnipeg Transit

DART is Winnipeg Transit's flexible service in south and southeast Winnipeg, Canada. It currently has four routes, all of which only operate during off-peak hours (weekday evenings, Saturdays, and Sundays). Riders are instructed to call DART's hotline number to speak directly to a bus operator in order to arrange a pick-up. People are encouraged to make reservations as soon as possible, but they can be made as little as 30 minutes in advance. DART operators will pick riders up at their door and bring them to any DART Stop. In order to minimize passenger walking distances, the number of DART Stops is around twice the number of regular bus stops. The operator gives riders a time window in which they can expect to be picked up. The operator will not wait for riders who are late.

According to Winnipeg Transit, DART costs roughly the same to operate as a one-bus feeder route. Whether Winnipeg uses DART or a fixed-route feeder route is determined based on the land uses and street layout of the service area. DART is considered better than fixed-route in two situations: when the street network makes it difficult to provide access to all residents within a 400 meter walking distance, and during times of the day when there is low demand.

The service was implemented in 1996 as a six month pilot

project, and it was made permanent in 1997. In order to evaluate DART's pilot program, Winnipeg Transit looked at feedback it received through regular meetings with bus operators, a survey for passengers, commendations and complaints received from the public, and a database of all passenger trips.

At first, Winnipeg Transit used 25-foot ELF buses with a capacity of 20 passengers. However, they found the turning radii of the buses was the same as their full-sized buses. As part of their evaluation, they decided to buy New Flyer Low-Floor buses with were 30-feet long and could hold 25 passengers.

Winnipeg Transit found that there were not necessarily cost savings associated with switching from fixed-route service to flexible transit. However, the service became much more efficient since nearly the same amount of money was spent on serving a much larger area.

Marketing materials used for DART included a specialized map that shows the locations of the activated stops and special branding for the flex service. Additionally, the DART phone number is posted prominently on DART bus signs and on street signs designating DART Stops.

DART

101

St. Amant Plaza Drive



DART 101 Terminal
Terminus du service DART 101

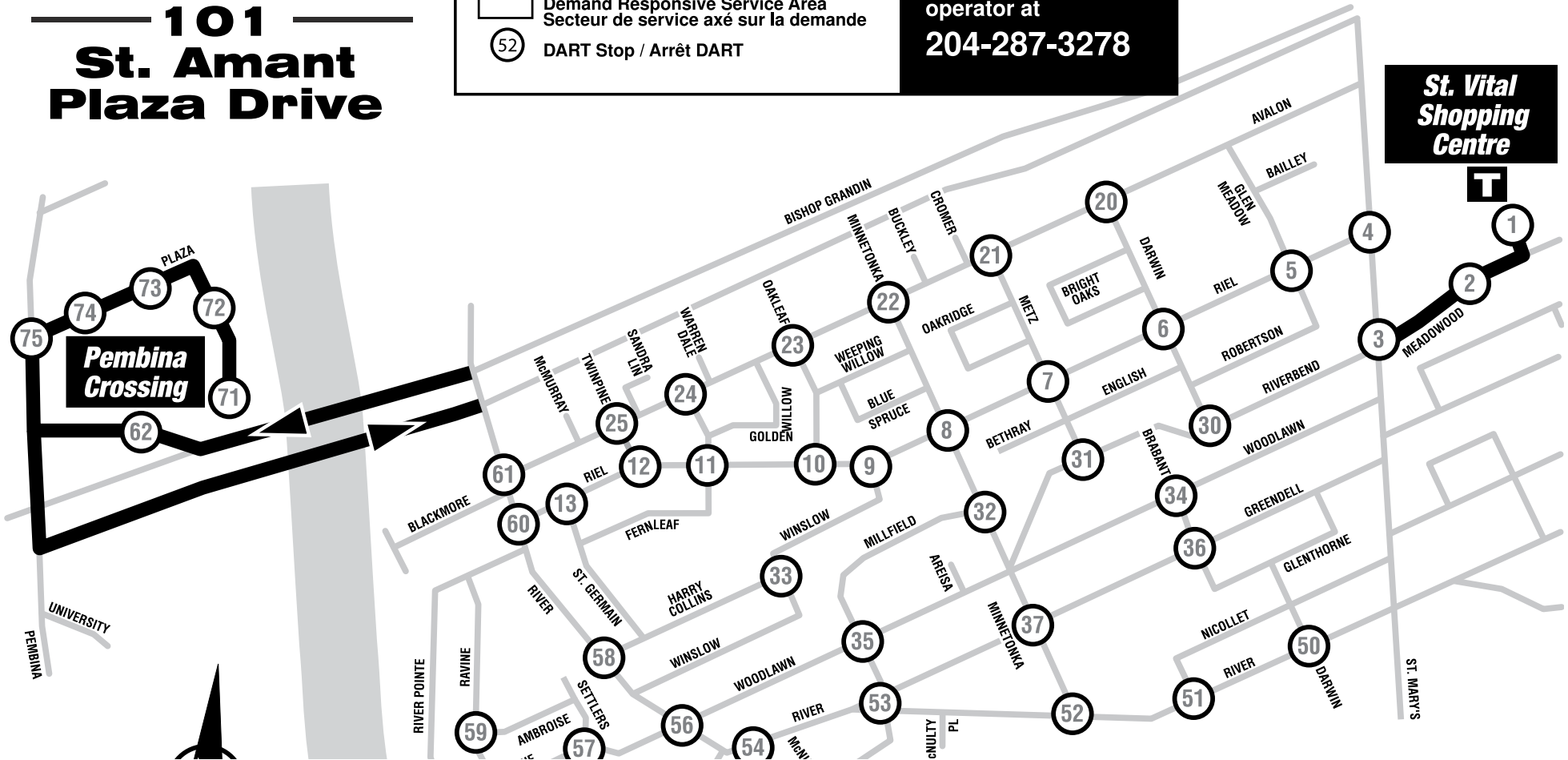


Demand Responsive Service Area
Secteur de service axé sur la demande



DART Stop / Arrêt DART

To book a ride on the
DART 101 contact the
operator at
204-287-3278



Map of the DART 101 route.

Findings

Overview

There currently are no concrete guidelines on implementing flexible transit. This could be due to a combination of its complexity, competing trade-offs in goals, and because the topic is still relatively new. As such there are a limited number of theories related to flexible transit that have general consensus.

The role of flexible transit used most often by transit agencies is to provide service in limited areas that are hard to serve for reasons surrounding demographics, street layout, or community preferences. For example, the Minnesota Transit Valley Authority introduced route deviation services in 1998 to replace their fixed-route bus services in outer-ring suburban areas with low ridership. Other common situations in which flexible transit was implemented were to provide service during low-demand times, such as Denver RTD's flex routes. Flex routes operate as regular fixed-route bus service during rush hours and switches to point deviation or demand-responsive connectors during non-rush hours.

Additionally, flexible transit can be used as the primary service for small cities, suburban areas, or rural areas. The Ride in St. Joseph Missouri, a city of 77,000 people, operates eight bus lines all with route deviation.

According to a 2010 survey of 95 agencies operating flexible transit, the majority responded that the motivations for implementing the service were to respond to community preference and geography and to provide service in low density areas. Other responses by agencies include:

- Balance customer access with route efficiency
- Reduce or eliminate costs associated with ADA paratransit services
- Lay groundwork for future fixed-route services
- Provide service in low-demand times

Service & Ridership

The size of the city and transit service area cover wide ranges, however there is not any definitive evidence to suggest that these characteristics are indicative of successful implementation. The size of the cities range from a population of two thousand up to two million and the size of the service areas range from 20 to 17,000 square miles. Known flexible transit service failures are attributed to factors other than size. This may likely be because of the challenges in balancing operational characteristics and/or because the size of flexible transit service areas can be defined by the transit agency to meet demand.

The most significant factor influencing flexible transit regardless of the service type or size of area served is the level of service provided as gauged in vehicle miles or vehicle revenue hours. Among the case studies compiled in *A Guide for Planning and Operating Flexible Public*

Transportation Services ridership appears to be the same or greater compared to the fixed-route services they replace as long as the service levels are comparable and the fares are not too high.

Actual ridership for most agencies ranges between three and ten passengers per hour. A smaller number of agencies operate flexible service for more than 11 passengers per hour. Agencies that operate with ridership above 11 passengers per hour typically offer flexible service for all their routes. A notable exception of high ridership for an agency that only offers flexible service in selected areas is San Diego's MTS, which has an average ridership of 14.5. Very few agencies operate flexible service under three passengers per revenue hour. In these instances, it appears that transit agencies operate flexible service at these levels for lifeline services.

Findings

Service & Ridership

Research from various reports show that flexible transit is structured differently and serves different needs depending on the area served.

- Flexible transit services that connect to fixed-route locations are shown to be implemented in areas with a greater range of land-use densities.
- Demand-responsive connectors are shown to work particularly well in elongated corridors and physically constrained environments such as suburbs.
- Flexible transit services have been used when there are general demand corridors oriented towards a major trip generator location.
- Flexible transit service is developed around focal points and moderately dense suburban corridors.
- Flexible transit has been seen to encourage first-time public transit riders.
- Low density development and/or widely spaced trip generators that are difficult to access are best served by flexible services with the greatest degree of demand-responsiveness.

Cost Savings

Flexible service is becoming increasingly attractive for the possibilities of associated cost savings. The economic potential is from improving inefficient fixed-route service and/or obviating the need for complementary and costly paratransit. Replacing fixed-route transit is more commonly done, but cost savings are minimal or none. Replacing complementary paratransit service for riders with the appropriate conditional eligibility is done less frequently, but can have the biggest impact in reducing costs.

Flexible services have been used in lieu of fixed-route transit as a cost saving tool because fixed-route transit operations in certain markets are at their greatest disadvantage. Reported productivity of flexible services is typically lower than fixed-route, yet the cost per passenger and total cost of providing the service is typically lower.

Flexible services have also been used to integrate fixed-route service and complementary paratransit service. Providing this type of service with trip screening, stricter paratransit eligibility requirements for conditionally eligible ADA riders, and other educational material or programs can result in notable cost savings. This may reduce system wide costs by covering a proportion of paratransit riders who would

otherwise have to be accommodated by a dedicated but more costly paratransit service.

Operating flexible service and complementary paratransit concurrently without imposing stricter eligibility requirements for riders with conditional eligibility has the potential to reduce dependence on paratransit, but the actual cost savings from this strategy have not been determined. Additionally, strategies to encourage paratransit riders to switch to fixed-route or flexible service has been shown to increase ridership, but not with a corresponding relative decrease in paratransit ridership.

Other cost savings have been shown to occur when flexible services are contracted out. Cost savings come from providers specializing in flexible service and already having smaller vehicles to fit ridership demands.

Information on the cost savings of using technology can only be surmised. Currently, there is no data to support associated cost savings, however, there is common agreement that technology does make flexible service operate more efficiently.

Findings

Performance Standards

Most transit agencies operating flexible service do not have specific performance standards for evaluating performance. Specific performance standards can vary dramatically among transit agencies that do use them because of the contextual demands that flexible transit is designed to meet. The variation among standards appears to be a matter of meeting policy goals or preferences. There is some agreement in that flexible service is expected to perform better than standard paratransit, but worse than most fixed-route service.

Multiple studies report a high number of agencies simply do not use service guidelines or standards to inform how flexible service is implemented or operated. This may be because the advantages are available regardless of whether agencies have separate standards, agencies often have no pressing need to develop separate standards.

Flexible service planning for most transit agencies is done without guidelines or standards. This may be due to how the concept of flexible transit is relatively new and the inherent complexities to design it. Interviews conducted by the Transportation Research Board in 2006 found that transit planners allocate resources based on experience and professional judgment. Transit planners' decisions are

also augmented by requests from the community and policy influence.

Standards for transit agencies that do use them vary from stringent quantitative analysis to less stringent qualitative analysis. When agencies do have standards, it's usually because the agency has limited financial resources and might have to cut even the less expensive services.

Among transit agencies that do set standards, the most commonly used performance standard is passengers per revenue hour. Most agencies set standards in the range of four to eight passengers per revenue hour. The standards set vary based on type of flexible transit service with less flexible types generally having higher standards.

Some agencies include subsidy per passenger as a stand-alone standard or in combination with passengers per revenue hour. Standards for subsidy per passenger range between \$4.50 and \$11.30. Even fewer agencies use farebox recovery ratio as a standard. In such cases, the minimum threshold to continue services ranges between 20% and 25% fare box recovery. The higher farebox recovery ratio is likely due to the additional surcharges for deviations. Considerations should be made for the type of riders and the associated discounts. Commuters who use flexible

transit services regularly will contribute more to a higher farebox recovery rate compared to seniors and people with disabilities who receive discounted fares.

Other notable unique standards include:

- Progressive standards based on the age of the route. Each year for three years, the standard for passengers per revenue hour and subsidy per passenger are incrementally raised. Pierce Transit's operates route deviation and request stops and sets the increment annually from three to five passengers per revenue hour.
- Combination of qualitative and quantitative goals previously used by San Diego's Metropolitan Transportation System.
- The qualitative goals include quality of service standards, transit supportive land uses, and regional transportation priorities.
- The quantitative criteria include passengers per revenue-mile, passengers per revenue-hour, and subsidy per passenger.
- Denver RTD conducts reviews of the least productive 10 percent of routes, based on either passengers per revenue hour and subsidy per boarding. The bottom 10 percent of routes are evaluated for marketing, revision, or elimination.
- Passengers per revenue-hour is the most commonly used performance measure.

Findings

Technology

Having a dedicated real-time decision support system is the most critical element for operating flexible transit. Decision support systems are responsible for registration, trip booking, and dispatching and can take several forms including customer service centers or directly through bus drivers. A poorly designed support system can dramatically impact the quality of service. Real-time scheduling and dispatching tasks become especially challenging when the system has to handle a large volume of requests. When calls are not answered, service requests cannot be accommodated, trips are missed, and riders are discouraged from using the system.

Transit agencies use a variety of technology for dedicated real-time decision support systems. Several transit agencies will adapt software used for paratransit services for use in operating flexible transit. Commonly used scheduling software include Trapeze, PASS, and RouteMatch. Adapting software to flexible service has shown some limitations, as is the case with St. Joseph's inability to fully use RouteMatch for route deviation services. Few agencies have custom designed software for flexible transit. Mobility DR is a software system custom designed to allow bus drivers to act as dispatchers for RTD's flexible services. All transit agencies use paper manifests and maps coupled with either cell phones or two-way radios as backup for when software is not operational.

Branding, Marketing, & Education

Information on branding and marketing is the most limited area of research topics. It's common for agencies to brand and market flexible service types, but no literature was found that provided comprehensive reviews or analysis on their impacts. Among agencies who market flexible transit services, the most common mediums include presentations, websites, and system maps. Other mediums used less frequently include brochures, paid ads, bus ads, and mailings.

Flexible transit services commonly have their own identities and branding, with unique logos and color schemes. Some examples of different identities are listed below:

- Call-n-Ride, RTD (Colorado)
- OmniLink, PRTC (Virginia)
- Groesbeck Flexible Route Service, SMART (Michigan)
- Ride Request, JTA (Florida)
- Finley Service, Ben Franklin Transit (Washington)

Education to community and staff is also considered critical for successful implementation and adoption of flexible service. Studies on demand-responsive connectors have shown that education on the need for flexible service is a lengthy but necessary element of building community support. This can be applied to other flexible service types as well. Community outreach includes education on the reason and need for flexible service and on how to use it. Since part of the motivation for implementing flexible services is fiscal constraints, agency staff are typically responsible for educating the public. Multiple transit agencies have seen an increase in rider complaints after implementing flexible service. However, nearly all of these same agencies reported that the complaints subsided as riders became more familiar with the new service.

Education of staff, especially schedulers and drivers, is critical as well. Staff need to understand the value of providing flexible service, particularly for more demand-responsive service types. This commonly takes into account how flexible services are used to help conserve the budget in a constrained funding environment.

Findings

Integration with Fixed-Route Systems

Coordination with regional and local fixed-route network and existing paratransit service is important for most flexible service types. A common connection has been made between demand-responsive connectors and areas that have exceptionally frequent fixed route service. Whereas demand-responsive connectors are seen to be avoided by passengers in areas that have long waits at transfer points. For transit agencies that provide ADA feeder services as a way to reduce complementary paratransit service, considerations 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 ten or 15 minutes, it may be necessary to provide a direct paratransit trip to the rider's destination.

Another important factor, similar to the value of coordination with fixed-route services, is to identify transfer locations that are sheltered and safe. A majority of flexible services use transfer points where it's possible for connections to be made in the most convenient way possible. These locations generally have a shelter, seating, sometimes a telephone, serve multiple routes, and are also priority areas for security.

Reasons for Discontinued Service

Accounting for as many variables as possible is valuable in reducing risks, but some agencies have discontinued service. The primary reason for discontinuing service was due to low ridership. For example, Fort Worth Transportation Authority discontinued its point deviation routes in 2003 due to low ridership. In some cases, such as Sarasota County Area Transit, the goal of shifting paratransit riders to a demand-responsive connector service was not met and service was discontinued. Other commonly cited reasons include issues with scheduling, possibly due to supply constraints described earlier. In some cases, ridership grew beyond the flexible service capacity and fixed-route service was implemented instead.

Commonly cited reasons from national research include:

- Low ridership
- Problems with scheduling and advanced notice requirements
- Pilot program failed to generate results
- Fuel expenses
- Equipment and resources needed in other areas
- Lack of buy-in from agency staff
- Service was changed to fixed-route because ridership grew too much
- Budget cuts

Lessons Learned

From our extensive research into flexible transit services around the country and seven personal interviews conducted by phone by Paradigm Planning members, a few of the major lessons learned regarding this form of transportation include:

- Agencies that attempt to offer flexible transit service usually attempt several types of service for their region. BFT, OmniLink, RTD, and PRTC all offered a variety of flexible options to riders in their respective transit areas.
- Flexible transit is implemented to assist a variety of customers. Many flexible options used primarily by low-income riders, students, seniors, and/or commuters. Many agencies appear to use their flexible service in exchange for offering paratransit, therefore including ADA riders to flexible service. PRTC, Pierce, and St. Josephs all used flexible service in place of paratransit.
- Subscription service is one popular form of reservation used with flexible transit. Commuters can especially benefit from having a reserved seat throughout the month. Three of the agencies' contacts shared that subscription services were used on their flexible routes.
- Reservations and scheduling differs greatly depending on the agency and the transit area. Most agencies seem to ask for reservations between 30 minutes and three days in advance. While reservations can be set only hours in advance, all systems work on a first-come-first-serve basis.
- From research and interviews, the range of deviation for service was very large. Some agencies only deviate four or five blocks, while others allow deviations of up to three-quarters of a mile.
- Additional charge for deviations also differs among agencies. According to the agencies interviewed, cost for a deviation ranged from no additional cost to \$1.50 per ride.
- Actual ridership for most agencies range between three to ten passengers per hour. Some agencies use ridership numbers as basic performance standards. BFT, OmniLink, Pierce, SMART, and RTD all use passengers per hour as their performance measure. Their range fell within the national average, with passengers per hour between two and eight for the three agencies.

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- Transit agencies will often implement flexible services through pilot programs with probationary periods between one to three years, the average being 18 months.
 - Education programs for both riders and operators are essential for a smooth transition to flexible service. Riders receive education through traditional public outreach and marketing methods. Operators receive education on service area and scheduling procedures,
 - Current technology for flexible transit service is varying and not necessarily as advanced as agencies may need. Most agencies have a call center with dispatchers making route choices based on number of deviations. RTD has implemented an online reservation webpage, but this is not common. While agencies do attempt to use computerized technology, all transit agencies use paper manifests and maps coupled with either cell phones or two-way radios as backup for when software is not operational.

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