

## 5 How about on-demand services?

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# What is on-demand public transportation?

## Purpose

In this report, when talking about transit we have usually been referring to transportation where:

- Buses, streetcars or trains (the mode),
- run between a defined set of places (the route),
- operate at published days and times (the schedule),
- load and unload passengers at defined places (the stops),
- that anyone can ride (the public) for a low price (the fare).

**Fixed routes generally assume that there is enough demand in the immediate vicinity of the route and stops that people will walk to a stop and ride**, so long as the schedule makes the service useful.

Deployed in the right environment and with the right level of investment, fixed routes can efficiently allow very large numbers of people to travel easily and fast to most of their destinations at a low cost per ride.

However, as we saw in Chapter 2, there are also inconveniences in using fixed routes, such as the requirement to walk potentially long distances, wait potentially long times, and travel on a potentially indirect path.

Furthermore, **many parts of KCMO have been developed piecemeal at low densities and generate very low demand within walkable distances**. These areas are far from ideal for the effective deployment of transit service. This is true most places north of the Missouri River, east of the Blue River or south of 85th Street.

Investment in fixed routes serving these areas has been limited, and the number of people riding the existing transit is generally low. These are all areas where public transportation would serve a coverage function rather than a ridership function. **So is there a better way to provide coverage to low-density areas than fixed routes?**

This question has come to the fore in recent years, largely in response to the ride-hailing apps (such as Uber and Lyft) that have revolutionized the taxi business.

**Recognizing that many people have benefitted from recent improvements in on-demand personal transportation, policy-makers are looking for way to extend the benefits of app-based ride-hailing to public transportation.** The private sector has responded in kind, creating algorithms for shared use, deployed in services like Uber Pool and Lyft Line.

## What does it look like?

In theory, an on-demand public transportation service could be any form of transportation managed for the benefit of the public that responds to specific individual requests for transportation rather than an assumed underlying demand.

In practice, there is strong interest in services that use smaller vehicles, can respond to requests within minutes, provide service to an area rather than on a route, and provide door-to-door service for a lower price than an individual taxi fare. On-demand services that tend in this direction are often termed “new mobility”<sup>1</sup>.

**But the more convenient and flexible an on-demand service becomes, the more expensive it becomes to provide. So managing an on-demand service is often about limiting who can ride, when they can ride, and where they can go, and where they can go, while also asking for a higher fare than a standard transit service.**

## Who operates and manages the service?

On-demand transit is usually managed by the same agency that manages fixed routes. However, there are no hard and fast rules regarding who actually owns or drives the vehicles.

On-demand transit can be provided by the public transit agency in-house, or contracted through a taxi operator, a ride-hailing app, a private medical care transportation provider, or any other entity with access to licensed vehicles and drivers.

In-house operation by the public transit agency tends to come at a higher cost, while operation by private entities is less expensive but sacrifices some level of control over the service. When using private operators, there is an administrative burden to the agency in contract management, and this burden is multiplied as the number of private operators increases.

**It’s important to note that KCATA does in fact already manage some on-demand services**, including the RideKC Freedom On-Demand program and four FLEX routes within the area studied by RideKC Next. FLEX service is provided directly by KCATA; Freedom On-Demand is provided through private taxi companies under contract to KCATA.

<sup>1</sup> “New mobility” has also been used as a catch-all term for any transportation service, public or private, that has been introduced in recent years and is not provided by a traditional transit agency or taxicab company. This includes ridehailing but also docked and dockless bike-share and scooter-share systems, and sometimes also refers to various means of smartphone-enabled fare payment.

## Who can ride?

Fixed transit routes serve the general public. Anyone with bus fare can ride. This can also be true of on-demand services, although in some cases eligibility might be restricted to reduce costs.

A good example of an existing on-demand service with limited eligibility is ADA paratransit through the RideKC Freedom program. Only riders with a qualifying disability may use this program, which provides door-to-door service for \$3 for trips that begin and end within 3/4-mile of a fixed route.

But other models also exist<sup>2</sup>: users might be restricted to those who live and/or work within a certain area; to people above or below a certain age (such as youth or elderly person); to students or participants in certain governmental programs; or to people with lower incomes or who qualify for certain government services.

## When can you ride?

Private ridehailing and taxi companies generally provide service on-demand at any time and within minutes if a vehicle and driver are available. This is the most convenient way to structure the service for riders, but also the most expensive for the transit agency.

One way to limit costs is to require advance scheduling, as many transit agencies (including KCATA) impose on disabled customers using ADA paratransit services. Advance scheduling may require trips to be scheduled within a certain time window, such as no less than 24 hours in advance but no more than two weeks in advance. Restrictions and penalties for no-shows, as with paratransit, can apply to these services.

Another way to limit costs is to set limits on when the on-demand service is available. Depending on the purpose and intended reach of the service, this can be as broad as providing on-demand service at the same times most bus routes operate, or as narrow as restricting service to hours that match a single driver’s work shift, or even capping the number of rides a user can take within a given day, week or month.

## Where can you go?

Because Kansas City, MO covers a huge area, it would be extremely expensive to provide an on-demand service that allowed riders to go anywhere. As a result, it’s likely any on-demand service will be restricted to a certain area (as the existing FLEX program is restricted today).

At its most flexible, on-demand transit can provide curb-to-curb service

<sup>2</sup> Although it is possible to limit eligibility in these ways, there are limits to such restrictions under civil rights laws; certain types of eligibility criteria may legally constitute discrimination. KCATA should ensure any eligibility criteria meet all applicable laws before implementing any such limits.

# On-demand service can mean many things; it's rarely a direct replacement of a fixed route.

like a taxi. However, a common way to limit cost is to provide curb-to-hub service, where one end of the trip must be a transit center or bus stop.

For example, a common form of service picks up customers at their homes in lower-density neighborhoods and drops them off at the nearest transit center or bus stop, where they can access fixed-route service. This is less attractive than curb-to-curb service but may still provide an improvement where fixed-routes cannot be provided within walking distance.

## How much will you pay?

It's possible to charge the same fare for on-demand service as for fixed-route transit. But this doesn't take into account the generally higher cost of each on-demand trip. Many transit agencies treat on-demand service as a premium product with higher fares, while making adjustments for riders with limited incomes. Higher fares are also a way to control the consumption of an expensive service. Fare policies can generally take one of two forms:

- **Fixed-fare.** The total fare is capped, and the costs of longer trips are borne by the transit agency. For example, the customer might pay \$3, with any cost beyond that covered by the transit agency, whether that cost is \$1, \$10 or \$100. This can be very expensive for the transit agency.
- **Fixed-subsidy.** The subsidy provided by the transit agency is capped, and the costs of longer trips are borne by riders. For example, the customer might be responsible for a base fare of \$3. The agency would contribute up to \$7 in subsidy, but no more. This can be very expensive for riders who make long trips.

In some cases, it's also possible to vary fares according to who is riding. For example, rides on the RideKC Freedom On-Demand program are available to the general public, but at a higher cost than for disabled passengers who qualify for ADA paratransit.

## Accessibility Issues

Challenges arise when considering app-enabled service and partnerships with ride-hailing companies. Many older and lower-income transit customers lack smartphones, data plans, credit cards, or all three.

One way around the credit card barrier is to use prepaid cards, which can be sold to customers who lack credit cards. For dispatching without smartphone apps, agencies can train their paratransit dispatchers to schedule ride-hailing trips by telephone call. In some cities, agencies have used local taxi companies as an alternative to ride-hailing to serve customers who lack either credit cards and/or smart phones.

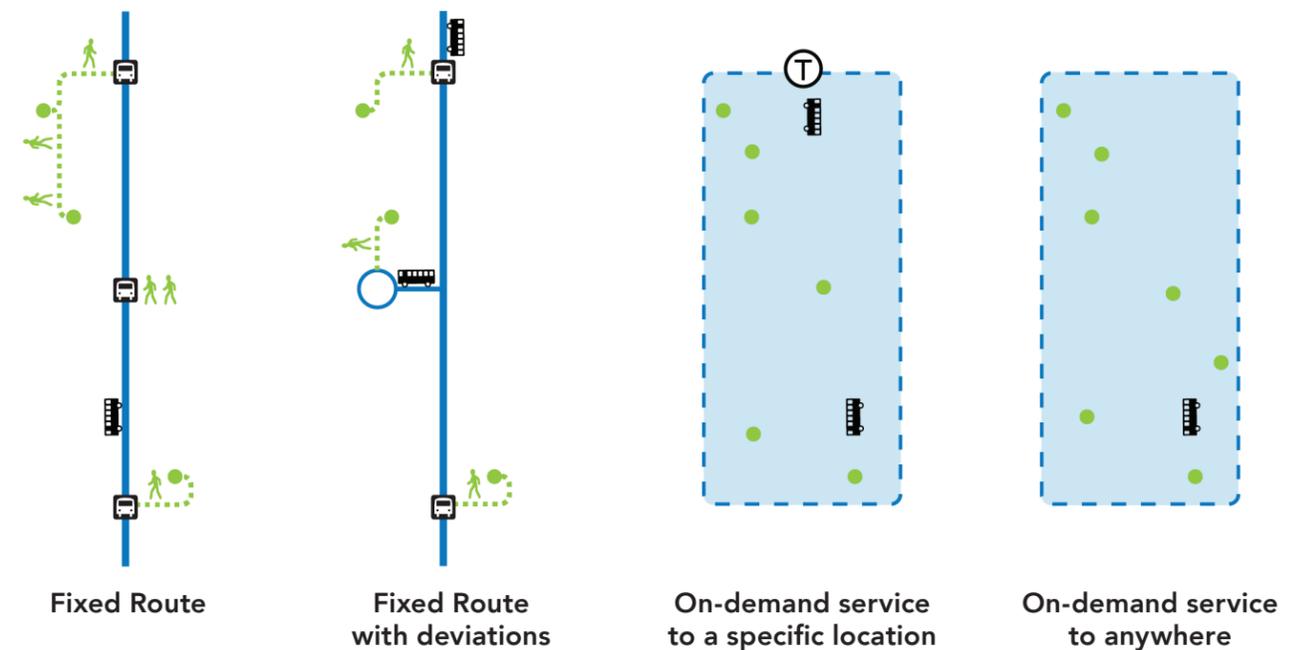


Figure 51: The spectrum of service, from a traditional fixed route to a fully on-demand service. As service becomes more flexible and convenient, it takes longer to serve each passenger, because passengers are rarely on the way between one destination and another. The longer it takes to transport each passenger, the higher the cost of each ride. In order to controlling costs for such desirable service, most agencies carefully manage who can ride, where and when they can go, and how much of the cost they are expected to cover with their fare.

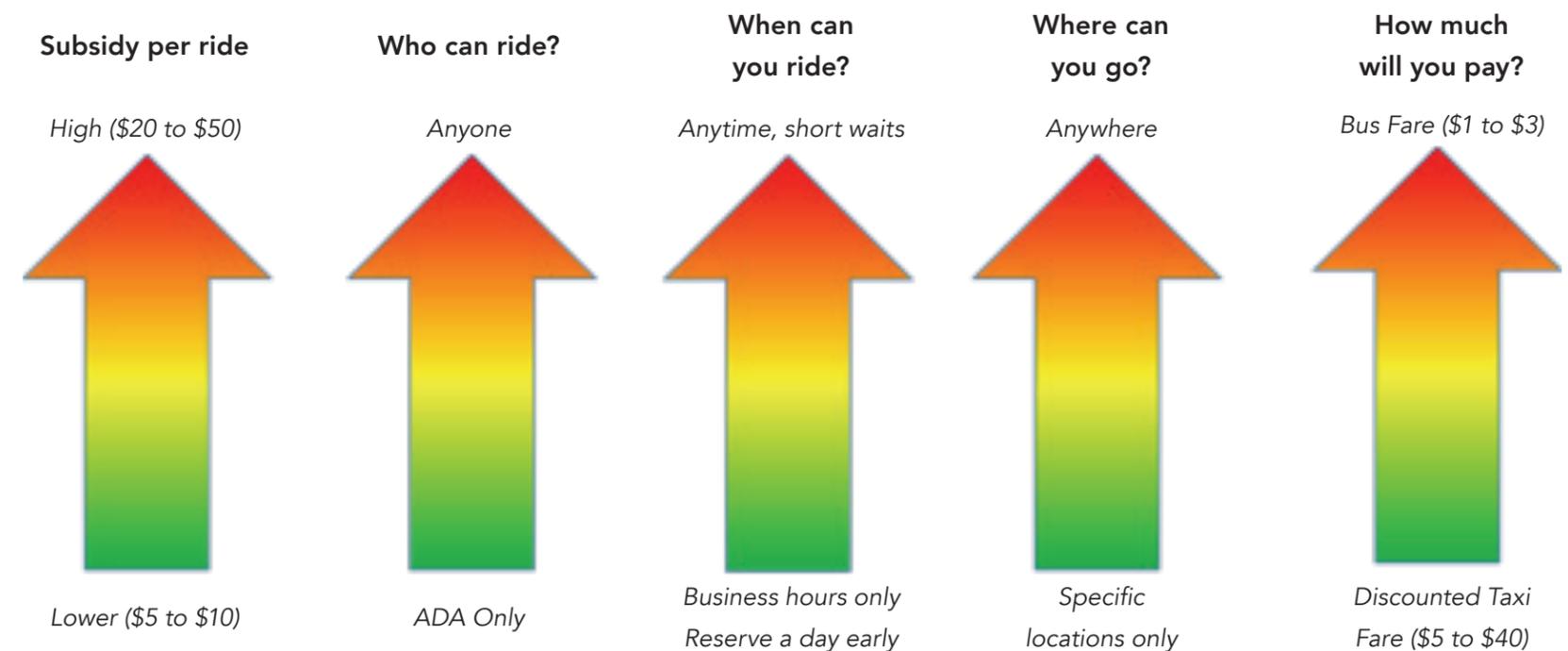


Figure 52: The features that make an on-demand service more convenient for a passenger also make it more expensive to operate. Cities around the country are debating how much subsidy per ride can be justified for on-demand service, and for which groups of people.

# Prior experience suggests high per-trip costs that limit how many people can be served.

KCATA currently manages three distinct on-demand services with different service parameters: Flex, Freedom On-Demand, and Johnson County Microtransit. In 2016-2017, KCATA also provided a pilot on-demand service with former microtransit provider Bridj.

## KCATA on-demand pilot programs

KCATA has led the nation in experimenting with smartphone-enabled on-demand transportation services. The table at right summarizes the results of the four pilot programs initiated so far. A table showing the results of three pilot program from other cities is shown on page 56.

Overall, KCATA's experience suggests that:

- **On-demand service operates at a small scale, up to a few hundred passengers per day.** KCATA has demonstrated the ability to serve 400 to 500 passengers per day with on-demand service. This number could certainly grow in future, but:
  - ▶ the low-density areas that would benefit most from any new on-demand transit inherently produce relatively few trips, and
  - ▶ the economies of scale for providing more rides are very limited. As a result, on-demand service is extremely unlikely to provide a similar number of trips as fixed-route transit.
- **The average cost per trip is generally in the range of \$15 to \$20.** This has been true across a variety of programs and contracting arrangements. A different operating and contracting arrangement could potentially yield a slightly lower cost, but that has not happened to date. This compares to an average of \$7 for fixed-route buses.
- **A few existing bus routes have such low ridership that the average cost per ride might justify replacement with an on-demand service,** such as Routes 231 (Riverside-Antioch), 234 (Boardwalk-Antioch), 235 (Winwood-Gracemoor), and 236 (East Gladstone). However, it's also likely that any on-demand service in the areas served by those routes would serve different types of trips than the existing fixed route.

Service Parameters	KCATA On-Demand Transportation Programs			
	FLEX	Freedom On-Demand	JC Microtransit <i>(ongoing pilot)</i>	Bridj <i>(suspended Feb. 2017)</i>
<b>Who drives?</b>	KCATA	Taxi Companies <i>(under contract to KCATA)</i>	Private Consortium <i>(under contract to KCATA)</i>	Bridj <i>(under contract to KCATA)</i>
<b>Who can ride?</b>	Anyone	Anyone <i>(but ADA paratransit customers get a discount)</i>	Anyone	Anyone
<b>When can you ride?</b>	24-Hour advance scheduling by phone	On-demand through mobile app and phone	On-demand through mobile app and phone	On-demand through mobile app
	Mostly on weekdays 6 AM to early evening.	Service 24 hours a day, 7 days per week	Weekdays only 6 AM to 8 PM	Weekdays only, 6 to 11 AM and 3 to 7 PM
<b>Where can you go?</b>	Stay within a zone of 5 to 40 square miles	Almost anywhere in KC	Stay within a zone of 40 square miles	Stay within one zone or between two zones
<b>How much will you pay?</b>	\$1.50	\$10 for first 5 miles and \$2 for each added mile <i>(\$5 for first 5 miles for ADA paratransit customers)</i>	\$1.50	\$1.50
<b>Daily Ridership (avg.)</b>	200 to 250	150 to 200	50 to 100	5 to 10
<b>Trip Cost (avg.)</b>	\$15.83	\$19.66	\$20+	\$887*
<b>Average Subsidy Per Trip</b>	\$14 to \$15	\$9 to \$10 <i>(\$14 to \$15 for ADA paratransit customers)</i>	\$18.50+	\$885.50

Figure 53: Summary of current and past KCATA on-demand transportation programs.

\* This figure includes capital costs, so it is overstated in comparison to the others. However, because Bridj was paid for on a per-hour basis and ridership was very low, the cost of operations was still much higher on a per-trip basis than for any other program.

## Flex

RideKC Flex is much like a steeply discounted shared taxi operating in a small area, except you need to call a day in advance to get a ride. Flex provides curb-to-curb service in defined areas, from about 5 square miles (Route 298-North Kansas City) to 40 square miles (Route 99-South Kansas City). Flex service is operated directly by KCATA using agency vehicles and drivers, and is open to the general public.

Flex service is primarily subsidized by local cities through specific contracts. Service hours vary from one area to another according to funding levels and agreements made between KCATA and the relevant cities. There are no limits on how many trips a person can make.

Using Flex requires scheduling trips by phone at least 24 hours in advance. Flex fares are the same as on any RideKC fixed route: \$1.50 per ride for the general public, with discounts for certain groups.

As of 2018, approximately 200 to 250 rides per day are provided on Flex, in all areas. Costs vary slightly from one area to another, but the average Flex ride costs \$15.83 to provide, which suggests the average subsidy per ride is \$14-15.



Figure 54: A map of the Flex service area in Gladstone-Antioch. Flex provides curb-to-curb transportation within each zone, within limited service hours, for the same fare as a fixed-route bus.

## Freedom On-Demand

Ride KC Freedom On-Demand is a premium service primarily intended as a supplement to ADA paratransit. **For eligible customers, Freedom On-Demand provides a subsidized taxicab ride going almost anywhere that can be hailed with a smartphone, like an Uber or Lyft vehicle.**

Freedom On-Demand provides curb-to-curb service in all of KCMO and most surrounding jurisdictions. Service is available 24 hours per day. RideKC Freedom On-Demand rides can be requested with a phone call instead of a smartphone app. Unlike private ridehailing companies, public agencies are required by civil rights laws to provide an option for customers who do not own or cannot operate a smartphone.

For paratransit-eligible customers, Freedom On-Demand fares start at \$5 for the first five miles, and \$2 for each subsequent mile. The general public can also use Freedom On-Demand, but at a higher price: \$10 for the first five miles, and \$2 for each subsequent mile.

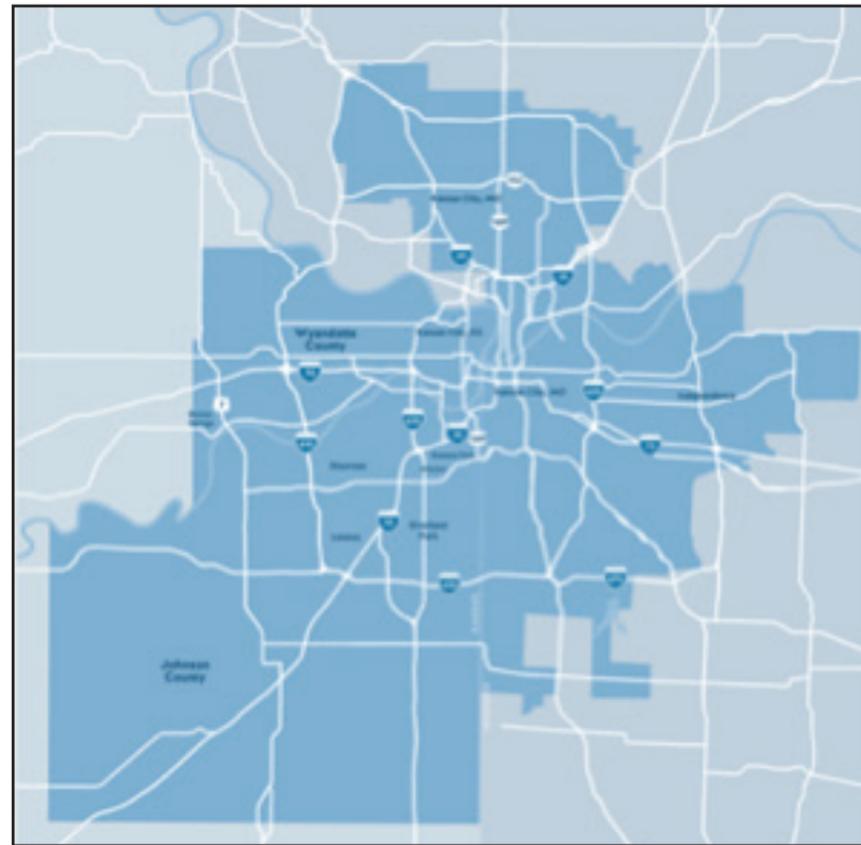


Figure 55: Map of the RideKC Freedom On-Demand service area. Eligible customers are able to travel throughout most of the Kansas City metro area for the cost of a discounted taxi ride, 24 hours a day.

As of late 2018, Freedom On-Demand was providing 150 to 200 rides per day on average. The average cost per ride in 2018 was \$19.66, and the average ride was about 5 miles long. This suggests the average subsidy per ride for paratransit-eligible customers is about \$14-15 per ride, like Flex. The average subsidy per ride for the general public is likely in the range of \$9-10, which is lower but still high compared to the average subsidy for using a fixed route.

The original Freedom On-Demand pilot actually charged a lower fare than today (\$3 for the first eight miles, \$2 for each subsequent mile) and attracted higher ridership than today (200 to 250 per day) despite being limited to smaller areas.

**When Freedom On-Demand ridership got too high and revenue was too low, costs grew beyond what KCATA could justify.** To restore the balance, KCATA raised fares, which recovered more of the costs and reduced demand for the service.

### Johnson County Microtransit

Similar to Flex, Johnson County Microtransit (marketed as RideKC Microtransit) provides curb-to-curb service with shared rides in a 40 square mile zone, and the vehicles used to provide service belong to KCATA.

But like Freedom On-Demand, you can reserve trips in real time through a smartphone app, or by phone call to a dispatcher; and the vehicles are operated by a private taxi company.

This Microtransit program is being provided as a six-month pilot from January to July 2019, funded by a \$250,000 grant from Johnson County. Service is open to the general public, and available from 6 AM to 8 PM on weekdays only. The pilot may be extended beyond July 2019.

As of mid-April 2019, the service has averaged about 70 rides per day, and the average cost per ride is over \$20, which suggests the average subsidy per ride is at least \$18.50.

### Bridj

KCATA's first foray into app-based transportation came in 2016-2017 through a partnership with Bridj, a now-defunct private transportation and technology company.

KCATA purchased 14 Ford Transit vans to be operated by Bridj. Any member of the public could book a ride using the Bridj smartphone app. Users could travel within or between two zones:

- Greater Downtown KCMO, including much of inner Northeast Kansas City.
- The greater area surrounding the KU Medical Center.

The service was only available at peak times on weekdays: 6 AM to 11 AM, and 3 PM to 7 PM. Fares were set at \$1.50, matching the general public fare for regular bus service. For a variety of reasons, including limited hours and long wait times, ridership was extremely low, averaging 5 to 10 passengers per day. Total program costs were in excess of \$1 million, suggesting a subsidy per ride of several hundred dollars.

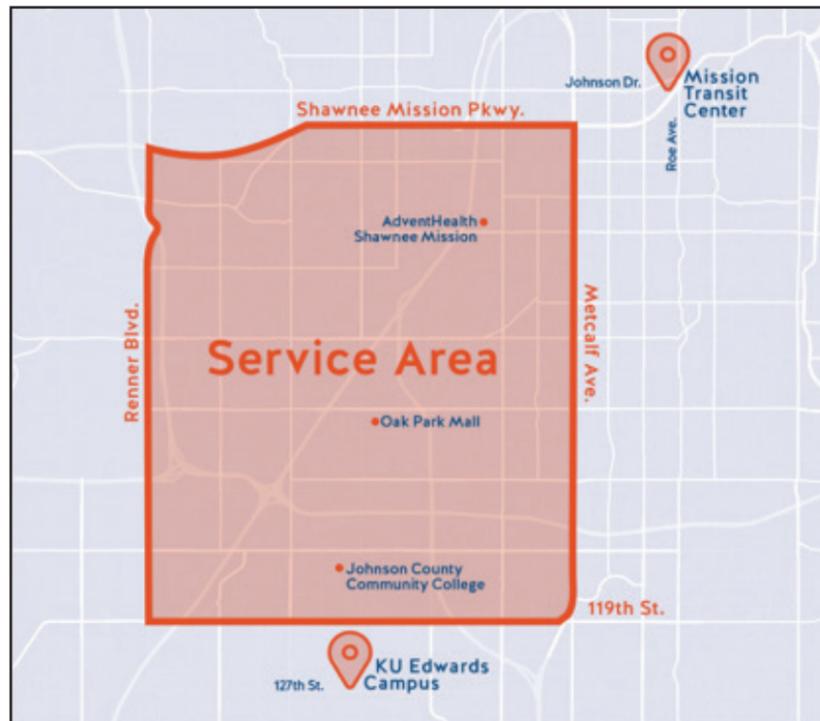


Figure 56: The Johnson County Microtransit pilot offers a curb-to-curb service, with limited hours, for which riders are charged the same fare as a fixed-route bus.

# What lessons can be learned from other places?

KCATA's experience with on-demand does not span the full range of service possibilities. So it's useful to study what has happened in other places to learn more. For the purposes of this study, we reviewed on-demand services in two other places:

- Oakville, ON is a low-density suburban area of 200,000 people located outside of Toronto. The local transit agency is Oakville Transit.
- Pinellas County, FL is a county of 970,000 people in Florida in the Tampa-Saint Petersburg metro area. The local transit agency, Pinellas-Suncoast Transit Authority (PSTA) carries 14 million passengers per year, which is a similar scale to KCATA.

The experiences of Oakville Transit and PSTA provide some insight into what happens when an on-demand service has different parameters. Key lessons include:

- **On-demand service can be effectively delivered either by a ridehailing service, but data-sharing is likely to be a problem.** While KCATA has mostly contracted with taxi companies in the past, PSTA's experience shows that it is possible to provide a subsidized on-demand transportation service operated by Uber. Both Uber and Lyft have in fact participated in a wide variety of pilot on-demand transit programs nationally through the FTA Mobility-on-Demand Sandbox program. At the same time, PSTA is not able to say much about the length or any other characteristics of Uber trips, as that data is considered a trade secret. This is not a unique situation among agencies that have partnered with ridehailing providers.
- **It's possible to limit the transit agency's costs by imposing a hard cap on subsidies, if you accept the program will mostly be useful for very short trips or connections to fixed routes.** PSTA's Direct Connect program subsidizes a flat amount of \$5 for Uber or taxi rides, regardless of the trip length or final fare. The data available for taxi rides suggest that the average trip is in the range of 2 miles. Even if Uber rides are typically longer, the fact that the customer pays every cent beyond \$5 means that many customers will avoid the service for longer trips.

- **It may be possible to control costs by narrowly defining the places an on-demand service can reach.** Most KCATA on-demand programs have allowed customers to travel anywhere within a fairly large area. Oakville's Home-To-Hub program and PSTA's Direct Connect both have much tighter requirements, focusing on providing access to the nearest transit center. Limiting the number of destinations makes it possible to drive in straighter and more predictable paths; that makes it possible to serve more trips for every hour of service.

However, none of these lessons change the fundamental math of on-demand service: **to control costs to the public, a subsidized on-demand service can't be both highly desirable and available without limit.**

Service Parameters	Other On-Demand Transportation Programs		
	Oakville, ON Home-to-Hub	Pinellas County, FL Direct Connect	Pinellas County, FL TD Late Shift
<i>Who drives?</i>	Oakville Transit	Uber Taxi companies	Uber Taxi companies
<i>Who can ride?</i>	Anyone	Anyone	Eligible low-income riders
<i>When can you ride?</i>	2 hours in advance by mobile app or phone Hours depend on zone, some service everyday	On-demand through mobile app and phone Everyday 6 AM to 11 PM	On-demand through mobile app and phone Every night 11 PM to 6 AM
<i>Where can you go?</i>	Stay within zones or travel to transit hub	24 designated bus stops/transit centers	Anywhere in the county
<i>How much will you pay?</i>	\$4.00	Uber or taxi fare, minus a \$5 discount	\$9 for up to 25 trips per month
<i>Daily Ridership (avg.)</i>	Unknown	50 to 100	50 to 100
<i>Trip Cost (avg.)</i>	Unknown	Uber: unknown Taxi: \$7	\$15
<i>Average Subsidy Per Trip</i>	Unknown	\$5	\$14-15

Figure 57: Examples of on-demand transportation programs in other locations.

# Where would it make sense to consider on-demand service?

## Some areas have extremely low demand

In some parts of Kansas City, MO:

- development has been so piecemeal and auto-oriented,
- population densities are so low,
- and the distance between people's homes, schools, jobs and shopping are so long,
- that the underlying demand for public transit struggles to justify a fixed route, even in a coverage-oriented network.

As discussed in Chapter 3, these types of areas include significant parts of the Northland, as well as parts of KCMO south of 85th Street, and certain areas east of the Blue River and/or I-435.

In such low-demand areas, it's possible that people who lack access to personal transportation would benefit more from an on-demand service than from an extremely infrequent or peak-only bus route as "insurance from isolation".

## What would an on-demand service for such areas look like?

It's difficult to think about the value of an on-demand service without understanding why it exists and what it would do.

- **Purpose:** An on-demand service could act as a replacement for one or more existing fixed-routes in areas with extremely low ridership. Or it's possible that an on-demand service might be extended to one or more areas not currently served by transit.
- **Service Parameters:**
  - ▶ **Who would drive?** KCATA would manage any on-demand service, but it could be operated either by KCATA or in partnership with a private-sector partner such as a taxi company or ridehailing service.
  - ▶ **Who could ride?** If the service is limited to isolated areas with small populations, it should be available to the general public within those areas. Otherwise the number of trips served would be too small to justify administrative expenses. As the area (and the number of potentially interested people) grows larger, it's possible eligibility would need to be restricted.
  - ▶ **When could you ride?** We would assume the service could be hailed on-demand, either through an app or by phone. To replace basic coverage service, hours would be on weekdays from at least 6 AM to 7 PM. It's likely that wait times would vary substantially from one trip to another, at least during the first months of service.
  - ▶ **Where could you go?** Any on-demand service should at minimum provide a connection to the nearest fixed-route bus stop or transit center that is also in a useful place. For example, from many areas in Platte County, it might make sense to provide a connection to Boardwalk Square. But if the service zones were small enough, it might also make be feasible to provide curb-to-curb service within those zones as well.
  - ▶ **How much would you pay?** As a replacement for an existing bus service, it would need to be provided for the same cost as the bus. However, fares might be higher if the service were introduced in new areas, or there might be higher fares for people who have not met an eligibility requirement (e.g. low income, age, disability, lack of options...).

## How much on-demand service could KCATA provide?

**On-demand service is inherently provided for coverage purposes, so this depends a lot on the answer to questions about the trade-off between high ridership and extensive coverage, and the purpose of coverage service (see Chapter 6).**

But, based on past experiences and assuming the current distribution of resources:

- With Flex and Freedom On-Demand and Microtransit, KCATA has shown it can manage programs serving a combined 400-500 rides per day.
- The most productive on-demand service managed by KCATA is Freedom On-Demand, which is currently handling 4.5 rides per hour of service.
- If fares are at or near existing bus fare, it's likely the subsidy per ride will be in the range of \$15.
- Within the RideKC Next study area, the annual service resources dedicated to routes with productivity and costs per ride at this level is in the range of \$1 million. These resources overwhelmingly come from routes that currently operate in the Northland.
- This suggests that KCATA could afford a service that handled 250-300 riders per day, if there were no higher priorities.
- Outside North Kansas City, the trip intensity currently experienced on Flex and Microtransit has been in the range of 2 to 4 boardings per square mile per day.

If a new on-demand service were twice as popular on average, this conservatively suggests that the total possible service area could be in the range of 60 to 80 square miles, in one or more zones developed at very low densities. However, this estimate would need to be substantially refined before any actual on-demand service were deployed.