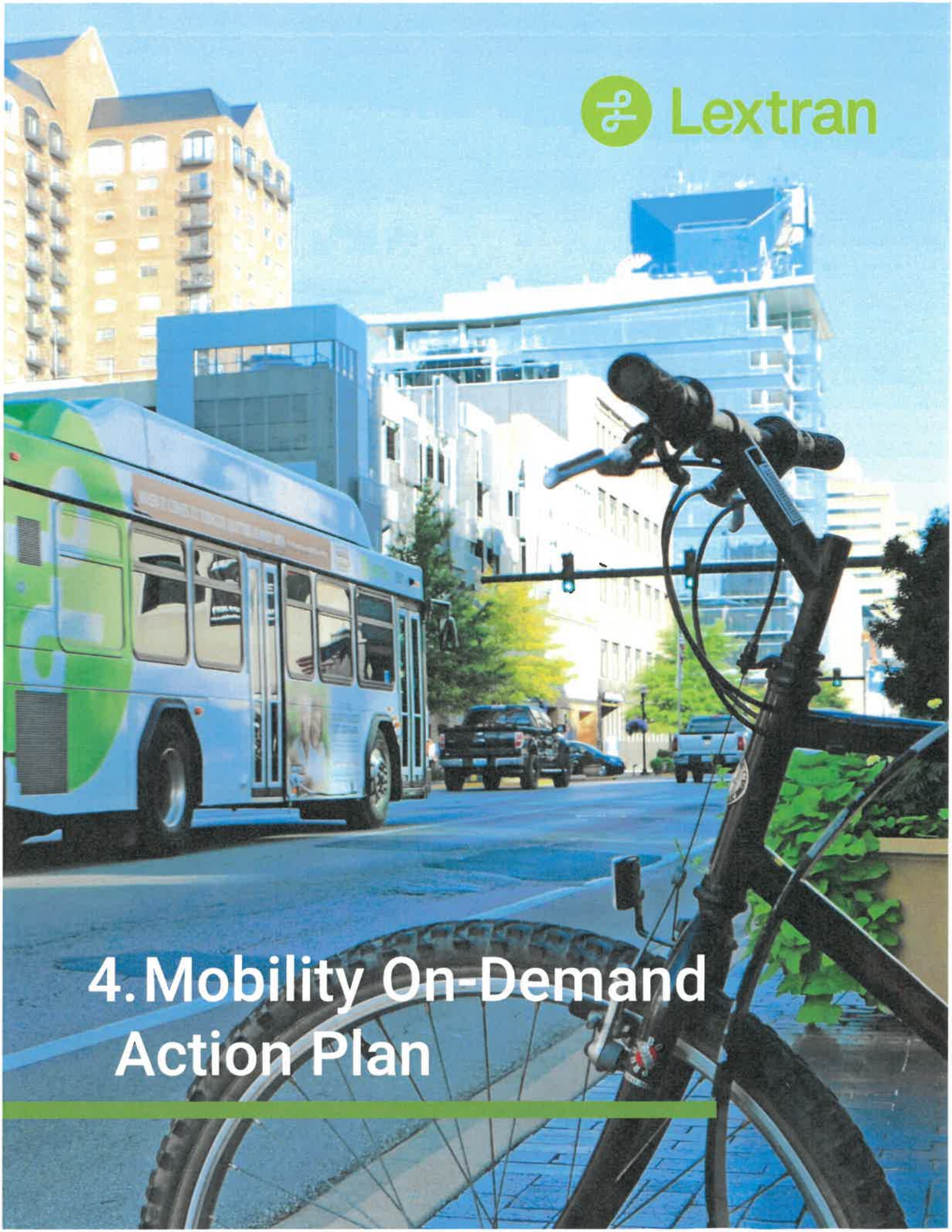


4. Mobility On-Demand Action Plan

4.1 Introduction

This chapter documents the findings and recommendations of a Mobility On-Demand (MOD) feasibility analysis performed for the Lextran service area. The following sections provide an overview of on-demand service and use cases, define potential on-demand zones in Lexington, and identify potential costs and implementation strategies should Lextran choose to offer this service in the future.

4.2 What is Mobility On-Demand?

As part of its long-term vision, Lextran is considering a new service type, Mobility on-Demand (MOD or on-demand transit service), to complement the fixed-route network and paratransit service. While on-demand service is not a new concept, recent advances in mobile technology and dynamic scheduling have fundamentally changed the way demand-responsive trips are booked and dispatched. Instead of booking a trip by phone, customers can hail a vehicle using an application on a mobile device with minimal advance reservation time required. The following sections summarize the typical MOD user experience, use cases, and benefits and challenges.

4.2.1 MOD User Experience

On-demand transit is similar to a conventional, fixed-route bus in that passengers are asked to walk to meet a vehicle at a 'virtual bus stop' that may be up to ¼ of a mile from their requested location. However, it is different from a bus in that there are no schedules or route maps. Instead, trips must start and end within zones that fill gaps in the bus network. Along the way, the vehicle will pick up and drop off other passengers heading in the same direction, but care is taken to avoid lengthy detours for passengers already on board.

To use the service, passengers can book a trip using a smartphone application ("app"), a website, or by phone. Once the passenger submits a trip request, they are notified when the vehicle will arrive and where to meet it. Typically, passengers must wait between 5 and 30 minutes for a trip. Fare payments are facilitated through the app using debit or credit cards or pre-loaded transit passes. Cash-paying customers can be accommodated through various means, including mobile payment through the booking app, on-board payment, or through vouchers purchased at retail outlets. **Figure 4-1** illustrates the typical end-to-end MOD user experience. **Table 4-1** on the following pages summarizes the key differences between fixed-route bus, ADA paratransit, and on-demand transit service from a user perspective.

Figure 4-1: Typical MOD User Experience

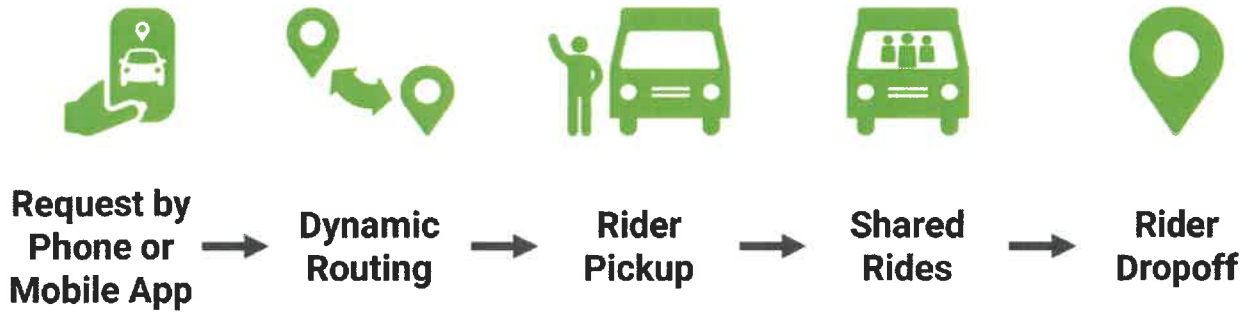


Table 4-1: Mobility On-Demand Rider Experience Frequently Asked Questions

On-Demand FAQs	Fixed Route Service	Paratransit Service	On-Demand Service
Where will I be picked up or dropped off?	Bus Stop	Front Door	Nearby Intersection
Where can I ride?	Trips must begin or end at fixed-route bus stop	Trips must begin and end within Fayette County	Trips must begin and end within defined on-demand zone
Do I need to book a ride in advance?	No advance booking is required	24-hour advance booking is required	Same-day booking. Typical wait time of 30 minutes or less.
Who can ride?	Anyone can ride	Pre-approved customers only	Anyone can ride
Is the service ADA-accessible?	Wheelchair accessible	Wheelchair accessible + Assistance provided	Wheelchair accessible
Will I share a ride with another passenger?	Yes	Sometimes	Sometimes

4.2.2 MOD Use Cases

Many transit agencies have implemented MOD service in recent years to provide service coverage where traditional fixed-route service is unproductive or to supplement existing ADA paratransit service. A survey of U.S. transit properties reveals several common applications, including providing first and last mile connectivity to fixed-route transit hubs, providing coverage in low-density and/or high-needs areas, and offering service during unproductive time periods (e.g. early morning or late evenings). Below is a summary of the most common MOD use cases throughout the industry.

- **Local Transportation in Lower Density Neighborhoods.** In Lexington, one of the more relevant use cases is local transportation in areas where fixed-route service is either unavailable or unproductive, such as in lower-density or suburban neighborhoods. To serve this use case, on-demand transit provides access to any location within a specific zone, and customers are not required to transfer to fixed-route service (though many passengers will still do so to complete longer trips).
- **First and Last Mile Connections:** Another common use case for on-demand transit is to effectively expand the fixed-route network by connecting riders to nearby bus services. In this use case, customers complete the first or last segment of their trip using on-demand transit. The first mile / last mile connection use case is most suitable if the fixed-route service at the transfer point offers frequent service throughout the day, ideally every 15 minutes or better. In Lexington, this use case is most applicable for zones adjacent to the Nicholasville Road corridor, which is served by the highest frequency route in the network, Route 5.
- **Off-Peak Travel Markets:** Serving off-peak travel demand is another key use case for on-demand transit. Because passenger travel demand is typically lower during off-peak times such as late evenings and weekends, it is also possible that on-demand transit can operate at a lower cost-per-trip (using smaller, right-sized vehicles) compared to the cost of extending fixed-route service running during the same hours.
- **Supplemental and Same-Day ADA Paratransit Service:** Supplementing an agency's existing ADA paratransit service is another common on-demand transit use case. Like most ADA paratransit services, Lextran's paratransit service requires passengers to book rides in advance (by 5:00 pm the day prior to the trip) and provides passengers with a variable, 30-minute pickup window. These factors limit the efficacy of paratransit for many types of trips and do not allow for the spontaneity that many passengers need. An alternative approach involves comingling ADA-compliant paratransit and mainstream on-demand transit services. This use case allows paratransit and on-demand services to share vehicle fleets, driver shifts, and even individual passenger trips. Commingling offers transit agencies significant potential cost savings by allowing mainstream on-demand and ADA paratransit customer trips to be routed and shared more efficiently among fewer vehicles and vehicle-hours. Paratransit riders benefit by receiving same-day, on-demand service if traveling within the on-demand zone.

4.2.3 MOD Benefits and Challenges

MOD offers transit agencies a range of potential benefits as well as risks and challenges that must be addressed. Some of the typical benefits of on-demand transit, compared to fixed-route service, include:

- Shorter average wait times, particularly compared to fixed-route bus corridors with existing frequencies of 30 minutes or more
- Shorter typical walking distances for riders to access pickup and drop off locations
- Greater geographic coverage without sacrificing quality of service
- No bus stop infrastructure required, with "Virtual Bus Stops"
- Lower insurance and driver training requirements due to smaller vehicles—in some cases, these may result in a lower cost-per-trip relative to underperforming fixed routes.

On-demand transit also carries several potential challenges and risks that should be addressed in service design and planning. Because on-demand service typically operates with smaller vehicles, it offers lower passenger capacity compared to fixed-route service. Likewise, on-demand offers a lower maximum productivity of service compared to the most productive fixed-route corridors because of the smaller vehicles used. Some on-demand passenger trips may require detours to pick up other passengers, though overall journey times are often shorter than comparable fixed-route trips. As a newer, less familiar form of demand-response transportation, on-demand transit requires an upfront investment in marketing and community outreach to attract significant ridership. Successful marketing campaigns for new on-demand transit services often include distributing promotional materials at key activity centers (e.g. major bus transfer points, colleges, grocery stores, or community centers), posting announcements on bus stop signage, and local news or social media advertising campaigns.

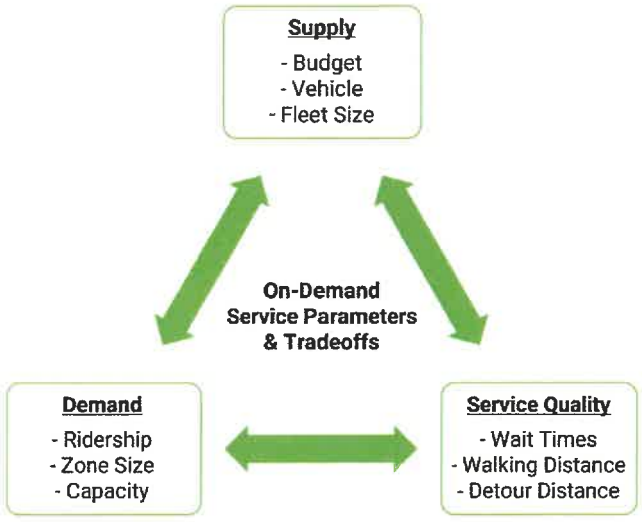
4.3 Proposed Mobility On-Demand Zones

This section outlines the various service design parameters that should be considered when establishing a new MOD service, identifies potential MOD opportunity zones in Lexington, and summarizes the methodology and results of a ridership and vehicle demand analysis for the potential MOD zones.

4.3.1 Service Design Parameters

Service design for MOD is highly configurable and involves numerous trade-offs that influence the selection of specific on-demand transit zones. These decisions are essential to determining a suitable solution that optimizes both quality of service and cost-effectiveness. Below is a summary of the key service design parameters to consider when designing a MOD service.

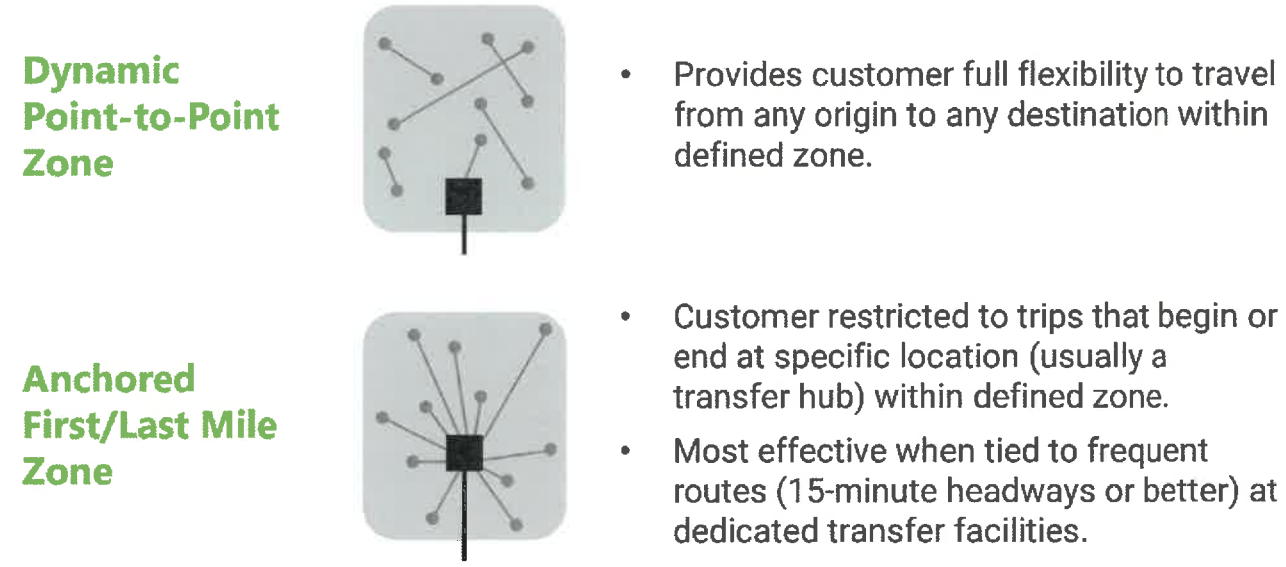
Figure 4-2: MOD Service Design Parameters and Tradeoffs



Trip Restrictions

In some on-demand zones, transit agencies restrict certain trips from being served by on-demand transit despite having an origin and destination falling within the overall service zone boundaries. Most commonly, these restrictions are implemented where there is a frequent and reliable fixed-route service operating within the zone (e.g. bus or train service) that could complete certain trips more cost-effectively. To avoid the displacement of fixed-route ridership to the on-demand service and ensure that trips connect to the broader fixed-route system, some on-demand zones require riders to select a designated transfer point as either their origin or destination. This effectively limits the on-demand service to fulfilling the first mile / last mile connection use case, described in the previous section, while precluding it from serving other types of trips. These trip restrictions are likely to marginally improve an on-demand service's productivity (passenger boardings per vehicle-hour) by ensuring that each trip is anchored by a key node of the fixed-route network, while discouraging travel on less commonly traveled routes. However, in lower-density cities like Lexington where high-frequency fixed-route service is not widely available, these trip restrictions are more likely to discourage ridership by making the on-demand service less useful to riders.

Figure 4-3: Dynamic Point-to-Point vs. Anchored First/Last Mile Service Designs



Passenger Eligibility

Most on-demand services are open to the general public, while a significant minority are limited to specific populations with mobility needs, such as seniors, people with disabilities, qualified ADA paratransit customers, or students. For the purposes of the potential on-demand services discussed in this chapter, we assume that on-demand transit service is available to the general public.

Fare Structure

Fares are an important determinant of ridership in many on-demand transit services. Unlike a taxi or ride-hailing service, on-demand transit is intended to be a fully integrated component of the public transit system. While some agencies offer fare-free on-demand services, a large majority charge flat fares equivalent to their existing one-way fixed-route bus fares, and a smaller number charge distance-based fares which reflect the higher cost of serving longer-distance trips. In most cases, free transfers are offered between on-demand and fixed-route services.

Advance Booking Restrictions

On-demand transit operators provide two primary service models, dynamic or pre-booked. In either case, riders may request rides with a mobile app, web portal, or by calling a customer service center. Both service models also feature real-time vehicle tracking in the passenger mobile app as well as arrival times updated in real time throughout the trip.

- **Dynamic on-demand** services involve rides booked on a same-day basis at the time of need, with vehicles dispatched immediately following a trip request and passenger wait times of typically between 5 and 30 minutes. This service model is generally preferable in urban or suburban areas with relatively short journey times (typically less than 30 minutes) and sufficient travel demand to justify a low-frequency, coverage-oriented fixed-route service.
- **Pre-booked on-demand services** are similar to conventional demand-response services and enable customers to book rides between 2 hours to several weeks in advance as well as book

recurring rides (also known as "subscription trips"). This service model is generally preferable in rural areas with very low, diffuse travel demand or for services geared primarily towards passenger groups who may prefer booking their trips in advance (e.g. some ADA paratransit customers) or on a recurring basis (e.g. dialysis patients, people with disabilities attending day support programs).

A summary of the advantages and disadvantages of dynamic and pre-booked on-demand service models is shown in **Table 4-2**.

Table 4-2: Comparison of Dynamic On-Demand vs. Pre-Booked On-Demand Service Models

	Advantages	Disadvantages
Dynamic On-Demand	• Higher capacity for same-day bookings • Flexibility to book at time of need, adjusts easily to daily schedule • Simpler user experience • Automatic adjustments of supply without the need for dispatch intervention	• Rides cannot be booked in advance nor can recurring rides be booked • Selection of correct booking time is up to rider, and there is no automatic link to bus schedule
Pre-booked On-Demand	• Customers can book rides in advance and recurring rides • Higher level of guarantee that a ride is indeed booked (barring unforeseen circumstances) • Greater potential for trip aggregation, especially in very low-density areas	• Higher average wait times • In a hybrid system, lower capacity for same day bookings because seats are filled "in advance" • Worse experience for rider if a pre-booked ride is missed compared to on-demand • Significantly more complex to operate, especially when needing to adjust supply

Vehicle Selection

On-demand transit is highly customizable with respect to the fleet vehicles used to operate service. Most software platforms are suitable for deployment on a range of vehicle types, from large transit buses to cutaways, minivans, and even passenger vehicles. However, ensuring a cost-effective on-demand service requires that transit agencies strike a balance between vehicle capacity (and therefore the service's capacity) and its cost to operate. Typically, in lower-density areas expected to serve a lower ridership, on-demand services can be operated most cost-effectively with smaller minivans with a capacity of between 6 and 10 passengers. These vehicles are less expensive to operate than cutaways or shuttles and typically carry lower insurance and driver training requirements.

Hours of Operation

Many on-demand services share the same hours of operation as the fixed-route transit system to maximize both the service's legibility and riders' ability to make transfers between on-demand and fixed-route buses. Alternatively, an on-demand service can be designed to fill the temporal gaps in fixed-route service, such as evening and weekend hours.

4.3.2 Zone Identification

Findings from the Existing Conditions analysis were essential to identifying potential on-demand transit zones for further screening. Potential on-demand transit service zones were screened for further analysis based on their ability to facilitate any of a range of improvements to the transit system in Lexington, such as:

- Replacing fixed-route bus service in corridors where transit is currently unproductive, or serves very low ridership;
- Providing first/last-mile connections to more productive fixed-route bus services;
- Facilitating short, locally-oriented trips for residents and employees living or working in the zone;
- Improving mobility for low-income residents;
- Enhancing access to medical facilities, shopping centers, and major employers; and
- Providing a same-day mobility option for ADA paratransit customers.

Characteristics of an ideal on-demand transit zone include the following:

- Multiple clearly defined, overlapping use cases to ensure an even distribution of demand throughout the day
- Major activity centers to generate ridership (e.g. shopping centers, hospitals, schools, social services, or universities)
- Demonstrated need for improved quality of service in the zone, which may be supported by:
    - Poor ridership or productivity on existing fixed-route bus services
    - Significant service gaps - either spatial or temporal
    - High-need or disadvantaged communities with higher propensity to ride transit
- Clear, legible boundaries (i.e. boundaries along major roadways or other natural barriers)
- Transfer opportunities to other fixed-route services

Based on these criteria, four potential on-demand zones were identified in Lexington, as identified in **Figure 4-4** and described below.

Northwest Zone

The Northwest zone covers the Masterson Station, Leestown Road, and western portion of the Georgetown Road neighborhoods. The zone is roughly bounded by New Circle Road on the south, Alexandria Drive, the RJ Corman railroad on the west, Masterson Station Park on the north, and the Norfolk Southern railroad on the east. Much of this zone is relatively low-density single-family residential with commercial uses located along the Leestown Road corridor. The zone is also home to important light industrial and warehouse job centers located along the Mercer Road and Citation Boulevard corridors. Other notable activity generators include the VA Hospital and Bluegrass Community and Technical College. Approximately 12,700 residents and 11,700 jobs are located in the zone. Fixed-route connections include routes 12 and 22.

Northeast Zone

The Northeast zone covers the Joyland, Winburn/Radcliff, and Bryan Station neighborhoods. The zone is bounded by New Circle Road to the south, Newtown Pike to the west, Swigert Avenue on the north, and Kilkenny Drive and Marietta Drive on the east. The zone is primarily comprised of low-density single-family residential land uses. New Circle Road serves as the zone's main commercial corridor and includes major retail destinations such as Walmart and Kroger. The planned connection of Citation Boulevard between Newtown Pike and Russell Cave Road will provide improved connectivity in this area. Approximately 18,000 residents and 3,700 jobs are located in the zone. The Northeast zone has the highest percentage of minority and low-income residents of the four proposed MOD zones. Fixed-route connections include routes 4, 6, and 7.

Southwest Zone

The Southwest zone covers the Wyndam Downs and portions of the Beaumont neighborhoods along with the southern end of the Nicholasville Road corridor. The zone is bounded by the Fayette County line to the south, Harrodsburg Road to the west, Pasadena Drive on the north, and Nicholasville Road on the east. The zone includes a mix of single and multi-family residential, retail, and office land uses. Major destinations include the Fayette Mall and adjacent shopping centers along Nicholasville Road and shopping centers and medical offices at Beaumont Center just west of the zone boundary. Approximately 30,700 residents and 18,300 jobs are located within this zone. Fixed-route connections include routes 5, 8, and 13.

Southeast Zone

The Southeast zone covers the Kirklevington Park, Southeastern Hills, East Lake, and Park Place neighborhoods along with the southern end of the Nicholasville Road corridor. The zone is bounded by the Fayette County line to the south, Nicholasville Road in the west, the Urban Service Area boundary to the east, and New Circle Road in the north. Land uses in the zone include single and multi-family residential and retail centers located along Nicholasville Road, Tates Creek Road, and Richmond Road corridors. Approximately 70,000 residents and 12,700 jobs are located within the zone. Fixed-route connections include routes 3, 5, 11, and 18.

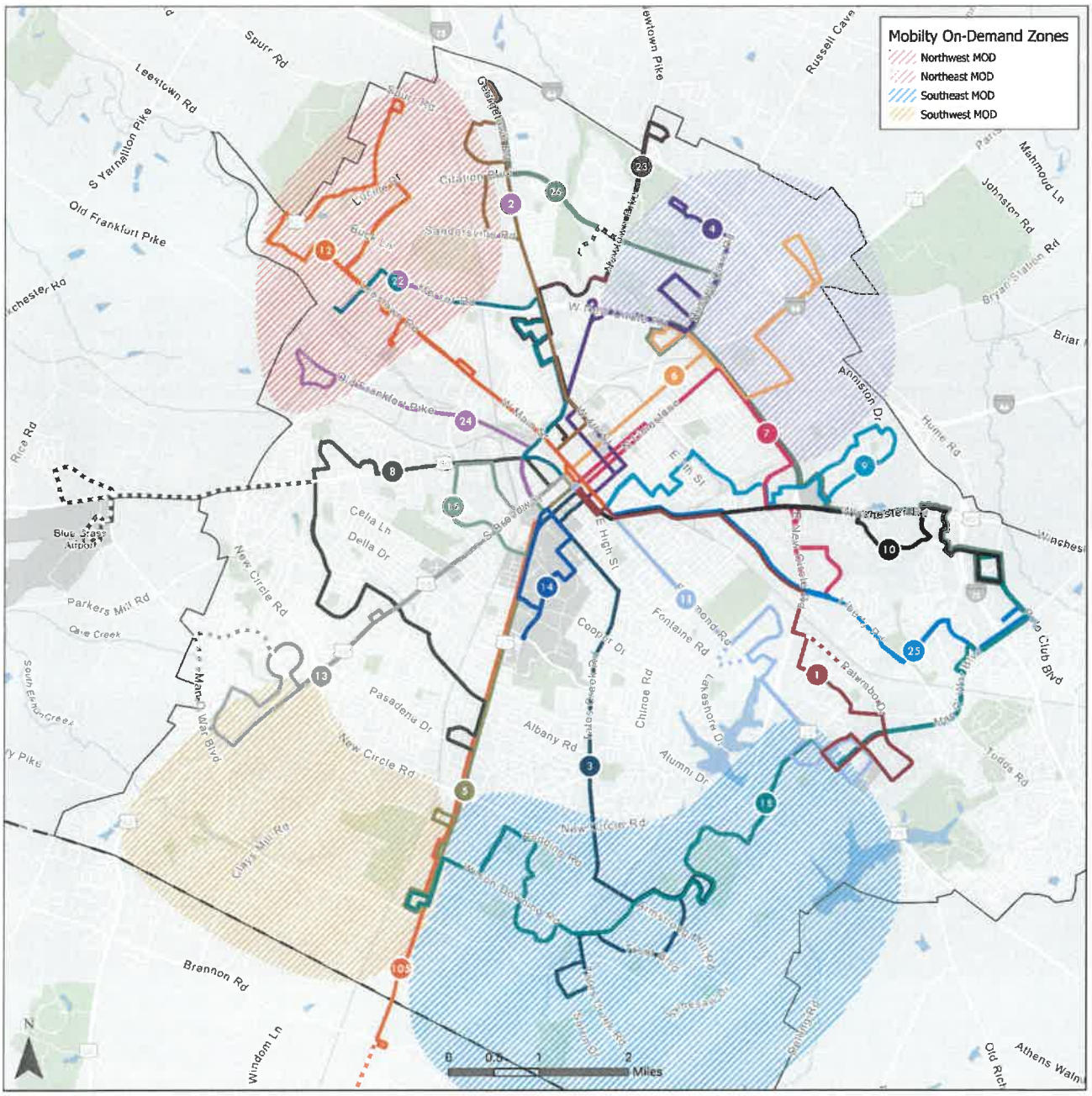
Combined Zones

The project team also evaluated the feasibility of combining the northeast and northwest zones into a single north zone and the southeast and southwest zones into a single south zone. From a customer service perspective, it may be advantageous to combine adjacent zones to provide more trip making opportunities. From an operational perspective, combining zones provides the ability to share vehicles across zones, potentially resulting in fewer vehicles required and higher vehicle utilization.

Table 4-3: Mobility On-Demand Zone Characteristics

	Individual Zones				Combined Zones	
	Northwest Zone	Northeast Zone	Southwest Zone	Southeast Zone	North Zone	South Zone
Area (sq. mi.)	5.1	5.0	8.1	13.5	10	22
Population	12,700	18,000	30,700	70,000	30,700	100,700
Households	5,000	7,500	12,500	31,900	12,500	44,400
Jobs	11,700	3,700	18,300	12,700	15,400	31,000
Minority Population	4,100	9,100	4,800	21,300	13,200	26,100
Percent Minority Population	32%	51%	16%	30%	43%	26%
Low-Income Population	1,200	5,400	2,800	15,800	6,600	18,600
Percent Low-Income Population	9%	30%	9%	23%	21%	18%
Carless Households	50	700	100	1,800	750	1,900
Percent Carless Households	1%	9%	1%	6%	6%	4%
Existing Average Weekday Bus Boardings	146	424	372	722	570	1,094
Existing Annual Paratransit Trips within Zone	760	1,590	1,380	7,440	4,350	13,900
Fixed-Route Connections	Route 12 Route 22	Route 4 Route 6 Route 7	Route 5 Route 8 Route 13	Route 3 Route 5 Route 11 Route 18	Route 4 Route 6 Route 7 Route 12 Route 22	Route 3 Route 5 Route 8 Route 11 Route 13 Route 18

Figure 4-4: Potential Mobility On-Demand Zones



4.3.3 Ridership & Vehicle Demand Estimation

Estimating ridership demand for new MOD services is challenging due to the wide variation of use cases and underlying land use and socio-economic characteristics across the industry. However, basic ridership assumptions are essential in order to estimate the number of vehicles, drivers, and financial resources needed to operate a MOD service. This section outlines the methodology and results of a ridership and vehicle demand analysis for the proposed MOD zones.

Methodology

A range of ridership estimates for the conceptual MOD zones were developed based on the following methodology using industry-standard demand and productivity factors provided in **Table 4-4**.

1. To estimate weekly ridership demand, a range of industry-standard market "capture" rates were applied to the aggregate residents and jobs within each zone. On the low end, this approach assumes that every 1,000 residents and jobs within a proposed MOD zone will produce five weekly MOD trips. On the high end, it is assumed that every 1,000 residents will produce 16 weekly trips, on average.
2. Average daily demand was calculated by dividing the total weekly demand estimates by the total weekly operating days. It is assumed that the proposed MOD zones will operate seven days per week, consistent with Lextran's fixed-route bus service.
3. Hourly demand was calculated by dividing the total daily demand by the total daily operating hours. It is assumed that the proposed MOD zones will operate 14 hours a day, seven days per week. For the purpose of this conceptual demand estimate, it is further assumed that the demand profile will be relatively flat throughout the day without significant peaking.
4. Finally, vehicle requirements are estimated by applying a productivity factor to the hourly demand estimates for each zone. Productivity factors will vary based on zone size and service parameters such as wait time, in-vehicle deviations, and walk distances. As such, a range of productivity factors was applied to each demand estimate, with a factor of three passenger trips per vehicle hour representing the low end of the range and seven trips per vehicle hour representing the high end.

Table 4-4: MOD Ridership & Vehicle Demand Estimation Factors

Range	Ridership Capture Rate (weekly trips per 1,000 people + jobs)	Productivity Factor (passenger trips per vehicle hour)
Low	5	3
Medium	11	5
High	16	7

Ridership and Vehicle Estimation Results

The results of the ridership and vehicle demand analysis are presented in **Table 4-5**. For this exercise, demand and vehicle estimates are provided for each individual zone and combined north and south zones. Given the various factors that influence demand, a range of potential ridership and vehicle requirements are provided for each zone. The results are summarized below:

- **Northwest Zone:** The Northwest zone is estimated to produce 20 to 60 trips per day and require between one and two vehicles.
- **Northeast Zone:** The Northeast zone is estimated to produce 20 to 50 trips per day and require between one and two vehicles.
- **Southwest Zone:** The Southwest zone is estimated to produce 40 to 110 trips per day and require between one and three vehicles.
- **Southeast Zone:** The Southeast zone is estimated to produce 60 to 190 trips per day and require between one and five vehicles.
- **North Zone:** The combined North zone is estimated to produce between 40 and 110 trips per day and require between one and three vehicles.
- **South Zone:** The combined South zone is estimated to produce between 90 and 300 trips per day and require between one and eight vehicles.

Table 4-5: Ridership and Vehicle Estimates by Proposed MOD Zone

	Individual Zones				Combined Zones	
	Northwest Zone	Northeast Zone	Southwest Zone	Southeast Zone	North Zone	South Zone
Population + Jobs	24,400	21,700	49,000	82,700	46,100	131,700
Average Weekly Passenger Trips	120 - 390	110 - 350	250 - 780	410 – 1,320	230 - 740	660 – 2,110
Average Daily Passenger Trips	20 - 60	20 - 50	40 - 110	60 - 190	40 - 110	90 - 300
Average Hourly Passenger Trips	1 - 4	1 - 4	3 - 8	4 - 14	3 - 8	6 - 21
Peak Vehicle Requirement	**1 - 2**	**1 - 2**	**1 - 3**	**1 - 5**	**1 - 3**	**1 - 8**
Low Productivity Factor	1 - 2	1 - 2	1 - 3	2 - 5	1 - 3	2 - 7
Medium Productivity Factor	1	1	1 - 2	1 - 3	1 - 2	2 - 5
High Productivity Factor	1	1	1 - 2	1 - 2	1 - 2	1 - 3

4.4 Mobility On-Demand Implementation Plan

This section summarizes the key steps that Lextran will need to complete in order to implement a new on-demand service. These steps include identifying a service delivery model, refining the service design parameters and zones, defining a capital and operating budget, identifying funding sources, and developing an implementation workplan.

4.4.1 Service Delivery Models

On-demand transit is typically delivered through one of two service models: 1) directly operated in-house using Lextran drivers and vehicles and 2) contract operated through a private vendor. These two service models are described below and summarized in **Table 4-6**.

In-House Operation: In this model, Lextran would provide on-demand transit services using the existing fleet, drivers, and operations team (or new vehicles and resources procured by Lextran) and procure a new software-as-a-service (SaaS) solution to facilitate on-demand trip booking and dispatching. Other services such as ongoing service design and optimization, operational support, and customer service may also be included as part of the technology procurement. This approach provides continuity with Lextran's existing fixed-route operating model using agency staff and assets. The primary disadvantage of this approach is the need to adapt existing resources—including fleet, staff, operators—and procedures to implement a new and unfamiliar service, which may create short-term inefficiencies and a higher cost-per-trip than the Transportation as a Service model described below. Lextran would need to hire or retrain drivers to operate an on-demand service and might need to create new labor classifications. The SaaS technology platform solution includes, at a minimum, the following components:

- Dynamic vehicle routing
- Passenger aggregation (shared-rides)
- Rider and driver mobile apps, with real-time vehicle tracking and live updated ETAs
- Support for booking by phone, as well as some form of cash payment for unbanked individuals
- Backend administrative tools, such as data dashboards to monitor performance
- Ongoing technical, operational, and marketing support

Turnkey Contract: In this model, a turnkey on-demand transit vendor provides a bundled solution that includes the on-demand transit technology described above plus drivers, vehicles, and operations management. The potential advantages of a turnkey contract solution include lower up-front costs and scalability. After the initial pilot project is launched, Lextran could evaluate whether to incrementally increase fleet size and/or extend operating hours. A bundled approach also ensures the operator and technology platform are interoperable and configured to work efficiently together. The primary disadvantage of this approach is the need to rely upon a vendor to operate and maintain the service, which may present administrative or labor-related challenges. Another potential drawback to the turnkey contract model is that Lextran would have less direct control over specific operational decisions, such as the vehicle make/model, driver recruitment and wages/benefits, and vehicle maintenance processes, provided the vendor meets the terms of its service level agreement with Lextran.

Table 4-6: MOD Service Delivery Models

Service Model	Description	Benefits	Drawbacks
In-House Operations	Lextran provides service using own fleet, drivers, maintenance staff/facility, and management team. Lextran procures software/ technology package for reservations/dispatch, customer-facing user interface, operational support, and customer service (optional).	• Provides continuity with existing services • Agency owns fleet, providing flexibility in service delivery method	• Requires need to adapt existing resources – including fleet, staff, operators – and procedures to implement a new and unfamiliar service
Turnkey Contract	Lextran procures turnkey contractor for software/technology, drivers, vehicles, maintenance, customer service, and operations management	• Faster deployment • Easily scalable based on ridership demand and desire to add new zones or expand existing zones •	• Requires reliance on contractor, which may present administrative or labor-related challenges

4.4.2 Cost Estimates & Potential Funding Sources

This section presents cost estimates for the proposed MOD zones based on the in-house and turnkey contract service models described in the previous section. Several potential funding sources for MOD service are presented at the end of this section.

Cost Estimates

Capital and operations and maintenance (O&M) costs were estimated for the proposed MOD zones based on financial data gathered from Lextran's National Transit Database (NTD) reports and industry pricing data. Capital cost assumptions are summarized in **Table 4-7** and ongoing O&M cost assumptions are summarized in **Table 4-8**. Basic costing assumptions are summarized below.

- **Capital Costs:** Upfront capital costs include one-time expenses required to start the service, including vehicles, hardware and data plans, software installation fees, and marketing. If Lextran chooses the turnkey contract delivery model, some or all upfront costs may be amortized over the life of the contract and reflected in the contract operator's annual fixed fee.
- **O&M Costs:** The in-house cost estimate assumes that Lextran will directly operate MOD service using agency vehicles, drivers, and maintenance facilities. Ongoing operational costs include all recurring fixed and variable expenses such as drivers, support and maintenance staff, fuel, and consumables. The turnkey cost estimate assumes that Lextran will procure a third-party contractor to operate and maintain the MOD service. This service model bundles all recurring costs such as vehicle leases, and driver pay, dispatch, and maintenance into a fully loaded cost per vehicle revenue hour. As shown in **Table 4-8**, two tiers of hourly costs are provided based on fleet size to reflect the economies gained by spreading fixed costs across a larger quantity of vehicles and revenue hours. Fixed costs include administration and dispatch, technology (software), marketing, and overhead.

Table 4-7: Upfront Capital Cost Assumptions

Type of cost	Cost Range	Assumptions
Vehicle acquisition	$35,000 - $50,000 per small van $75,000 - $100,000 per accessible van	Cost of acquiring vehicles for the service. Assumes entire fleet is wheelchair accessible.
Hardware and data plans	$200 - $500 per tablet plus ongoing data plan subscription	Cost to purchase tablets, mounts, chargers, and dispatcher hardware (computer, phone, etc.) Each device will require an active data plan.
Software installation fees	$20,000 - $50,000	Software installation fees vary depending on the provider and the size of the deployment.
Marketing	$10,000 - $40,000	Cost to market the service prior to launch, ensuring riders are aware of any changes. This includes the cost of providing referral incentives (e.g., refer a friend and get $5).

Table 4-8: Ongoing Operations and Maintenance Cost Assumptions

Type of cost	Cost Range	Assumptions
In-House Operations		
O&M Cost	$70 - $105 per vehicle revenue hour According to the National Transit Database for the FY2020 reporting year, Lextran spent $105 per vehicle revenue-hour on its fixed-route service and $45 per vehicle revenue hour on its paratransit service. Actual O&M cost will likely fall towards the upper end of this range.	• These figures are inclusive of operations, maintenance, insurance, management, and dispatch/customer service functions. • Lextran would either contract with a 3rd-party vehicle operator to manage ongoing vehicle maintenance or would provide maintenance with its own staff. • A third-party contractor or Lextran would manage the service. Usually this requires at least one person at all times. This individual would act as a dispatcher, receiving phone bookings, managing driver issues, and more.
Software licensing fees	$20,000 - $60,000 / year	Software installation fees vary depending on the provider and the number of vehicles needed to operate the on-demand service.
Turnkey Contract Operations		
O&M Cost (less than 5 fleet vehicles)	$80 - $100 per vehicle revenue hour	Fully loaded cost per vehicle revenue hour, which includes recurring technology fees, vehicle leases, driver pay, and customer service.
O&M Cost (5-10 fleet vehicles)	$60 - $80 per vehicle revenue hour	

Cost Summary

Table 4-9 summarizes the estimated capital and O&M costs associated with the in-house and turnkey contract service delivery models. For both service models, the O&M cost estimates represent the midpoint of the demand and productivity ranges summarized in the previous section. Actual operating costs may be higher or lower depending on the chosen service design parameters and ridership demand. Capital costs for the turnkey contract model are assumed to be included in the annual O&M cost.

Table 4-9: MOD Cost Estimate Summary based on Medium Demand and Productivity Assumpions

	In-House		Turnkey Contract
Zone	Capital	O&M	O&M
Individual Zones			
Northwest Zone	$235,700	$487,500	$459,900
Northeast Zone	$235,700	$487,500	$459,900
Southwest Zone	$235,700	$487,500	$459,900
Southeast Zone	$323,550	$934,900	$919,800
System Total	**$850,650**	**$2,277,300**	**$1,788,500**
Combined Zones			
North Zone	$235,700	$487,500	$459,900
South Zone	$411,400	$1,382,400	$1,379,700
System Total	**$587,100**	**$1,829,800**	**$1,430,800**

Table 4-10 on the following page provides additional detail including vehicle requirements, annual vehicle-hours, and costs to operate on-demand services under both service delivery models. The table also shows the cost per passenger trip as a measure of the service's relative cost-effectiveness.

Table 4-10: MOD Cost Estimate Detail based on Medium Demand and Productivity Assumpions

Cost Category	Individual Zones					Combined Zones		
	Northwest Zone	Northeast Zone	Southwest Zone	Southeast Zone	System	North Zone	South Zone	System
Cost Drivers								
Fleet Vehicles	2	2	2	3	9	2	4	6
Annual Vehicle Hours	5,110	5,110	5,110	10,220	25,550	5,110	15,330	20,440
Capital								
Vehicles	$175,000	$175,000	$175,000	$262,500	$787,500	$175,000	$350,000	$525,000
Hardware / Data	$700	$700	$700	$1,050	$3,150	$700	$1,400	$2,100
Software	$35,000	$35,000	$35,000	$35,000	$35,000	$35,000	$35,000	$35,000
Marketing	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000
Capital Total	**$235,700**	**$235,700**	**$235,700**	**$323,550**	**$850,650**	**$235,700**	**$411,400**	**$587,100**
Operating								
In-House Model								
O&M	$447,500	$447,500	$447,500	$894,900	$2,237,300	$447,500	$1,342,400	$1,789,800
Software Licensing	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000
In-House Operating Total	**$487,500**	**$487,500**	**$487,500**	**$934,900**	**$2,277,300**	**$487,500**	**$1,382,400**	**$1,829,800**
Cost per Passenger Trip	$40.63	$54.17	$23.21	$25.97	$29.20	$23.21	$23.04	$22.59
Turnkey Contract Model								
O&M	$459,900	$459,900	$459,900	$919,800	$1,788,500	$459,900	$1,379,700	$1,430,800
Turnkey Operating Total	**$459,900**	**$459,900**	**$459,900**	**$919,800**	**$1,788,500**	**$459,900**	**$1,379,700**	**$1,430,800**
Cost per Passenger Trip	$38.33	$51.10	$21.90	$25.55	$22.93	$21.90	$23.00	$17.66

Potential Funding Sources

In addition to Lextran's existing operations funding resources, the following sources could provide financial support for on-demand transit services:

- **State and Federal grants:** Most on-demand transit operators will support public agencies in their applications for State and Federal grants. The FTA's RAISE and Accelerating Innovative Mobility (AIM) grant programs are two funds that are particularly suitable for on-demand transit.
- **Private financing:** Private capital can defray the upfront costs of operating microtransit services, aligning the private provider and public partner's interest over the term of the contract. In some cases, private sources of funding have contributed sponsorships or matching funds to operate on-demand transit service. These private sources include major employers, retail and entertainment associations, universities, and other local institutions with a vested interest in ensuring the mobility needs of their communities are met, spurring economic development in the region, offering visitors convenient transportation.
- **Advertising:** Some on-demand transit services have recouped operational expenses by offering "takeover" advertising campaigns. These campaigns may include elements of advertising on vehicles, in-app affiliate marketing, and branded event promotions. Combined into a takeover campaign, these individual strategies have greater value to a potential advertiser. The unique qualities of an on-demand transit service – an app-based system with dedicated vehicles serving geographically-defined markets – make it particularly well suited for a takeover campaign strategy.

4.4.3 ADA Paratransit Considerations

Serving current ADA paratransit customers, particularly with same-day service options, is a primary objective of on-demand transit. On-demand transit may potentially offer Lextran additional cost savings if existing ADA paratransit customers shift a portion of their trips from ADA service to on-demand transit. This shift is due to the fact that MOD is likely to be operated at a slightly lower cost compared to Lextran's 2020 ADA paratransit cost-per-trip of $26. Based on findings from other American MOD services, we find that areas with on-demand transit service generate levels of ADA paratransit ridership (normalized for underlying population) 31% lower than areas without on-demand transit service.[4] By applying this modal shift assumption to the ADA trips that currently have an origin *and* destination within the proposed MOD zones Lextran would realize $20,000 to $50,000 in annual savings, depending on the service delivery model.

[4] Khan et al. 2021. "Travel Behaviors of the Transportation-Disabled Population and Impacts of Alternate Transit Choices: A Trip Data Analysis of The Handitran Paratransit Service in Arlington, TX." p. 9. https://doi.org/10.1061/9780784483534.043.

4.4.4 Marketing New Services

For any new transit service to be successful, it is critical to create a comprehensive marketing plan prior to the launch of the service. Marketing efforts for new MOD services could include:

- Street marketing at fixed-route bus stops
- Parking branded service vehicles in high-traffic areas
- Canvassing or handouts at key points of interest
- Bus driver handouts
- Ads/notices on bus stop signage
- Producing a public service announcement (PSA) to be aired on local public television or the agency's YouTube account
- Placing social media ads
- Participation in community events (e.g. farmers markets, sports tournaments, street fairs)
- Activation of key local influencers and community leaders
- Free ride promotions
- A launch event with local politicians, business leaders, and media present to promote the service

In addition to marketing to customers directly, local institutions are often excellent marketing partners who can help promote local transit services to their customers, employees, and, in the case of universities, students. Lextran should explore such partnership opportunities with local institutions such as the University of Kentucky, Bluegrass Technical College, local healthcare/hospital systems, and other major employers in Lexington.

4.4.5 Implementation Steps & Phasing

The following steps were identified to advance the implementation of on-demand service in Lexington.

1. **Planning & Fundraising**
    - Identify pilot project scope (zonal boundaries, service levels, service policies, fares)
    - Select service delivery model (in-house vs. turnkey contract) and define budget
    - Identify and pursue grant opportunities and identify supplemental operating and capital funding sources
    - Initiate procurements, including a service contractor (if outsourcing operations), vehicles, technology.
2. **Phase 1 Pilot Testing (6-12 months)**
    - Start-up activities
    - Marketing
    - Service launch
    - Service monitoring and evaluation
    - Refine service policies in advance of expansion
3. **Phase 2 Service Expansion**
    - Expand existing zones or launch new zones
    - Initiate procurements, as needed, including new vehicle acquisition and/or modifying service contracts.