GoDurham

# Microtransit Planning Study

June 2020

NELSON
NYGAARD

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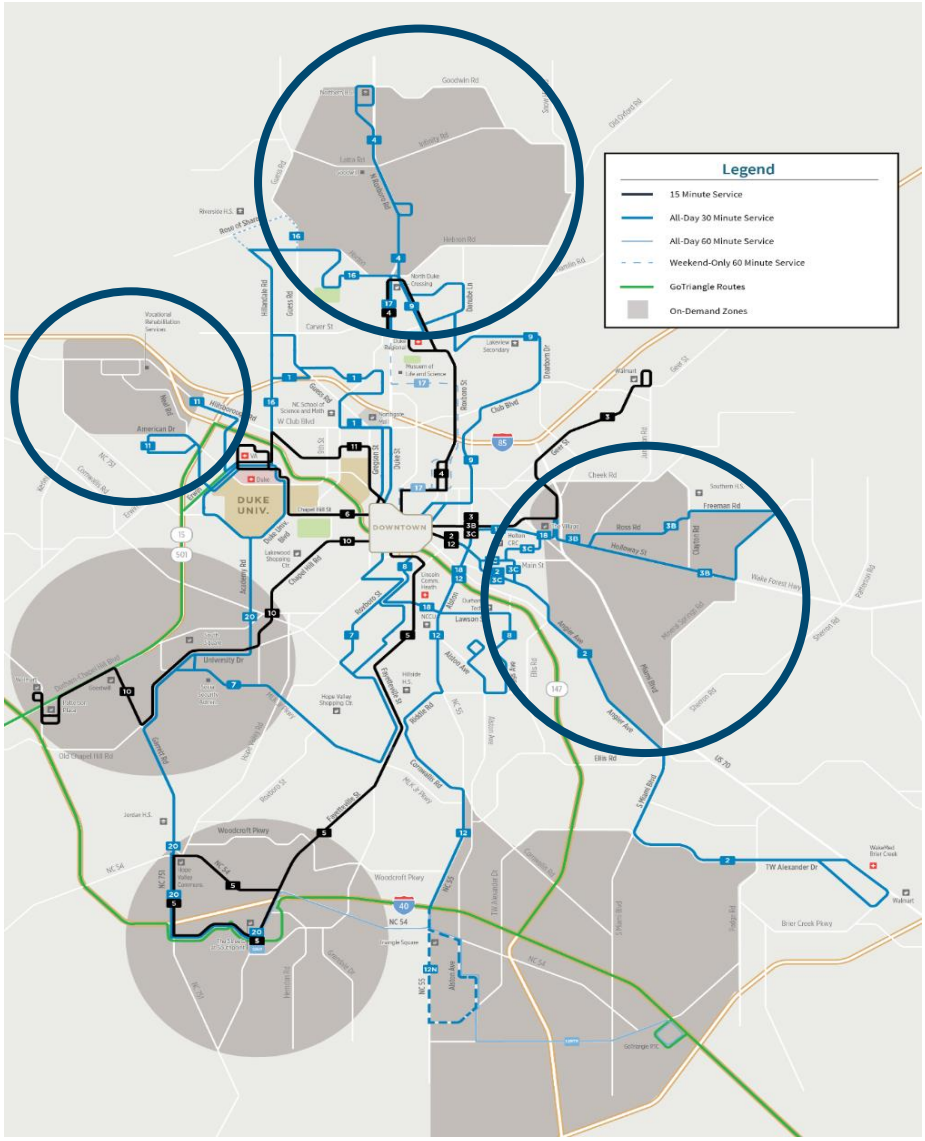
# 1 Overview

In June 2019, the Durham City Council adopted the GoDurham Short Range Transit Plan (SRTP). The SRTP identified six potential on-demand zones on the periphery of the city where fixed-route ridership and residential density are low, but mobility needs of the community remain high. The purpose of this Microtransit Planning Study is to investigate service scenarios and provide recommendations for three of these zones, listed below and shown in Figure 1:

- Zone 1: East Durham – east of the Village Shopping Center
- Zone 2: Sparger Road – west of Cole Mill Road serving Neal Road, Sparger Road, and Operations Drive
- Zone 3: North Durham – north of Horton Road

**Figure 1 Three Study Zones Overlaid on SRTP Recommendations**



The GoDurham Microtransit Planning Study starts with a definition of the goals and objectives of providing on-demand service in Durham. The study follows with a market review to understand the socioeconomic characteristics, key activity centers and existing transit service within each zone. Market review findings helped inform the development of service design scenarios. Criteria developed from the goals and objectives were used to evaluate each scenario, including key performance indicators of ridership and cost. Lastly, the study concludes with a recommended direction for on-demand service in Durham, including prioritization of zones and a high-level implementation strategy.

## KEY FINDINGS

The GoDurham Microtransit Planning Study resulted in the following key takeaways:

- The study recommends a course of an action for implementing on-demand service in Durham, aligned with goals to make service more convenient, more equitable, and improve connections, while ensuring that the model created will be sustainable over the long term.
- The three study areas are generally characterized by low-density residential areas, plus some employment and activity centers. They have a high proportion of residents with socioeconomic characteristics that are linked to a higher transit propensity. Each zone currently has a lower frequency fixed route service running through part of the zone, plus a major hub with frequent fixed route connections.
- On-demand service can be designed in many ways, including different service delivery models and zone designs. Preliminary zone boundaries are drawn for each zone to encompass major population, employment, and activity centers. Based on GoDurham operational requirements and the goals of this study, two scenarios were created for further evaluation:
    - A ride-hail partnership model in which the agency provides subsidized rides with ride-hailing companies like Lyft, Uber, or local taxis, with a hybrid hub- and zone-based design which provides trips within a specific geographic zone and to specific identified connection points outside the zone, focused on providing first mile/last mile connections.
    - A microtransit turnkey model in which a dedicated transit service provider, like Via, is contracted to provide software, vehicles, and service operations within a specific geographic area, focused on providing community connections anywhere within the zone.
- The two scenarios and zone boundaries were evaluated based on metrics aligned with the study goals and objectives. Based on the evaluation, budget, and expected implementation timeline, the study recommends that GoDurham implement a ride-hail partnership in the East Durham zone as the highest priority. This service could expand upon the East Durham Connect pilot to a wider geography and extend the use of this service to those under 18. This service is estimated to serve 36 riders per day in the first year, increasing up to 120 riders per day in successive years. For the first year, the annual operating cost will be approximately $119,000.
- If budget allows, Sparger Rd. 2 could also be included as part of an initial phase. This service is estimated to serve 8 riders daily at a cost of $18,000 annually. This zone does

not have the highest ridership potential, but it is the smallest zone with the lowest cost and highest number of transit riders who lost service since the SRTP (63 riders/daily).

- In order to ready this service for implementation, GoDurham must conduct extensive public engagement to adjust these preliminary recommendations to better fit the communities that will use this service. Implementation will also require robust marketing to ensure that potential customers know about and understand how to use the service.

# 2 Goals and Objectives

GoDurham staff, GoTriangle staff, and the project team developed a series of goals and objectives for microtransit service in Durham. Since this project explores the potential introduction of new service types and delivery models, goals were developed for the microtransit service itself (customer experience) and the internal knowledge growth during the service implementation process (agency experience). The team developed four goals, each with several objectives. These serve as the evaluation framework to determine which service scenario and geographic area would best meet the goals and objectives of this effort.

## Goal 1: Make Service More Convenient

- Preserve and enhance mobility for current customers
- Expand coverage to areas not served by fixed route
- Improve the customer experience, including more access, decrease wait and trip times, and ease of use
- Integrate experience with other modes, including fixed route

## Goal 2: Connect People to Life's Activities

- Improve access to jobs
- Connect people to healthcare and other social services
- Design service that will benefit the largest number of people
- Improve connections to fixed route network

## Goal 3: Design an Equitable Service that Improves Access to Opportunity

- Create shared economic prosperity for disadvantaged populations
- Address safety concerns around microtransit
- Build partnerships within each zone to encourage use and improve service

- Ensure fares are accessible and affordable
- Design service to meet the needs of those with the fewest mobility options

## Goal 4: Create a Model That Will Be Sustainable

- Understand the financial and technical feasibility of on-demand mobility options
- Develop services that achieve a high level of public support
- Learn and test new strategies for leveraging technology to improve the customer experience
- Generate additional data to understand transit demand and travel flows
- Gain experience collaborating and contracting with private-sector mobility companies

# 3 Market Review

The GoDurham Microtransit Study market review builds off findings from the GoDurham SRTP, as well as previous surveys conducted by GoDurham, to understand the unique transportation needs in these three zones (Figure 1). The market review analyzes the market demand of each zone based on demographics, employment centers, and other activity centers, as well as the performance of existing and past transit services in these areas.

## ZONE FINDINGS

The key findings for each of the three zones from the market review are as follows:

- Zone 1: The East Durham Microtransit Zone is generally characterized by low-density residential developments, plus a couple clusters of employment areas. Higher transit propensity, determined through a series of socioeconomic characteristics, is concentrated in the half of the zone closer to downtown. The Village Shopping Center represents a potential key transfer point from microtransit to frequent fixed-route transit service.
- Zone 2: The Sparger Road Microtransit Zone generally encompasses low-density industry and commercial areas, with some low-density homes and apartments complexes. Transit propensity is relatively low, but low-wage employment sites along Hillsborough Road, social services agencies like the Vocational Rehabilitation Services facility, and low-income housing developments are potentially major markets for microtransit.
- Zone 3: The North Durham Microtransit Zone contains low density residential areas plus major commercial and retail centers. North Duke Shopping Center and Willowdale Shopping Center are potential key transfer points for microtransit to fixed-route transit. Transit propensity is relatively high throughout the study area. However, population and employment density are not strong enough to warrant fixed-route transit service.

## FINDINGS FROM PREVIOUS STUDIES AND SURVEYS

### GoDurham Short Range Transit Plan

The GoDurham SRTP was adopted by the Durham City Council in June 2019. The Plan recommended changes to the GoDurham network to provide more frequent and reliable service. The Plan also identified six zones to be served by on-demand services rather than fixed-route buses. This study focuses on three of these zones (Figure 1) and builds on the SRTP's market analysis and survey results.

#### Market Analysis

The SRTP analyzed the population density and demographic characteristics of Durham County. As shown in Figure 2, the population of Durham is concentrated towards downtown, with a low number of people per acre in the three microtransit study areas. However, as shown in Figure 3, areas with high proportions of populations who have a propensity for transit are spread out throughout the city and county, including in the microtransit study areas.

**Figure 2 Durham SRTP – Population Density**

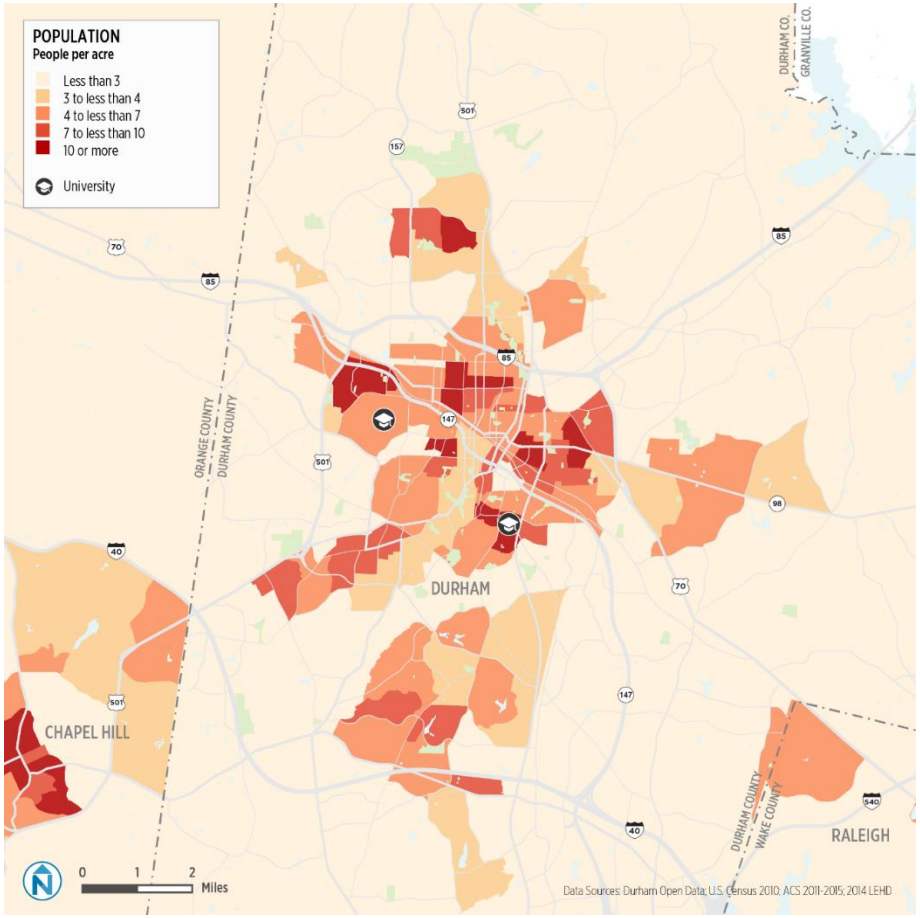



**Figure 3 Durham SRTP – Transit Propensity Index**

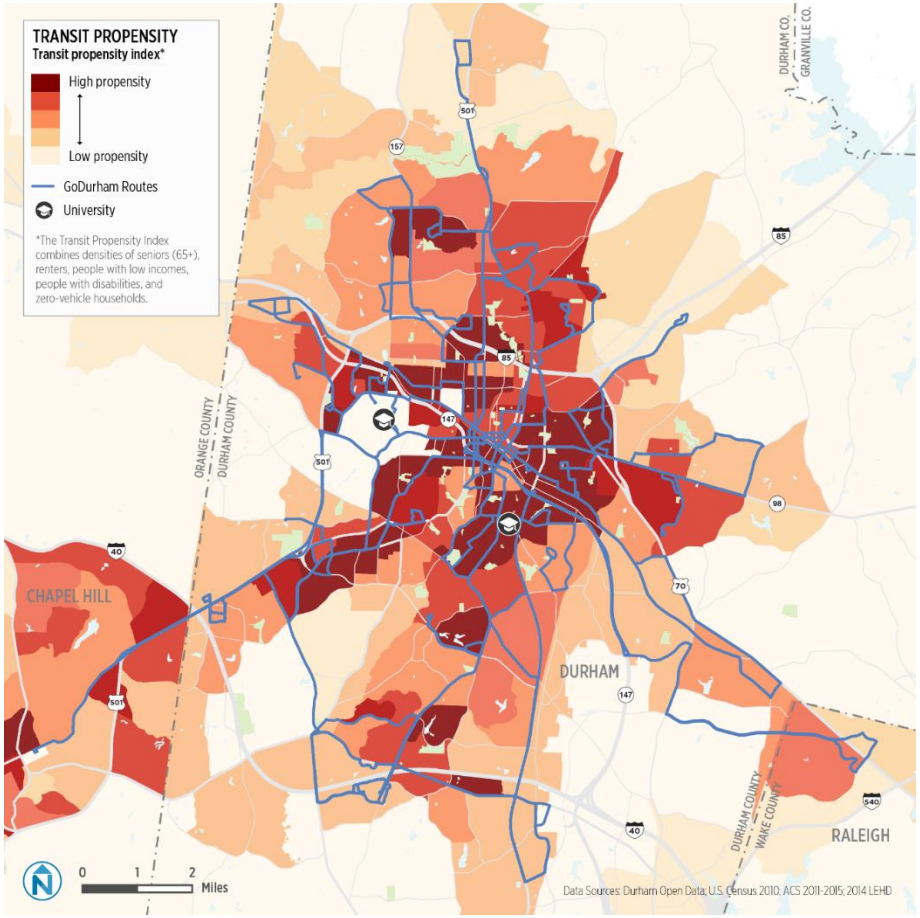


**Figure 4 Durham SRTP – Employment Density**

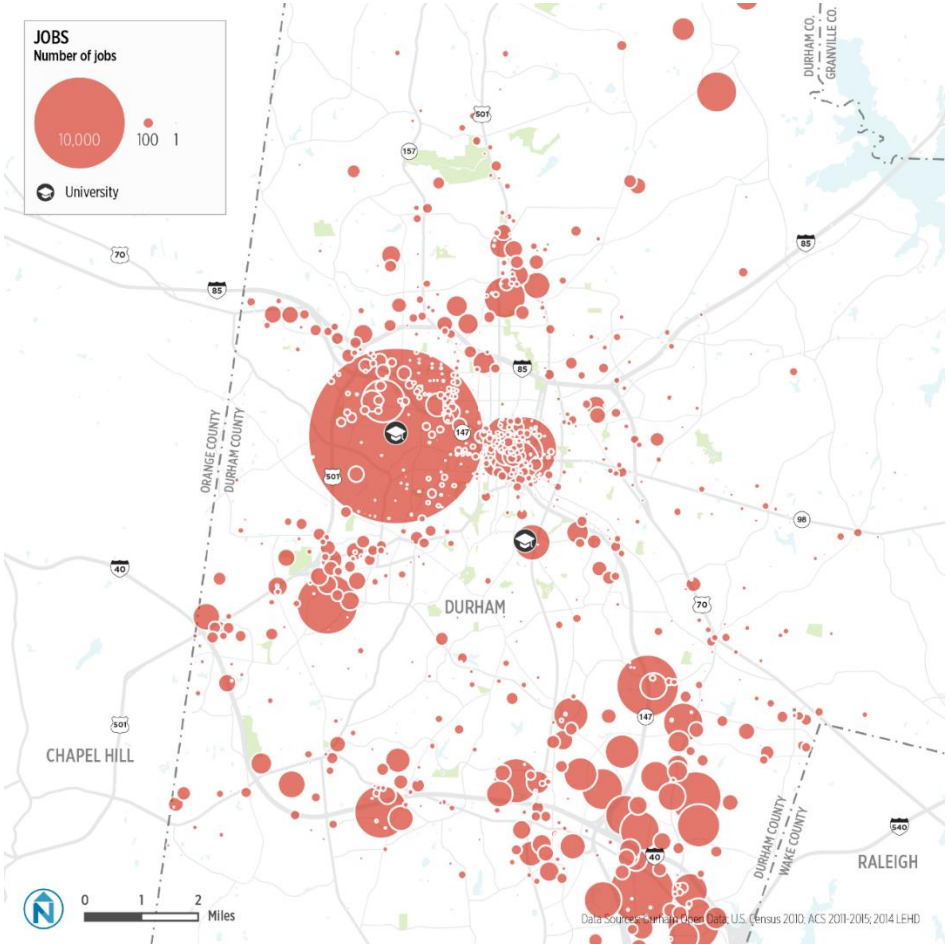
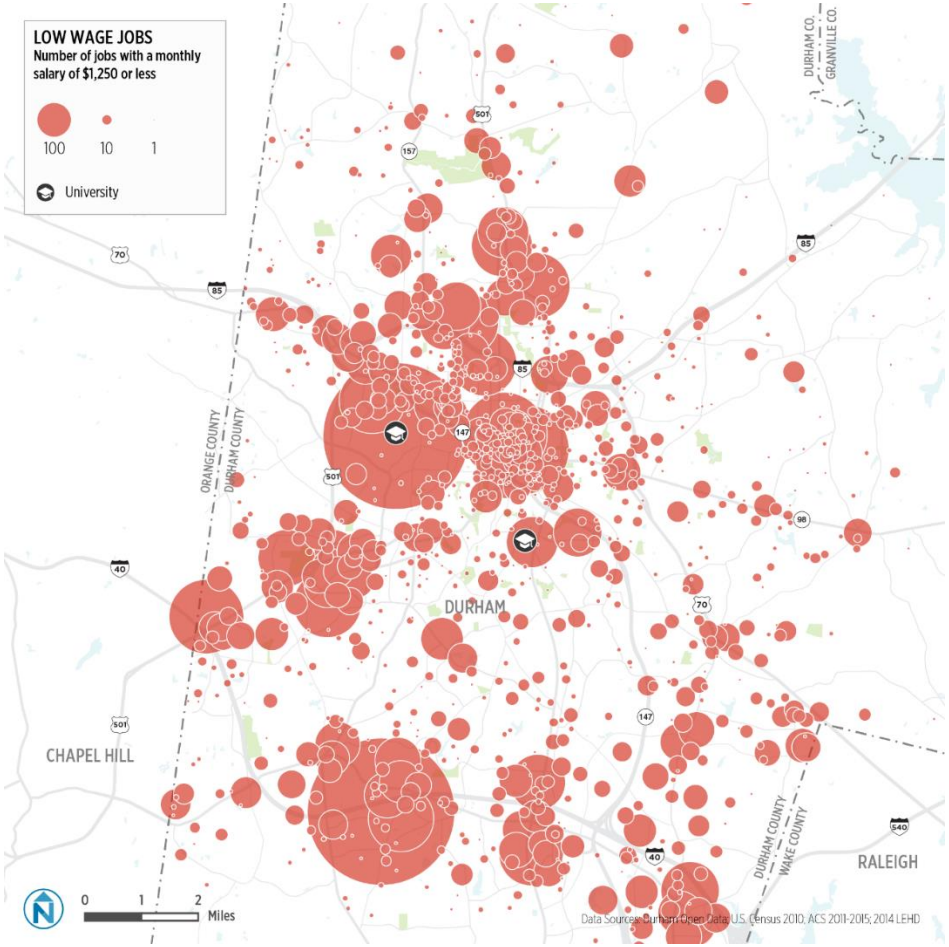



**Figure 5 Durham SRTP – Low-Wage Employment Density**



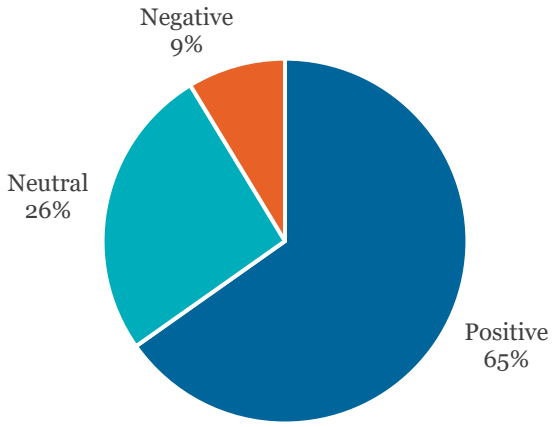
The demographic data used in the SRTP included US Census, American Community Survey (ACS), and Longitudinal Employer-Household Dynamics (LEHD) data from 2010 to 2015. According to ACS population estimates, between 2010 and 2018 the population of Durham has increased by nearly 20%, and the socioeconomic characteristics of the city have also shifted. Additionally, the Transit Propensity Index (Figure 3) from the SRTP took into account several demographic factors—low-income populations, people with disabilities, seniors, people who live in rental units, and zero-vehicle households—but did not include race, which is a factor that greatly correlates with transit need. This market review updates the demographic analysis, using more recent population data and incorporating race into the Transit Propensity Index.

The SRTP market analysis also analyzed the employment density of the City and County of Durham. Figure 4 shows the employment centers are concentrated downtown, at Duke University, and near Research Triangle Park. However, Figure 5 shows low-income employment centers distributed throughout the county, including in the three microtransit study areas.

## On-Demand Zone Feedback

The GoDurham Short Range Transit Plan collected community feedback on a range of transit improvements and recommendations. When asked about the proposed on-demand zones, 65% of 23 survey respondents reacted favorably, compared to 26% who reacted negatively. Comments included the following feedback:

**Figure 6 SRTP On-Demand Zone Public Feedback**




- Concern that higher costs would create a financial burden, especially for riders getting passes through Duke.
- Concern about greater pollution with a potential reduction in service by replacing fixed-route with on-demand service.
- Support for late-night on-demand service, especially during the weekends.
- Support for greater subsidies for low-income individuals.
- Concern about funds being directed away from bus service and liability issues behind transportation network companies (TNCs).

## Service Changes Since SRTP

Since the adoption of the SRTP in June 2019, GoDurham has implemented many recommended service changes. The January 2020 service changes included the following routes that affect our study area:

- Routes 2, 2A, 2B, and 15 were combined into a new Route 2 and service was simplified. Route 2 now runs along Angier Avenue without a loop and service is more frequent.
- Route 3C in East Durham was restructured to serve The Village Shopping Center and Alston Avenue, rather than Holloway Street and Lynn Road. The East Durham Connect pilot program was put in place along the area that Route 3C no longer serves.
- Route 6 and Route 6B were combined and shortened to serve Duke and VA Medical Centers and no longer serve Sparger Road, Operations Drive, or Hillsborough Road west of Duke University.

- Routes 9, 9A, and 9B maintained its routing with some schedule adjustments in North Durham.
- Route 11B was restructured and no longer serves Sparger Road or Hillsborough Road west of Cole Mill Road.
- Route 23 was eliminated, and service was increased on Route 3B at night and on weekends.

## Onboard Survey of GoDurham Customers 2019

GoDurham conducts an annual onboard survey of the agency's customers. The 2019 survey was conducted on buses in mid-October 2019, with 920 responses and a margin of error of +/- 3.2% at the 95% level of confidence. The project team reviewed the results of this survey to glean the following information relevant to planning on-demand service, with a focus on existing riders:

- *Trip Purpose*: A majority (62%) of current riders use transit primarily to get to work. A sizeable population (14%) primarily use transit to get to schools and colleges.
- *Fare Medium*: About half of GoDurham customers pay with cash, including 29% who pay in cash for a one-way ride on the bus and another 21% who purchase a day pass, likely through cash on the bus as well. As shown in Figure 7, the fare medium used differs by income level. Over 60% of customers who make less than $50,000 per year use cash or a day pass. 42% of those who make more than $50,000 use a GoPass or University ID, compared to less than 25% for lower income customers.

**Figure 7 Income of Customer and Type of Fare Medium**

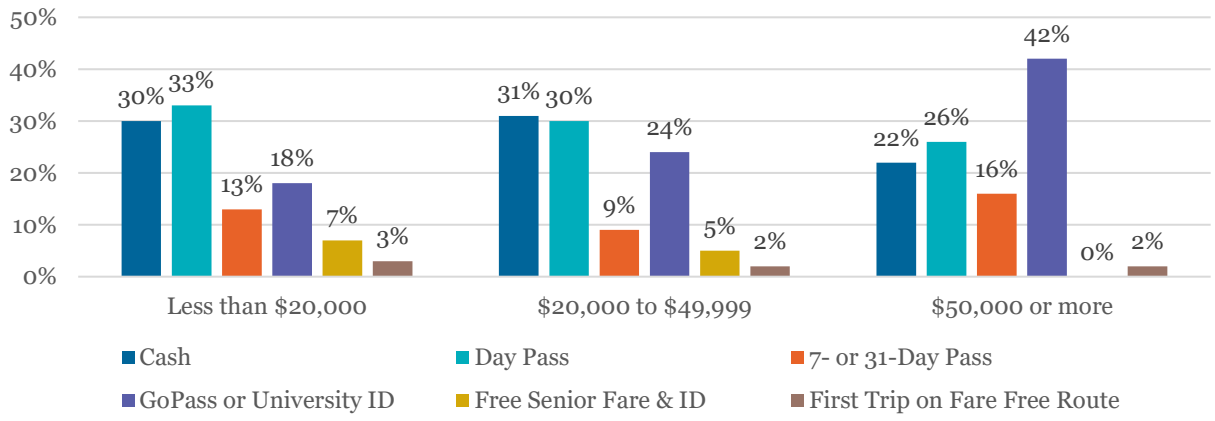
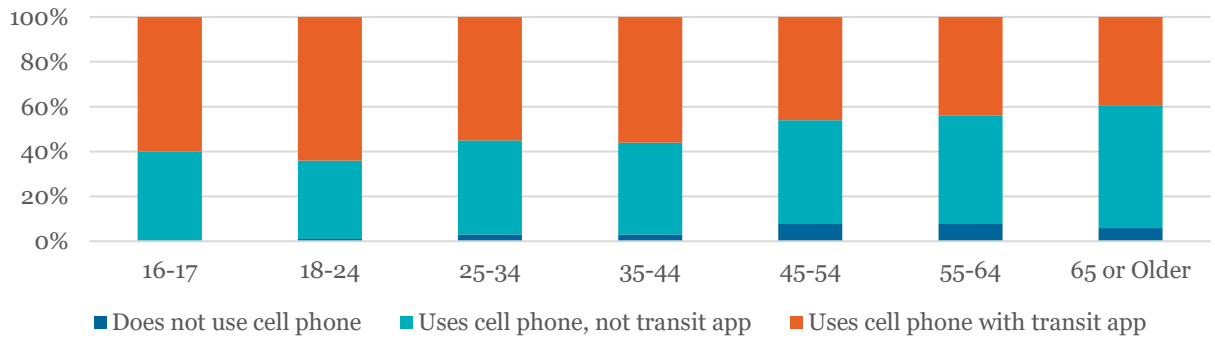



**Figure 8 Age of Customer and Use of Cell Phone and Transit App**



- *Uber/Lyft Usage*: In the thirty days before the survey was conducted, about 51% of customers did not use Lyft and Uber. About 10% used Lyft or Uber once, 19% used them twice or three times, and about 20% used Lyft and Uber four or more times.
- *Mobile/Transit App Usage*: An overwhelming majority (96%) of customers use cell phones. 55% of customers use a cell phone and have a transit app downloaded already. As shown in Figure 8, cell phone and transit app usage vary a bit with age. 64% of customers who are between 18 and 24 use a cell phone with a transit app, compared to 40% of customers who are 65 or older.

### Community Survey of Adults in Wake, Durham, and Orange Counties 2019

In August and September of 2019, the transit providers in the Triangle Region conducted a community survey of the general adult population in Wake, Durham, and Orange Counties. The results of the survey are based on a random sample of 1,202 adults in the three counties, including both transit riders and non-riders, 400 of whom are from Durham County. The project team reviewed the results of this survey to glean the following information relevant to planning on-demand service, with a focus on the general population, or the total pool of potential riders rather than just existing transit riders:

- *Trip Purpose*: In Durham County, 63% of local trips are work-related, regardless of transportation mode. The second greatest proportion of trips are for errands and shopping at 25%, with school-related trips at 6% of the survey population.
- *Uber/Lyft Usage*: In Durham County, 62% of the sampled population did not use Lyft or Uber in the thirty days before the survey was taken. About 21% of people used Lyft or Uber one to three times, and 18% used them four or more times.

## MARKET REVIEW METHODOLOGY

In order to understand the market for microtransit in Durham, this market review evaluates the following characteristics for each study area.

- *Key activity and employment centers:* The market review identifies key activity centers in and around each zone as places that many customers may want to travel from or to, such as shopping areas, apartment complexes, schools, and supermarkets. Since people who work low-wage jobs are more likely to use transit than those with higher income, the market review also looked locations of low-wage jobs identified in the SRTP.
- *Residential market for transit*: The market review analyzes the population density within each zone (Figure 9), as well as demographic characteristics associated with a higher propensity for transit. Using US Census ACS 2018 5-year estimates data at the block group level, this market review assesses the proportion of residents in each zone who are seniors (age 65+), have low incomes (<100% of poverty level), are non-white, have disabilities, and live in households with no vehicles. These indicators are combined into a composite Transit Propensity Index (TPI), which highlights the areas with the greatest transit need (Figure 10).
- *Existing transit and ridership*: To determine potential connections to fixed-route transit within the microtransit zones, this market review discusses GoDurham bus routes that cross through the study areas. The SRTP also analyzed transit ridership by stop on the GoDurham network before January 2020 service changes. This ridership analysis is included in the market review since it helps to identify key transfer points and areas where customers already use transit.

**Figure 9 Durham Population Density**

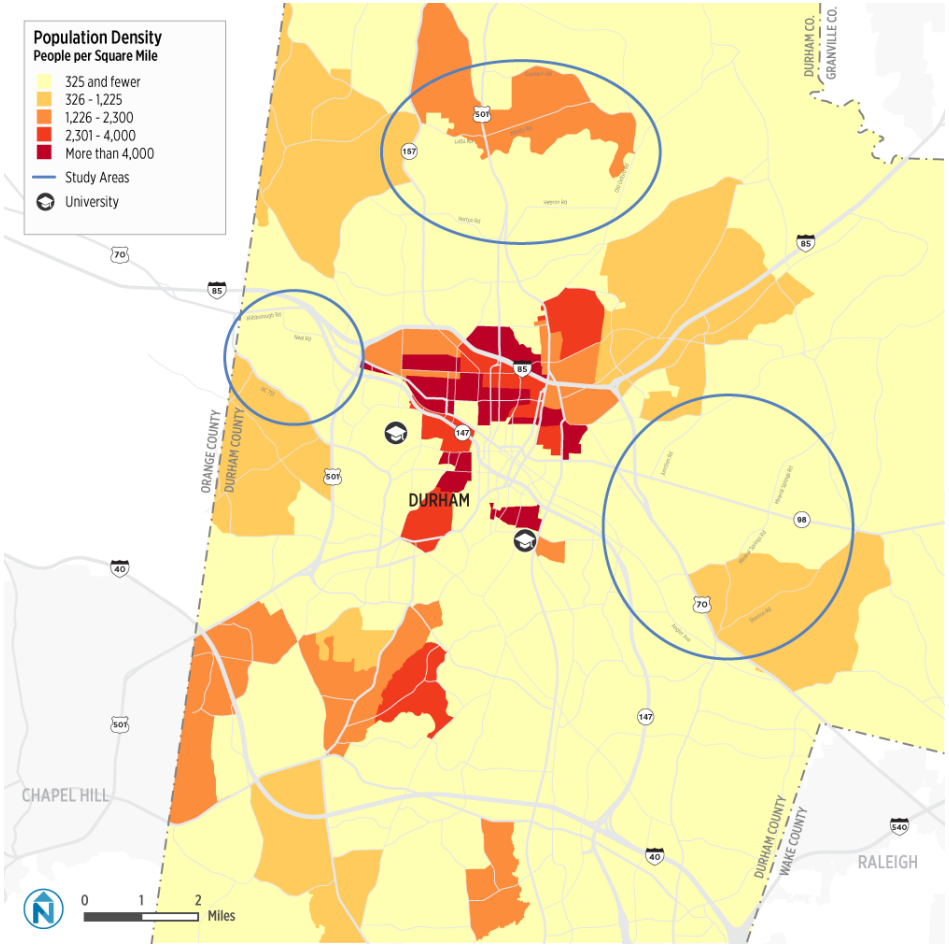
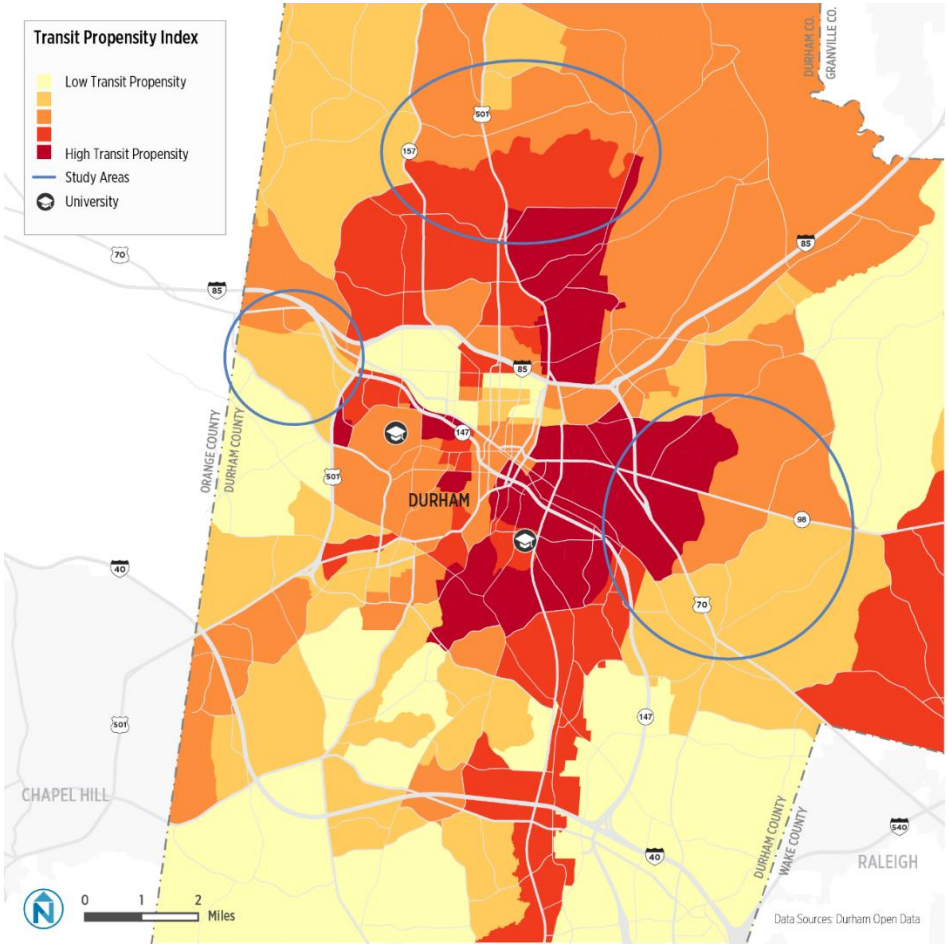



**Figure 10 Durham Transit Propensity Index**



# ZONE 1: EAST DURHAM

The East Durham Microtransit Zone is generally characterized by low-density residential developments and a few commercial and retail corridors, plus high transit propensity on the western half of the zone. The study area is east of Downtown Durham and its major corridors include Holloway Street, US Route 70, and Angier Avenue. The area is currently served by GoDurham Route 3B. GoDurham Route 2 also intersects the southern part of the study area.

## Activity and Employment Centers

The Village Shopping Center represents a key transfer point with fixed-route service to Durham Station every 15 minutes. As shown in Figure 11, key activity centers include:

- The Village Shopping Center and retail development surrounding the intersection of Holloway St and N Miami Blvd
- Southern High School
- Springwood Park Apartments (previously served by Route 3C)
- Food Lion
- Rochelle Manor Apartments
- Durham Ridge Assisted Living

East Durham also contains clusters of low-wage jobs (Figure 12). These jobs are located:

- At the Village Shopping Center and its surrounding retail development
- Along Holloway Street
- At the intersection of Sherron Road and US Route 70

**Figure 11 East Durham Study Area and Activity Centers**

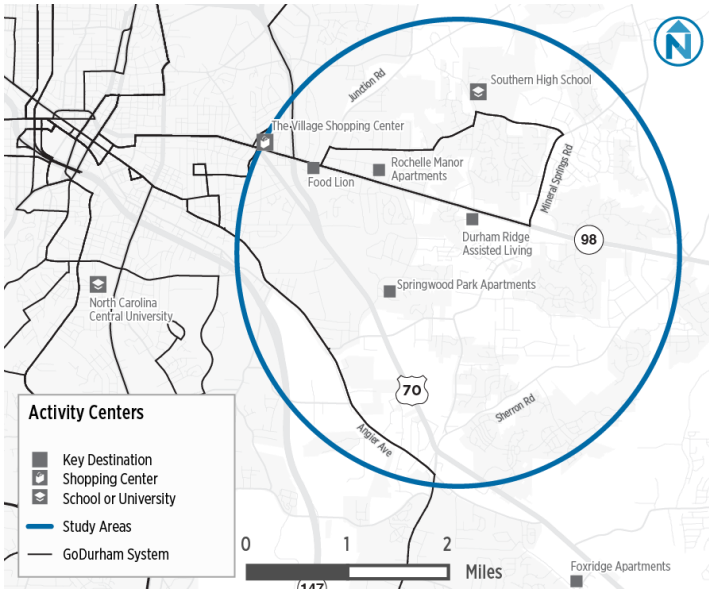
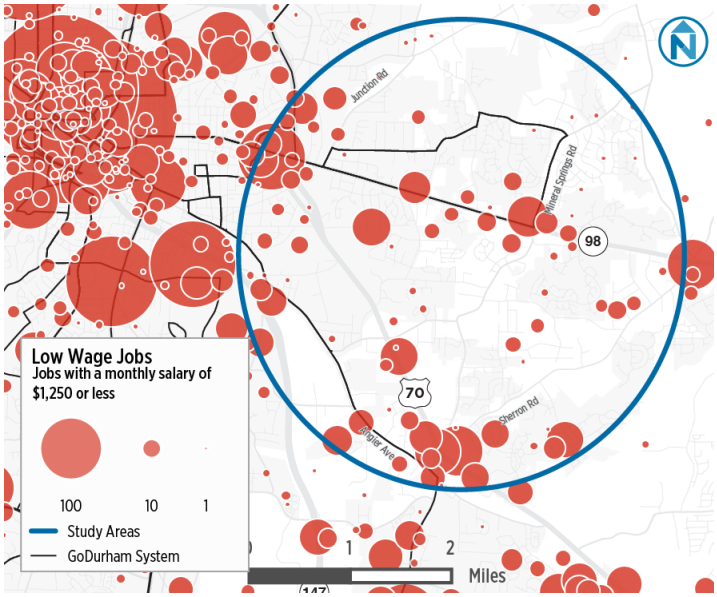



**Figure 12 East Durham Low Wage Jobs**




## Residential Market for Microtransit

The East Durham Microtransit Zone, as shown in Figure 13, has relatively low population density. The zone has higher population density in the residential subdivisions adjacent to Sherron Rd and S Mineral Springs Rd in the southern portion of the study area.

**Figure 13 East Durham Population Density**

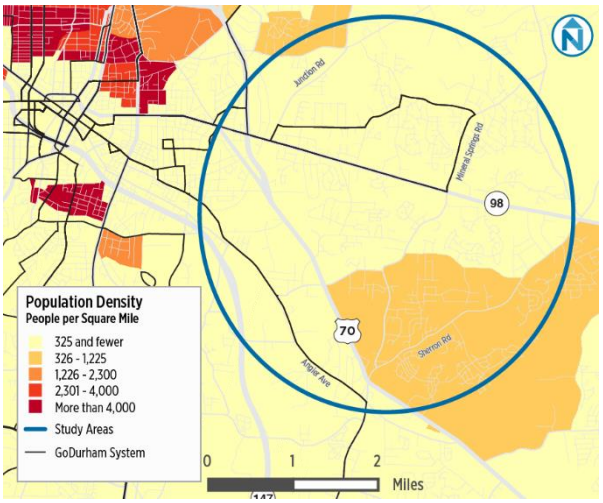
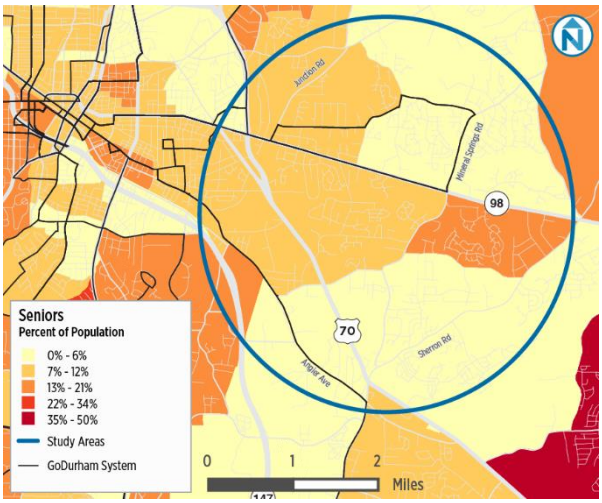



**Figure 14 East Durham Senior Population**




The project team analyzed socioeconomic characteristics that correlate to greater transit need:

- The study area has moderately low concentrations of seniors, ages 65 and older (Figure 14). The highest concentration of seniors (13% - 21%) is in the Grove Park neighborhood, located south of NC 98, between S Mineral Springs Rd and Sherron Rd. Additionally the Durham Ridge Assisted Living home is located on NC 98 approximately ½ mile west of Mineral Springs Rd.
- The western portion of the East Durham Microtransit Zone has the highest concentration of people living below 100% of the Federal Poverty Level (Figure 15), including the Wellons Village, East Durham, and Wedgewood neighborhoods. These neighborhoods include several large apartment complexes and subsidized housing projects, like Hardee Terrace Apartments, Cambridge Village Apartments, and Rochelle Manor Apartments.

**Figure 15 East Durham Low-Income Residents**

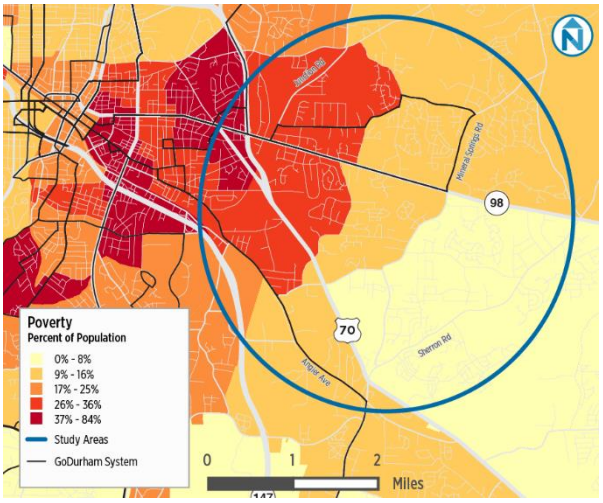
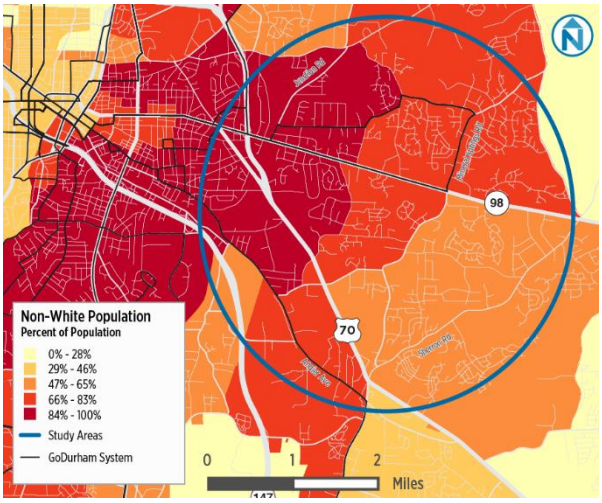



**Figure 16 East Durham Non-White Population**




- The East Durham Microtransit Zone has high concentrations of non-white populations, as shown in Figure 16. Areas with the highest concentrations are generally in the western portion of the study area, including East Durham, Wellons Village, Merrick Moore, Wedgewood, and Y.E. Smith neighborhoods.

- The East Durham Microtransit Zone has relatively high concentrations of people with disabilities in the western portion of the study area, as shown in Figure 17. These concentrations are highest west of Lynn Rd and are lowest east of Mineral Springs Rd and south of NC 98.

**Figure 17 East Durham People with Disabilities**

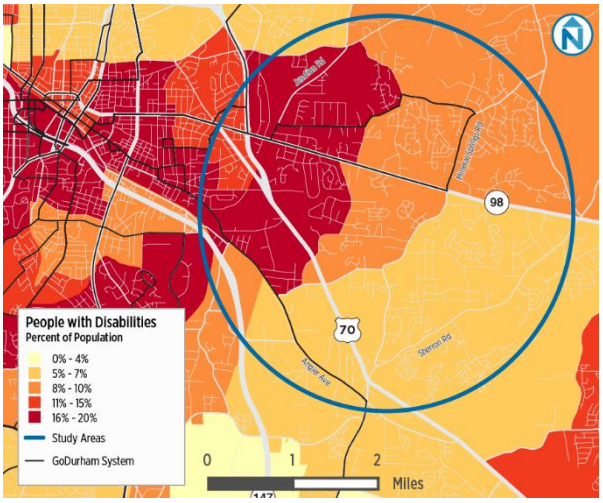
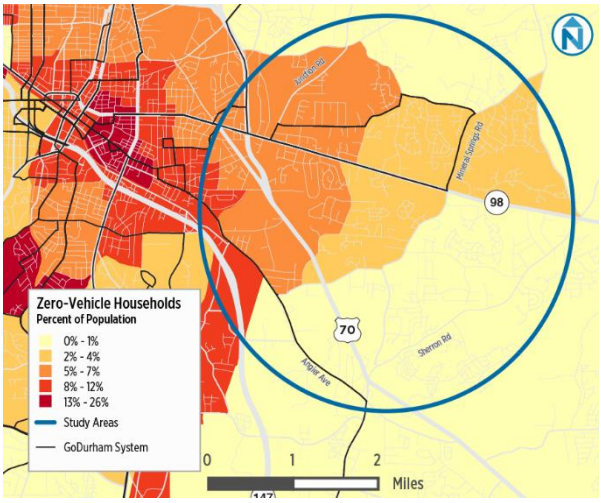



**Figure 18 East Durham Zero-Vehicle Households**




- Durham generally has high automobile ownership rates and this is true for the East Durham Microtransit Zone as well. Zero-Vehicle Households are most concentrated in the western portion of the study area (Figure 18)

The overall Transit Propensity Index, which combines the five above demographic factors, varies across the East Durham Microtransit Zone, with the highest propensity in the western portion of the study area and the lowest propensity in the southeastern portion, as shown in Figure 19.

## Existing Transit Services

The East Durham Microtransit Zone is currently served by the following GoDurham routes (Figure 20):

- Route 3B: along Holloway Street, Ross Road, and Freeman Road. Route 3B runs every hour from around 5AM to midnight on Mondays to Saturdays and from 7AM to 9PM on Sundays.
- Route 2: along Angier Ave. Route 2 runs every 30 minutes daytime and every hour nighttime Mondays to Saturdays from 6AM to midnight and runs every hour Sundays from 6:30AM to 9PM.
- Routes 3/3B/3C all serve the Village Shopping Center, which gets service every 15 minutes during the day Monday to Saturday and every 30 minutes on nights and Sundays.

**Figure 19 East Durham Transit Propensity Index**

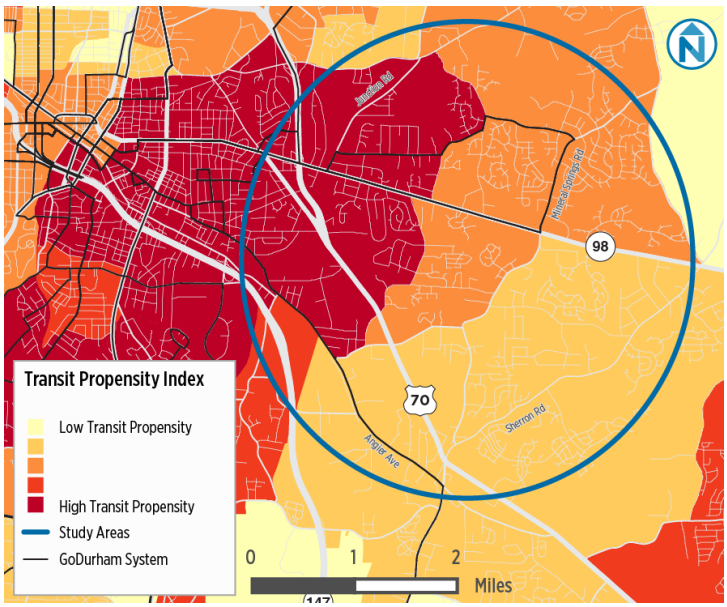


**Figure 20 East Durham Transit Routes**

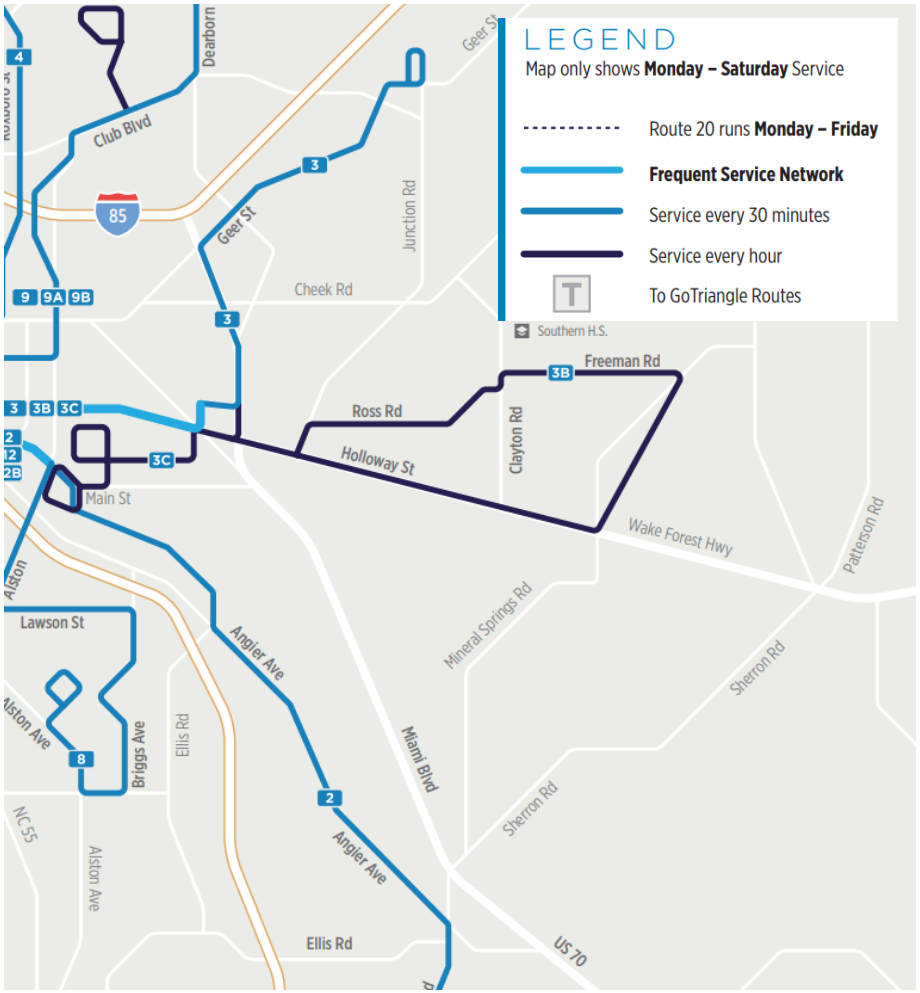
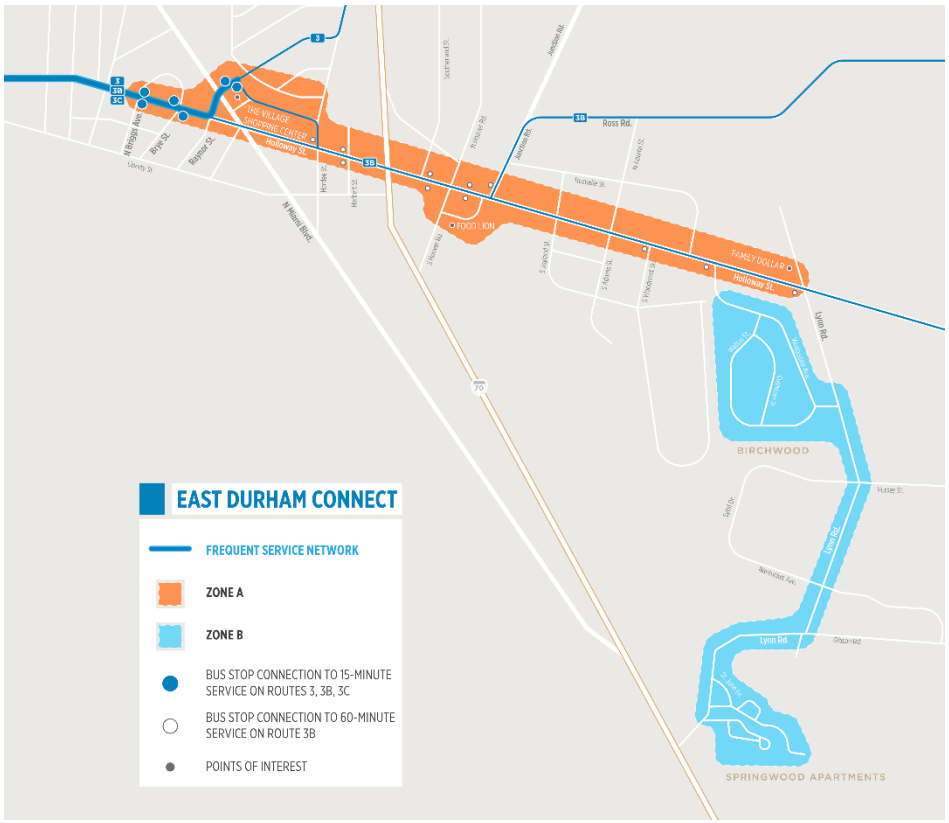



**Figure 21 East Durham Connect Pilot Zones**



In addition to fixed-route services, GoDurham is currently piloting an on-demand zone in this area, called the East Durham Connect. The pilot program is in partnership with Lyft. Customers use Lyft for free rides between the two zones shown in Figure 21: A) along Holloway Street encompassing the Village Shopping Center and B) between NC 98 and US 70 on Wedgedale Avenue and Ivywood Lane. Zone A has employment and activity centers, plus connections to the bus frequent service network. Zone B is residential and along the same corridor that Route 3C used to serve before it was rerouted.

Lyft trips must go from Zone A to Zone B or vise versa, and customers access the free ride subsidy on the Lyft app using a discount code. The service is available on Mondays to Saturdays from 6AM to 7PM, and customers are limited to 50 rides a month. Additionally, youth 17 years of age or younger cannot ride the service alone due to Lyft requirements and instead must book a ride with GoDurham ACCESS. The pilot was launched in February 2020 and goes until the end of June 2020 but may be extended.

Ridership on East Durham Connect has been lower than estimated, likely partially due to the Covid-19 pandemic. In February and March, the service had a little over 6 riders per day, compared to an estimated expected ridership of 35 people on each weekday and 20 people on each Saturday. The cost per trip has been about $8, at an average trip length of 1.8 miles.

## Ridership on Prior Transit Services

During the development of the SRTP, stop level ridership was assessed for every route in the GoDurham system using Automatic Passenger Count (APC) data from September 2016. Though some of these routes have changed, key findings related to ridership in the study area relevant to this study include:

- Route 2/2A: Route 2 had relatively high ridership, but only in the segment between Durham Station and Angier Avenue at Guthrie Avenue (Figure 22). Within the East Durham Microtransit study area, Route 2/2A had much lower ridership, likely due to lower density and the loop design of the route (which has since been redesigned). The intersection of Angier Avenue and Miami Boulevard has relatively higher ridership, as well as the southeastern point of the route on Page Road near Foxridge Apartments, which is no longer served by fixed-route transit.
- Route 3/3B/3C: Route 3 (Figure 23) was the highest ridership and most productive route in the GoDurham System, but that ridership was concentrated outside of the microtransit study area between Durham Station and the Village Shopping Center, emphasizing the potential for the Village Shopping Center to be a large transfer point between the microtransit zone and the GoDurham system. The 3B loop variant along Holloway Street, Freeman Road, and Ross Road has relatively low ridership, though riders are distributed through the loop. Route 3C had very low ridership and has since been rerouted and replaced by the East Durham Connect pilot.
- Route 23: As shown in Figure 24, Route 23 was a low ridership route and operated along a similar set of corridors as Route 3/3B. The route ran on Monday-Saturday nights and Sundays and was relatively productive along the Holloway Street, Freeman Road, and Ross Road loop, bringing people to the Village Shopping Center. Route 23 has since been discontinued, and Route 3/3B now operates more frequently and later into the night.

**Figure 22 Ridership by Stop on Old Route 2/2A/2B, Inbound (Left) and Outbound (Right)**


**Figure 23 Ridership by Stop on Old Route 3/3B/3C, Inbound (Left) and Outbound (Right)**

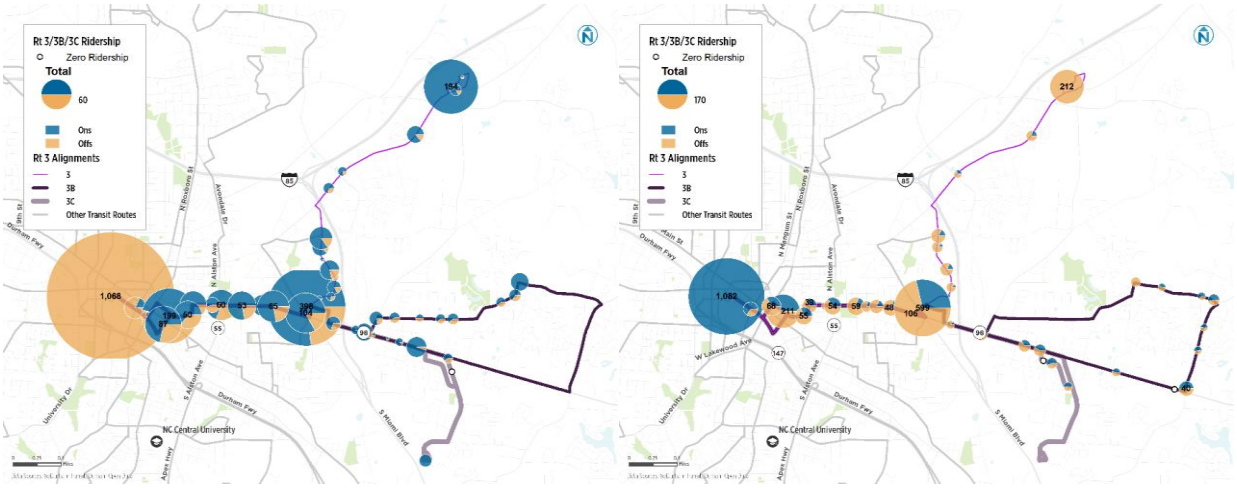
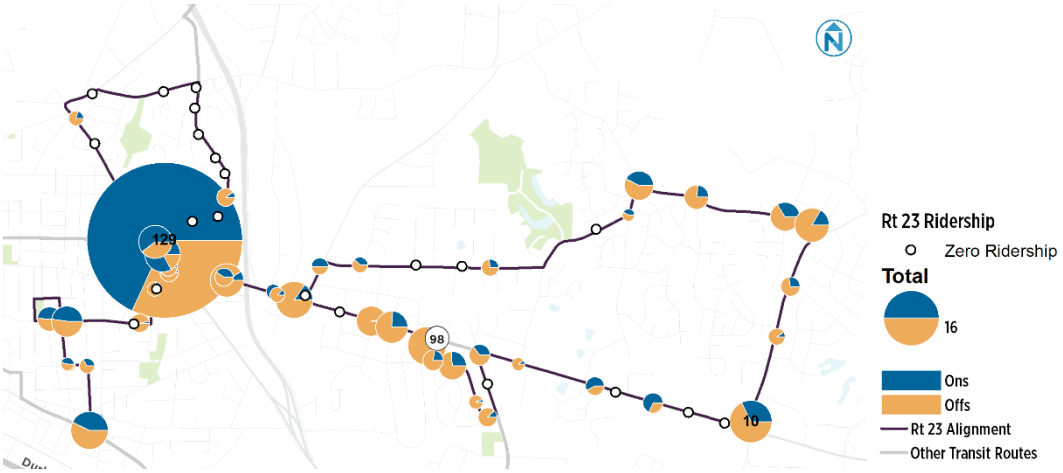



**Figure 24 Ridership by Stop on Old Route 23 (Loop)**



# ZONE 2: SPARGER ROAD

The Sparger Road Microtransit Zone is located on the west side of Durham, to the northwest of Duke University. The zone encompasses west of Cole Mill Road, serving Neal Road, Sparger Road, Operations Drive, and Hillsborough Road. The study area is generally characterized by low-density industry and commercial entities, plus some low-density residential places. The area is partially served by GoDurham Routes 11 and 11B.

## Activity and Employment Centers

The Sparger Road zone has limited access to transit, and no access to frequent routes, but does have various activity and employment centers. As shown in Figure 25, key activity centers include:

- The Vocational Rehabilitation Services building on Hillsborough Rd
- Food Lion and retail employment
- Low-income housing developments along American Dr and Constitution Dr that continue to be served by Route 11B
- Industrial and light manufacturing job sites along the western part of Hillsborough Rd
- Fast food and service jobs along eastern part of Hillsborough Rd

The Sparger Road study area also has clusters of low-wage jobs (Figure 26), located:

- Along the Hillsborough Rd corridor west of NC Hwy 147, previously served by Route 11
- Along the Hillsborough Rd corridor east of NC Hwy 147, currently served by Route 11

**Figure 25 Sparger Road Study Area and Activity Centers**

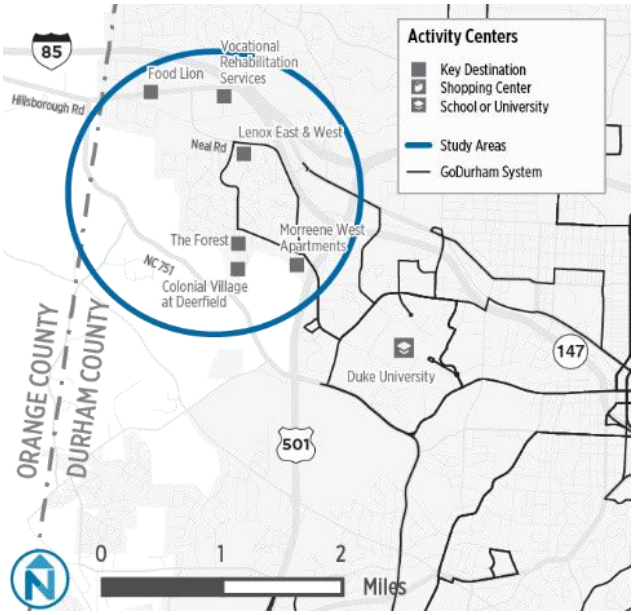
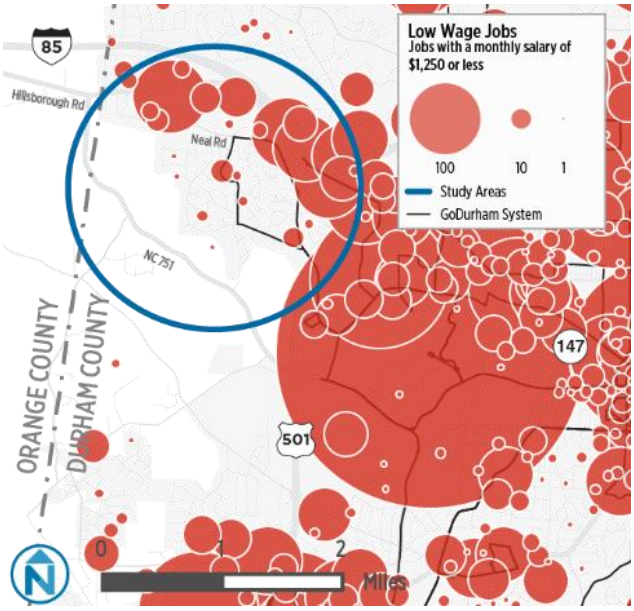



**Figure 26 Sparger Road Low Wage Jobs**




## Residential Market for Microtransit

The Sparger Road Microtransit Zone is a low population density area, as shown in Figure 27. The northern portion of the study area is primarily light industrial, and the southern portion is low-density residential subdivisions with a few apartment complexes located on American Dr and Constitution Dr near US 15-501.

**Figure 27 Sparger Road Population Density**

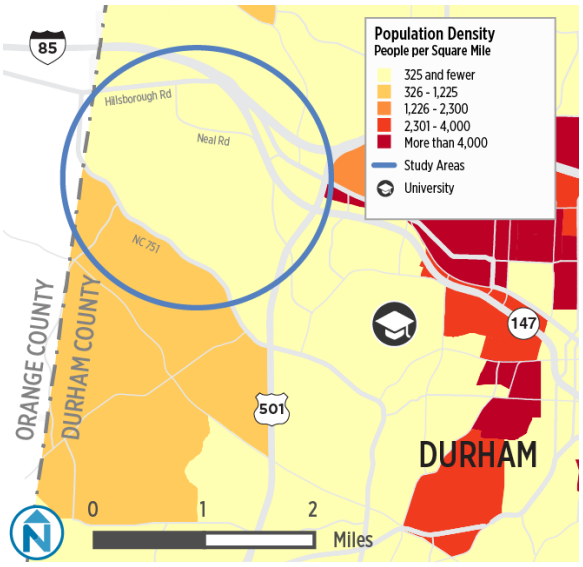
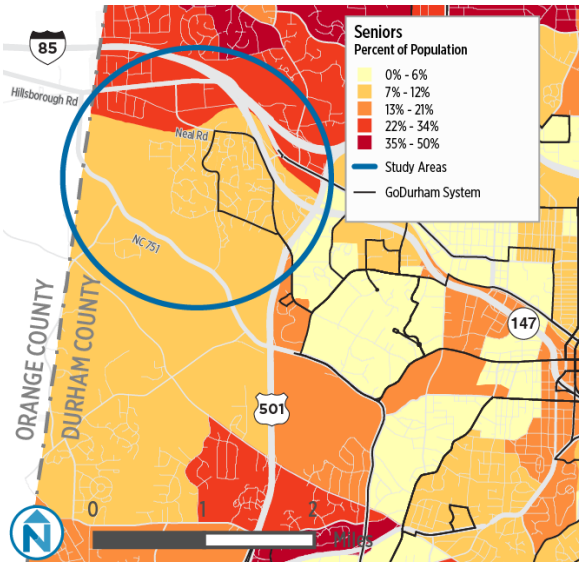



**Figure 28 Sparger Road Senior Population**




The project team analyzed socioeconomic characteristics that correlated to greater transit need:

- The study area has relatively low concentrations of seniors (Figure 28). The area adjacent to Hillsborough St in the northern portion of the study area shows the highest concentration of seniors. However, this corridor is primarily an employment zone with a relatively few residential areas.
- The study area also has relatively low concentrations of low-income populations, as shown in Figure 29. The study area is adjacent to Duke University and the surrounding student housing areas with high concentrations of low-income households.

**Figure 29 Sparger Road Low-Income Population**

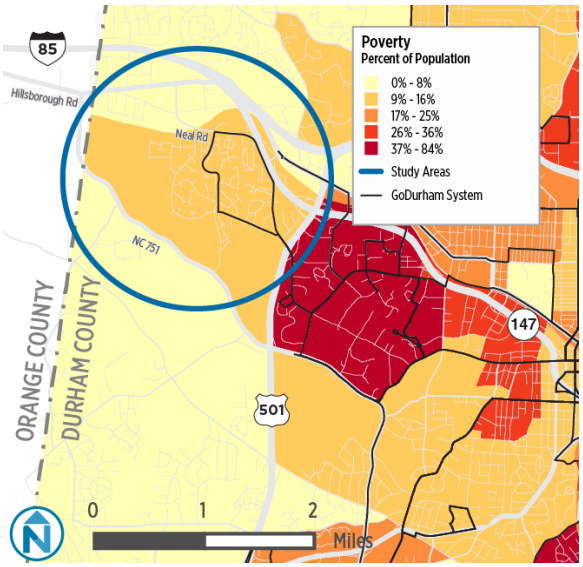
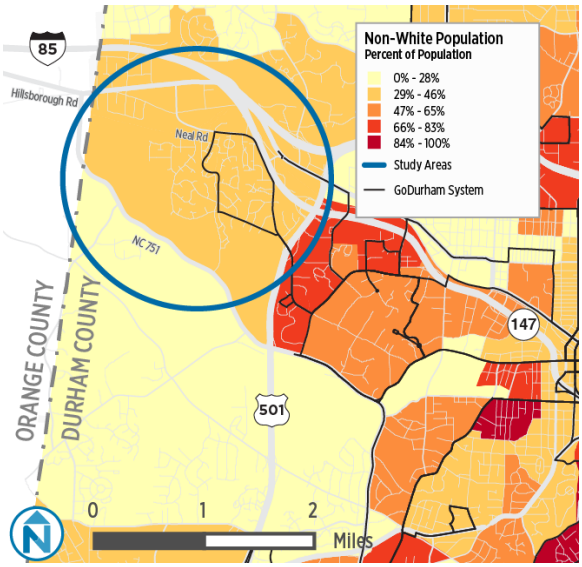



**Figure 30 Sparger Road Non-White Population**




- The Sparger Road Microtransit Zone has relatively low concentrations of non-white populations (Figure 30). The study area is adjacent to higher concentrations of non-white populations in the neighborhoods surrounding Duke University.

- The zone has relatively low concentrations of people with disabilities, as shown in Figure 31. The Hillsborough Rd corridor and adjacent neighborhoods north of I-85 have higher concentrations of people with disabilities that the rest of the study area.

**Figure 31 Sparger Road People with Disabilities**

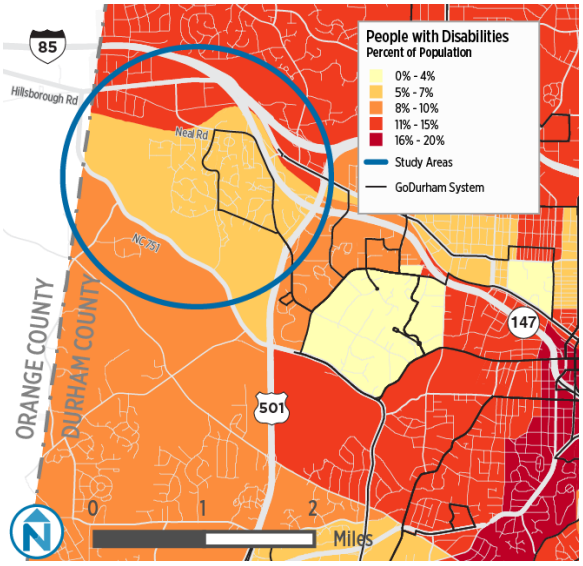
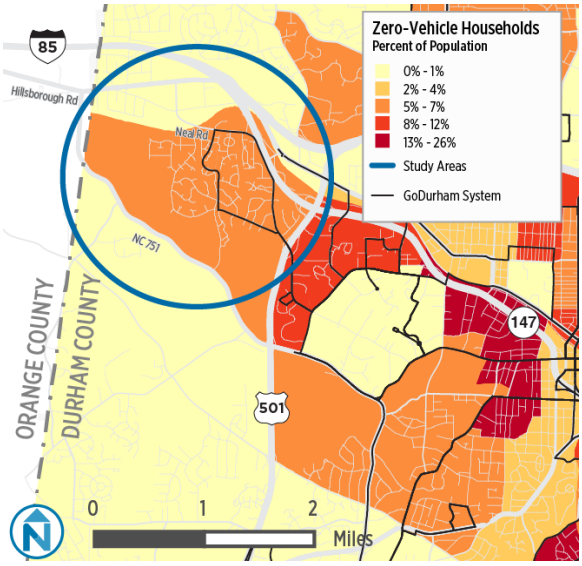


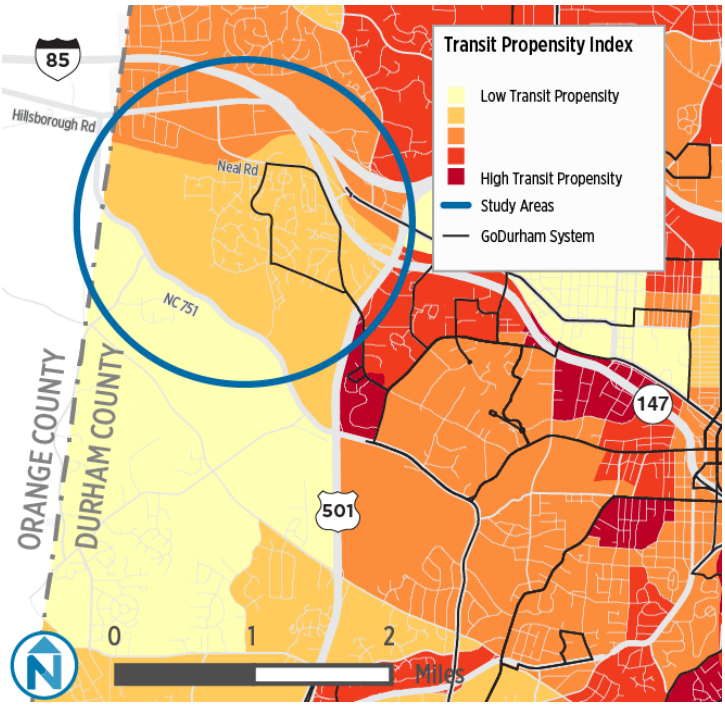

**Figure 32 Sparger Road Zero-Vehicle Households**




- Lastly, the zone has relatively low concentrations of zero-vehicle households (Figure 32), particularly compared to the high concentrations found in the adjacent neighborhoods surrounding Duke University.

The Sparger Road Microtransit Zone has relatively low transit propensity, as shown in Figure 33. Transit propensity is relatively low in this area due to the low-density residential development. However, the manufacturing and industrial employment hub along the Hillsborough Rd corridor and the Vocational Rehabilitation Services facility represent potential markets for microtransit service to provide access to employment and improve community mobility.

**Figure 33 Sparger Road Transit Propensity Index**




## Existing Transit

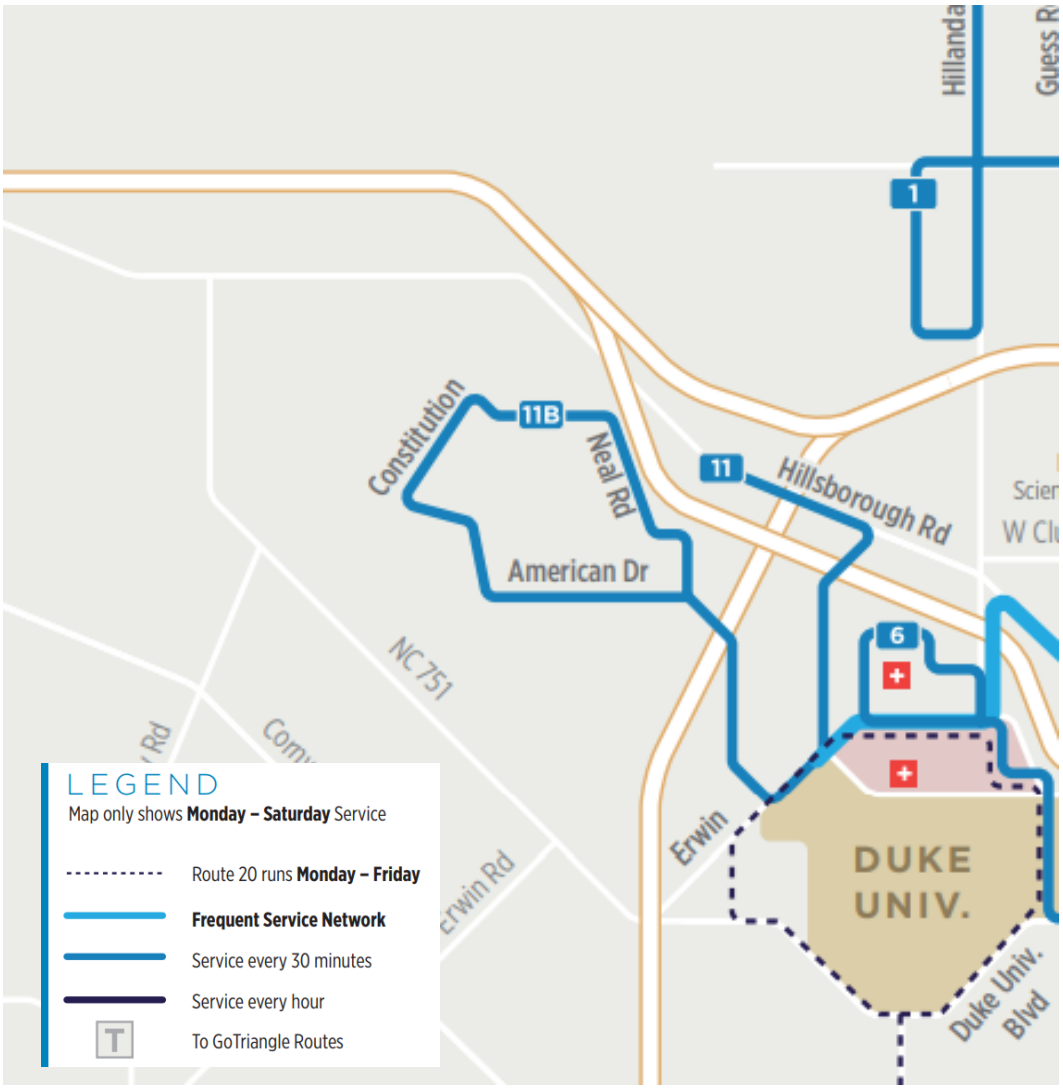
The Sparger Road Microtransit Zone is currently served by the following GoDurham Routes (Figure 34):

- Route 11: along Hillsborough Road east of NC Hwy 147. Route 11 runs every 30 minutes Mondays to Saturdays from 5:30 AM to 7:00 PM and every 60 minutes from 7:00 PM to 12:30 AM. The service runs every hour on Sundays from 6:30 AM to 9:30 PM.

- Route 11B: in a loop along Neal Rd, American Dr, and Constitution Dr. Route 11B runs every 30 minutes from 5:45 AM to 7:00 PM and every 60 minutes from 7:00 PM to 12:00 AM on Mondays to Saturdays and every hour from 7:00 AM to 9:00 PM on Sundays

Routes 11 and 11B combine just outside of the study area at Erwin Road surrounding Duke University. Combined, these two routes serve Duke every 15 minutes. Route 6 also serves the Duke and VA hospitals every 30 minutes.

**Figure 34 Sparger Road Zone Transit Routes**




## Ridership on Prior Transit Services

During the development of the SRTP, stop level ridership was assessed for every route in the GoDurham system using Automatic Passenger Count (APC) data from September 2016. Though some of these routes have changed, key findings related to ridership in the study area relevant to this study include:

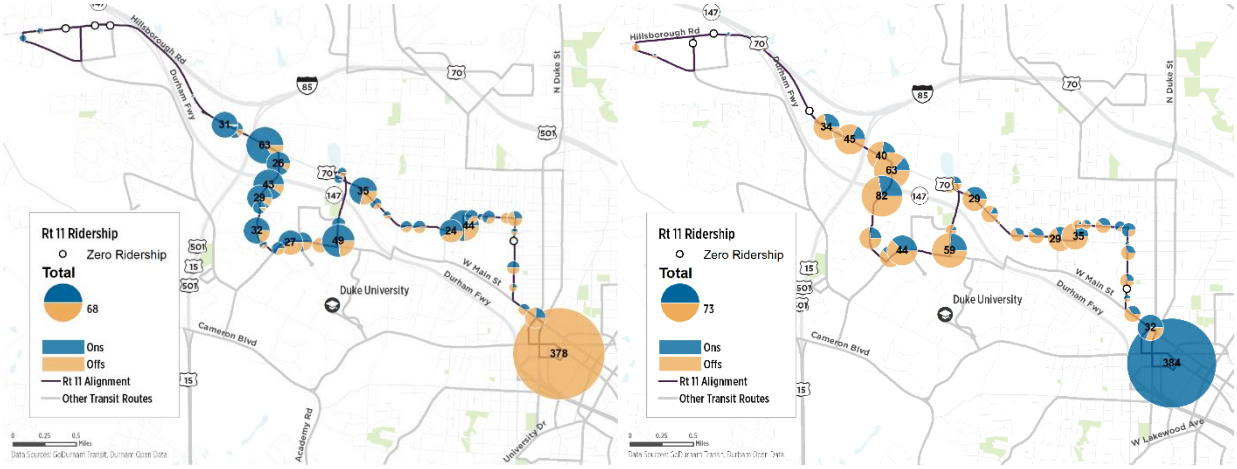
- Route 6/6B: Route 6/6B was GoDurham's second most productive route at 49 passengers per hour, though boardings mostly occurred on the 6 and 6B combined portion of the route. The 6B leg on Morreene and Neal to Hillsborough Rd had very low ridership, while the 6 leg on American

and constitution had moderate ridership. Route 6 and 6B has since been combined and the route has been truncated to just serve the Duke and VA Hospitals.

- Route 11: This route had relatively low ridership, and most boardings occurred on LaSalle and to the east of it near the Duke campus. The section of the route west of Durham Freeway on Hillsborough Rd had virtually no ridership. Route 11 has since been truncated and split into two variants: Route 11 which serves LaSalle and Hillsborough east of Durham Freeway, and Route 11B which runs along a loop in the study area.

**Figure 35 Ridership By Stop on Old Route 6/6B, Inbound (Left) and Outbound (Right)**


**Figure 36 Ridership By Stop on Old Route 11, Inbound (Left) and Outbound (Right)**



# ZONE 3: NORTH DURHAM (NORTH OF HORTON ROAD)

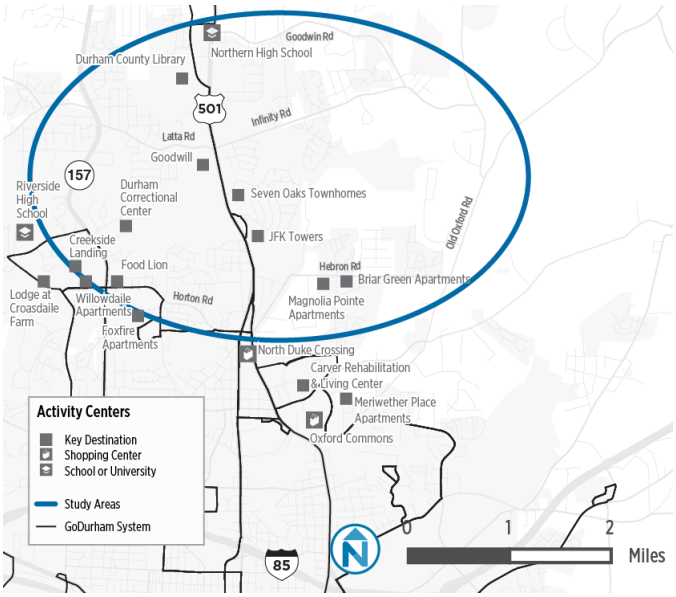
The North Durham Microtransit Zone is generally a low-density residential area, bisected by N Roxboro Street and contains Infinity Rd, Latta Rd, and Hebron Rd. The area is served by Routes 4, 9, 9A, and 9B.

## Activity and Employment Centers

The North Durham Microtransit Zone is mostly residential but also has some commercial and retail centers. As shown in Figure 37, key activity centers include:

- North Duke Shopping Center
- Riverside Shopping Center
- Oxford Commons Shopping Center
- Carver Rehabilitation & Living Center
- Apartment complexes, including Meriwether Place, Preiss Steele, JFK Towers, Magnolia Pointe, and Briar Green, among others
- Northern High School and Riverdale High School
- Willowdale Shopping Center
- Durham County Library
- Durham Correctional Center

**Figure 37 North Durham Study Area and Activity Centers**

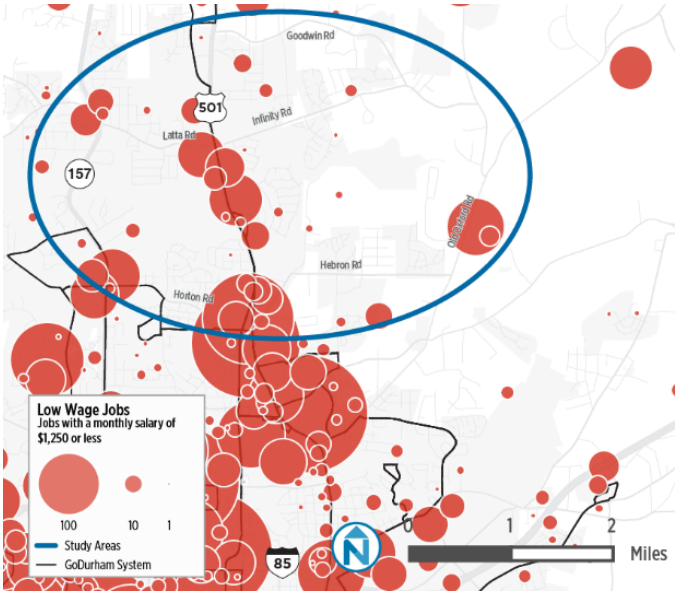



North Duke Shopping Center represents a key transfer point for potential microtransit services to reach Route 9/9A/9B. The commercial area, which includes Food Lion and other stores, at the intersection of Guess Road and Horton Road is also a potential transfer point to Route 9A. The study area has a number of low-income apartment buildings and senior facilities that may represent a market for door-to-door microtransit service.

The North Durham study area has clusters of low-wage jobs (Figure 38), located:

- Along N Roxboro Street just south of Latta Road
- At the intersection of Guess Road and Horton Road around Willowdale Shopping Center
- At the southern part of the study area, around the North Duke Crossing Shopping Center

**Figure 38 North Durham Low Wage Jobs**



## Residential Market for Microtransit

The North Durham Microtransit Zone has relatively low population density, as shown in Figure 39. The highest density area is the northern portion of the study area along the Infinity Rd corridor. This area includes several residential subdivisions and apartment complexes, including JFK Towers and Seven Oaks Townhomes.

**Figure 39 North Durham Population Density**

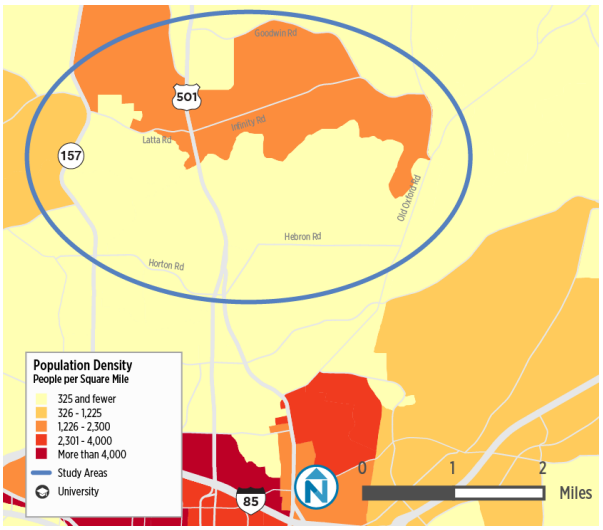
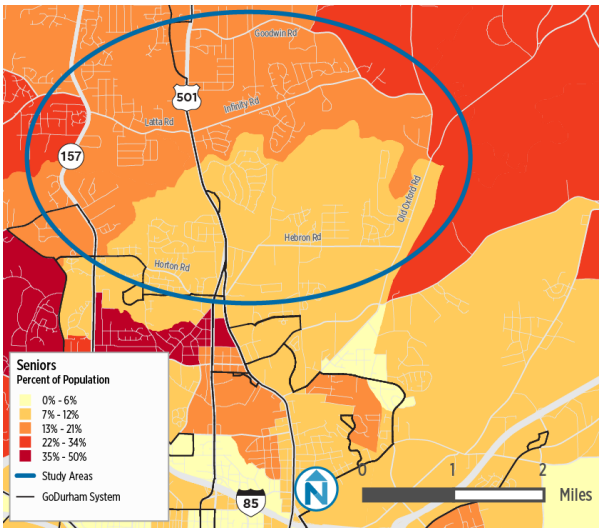



**Figure 40 North Durham Senior Population**




The project team analyzed socioeconomic characteristics that correlate to greater transit need:

- The study area has a moderate concentration of seniors, aged 65 and older. As shown in Figure 40, seniors represent a greater proportion of the denser areas of the zone, surrounding the Infinity and Latta Rd corridor.
- The study area has a relatively low proportion of people living under 100% of the federal poverty line (see Figure 41). Low-income populations are concentrated along the southern part of the zone, south of Hebron Rd, and include the Briar Green Apartments and Magnolia Pointe Apartments.

**Figure 41 North Durham Low-Income Population**

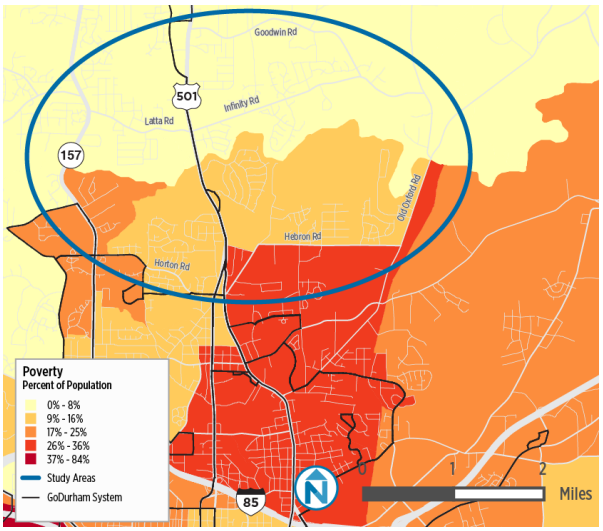
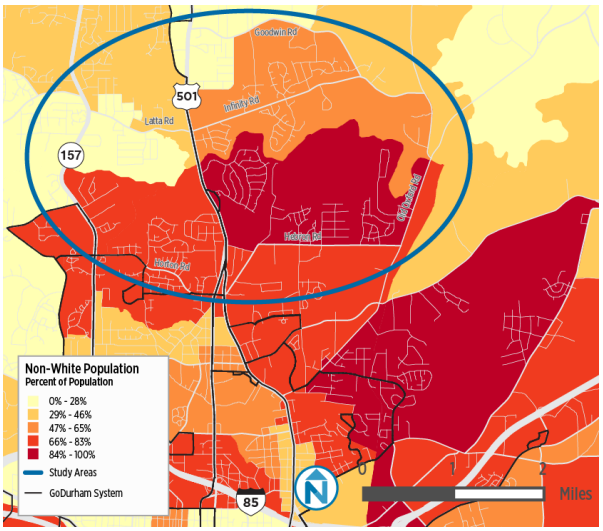



**Figure 42 North Durham Non-White Population**



- The southern half of the North Durham Microtransit Zone has a relatively high proportion of non-white residents, especially between Infinity Rd and Hebron Rd, as shown in Figure 42. This area has a very low population density, but the vast majority of people who do live in the area are people of color.
- The study area also has a relatively high proportion of people with disabilities throughout the study area (see Figure 43). The area north of Latta Road and west of N Roxoboro Street has both a high proportion of people with disabilities and a relatively higher density of residents.

**Figure 43 North Durham People with Disabilities**

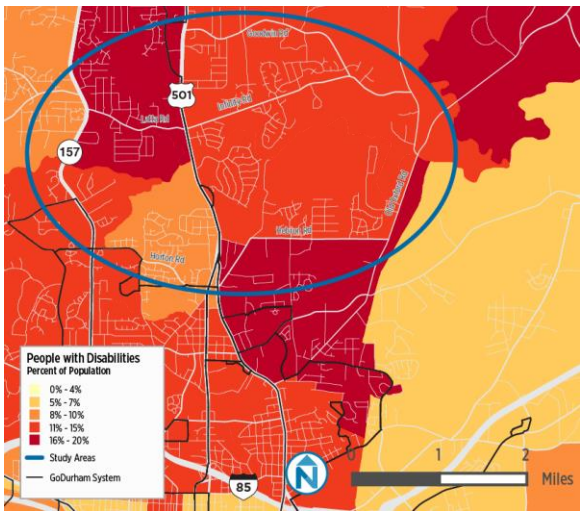
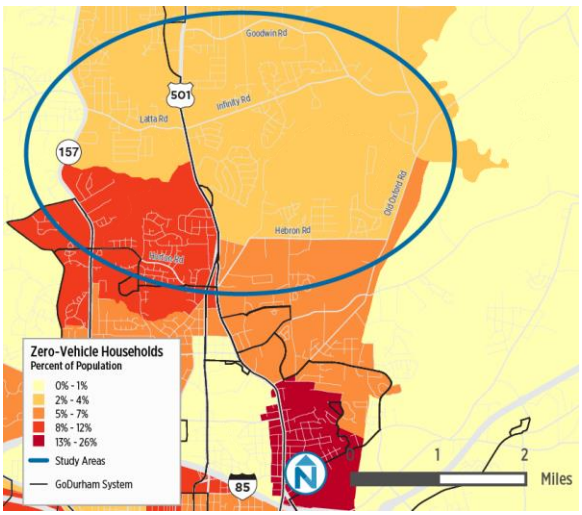


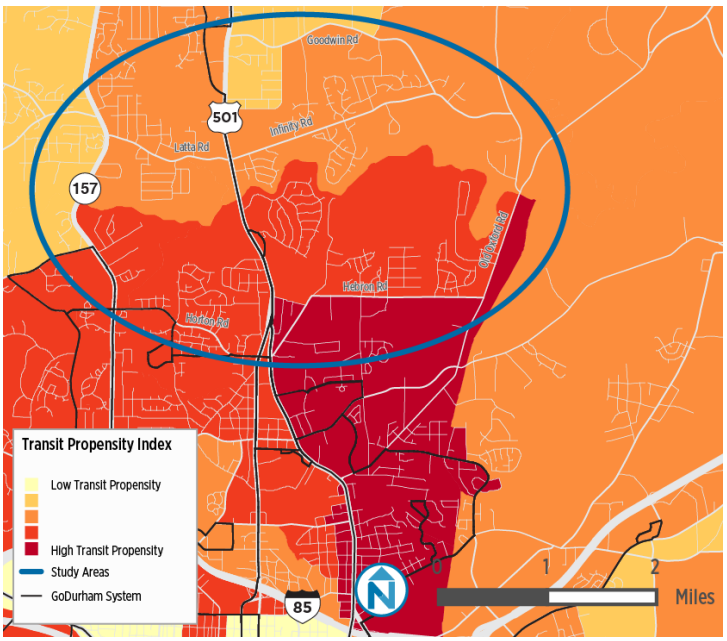

**Figure 44 North Durham Zero-Vehicle Households**




- The overwhelming majority of North Durham households own at least one vehicle, as shown in Figure 44. The southwestern part of the zone has the highest proportion of households with no vehicles.

Combining the five socioeconomic characteristics described above, the North Durham Microtransit Zone has a relatively high transit propensity index. As shown in Figure 45, the southern half of the study area has the highest transit propensity, as well as the places immediately to the south of the study area.

**Figure 45 North Durham Transit Propensity Index**




## Existing Transit

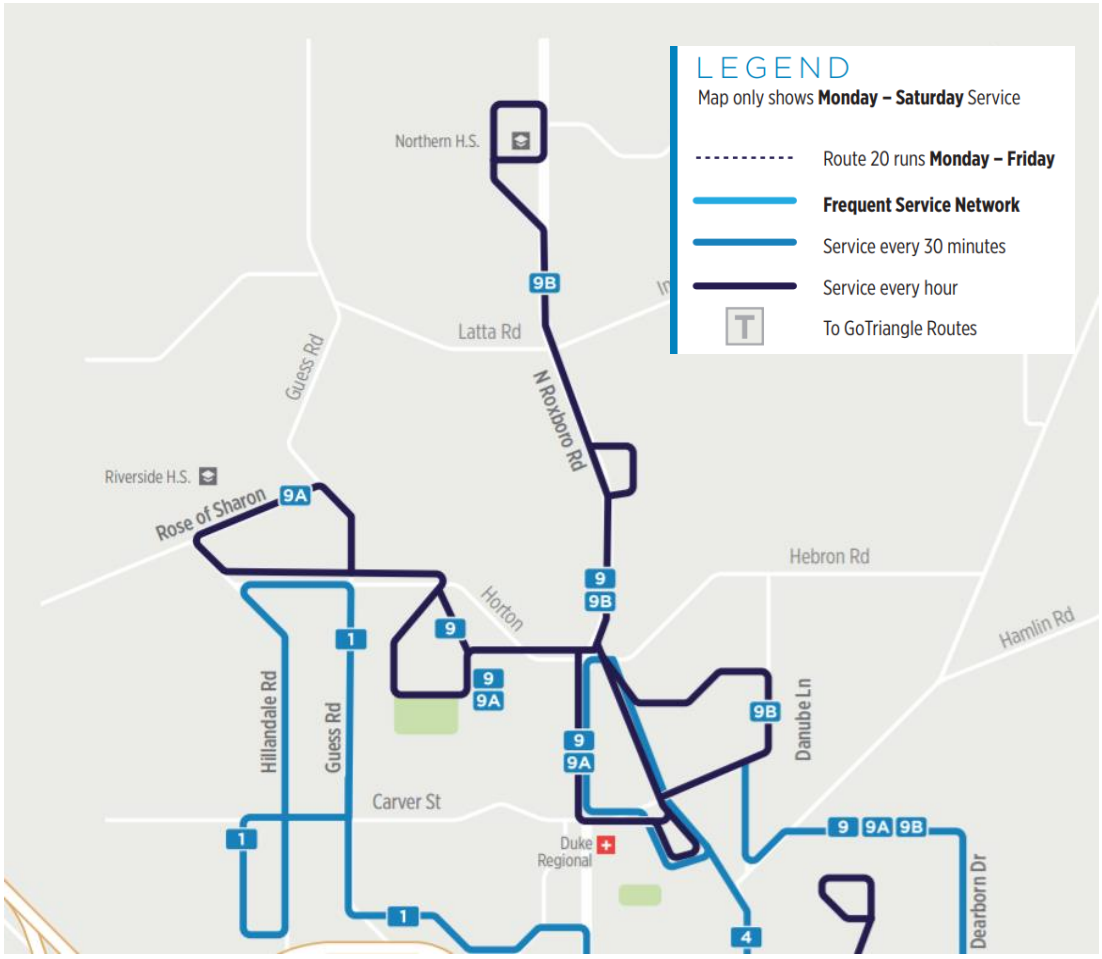
The North Durham Microtransit Zone is currently served by the following GoDurham Routes (Figure 46):

- Route 4: Operates along Roxboro St, Carver St, and Duke St, providing direct

service to Duke Regional Hospital and North Duke Crossing. Route 4 operates every 30 minutes from 5:30 AM to 7:00 PM and every 60 minutes from 7:00 PM to 12:30 AM, Monday through Saturday and every 60 minutes from 7:00 AM to 9:00 PM on Sundays.

- Route 9B: Running along N Roxboro Rd to Goodwin Rd via JFK Apartments and Northern High School, Route 9B operates every hour Mondays to Saturdays from 5:30 AM to 8 PM. There are also additional trips that only serve Northern High School on school days.
- Route 9A: Route 9A serves the southwest edge of the study area on Horton Road and at Willowdale Shopping Center. Service runs every hour from 5:30 AM to 7 PM on Mondays to Saturdays.
- Route 9: Routes 9A and 9B do not run on Sundays or late evenings on Mondays to Saturdays. Route 9 replaces 9A and 9B and only runs at those times, though not the full routes. Route 9 runs evenings and Sundays once per hour, and only serves as far north as JFK Apartments and as far west as New Castle Rd at Wylderwood Rd.

**Figure 46 North Durham Transit Routes**



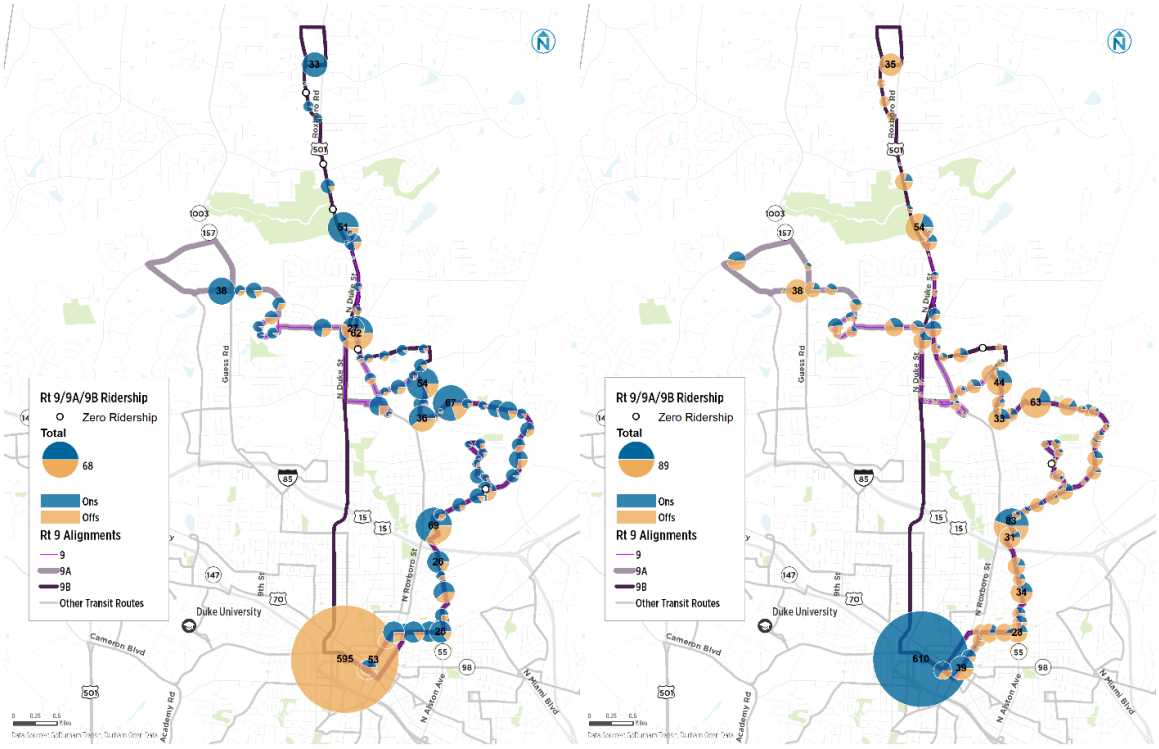

Additionally, Route 1 intersects a small part of the study area in the southwest section, serving Willowdale Shopping Center every 30 minutes on Mondays to Saturdays and every hour on Sundays.

## Ridership on Prior Transit Services

During the development of the SRTP, stop level ridership was assessed for every route in the GoDurham system using APC data from September 2016. Though the schedule for Route 9/9A/9B has been adjusted since then, the routing remains relatively the same.

Route 9 was the fourth highest ridership route in the GoDurham system, but its productivity, or the number of boardings per service hour, is one of the lowest. As shown in Figure 47, the southern half of the route had much higher ridership than the parts of the route that overlap with the study area. Within the study area, the places with a relatively high number of boardings and alightings include near Willowdale Shopping Center, JFK Apartments, North Duke Shopping Center, and Northern High School. Route 1 ridership analysis also showed a relatively high number of boardings and alightings at Willowdale Shopping Center.

**Figure 47 Ridership By Stop of Old Route 9/9A/9B, Inbound (Left) and Outbound (Right)**



# 4 Service Design

## OVERVIEW

Effective microtransi can act as a complement to fixed route service. It can help meet the mobility needs of customers who may have lost their bus route, or who live just beyond a reasonable walking distance to the closest bus route. Low density areas can be difficult to serve with a large bus, and on-demand technology using smaller vehicles offers a low-cost innovative solution to serve areas with lower demand.

For this effort, the project team looked at several factors, including a range of service delivery models and approaches to service design. The team also reviewed peer agencies that are offering similar on-demand services, as shown in Appendix A. Four service delivery models and four service design approaches were considered. Two approaches were identified to consider within each proposed geographic zone.

### On-Demand Service Delivery Models

On-demand service, as with other types of public transportation services, is delivered in four primary ways in the United States. These service delivery methods range from complete ownership to fully contracted service. Geographical parameters and pricing of the service can be designed to function in much the same way across all models, although different delivery methods may have consequences for other aspects of the digital and physical user experience, as well as service characteristics like wait times and hours of operation. To the municipality or transit provider, these service delivery methods have a significant impact on cost and general oversight requirements.

- **In-House Operation:** The City or agency acts as the sole entity responsible for all aspects of public transportation operations, employing every position, owning every vehicle, and managing all compliance and oversight requirements.

- **Hybrid:** The City or agency contracts with a private entity for a subsect of transportation management and operations. For microtransit, many agencies enter contracts with transportation technology companies for software and trip booking algorithm support. The agencies often provide vehicles and drivers in-house.

- **Turnkey Contract:** The City or agency contracts with a private transportation provider offering a full software platform and dedicated vehicles for the day-to-day management of the public transportation service and only remains responsible for the administration of the contractor and the assurance of all compliance and oversight requirements.

- **Ride-Hail Company Contract:** The City or agency contracts with a ride-hail provider, such as Uber or Lyft, offering its standard consumer-facing software and non-dedicated vehicles for the day-to-day management of the public transportation service and only remains responsible for the administration of the contractor and the assurance of all compliance and oversight requirements.

As shown in Figure 48, each on-demand operating model has benefits and challenges with regards to capital and staffing needs, costs, software needs, service quality, and launch timeline.

**Figure 48 On-Demand Operating Models**

## In-House

Agency provides and manages vehicles, drivers, brand, payment system, marketing, customer service.

Procure custom app and dispatch software.

**Pros:**

Most agency control over service experience, brand, data. Clear regulatory compliance.

**Cons:**

Highest capital and staff costs. Long time to launch. High per-ride costs & wait-times, limited service hours & coverage. Less sophisticated software and dispatch optimization.

## Hybrid

Agency provides and manages vehicles, drivers, brand and marketing, customer service.

Partner provides off-the-shelf app and dispatch software, payment system.

**Pros:**

Good agency control over service experience, brand, data. Better software and dispatch optimization. Clear regulatory compliance.

**Cons:**

High capital and staff costs. Long time to launch. High per-ride costs & wait-times, limited service hours & coverage.

## Turnkey

Turnkey contractor provides dedicated vehicles, drivers, app and dispatch software, brand, payment system, and customer service.

**Pros:**

Lower capital and staff costs. Moderate time to launch. Better software and dispatch optimization. Polished end-to-end experience with some agency customization. Moderate operating economics.

**Cons:**

Less agency control over service experience, brand, data. Moderate per-ride costs, wait-times, hours and service coverage. Some regulatory complexity.

## Ride-hail

Non-dedicated TNC fleet serves rides meeting agency criteria, invoices agency based on agreed-upon subsidy structure.

TNC provides app and dispatch software, brand, payment system, and customer service.

**Pros:**

Lowest capital and staff needs. Quick to launch. Most sophisticated software. Lowest-per ride costs and wait times. Best hours and coverage. Familiar to many riders.

**Cons:**

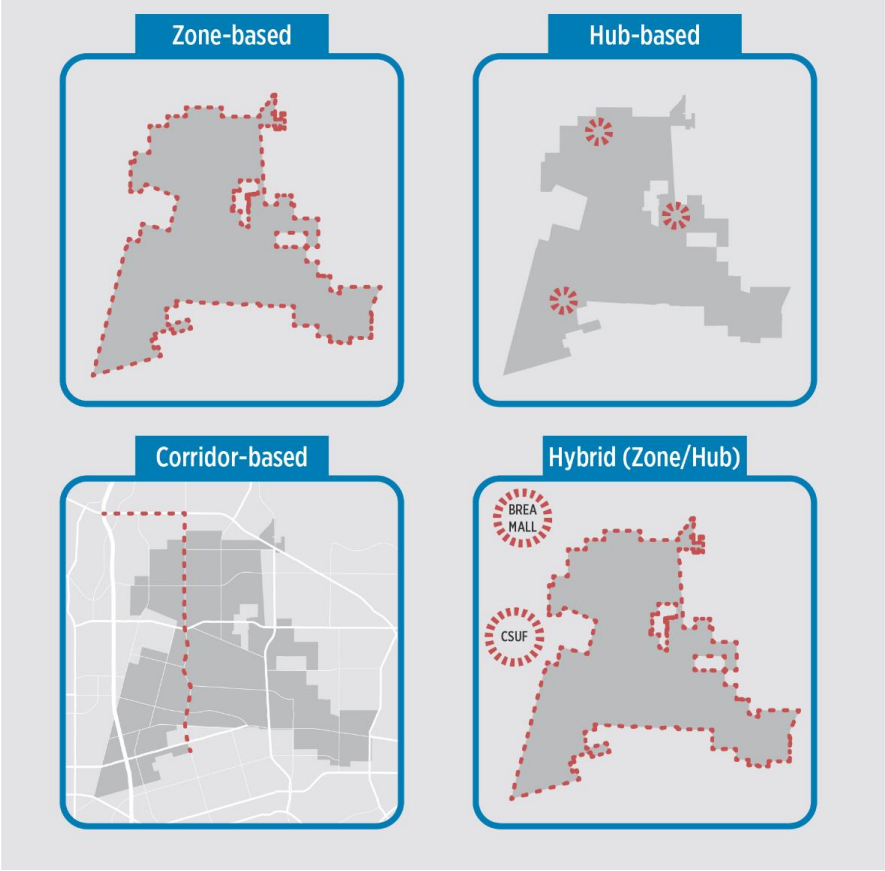
Least agency control over service experience, brand, data. Regulatory limitations.

## Zone Design Models

Once an on-demand service delivery model is selected, agencies have multiple options for how they can design on-demand zones, based on the goals of the service and the needs of the area being served. Figure 49 shows a diagram of the following four potential zone design models:

- **Zone-based:** Rides are provided anywhere within the zone boundaries, with pick-ups and drop-offs not constrained to any specific stop as long as they are in the zone boundary.
- **Hub-based:** Rides are provided between specific hubs, or stops, within a zone. Hubs are usually activity centers or existing transit stops.
- **Corridor-based:** Rides are provided along a specific corridor within the service area. Pick-ups and drop-offs must be along the corridor. Corridor-based design usually replaces an existing fixed-route bus route.
- **Hybrid:** A combination of the above three zone designs. A hybrid zone/hub design can include rides that must either start or end at a hub, with the other end of the trip unrestricted. Hubs can be within the zones or outside of the zones.

**Figure 49 On-Demand Zone Design Models**



## GoDurham Operational Requirements

GoDurham is planning to design this on-demand service as an extension of its fixed route network. Thus, any type of on-demand service implemented in Durham must consider the following operational requirements:

- Accept GoDurham fare media and allow GoDurham to collect fare revenue for different prices for different rider groups, as well as from GoPasses and mobile payment.
- Ensure equitable access for unbanked customers.
- Ensure youth under age 18 can ride without an adult.
- Comply with Title VI requirements: non-smartphone bookings, wheelchair accessible vehicles.
- Be scalable to be operated in multiple zones.

Additionally, GoDurham intends to implement one of the studied on-demand zones by January 2021 and has budgeted $125,000 for a year of service in this zone. Due to a relatively tight implementation timeline and budget constraint, this study chose to focus on the turnkey and ride-hail service delivery models to explore further. Other delivery models can be revisited once initial zones are successful and GoDurham would like to further invest in on-demand service. For the zone design, the study focuses on the zone-based and hybrid models as they best fit the low-density, high transit need nature of the three study areas.

# SERVICE DESIGN SCENARIOS

To design a service that best fits the context of Durham, two operational service design scenarios are created and applied to the three study areas, each with a refined service boundary. These scenarios are then evaluated based on the goals and objectives of the study.

## Operational Service Design

As shown in Figure 50, two service design scenarios were created, one designed around a ride-hail partnership and the other around microtransit provided by a turnkey contractor.

### Scenario 1: First Mile/Last Mile Ride-Hail Model

This ride-hail partnership model involves a GoDurham subsidy of ride-hailing trips whose origin and destination lies within the-defined service area, provided that the trip starts or ends at a transit stop. This model has a similar service span to the fixed route bus service, so that customers may have a first mile/last mile option whenever using fixed route.

### Scenario 2: Community Connections Microtransit Model

This turnkey model is designed to use microtransit to connect customers to fixed route transit or other destinations within the zone. Rides are not restricted to bus stops, as long as they remain within the zone. Due to cost considerations, service spans are more limited than existing fixed route service.

**Figure 50 Service Design Scenarios**

| | Scenario 1:<br>First Mile/Last Mile | Scenario 2:<br>Community Connections |
|---|---|---|
| Operator | Ride-hailing companies (such as Lyft, Uber, and taxis) | Turnkey contractor (such as Via) |
| Operation Model | Hybrid (zone/hub) – rides anywhere within the zone that starts or end at an existing transit stop. Rides will mostly be solo, with potential for some shared rides. No ride caps. | Zone-based – rides starting and ending anywhere within the zone. Rides are designed to be shared, but maybe be solo depending on demand. No ride caps. |
| Service Span | M-Sa: 5:30AM to 12:30AM<br>Sun: 7AM to 9PM<br>(Same as fixed route service) | M-Sa: 7AM to 8PM<br>Sun: 8AM to 7PM |
| Fares | Free, if the ride is under $12 - Since the service is designed for first mile/last mile, most people will pay a fare through their typical fare medium once they transfer to fixed route. | Follows GoDurham's existing fare structure – a single trip is $1, and all discounts and passes apply. |
| Fare Medium | Overwhelming majority of trips will be free, but for trips that are over $12, the prepaid card or credit card on file will be charged. | All existing GoDurham fare mediums can be used. |
| Registration, Booking, and Waiting | Trips can be booked via an app or phone call, either scheduled in advance or on-demand. The maximum wait time is 15 minutes, with most waits below 10 minutes. Vehicle tracking is available on the app. | Trips can be booked via an app or phone call, either scheduled in advance or on-demand. The maximum wait time is 15 minutes, with most waits below 10 minutes. Vehicle tracking is available on the app. |
| Integration with GoDurham Services | Trips must start or end at an existing transit stop. | Free transfers to GoDurham fixed route services through existing fare mediums. |
| Access (age and ADA) | Service is open to all, but customers who are under 18 or use wheelchairs must book through a taxi company rather than Lyft or Uber. | Service is open to all, and vehicles will be wheelchair accessible. |
| Data Sharing Requirements | Origin-destination and other trip statistics will be shared with GoDurham. | Origin-destination and other trip statistics will be shared with GoDurham. |

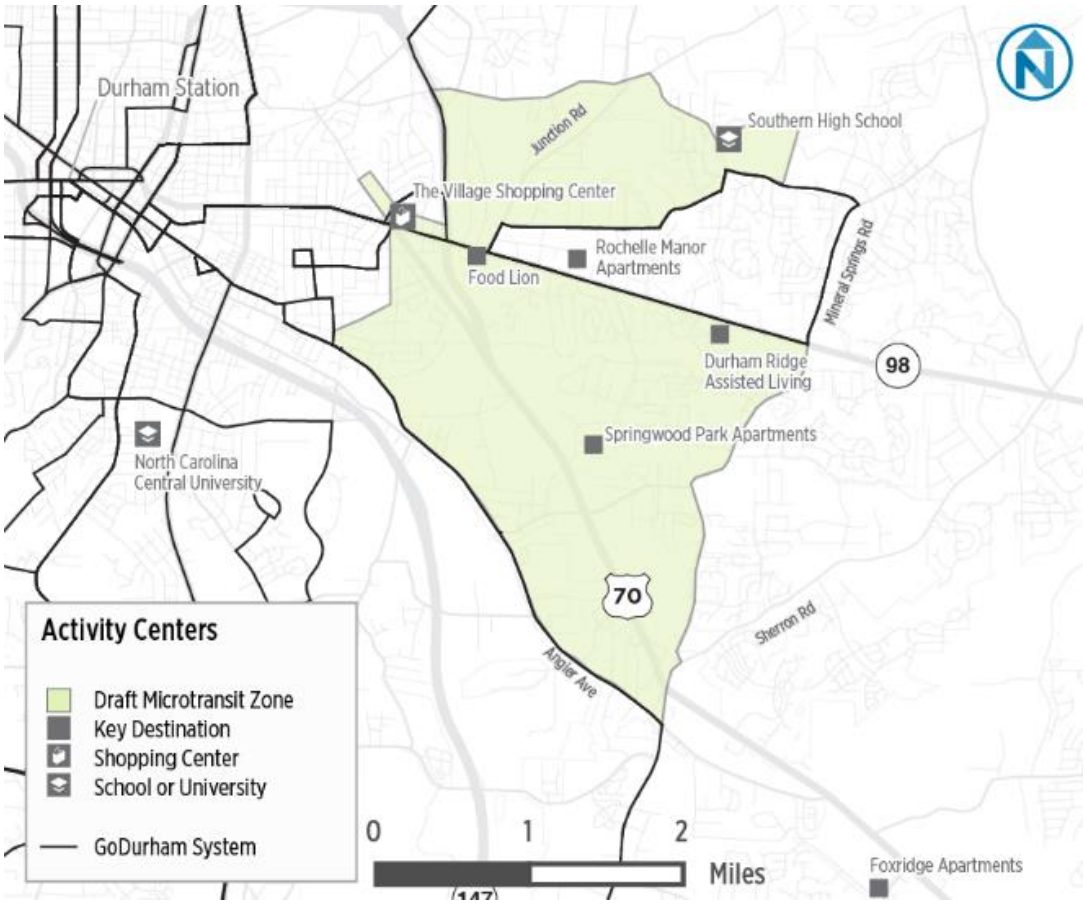
# Zone Design

Preliminary on-demand service zones were developed in accordance with market review findings and identified potential service types, including a zone-based model and a hybrid zone/hub-based model. Preliminary service zones were designed to provide first- last-mile connections to existing fixed-route service, provide service in high transit propensity areas, and improve connections to key activity centers within the study areas. The preliminary service zones were refined based on their potential for successful implementation, ability to complement existing fixed-route transit service, and potential to meet the unique needs of the community.

## East Durham Service Zone

The East Durham Service Zone, as shown in Figure 51, is a roughly 6.4 square mile are in East Durham. The zone is roughly bounded by Angier Ave to the south, Mineral Springs Rd to the east, Clayton Rd and Cheek Rd to the north, and Gary St to the west. The zone was designed to exclude the area within the Route 3B loop to provide complementary service without jeopardizing performance of the existing fixed-route service. The service zone includes transfer hubs with high frequency service on Routes 3, 3A, and 3B at the Village Shopping Center and with Route 2 at Angier Ave & Guthrie Ave. The zone also includes a potential hub further to the east at John W Neal Middle School on NC 98, which is currently outside of the GoDurham service area.

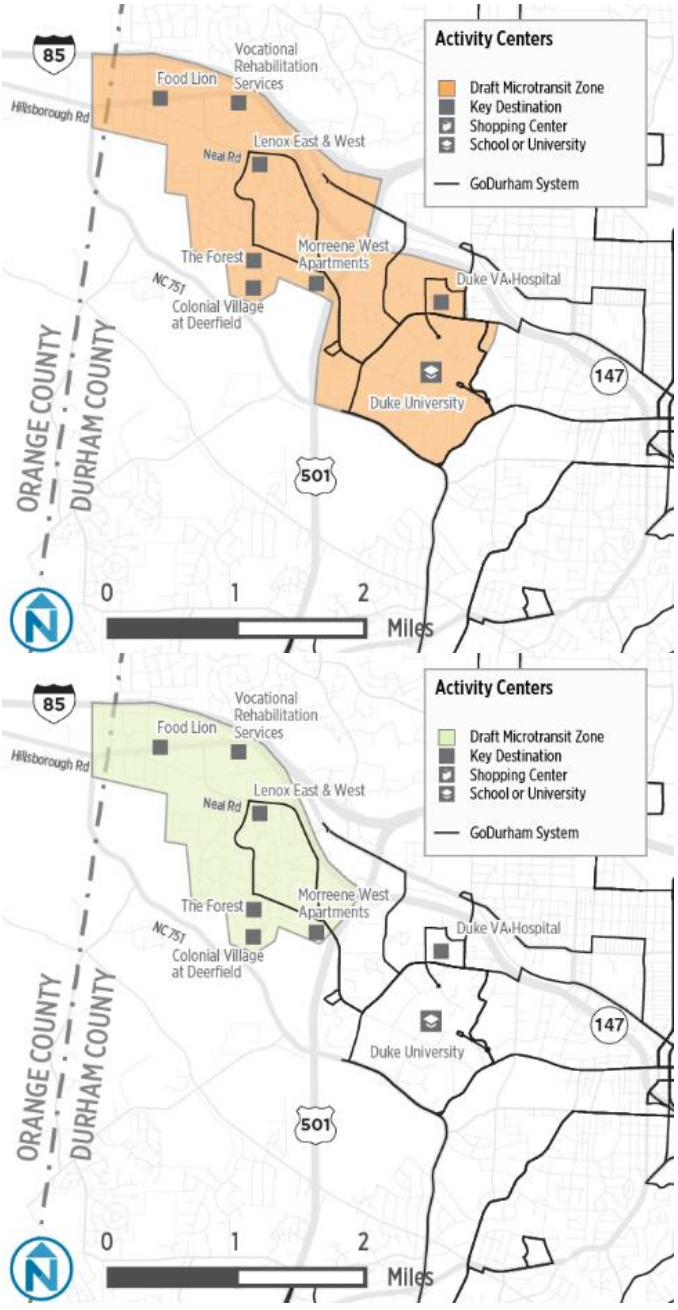
**Figure 51 East Durham Service Zone**



## Sparger Road Service Zones

Two Sparger Road Service Zones, as shown in Figure 52, were developed to assess potential trade-offs associated with directly serving the Duke University campus and hospital system (Sparger Road Zone 1) or limiting service to a smaller zone located to the west of Hwy 501 and to the south of I-85 (Sparger Road Zone 2). Sparger Road Zone 1 is approximately 3.9 square miles and overlays service on Route 6, 11, and 11B, including connections to high frequency transit service on Erwin Rd where Routes 11 and 11B overlay. Sparger Road Zone 2 is approximately 2.0 square miles and provides a connection to Route 11B.

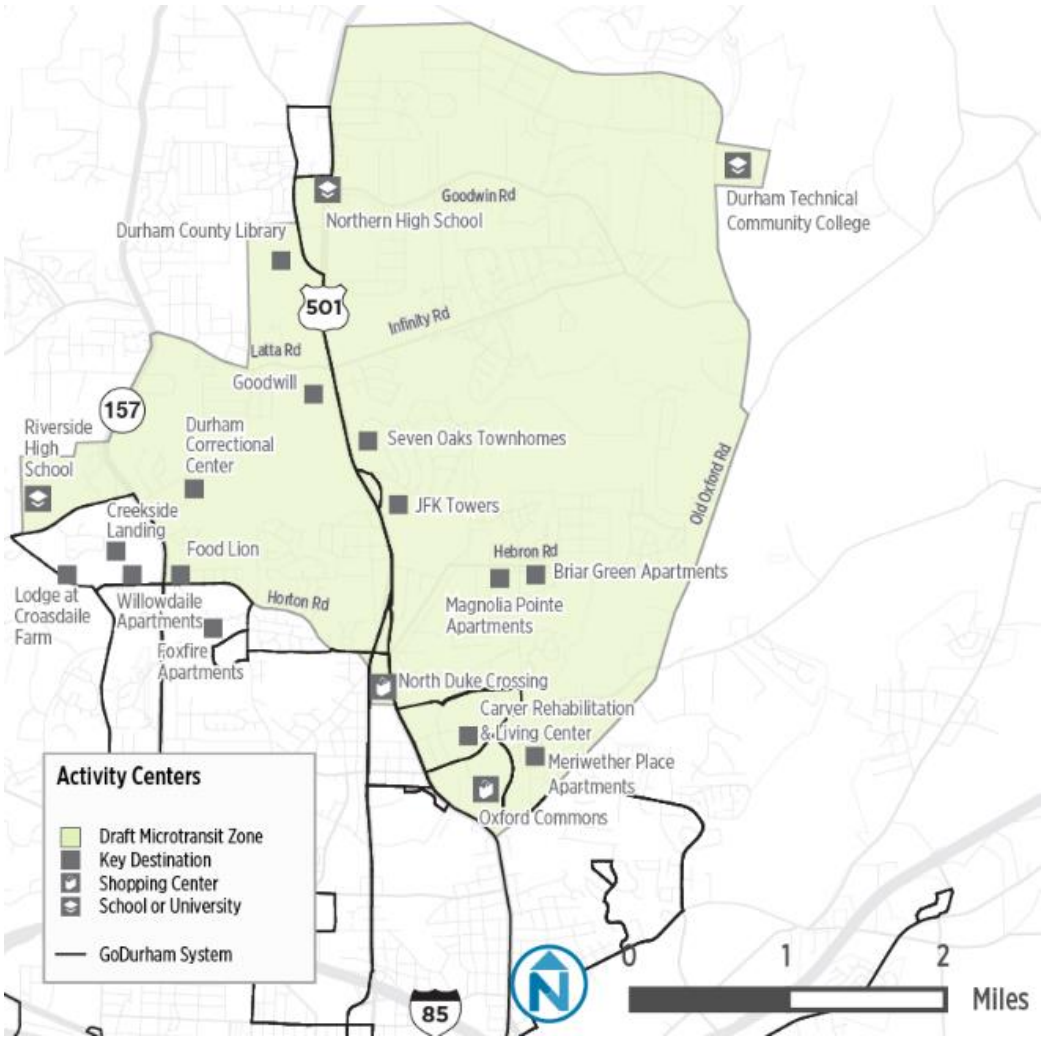
**Figure 52 Sparger Road Service Zones 1 and 2**



## North Durham Service Zone

The North Durham Service Zone, as shown in Figure 53, is a roughly 13.6 square mile zone bounded by Snow Hill Rd to the north, Old Oxford Rd to the east, Horton Rd and Roxboro Rd to the south, and Guess Rd to the east. The zone includes Riverside High School, Northern High School, Durham Technical Community College, North Duke Crossing, and Oxford Commons as key destinations. The zone provides connections to fixed-route service on Routes 9, 9A, 9B, and 4 at North Duke Crossing and Oxford Commons.

**Figure 53 North Durham Service Zone**



# 5 Evaluation

Each of the four on-demand zones were evaluated according to specific criteria designed to align with the four identified study goals and objectives:

1. Make Service More Convenient
2. Connect People to Life's Activities
3. Design an Equitable Service that Improves Access to Opportunity
4. Create a Model that will be Sustainable

The findings for these evaluation metrics are shown below in Figure 54, Figure 55, Figure 56, and Figure 57.

## METHODOLOGY

Evaluation criteria cover a range of assessments including quantitative statistics regarding existing service, demographics, as well as projected ridership and costs. While service performance, productivity, and costs are important considerations, the evaluation criteria also considered several qualitative characteristics, including convenience, modal integration, and potential for future partnerships and public support. Evaluations were performed for each geographic zone and for the two most feasible operator models: Ride-Hail Partnerships and Microtransit Partnerships. The following briefly discusses the main methodologies for scenario evaluation.

- **Market analysis:** For metrics that evaluated the number of people or jobs within the zone, within the fixed route walkshed, or outside of the existing fixed route walkshed, the analysis is conducted using data and results from the market review and SRTP. The fixed route walkshed is within one-quarter mile of a bus stop, or about a five-minute walk.
- **Ridership estimates**: On-demand services are relatively new to the transit field, and ridership is difficult to estimate due to the nature of these services. As a part of this study, a high-level ridership estimation was developed by looking at existing transit ridership and potential new riders based on the proportion of population and jobs without easy access to fixed route service within each zone. This mode share was also adjusted due to factors that differ between fixed route and on-demand services, as well as different service spans. A review of peer agency services also helped to understand ridership from similar projects in other cities. Additionally, new transit services and technologies take time to reach their full ridership potential. Due to the Covid-19 pandemic, the adoption rate will likely be even slower, so ridership is estimated at a lower level for the first year of adoption and is anticipated to grow in future years as transit regains lost ridership.
- **Cost estimates**: Cost estimates are based on ridership estimates and the experiences of other local or peer agency projects. Ride-hail costs are calculated based on a per-trip average cost for the area, and microtransit costs are calculated based on a per-hour average cost from peer agencies.
- **Qualitative analysis**: The scenarios and zones are compared in a relative manner, based on characteristics of the service model and zones, as well as experiences in peer cities that have implemented on-demand service.

**Figure 54 Make Service More Convenient – Evaluation Criteria Matrix**

| Objective | Criteria | East Durham | Sparger Road 1 | Sparger Road 2 | North Durham |
|---|---|---|---|---|---|
| Preserve and enhance mobility for current customers | Qualitative description of current fixed-route frequencies and estimated wait times | ▪ 15-minute frequency between the Village Shopping Center and Durham Station<br>▪ 30-minute frequency on all other routes throughout the zone<br>▪ Average wait times would decrease for microtransit service but may require a transfer | ▪ 15-minute frequency on Erwin Road east of La Salle Street<br>▪ 30-minute frequency on all other routes throughout the zone<br>▪ Average wait times would decrease for microtransit service but may require a transfer | ▪ 30-minute frequency on Route 11B<br>▪ Average wait times would decrease for microtransit service but may require a transfer | ▪ 30-minute frequency on combined Route 9, 9A, 9B alignment and Route 4<br>▪ Average wait times would decrease for microtransit service but may require a transfer |
| | Ridership at existing transit stops within the zone | 1,053 | 1,183 | 141 | 489 |
| Expand coverage to areas not served by fixed route | # of additional residents outside fixed-route walkshed | 7,074 | 1,324 | 586 | 13,083 |
| | # of additional jobs outside fixed-route walkshed | 895 | 1,169 | 1,157 | 787 |
| | Projected on-demand ridership within zone | **Scenario 1: Ride-Hail Partnership** | | | |
| | | *First year* | | | |
| | | ▪ 36 per day<br>▪ 13,200 per year | ▪ 8 per day<br>▪ 2,900 per year | ▪ 6 per day<br>▪ 2,000 per year | ▪ 25 per day<br>▪ 9,100 per year |
| | | *1-2 Years* | | | |

| Objective | Criteria | East Durham | Sparger Road 1 | Sparger Road 2 | North Durham |
|---|---|---|---|---|---|
| | | ▪ 120 per day<br>▪ 44,000 per year annual | ▪ 26 per day<br>▪ 9,600 per year | ▪ 18 per day<br>▪ 6,700 per year | ▪ 83 per day<br>▪ 30,300 per year |
| | | **Scenario 2: Microtransit Partnership** | | | |
| | | *First year* | | | |
| | | ▪ 33 per day<br>▪ 12,000 per year | ▪ 7 per day<br>▪ 2,600 per year | ▪ 5 per day<br>▪ 1,800 per year | ▪ 23 per day<br>▪ 8,300 per year |
| | | *1-2 Years* | | | |
| | | ▪ 100 per day<br>▪ 36,100 per year | ▪ 22 per day<br>▪ 7,900 per year | ▪ 15 per day<br>▪ 5,500 per year | ▪ 68 per day<br>▪ 24,800 per year |
| Improve the customer experience | Qualitative assessment of level of improvement | **High**; Extends first- last-mile service in high transit propensity neighborhood to existing high-frequency transit | **Low**; Overlaps large areas of high-frequency transit service near Duke University, extends first- last-mile service on Sparger Road corridor | **Medium**; Extends first- last- mile service on Sparger Road corridor with less service duplication than Sparger Road 1 | **High**; Extends first- last-mile service in high transit propensity neighborhood serving multiple high schools and high ridership retail employment hubs |
| | Number of riders from recently removed stops | 57 | 63 | 63 | 0 |
| Integrate experience with other modes | Qualitative Assessment | All service zone geographies provide opportunities to integrate with existing modes | | | |

**Figure 55 Connect People to Life's Activities – Evaluation Criteria Matrix**

| Objective | Criteria | East Durham | Sparger Road 1 | Sparger Road 2 | North Durham |
|---|---|---|---|---|---|
| Improve access to jobs | # of jobs within zone | 1,760 | 41,121 | 1,507 | 4,656 |
| Connect people to healthcare and social services | # of healthcare and social services within zone | ▪ Durham Ridge Assisted Living | ▪ Vocational Rehabilitation Services<br>▪ Duke Hospital System | ▪ Vocational Rehabilitation Services | ▪ Carver Rehabilitation and Living Center |
| Design service that will benefit the largest number of people | # of residents within zone | 11,914 | 8,926 | 3,582 | 19,544 |
| Improve connections to fixed-route network | # of connections to fixed-route service | Route 2, 3, 3B | Route 6, 11, 11B | Route 11B | Route 9, 9A, 9B, 4 |
| | # of connections to high frequency transit | 1 | 1 | 0 | 0 |

**Figure 56 Design an Equitable Service that Improves Access to Opportunity – Evaluation Criteria Matrix**

| Objective | Criteria | East Durham | Sparger Road 1 | Sparger Road 2 | North Durham |
|---|---|---|---|---|---|
| Create shared economic prosperity for disadvantaged populations | # of low wage jobs within zone | 479 | 2,588 | 205 | 1,227 |
| Address safety concerns around microtransit | Wait times | Maximum wait time standard of 15 minutes would be consistent between all zone geographies. Average wait times may vary within zones and are estimated at approximately 7.5 minutes. | | | |
| Build partnerships within each zone to encourage use and improve service | Qualitative assessment of potential partnerships | **Medium**; Potential Partners – The Village Shopping Center, Housing complexes | **High**; Potential Partners – Duke University, Vocational Rehabilitation Services, Housing complexes | **Low**; Potential Partners – Vocational Rehabilitation Services, Housing complexes | **High**; Potential Partners – North Duke Crossing, Oxford Commons, Durham Technical Community College, Housing complexes |
| Ensure fares are accessible and affordable | Offers payment alternatives, low-income fares, and ease of integration with transit system fare structure | Fare integration can be applied consistently across all zone geographies. Fare structure integration is feasible for both Scenario 1: Ride-Hail Partnership and Scenario 2: Microtransit Partnership. Because of the availability of fare box equipment on microtransit vehicles, it will be simpler to facilitate fare integration in Scenario 2: Microtransit Partnership. | | | |
| Design service to meet the needs of those with the fewest mobility options | # number of residents within socioeconomic groups with higher transit propensity | 11,070 people of color<br>1,168 seniors<br>5,048 poverty in poverty<br>990 disabled people<br>434 zero-vehicle households | 6,664 people of color<br>800 seniors<br>3,852 poverty in poverty<br>1,116 disabled people<br>447 zero-vehicle households | 1,503 people of color<br>474 seniors<br>1,476 poverty in poverty<br>777 disabled people<br>245 zero-vehicle households | 14,228 people of color<br>2,575 seniors<br>9,299 poverty in poverty<br>1,430 disabled people<br>1,067 zero-vehicle households |

**Figure 57 Create a Model that will be Sustainable Over the Long-Term – Evaluation Criteria Matrix**

| Objective | Criteria | East Durham | Sparger Road 1 | Sparger Road 2 | North Durham |
|---|---|---|---|---|---|
| Understand the financial and technical feasibility of on-demand mobility options | Operating cost per trip | **Scenario 1: Ride-Hail Partnership** | | | |
| | | $8 | $8 | $8 | $8 |
| | | **Scenario 2: Microtransit Partnership** | | | |
| | | $23 | $106 | $151 | $33 |
| | Annualized cost (first year of service) | **Scenario 1: Ride-Hail Partnership** | | | |
| | | $119,000 | $26,000 | $18,000 | $82,000 |
| | | **Scenario 2: Microtransit Partnership[1]** | | | |
| | | $277,000 | $277,000 | $277,000 | $277,000 |
| Develop services that achieve a high level of public support | Qualitative assessment based on public engagement process | Ability to generate public support will be determined during the public involvement process. Generating public support and ridership on the service will require significant marketing efforts by the agency. The East Durham Service Zone was previously served with an on-demand pilot and may have a higher level of public support as a result. | | | |
| Learn and test new strategies for leveraging technology to improve the customer experience | | Experience testing new strategies and technologies will be consistent between service zone geographies. | | | |
| Generate additional data to understand transit demand and travel flows | Produces data to help support agency planning efforts | Data produced from new service will be consistent between service zone geographies. | | | |
| Gain experience collaborating and contracting with private-sector mobility companies | | Experience with private-sector mobility companies will be consistent between service zone geographies. | | | |

[1] Estimated demand for service is not sufficiently high in any of the four on-demand service zones to warrant more than one microtransit vehicle.

# EVALUATION RESULTS

## Operator Model

The service scenario evaluation has identified several trade-offs between ride-hail partnerships and microtransit partnerships in terms of affordability, scalability, ridership potential, and agency oversight.

### Ride-Hail Partnership

Ride-hail partnerships represent an affordable, scalable service with a higher ridership potential than microtransit partnerships. Ride-hail partnerships are relatively affordable because the agency does not pay the full amount of operator wages. Instead, the agency provides defined subsidies for eligible trips within the on-demand zone. While this model provides service at a lower cost to the agency, it gives the agency less control over service operations. In these partnerships, the agency does not control dispatching and cannot ensure a specific number of vehicles will be present in the zone at any given time. This makes monitoring performance standards more difficult compared to microtransit partnerships, although the potential for superior wait times is strong under this model, given the large number of vehicles operating on ride-hail platforms at any given time in the region.

As ride-hail services like Lyft and Uber have become ubiquitous throughout many communities, potential riders have become more comfortable riding these services. This presents an opportunity for higher initial ridership through a ride-hail partnership than a microtransit partnership, with which potential passengers may be less familiar.

### Microtransit Partnership

Microtransit partnerships are more expensive to operate than ride-hail partnerships and may therefore need to be designed with more limitations on service hours, frequency and coverage to contain cost, but they create a stronger extension of the agency's brand, allow greater control and operational oversight, and allow for more seamless integration of existing fare media within the service. Microtransit service operators are paid for the full amount of time service is operating, not just while transporting passengers like ride-hail operators. This difference in operator wage structures makes microtransit partnerships significantly more expensive than ride-hail partnerships.

Unlike ride-hail partnerships, microtransit partnerships provide a dedicated service with greater agency oversight. In these kinds of partnerships, the agency can ensure every vehicle is ADA compliant, can more easily monitor operating statistics and performance standards, and can ensure a specific number of vehicles are in service at any given time. Microtransit partnerships allow the agency to extend their branding to vehicles operating the service. This makes the service more visible to potential passengers and improves marketing. Additionally, microtransit service is capable of incorporating on-board farebox equipment that allows for a seamless integration of the existing fare structure and fare media. Microtransit can work under several operating models ranging from in-house, which is completely managed and operated by the agency; a hybrid with procurement of third-party technology for scheduling, dispatching and fare payment; or turnkey which complete outsources all elements of the service.  All three are possible for GoDurham, but turnkey is recommended as it is the least expensive and easiest to implement.

## Geographic Zones

All four on-demand service zones present unique challenges and opportunities for on-demand service.

### East Durham

The East Durham zone has the highest ridership potential of the four geographic zones, with initial ridership estimates in the range of 33 – 36 passengers per day. The zone provides connections to four existing transit routes and one high-frequency transit hub at the Village Shopping Center. Existing fixed-route service in the East Durham zone accounts for over 1,000 daily boardings and appears to be well suited for first- last-mile connections to transit. Additionally, the previous East Durham Connect Pilot makes this area well positioned for marketing the new service to residents. Depending on the operator model, on-demand service in the East Durham zone would have an estimated annual cost of $119,000 – $227,000.

### Sparger Road 1

Sparger Road Zone 1 has relatively low ridership potential, with initial ridership estimates in the range of 7 – 8 passengers per day. Many areas within the zone are adjacent to existing fixed-route service operating every 15-30 minutes. This zone includes the largest number of jobs, due to the inclusion of the Duke University campus and numerous Duke health system facilities. Depending on the operator model, operating on-demand service in this zone is estimated to cost between $26,000 – $277,000 per year.

Despite the relatively low potential ridership projections based on current mode share estimates, there is a possibility that a subsidized on-demand service could be used for transportation within the Duke Campus, rather than as a first- last-mile connection to fixed-route service. This zone presents a potential risk given the complex dynamics of providing direct service to Duke University. However, Duke University represents a key potential partner for the service in this zone and will be an important stakeholder in any ongoing transit projects in the area.

### Sparger Road 2

Given the small size of the zone and limited population and employment, the Sparger Road Zone 2 has relatively low ridership potential, with initial ridership estimates ranging from 5 – 6 passengers per day. The zone would provide first- last-mile connections from the existing Route 11B to the Sparger Road and Hillsborough Road corridors that were previously served by fixed-route, including the Vocational Rehabilitation Services facility. Sparger Road zone 2 has significantly less overlap with existing fixed-route service than Sparger Road zone 1 and does not include the large employment associated with Duke University and the Duke health system facilities. Depending on the operator model, operating on-demand service in this zone is estimated to cost between $82,000 – $277,000 per year.

### North Durham

The North Durham zone is the largest zone analyzed as a part of this assessment and contains the largest total population. This zone has moderate ridership potential, higher than both Sparger Road zones but lower than the East Durham Zone, with initial ridership estimates ranging from 23 – 25 passengers per day. The North Durham zone would provide first- last-mile connections between existing fixed-route transit service and numerous large apartment complexes, retail

employment centers at North Duke Crossing and Oxford Commons, and educational institutions including Northern High School, Riverside High School, and Durham Technical Community College. Existing ridership at fixed route stops within this zone account for nearly 500 daily boardings. Depending on the operator model, operating on-demand service in this zone is estimated to cost between $18,000 – $277,000 per year.

## Recommended Scenario

The evaluation criteria established for this Microtransit Planning Study identify the tradeoffs between different operator models and geographic zones. The prioritization for implementation by geographic zone is as follows:

1. East Durham
2. Sparger Road Option 2
3. North Durham

While each of the zones and operator models evaluated are generally supportive of on-demand transit service, a ride-hail partnership in the East Durham zone has been identified as the highest priority scenario for implementation. The high transit propensity, available connections to high-frequency transit service, and local familiarity with on-demand transit service from the East Durham Connect pilot program make the East Durham zone the preferred area for expanding on-demand service operations. The East Durham Connect pilot was significantly more restricted than this proposed service and will serve as a key launching point for on-demand service in the GoDurham service area with significant potential to expand or adjust service as needed.

While Sparger Road Option 2 provides a smaller extension of first- last-mile connections in a lower transit propensity area, the service can be provided at a relatively low cost and would extend service to an area that was previously served by fixed-route bus service. Sparger Road Option 2 represents a low-cost option for replacing removed fixed-route service and should be considered as a part of a phased implementation for on-demand service.

North Durham has moderately high transit propensity and provides connections to numerous employment hubs, shopping centers, and high schools, which all present potential connections and trip generators in the zone. The North Durham zone has a lower ridership potential than the East Durham zone and comes at a higher estimated cost than the Sparger Road zones. This zone should be considered for implementation after marketing efforts for the East Durham and Sparger Roads raise public awareness and acceptance for on-demand service.

The relatively low costs and scalability of ride-hail partnerships make them the preferred operator model for initiating and adjusting service to meet demand. While there are numerous benefits associated with the microtransit partnership model, the higher operating cost makes this a less feasible option in the short term. As ridership and awareness of on-demand service increases in the region, microtransit partnerships may become a more attractive model, but in the short-term is cost prohibitive. Following implementation, performance and productivity should be monitored continuously and the service parameters, subsidies, zone boundaries, and operator model may be adjusted to reflect potential changes in demand.

# 6 Implementation

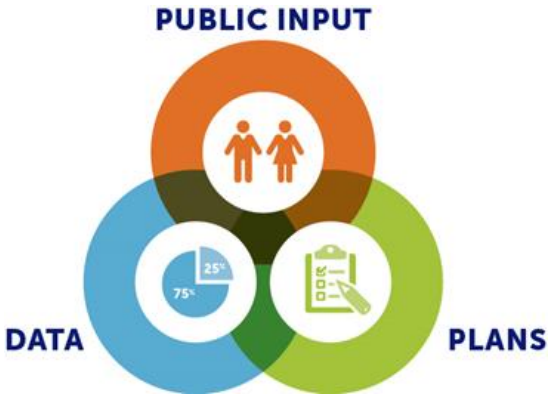
This study explored two service models and evaluated their effectiveness in three potential on-demand zones. These proposed service areas were developed based on market demand, community need, and previous studies conducted by GoTriangle. The assessment included a detailed look at the benefits and challenges of the service type, total service cost, and implementation feasibility.

While this effort uses past studies and available data to propose new service concepts, GoDurham must seek public input to refine the design to develop and implement a pilot that puts the needs of the community first. The goals and objectives established at the beginning of the program, along with public input should direct the procurement requirements. Procurement of new services should ensure that all of GoDurham's operational requirements will be met. Services should also provide GoDurham staff with the flexibility to modify service design, including changes to the service area boundary, span of service, and fare structure, including ride caps in order to adapt as users test the new service and issues or opportunities are identified. Given the variety of potential operator types that may be interested in bidding on this service, the agency may wish to craft the procurement documents broadly enough such that taxis, turnkey microtransit providers, and taxi companies are all able to respond, allowing the agency to compare the offerings of these different vendors before selecting one or more of them. The RFP should also include specific language directing the service provider to disseminate agency designed surveying consistent with the ongoing annual and triennial customer experience and satisfaction surveys in the region. Finally, the new service should provide the agency with ample and timely data to inform ongoing evaluation of the service, the content, frequency, and format of which should be specified in the RFP and contract documents to ensure upfront alignment in agency and contractor expectations.

New on-demand service will require additional agency resources beyond a contract for services. Bus stops within the zone will need to be identified as pick up and drop off points. These locations will need updated wayfinding, signage, and possibly additional investments in seating, sidewalk infrastructure and enhanced lighting for riders to safely wait to transfer between services. Other resources will need to be invested in marketing and community outreach to introduce and promote the new service. New service also presents an opportunity for interagency coordination to promote wider regional travel. On-demand services in East Durham provide an opportunity to connect riders to GoTriangle services – the agencies should work together to consider app integration and fare policies that allow for cross-agency service connections.

Ride-hail wayfinding signage at T.F. Green Airport (Warwick, RI)

## PUBLIC ENGAGEMENT




This study is conducted during the Covid-19 pandemic, a time when typical public engagement efforts cannot be done effectively and will require more time. Thus, the results and recommendations of this study are tentative and should be adapted based on future public input before implementation.
A community survey would help to fine-tune components of new on-demand service including, but not limited to, the following:

- Service Hours – what times of day and days of the week is service needed?
- Booking Preference – would a smartphone be someone's primary booking method? Or would a telephone be a preferred option for booking a trip.
- Willingness to Pay – how much would someone be willing to pay? While fares will be comparable to GoDurham's existing fares, is there an interest to pay more for higher levels of service?
- Wait Time Tolerance -how long are people willing to wait? Is there a threshold where people would look at alternatives unless cost savings were significant?
- Purpose of Use – where are people going? Would services be helpful for personal errands or do people need to connect to locations outside of the zone? How could this service, in combination with fixed route service, facilitate these connections?
- Frequency of Use - how often would people be willing to use the service? One or two times a week, or for daily commuter connections.
- Safety and Comfort – how comfortable are people with riding an agency branded microtransit service or using a ride-hail service to reach a fixed-route bus? How do people perceive their safety using these services or waiting for these services.

## MARKETING

Robust marketing and outreach are essential to ensure that all potential customers know about and understand how to use the service. Promoting any new transit service is important, but unlike fixed route service, on demand transit is less visible and people may not be aware new service has begun. Also, peer experience demonstrates that awareness of the services can have a huge impact on how well it is utilized. Targeted marketing strategies within the zone could include distributing materials to businesses and residences, specifically local employers, housing complexes and other key activity centers. If budget allows, conducting geo-targeted digital advertising could also help raise local awareness.

Promotion of new on demand service should also align with larger marketing efforts to attract riders back to public transit – be creative in making the new normal feel normal, by aligning choosing to ride with the economy or climate change or to provide (socially distanced) human connections again.

## COVID-19

The impact of the COVID-19 pandemic on local and regional transportation systems was immediate: traffic volumes and transit ridership decreased immediately and dramatically. Public transit has benefited from strong public support during COVID-19, being an essential service for frontline workers and others. In June 2020, roughly 70 days after the initial shelter in place directive was issued, businesses and industries are slowly re-opening. Employment, however, has not yet been fully restored. Riders' return to public transportation is expected to be cautious. Public transit systems must identify ways to address safety concerns, attract customers back, and prepare for a new transportation paradigm.

There are new protocols on buses and at transit centers to maintain social distancing and reduce the risk of transmission and protect the health of transit employees and customers. These new measures include reduced capacity on fixed route buses. New policies combined with low ridership and increased cleaning requirements will continue to strain transit agency budgets. Many agencies have already had to reduce service hours and frequency, and on-demand service could be used to both fill in some of these service gaps or to offset fixed route capacity.

Transit riders, like all consumers, need to know the steps that transit agencies are taking to protect them. On-demand service through a third party, is still a part of GoDurham's public transit services. Policies that impact fixed route services should extend to on-demand vehicles, when applicable. These include efforts to maintain social distancing, use of masks, and customers should refrain from using services if they are not feeling well. On-demand service also can provide an affordable alternative for seniors or those who may have health issues and concerns riding a fixed route bus. Contactless fare payment and adjusting vehicle capacity are other features of on-demand service that can help to reduce risk of transmission. While somewhat controversial, on-demand apps could also provide contact tracing to help warn riders if they have been exposed to the virus and reduce the spread of transmission.

Transit agencies are also using on demand services to fill gaps in service due to service reductions and to meet immediate community need. By modifying existing on-demand services, agencies have been able to bring healthcare workers directly to hospitals or provide seniors with trips for essential services. The Central Ohio Transit Agency (COTA) expanded their COTA/Plus on-demand pilot to a second zone to specifically mitigate COVID-19 related service reductions. LA Metro also adapted its microtransit service to three train stations by providing direct rides to essential services and jobs. On-demand service offers a way to respond to transit need in times of public health crises and to also creatively meet mobility needs when fixed route service is not available or needed.

Flexibility is perhaps on-demand transit's biggest asset, and as new transportation patterns emerge from the pandemic, fixed route demand will change. GoDurham will be able to utilize lessons learned from its on-demand services to explore new, innovative ways to create a more responsive and resilient transit system for the future. On-demand service operates very differently than fixed route, and the success or failure of GoDurham's new zone based service should be determined based on performance metrics that go beyond ridership or fares, such as improved mobility, increased safety, and enhanced customer experience. The peer agencies identified in Appendix A may provide relevant examples for on-demand service performance standards, but metrics should be tailored to reflect the unique goals and characteristics of the agency.

# Appendix A: Peer Agency On-Demand Services

| Service Name | Service Description | Findings |
|---|---|---|
| SC Rides (San Clemente, CA) | Ride-hail partnership to replace two low performing fixed routes with corridor-based on-demand service | • 6AM to 8PM span along 8-mile corridor<br>• Fare: $2-$5, with maximum subsidy of $9<br>• Serves 50-100 passengers/day, compared to 100 on previous fixed route |
| Go Dublin (Dublin, CA) | Ride-hail partnership to replace low performing fixed route with zone-based on-demand service | • 6 square miles service area<br>• Subsidy: 50% discount on ride up to $5 |
| Direct Connect (Pinellas County, FL) | Ride-hail partnership as first mile/last mile service to many bus stops around the county | • Subsidy: $5 for TNC service, $25 for wheelchair service<br>• Ridership: 40 rides per day |
| East Durham Connect (Durham, NC) | Ride-hail partnership to replace low performing fixed route with a hybrid corridor/hub on-demand service, launched during Covid-19 pandemic | • 3 miles combined corridor length<br>• Free fare, agency cost on average $8/ride<br>• Ridership: 4-7 rides per day |
| RTP Connect Pilot (Raleigh/Durham, NC) | Ride-hail partnership to serve hard-to-serve area with a hybrid zone/hub on-demand service | • 6:30AM to 10PM on weekdays<br>• Subsidy: maximum of $10 per trip; on average trips are $7.96<br>• Ridership: 107 rides per day |
| VTA Flex (Santa Clara, CA) | Microtransit service with defined pick up and drop off locations | • 5:30AM to 8:30PM on weekdays in 5.5 square mile area<br>• Fares: $2 off-peak, $3 peak (fixed route is $2)<br>• Ridership: 41 rides per day<br>• Average wait time: 7.5 minutes<br>• Average travel time: 8 minutes |
| West Salem Connector | Microtransit service with defined pick up and drop off locations | • 5:30AM to 9PM on weekdays in 2.38 square mile area (denser than Durham) |

| Service Name | Service Description | Findings |
|---|---|---|
| | | • 1 vehicle in operation<br>• Ridership: 50 boardings per day, with 4.7 trips at the peak hour |
| Call n Ride (Denver, CO) | Microtransit service with many zones, designed for first mile/last mile connections, zone-based and curb-to-curb | • Average span is 14.2 hours per day, 23.2 vehicle hours<br>• Fare: $2.65, same as fixed route and free transfers<br>• Ridership: 95.9 riders per day in each zone on average, 3.9 per hour<br>• Cost: $21.84 per trip on average |
| Capital Metro Pickup (Austin, TX) | Microtransit service that is zone-based and curb-to-curb | • 7AM to 7PM weekdays, 10AM to 5PM Saturdays, 7.37 square mile area<br>• Started with 2 vehicles, has increased over time as ridership increased<br>• Ridership: 2400 rides/month, average 3.1 per vehicle hour<br>• Average wait time: 11 minutes, with service standards of 15 minutes maximum<br>• Cost: $28.5 per trip on average |
| Go OnDemand Pilot (Raleigh/Durham, NC) | Microtransit service that is zone-based and curb-to-curb in Research Triangle Park | • 6:30AM to 6:30PM weekdays span<br>• 4 vehicles<br>• Ridership: 83 rides/day<br>• Cost: $31.44 per trip |
| Other microtransit services | TCRP Synthesis 141: *Microtransit or General Public Demand–Response Transit Services: State of the Practice* evaluated a series of agencies offering on-demand services | • For agencies contracting a turnkey provider for microtransit, the average cost per vehicle hour is $57 |