REGIONAL CONNECTIONS OPPORTUNITIES REPORT

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Let's think about transit

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Contents

INTRODUCTION

REPORT GOALS

The Regional Connections Opportunities (RCO) report is a technical volume providing insights into where and how public transit service can succeed in Orange County with respect to system geometry, ridership goals, development plans, mobility services, and equitable provision of service. Overall, this report identifies key issues and opportunities supporting effective transit service and establishes metrics and performance criteria for developing scenarios and evaluating prospective transit projects. In addition to this introductory section, there are seven (7) main topic areas covered in the RCO Report:

- Context and Project Area: Discusses the geographic project area, local and regional development trends, and ongoing plans and projects that could potentially impact transit planning.
- Transit Trends: Assesses direct and indirect factors influencing local and regional transit trends.
- Current Transit System Performance: Addresses existing conditions in all three local transit systems including frequency of service; span/duration of service; productivity of service and proximity to transit; and access to jobs and services for various population groups. This section also discusses known factors increasing the likelihood of transit ridership.
- Regional Travel Markets and Need: Assesses ridership potential based on likely travel markets and community transit needs. This section also considers accessibility (destinations reachable by travel time) for various travel modes and compares existing transit service to other travel modes.
- Emerging Transportation Technologies: Analyzes emerging transportation technologies and shared mobility options in Orange County and describes potential impacts of these new technologies on transit operations, access, and service effectiveness.
- Impacts of COVID-19: Discusses transit resilience and the ways in which ridership has changed under pandemic restrictions including likely effects on budgets, ridership, and public perceptions.
- Opportunities for Service Enhancements: Identifies conditions ripe for enhancing transit service and for new transit investments in Orange County.

While this report is intended primarily as an analytic resource, the maps, data visualizations, and key findings will be summarized and reported on during public engagement efforts and ultimately memorialized as part of the final 2020 Orange County Transit Plan Update.

THE ROLE OF TRANSIT IN ORANGE COUNTY

WHY SHOULD ORANGE COUNTY INVEST IN TRANSIT?

Public transit service supports basic mobility for individuals who do not have access to a private vehicle or other means of transportation. Public transit service also supports overall transportation goals such as reduced congestion and reduced travel time and can help meet environmental goals including reduced emissions, improved air quality, and a decreased reliance on fossil fuels.

These benefits impact both riders and non-riders making public transit a true public good. For these reasons alone, public transit investments are a foundational element of great communities.

In a rapidly growing and deeply interconnected region like the Research Triangle, there are additional benefits to investing in high quality public transit service. Local and regional transit service provides options for a range of transit riders including commuters, students, workers, travelers, and more. Transit relieves congestion and reduces travel times on the region's major transportation corridors, making connections between the places riders call home and the region's major employment hubs such as Research Triangle Park (RTP), UNC Chapel Hill hospitals, and Duke University hospitals. Fare-free service provided by Chapel Hill reduces the need for parking on and near UNC Chapel Hill's campus, supporting higher and better uses of limited land resources. And, thanks to membership in the Burlington-Graham MPO, there are also connections in the County to western destinations via Piedmont Authority for Regional Transit (PART), a service that is expanding. Transit service also expands housing options for lower-wage workers, particularly as housing prices continue to rise and affordable housing is increasingly located on the region's periphery. High quality public transit service aligns with the region's aggressive environmental improvement objectives and provides redundancy, increasing transportation resilience.

The technology sector's strong presence in Orange County and the Triangle means that the region is often at the forefront of emerging transportation technologies. A large population of likely "early adopters" including students and young adults provides a fertile environment for pilots of innovative transportation options that may integrate or connect to public transit. A regional commitment to equitable development helps ensure that emerging technologies can be accessed by all individuals.

For these reasons and so many more, it is critical that Orange County continues to make strong investments in the County's public transit service. The analyses contained in this report provide baseline information on land use, demographic, and transit trends and highlight opportunities for transit service enhancements. First it is necessary to understand the relationships, roles, and responsibilities of the region's transit service providers.

TRANSIT SERVICE RELATIONSHIPS

The interconnectedness of the Triangle Region necessitates both local and regional transit funding, planning, and service. In 2012, Orange County voters approved a half-cent sales tax supporting transit funding (Article 43).[1] A regional transportation public authority, known as GoTriangle, was created to help administer these revenues and work on public transit service projects involving Orange, Durham, and Wake Counties. The revenues from Article 43 are allocated by the North Carolina Department of Revenue to GoTriangle, which then allocates a portion of that money to Orange County through reimbursements for projects that either offer new public transit services or expand existing ones. There are three additional dedicated funding streams supporting transit in Orange County: a five-percent Vehicle Rental Tax (Article 50); and two Vehicle Registration Fees (Article 51 and Article 52).

[1] https://www.orangecountync.gov/1991/Article-43

Transit Service Providers

Transit services in Orange County are provided by three agencies, and each has participated in the development and implementation of prior transit plans since passage of Article 43 (2012 and 2017). **Chapel Hill Transit** is a multijurisdictional agency formed by a partnership of the Towns of Chapel Hill, Carrboro, and the University of North Carolina – Chapel Hill (UNC-CH). Chapel Hill Transit provides fare-free regular and express routes and demand response service in Chapel Hill, Carrboro, and UNC-CH campus areas. Chapel Hill Transit also provides regional express bus service to Hillsborough in cooperation with GoTriangle. **Orange County Public Transportation** is a county agency providing fixed route and demand response community transportation services to all residents of unincorporated Orange County, the Town of Hillsborough, Efland, and a portion of the City of Mebane with destinations within and beyond Orange County's borders. Orange County Public Transportation also provides circulator service within Hillsborough (in cooperation with the Town of Hillsborough), midday service connecting Chapel Hill to Hillsborough, and connections to Cedar Grove in northern Orange County. **GoTriangle** is a regional transit agency providing regional commuter express and demand response service connecting Wake, Durham, and Orange counties. The **Piedmont Authority for Regional Transit** provides longer distance service between Greensboro, NC, and UNC-CH Hospitals with several stops in Alamance County.

Transit Agreement Parties

In 2012, Orange County, GoTriangle, and the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC MPO) executed an Interlocal Implementation Agreement[2] ("Implementation Agreement") providing for effective implementation and oversight of transit planning. The Parties desire to support the future transportation needs of Orange County and the surrounding region, understanding that enhanced mobility options will support a high quality of life, strengthen economic development, strengthen human services transportation, support air quality goals, and enhance sustainability. The Implementation Agreement establishes a Staff Working Group including representatives from Orange County, GoTriangle, and DCHC MPO. The Staff Working Group reviews transit planning implementation progress and supports updates to the Plan at least every four years (or upon occurrence of circumstances and/or changes to costs or revenues that are significant enough to require a plan update). The 2020 Orange County Transit Plan Update is the second update to the 2012 Orange County Bus and Rail Investment Plan, created in response to the 2019 discontinuation of the Durham-Orange Light Rail Transit (D-O LRT) project.

ORANGE COUNTY TRANSIT GOALS

2012 and 2017 Transit Plan Goals

The original 2012 Orange County Bus and Rail Investment Plan[3] and the successive 2017 Transit Plan[4] update, both adopted by the governing boards of Orange County, DCHC MPO, and GoTriangle, featured five goals:

- Improving overall mobility and transportation options

[2] http://www.orangecountync.gov/DocumentCenter/View/1373/Interlocal-Implementation-Agreement-PDF?bidId=
[3] https://orangecountync.gov/DocumentCenter/View/1377/Orange-County-Bus-and-Rail-Investment-Plan-BRIP-PDF?bidId=
[4] https://gotriangle.org/sites/default/files/publications/orange-county-transit-plan_170424_app.pdf

- Providing geographic equity
- Supporting improved capital facilities
- Encouraging transit-supportive land use and
- Providing positive impacts on air quality.

These goals were identified through robust public engagement during development of the 2012 plan and were retained as the goals of the 2017 transit plan update. These goals will be revisited during the 2020 Orange County Transit Plan Update to evaluate both their continued relevance (particularly given the discontinuation of the DOLRT and likely fiscal impacts of the ongoing COVID-19 pandemic) and potential conflicting objectives. This type of conflict is evident in the existing plan in the goals "Improving overall mobility and transportation options" and "Providing geographic equity." The first of these suggests orienting transit to generate greater ridership while the latter supports a coverage-oriented approach. As this report will discuss in greater detail, a transit system cannot maximize both simultaneously given the limited resources available for investment. However, both ridership and coverage orientation exist on a spectrum – finding the "right" balance of these competing objectives is a major driver of system design within Orange County.

2030 Comprehensive Plan

Orange County's comprehensive plan[5] adopted in 2008 contains a transportation element that provides "guidance and direction regarding future transportation efforts in Orange County." This plan element contains several goals relevant to the 2020 Orange County Transit Plan Update including:

- An efficient and integrated multi-modal transportation system that protects the natural environment and community character.
- A multi-modal transportation system that is affordable, available, accessible to all users, and that promotes public health and safety.
- Integrated land use planning and transportation planning that serves existing development, supports future development, and is consistent with the County's land use plans which include provisions for preserving the natural environment and community character.
- A countywide and regionally integrated, multi-modal transportation planning process that is comprehensive, creative, and effective.

For each of these goals, numerous objectives have been identified, many related to making transit service more efficient and accessible in Orange County.

2050 Metropolitan Transportation Plan

DCHC MPO is currently working on a scheduled update to the MPO's Metropolitan Transportation Plan (MTP). This plan identifies the highway, public transportation, bicycle, pedestrian, and other transportation projects to be implemented over the next 30 years to meet the MPO's goals. The MTP must support future land use plans and policies in the member jurisdictions and the plan is "fiscally constrained" meaning project costs must be aligned with expected revenues. Additionally, projects MUST be included in the MTP to be considered for state and/or federal funding. DCHC

[5] https://www.orangecountync.gov/1242/2030-Comprehensive-Plan

has recently aggregated an “approved” set of goals and objectives for the 2050 plan update based on public feedback including a survey (over 2,100 responses) and written/oral comments resulting from a public hearing. All the approved goals are relevant to transit service planning including:

- Protect the Human and Natural Environment and Minimize Climate Change
- Ensure Equity and Participation
- Connect People and Places
- Ensure That All People Have Access to Multimodal and Affordable Transportation Choices
- Promote Safety, Health and Wellbeing
- Improve Infrastructure Condition and Resilience
- Manage Congestion & System Reliability
- Stimulate Inclusive Economic Vitality.

TRANSIT SYSTEM TENSIONS

Planning for transit requires balancing conflicting needs and objectives within the confines of limited funding. Equitably meeting these needs and objectives can be even more challenging in a partially rural county like Orange, where coverage needs are greater and potential ridership is lower. However, while trade-offs and decisions need to be made, these are not zero-sum choices. Transit systems can be configured to meet specific goals along the spectrum of service orientation. To find the right balance for Orange County, planners first need to ask: 1) What do riders want? and 2) What can transit service providers deliver? The answers to these questions help identify where Orange County transit riders and providers fall along several critical tension spectrums. These include:

Ridership versus coverage: Transit systems can be designed to maximize the number of riders who use the service or to maximize the geographic reach of the system. As Figure 1 illustrates, a transit system oriented to maximize ridership (left) will have fewer routes concentrated along key high ridership corridors. A transit system oriented to maximize coverage (right) will have more routes spread across a larger geographic area; each route carries fewer riders. The spectrum under the images represents the range of orientation possibilities. As indicated, a system does not have to be 100% ridership oriented or 100% coverage oriented – there are infinite possibilities along the service spectrum. The key is to find a balance that meets the needs of the most riders given the limited resources available for transit.

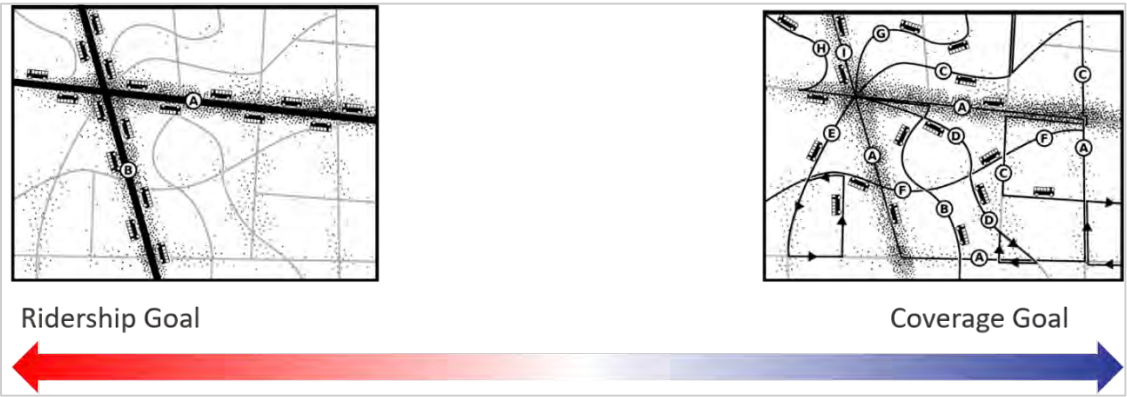

Image Source: Jarrett Walker & Associates

Figure 1 The spectrum of transit service orientation.

Local service versus regional reach: Another fundamental tension in transit system network design is local versus regional orientation. This element of system design is especially important in places like Orange County where the region is highly interconnected with many workers traveling through and between counties to access jobs, homes, education, entertainment and more. Local service orientation emphasizes *accessibility* – service tends to be more frequent with more stops and more routes. Regional (or commuter) service emphasizes *mobility* – riders can travel further but there are longer routes with fewer stops (often advertised as "express" routes). Resolving the tension between local and regional service in Orange County means balancing the needs of those who use the system for shorter, more frequent trips and those who rely on the transit system to provide reliable regional connections.

Service Equity: Funding for transit service is inherently limited – it is not possible to meet the needs of every rider, for every trip. Rider needs also vary dramatically based on how and why the rider is utilizing the transit system. For example, commuters, workers, students, and casual travelers all access and/or rely on the transit system for different reasons and each has reasonable expectations of the transit system (timeliness, reliability, convenience, safety, cleanliness, etc.). The needs and circumstances of all rider groups must be considered during transit system planning, particularly a rider's dependency on transit or ability to choose between transit and alternative modes of transportation. Factors such as age, income, race or ethnicity, educational attainment, and location (i.e. urban versus rural; land use policies) provide clues about the population's dependence on transit and the availability of alternatives (private transportation, walking/biking, carpooling, on-demand service, etc.). Equitable transit system design requires affirmative consideration of factors influencing transit dependence.

Feedback gathered during the first phase of outreach and engagement and the findings of this report will elucidate the wants and needs of current and potential transit riders, determine how transit service is currently oriented in Orange County, clarify the ability of transit service providers to deliver the services that are needed and wanted, and set the stage for developing an updated set of balanced goals for the 2020 Orange County Transit Plan Update.

CONTEXT AND PROJECT AREA DESCRIPTION

PROJECT AREA

Orange County is centrally located in North Carolina's Piedmont Region, part of the internationally recognized "Research Triangle" which is named for the geometry of the connections between the region's universities, research institutes, and employers. Orange County is home to the University of North Carolina's flagship campus at Chapel Hill and contains the Towns of Carrboro and Hillsborough – the county seat. In this report, several key geographic areas are defined to understand trends and conditions in Orange County within a broader context (Figure 2):

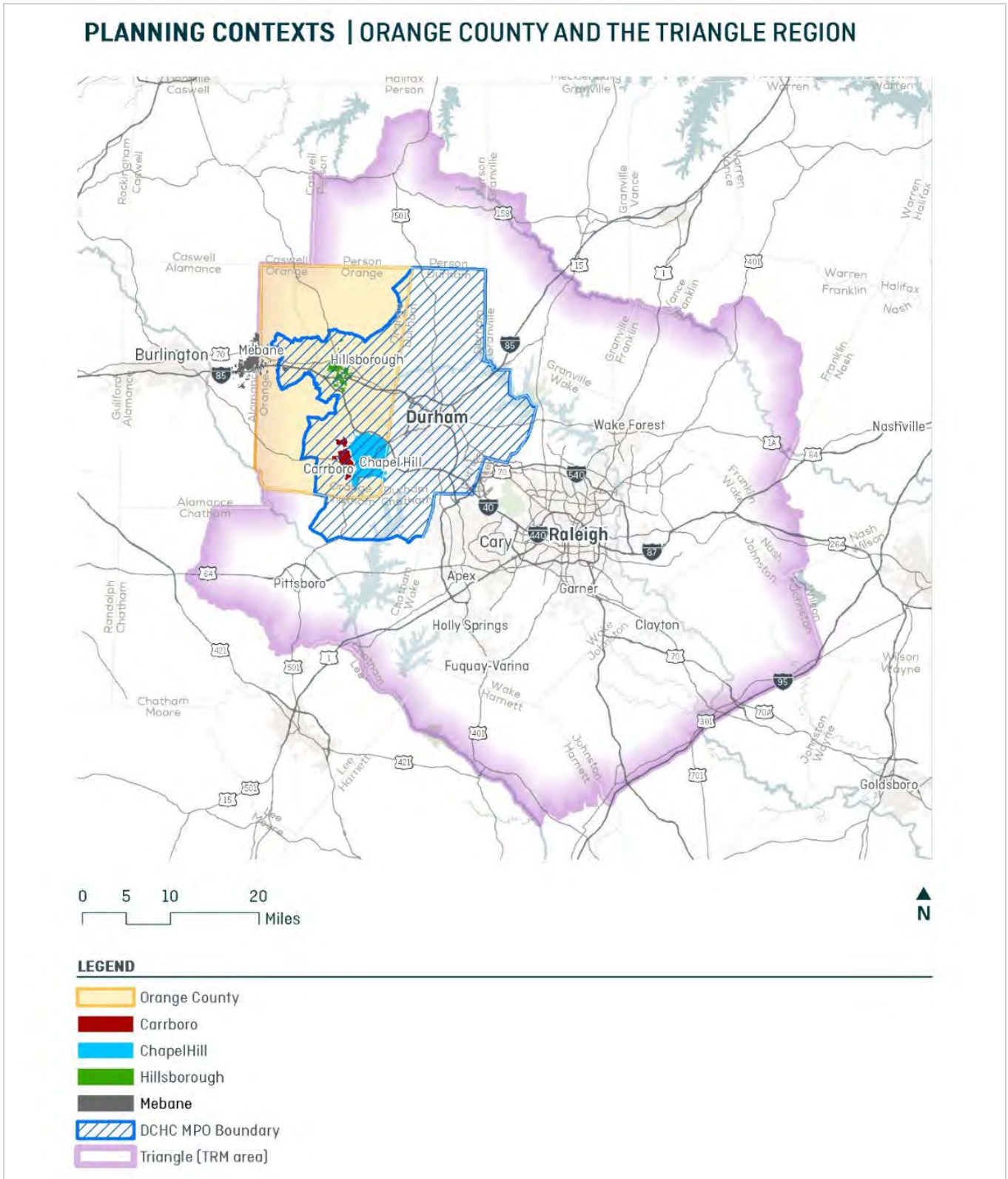

Figure 2 Map of project area.

- The term *local* refers to Orange County and its local jurisdictions, the Towns of Chapel Hill, Carrboro, and Hillsborough.
- The term *regional* refers to all of Orange County plus the DCHC MPO planning area, which covers all of Durham County, and the northeastern portion of Chatham County.
- The term *Triangle* refers to the larger Research Triangle area, as reflected in the Triangle Regional Model (TRM), which is the regional model used for transportation planning and forecasting. The TRM covers all of Orange, Durham, and Wake Counties, plus portions of Chatham, Person, Granville, Franklin, Nash, Johnston, and Harnett Counties.
- The term *extra-regional* refers to locations outside of the areas specified above that generate daily trips to/from Orange County. This primarily refers to locations in Alamance County to the west of Orange County, including the Town of Mebane.

REGIONAL CONTEXT

REGIONAL DEMOGRAPHIC TRENDS

Population and demographic trends impact the region's transit systems. Population continues to grow, attracting individuals and employers from across the nation and the world. Comparing population per square mile in 2012 and 2016 (using census block group data from the American Community Survey) indicates that some of the largest increases in growth are occurring in the region's more rural and suburban areas. Two of the region's largest increases in population density are in southeast Durham County and northwest Chatham County (contiguous to Orange County). Urban areas are also experiencing growth, but at a relatively slower rate than areas outside the region's city centers.

Since 2012, there has been significant growth in the region's share of older residents (age 65 and over). Older populations tend to be concentrated in the far northern and southern parts of the region. Chatham County experienced the largest growth in older residents, with five (5) percent of the county's population falling into this age bracket.

The region has also seen increases in the educational attainment and income of residents. There has been a slight but notable increase in the share of population with higher levels of educational attainment since 2012, particularly in those holding a post-graduate degree. Households earning more than $125,000 annually increased regionally, as well. Higher earning households are generally located in the region's northern and southwestern areas but there is a significant cluster in and around Chapel Hill's urban core. Although there has been an overall regional decrease in households earning less than $25,000 (the lowest reported income bracket), the incidence of extremely low-income households is increasing on the region's fringes, particularly in northern and eastern Durham County.

The region is comparatively more diverse than the state with a larger percentage of Black or African American residents, Asian residents, and residents identifying as other races. Data suggest no recent significant shifts in the composition of the region's racial diversity and the region continues to track closely with state level trends. These include an increase in the Asian population and individuals identifying as two or more races. Durham County has the largest regional share of African American residents, particularly in the City of Durham and in northern portions of the county. Concentrations of Asian residents are found near Chapel Hill and in the southern portion of Durham County, approaching Cary. The region's Hispanic population is concentrated mainly within the City of Durham, with a noticeably higher share east of the city.

Data indicates that many of the region's minority populations reside outside of the region's urban centers. For example, there has been significant growth in the African American population in Orange County north of Chapel Hill and I-85 and I-40. There has been notable growth in Hispanic residents in this same area and to the north and east of Hillsborough.

REGIONAL ECONOMIC TRENDS

Unsurprisingly for a region with numerous universities, colleges, and other educational assets, 19 percent of the region's jobs are in the educational services industry. In Orange County, nearly one-third of jobs are in educational services. The health care and social assistance industry generates a similar share of jobs in the region (nearly 19 percent). Regionally, these two industries generate nearly twice the share of jobs as the region's third highest employing industry – professional, scientific, and technical services (10 percent). Patterns of employment density reflect the regional impact of these industries. Jobs are concentrated near higher education and research facilities, particularly around the Duke Hospital campus, the UNC Chapel Hill campus, and Research Triangle Park (RTP).

Major jobs centers are highlighted in Figure 3 based on TRM zonal jobs estimates. The jobs centers shown in the maps are clusters of traffic analysis zones (TAZs) with moderate-to-high density jobs estimates. Clusters with more than 2,000 total jobs are shown on the map, and centers are shaded by jobs density (jobs per acre). High-density centers are the most suitable for ridership-focused transit services. Figure 3 also includes a chart showing the total jobs by type estimated for each center. The largest jobs centers (Duke Hospital, UNC, and RTP) are characterized by office and service (primarily health care) jobs. Smaller jobs centers often offer a higher proportion of retail jobs and may be key destinations for commuters with limited mobility options apart from transit. Of the three major employment centers located in Orange County, Eastgate/Patterson Place and Chapel Hill/Carrboro have notable shares of retail jobs. Southpoint, South Square, and Brier Creek are examples of retail-heavy jobs centers located elsewhere in the Triangle.

Several new industrial developments have recently been approved in Orange County, that may be worth tracking as potential opportunities for transit service extensions or enhancements, depending on workforce characteristics and travel behavior. One is ABB's expansion in the Orange County portion of Mebane. The announced expansion is projected to generate up to 400 new jobs for local workers. Partnerships with community colleges and technical schools are in place to ensure education and training for potential employees. Another development to keep an eye on is the Research Triangle Logistics Park proposed just off I-40 and within three miles of I-85. RTLP will host over two million square feet of industrial, manufacturing, and warehousing space on 160 acres. The facility is expected to generate up to 1,000 new jobs.

With average annual salaries in the educational services; health care and social assistance; and professional, scientific, and technical services industries ranging from $58,107 to $96,402, a worker earning the average annual salary can comfortably afford a home valued at or near the regional median ($212,400). But there are industry sectors where average earnings are not high enough to support the purchase of a home priced at or near the regional median home value. These include the retail trade; accommodation and food services; administrative and support and waste management; transportation and warehousing; and arts, entertainment, and recreation. Employees working in these industries (that make up nearly one-quarter of regional jobs) are more likely to be housing and transportation cost-burdened.

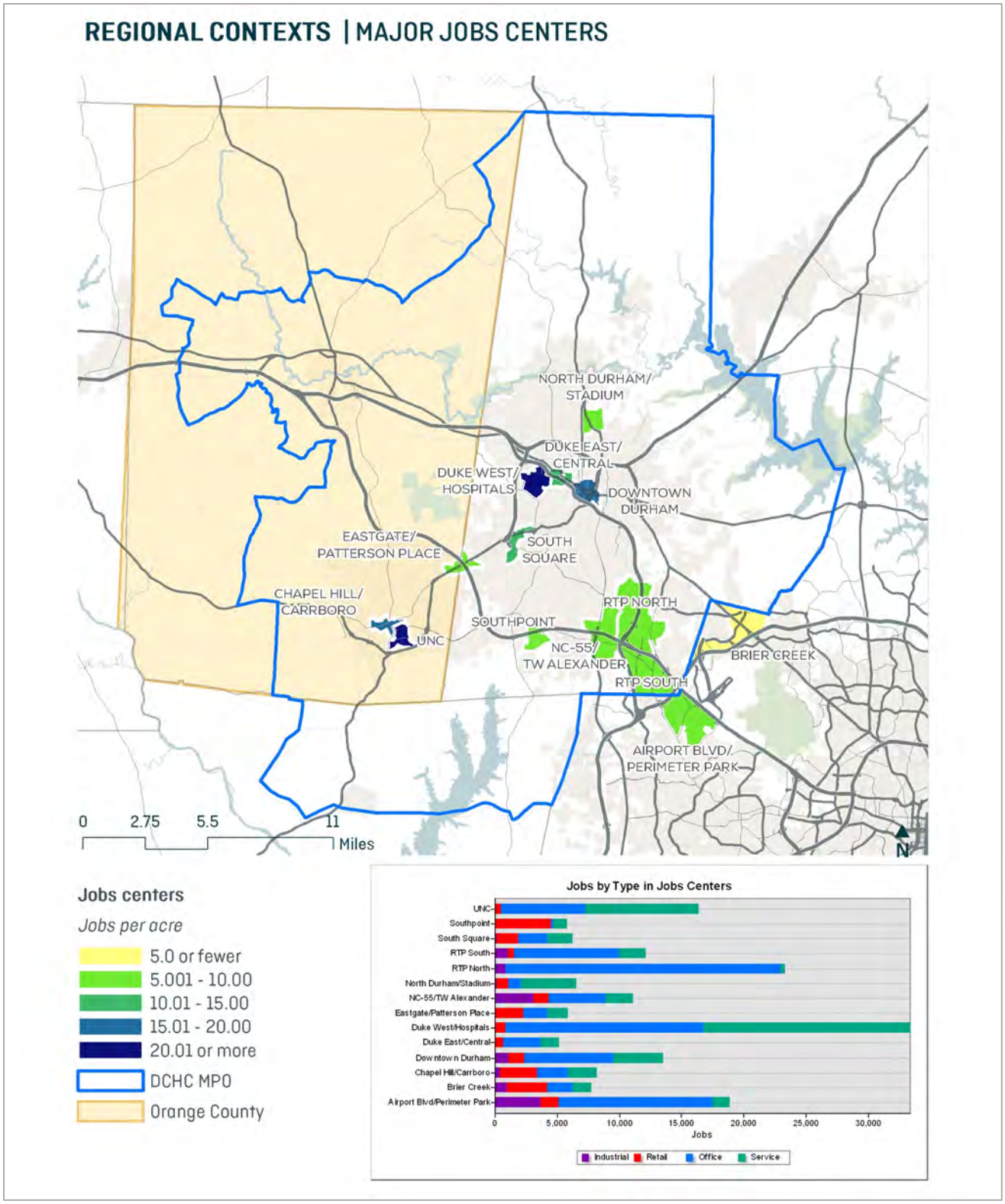

Figure 3 Regional job centers.

Using area median income (AMI) and current interest rates, the approximate value of an "affordable" home for the region can be calculated.[6] For an individual earning regional AMI, an affordable home in the region is approximately $250,000; for the state, an affordable home is around $220,000. This affordability value can then be compared to actual home values to determine how much of the regional housing stock is affordable to households earning AMI. In this region, slightly under 30 percent of the existing housing stock can be called affordable to a resident earning at or near AMI. At the state level, nearly 50 percent of homes are affordable.

Orange County has the highest median home value ($283,000), followed by Chatham County ($251,600), and then Durham County ($195,900). Median values reflect the relative affordability of the housing stock in each county. Durham County has a higher share of affordable and potentially affordable homes; Orange County has the highest share of homes that are not affordable and the lowest share of affordable homes. Chatham and Durham counties have a comparable proportion of affordable homes as a share of total housing stock. Most housing falling into the "affordable" range is developing in the area between I-40 and US 15-501 between Chapel Hill and Durham, south of NC-54 and west of US 15-501 near Chapel Hill, east of Hillsborough, and in the southern part of Durham County.

REGIONAL COMMUTER FLOWS

Regional Commuter Flows

Within the DCHC region, home-to-work commuter flows are characterized by strong pulls towards several key job centers (Figure 4). These include (in order of relative magnitude) North Durham to Duke/Downtown Durham; East Durham to Duke/Downtown Durham; the Southpoint area of Durham to Duke/Downtown Durham; Chapel Hill to Duke/Downtown Durham; Carrboro to Chapel Hill; and Hillsborough to Durham. The demand for connections between Chapel Hill and Durham; Hillsborough and Durham; and Carrboro and Chapel Hill may present opportunities for expanding transit service along key regional corridors such as US. 15-501; I-85; and US 70.

[6] This calculation assumes a 30-year fixed rate mortgage, no down payment, and capping housing costs at 25% of income.

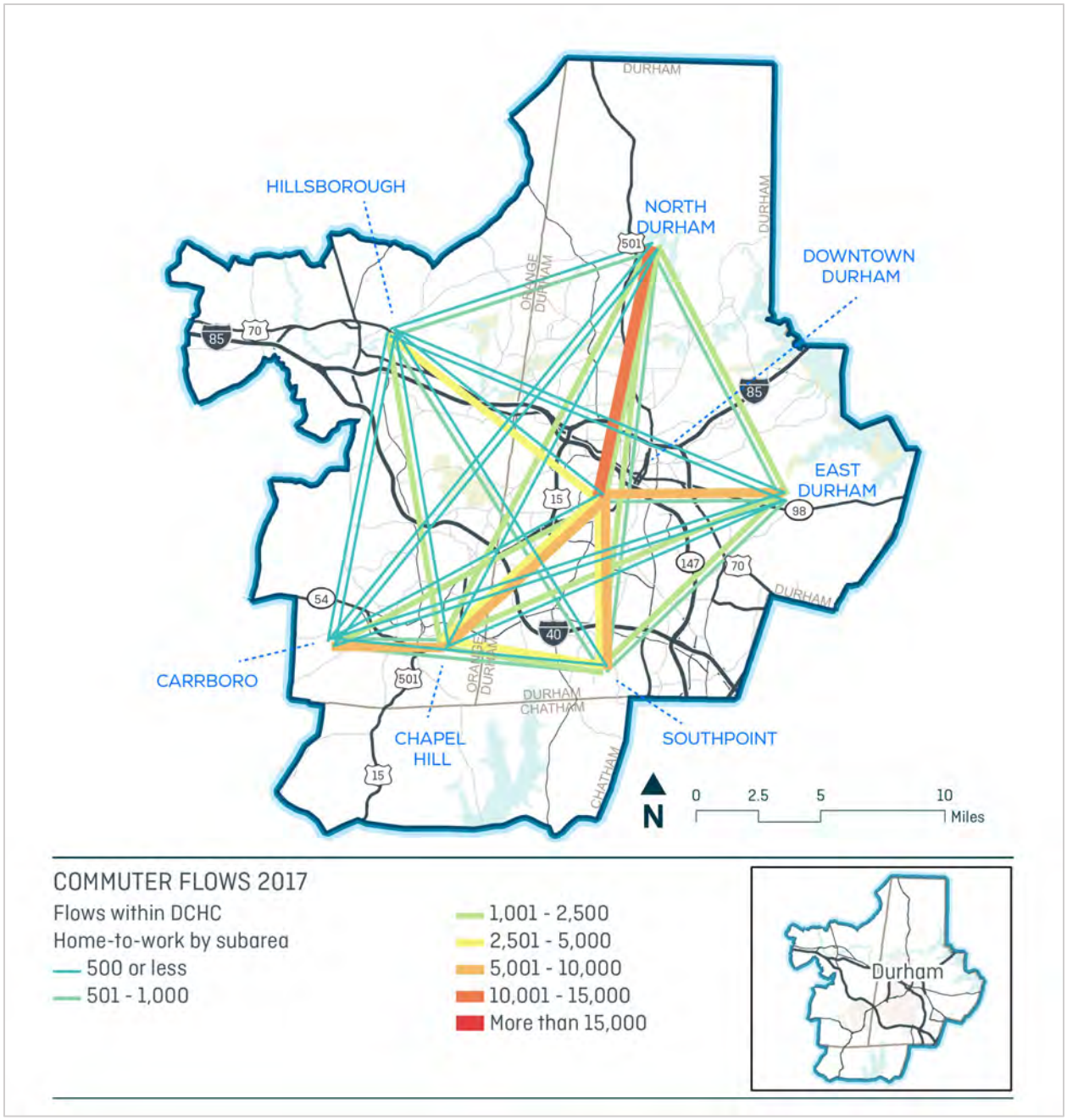

Figure 4 Commuter flows within the DCHC Region

Commuter Flows in the Greater Triangle and Extra-Regional Areas

Commuter flows in the Triangle Region are dominated by flows between Wake County and Research Triangle Park; flows between Wake County and Duke/Downtown Durham; and flows between Wake County and Chapel Hill (Figure 5). There are relatively lighter flows between Chatham County and Chapel Hill; Alamance County and Chapel Hill; Alamance and Duke/Downtown Durham; and Alamance and Hillsborough. The greatest opportunities for

regional transit connections are between Wake County and Chapel Hill; between Wake County and Duke/Downtown Durham; and between Wake County and RTP.

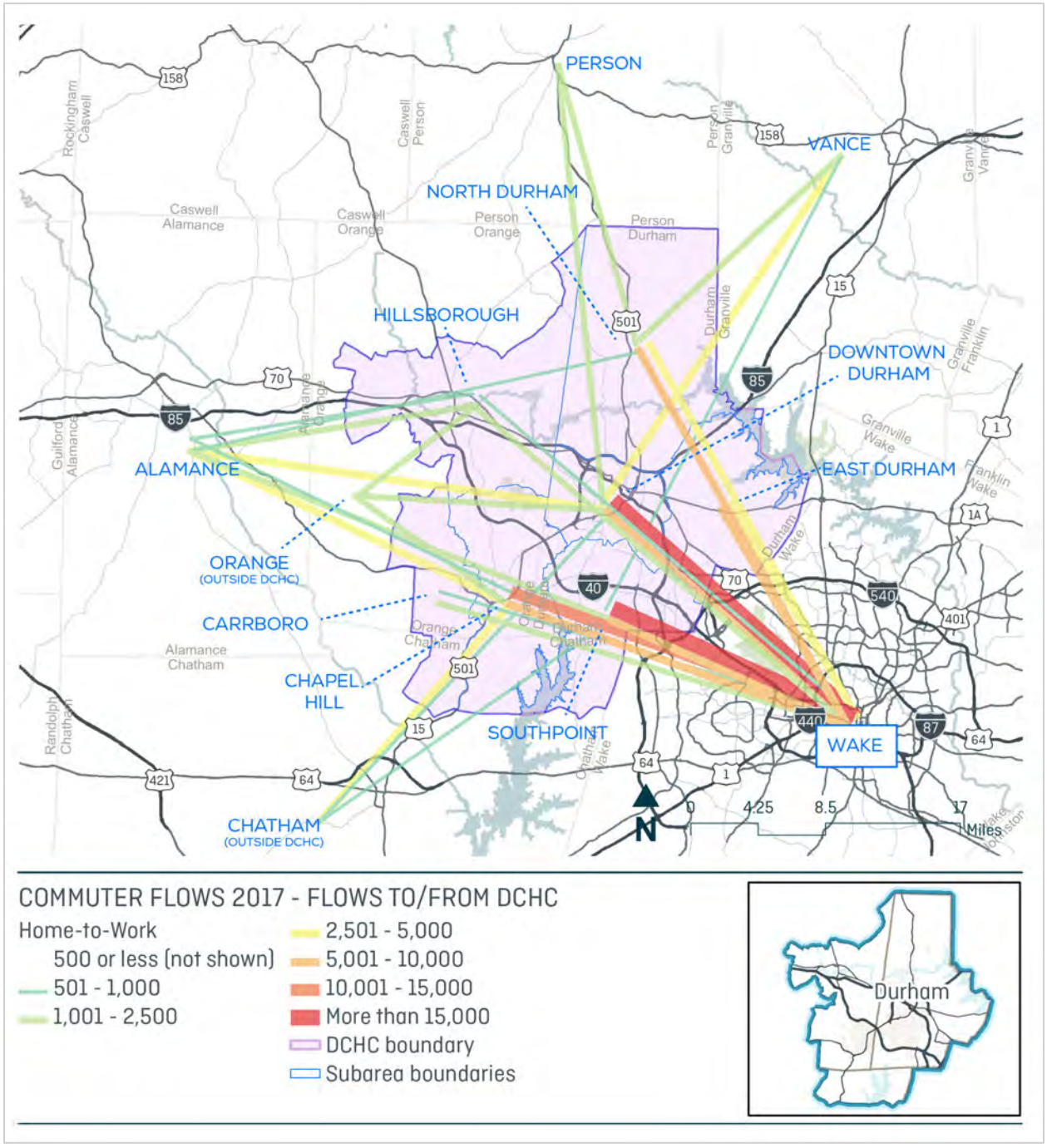

Figure 5 Commuter flows to/from the DCHC Region

REGIONAL DEVELOPMENT TRENDS

Developments of Regional Significance

Larger developments and development patterns are likely to impact transit on a regional level and should be considered as part of transit system design planning.

Chatham Park[7]: One major development likely to impact transit on a regional level is Chatham Park located just outside of Pittsboro in Chatham County. When complete, Chatham Park will be a 7,000-acre community featuring more than 20,000 homes and 22 million square feet of office, research, retail, and community space. Early phases of the project are currently underway, but the development will not be complete until at least 2050.

Regional Transit Trends

Durham Orange Light Rail Transit (DOLRT)

There are several regional land use and development trends and decisions likely to impact transit investment decisions in Orange County. The first is the discontinuation of the Durham-Orange Light Rail Transit (DOLRT) project in April 2019. The ending of this project is significant on several levels. First, the DOLRT was meant to help mitigate the transportation impacts of regional growth while supporting vibrant, walkable communities and connecting residents to jobs, education, and health care. This project's end also means that the region lost its primary plan for investing in enhanced commuter transit service, to alleviate congestion from continued growth. Additionally, many of the region's land use and development plans developed over the last decade assumed construction of the DOLRT and directed growth and development to what was to be the region's primary transit corridor. Planned station areas were targeted for higher-density residential and commercial development to promote transit-oriented or transit-supportive development (TOD). The DOLRT's discontinuation means that many areas flagged for more intense growth now lack the transit service meant to support them.

Commuter Rail Transit

As planned, the Commuter Rail Transit (CRT) project runs 37 miles along the North Carolina Railroad (NCRR) Corridor between Garner and West Durham with stops at downtown Raleigh, N.C. State, Cary, Morrisville, and Research Triangle Park (Figure 6). Up to eight trips in each direction during peak hours are possible with up to two trips each way during midday and evening hours. The CRT would utilize an existing rail corridor owned by NCRR and operated/maintained by Norfolk Southern Railway meaning the CRT would share the tracks with both commuter (AMTRAK) and freight trains. It is likely that additional tracks would be needed to accommodate the added capacity generated by the CRT. Preliminary findings suggest that travel between the CRT's endpoints would be faster and more reliable than vehicular travel (both private and public); that ridership in the Triangle would be comparable to ridership on peer systems across the country; and that 30-minute peak service with more limited off-peak service is the most productive service scenario.[8] Orange County opted out of the current CRT project but destinations in the County remain regional priorities. Future service could potentially be expanded as far west as Mebane providing a new and reliable way for commuters to reach destinations to the east including Durham, RTP, RDU, Raleigh, and beyond.

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[7] https://www.prestondev.com/chatham-park
[8] http://goforwardnc.org/wp-content/uploads/2018/03/PRES_GTCR-Prelim-Results-191218_DRAFT_v5.1-for-web.pdf

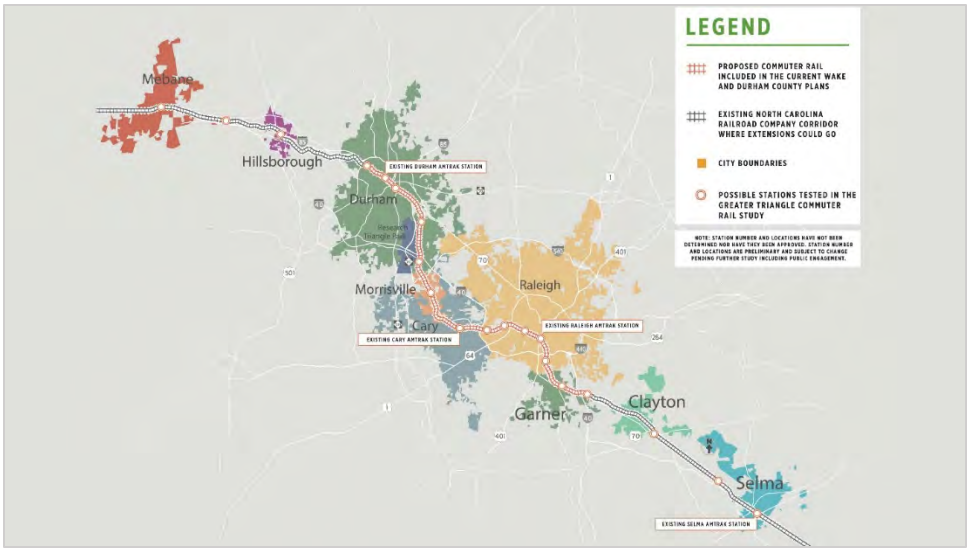

Figure 6 Proposed Commuter Rail Transit Route

Freeway and Street Based Transit (FAST) Network Study

FAST is a joint study by the Regional Transportation Alliance (RTA) business coalition, GoTriangle, NCDOT "to inspire, inform, and advance ideas for improving regional connectivity." The strategic goal of the FAST study is to institutionalize transit advantage on the state highway system to make transit more attractive, effective, and reliable. The study's stated benefits of this approach include improving travel time and reliability, reducing transit operating costs, increasing transit ridership, and preparing roadways for future transit service. The FAST study offers a phased approach integrating transit advantage elements including traffic signal priority (TSP), queue jump lanes, RED lanes, floating bus stops, and more. Streets and highways with these elements connect to key transit corridors including planned bus rapid transit (BRT) corridors and the proposed Commuter Rail Transit (CRT). Several key travel corridors are in Orange County including I-85 (proposed FAST freeway) and Chapel Hill Transit's North-South BRT project (Figure 7).

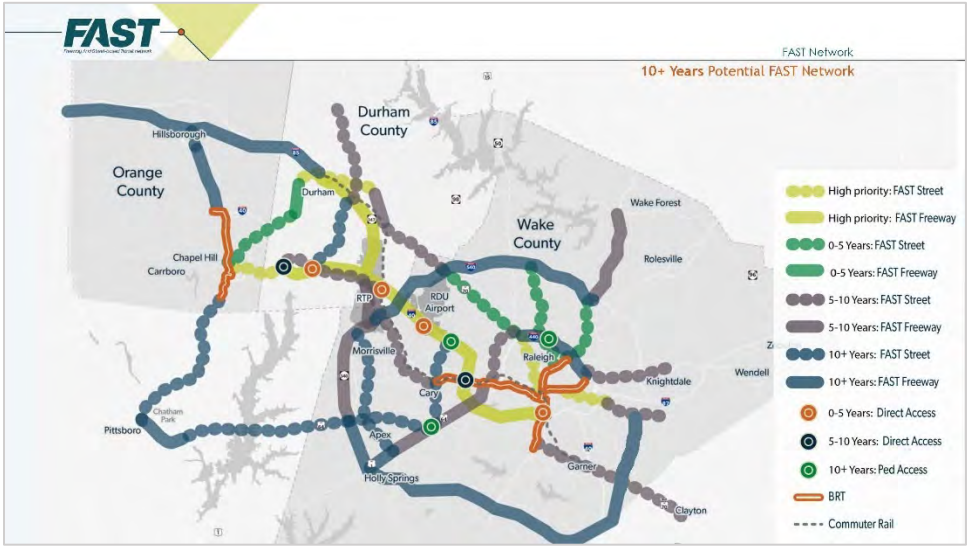

Figure 7 10+ Years Potential FAST Network

LOCAL CONTEXT

Orange County is centrally located in North Carolina's Piedmont, part of the Research Triangle Region. Three municipalities are contained entirely within the county – the Towns of Chapel Hill, Carrboro, and Hillsborough. The county's population is largely concentrated within the urbanized areas of the towns, though there are several rural communities including Efland and Cedar Grove. Additionally, part of Mebane falls within Orange County although most of that municipality is within Alamance County.

Orange County was originally inhabited by the Eno, Occaneechi, and Haw tribes of Native Americans. Later colonizers included the English, German, Scotch-Irish, and Welsh. The county played a pivotal role in the lead up to the American Revolution due to the Regulator Movement – North Carolina residents who instigated armed rebellion against corrupt colonial officials. In 1789, the flagship campus of the University of North Carolina system was established in Chapel Hill.

Like many areas in the American south, the county's development was rooted in agriculture (tobacco, cotton) and influenced by the railroad's arrival in the mid-1800s. The railroad's connections to national and international markets and the manufacturing advances of the Industrial Revolution combined to form the foundation of the Piedmont's textile industry. The region's strong grip on textiles manufacturing continued into the mid to late 20th century but then began to see a precipitous drop off, likely due to competition from overseas producers. A strong agricultural tradition still exists in Orange County today, though the county's economy has evolved and diversified to embrace new industrial sectors such as life sciences and biotechnology. The establishment of Research Triangle Park (RTP) in 1959 ensured the region's place in the new global economy. Information and knowledge-based sectors are strongly supported by the region's numerous universities, nearby international airport, high quality of life in the region's communities and an entrepreneurial spirit.

Today, approximately 143,000 residents call Orange County home, an increase of approximately 13,000 residents since 2010.[9] Median age remains relatively low (34.7) though the County has seen an increase in the share of the population aged over 65 (9.4% in 2010, 12.8% in 2018). The share of residents under the age of 18 has remained stable over the last decade (20.0% in 2010 compared to 20.9% in 2018). Racial diversity in the county remains varied though trends indicate small shifts in the racial make-up of the county. The share of white residents (76.0% in 2010 and 74.5% in 2018) and residents identifying as Black or African American have both slightly decreased (12.1% in 2010 and 11.6% in 2018). Asian residents (6.6% in 2010 and 7.8% in 2018) and residents identifying as Hispanic or Latino of any race (7.4% in 2010 and 8.4% in 2018) have both increased over the same period.

Residents of Orange County are highly educated. Over a quarter of the population hold a bachelor's degree and the rate of master's degree attainment hovers near 30% - a figure that has not changed significantly over the last decade. Unemployment remains low (4.2% in 2010 and 2.9% in 2018) though this figure will likely change due to the impacts of the COVID-19 pandemic and quarantine.

Median household income tracks closely with the national average but over 35% of households in Orange County report earning $75,000 or more. While cost of living in North Carolina remains

[9] 2018 ACS 5-year Estimate, U.S. Census Bureau; 2010 ACS 5-year Estimate

lower than the national average, over half of all renters report spending more than 30% of their gross monthly income on housing each month.[10] This figure only incorporates housing costs which may underestimate the amount a household spends each month since the figure neglects to incorporate transportation costs.

The county's largest employers are UNC Chapel Hill, UNC Health Care, and Chapel Hill-Carrboro City Schools. The county's largest private employer is Eurosport (Sports Endeavors, Inc.) a distributor of sports equipment and apparel. Like the larger region, most residents are employed in the educational services, and health care and social assistance sector (39.1% of the workforce in 2018) followed by professional, scientific, and management, and administrative and waste management services (12.9%, 2018).

Most county residents have at least one vehicle available, but it is likely that there are spatial variations in this data which will be explored in later sections of this report (i.e., it is likely that there are concentrations of areas where residents are less likely to have a vehicle available). Most employees travel to work alone in a car, truck, or van. Some workers carpool but the share of carpooling workers has decreased between 2010 and 2018 (11.3% and 7.1%, respectively). Notably, there have been no changes in the share of workers who use public transportation to reach work (7.1% in both 2010 and 2018). There has been a small increase in the number of employees who walk to work (5.0% and 6.1% in 2010 and 2018, respectively) but no change in the share of residents cycling to work (1.8%). There has been a more significant increase in the share of employees working from home (6.3% and 9.1% in 2010 and 2018, respectively), a figure that is likely to increase given continued technological innovations and the COVID-19 pandemic and quarantine. Mean travel time to work has increased by nearly one minute since 2010 (21.8 as compared to 22.9 minutes in 2018).

LOCAL DEVELOPMENT ACTIVITY

At the local level, development trends continue to demonstrate robust growth. Residential development is notably strong. Mixed-use and apartment style construction is occurring near urban centers such as Chapel Hill and Hillsborough; single-family detached construction tends to be concentrated in more rural parts of Orange County. Residential development is also occurring in Mebane with many residential properties including apartments, townhomes, and single-family homes in the construction pipeline. Recent and proposed mixed-use, multifamily, and large single-family developments with the potential for enhanced transit service connections are included below.

Carrboro

Ballentine: Located north of Harmony Farms and east of Old NC 86 this approved developed is 96 units (60 single-family homes and 36 townhomes) on a little more than 52 acres of land.

CASA Merritt Mill Affordable Housing: Project consisting of 48 affordable units near Lincoln Center (Chapel Hill-Carrboro City Schools) on the north side of Merritt Mill Road. Twenty-four units are in Carrboro and 24 are in Chapel Hill. Both towns must approve the project.

Lloyd Farm Property: Located at the corner of Old Fayetteville Road and Highway 54 in Carrboro, this is a mixed-use project containing multiple commercial buildings on multiple parcels

[10] https://worldpopulationreview.com/state-rankings/cost-of-living-index-by-state

including an anchor grocery store and several outparcels. It includes a 293-unit residential apartment complex and 15 townhome units.

Winmore: A “village mixed use project” at 1400 Homestead Road. As approved, the project includes 104 single-family lots, 59 multifamily townhome lots, 68 multifamily apartments, and 20 commercial lots. A minimum of 58 units will meet Carrboro’s affordable housing criteria.

Chapel Hill

AURA Chapel Hill: Located at the northeast corner of Martin Luther King Jr. Blvd. and Estes Drive, AURA is a proposed 14.7-acre mixed-use (retail/office, live-work space, and market-rate and affordable multi-family) development accessible to the proposed Chapel Hill Transit N-S BRT route.

Blue Hill District: Surrounding the intersection of Fordham Boulevard and Ephesus Church Road, the vision of the Blue Hill District is to create a pleasant walking experience, and a mix of commercial uses, upper story residences and offices, bike paths and sidewalk cafes. To support this vision, a form-based code was adopted for the district in 2014. This area represents an opportunity for enhanced transit service in an area of relatively higher residential density.

Bridgepoint: At Homestead Road this proposed development is 53 individual townhouses with 5 affordable housing units. Note - primary access to the development is proposed from Weaver Diary Road Extension.

Carraway Village: Currently in Phase 2 of development, Carraway Village features 900,000 sq. ft. of multi-family residential, commercial/retail, including drive-up windows, office, and hotel. The development is on Eubanks Road, adjacent to Eubanks Road Park and Ride Lot (and the northern terminus of the planned N-S BRT) and near the intersection with NC-86/ Martin Luther King Jr. Blvd. The property also abuts the I-40 Interchange with NC-86/ Martin Luther King Jr. Blvd.

University Inn: Located in Chapel Hill’s Blue Hill form-based code district, the proposed redevelopment of the University Inn property on Fordham Boulevard will demolish existing buildings on-site and construct approximately 341 one- and two-bedroom residential units and approximately 18,450 square feet of commercial space within the northerly portion of the site (Fordham Blvd/Ephesus Church Road intersection). Structured parking will be provided internal to the site. Courtyards, a community garden, and recreation space are proposed for the site.

University Place Redevelopment: A proposed redevelopment of the 42-acre site of the existing University Place Mall on East Franklin Street. A portion of the existing mall will be removed and replaced with a central gathering area and pedestrian access. New structures, potentially including a structured parking facility, are proposed along Willow Drive. Where new buildings are constructed, the intention is to bring these buildings closer to the surrounding street.

Weavers Grove Community: Located at 1516 Sunset Road in Chapel Hill, this is a proposed Habitat for Humanity affordable housing residential community with up to 243 dwelling units, including 99 affordable units, a community center, café, and amenities. Public transit should be a key consideration during the planning stages of this project given the high percentage of affordable homes.

Hillsborough

Corbinton Commons: On 70 East, this age-restricted neighborhood is currently under construction. Single-family houses are available to buyers 55 years of age and older without minors in the household. The developer has the option to construct a continuing care retirement community and support facilities with partner Duke Wellness.

Collins Ridge: Located at the east end of Orange Grove Road in Hillsborough, this development is 950 dwellings of different types and market targets (houses, townhouses and apartments) including 88 affordable rental units.

Crescent Magnolia: A 24-townhome community for seniors built by Habitat for Humanity and located at 265 College Park Road. 20 of 24 units are currently complete.

Forest Ridge: Located on US 70A, 233 acres of single-family units and 25,000 square feet of mixed-use development on 18.77 acres. A public trail from U.S. 70-A North connects to the Riverwalk/Mountains-to-Sea Trail Extension.

Waterstone: This mixed-use development in Hillsborough has an approved master plan covering 330 acres of potential development including 134 single-family detached units (approved); 599 attached housing units (328 townhouses and 271 apartments), with additional dwellings possible; and 1.08 million nonresidential square feet (390,000 square feet approved).

Harmony at Waterstone: Part of the Waterstone development, located across from the driveways to UNC Hospitals Hillsborough Campus, this development is 200 townhouses on 42.2 acres.

Mebane[11]

The Meadows: A residential development on 132 acres consisting of 369 total housing units (318 single family homes and 51 townhomes) on Bowman Road.

Bowman Village and Bowman Place: 77 single-family homes on +/-69.22 acres at the corner of Bowman Road and Rock Quarry Road, outside the Mebane city limits. The property will require annexation prior to action by the City Council. The developer is requesting a conditional rezoning from AR (Orange County zoning) to R-12(CD).

Orange County

Hart's Mill Master Plan Residential Community: A village style development with approximately 34 dwelling units.

[11] Only new developments in the Orange County portion of Mebane are included

EXISTING PLAN REVIEW

The 2020 Orange County Transit Plan Update directly impacts transportation networks within and beyond Orange County. The existing plan review examines local and regional visions for growth from a transit planning perspective. Plans are catalogued and discussed, and elements potentially impacting transit are identified. Specifically, plans were reviewed to identify potential opportunities for transit-oriented development (TOD) and other elements supporting enhanced transit service and/or transit-related infrastructure. Table 1 provides a summary list of the plans reviewed for this report. Transit-relevant findings are reported in the section below.

PLAN	JURISIDICTION	YEAR
State Transportation Improvement Program (STIP)	NCDOT	2020
Statewide Strategic Public Transportation Plan		2018
Environmental Justice Report	DCHC MPO	2020
US 15-501 Corridor Study		2020
2045 Metropolitan Transportation Plan (MTP)		2018
Comprehensive Transportation Plan (CTP)		2017
BGMPO Metropolitan Transportation Plan 2045	Burlington-Graham MPO	2020
Orange County Comprehensive Transportation Plan (CTP)	Triangle Area Rural Planning Organization	2013
Buckhorn Area Plan	Piedmont Triad Regional Council	2020 (draft)
GoTriangle Short-Range Transit Plan	GoTriangle	2018
Efland-Buckhorn-Mebane Access Management Plan	Orange County	2019
Orange County Public Transportation Short Range Transit Plan		2018
Master Aging Plan		2017
Eno Economic Development District Access Management Plan		2013
Eno Economic Development District Small Area Plan		2008
2030 Comprehensive Plan		2008 (as amended)
Highway 57 Speedway Area Small Area Plan		2007
Downtown Parking Plan	Carrboro	2017
Community Climate Action Plan		2017
Carrboro Economic Sustainability Plan		2017
Safe Routes to School Strategic Action Plan		2012

PLAN	JURISIDICTION	YEAR
Comprehensive Bicycle Transportation Plan		2009
Carrboro Parking Study		2008
Downtown Carrboro New Vision Charette Report		2001
Carrboro Vision 2020		2000
Chapel Hill Transit Short-Range Transit Plan (2020)	Chapel Hill	2020
Mobility and Connectivity Plan		2017
West Rosemary Development Guide		2017
North-South Corridor Study		2016
Greenways Master Plan		2013
2020 Comprehensive Plan		2012
Chapel Hill/Carrboro Long Range Transit Plan		2009
Bike and Pedestrian Action Plan		2004
Hillsborough Vision 2030	Hillsborough	2015
Parks and Recreation Master Plan		2014
Hillsborough Rail Station Small Area Plan		2010
Downtown Parking Study		2010
Community Connectivity Plan		2009
US-70/Cornelius Street Corridor Strategic Plan		2007
Strategic Growth Plan		2006
Churton Street Corridor Strategic Plan		2006
City of Mebane 2040 Comprehensive Transportation Plan	Mebane	2018
Mebane Downtown Vision Plan		2018
Mebane Comprehensive Land Development Plan		2017
Mebane Bicycle and Pedestrian Transportation Plan		2015

Table 1 Summary of reviewed plans.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

State Transportation Improvement Program (STIP) (2020)

The STIP is a multi-year capital improvement document which denotes the scheduling and funding of construction projects across the state over a minimum 4-year period as required by federal law. North Carolina's STIP covers a 10-year period, with the first six years of each programming period referred to as the delivery STIP and the latter four years as the developmental STIP. The STIP is updated every two years and approved by the state Board of

Transportation. The STIP is submitted to Federal Highway Administration (FHWA) & Federal Transit Administration (FTA) for approval at least every 4 years; is fiscally constrained by year; and is presented for public comment prior to adoption. The following projects within the 2020-2029 STIP directly relate to transit in Orange County:

- NC 86 (South Columbia Street) to NC 54 (Raleigh Road). Capacity improvements, with sidewalks, wide outside lanes and transit accommodations.
- NC 54 (Raleigh Road). To SR 1742 (Ephesus Church Road). Capacity improvements, with sidewalks, wide outside lanes and transit accommodations
- US 15 / US 501 in Orange County to SR 1116 (Garrett Road) in Durham County. Bicycle, pedestrian, and transit improvements; and construction of roundabout.
- Triangle Transit Authority: routine capital - bus stop shelters, benches, shop equipment, spare parts, engines, farebox, service vehicles, etc. includes ADA, PM and service vehicles
- Purchase expansion vehicles for CRX route (GoTriangle)
- Town of Hillsborough. Construct park-and-ride lot.
- UNC hospitals area in Chapel Hill. Construct neighborhood transit center transfer station. 400; 405; 420; 800; 805; CRX; FCX
- Several new vehicles for OCPT.

Statewide Strategic Public Transportation Plan (2018)

This plan called “Connecting North Carolinians to Opportunity” establishes a collective transit vision of connecting North Carolinians to opportunities via three strategies: Building Thriving Healthy Communities, Improving Access to Jobs and Economic Development, and Connecting Communities to Opportunities. The plan contains several recommended actions including Building Connections, Fostering Regional Partnerships, Breaking Down Silos, Leveraging Regional Multi-MPO Planning, and Prioritizing Transit Effectively. Orange County is noted as a rapid growth area in the plan.

DCHC MPO

Environmental Justice Report (2020)

This document covers identifies Communities of Concern (COC) within the DCHC region to help determine if transportation-related impacts have adverse or inequitable impacts on these communities. COC are defined as any geographic area where the percentage of any environmental justice (EJ) population is greater than the regional threshold for that particular EJ population. The study identifies several historic EJ neighborhoods in Orange County including Pine Knolls and Northside in Chapel Hill, and White Rock Church, Efland, and Fairview in unincorporated Orange County. Several areas in Orange County have overlapping communities of concern (i.e., more than one demographic factor with EJ implications). The report also identifies the location of these overlapping communities of concern relative to ongoing or proposed transportation projects.

US 15-501 Corridor Study (2020)

The goal of the study was to Reimagine US 15-501 as an integrated, multimodal corridor informed by a community vision and goals, and supported by strategies that lead to the implementation of that vision. One segment of the study corridor is in Orange County (Ephesus Church Road to the

county line); the remainder of the study area is in Durham County. The study addresses several key issues related to transit including gaps in the existing transit system; corridor served by multiple transit agencies; difficult to efficiently serve existing development from US 15-501; challenging to provide local service along the corridor; bus operations impacted by congestion and delay.

2045 Metropolitan Transportation Plan (MTP) (2018)

"Connect 2045" is the guiding document for future investments in roads, transit services, bicycle and pedestrian facilities and related transportation activities in the Research Triangle Region. This MTP was developed by the two organizations charged with transportation decision-making in the Research Triangle Region: Capital Area Metropolitan Planning Organization (CAMPO) and Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC). Specific transit projects impacting Orange County included in the 2045 MTP are:

- Chapel Hill Transit North-South Corridor BRT: an 8-mile, 16-station project along the primary north south corridor in Chapel Hill, Martin Luther King Jr. Blvd. and Columbia Street. It is currently in FTA's Small Starts Project Development program. Additional environmental analysis and project design is underway, and revenue service anticipated to begin before the end of the 2025.
- A westward extension of the rapid rail system from west Durham to Hillsborough, where a new Amtrak intercity rail station is currently being develop (scheduled for 2036-45).

Comprehensive Transportation Plan (CTP) (2017)

This is a long-range multimodal transportation plan that covering transportation needs through 2040. Modes of transportation evaluated in this plan include highway, public transportation and rail, bicycle, and pedestrian. Several projects relevant to the 2020 Orange County Transit Plan include:

- Realignment of Eno Mountain Road (SR 1148) at the intersection of Mayo Street (SR 1192) and Orange Grove Road (SR 1006) with on-road bicycle, pedestrian, and bus accommodations.
- Orange Grove Road Extension: Construct a new 4-lane divided boulevard facility with bicycle, pedestrian, and bus accommodations.
- NC 86 (S Columbia St) – Ephesus Church Rd: capacity improvements and intersection/ interchange improvements with sidewalks, wide outside lanes, and transit accommodations.

GOTRIANGLE

Short-Range Transit Plan (2018)

The GoTriangle Short-Range Transit Plan (SRTP) provides an integrated blueprint for how the agency will develop and implement regional bus service through FY 2027 and is centered on three goals: Make service faster and more time-competitive; provide more frequent service; and provide more all-day service. Near-term priorities relevant to the 2020 Orange County Transit Plan Update include:

- Improve speed, consistency, and frequency of service in the US 15-501 corridor.

- Support flourishing Orange-Durham commute service with increased frequency and speed.
- Increase reliability of commuter service between Hillsborough and Chapel Hill.
- Increase frequency of Orange-Durham Express (ODX) from hourly to 30 minutes at peak. Realign service to use I-85 and I-40 instead of US-70, removing stops currently served as part of reverse-peak trips.
- Realign service on the 420 route (Hillsborough-Chapel Hill) from Old NC-86 and US-70 to Churton St and I-40.

BURLINGTON-GRAHAM MPO

BGMPO Metropolitan Transportation Plan 2045 (2020)

A portion of Orange County falls within the Burlington Urbanized Area and within the Burlington Graham MPO. The BGMPO 2045 Metropolitan Transportation Plan updates the Metropolitan Transportation Plan (MTP) for the Burlington-Graham Metropolitan Planning Organization (BGMPO) planning area. The study was conducted over a sixteen-month period beginning in March 2019 and concluding in June 2020. Several transit projects related to Orange County are found within the MTP including:

- Two New Circulator Routes /Eastern Burlington (OCPT)
- Purchase One Replacement Vehicle (OCPT)
- Purchase One Transit Bus for Mebane Park and Ride (OCPT)
- ODX Orange-Durham Express Route Frequency Increase and Realignment: Frequency increase to every 30 Minutes during Peak was proposed in GoTriangle Short-Range Transit Plan (2018); reverse commute stops would be eliminated, and the route would primarily travel along I-40/I-85 corridor without significant deviation
- NC 54 Express Bus Route: An NC 54 Express Bus Route would connect from Graham park and ride lot to a transfer point in Orange County near Carrboro. In the preliminary ridership analysis for MTP 2045, this route did not perform as well as some of the other transit expansion options considered. This will likely be a very long-term option.
- With the discontinuation of Durham-Chapel Hill Light Rail project, both Durham and Orange Counties are planning transit plan updates, which might include consideration of a Durham to Mebane Commuter Rail service.

TRIANGLE AREA RURAL PLANNING ORGANIZATION

Orange County Comprehensive Transportation Plan (CTP) (2013)

The Orange County Comprehensive Transportation Plan (CTP) includes only the rural areas of the county (no municipalities) not included in an MPO. The planning area is the Triangle Area Rural Planning Organization (TARPO) area of Orange County, outside the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC MPO) and the Burlington Graham Metropolitan Planning Organization (BGMPO). It is a long-range multi-modal transportation plan that covers transportation needs through the year 2035 including highway, public transportation and rail, bicycle, and pedestrian. The goals of the 2030 Orange County Comprehensive Plan guided development of the CTP. Several public comments addressed transit notably that survey takers generally don't want more roads - instead want more public transit, as well as more mixed-

use development and consolidated growth and that there is interest in rail service to connect the Triangle.

PIEDMONT TRIAD REGIONAL COUNCIL

Buckhorn Area Plan (2020)

This draft plan is a technical study of future land use and potential utility services to identify properties that could be zoned for nonresidential purposes and best support economic development, while balancing the cost of utility service extensions. The boundaries for this plan focus area are the rail line to the North; Ben Wilson and Mattress Factory Road to the west, Mt Willing Road and parcels along the I-85 connector to the East; Bushy Cook Road and Seven Mile Creek to the South. Recommendations in this plan include the expansion of manufacturing, wholesale, distribution, and service uses in the Buckhorn Area. With this expansion of the Buckhorn Economic Development District, the plan also recommends additional land use districts to incorporate a new zoning district that encourages documented research, office and manufacturing facilities and support walkability, mixing of uses and practical design that is compatible with the surrounding land uses. The Orange-Alamance Connector does not currently stop inside the study area but travels through the study area on I-40 from Mebane to Hillsborough. There is also a Park and Ride located at the Cone Health MedCenter, just west of this study area and accessible from the Mebane Oaks Road interchange with I-40/85. This location provides connections between the Triangle and the Triad and is served by the GoTriangle ODX line, PART Route 4, Link Red Route, and Alamance County Transportation Authority (ACTA). The Burlington Graham MPO TAC approved the Mebane Park and Ride Relocation Study Special Study for FY2021. The purpose of the study is to establish site parameters and evaluation criteria for a new 150-200 space park and ride to be shared by GoTriangle, PART, and Orange County Public Transit.

ORANGE COUNTY

Efland-Buckhorn-Mebane Access Management Plan (2019)

The Efland-Buckhorn-Mebane Access Management Plan (E-B-M AMP) is a combination of the original adopted 2011 E-B-M AMP; a 2017 Transportation Study; and County Planning, City of Mebane, and public comments. It is a long-range transportation vision for the area illustrating the roadway alignments and corridor widths necessary to serve future land uses and address traffic impact as development occurs. It is also a plan helping the County in promoting economic development through its development review process by encouraging developers to dedicate right-of-way necessary for future roads. The plan ensures that future road designs consider all available options as development occurs including transit services and the plan states that Orange County will promote transit practices as potential options in the planning area. Orange County Public Transportation currently operates one route in the planning area (Orange-Alamance route). Consideration will also be given to transit in the planning area as additional routes are added.

Orange County Public Transportation Short Range Transit Plan (2018)

OCPT's Short Range Transit Plan (SRTP) assesses the market for transit service, operations in Orange County, and prioritizes future recommendations. Key plan findings include:

- There is opportunity to improve ridership on existing services. The Hillsborough Circulator and the Orange-Chapel Hill Midday Connector serve approximately 64 and 15 average daily riders, respectively.
- Population density in Orange County outside of Chapel Hill and Carrboro is relatively low. Most of the county does not have the population or employment density to support fixed-route transit.
- The most common commute destinations for north Orange County residents are to Hillsborough, Durham, and Chapel Hill.

Top public priorities (identified during public outreach) are improving weekday and Saturday service frequency and providing later evening service; and improving local circulation in Hillsborough and providing enhanced connections to Chapel Hill.

Orange County Master Aging Plan (2017)

The plan's goal is making Orange County an "age-friendly" community. The plan focuses heavily on expanding services and improving infrastructure for safe, accessible, and affordable travel within Orange County for older adults by expanding transit options.

Orange County Eno Economic Development District (EDD) Access Management Plan (2013) and Eno Economic Development District (EDD) Small Area Plan (2008)

These plans identify and explain the importance of a designated area for higher intensity activity, preserving the environmental and cultural resources of the Eno River to the north and Stoney Creek Basin to the west. One objective of the small area plan (2008) is an efficient, multi-modal transportation system. The report suggests feasibility evaluations for improved bike/pedestrian, bus, and rail infrastructure.

Orange County 2030 Comprehensive Plan (2008 and as amended)

The Orange County Comprehensive Plan guides the county's growth and development through 2030. Many strategies relate to transit such as limiting sprawl, preserving the county's rural character, and supporting more efficient transportation systems. The plan proposes directing growth to higher density mixed-use districts along transit corridors and improving multi-modal transportation in areas slated for more intense development.

Highway 57 Speedway Area Small Area Plan (2007)

This plan is part of an effort to encourage economic development in the rural portion of Orange County. Like the EDD plans, this plan preserves the rural character of the Highway 57 Speedway area by focusing density in targeted areas.

CARRBORO

Downtown Parking Plan (2017)

This plan defines the current state of parking in downtown Carrboro and forecasts likely future conditions. The plan's findings suggest that there is not currently a need for additional parking in downtown. However, parking demand will likely increase in the next five years. The plan recommends focusing on alternative transportation modes (like transit) to mitigate the need for additional parking in the future.

Community Climate Action Plan (2017)

This plan updates the Town's 2014 Energy and Climate Protection Plan. The plan recommends adopting a goal to reduce greenhouse gas emissions by 50% by 2025. In support of this goal, the plan offers transportation-related strategies including improvement/extension of transit service, improved vanpool/carpool options for commuters, promotion of walking, biking and transit use, limitation on idling in school zones, and more.

Carrboro Economic Sustainability Plan (2017)

This plan details values, guiding principles, and action items for the town's continued development and economic well-being. Access to public transit is a key "quality of life" value identified in the plan.

Safe Routes to School Strategic Action Plan (2012)

This plan supports actions making biking and walking safer and more appealing, encouraging more children to walk and bicycle to school. The plan also seeks to reduce traffic, fuel consumption, and air pollution in the vicinity of schools.

Comprehensive Bicycle Transportation Plan (2009)

Supported by a North Carolina Department of Transportation (NCDOT) Bicycle and Pedestrian Planning grant, this plan recommends bicycle networks and facilities accommodating all levels of bicyclists traveling for transportation, recreation, and health. Carrboro expects to adopt an updated bicycle plan in the Fall of 2020.[12]

Downtown Carrboro New Vision Charette Report (2001)

This report recommends creating walkable spaces and increasing accessibility by encouraging biking and public transit usage. Seven featured projects help the town achieve their vision for downtown development.

Carrboro Vision 2020 (2000)

This plan guides Carrboro's development and acts as a "caretaking tool" to "preserve the Town's history and qualities in an atmosphere of desirable growth." The plan includes several strategies reflecting transit opportunities such as connecting amenities through expanded public transit, bicycle, and pedestrian options. The plan supports transit-oriented development, concentrating higher-density development along transit routes by changing zoning. In Fall 2020, Carrboro kicked off a plan update process. The new comprehensive plan is expected to be complete in 2022.

CHAPEL HILL

Chapel Hill Transit (CHT), Short-Range Transit Plan (2020)

This is CHT's roadmap for the next 10 years, positioning the agency for continued financial and operational success. The plan recommends enhancing transit mode share, increasing ridership, creating high frequency transit corridors, emphasizing equity, improving weekend service, and enhancing the convenience of living without a personal vehicle.

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[12] https://www.townofcarrboro.org/1174/2019-Bike-Plan-Update

Mobility and Connectivity Plan (2017)

This plan's goal is achieving a combined 35% bicycling, walking, and transit commute mode share by 2025. One of the plan's core objectives is integrating transportation networks by expanding and linking walking, bicycling, and shared-use options supporting connections to transit.

West Rosemary Development Guide (2017)

The development guide defines a commercial and economic development vision for the West Rosemary Street corridor. A foundational component of the vision is encouraging the use of public transit and bringing more people to the West Rosemary corridor.

North South Corridor Study (2016)

The North-South Corridor Study was led by Chapel Hill Transit (CHT) in coordination with the Chapel Hill Transit Partners, which includes the Town of Chapel Hill, the Town of Carrboro, and the University of North Carolina - Chapel Hill (UNC). The study identified and evaluated a series of transit investment alternatives for implementation within the study corridor which runs along the Martin Luther King, Jr. Blvd.; South Columbia Street, and US 15-501 South. The 8.2-mile corridor has its northern terminus at the Eubanks Road park-and ride lot and its southern terminus at US 15-501 at the Southern Village park-and-ride lot. The identified locally preferred alternative (LPA) is a combination mixed traffic / dedicated lane BRT route connecting the Eubanks Road park-and-ride with Southern Village park-and-ride. Several key characteristics were identified including using higher capacity buses to add capacity and accommodate growing ridership; optimizing station locations to generate time savings for transit trips in the corridor; providing a direct connection UNC Hospitals and the (now discontinued) Durham-Orange Light Rail Transit service to facilitate regional connectivity and provide direct access to a major regional employer; and targeting use of dedicated lanes in certain segments of the corridor to reduce costs and mitigate potential negative traffic impacts.

Greenways Master Plan (2013)

This plan provides strategies for establishing and maintaining community greenways. The plan also identifies trails providing alternatives to automobile transportation. The plan envisions greenways as a key strategy connecting public amenities and transit stops.

Chapel Hill 2020 Comprehensive Plan (2012)

Chapel Hill's future is defined by five "big ideas" identified through community engagement. The first big idea focuses on transportation and the need for safe connections between community destinations. It also focuses on green infrastructure such as greenways and trails. Other relevant goals include transportation systems supporting dense development; creating accessible transportation options; and connecting to regional transportation systems.

Chapel Hill/Carrboro Long Range Transit Plan (2009)

This joint plan determines that future travel demand requires improved transit services. The plan investigates the ability of light rail, bus rapid transit, and enhanced express service to reduce traffic along six main commuter corridors.

Bike and Pedestrian Action Plan (2004)

This plan identifies a potential network of bicycle and pedestrian facilities. It recommends improved bike and pedestrian infrastructure to connect more community members to amenities including public transit stops.

HILLSBOROUGH

Hillsborough Vision 2030 (2015)

This high-level policy document guides the town's development and policy decisions through 2030. It supports investigating transportation alternatives to personal vehicles. The plan promotes increasing density in downtown's Historic Overlay District which could potentially be served by enhanced transit options.

Parks and Recreation Master Plan (2014)

The plan advocates for safe, convenient, and efficient connections for non-motorized transportation. It also recommends improving connections between Hillsborough's parks and green amenities. The plan mentions land-use strategies and development projects promoting walking, such as higher density mixed-use, infill, and transit-oriented development.

Hillsborough Rail Station Small Area Plan (2010)

The plan provides recommendations for a parcel of land in Hillsborough identified for an Amtrak rail station and adjacent commercial, residential, and civic uses. The plan highlights the development's potential for creating a variety of multimodal travel connections.

Downtown Parking Study (2010)

The study finds that adequate amounts of parking are available in downtown Hillsborough but that the available parking is difficult to locate and navigate. The study recommends encouraging alternative transportation options and continuing to work towards goals for pedestrian and bicycle connectivity.

Community Connectivity Plan (2009)

This plan provides specific recommendations for supporting Hillsborough's pedestrian and bicycle environment by improving community connectivity and coordinating with local transit agencies to provided needed public transportation options.

US-70/Cornelius Street Corridor Strategic Plan (2007)

The plan provides options for enhancing the existing character of the Cornelius Street portion of US-70 to encourage economic development. The plan identifies congestion and current road conditions as hindrances to the corridor's improvement and recommends supporting additional public transit options.

Strategic Growth Plan (2006)

Development at the town's fringes induced Hillsborough to reconsider the provision of public water and sewer services. This plan identifies the desired type, rate, timing, and location for future growth, to limit sprawl. The plan also suggests that there is an opportunity to promote TOD in downtown to preserve the community's more rural areas outside the more urban core.

Churton Street Corridor Strategic Plan (2006)

The Churton Street Strategic Plan was initiated with the goal of developing a strategic plan design and development of the Churton Street Commercial Corridor. A key plan objective is to improve mobility and access for users of the corridor, including automobiles, pedestrians, and bicyclists.

MEBANE

City of Mebane 2040 Comprehensive Transportation Plan (2018)

The city's transportation vision focuses on a safe, cost-effective, reliable, and integrated multimodal transportation system supporting sustainable economic development, regional and local connectivity, and healthy living. The plan lays out a vision for future development that increases density in downtown areas and proposes a bus project called the Mebane Circulator.

Mebane Downtown Vision Plan (2018)

This plan seeks to create a more dense, attractive, and walkable downtown. The plan discusses alternative transportation options but focuses more on creating walkable and accessible communities close to downtown and reconfiguring existing parking for those who need to drive downtown. The plan proposes new kinds of buildings like medium-density live-work and residential and higher density residential.

Mebane Comprehensive Land Development Plan (2017)

This plan focuses heavily on managing new growth in Mebane. The plan encourages more compact and walkable development supporting aging in place, reducing sprawl, protecting natural areas, improving access, promoting walkability, and reducing infrastructure cost over time.

Mebane Bicycle and Pedestrian Transportation Plan (2015)

The plan's vision for Mebane is a clean, connected, healthy, and active community where residents and visitors can experience nature, enjoy exercising, and travel safely by foot or by bicycle to local businesses, services, and schools. The plan also discusses areas of notable density in Mebane, where transit and bicycle and pedestrian facility placement would impact and connect the most people.

CURRENT TRANSIT SYSTEM PERFORMANCE

This section presents findings from an analysis of Orange County's fixed route transit network. A network overview is provided, and several key indicators of system performance are considered. Performance measures include frequency of service, productivity of service, network coverage (the number of people currently near transit service) and transit network accessibility.

NETWORK OVERVIEW

There are several fixed route transit providers serving Orange County:

- **Orange County Public Transit (OCPT)**: a department of Orange County, operates three circulator routes.

- **Chapel Hill Transit (CHT)**: a shared enterprise of the Town of Chapel Hill and the University of North Carolina – Chapel Hill, serves most of the town of Chapel Hill and runs a weekday rush hour service between Chapel Hill and Hillsborough (route 420).
- **GoTriangle**: operates regional bus and shuttle service, paratransit services, ride matching and vanpools; provides commuter resources and an emergency ride home program for the Raleigh-Durham-Chapel Hill area including Apex, Cary, Chapel Hill, Durham, Garner, Hillsborough, Knightdale, RDU International Airport, Raleigh, the Research Triangle Park, Wendell, Wake Forest, and Zebulon.

Connecting services.

- **GoTriangle:** operates routes connecting Chapel Hill with Durham and provides regional transit services between Wake, Durham, Orange, and Alamance Counties Orange-Durham Express route provides hourly peak only service between Durham Station and Mebane City Hall.
- **GoDurham:** provides no service in Orange County but does offer some connections with GoTriangle routes near the county line.
- **Piedmont Authority for Regional Transit (PART)**: provides service in the Greensboro, Winston-Salem, and High Point Piedmont Triad, operates a bus that runs during rush hour and sparsely during midday connecting Chapel Hill and Mebane to Greensboro, with a timed connection a few times a day to GoTriangle service in Mebane.

Figure 8 illustrates the pre-COVID-19 transit network. Service is characterized by a high number of routes, many of which run concurrently for parts of the network, such as along the major north-south connector of MLK, Jr. Boulevard in Chapel Hill. This creates high frequency along that corridor but the combination of many routes on the same street makes the network more complicated. It also requires substantial scheduling coordination to avoid bus-bunching when so many different routes serve the same corridor.

Service frequency increases during rush hour on many routes, particularly on routes serving the Park & Rides, which sometimes come as often as every five minutes. Some routes only run during rush hour. Most service is concentrated in Chapel Hill and Carrboro and served by Chapel Hill Transit, in part because that is where most people and jobs in Orange County are located. Outside of the CHT service area, only hourly or rush hour transit service is available.

In August 2020, CHT initiated a planned change to its network, part of its Short-Range Transit Plan. With this service update, several Chapel Hill routes have been merged (Figure 9) resulting in higher frequency on major corridors and a simplified route structure. More routes and additional frequency are planned to roll out when the COVID-19 pandemic abates.

The new network provides frequent (every 15 minutes), all day service around downtown Chapel Hill. It maintains (but consolidates) a fair amount of service to several Park & Rides, including the Friday Center, Eubanks Road, and Jones Ferry Road. The August redesign also provides Sunday service for the first time in many years.

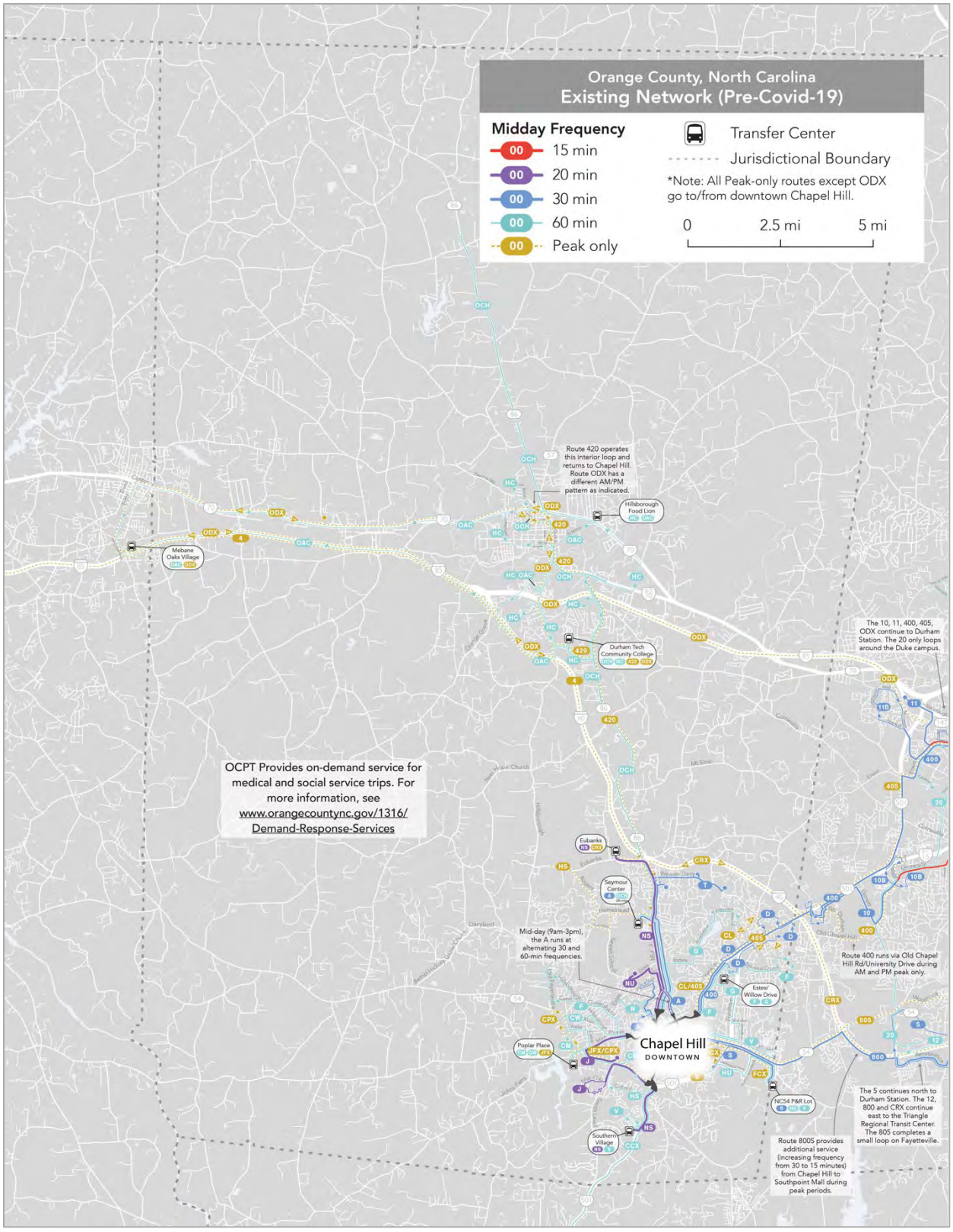


Figure 8 Orange County Existing Transit Network (pre-COVID-19)

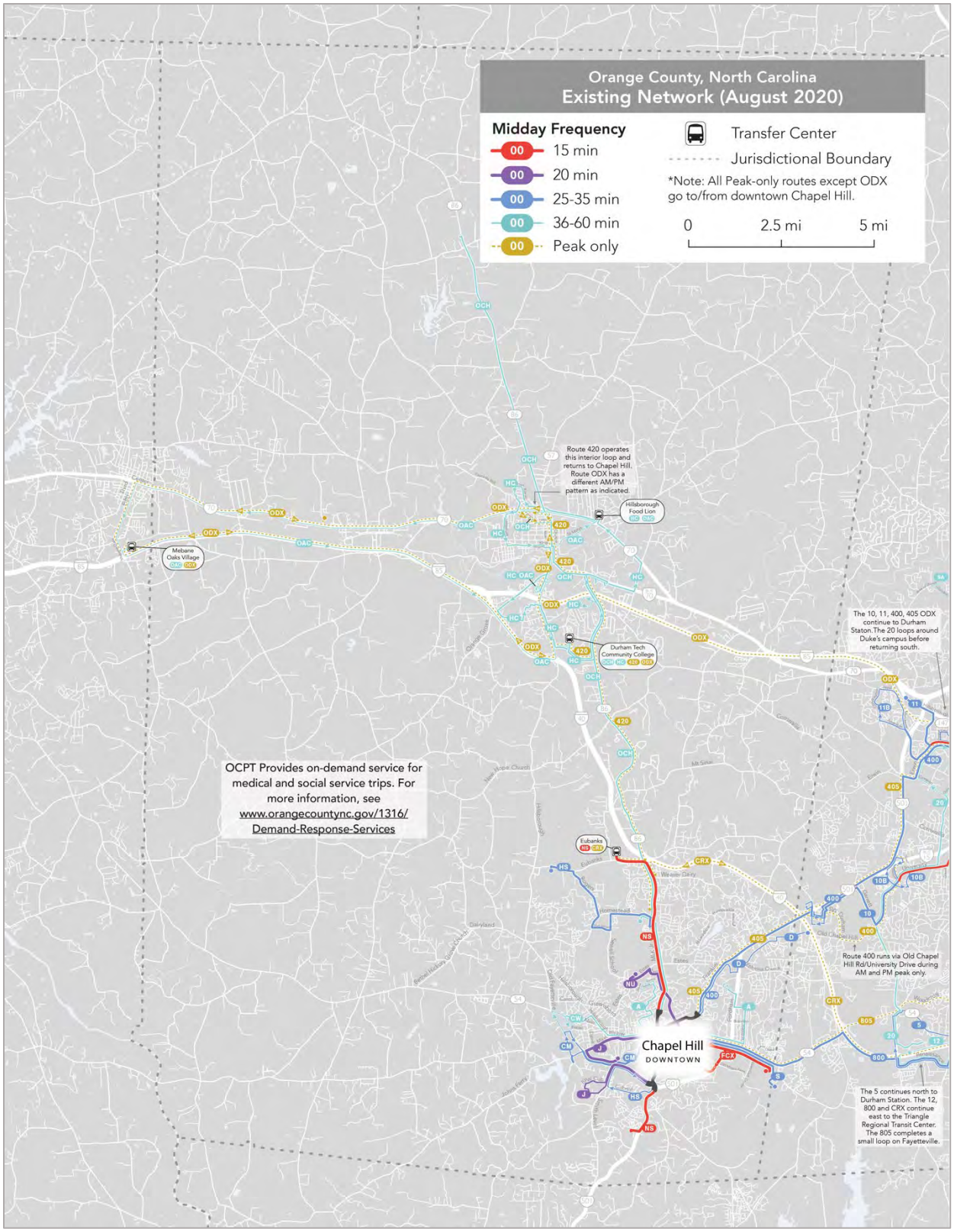


Figure 9 Orange County Existing Transit Network (August 2020)

FREQUENCY

Frequency means freedom. Frequent service provides several related benefits for customers. These include:

- **Shorter Waits:** the average wait time for a 15-minute service is just 7.5 minutes.
- **Faster Connections:** transferring between routes lets a rider reach many places that may not be all along one route. Connections are the glue that transform a pile of routes into a useful network and frequency makes connections easy because the next bus is always coming soon.
- **Easier Recovery from Disruption:** frequent service is more reliable because if a bus breaks down, the next bus is always coming soon.
- **Spontaneity:** rather than building your life around a bus schedule, customers can show up at the stop on their own schedules.

The payoffs of frequency are non-linear, with the highest ridership benefit usually being found in 5 to 15-minute frequencies. For most urban purposes, **a frequency of 15 minutes or better is typically of greatest value**, and it is at these higher frequencies that the non-linear payoff begins to appear. Adequate frequency depends on average trip length because **it does not make sense to wait a long time to travel a short distance**. Downtown circulators, for example, do not usually make sense unless they can be run at frequencies well under 10 minutes. If the bus is not coming soon, it may just be quicker to walk.

Figure 10 shows spans and frequencies for all routes serving Orange County. Frequency refers to how many minutes you must wait between buses, while span describes what hours of the day the service operates. Several routes operate during rush hours only, and other routes run more frequently during rush hour, including some very frequent routes such as the U and RU, the S and the FCX. However, very few of the Chapel Hill Transit routes run during the evening, and those that do have lower frequencies and often stop service at 9 PM. Few Chapel Hill Transit routes run on weekends, though more service is now available on weekends with the August 2020 update. Service is largely focused on serving students, UNC Healthcare patients, and employees working a traditional 9-5 schedule. This, however, leaves a gap for many people who use transit at other times: workers with non-traditional schedules (hospital, retail, and restaurant workers) and people wanting to pursue leisure and entertainment activities on evenings and weekends, particularly students. People who cannot access transit when they need it will need to purchase a car or use taxi and ride share services, which is costly and may induce them not to use transit even when it is available.

Orange County Public Transit frequency and span are limited. OCPT serves a very large and mostly low-density area with minimal resources. Therefore, it is impossible to provide service across much of the county at any significant frequency. Thus, the service that is provided is primarily coverage-oriented, ensuring against social isolation, providing basic access to shopping, medical, and social trips, but only for those who are willing to wait or carefully plan their trips. GoTriangle does offer some late and weekend service which does allow those in downtown Chapel Hill to access the rest of the region.

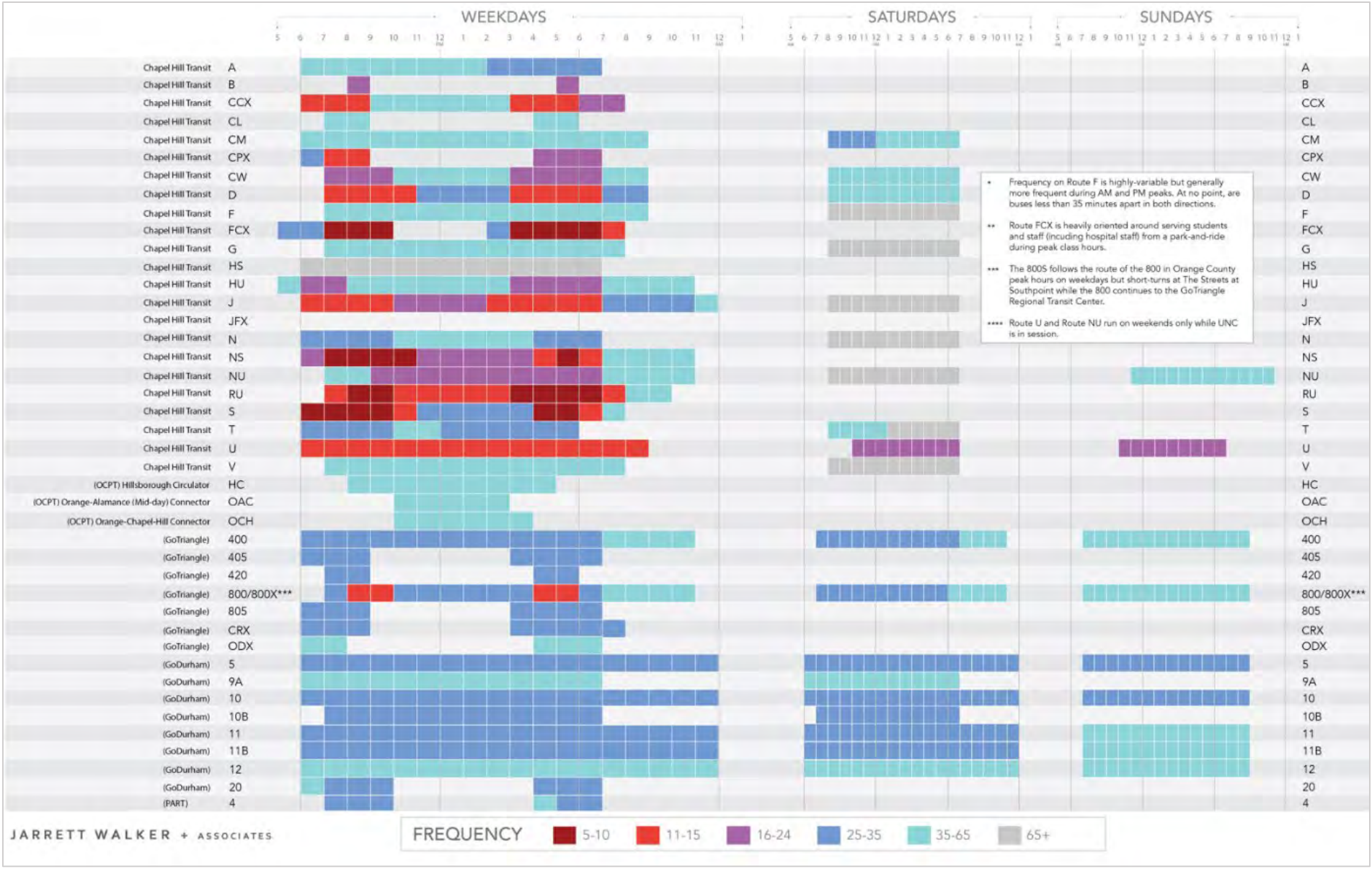


Figure 10 Orange County Existing Network Route Frequencies

GoDurham, which does not serve Orange County, offers an interesting comparison. Service on core routes is the same from morning to midnight, Monday to Saturday. Closer into downtown Durham, branches combine with even spacing into trunks with 15-minute frequency, which runs morning to evening. This provides a high level of frequency on a few core routes throughout the day, six days a week. Frequent, consistent service tends to generate higher ridership and productivity, as people can count on it for most of their trips.

PRODUCTIVITY

People who value the environmental, business, or development benefits of transit will talk about ridership as the key to meeting their goals. However, because any transit agency is operating under a fixed budget, the measure they should be tracking is not sheer ridership but ridership relative to cost. They would not be satisfied simply by many boardings on a route until they knew what it cost the transit agency to achieve that number. Ridership relative to cost is called "productivity." In this report, productivity is measured as boardings per service hour:

Productivity = Ridership / Cost = Boardings / Service hour

The service hours provided on any particular route, and to any particular stop, depend on a few factors:

- The length of the route.
- The speed of the bus (since a slower speed means that covering the same distance takes more time).
- The frequency of service along the route or to the stop. Higher frequency is typically delivered by increasing the number of buses being driven on the route at once.
- The daily and weekly span of service for the route (how many hours it is available).

Changing any of these factors for a transit route affects service hours, the denominator of the productivity ratio. For example, doubling the frequency of service on a route will double the number of service hours being supplied. This means the denominator of the productivity ratio has been doubled. We might therefore expect that productivity of the route would be cut in half unless the numerator of the productivity ratio (boardings) were to also increase.

Productivity is strictly a measure of achievement towards a ridership goal. Services that are designed for coverage goals will likely have lower productivity. This does not mean that these services are failing or that the transit agency should cut them. It just means that their funding is not being spent with the purpose of attracting high ridership.

High ridership arises from the alignment of useful service and supportive land use. The result is high ridership per cost of service, or productivity. Figure 11 shows productivity for routes in and around Orange County.

The highest-productivity routes in the network are the more frequent services in dense, high-demand places. This is a common trait in many transit agencies since frequent services are both much more useful than infrequent service (capable of competing for users) and intentionally designed to serve the strongest markets. Overall, the highest productivity service is the U route and its reverse route, the RU which run at high frequency and directly serve the core of downtown Chapel Hill and UNC. Most CHT routes have relatively high productivity, with nearly all routes reporting 20 boardings per hour or higher. CHT achieves this productivity level in part because

they serve the densest, most active part of the county. Yet, they also achieve very high productivity in part because they are free. Free services naturally attract much higher ridership because of the ease of use and the ability for anyone to ride without hesitating to think about how to pay.

Most GoTriangle services achieve lower productivity levels, between 10 and 20 boardings per hour. Both GoTriangle all-day services (Routes 400 and 800) achieve 16 boardings per hour. Three GoTriangle peak-only routes (420, CRX, ODX) achieve productivity levels below 13 boardings per hour.

All three OCPT services achieve productivity levels below 10 boardings per hour, suggesting that these services are primarily serving coverage goals. The Orange Alamance Connector (OAC) routes are the lowest performing routes at 0.9 boardings per hour.

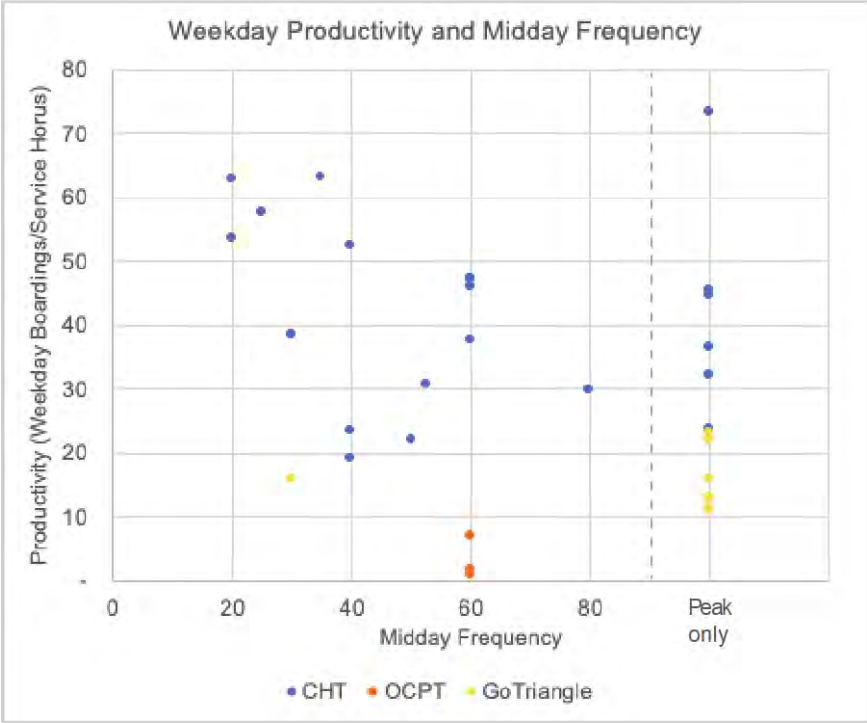


Figure 11 Weekday productivity and midday frequency for transit service in Orange County.

Another measure of ridership relative to cost requires dividing the cost of service per hour by the boardings per hour, to get a cost-per-boarding measure. Figure 12 shows the cost per boarding for routes in Orange County. In this case, a higher number indicates lower performance.

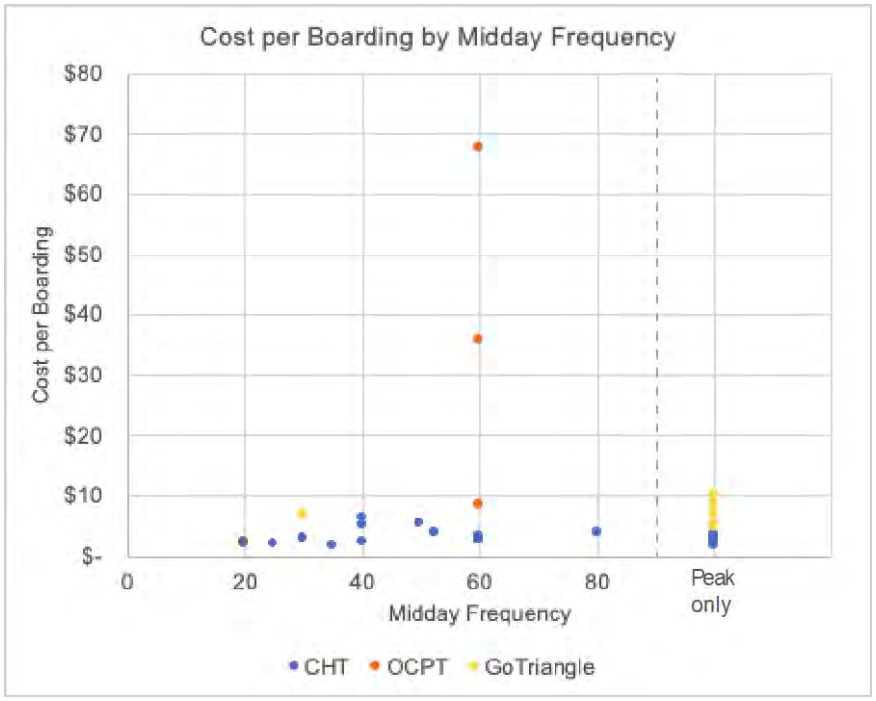


Figure 12 Cost per boarding by midday frequency for Orange County transit service.

HOW MANY PEOPLE ARE NEAR SERVICE?

Coverage goals for transit are met when transit is *available* to people, whether they ride it in large numbers or not. Figure 13 shows the coverage provided by the existing service in and around Orange County. The chart below shows what percentage of the service area is within a half mile of a transit stop with service (proximity) during the midday. This chart measures coverage by any service as well as to frequent service. The distinction is important because frequent service is most likely to attract high ridership relative to its cost. Measuring coverage at mid-day is critical because while rush hour service is important, many people have work, class, and medical schedules that require trips in between the morning and afternoon rush hours.

About a third of residents, minority residents, and residents under 200% of the federal poverty line are near a stop with a route that comes every 20 minutes or better during the midday, as are over half of jobs. However, nearly half of Orange County residents in poverty (200% of the poverty line) are not within ½ mile of transit. This is likely due to the relatively high levels of poverty in the county's rural areas. Low-income residents in rural areas are more expensive to serve with transit than low-income residents in more dense areas because, to reach them, buses must travel long distances between customers.

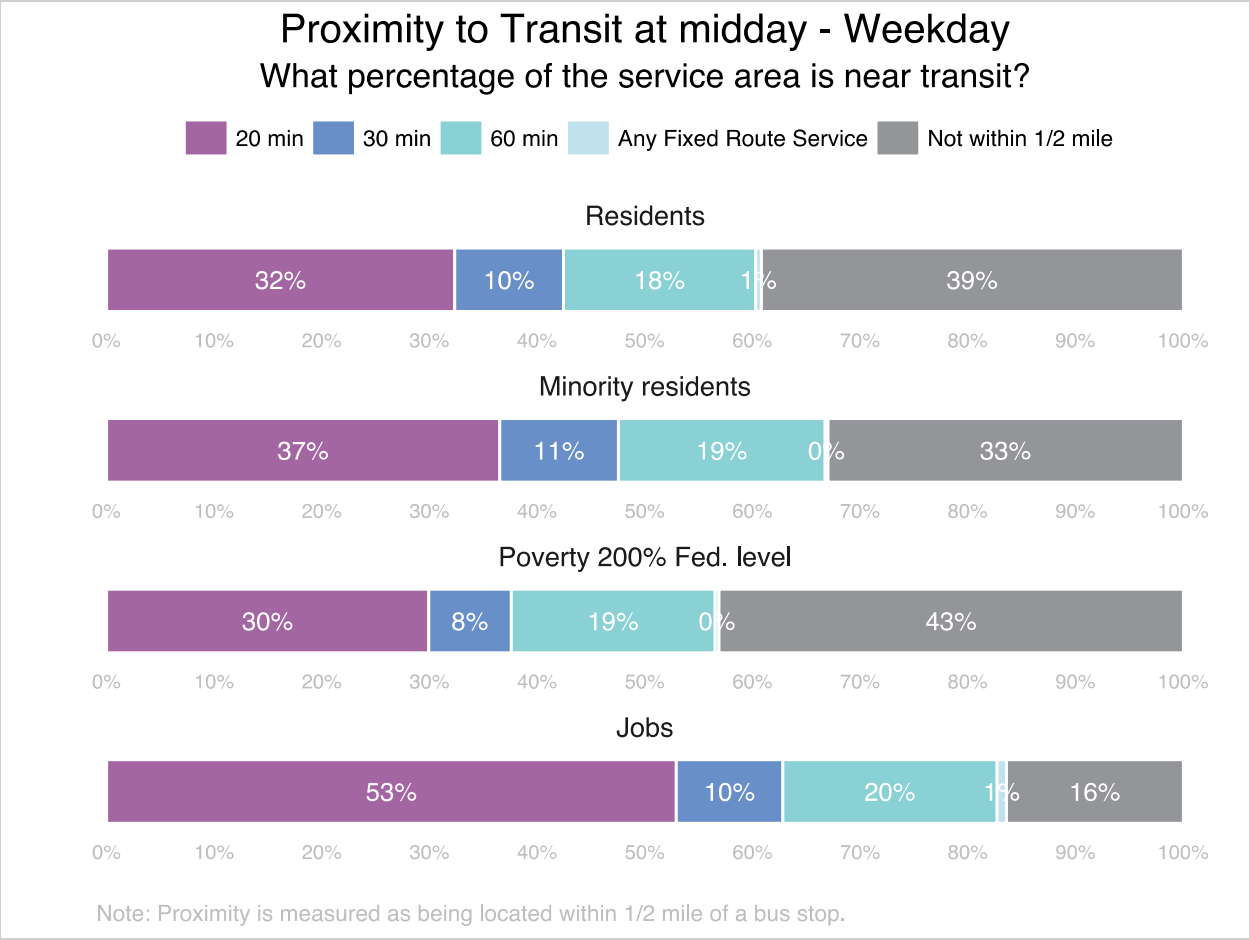


Figure 13 Transit service proximity in Orange County.

TRANSIT ACCESSIBILITY

The effectiveness of existing transit services can be described in terms of their ability to connect residents to destinations, including jobs and community assets. The latter refers to facilities and businesses oriented to community or social services, health care, housing, and education. Transit accessibility is measured for travel analysis zones (TAZs) that roughly approximate neighborhood boundaries. The accessibility scoring process consists of four steps:

1. Estimate the average travel time from each zone to all other zones. For this report, all zones in the Triangle Regional Model were analyzed using a transit network developed by combining the region's GTFS feeds[13] with pedestrian network features obtained from OpenStreetMap[14]. The pedestrian network and transit schedules provide the basis for approximating the average time it would take to travel by bus from a given origin zone to a destination zone during the morning peak commuting period (7 am to 9 am) on a typical weekday.

[13] https://jlehman01.github.io/orange-county-gtfs-review/index.html
[14] https://www.openstreetmap.org

2. Estimate travel likelihood based on expected duration of travel. The likelihood of travel to a given zone varies depending on the time required to reach it. Generally, travelers are more likely to choose nearby destinations over those that take a long time to reach. Travel times between origin-destination pairs are transformed into travel likelihoods using the formula: $2.342 * e^{-0.035*m}$, where *m* is the travel time in minutes and the output of the equation is limited to values between 0.0 and 1.0.
3. Multiply the number of destination activities (jobs or community assets) by the likelihood of travel for each origin-destination pair.
4. Summarize the number of weighted destinations reachable from each origin.

The resulting access scores reveal the locations where transit provides timely connections to many destinations. These areas generally generate relatively high shares of transit trips due to the number of destinations travelers can reach by transit. Access scores are sensitive to the design of transit routes, schedules and service frequencies, the directness of walk connections to, from, and between transit stops, and the locations of destination activities. Moreover, they can be summarized for different collections of zones or by different population groups to describe the overall effectiveness of transit services in providing equitable access to jobs and community assets.

A series of transit travel time contour maps from different origin points throughout Orange County is available here.[15] Note that destinations in neighboring counties are reachable in many cases, and these count toward the accessibility score. However, since the accessibility analysis relies on the TAZ data from the TRM, the scores only reflect the jobs and community assets within the Triangle. Current transit services operating in Orange County also provide connections between zones in Orange County and extra-regional locations. The operating characteristics of these services (service frequency, span, and travel time, e.g.) and amount of activity in potential extra-regional destinations (Mebane, e.g.) mean these connections are unlikely to drastically impact accessibility scores reported later in this section. Nevertheless, travel demand between Orange County and extra-regional locations to the west is increasing as growth continues apace across North Carolina. The Town of Mebane, for example, is growing just across Orange County's western border, adding housing and substantial employment as noted elsewhere in this report.

ACCESS TO JOBS

The maximum observed transit access to jobs score in Orange County is 83,365 in downtown Chapel Hill. For reference, there are just over 850,000 jobs estimated in the TRM zonal data, indicating that transit connects downtown Chapel Hill to about 10 percent of the region's jobs. However, it is important to recall that the accessibility score is weighted by travel likelihood (step 2 above). If time were not a constraint, transit would connect downtown Chapel Hill to about 210,000 jobs, closer to a quarter of the regional total. However, the average time to these jobs is about 60 minutes (including walking to and from bus stops, waiting for the bus to arrive, and time spent on the vehicle). When the time-based travel likelihood factor is applied, the "effective" number of jobs reachable is reduced to approximately 40 percent of the unweighted total.

Transit access to jobs is mapped by TAZ in Figure 14. Access scores in Orange County are highest in Chapel Hill and Carrboro, reflecting both the high overall concentration of jobs in the area and the transit connectivity offered by CHT. High accessibility scores extend along NC 54

[15] https://jlehman01.github.io/orange-county-gtfs-review/transit-travel-time-analysis.html

from Carrboro in the west to the Durham County line in the east, from downtown Chapel Hill along US 15-501 north towards the Blue Hill District and south towards Southern Village, and along NC 86 towards Carraway and Hillsborough. Modest transit access is observed along the US 70/I-85 corridor, reflecting the lower density of destinations and overall lower levels of transit service provided by OCPT and GoTriangle. As noted above, destinations in Mebane and other extra-regional locations are not reflected in these scores, so the access scores in the US-70/I-85 corridor are likely slightly higher than what is shown in Figure 15. Many of the county's rural areas have no access to jobs via fixed route transit, though many are within the demand response service area implied by the route structure of the three transit operators.[16]

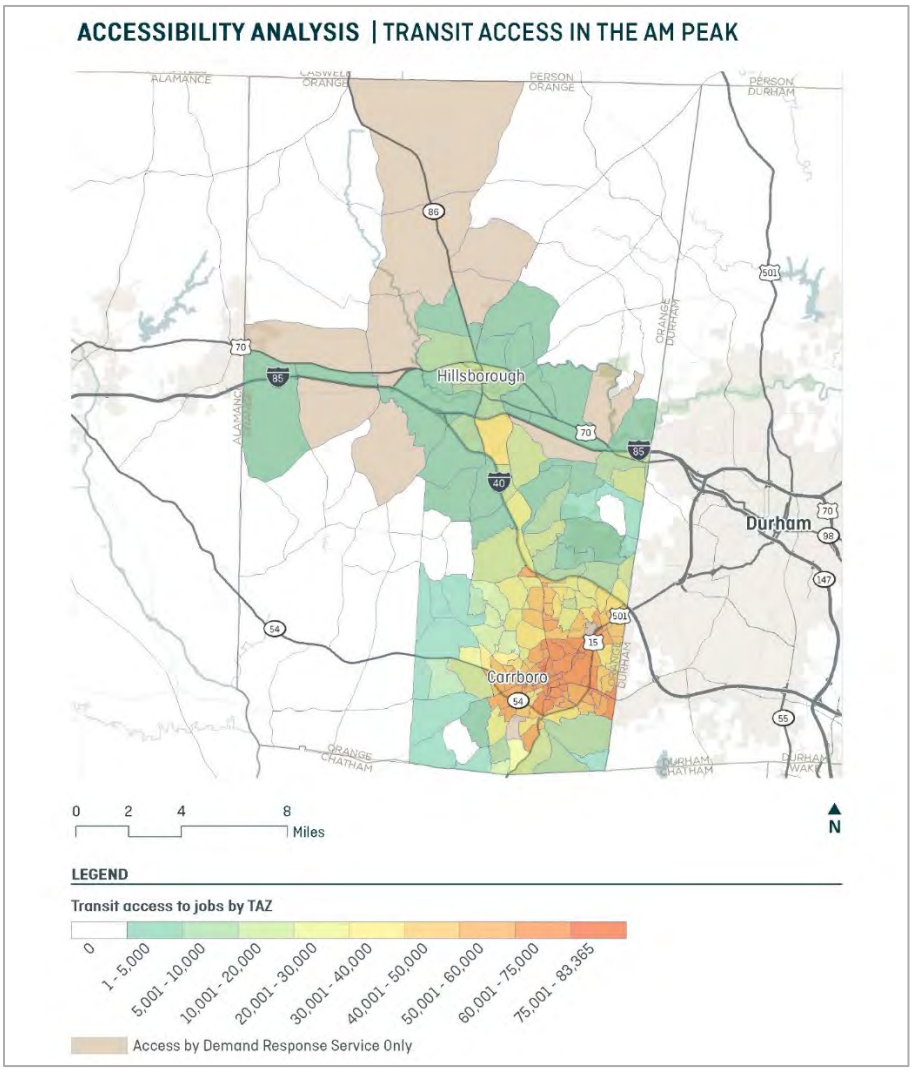


Figure 14 Orange County Transit Access to Jobs AM Peak

[16] Transit agencies offer demand response services, sometimes referred to as "paratransit", in addition to fixed route services. Demand response services are arranged by calling the transit operator to schedule pickup/drop-off. Multiple calls may be served in a given trip. Demand response service areas must generally approximate the area served by the fixed route system. For this analysis, the demand response service area was defined as any TAZ within a mile of fixed route service. See https://www.transit.dot.gov/regulations-and-guidance/access/charter-bus-service/demand-response-service-explained for additional information on demand response service.

Figure 15 provides a summary of accessibility by different population groups. The numbers reflect the average access to jobs scores for diverse segments of the population. Breakdowns are provided by race, ethnicity, age, income, and student (collegiate) versus non-student population. Average scores vary based on the location of persons and households in each reported segment relative to the jobs accessibility provided by the transit services operating in Orange County. For example, the vast majority of Orange County's student population lives in Chapel Hill or Carrboro. These areas also have the county's highest accessibility scores, so students have much higher access to jobs via transit than any other segment of the county's population.

Category	Population Segment	Average score
Race	White	24,206
	Black	24,161
	Asian	16,003
	Other	32,253
Ethnicity	Hispanic	23,128
	Non-Hispanic	25,396
Age	Under 18	21,320
	18 to 64	27,454
	65 and up	20,482
Income	Low	30,533
	Medium	24,864
	High	23,975
Student	Students	52,929
	Non-students	25,197
TOTAL	Total Pop.	29,425

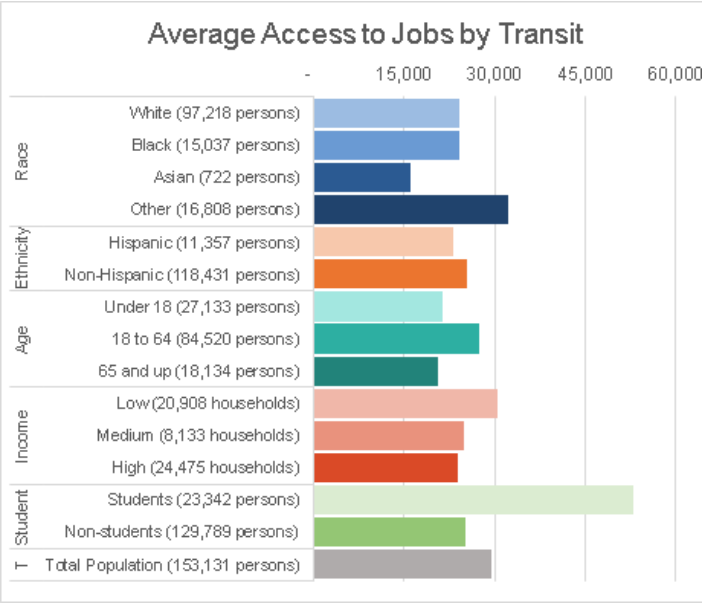


Figure 15 Average Access to Jobs by Transit for Selected Population Groups

As Figure 15 reveals, average access to jobs by transit varies among demographic groups. The county's Asian population has notably lower access to jobs by transit than other racial groups, while people of Hispanic ethnicity have slightly lower access than Non-Hispanic persons. Persons over the age of 65 have the lowest access scores among the age groups summarized. Access by transit is highest among low-income households (earning less than $40,000 per year), while medium-income households (earning between $40,000 and $125,000 per year) have only slightly better access than the county's high-income households. Finally, as noted above, college students enjoy greater access to jobs than any other population segment, reflecting their general proximity to the UNC campus, the county's principal employment centers, and the heart of its transit network.

Access to Community Assets

The maximum observed transit access to community assets score in Orange County is 983 in downtown Chapel Hill. For reference, there are just under 7,800 community asset destinations estimated in the region, indicating that transit connects downtown Chapel Hill to about 13 percent of the region's community assets. As with the access to jobs scores, it is important to recall that the accessibility score is weighted by travel likelihood (step 2). If time were not a constraint, transit would connect downtown Chapel Hill to about 2,300 community assets, closer to 30 percent of

the regional total. The average time to these community assets is about 55 minutes (including walking to and from bus stops, waiting for the bus to arrive, and time spent on the vehicle), meaning community assets are closer than jobs on average. When the time-based travel likelihood factor is applied, the “effective” number of community assets reachable is reduced to approximately 43 percent of the unweighted total.

Figure 16 shows transit access to community assets. These include health care and social service providers, schools, libraries, public and civic services, etc. The patterns of accessibility are very similar to those observed for access to jobs, with high values in Chapel Hill and Carrboro emanating out along major commuting corridors. Modest access to community assets is provided via transit along the US 70/I-85 corridor, and some zones only have access via demand responsive services. These patterns are very similar to those shown in the access to jobs analysis.

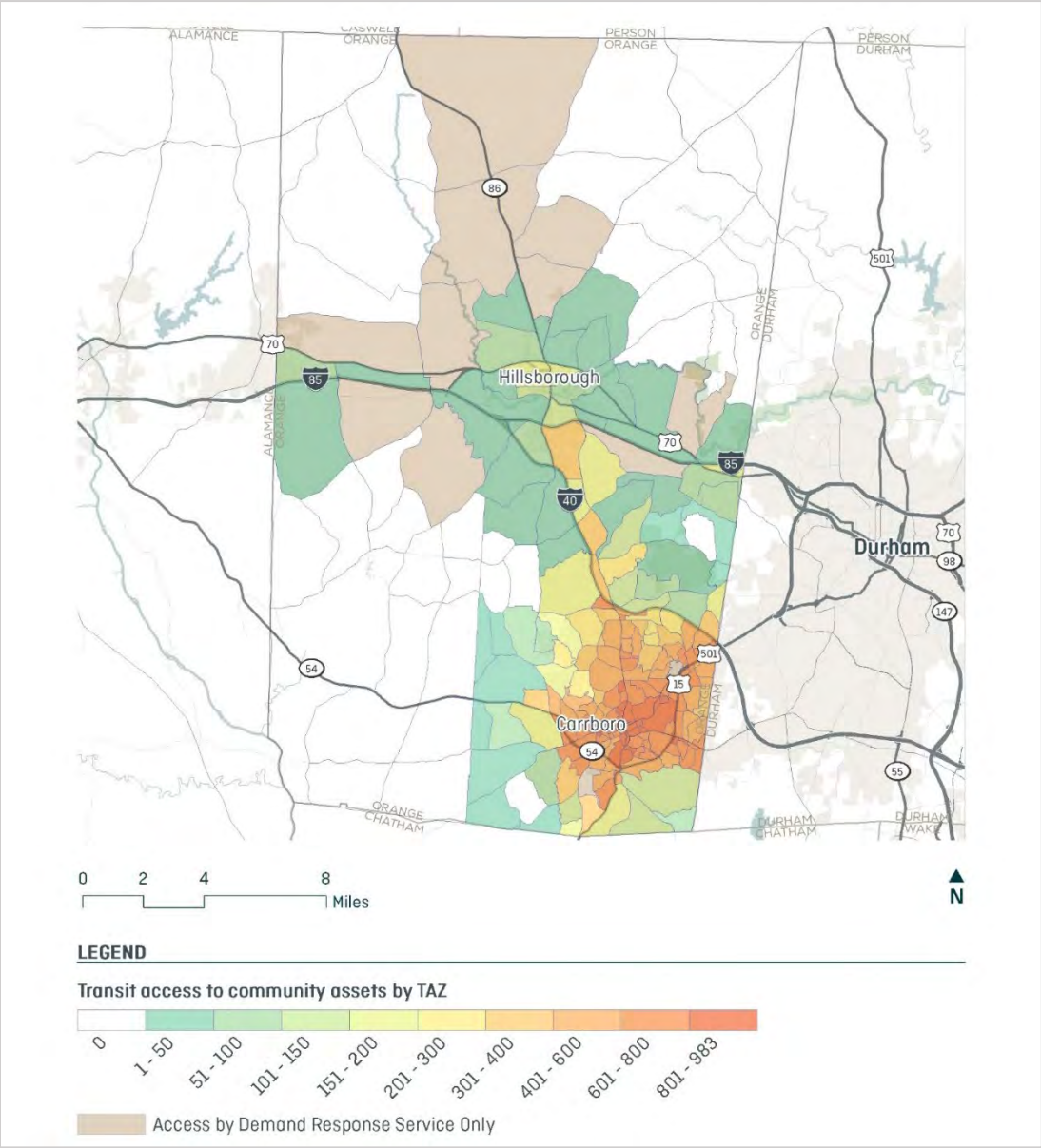


Figure 16 Orange County Transit Access to Community Assets AM Peak

Figure 17 summarizes accessibility for different population groups. The numbers reflect the average access to community assets scores for the same population segments presented in Figure 15 and shows similar patterns to those observed in the access to jobs summary.

Category	Population Segment	Average score
Race	White	306
	Black	306
	Asian	205
	Other	406
Ethnicity	Hispanic	291
	Non-Hispanic	321
Age	Under 18	269
	18 to 64	347
	65 and up	258
Income	Low	385
	Medium	314
	High	302
Student	Students	663
	Non-students	318
TOTAL	Total Pop.	371

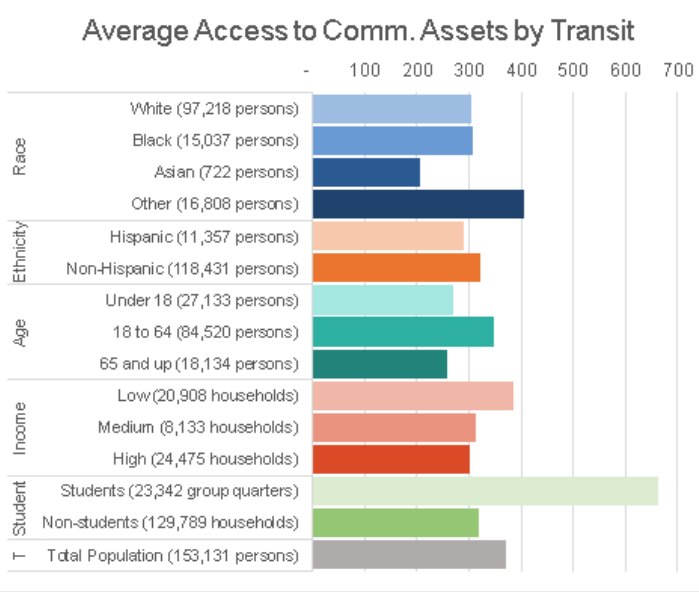


Figure 17 Average Access to Community Assets by Transit for Selected Population Groups

TRIP-MAKING POTENTIAL

The accessibility analysis process described above also provides a foundation from which to evaluate generalized trip-making potential using existing transit services. Consider two hypothetical households. One has access to a large office park by transit within 20 minutes; the other can access the same office park by transit, but in 60 minutes. All else being equal, it is reasonable to expect the first household is more likely to travel by transit than the second household for any trips being made to the office park.

Whether either household would use transit depends on a host of factors related to their daily travel needs, place of residence, vehicle availability, and so on. The estimation of mode choice based on travel optimizations for individuals and households requires detailed travel models, which are data intensive and computationally complex. However, a generalized assessment of transit trip-making potential is available through examining the magnitude of potential trip producers (i.e., household locations), potential trip attractors (job locations), and the time it takes to travel between all possible origin-destination pairs by transit.

This procedure uses steps 1-3 in the accessibility analysis process described above. It then adds an alternative fourth step: multiplying the weighted number of reachable destinations by the number of households at the origin end. The result is an origin-destination matrix that estimates a trip-making potential index score as a function of origin-end households, destination-end jobs, and the travel time required to move between origin and destination zones by transit. Higher index scores represent origin-destination pairs for which transit connects large numbers of households and jobs in a timely manner. These are the places between which the current transit system is likely to serve the greatest number of trips.

Figure 18 shows the origin-destination pairs with the highest transit trip-making potential under existing conditions for trips **originating in Orange County**. The map reveals the existing transit system's connectivity to two major regional employment centers: central Chapel Hill/Carrboro, including the UNC campus and UNC Hospital, and the Duke Hospital area in Durham. It also reveals the extent to which current services are focused on Chapel Hill, with just one high-potential origin located north of I-40.

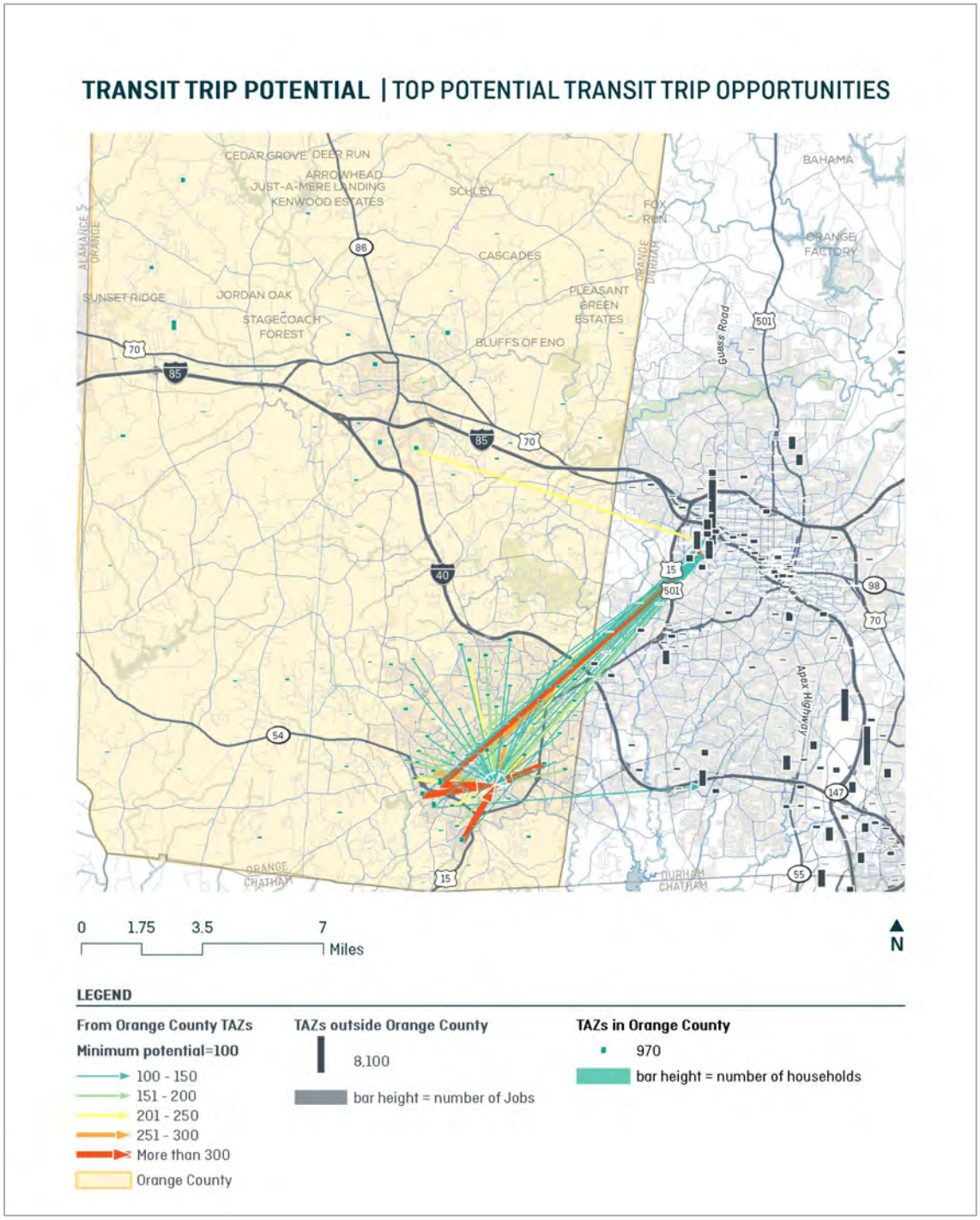


Figure 18 Top potential transit trip opportunities originating in Orange County (existing conditions).

Figure 19 shows the origin-destination pairs with the highest transit trip-making potential under existing conditions for trips **destined to Orange County**. Since most existing transit is focused on Chapel Hill, this map is like the origin-end map. However, it reveals strong bi-directional trip-making potential between Chapel Hill and the Duke Hospital area. It also shows the connections available to Chapel Hill from residential areas in southern Durham County.

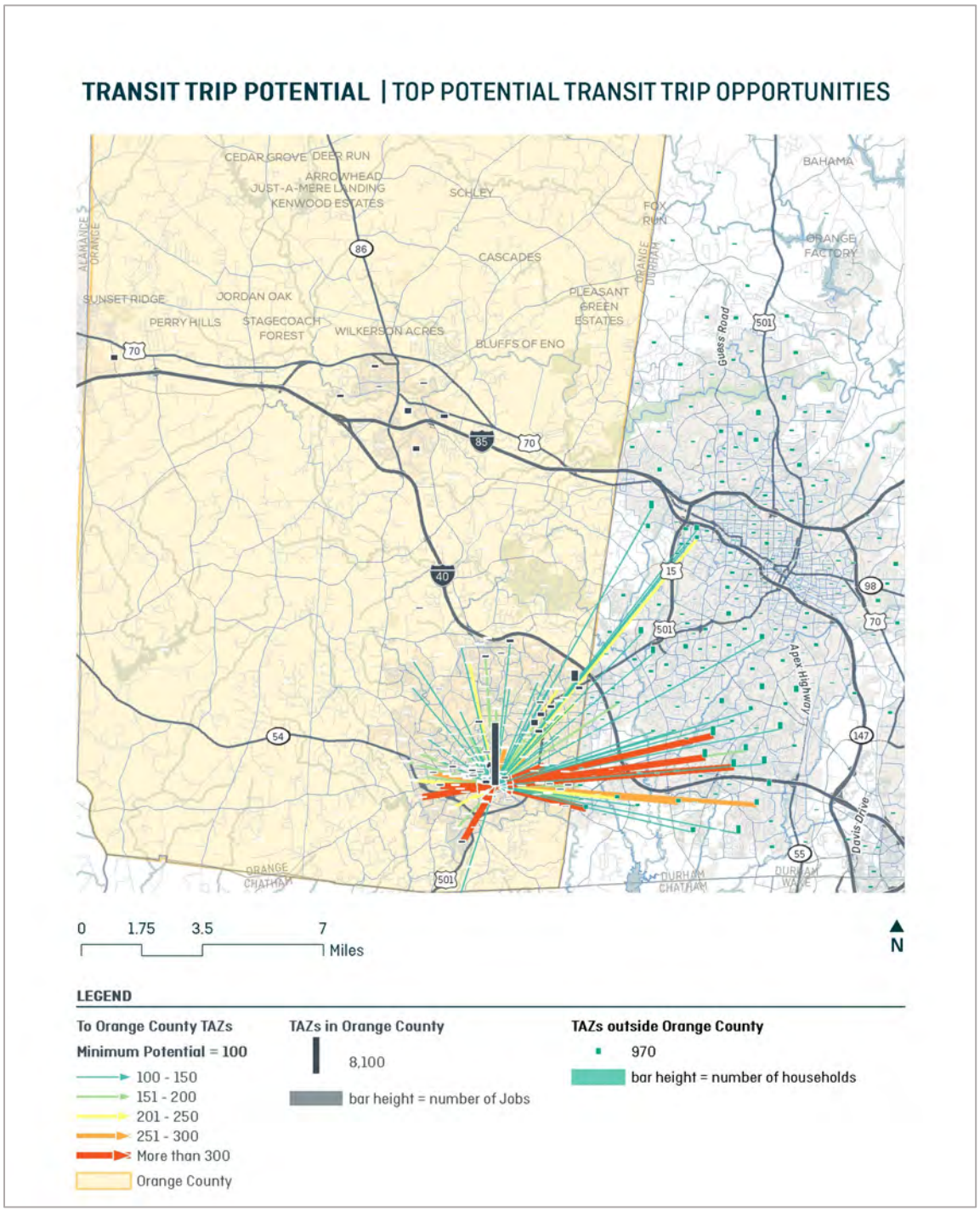


Figure 19 Top potential transit trip opportunities ending in Orange County (existing conditions).

Since the accessibility and trip-making potential analyses was conducted using TRM data, and the TRM does not cover extra-regional locations, the maps above only reflect the trip-making potential to destinations in other Triangle counties. Some existing transit services, such as the PART Route 4, connect Orange County to locations in Alamance County to the west. Richer data development focused on trip-making among communities in the Triangle and Triad regions will be needed to comprehensively assess travel potential to and from Orange County and understand the impact of these routes. For this report, their presence is acknowledged here and in related sections. Under current conditions, however, these westward-oriented routes are unlikely to register among the connections with high trip-making potential due to the relatively low densities of housing and jobs compared to connections to/from Durham County.

Within Orange County, these figures highlight transit trip-making opportunities in the urbanized areas of Chapel Hill and Carrboro primarily, especially to/from the downtown areas to nodal developments like Southern Village, the Blue Hill District, and Carraway/Weaver Dairy Road.

TRANSIT TRENDS

Transit performance measures track factors like boardings, budget, and service hours, with a goal of demonstrating the efficiency of a transit system. Transit performance measures generally tell the story of trends from the perspective of service providers and tracking service metrics over time. These measures provide context helping transit agencies understand where to focus their attention in the future to improve service for their communities.

Two kinds of trends are discussed in this section: *direct measures* and *indirect measures*. Direct measures quantify things like trips, ridership, and revenue. Indirect measures describe broader conditions impacting transit agencies, such as gas prices. Examining both direct and indirect measures describes and contextualizes the state of transit service in Orange County.

DIRECT MEASURES

Chapel Hill Transit, GoTriangle, and Orange Country Public Transit display mixed trends between 2012 – 18. The direct measures reported here include:

- Ridership expressed by *boardings* per year.
- *Service hours* measures the quantity of transit service provided by a system each year.
- Productivity defined by *boardings / service hour.*
- A second productivity measure is yearly operating expenses divided by annual boardings. This reflects the *cost per boarding*. This measure provides a clear indicator of trip cost in understandable terms.

TOTAL ANNUAL RIDERSHIP, 2012 to 2018

Chapel Hill Transit and GoTriangle had the most boardings in the region (6 and 1.7 million, respectively); Orange County Public Transit had notably fewer boardings on their fixed-route operations (17,852). Figure 20 shows each agency's performance from 2012-18. Despite differences between the three transit providers, each served a similar number of trips in 2018 as they did in 2012. Chapel Hill Transit experienced a 12% decline in boardings between 2014-17 but recovered half of those boardings in 2018. GoTriangle's boardings were consistent with no

dramatic changes and increasing ridership between 2012 and 2015 (+12%); there was a decline in boardings between 2015 and 2018 (-5%). Ridership fluctuations for Orange County Public Transit are more noticeable likely due to being a smaller service provider. Boardings fluctuated between 15,000 trips in 2012 to about 24,000 in 2017 and 18,000 trips in 2018.

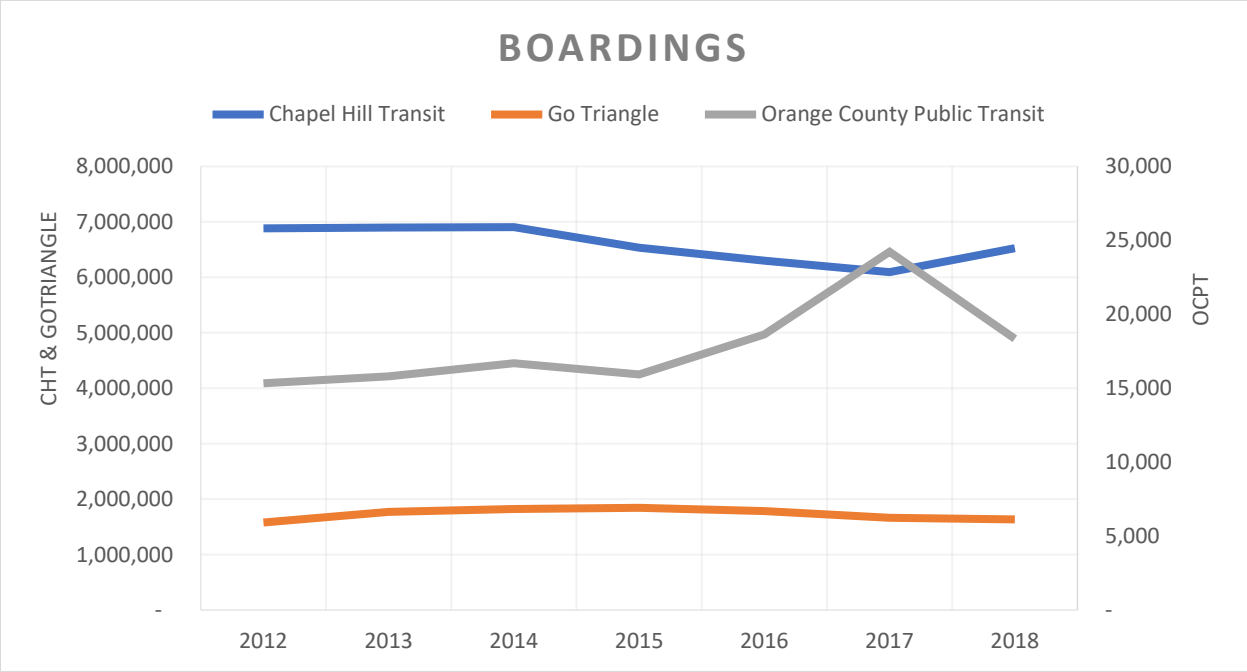


Figure 20 Transit providers' annual ridership, 2012-2018 (NTD Reporting). Please note differences of scale between CHT/GoTriangle and OCPT.

SERVICE HOURS, 2012 to 2018

Another way of analyzing transit service delivery is through service hours. Service hours represent the total time during which a transit vehicle offers revenue service (i.e., when passengers may be on board). It also includes interstitial periods of service, such as dwell time at stops (for boarding and alighting passengers), time transiting passengers between stops, and recovery time for operator breaks or pauses along the route to avoid serving stops ahead of schedule. For example, if a route has two buses in each direction are in service from 7:00 am to 7:00 PM (12 hours) every day, the route generates 24 service hours (2 vehicles *x* 12 hours) each day or 8,760 service hours annually (24 daily service hours *x* 365 days). In most cases, service levels vary by time of day, day of week, by season, and for holidays. Total annual service hours provide a general quantification of how much transit service an agency provides and is useful for understanding each agency's role in the regional transit network. Figure 21 shows annual service hours by transit provider from 2012-18. While there are differences between transit service providers, the data indicates that service hours were higher for each system in 2018 than in 2012.

Chapel Hill Transit's short-to-medium length local routes focused on downtown Chapel Hill and the UNC campus accrue the most service hours of the three providers in Orange County. Since 2012, CHT has consistently provided around 160,000 service hours per year; in 2018, service hours increased and peaked at approximately 163,000 service hours. This is like the boarding trends in Figure 20.

GoTriangle mainly provides express bus service for regional connections. Their routes often only operate during peak commuting periods with lengthier travel times between regional destinations. Service hours steadily increased from 107,000 in 2012 to 143,000 in 2018 (+33%).

Owing to a smaller service portfolio (fixed route service in Hillsborough, local circular, and hourly regional connections), OCPT's service hours are the lowest of the three providers in Orange County. It also has the largest fluctuations during the period examined. OCPT's service hours steadily decreased between 2012 and 2014, then slightly increased between 2014 and 2015, and then significantly increased between 2015 and 2016. Service hours remained consistent between 2016 and 2018.

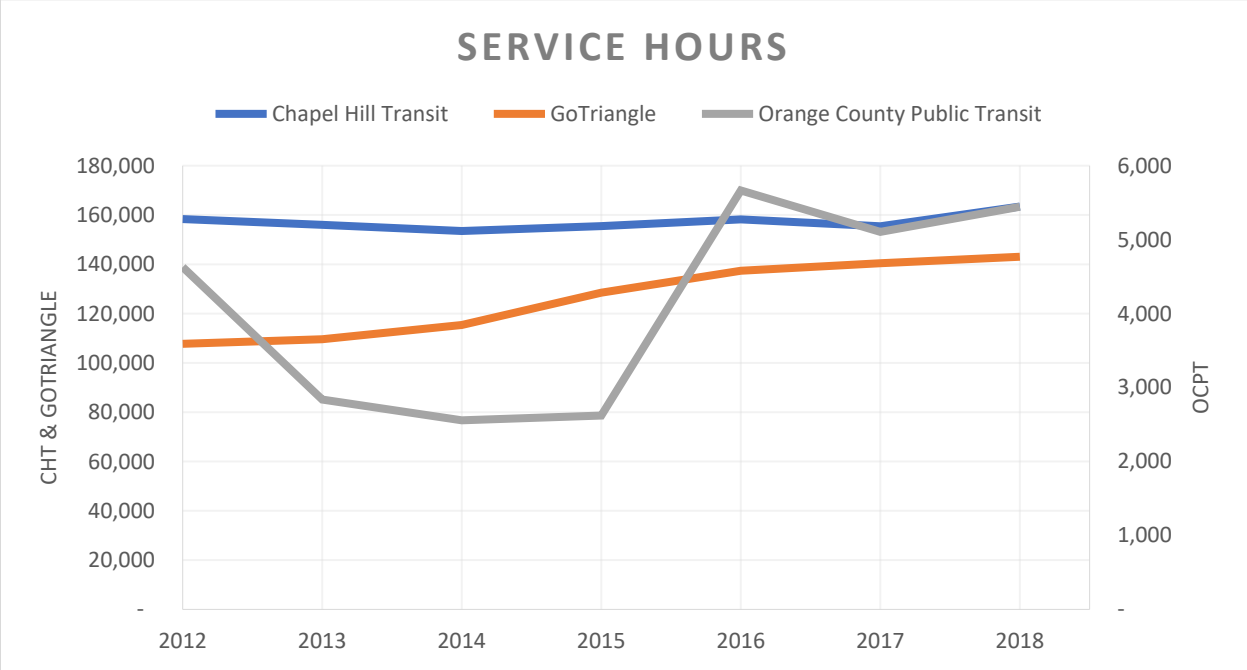


Figure 21 Transit service providers' annual service hours, 2012-2018 (NTD Reporting). Please note differences of scale between CHT/GoTriangle and OCPT.

PRODUCTIVITY, 2012 to 2018

Measures of transit productivity offer a way to compare system performance while accounting for the varying sizes of transit agencies. Productivity (boardings per service hour) illustrates the utilization of transit service relative to the amount of service provided. Annual yearly operating expenditure dollars per boarding ($ OE / boarding) expresses the cost of providing transit services on a per-rider basis.

Productivity: Boardings Per Service Hour

Figure 22 shows productivity (boardings per service hour) for Orange County's three transit providers from 2012 to 2018. For this metric, *higher* numbers indicate *greater* productivity. By this measure, Chapel Hill Transit is the most productive transit system in Orange County serving 39 riders per service hour in 2018. However, Chapel Hill Transit experienced a modest decline in productivity (13%) between 2013 and 2017. GoTriangle's productivity has followed a similar trend, declining from a high of 16 riders per service hour in 2013 to just over 11 riders per service hour in 2018 (-30%). The lower productivity reflects GoTriangle's role in connecting regional centers,

using fewer buses on longer routes. OCPT's productivity is the lowest of the three providers, reflecting its service context – small, traditional downtowns surrounded by low-density residential development. However, OCPT's productivity has remained stable from 2012 to 2018, rising to a high of 6.5 boardings per service hour in 2014.

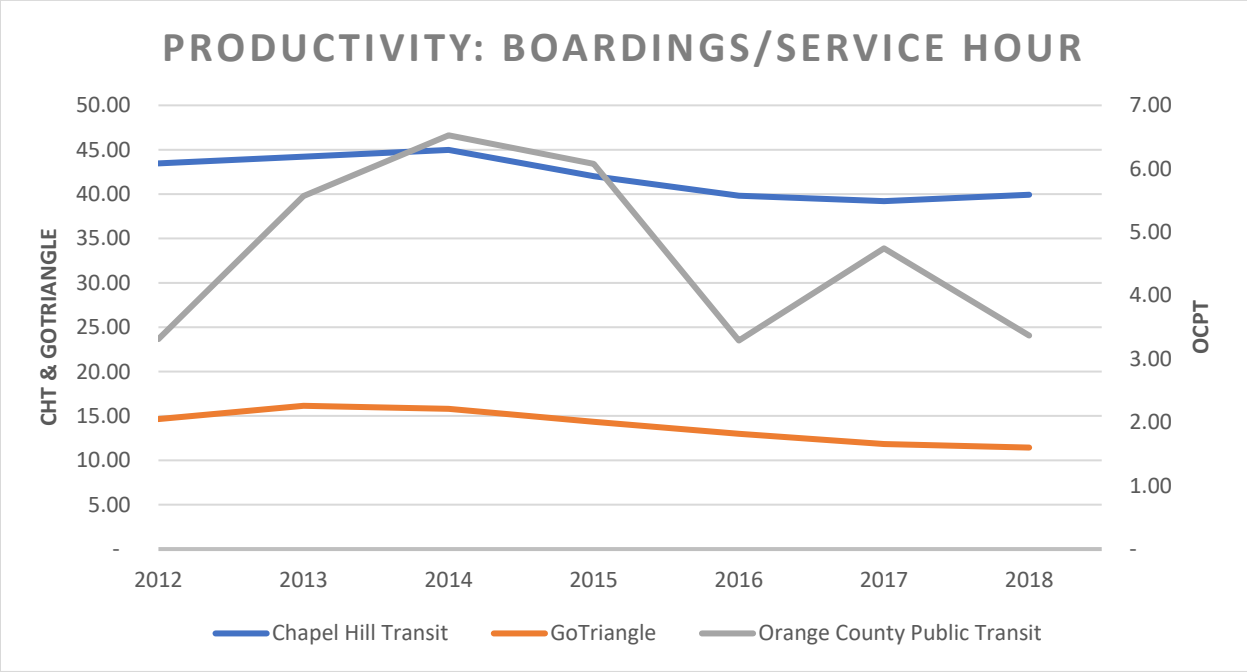


Figure 22 Unlinked passenger trips per vehicle revenue hour. Please note differences of scale between CHT/GoTriangle and OCPT.

Productivity: Cost Per Rider

Figure 23 shows the cost (per boarding) by operating expense ($ OE) from 2012 to 2018. For this metric, *lower* numbers indicate *greater* productivity (lower cost per rider). Operating expenses are generally more consistent over time than overall expenditures because they do not include unpredictable (and usually large) capital expenditures. OE is reported in year-of expenditure dollars (YOE $) and are not adjusted for inflation.

Cost per rider is impacted by the size of the transit agency, the number of riders, and the nature of service provided (i.e., ridership oriented or coverage oriented). Ridership-oriented service (more passengers along concentrated, centralized routes) are inherently more productive than coverage-based service schemes where vehicles must travel longer distances to serve fewer passengers.

Chapel Hill Transit's cost per rider increased by 36% between 2012 and 2018 ($0.34 per boarding in 2012 and $0.46 per boarding in 2018) but it still has the lowest cost per rider of the three transit agencies serving Orange County. This higher productivity reflects CHT's shorter, higher-ridership routes (influenced by a fare-free system and parking restrictions on UNC's campus).

Between 2012 and 2018, GoTriangle's cost per rider increased 250% from $1.22 to $2.81. OCPT's cost per boarding spiked in 2016 but stabilized to its 2013 level by 2018 (2012 data was unavailable for OCPT). Cost per rider is significantly higher for OCPT as compared to the other

two services (ex. in 2016, OCPT's cost per rider was nearly $17; during the same period, cost per rider for CHT and GoTriangle were $0.48 and $2.70, respectively).

The relatively higher cost per rider for both GoTriangle and OCPT reflects the coverage-based system orientation of these two providers – one a regional commuter service and the other serving a largely suburban and rural county with decentralized pockets of riders.

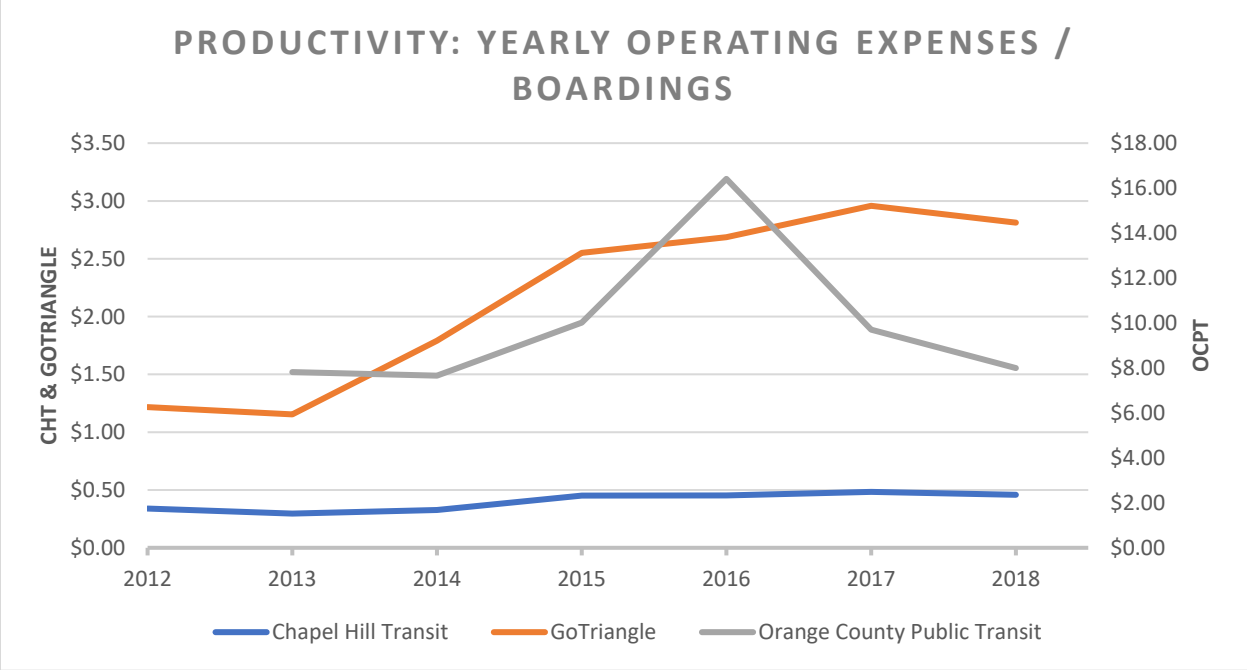


Figure 23 Productivity: cost per rider (NTD Reporting). Please note differences of scale between CHT/GoTriangle and OCPT.

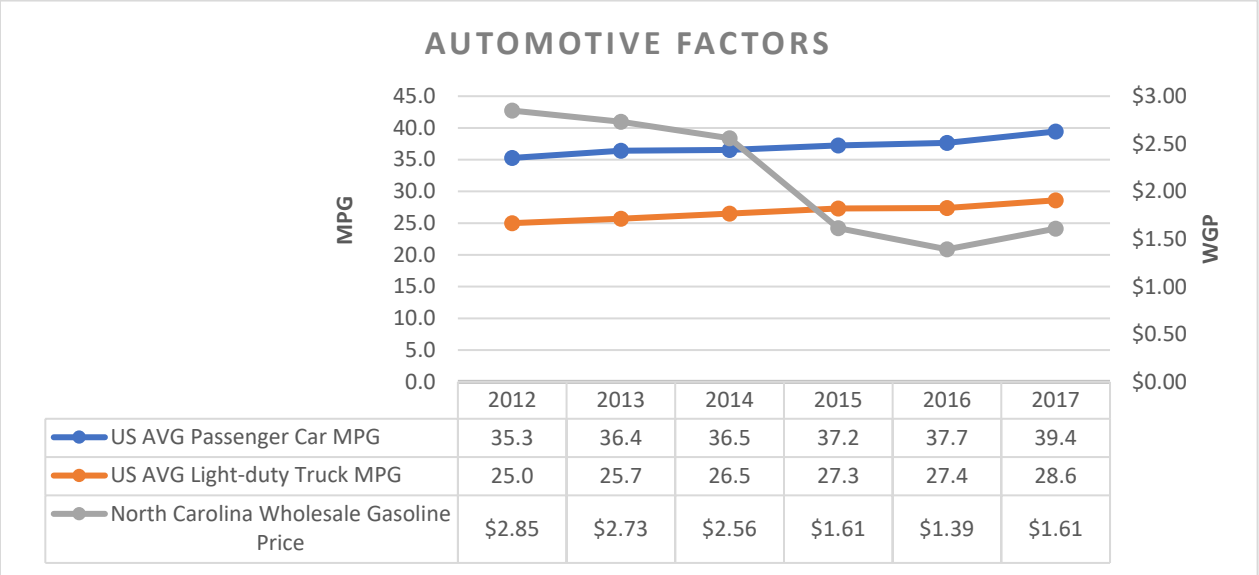
INDIRECT MEASURES

Indirect measures describe outside conditions influencing the transit operating context and mobility and transportation patterns at the local level. Economic circumstances shift an individual's perceived options when making transportation decisions. For example, higher gas prices historically shift transportation choices such as driving alone less, carpooling more, and opting for different ways of getting around. New forms of mobility enabled by the shared economy have prompted many to abandon personal vehicles altogether, though this change has unevenly impacted transit.

GAS PRICES

Gas prices directly affect the cost of travel. For personal automobiles, lower gas prices typically generate more driving, and higher gas prices generate less driving —all other things equal. However, all other things are not usually equal, and the relationship is bi-directional. Lower *demand* often results in lower gas *prices*. For example, during the COVID-19 pandemic petroleum crude prices dropped below the cost of production because of dramatically decreased demand. Very high gas prices, generally indicating international high demand, have historically led to nationwide reductions in personal automotive travel and increased transit utilization.

Adding greater complexity is the nation's current fleet of vehicles. Figure 24 shows that, while the cost per gallon of gasoline has fallen between 2012 and 2016 in North Carolina, average miles per gallon (MPG) figures have increased for *both* the typical passenger car fleet, including most sedans, coupes, and SUVs, *and* the light-duty truck fleet, which includes heavier vehicles that can tow more than 4,000 pounds, including the Ford F150, Chevrolet Tahoe, and Toyota 4-Runner. Efficiency improvements in the U.S. passenger fleet and declines in fuel prices have increased the use of personal vehicles for typical travel needs. Despite this systemic change in vehicle trends, regional transit ridership in the region has remained stable.



	2012	2013	2014	2015	2016	2017
US AVG Passenger Car MPG	35.3	36.4	36.5	37.2	37.7	39.4
US AVG Light-duty Truck MPG	25.0	25.7	26.5	27.3	27.4	28.6
North Carolina Wholesale Gasoline Price	$2.85	$2.73	$2.56	$1.61	$1.39	$1.61

Source: Wholesale gasoline price (WGP) data: **IEA**. Miles per gallon data: **EPA**.

Figure 24 Automotive Factors Indirectly Impacting Transit Trends

Transit agencies with petroleum-powered vehicles are also sensitive to petroleum prices. Shifts to buses that rely on alternative energy (electric drivetrain, e.g.) may limit transit agency exposure to fluctuations in gas prices.

SHARED MOBILITY & TNCS

Transportation network companies (TNC) offer shared or distributed transportation opportunities and/or vehicles ("shared mobility"). Well-known TNCs include Uber and Lyft, both primarily mobile phone-based vehicle ride hailing companies. Other TNCs include bike and scooter-sharing companies, like Lime, Gotcha, and Byrd. The impacts of these new players on transit (and transportation more generally) are difficult to quantify due to the novelty of shared mobility platforms and the reticence of privately-owned TNCs to share user data. Academic research has yielded mixed and sometimes contradictory findings about the impact TNCs are having on travel behavior.

One hope is that TNCs can help solve the "last-mile" problem, providing a bridge between fixed-route transit services and from/to trip origins/destinations. TNCs could help riders seamlessly switch between transit vehicles and shared mobility vehicles, enabling greater centralization of transit services and enhanced frequency in key corridors while mitigating the need for private vehicles.

One key concern is that TNCs may compete with transit routes, making it difficult for transit agencies to compete with private service providers. Early research indicates that TNCs may offer stopgaps for transit, such as when walk distances are substantially far or conditions are unreasonably crowded on transit routes.[17] A 2017 study from Denver, Colorado area finds that Uber and Lyft may replace up to 22% of public transit trips but may also replace 19% of "drive alone" trips.[18] A 2018 nationwide study finds that Uber "compliments" transit agency efficiency and ridership *after* two years of consistent operations.[19] And a 2019 Transportation Research Board (TRB) manuscript reports mixed findings with ride-hailing negatively impacting bus ridership at a statistically significant rate and bike sharing positively impacting bus ridership. [20] Until more data are available and regulatory models mature, the case is incomplete on the precise effects TNCs have on transit utilization and/or how transit service design can effectively respond to their presence.

TNCs may still have a positive effect on overall accessibility. New partnerships with ridesharing companies and transit agencies have recently been spearheaded including DART, of Dallas, Texas, who partnered with Uber in 2015 to solve the "last mile" problem. Less integrated solutions using mobile transit apps (such as Moovit) offer links to mobile TNC apps while customers attempt to conduct transit routing. Additionally, the federal government is providing funding opportunities supporting the development of technology solutions through programs such as Accelerating Innovative Mobility (AIM) grants.[21]

REGIONAL TRAVEL MARKETS AND NEED

The following sections assess the transit travel market in Orange County, including ridership potential, and identifying areas where transit need is relatively high. We will also evaluate existing transit coverage in these areas of higher need and assess the competitiveness of transit in Orange County as compared to other available modes of transportation.

GEOGRAPHIC INDICATORS OF HIGH RIDERSHIP POTENTIAL

If Orange County were trying to maximize transit ridership relative to cost, then the County would focus investments on service enhancements to provide more frequency of service to the places service is most used. Frequency is expensive, so it cannot be offered everywhere. To maximize the number of people and opportunities reachable by increased frequency, we would look to put

[17] Badger, 2017. New York Times. Paywall: https://www.nytimes.com/2017/10/16/upshot/is-uber-helping-or-hurting-mass-transit.html
[18] Henao, A. (2017). "Impacts of Ridesourcing-Lyft and Uber-on Transportation Including VMT, Mode Replacement, Parking, and Travel Behavior." University of Colorado at Denver.
[19] Hall, Palsson, & Price. 2018. "Is Uber a substitute or compliment for public transit?" Brigham Young University and NBER. Manuscript available from: http://individual.utoronto.ca/jhall/documents/Hall,%20Palsson,%20Price%20-%20JUE%20-%20WP%20-%202018.pdf.
[20] Graehler, Mucci, & Erhardt. "Understanding the recent transit ridership decline in major US cities…" TRB 2019 Annual Meeting / University of Kentucky. Manuscript available from https://usa.streetsblog.org/wp-content/uploads/sites/5/2019/01/19-04931-Transit-Trends.pdf.
[21] Federal Transit Administration; Accelerating Innovative Mobility. https://www.transit.dot.gov/research-innovation/fy20-accelerating-innovative-mobility-aim-project-selections

increase frequency in places with high ridership potential. Figure 25 below shows four primary factors indicating high ridership potential.

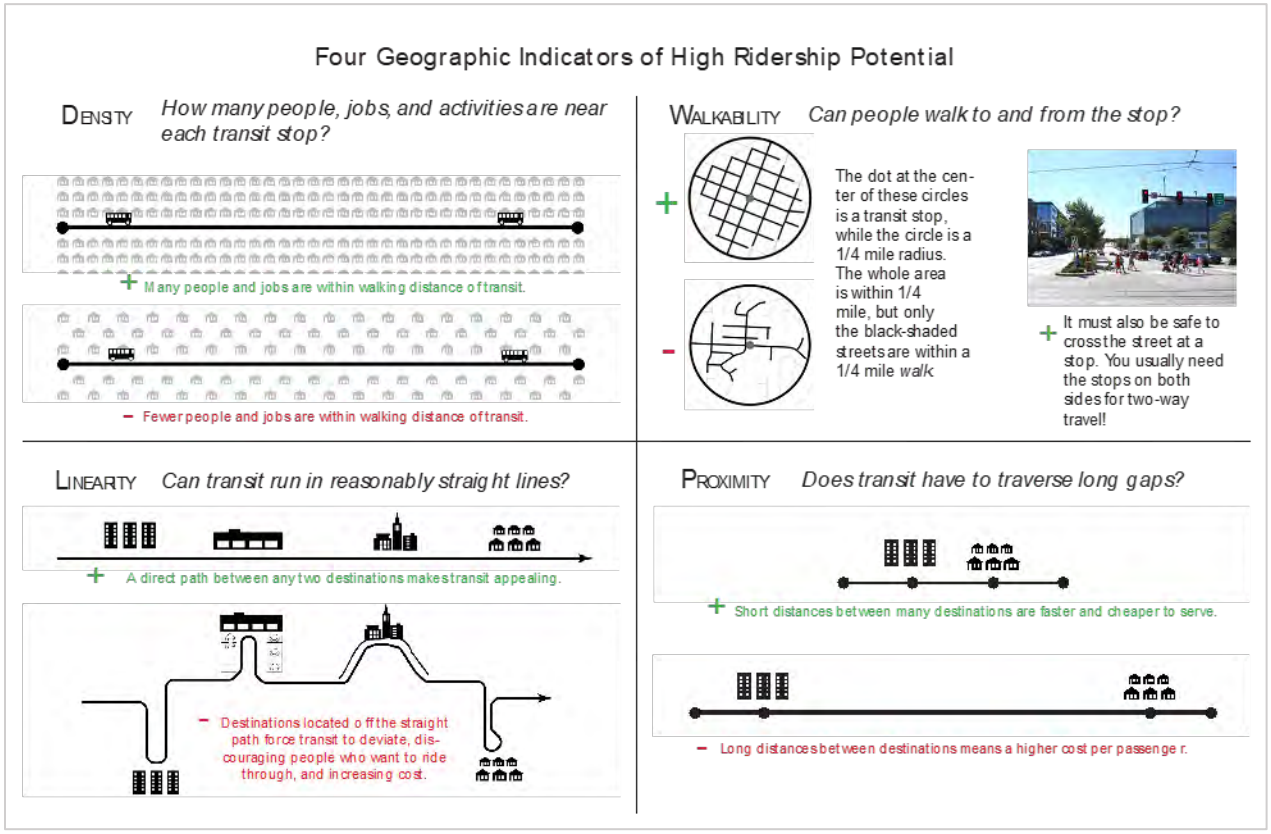


Figure 25 Four geographic indicators of high ridership potential.

These four factors can be thought of in terms of two key questions about how transit might serve an area:

- **How many residents or useful destinations can be easily reached from each transit stop?** This question looks for density and walkability. High density means more people will find a stop useful, and high walkability means that people over a larger area will find the stop easy to walk to.
- **Are stops with high demand concentrated along a logical line?** This question looks for linearity (can the line be straight?) and proximity (does the line have to cross areas with no demand (gaps)?).

These geometric facts result in a difficult political challenge around transit. A transit system designed to maximize ridership serves the county unevenly, concentrating service where demand is high. Yet even in areas where demand is low, people need transit and will ask for service to their area. This means that it is common to hear complaints about equity no matter what network design is proposed. People who live in places that are dense, walkable, and linear are cheaper to serve, on a per-rider basis, than those who live in places with lower density, walkability, and linearity.

Imagine that Ms. Smith lives in an apartment downtown (dense, walkable, linear, proximate) while Ms. Jones lives in a large house in a cul-de-sac, off a rural road, on the edge of the county (not dense, not walkable, not linear, not proximate). The objective fact is that it would cost much more to serve Ms. Jones than to serve Ms. Smith. Is it fair to give them the same level of service regardless? Or is it fair to spend the same amount serving each of them, which would mean very little service for Ms. Jones? The answer depends on the goals for that transit system.

A good way to visualize how these factors impact ridership and costs is to ask: "How far does a bus need to go to serve 1,000 people or jobs?" The farther you must go, the more expensive it is to provide service to the same number of people.

MARKETS

RESIDENTIAL DENSITY

Residential density is an important way to assess the strength of transit markets since most people's daily travel behavior begins and ends at home. Transit designed to get high ridership will seek to offer very useful services in places with high residential densities. Coverage services will try to reach all or most residents, even in areas with low- density development pattern where few people live near any given stop. While not all trips start or end at home, nearly everybody makes at least one trip starting or ending at home on most days. Further, places with many households are also destinations for other people, whether for visiting, worship, caring for family or home-based work.

Figure 26 maps residential density across Orange County and its surrounding areas. The largest clusters of residential density are in Chapel Hill, Carrboro, Durham, and areas along the Fordham Boulevard/Durham-Chapel Hill Boulevard (Route 15/501) corridor.

Areas of high density (over 10,000 residents per square mile) include Duke University and the University of North Carolina - Chapel Hill. These areas feature multi-family housing and often a traditional development pattern of smaller lots and higher street network connectivity. These higher-density, well-connected areas are easy to serve by transit. Hillsborough is also built around a traditional grid of streets but has larger lots and much lower residential density than Chapel Hill or Carrboro. There are pockets of higher residential density further from downtown Chapel Hill on the Fordham Boulevard/Durham-Chapel Hill Boulevard (Route 15/501) corridor and the north-south MLK Jr. Boulevard corridor.

Residential density drops at the boundaries of Chapel Hill and Carrboro. Most of the county's geographic area is rural and very low-density (less than 1,000 residents per square mile).

Suburban Development

Outside downtown Chapel Hill, the traditional grid-style development shifts to more post-war suburban development with larger lot sizes, a clearer separation of uses, and a more disconnected, looping street patterns. These areas tend to be more difficult to serve by transit. For example, dense neighborhoods like Homestead Park and Southern Village are both located near a main road with 15-minute bus service but requires buses to detour and loop to serve the area. Residents face a potentially long, circuitous walk to access bus service.

JOB DENSITY

A map of job density shows us not only the places people travel for work, but also places people go for services, shopping, community, health care, and more. A person's workplace may be, throughout the day, a destination for dozens or even hundreds of people.

Areas of High Employment Density

Figure 27 shows the current job density of Orange County and the surrounding area. Most job density is in and around downtown Chapel Hill and Durham as well as along the 15/501 corridor between them. Apart from this concentration of jobs, there are pockets of jobs density in shopping centers such as Meadowmont or the Mebane outlets. However, shopping centers are not always dense with jobs because big box retailers, such as Patterson Place, or Woodcroft Shopping Center, typically only show up as areas of moderate employment density because they are located on large parcels with extensive parking areas that well exceed the building footprint of the retail space.

Job centers surrounded by large parking lots are more difficult to serve by ridership-oriented transit because in most cases, there is a long walk between on-street bus stops and the front entrance. In some cases, buses make a time-consuming deviation into these shopping centers to allow a shorter walk, but that means all the other passengers on the bus must go out of their way, which makes transit routes slower and less attractive. Large parking lots also reduce walkability because they force people to walk longer distances to reach their destination and are often not designed with the expectation that people will be walking through them.

ACTIVITY DENSITY

Residential and jobs density are both critical measures of transit market potential relative to other parts of the service area. When combined, these two measures show activity density - the concentration of both jobs and residents. Activity density helps visualize the overall potential transit market of an area. Figure 28 maps activity density in Orange County and the surrounding area.

Places with more residential density are shown in increasingly brighter shades of yellow, areas of high employment density, in brighter shades of blue. The areas shown with increasing shades of red are places where there are high densities of both jobs and residents, and where there is likely to be a strong market for travel for most or all day.

Areas with the Highest Activity Density

In the Orange County area, the areas of highest activity density, with the most homes, jobs, and services, are found in and around downtown Chapel Hill, UNC, and Carrboro. There is also a corridor of activity density along US 15/501 between Chapel Hill and Durham. These areas are the strongest transit markets in terms of density, capable of generating substantial travel demand throughout the day and possibly even weekends.

There are numerous smaller pockets of dense residential or commercial/employment activity in Meadowmont/Downing Creek, around the Renaissance Center, around the Woodcroft Shopping Center, southeast of I-40 and MLK Boulevard and in West Hills East (just east of the Orange County line). For these corridors, there is a mixture of commercial development and moderate to high density housing, often as apartments, but the uses are generally separated from each other.

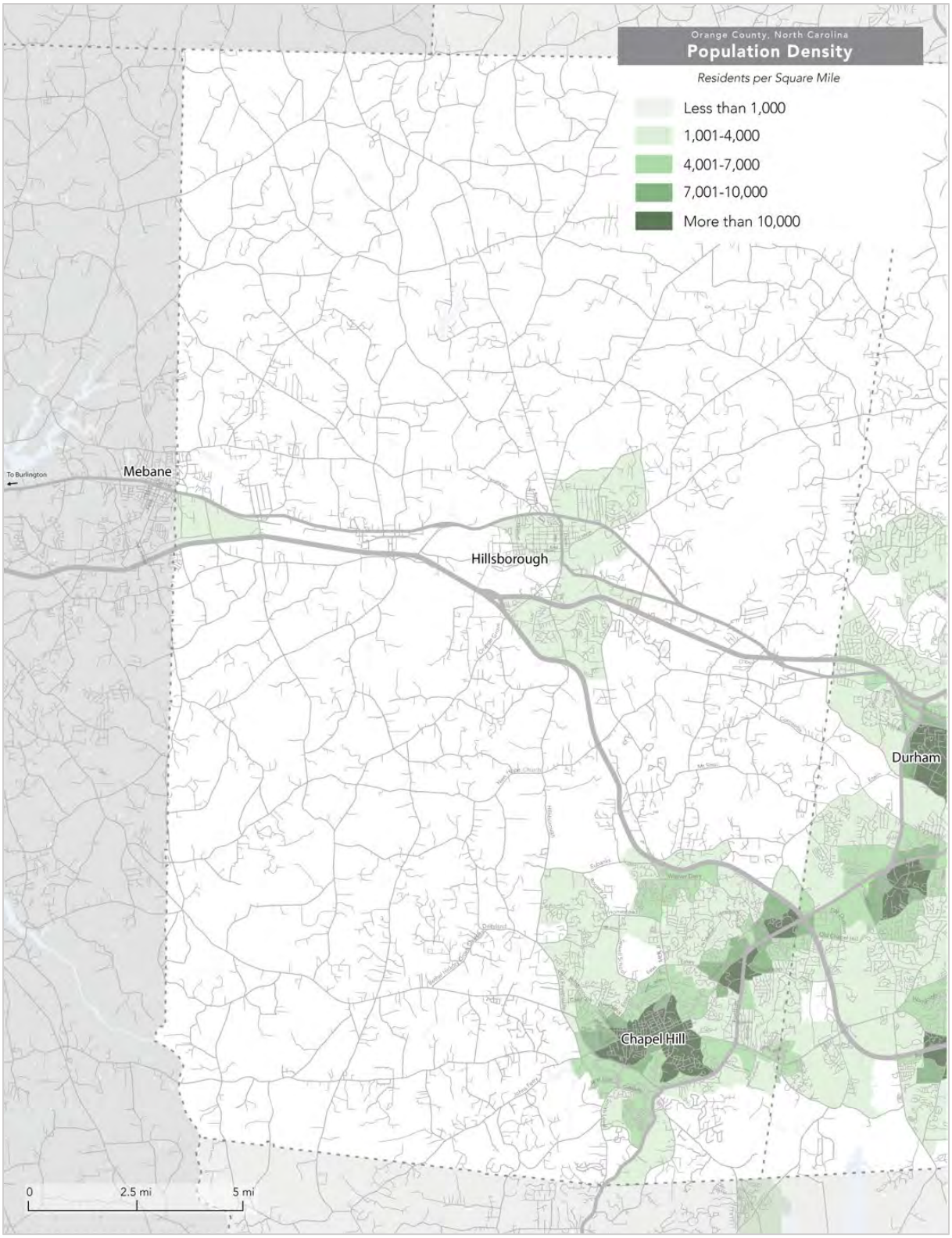


Figure 26 Population density Orange County, NC.

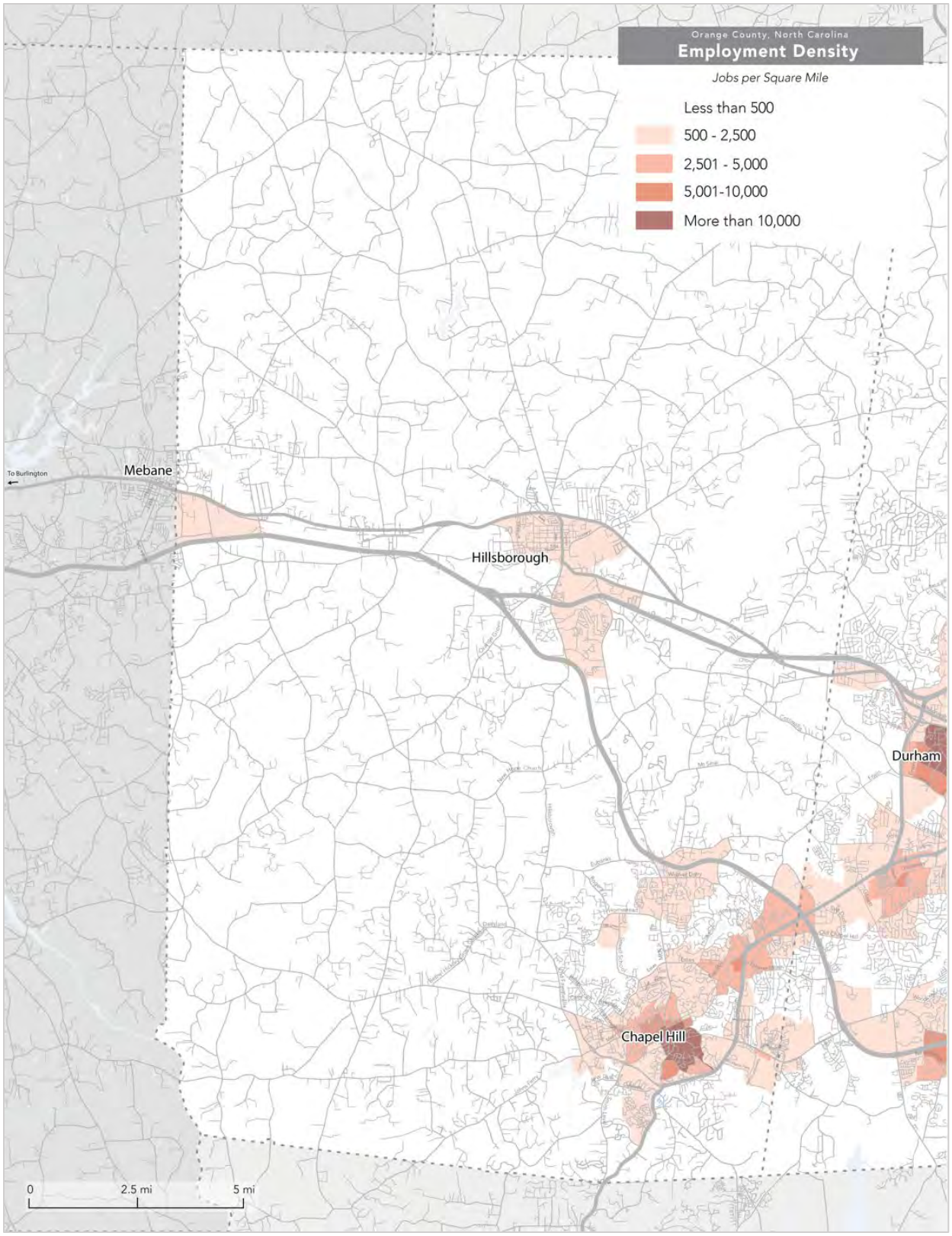


Figure 27 Employment density Orange County, NC.

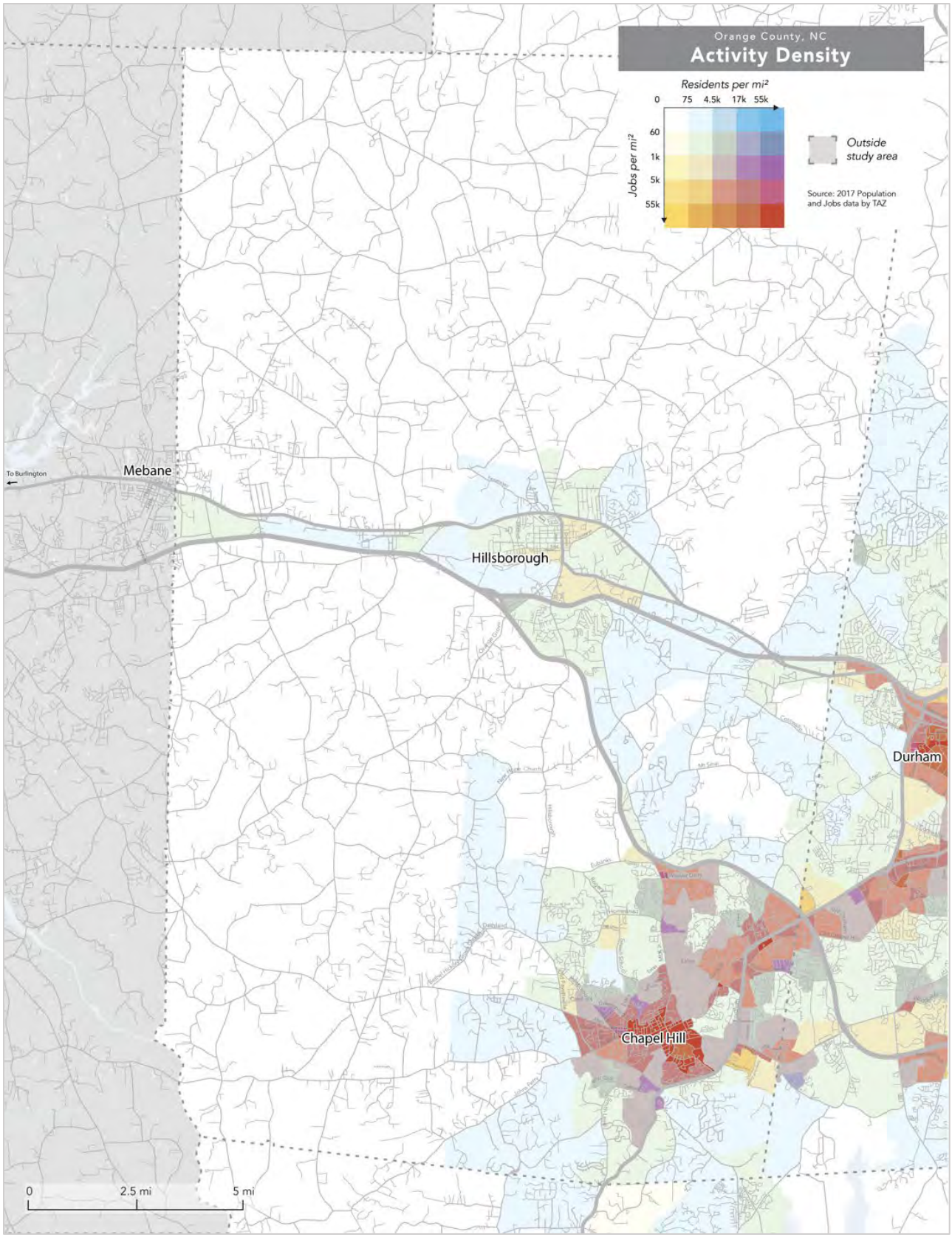


Figure 28 Activity density Orange County, NC.

Mixed Land Uses allow for Higher Transit Productivity

In addition to high density, the mix of uses along a corridor affects how much ridership transit can achieve, relative to cost. This is because an area with a mix of housing, retail, services, and jobs tends to generate more even demand for transit in both directions, throughout the day. Transit serving purely residential neighborhoods tends to be used in mostly one direction and mostly during rush hours—as residents leave in the morning and return in the evening. Transit serving residential-only areas tends to have higher costs per rider because:

- If ridership is only high during the morning and evening rush hours, the transit agency must run mostly empty buses during the rest of the day (or must pay drivers to take split-shifts, which are less desirable because they require working both early mornings and evenings each day with a long mid-day break.
- If ridership is only high in one direction during each peak, then the transit agency must run mostly empty buses back in the other direction. The service may not even be advertised as two-way, but the operating costs are always two-way.

Transit agencies who run lots of peak-only service must also buy and maintain extra buses for those few busy hours of peak service each day.

Buses serving a mix of jobs and residents can be full in both directions, leading to lower costs per-rider. If mixed-use areas include jobs from a diversity of sectors such as healthcare, education, and retail -- all extending beyond the typical 8-5 office schedule, transit also tends to see stronger all-day, two-way demand.

Universities are often sources of all-day, all-directions transit demand. This is partly because they are dense with jobs and housing. It also relates to the type of “job” done there: students come and go depending on their class schedules, from morning through the evening. Professional, retail and facilities staff have their own commute patterns. The sum of all these patterns is generally high demand, all day, every day.

DENSITY AND WALKABILITY

In almost all cases, transit trips begin and/or end by walking. Therefore, the ability to walk to transit is very important. As mentioned in the previous pages, the more jobs and residents there are near a stop, the stronger the likely transit market. However, the size of the market is also limited by the street pattern, since that determines how much of the area around a stop is truly within a short walking distance.

A lack of sidewalks and safe crossings of major streets can also mean that fewer people and jobs are within a short walk of transit because people may have to walk further and less directly to cross the street to reach a bus stop.

Walking distances to and from bus stops can far exceed “flying” distances because:

- Areas with highly connected street patterns provide short and direct path between any two locations.
- Areas with poorly connected street patterns, often in “walled garden” developments, forces long and circuitous paths between locations and discourages walking.
- Low street connectivity tends to be accompanied by wide, fast arterial streets, because the few through-streets that exist must handle all of the area’s car traffic.

Walk network connectivity is a way of assessing how complete a place's pedestrian and street network is. To do this, the area accessible "as the crow flies" in a given distance from a location is compared to how far you can go in the same distance along the street and pedestrian network.

In the "Low Accessibility" areas, a disconnected street network allows access to a much smaller portion of a ½ mile radius around a transit stop, while in High Accessibility areas, much more of the radius is reachable. We call this measurement "effective walk radius". Figure 29 shows the walkability or "effective walk radius" of Orange County and the surrounding area.

The highest walk network connectivity in the region tends to be in areas developed in the first half of the 20th century or earlier. The largest high-walkability areas in the region are downtown Chapel Hill, Hillsborough, and eastern portions of Mebane.

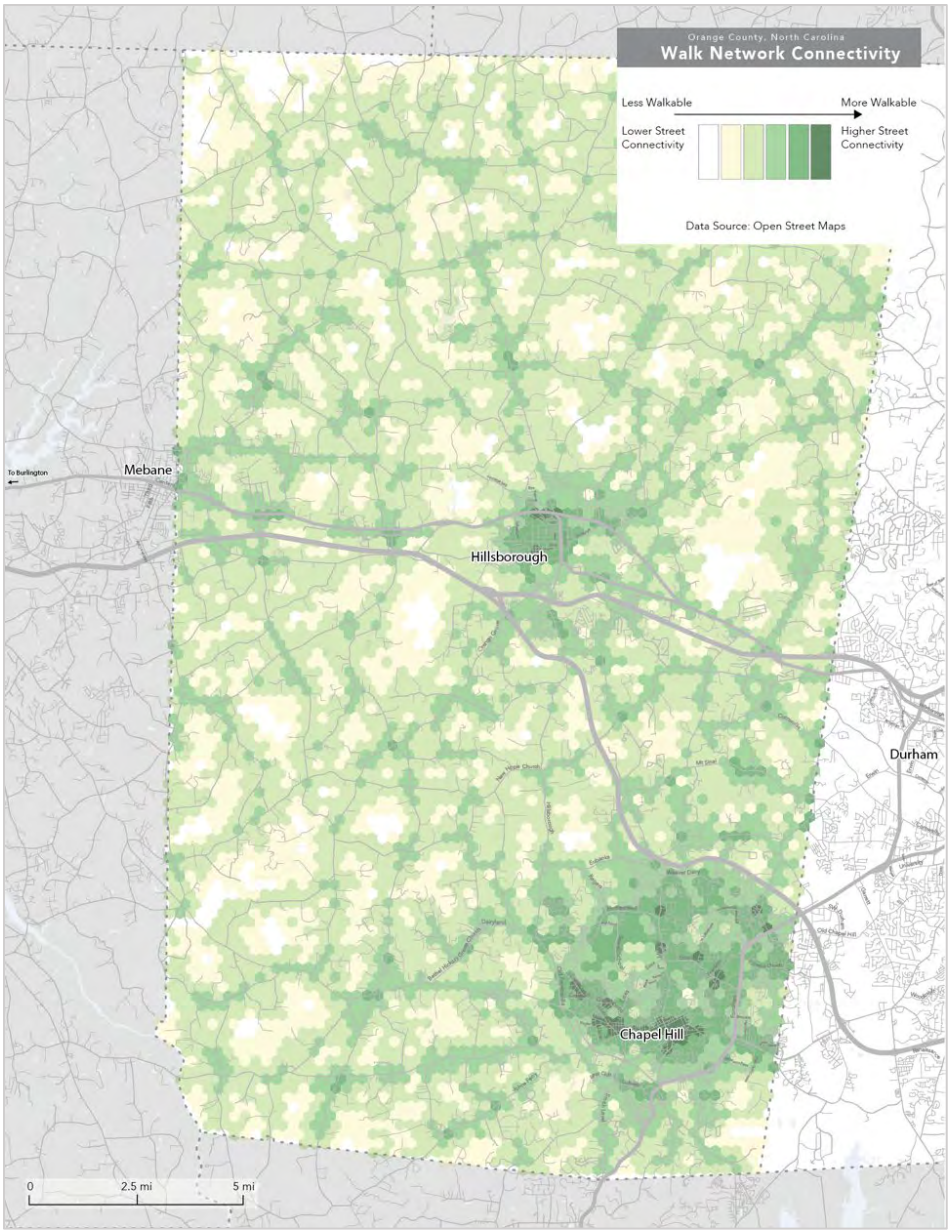


Figure 29 Walk network connectivity, Orange County, NC.

NEEDS

An area with a robust travel market (i.e., potential for high ridership) does not always reflect areas with the greatest transit need. In fact, many residents who live in rural and geographically distant areas are often those who need transit the most but who are often the most difficult transit customers to serve. Several demographic indicators suggest a higher likelihood of transit need including income, vehicle availability, and age. There is also a need to avoid placing undue transportation burdens on minority population groups. These factors and findings impacting transit service in Orange County are discussed in the following sections.

DENSITY OF LOW-INCOME RESIDENTS

Transit is often tasked with providing affordable transportation for low-income people. Federal laws also protect people with low incomes from disparate transportation impacts, which can lead agencies to provide transit service in places where poverty is high even if it does not maximize ridership.[22]

Low-Income Residents Only Use Transit if it is Useful

In some built environments, serving low-income people can meet a ridership goal. Transit can be an attractive option for lower-income people due to its low price and low barrier to entry so in medium to high density areas, with walkable street networks, service to low-income people can be a powerful ridership generator.

However, an area with low-income residents does not necessarily get high transit ridership just because it served by a transit route. If transit is not actually useful for the type of trips people need to make, in a reasonable amount of time, even lower-income residents will not use it. Most people can find other travel options, even if those other options, such as taking out a high-interest loan for a used car, cause financial distress.

Some Areas with Low-Income Residents are Easier to Serve than Others

Figure 30 shows the density of residents in poverty[23] and mean income in and around Orange County. The highest concentrations of residents in poverty are in rural areas outside the town boundaries of Hillsborough, Mebane, Chapel Hill, Carrboro, and Durham.

When low-income residents live in distant, harder-to-reach areas, the additional distance means that the cost per ride to serve them is much higher. There are several high-poverty neighborhoods which are more geographically isolated and thus harder to serve with cost-effective transit.

[22] Title VI of the Civil Rights Act of 1964 and Executive Order 12898 require transit agencies that receive federal funding to ensure that service and fare changes do not have a disproportionate negative effect on protected populations, including racial and ethnic minorities, low-income people, and those with limited English proficiency. Every transit agency sets its own specific policies for addressing these federal requirements and each agency is subject to regular reviews of its policies and their implementation

[23] Here, “poverty” means a family income at or below 100% of the federal poverty level for each size of household.

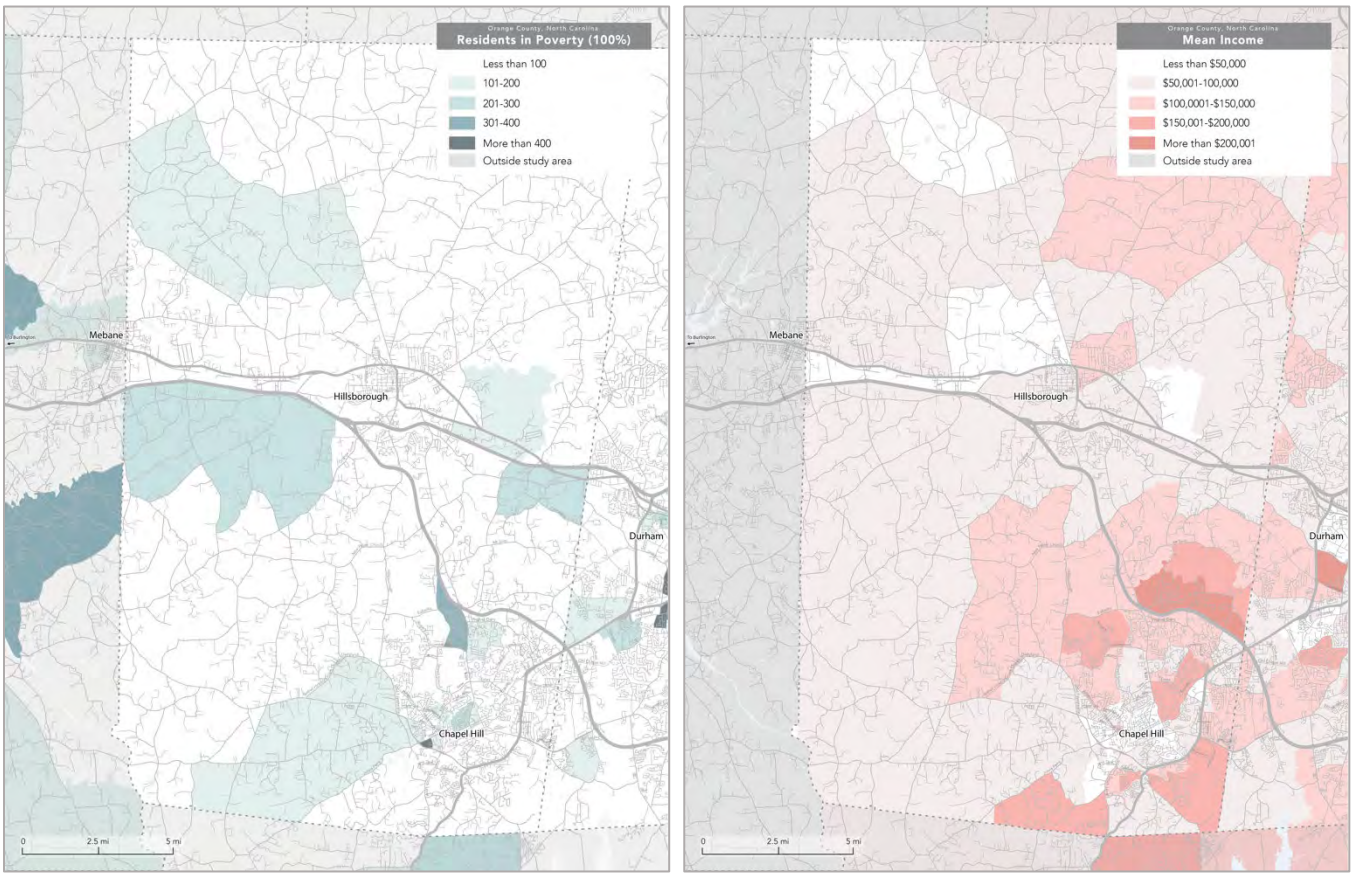


Figure 30 Locations of residents living in poverty and mean income in Orange County, NC.

DENSITY OF ZERO-VEHICLE HOUSEHOLDS

Not everybody has ready access to a personal automobile, and individuals who have less access or no access will need to use other modes when they need to travel. This includes walking, cycling, getting a ride from a friend or family member, or, if it is available and useful, transit.

If transit does not present a realistic travel option, then individuals without cars will find other ways of reaching the places they need to go. People in households without vehicles are not necessarily "transit-dependent" but do have a greater inclination toward transit use because they do not have a car in their driveway, always ready to go.

Figure 31 maps the regional density of households with zero vehicles. Few people in and around Orange County live without a car, so overall densities of zero- car-households is low. The highest levels are found within and immediately around downtown Chapel Hill, where non-car options (transit, bike share and bike infrastructure, etc.) are richest. Beyond this area, zero-car household densities are higher in rural areas between Hillsborough and Chapel Hill.

Figure 31 Households without access to a vehicle in Orange County, NC.

REGIONAL DENSITY OF SENIORS

Seniors (persons age 65 and above) are an important constituency for transit because a major goal of transit coverage is providing service for people who cannot drive, no matter where they live.

Some Seniors Cannot Drive and Are More Likely to Use Transit

As a demographic group, senior-headed households are less likely to own cars than the general population, a built-in advantage for transit in places where other characteristics for high ridership (such as density, walkability) are present. Figure 32 shows the density of senior residents in and around Orange County. The highest concentrations of seniors are on the outer edges of urban areas like Chapel Hill, Durham, and Mebane. Some areas with many seniors are home to retirement communities.

Seniors Have Different Preferences for Transit

Seniors' needs and preferences are, on average, different from those of younger people. Seniors tend to be more sensitive to walking distance, because of limits on their physical ability, or concerns for their personal safety. Seniors also tend to be less sensitive to long waits for transit, because they are less likely to be employed. For the same reason, seniors are, on average, less likely to be discouraged by slow or indirect routes that take them out of their way.

Because of these factors, **transit service designed primarily to meet the needs of seniors rarely attracts high overall ridership**. Most riders who are employed, in school or caring for kids in school will find service with long waits to be intolerable. Thus, the amount of focus that transit agencies place on meeting the needs of seniors should be carefully balanced with the needs and desires of the community.

Figure 32 Density of residents aged 65+ in Orange County, NC.

CIVIL RIGHTS ASSESSMENT: MINORITY RESIDENTS

While information about people's income tells us something about their potential interest in or need for transit, information about ethnicity or race do not alone tell us how likely someone is to use transit. However, avoiding placing disproportionate burdens on individuals identifying as a minority, through transportation decisions, is essential to the transit planning process.

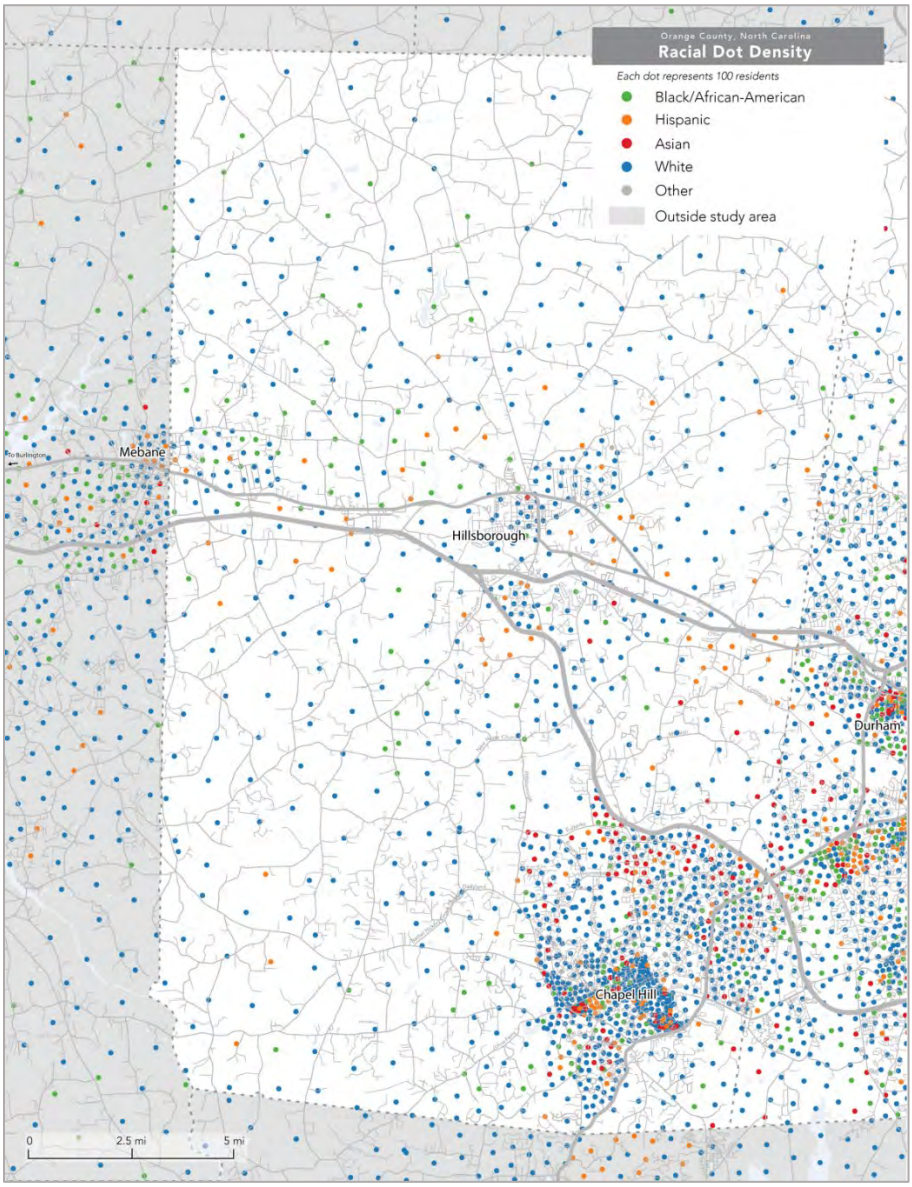


Figure 33 Racial dot density in Orange County, NC.

Transit agency policies that protect minority people from negative impacts are one type of coverage goal, because they pursue an outcome that is valuable regardless of ridership. Such policies might state, for example, that service to high-density and high-minority neighborhoods should be prioritized even if such service would not maximize ridership.

It is also important to understand where large numbers of non-white people live, so that public outreach during this project can be sensitive to language and cultural barriers, and so that service changes can be evaluated considering impacts to protected people.

Figure 33 shows where people of different races and ethnicities live in and around Orange County. Each dot represents 100 residents. Where many dots are very close together, the overall density of residents is higher. Where dots of a single color predominate, people of one race or ethnicity make up most of that area's residents. Overall, Orange County is diverse, with large populations from many different racial and ethnic groups, but that diversity is not evenly distributed.

Rural parts of the county have mostly white residents and a few black and Hispanic residents. Urbanized areas are more diverse and have many neighborhoods with more even mixes of Black, Hispanic, Asian, and White residents.

TRANSIT COMPETITIVENESS

"Transit competitiveness" focuses on the trip-making opportunities offered by existing transit services relative to those available by automotive travel. Consider a hypothetical household and two destination locations. The example household can reach a major office district in 15 minutes by driving or in 30 minutes by transit; it can reach a shopping center in 15 minutes by driving and 45 minutes by transit. Clearly, transit is more competitive for traveling from the example household to the office district than to the shopping center.

A generalized assessment of transit competitiveness evaluates these relative travel times and their impact on accessibility using the accessibility analysis procedures described above. In this case, however, both the transit and auto modes are considered, and the ratio of transit access to auto access is reported. Auto times are estimated using the Triangle Regional Model's base year (2013) congested highway network. This network models traffic volumes and resulting delays on roads throughout the region for a reasonable assessment of daily zone-to-zone travel times.

Figure 34 shows a map of transit competitiveness for access to jobs in Orange County. In Carrboro and Chapel Hill, transit provides access to roughly a third of the jobs reachable by car. These zones have the highest competitiveness scores in the county, and indeed, these ratios suggest that transit provides meaningful connectivity to jobs and is likely to capture relatively high shares of commutes from these zones. An axis of moderate competitiveness is also observed along NC-86 between Chapel Hill and Hillsborough. Elsewhere, the competitiveness scores are notably lower, and transit is likely used by residents of these zones only infrequently or largely by households with low rates of vehicle ownership (no cars or one car per household).

Areas to the west of Orange County such as Burlington, Graham, Alamance County, and other Piedmont-Triad areas do not yet demonstrate a major impact on transit competitiveness analyses but are worth keeping an eye on, in the future.

Adaptations to the trip-making potential analysis reported above can help identify origin-destination pairs that present numerous trip-making opportunities by car but few by transit. In this adaptation, the trip-making potential index score by car is estimated for each origin-destination pair, and the trip-making potential index score by transit for that zone pair is subtracted from it. Pairs with high auto trip-making potential but low transit trip-making potential represent underserved origin-destination pairs. These indicate opportunities to better connect residents to jobs with transit services that offer travel times that are competitive with those available by car.

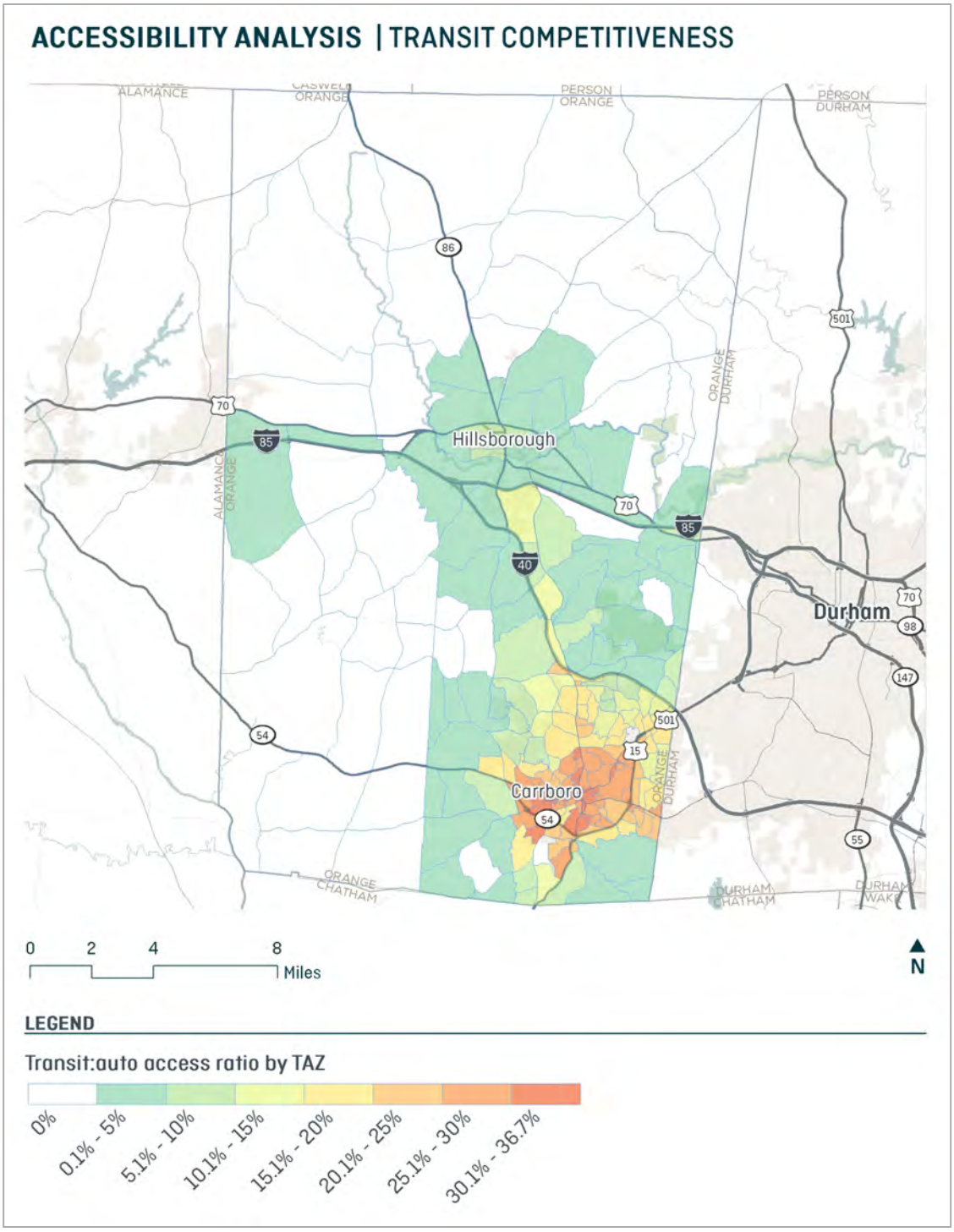


Figure 34 Transit competitiveness: access to jobs, Orange County, NC.

Figure 35 shows the transit opportunities estimated through this process for **origins in Orange County**. The map reveals several opportunities to strengthen transit connections between residential areas in Chapel Hill and Carrboro to the downtown/UNC area, notably from the Blue Hill District and several in-town neighborhoods with more modest opportunity from northern Carrboro and southern Hillsborough. OCPT and CHT route additions or modifications would be

the most likely services to enhance these local trip-making opportunities. There are also underserved regional connections from central Chapel Hill/Carrboro to Raleigh, from Hillsborough to Duke Hospital, and from northern Carrboro and Chapel Hill (including the Blue Hill district) to Duke Hospital. GoTriangle's express bus services are the most likely to serve these regional trip-making opportunities.

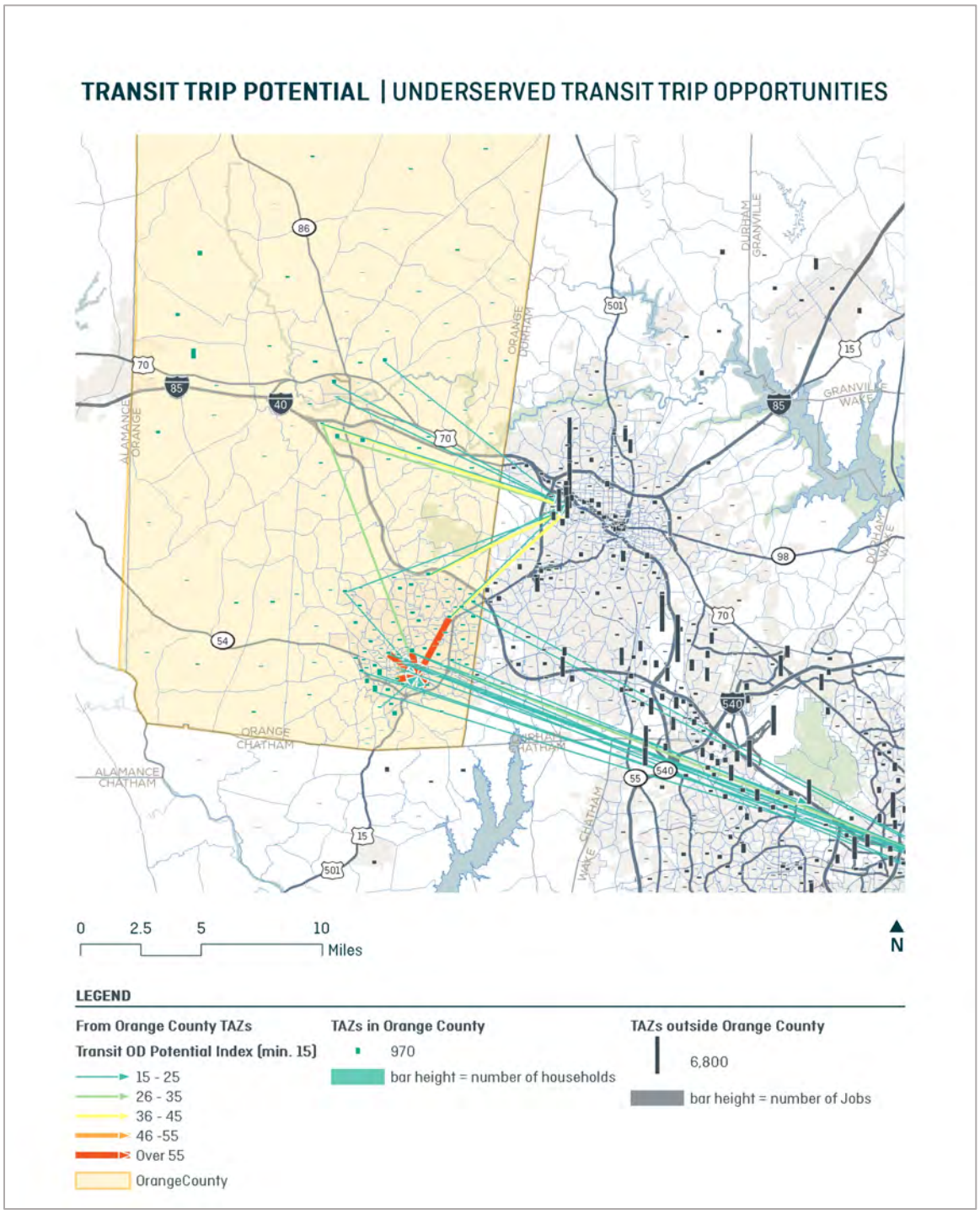


Figure 35 Potential transit trip opportunities from Orange County, NC.

Figure 36 shows the underserved transit connections for trips with **destinations in Orange County**. The strength of the employment cluster in the downtown/UNC area makes it the focal point for these opportunities to enhance transit competitiveness. Prominent connection opportunities within Orange County reflect those identified in the origin-end analysis described above. Clusters of regional connection opportunities are observed from southeastern Durham County, northern Durham, the Brier Creek area, eastern Cary, and northern Raleigh. While transit travel is currently possible from these areas to Chapel Hill, doing so requires at least one transfer at an out-of-the-way transit center. The transfer requirement and circuitous routing undermine transit competitiveness. Since these clusters are spread out across broad areas, they would likely be most naturally served through park-n-ride access to peak hour express bus services.

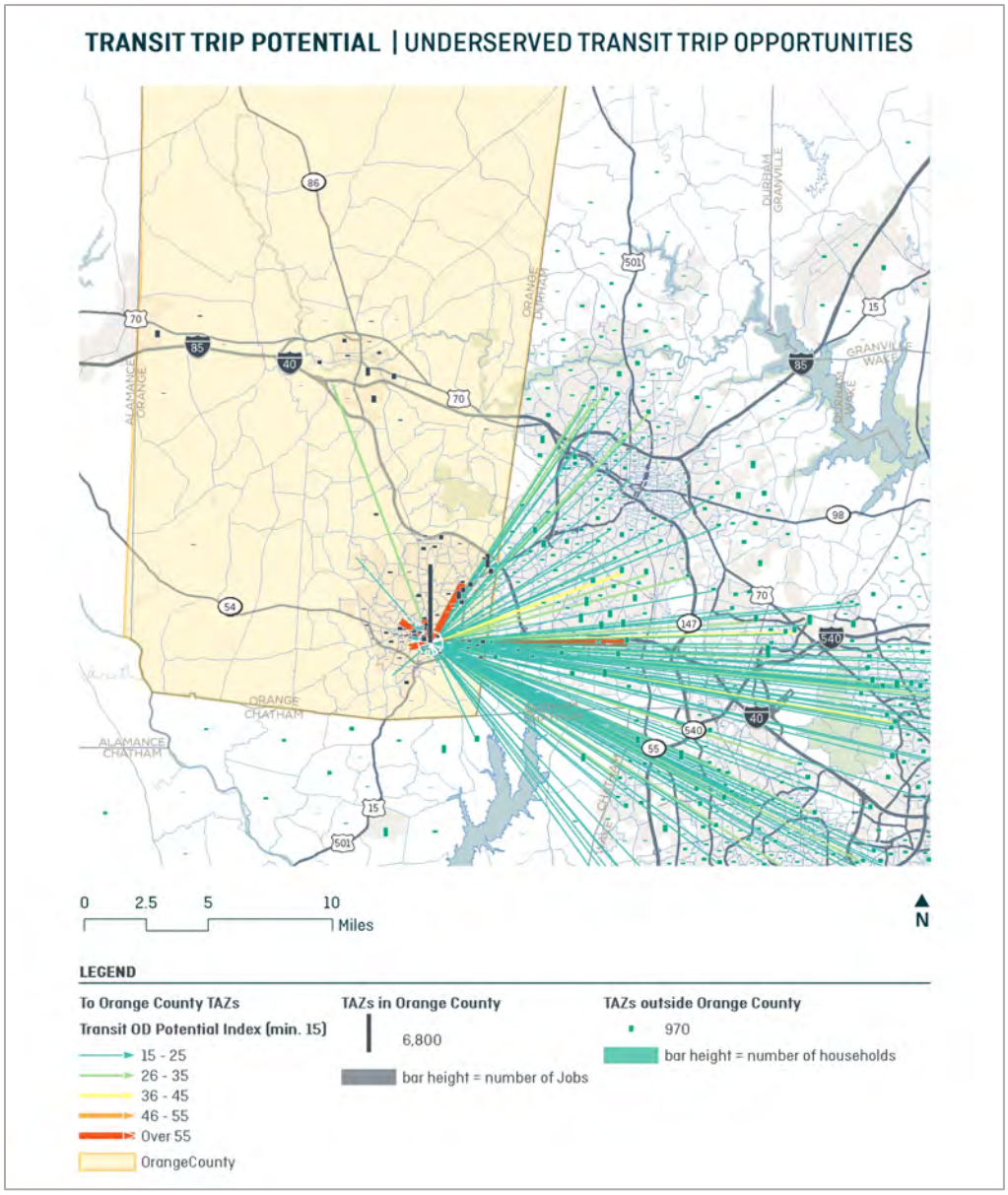


Figure 36 Potential transit trip opportunities to Orange County, NC.

This competitiveness and transit opportunities analysis assumes that effective transit provides timely and reliable connections among residents and major employment centers. Opportunities to enhance transit competitiveness may be address through the development of new transit routes, restructuring of existing routes, and/or enhancing service frequency, reliability, and span of service. However, additional considerations that address geographic coverage, service to disadvantaged populations, and similar policy objectives must also be considered in transit route and system designs. Furthermore, alleviating barriers to accessing and using transit can enhance its competitiveness in ways that are not captured in this analysis.

EMERGING TRANSPORTATION TECHNOLOGIES

MOBILITY AS A SERVICE

New technologies and concepts are emerging that could address some transportation needs and change aspects of the transit agency role in Orange County. A key idea is that a trip must be understood from end to end and may consist of an ever-widening range of services, public and private. For example, a trip from end to end may include a walk, using a scooter, and a bus ride. Mobility as a Service (MaaS) refers to the goal of making it easier to plan and pay for these trips. Many transit agencies are exploring how to expand their services or their connection to other service to be MaaS providers or are exploring ways to integrate their service into other MaaS provider systems. A key question about MaaS and other technology trends is whether, and how much, they are adding to freedom and access.

Among the widening range of mobility on demand[24] services and technologies are car sharing[25], ride sharing[26], ride sourcing,[27] bike sharing[28], microtransit, dockless bike sharing,[29] and even connected and autonomous vehicles.[30] Many of these seem like all new modes of transportation, but many are older modes where new technology has made the process of finding and paying

[24] An integrated, connected multimodal network of safe, affordable, and reliable transportation options that are available and accessible to all travelers.
[25] A service that provides members with access to an automobile for intervals of less than a day. Some companies require users to borrow and return vehicles at the same location. Others have one-way or free-floating approaches, so users can pick up and drop off at different locations. Some operate peer-to-peer (p2p), which allows car owners to earn money at times when they are not using their vehicles by making them available for rent to other carshare members.
[26] Adding passengers to a private trip when driver and passengers share a destination. This arrangement provides additional transportation options for riders while allowing drivers to fill otherwise empty seats in their vehicles. Traditional forms of ride sharing include carpooling and vanpooling. This term is sometimes used to refer to ride sourcing.
[27] Use of online platforms to connect passengers with drivers and automate reservations, payments, and customer feedback. Riders can choose from a variety of service classes such as drivers who use personal vehicles, traditional taxicabs dispatched via apps, and premium services with professional livery drivers and vehicles. Ride sourcing has become one of the most ubiquitous forms of shared mobility. Uber and Lyft are commonly known ride sourcing companies and rides are ordered on-demand through a mobile app.
[28] Short-term bike rental, usually for individual periods of an hour or less. Information technology-enabled public bike sharing provides real-time information about the location and demand for bikes at docking stations throughout a community.
[29] Like bikeshare, but docking stations are replaced with individual unit location information. Lime and Bird are the most common dockless scooter and bike operators nationally.
[30] An overarching descriptor for varying levels of vehicle control. Also included in this category are the implementation of autonomous, low-speed shuttles which operate in general traffic roadways.

much easier. As technology has made these modes easier to provide in new ways, many have become commonplace.

Research suggests emerging guidance for transit operators who want to experiment with shared mobility options, specifically transportation network companies (TNC) like Uber and Lyft. These include:

- Designating specific curb space near transit stops and stations for for-hire vehicle pick-ups and drop-offs.
- Pursuing opportunities for cost savings through dial-a-ride, paratransit, and late-night partnerships, particularly at times and areas where fixed-route transit would have low productivity.
- Tracking and understanding TNC usage through surveying and requiring data sharing from TNC companies.[31]

First and last mile connections may also be an opportunity for technology solutions. Most often, bike- and scooter-shares fill this gap in urban settings. The connection of multiple modes in a single trip is becoming a key exploratory area in the move to mobility as a service, where coordination between private and public mobility services can improve access and mobility for many.

TRANSIT TECHNOLOGY

Technology solutions may aid Orange County transit operators in improving the rider experience and encouraging more people to ride. Mobile fare payment is becoming more common among transit agencies around the nation. Many agencies are exploring methods to integrate a cross-platform fare payment option so riders could use one mobile app to pay for multiple transit or other mobility services. This may aid in connecting Orange County residents to other services in the area, expanding the options to transfers easily to other services and opening opportunities to use transit to travel around the region. Another element of transit technology that can help attract and retain more riders is real-time information for bus location and arrivals. Real-time information helps inform riders about their travel options.

MICROTRANSIT

Several transit agencies have tried or are trying pilot projects with private providers of microtransit[32] services. Most of these pilot projects are using app-based services to extend or replace fixed-route transit service in areas where ridership is relatively low. One common marketing pitch for these pilots is that the new demand responsive services will improve customer service by reaching people where they are, or that the new services will be able to expand service to areas which are difficult to serve cost-effectively using traditional fixed-route service.

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[31] Transit Cooperative Research Program Report 195, “Broadening Understanding of the Interplay Among Public Transit, Shared Mobility, and Personal Automobiles”

[32] Building on the familiar model of Dial-a-Ride, or demand responsive service, *microtransit* is a service where a bus or van route’s actual path is variable depending on who requests it. Microtransit refers to services of this form that are expedited with modern communications (most often a smartphone) to produce higher efficiency and faster response times, so that trips do not need to be reserved so far in advance. It is a relevant option for low-demand coverage services.

Demand-response service of any kind—including new microtransit services that use an app and take real-time requests—cannot achieve high ridership relative to service levels, simply because driving to and from everyone's requested places takes a lot of time. This is an inherent limitation that is not altered by the size of the vehicle, the strength of the marketing campaign, or the amount of demand.

The record productivity of a traditional dial-a-ride service is six boardings per vehicle hour. No app-enabled, demand-response transit service has yet exceeded three boardings per hour. Early results of a pilot project using an app-based microtransit service in Sacramento suggest that it will not exceed three boardings per hour.

A challenge unique to microtransit is the promised real-time responsiveness of the service. With traditional dial-a-ride, the transit agency can ask passengers with travel time flexibility to make their trip at a slightly different time to help improve productivity. If a microtransit service promises to respond to requests in real-time:

- Trips cannot be nudged to times that are more efficient to service.
- Extra buses and drivers must be on the ready (and on the clock) at many more times of the day, so that all potential requests can be handled.
- If requests cannot be handled in real time and requests are only fulfilled on a space-available basis, that means that people cannot depend on the service, and must have a car in the driveway, a fixed route nearby, or the ability to pay a higher fare for a taxi, Uber, or Lyft.

Demand response service, whether it is called dial-a-ride or microtransit, is generally used as a specialized coverage service. It provides access to transit over a large geographic area but cannot achieve high ridership relative to costs. It is specialized to the needs of people who cannot, or do not like to, walk, especially in places where walking distances are long, or conditions are difficult. If fares are set to reflect the higher cost per rider, then service is only useful only to people who can afford the higher fare. If it is offered on a "space-available" basis, then it is useful only to people who have some back-up option at the ready, or who are making discretionary trips.

One way to increase productivity is asking microtransit riders to use centralized locations to access the service and to travel at times that make the service more efficient. This is one way that boardings could perhaps exceed six per vehicle hour. However, the line between on-demand microtransit and fixed transit service also becomes increasingly blurred.

More successful pilots are being employed as extensions of, and supplements to, existing paratransit service. These include methods of improved routing and introducing trip creation automation to reduce administrative and dispatch costs. In Richmond, GRTC is currently partnering with reservation companies (UZURV and Roundtrip) that book trips through ride sourcing companies or other vehicles depending on the person's needs and abilities.

CHALLENGES

Barriers exist limiting the feasibility of emerging transportation technologies. Expanded service comes at a cost, regardless of the efficiency of technology. Paratransit and demand-responsive service continues to be costly because of the labor-intensive nature of operations. Only full automation (which is still prohibitively far into the future) could potentially aid in significant labor cost reductions. However, full automation reduces the customer service component of transit

service. As such, efficiency and service should be weighed carefully to determine the appropriateness of a solution.

While partnerships with private companies such as Uber and Lyft are being explored, strong evidence suggests that ride sourcing services in urban areas are drawing riders away from transit. For users not constrained by cost, more responsive service is often more attractive than more cost-efficient service (lower costs per rider) requiring them to wait longer, walk farther, or that just takes more time.

Orange County must also consider if emerging technologies are detrimental to the community's needs and values and the mission of transit service providers. If high ridership relative to cost and making efficient use transportation networks are high priorities, then implementing microtransit services might undermine those priorities. But if the County wants to prioritize maximum coverage of people and places in less dense parts of the county, or minimizing walks and maximizing rider comfort, then microtransit and dial-a-ride options may be a useful tool. Fixed-route transit currently remains the most productive form of travel in urban areas but in the late-night hours, when demand is much lower, demand-responsive solutions may achieve the mobility goals of the County more effectively.

ANTICIPATING/RESPONDING TO THE IMPACTS OF THE PANDEMIC

The COVID-19 pandemic has disrupted public health and quality of life throughout Orange County. Transit ridership has dropped because of reduced capacity and social distancing mandates on travel by all modes. The transit mode is particularly affected because operations and ridership are predicated on bringing people together in close proximity.

COVID-19 is expected to disrupt our daily lives for a (relatively short) period of one to three years, until effective vaccines are developed and distributed. COVID-19's effects on economic recovery will likely outlast direct public health impacts. Over the twenty-year horizon of the 2020 Orange County Transit Plan Update, the pandemic's impacts will slightly dampen forecasted economic growth; the uncertainty associated with longer term pandemic effects is like uncertainties caused by a variety of other local, national, and global factors ranging from social inequities to climate change.

In the short term, however, the effects of COVID-19 will be more volatile and uncertain as public health and public transit officials continue to respond to virus-related issues. While COVID-19 has reduced transit ridership, it has also affected operations from mandating vehicle capacity and fare collection changes to addressing staffing needs due to operator illness. More critically, the large increase in unemployment means that sales tax and other local funding sources that support the local and regional transit agencies can be expected to fall, because people reduce their spending when they lose their income.

The pandemic arrived just as Orange County began the process to reconsider how to spend the sales tax funds generated for transit. This transit plan update is needed, in part, because the Durham-Orange Light Rail Transit project has been cancelled, and the planned funding for that project can now be redirected to other transit investments. Expectations before March 2020 were

that sales tax funding would continue to grow for the foreseeable future, but now those expectations must be revised.

The 2020 Orange County Transit Plan Update will need to address COVID-19 uncertainties, including

- The evolution of social distancing – not just the mandate but the individual level of comfort with proximity to others. We can suspect that social distancing will continue as an expectation, affecting people's travel choices, long after it ceases to be a mandate.
- Patterns of demand as economic activity rebounds, but toward a new normal. We can suspect, for example, that hospitality demand will return more slowly than many other economic activities.
- Expected declines in financial capacity across all local governments.
- Likelihood of short-term shifts in the economic recovery process due to new waves of outbreaks.

Given these uncertainties, and the need to maintain social distancing on transit for at least the next few months, we can expect that the near-term plans for transit will be primarily about responding as the virus progresses and the economy, hopefully, rebounds after a vaccine is available and people can return to regular activities.

It is possible that many people will continue to fear gathering in large groups or sharing a bus with many people. Therefore, it may be many years before everyone who used to ride transit is comfortable doing so again. Furthermore, an economic recession might significantly reduce transit ridership if many people are out of work. In the short and long-term, however, transit is still essential for two key reasons:

- Many people who do not have cars, some of whom cannot use cars, will need transit to get to essential jobs and reach essential services. These people will still need some transit service.
- In dense areas, there is limited road space per person, and widening roads is destructive to the economic growth and character of a community. In these places, the geometry of movement means that people must take up relatively little space per person to get around, which means walking, biking, and buses are essential to ensuring that everyone has access to opportunity. The alternative is crippling congestion.

Therefore, even with the heightened level of uncertainty, maintaining an essential transit system is critical to the lives of many people, and investing in the long-term success of transit on ridership terms is essential to the long-term success of dense places in Orange County, like Chapel Hill and Carrboro. The development of the 2020 Orange County Transit Plan Update will need to leverage the best estimates for both shifts in demand over the next few years as well as the possibility of economic stimulus funding to both maintain needed public services and help catalyze economic recovery.

PUBLIC SURVEY

A public survey was executed during September 2020 to better understand the demographics, needs, and values of transit riders in Orange County. Two hundred and fifteen (215) individuals responded to the survey (approximately half responded online via SurveyMonkey and the other half responded via a paper survey). The survey was written in both English and Spanish. A summary of key findings is presented, and full results are available as an appendix to this report.

- Most respondents live and/or work in Orange County (93%).
- Over half of respondents currently ride transit in Orange County (CHT, OCPT, GoTriangle) (62%).
- CHT and OCPT are the most-used transit services (62% and 52% of respondents, respectively).
- An overwhelming majority of respondents use fixed route or circulator service (92%).
- 88% of respondents use transit to travel *within* Orange County.
- Most respondents use transit to get to/from work (63%); to reach services (46%); to save money (38%); to support environmental sustainability (37%); and/or because they do not have access to a personal vehicle (30%).
- 68% of respondents indicated their transit use have changed since the beginning of the COVID-19 pandemic.
- Most respondents (53%) indicate they will intend to go back to their normal routine after the pandemic is over.
- Riders state the following reasons for changes in their travel patterns due to the pandemic:
    - Leaving home less often (for a variety of reasons)
    - Required to work/attend school at home
    - No longer taking children to/from school
    - Loss or reduction of employment
    - Concern about contracting/spreading COVID-19
    - Timing and route changes of transit service due to the pandemic
    - Walking/cycling more
    - Using private vehicle more often
- Respondents made the following suggestions for enhancing Orange County's transit system:
    - Provide Saturday/weekend service (most common response)
    - Provide service earlier and later each day (common response)
    - Provide more frequent service (common response)
    - Make transfers "easier"
    - Provide better/clearer/more reliable information, particular for infrequent users of transit, including routes/schedules and app-based services to inform riders if buses will be late or if they are full
    - Provide masks for riders who need them
    - More amenities at bus stops (benches, bike racks, shelters, lighting, trash disposal)
    - Direct service to RTP/ better regional connections
    - Coordinate bus schedules with hospital shifts
    - More coverage
    - More direct routes ("don't ride all over the county on route")

    - Provide more stops
    - Provide free transit service (besides CHT)
    - More comfortable vehicles ("better shock system" was suggested by several respondents)
    - More service to places like doctors' offices and grocery stores for seniors
    - Move to electric buses
    - Improve non-motorized access to transit stops/routes
    - Premium express service like bus rapid transit
    - Free park and ride
    - Smaller vehicles for express routes
- Most respondents indicated that they would like to see service balanced between higher frequency and higher coverage service, even if it means less service overall (40%); 19% would like to see more frequent service and 15% would like to see more coverage; 17% indicated they have no preference and 9% responded "other." Reponses for "other" included things like investing in on-demand and AV/CV technology, redirecting transit funding to other priorities, and "whatever will increase ridership."
- The most common ZIP codes of respondents include: 27278 (Hillsborough and outlying areas); 27516 (southwestern Chapel Hill and Orange County, excluding Carrboro); and 27510 (Carrboro).
- Three riders indicated a Mebane/Alamance County home ZIP code, and three riders indicated a home ZIP code for Cedar Grove.
- Racial characteristics of respondents tracked closely with those of Orange County as a whole (64% white; 24% Black or African American; 1% Asian; 6% Hispanic/Latinx of any race).
- 96% of respondents speak English at home.
- Nearly 20% of respondents indicated they are aged 55-64; 17% indicated they are 35-44; 17% indicated they are 25-34; and 16% are over aged 65%. Only one respondent was under age 18.
- 86% of respondents indicated they are not students.
- Income of respondents is widely distributed across categories with the highest reported categories being under $15,000 (14%) and between $30,000 and $49,999 (14%); 26% of respondents did not indicate their income.
- Most respondents (58%) report always having access to a vehicle; 18% report they never have access to a vehicle.
- Of the 75% of respondents who chose to report a gender identity, 49% of respondents identify as female and 42% identify as male.

CONCLUSION: OPPORTUNITIES FOR SERVICE ENHANCEMENTS

This section contains facts and findings from this report reflecting opportunities for potential transit service enhancements, changes, connections, investments, and more, responding to the on-the-ground context, forecasts of future conditions, and responses to the public survey. These will be integrated and further explored during development of the conceptual transit scenarios representing potential transit service and investment options for Orange County.

- Population growth away from urban centers, accompanied by an increase in extremely low-income households and an aging population in these same areas, suggests an increase in transit-dependent households located farther from transit-rich areas. Strategies such as investing in additional demand-response vehicles or investigating the feasibility of expanded transit coverage to better serve these growing, transit-dependent areas of the region may be considered. It also suggests a long-term change in land use policy may be needed, as responding by adding transit service in places that are expensive to serve with transit is an expensive solution to this problem.

- The region's campuses and research facilities will likely continue as major job centers, generating higher traffic demand and commuter flows. Strategic transit improvements can help alleviate congestion and ensure that employees in key industries earning below-average wages are not inequitably impacted because automobile transportation is not an option.

- Workers with jobs in lower paying industries and who live in areas where wages are not aligned with the cost of living are moving farther from job centers to find housing that is affordable, based on their income. This results in longer commute times, higher VMT, and increased transportation costs. Investment in affordable and dependable regional transit is essential to support these residents and workers.

- Higher housing values in Orange County suggest that workers in lower-wage industries likely travel *into* the county for work. This increases commuter strain on corridors connecting Orange County and other parts of the region where housing remains attainable for low-wage workers. Corridors connecting affordable housing growth areas to job centers will likely see an increase in traffic driven by development growth outside of the region's urban cores. Enhanced regional transit connectivity may help alleviate growing traffic congestion on key corridors.

- While the discontinuation of the DOLRT was an unexpected setback, it is also an opportunity to leverage transit-supportive planning and policies developed in anticipation of the light rail system. There are opportunities for investment in regional transit that take advantage of the planning and groundwork conducted for DOLRT but that utilize alternative transit technologies like bus rapid transit (BRT).

- Chatham Park (to the south of Orange County) has the potential to dramatically shift the makeup of Pittsboro and the surrounding communities, including shifts in travel demand and commuting patterns. With an expected 20,000 new homes, Chatham Park will impact roadway usage, congestion, and commute times. Many new residents will work at key regional

employment centers including UNC, Duke, and RTP. There are currently few transit options in this area. Planning for enhanced, premium transit options to connect these new residents to major jobs centers should be considered for the future.

- Largest high-walkability areas in Orange County are downtown Chapel Hill, Hillsborough, and eastern portions of Mebane. The highest activity density (the most homes, jobs, and services) is found in and around downtown Chapel Hill, UNC's campus, and Carrboro. There is also a corridor of activity density along US 15/501 between Chapel Hill and Durham. These areas are the strongest transit markets in terms of density, capable of generating substantial travel demand throughout the day and possibly even weekends. Enhanced transit service and improved regional connections should be prioritized in these higher-demand areas.

- The Orange Alamance Connector (OAC) route is the lowest performing route (less than one boarding per hour). This level of productivity is exceptionally low, even for a coverage-oriented fixed route. This suggests the OAC route may need to be significantly redesigned or converted into an on-demand service.

- The gaps between transit trip-making potential and auto trip-making potential are greatest for regional connections, including between Hillsborough/Efland to Duke Hospital; Efland to Chapel Hill/Carrboro; Hillsborough to RTP; and Chapel Hill to RTP. This reflects the magnitude of employment at the destinations and the availability of high-speed auto travel via I-40, I-85, and NC-147 between these origin-destination pairs. GoTriangle's express bus services are the most likely to serve these trip-making opportunities in the near term and should be explored.

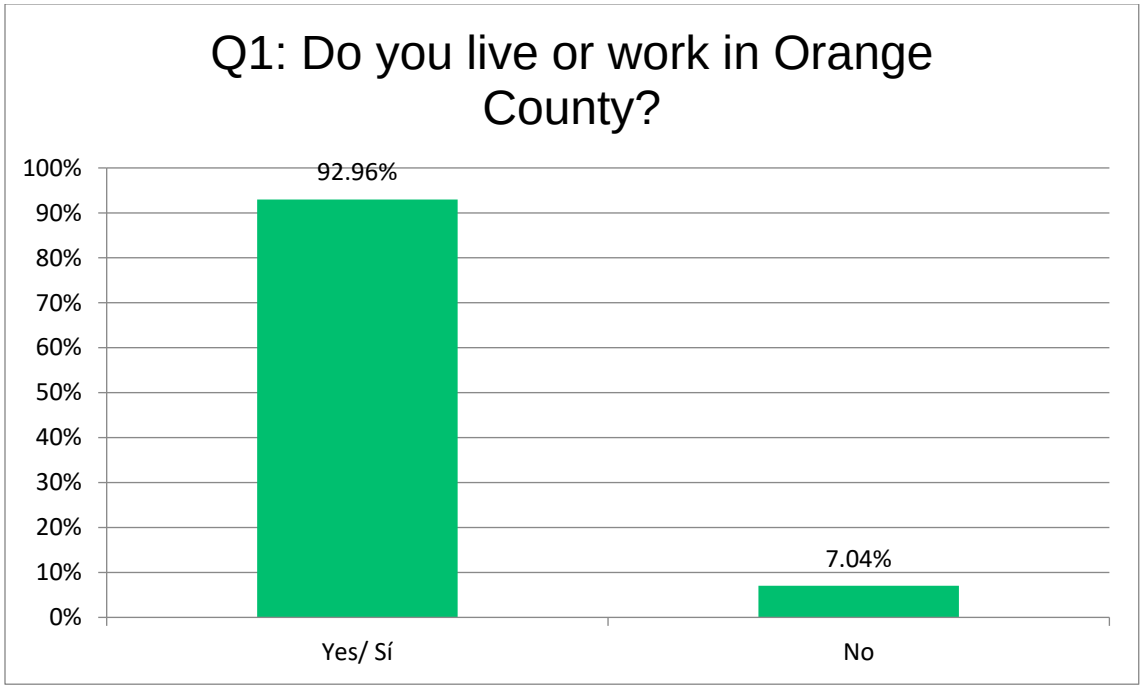
- There are prominent opportunities to enhance transit competitiveness in northeastern Chatham County, southeastern Durham County, and Efland. Among these, the linear transportation network components in southeast Durham County present the best opportunity for implementing enhanced transit service to Chapel Hill (as compared to northeastern Chatham which is characterized by circuitous networks off the primary road network).

- The 15/501 corridor from Chapel Hill to Durham is the longest corridor in the area with relatively high-density and linearity and relatively consistent development with key anchors at both ends (UNC and Duke campuses). Portions of the corridor suffer from poor walkability conditions and the complexity of a regional fare-based transit service competing against free, local transit service in Chapel Hill creates challenges in the design of service patterns between operators in this corridor. Nevertheless, this is the ripest inter-county corridor for high-frequency, high-capacity transit service.

- In the long-term, the US 70 corridor from Mebane to Hillsborough and from Hillsborough to Durham could develop into a key regional corridor. Currently, the development pattern within eastern Orange County lacks density limiting the potential for high ridership transit to succeed in this corridor today.

APPENDIX

SURVEY RESPONSES: ORANGE COUNTY TRANSIT PLAN UPDATE



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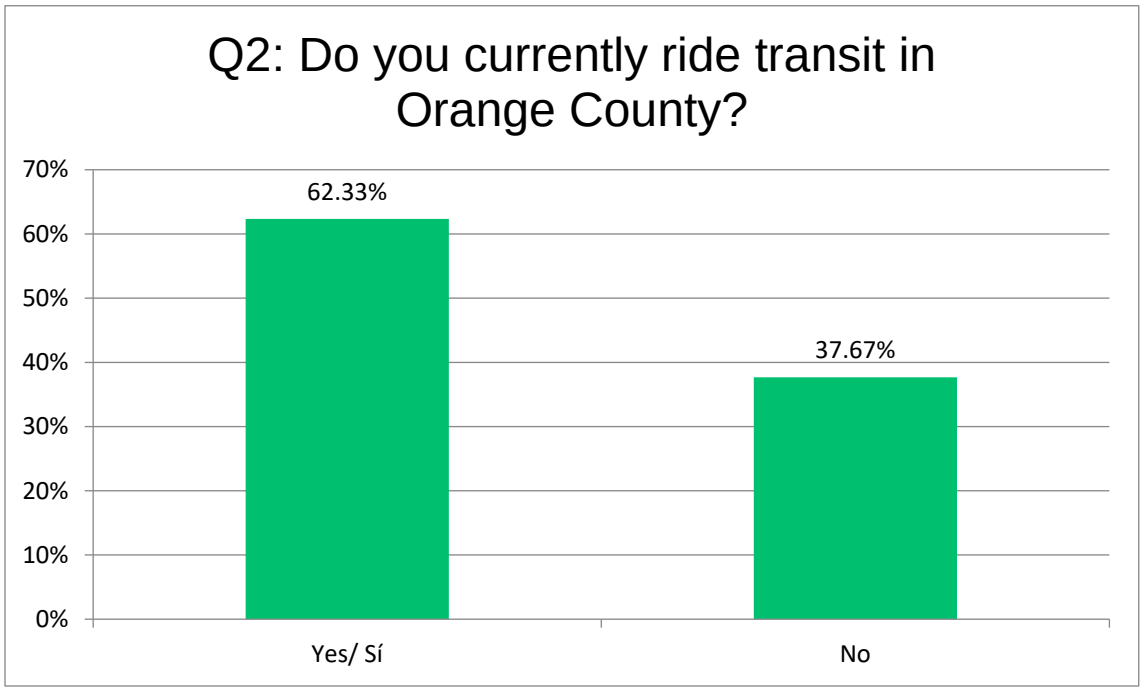
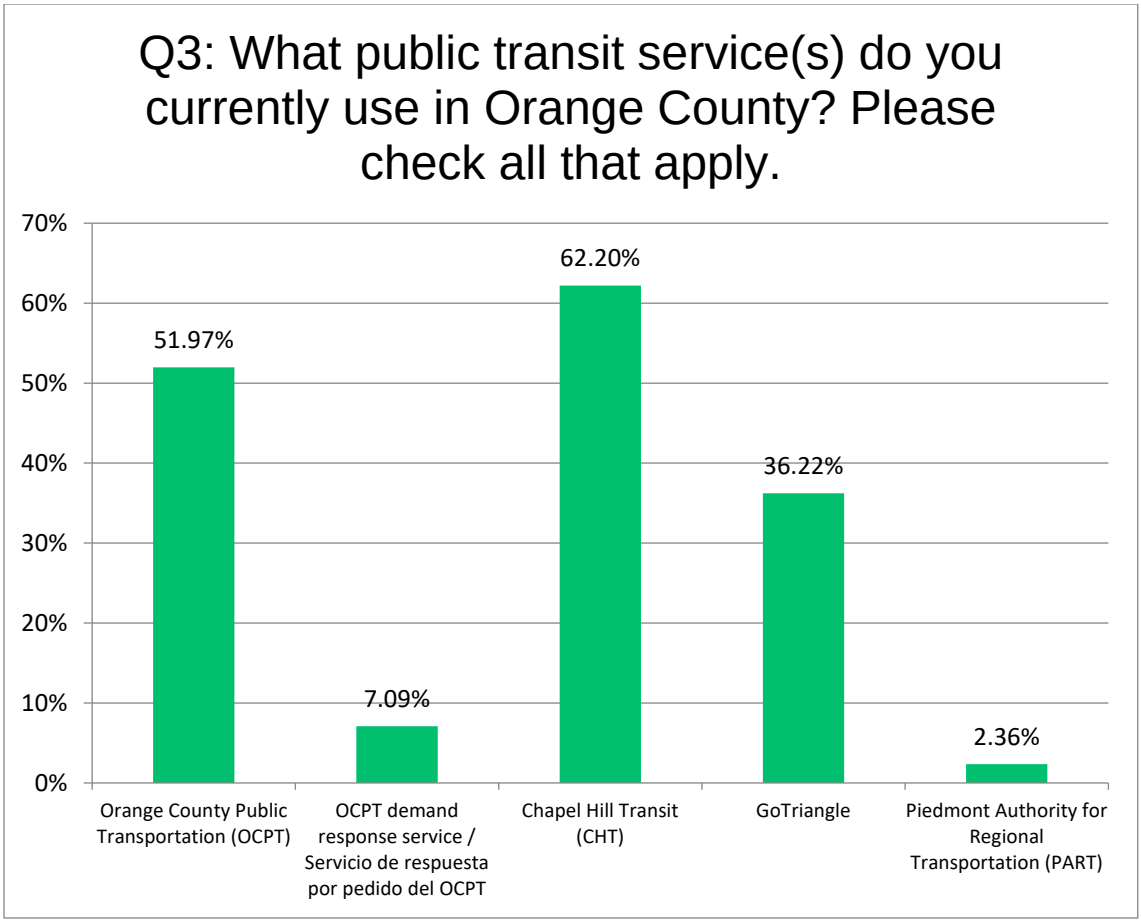
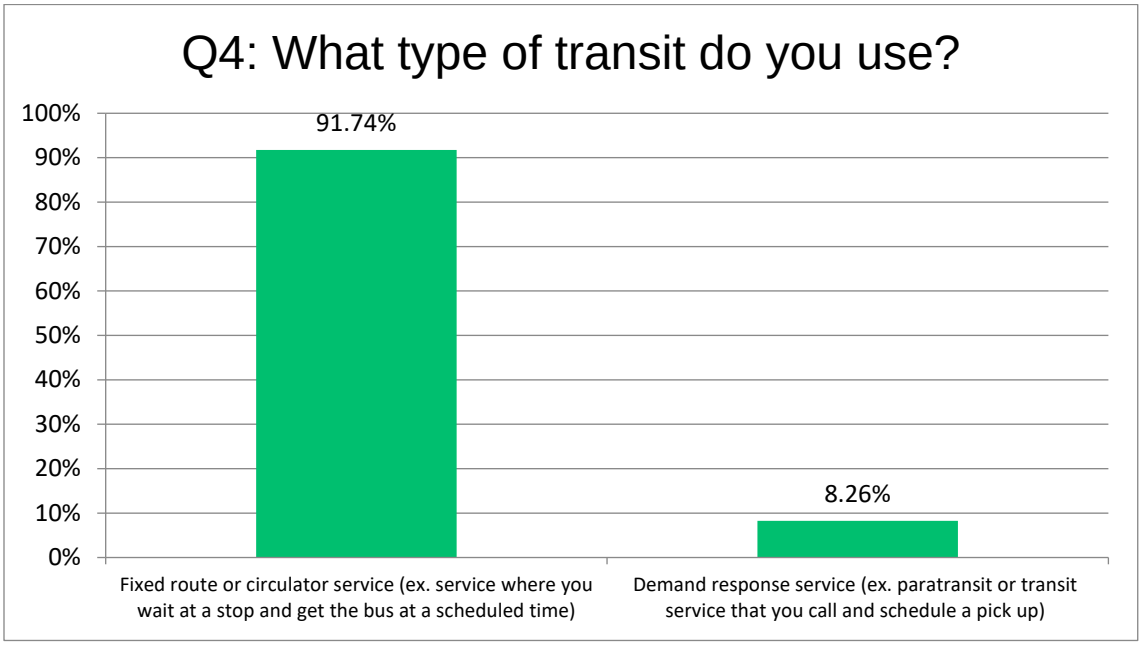


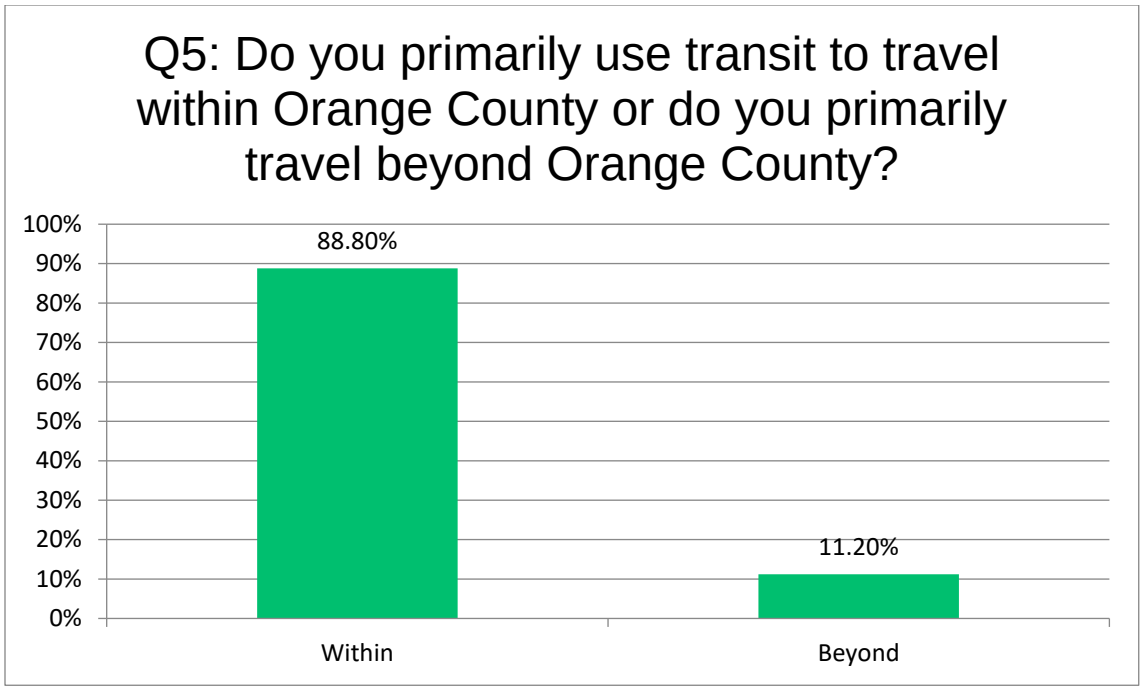
N=215


Q3: What public transit service(s) do you currently use in Orange County? Please check all that apply.
70%
60%
50%
40%
30%
20%
10%
0%
51.97%
7.09%
62.20%
36.22%
2.36%
Orange County Public Transportation (OCPT)
OCPT demand response service / Servicio de respuesta por pedido del OCPT
Chapel Hill Transit (CHT)
GoTriangle
Piedmont Authority for Regional Transportation (PART)

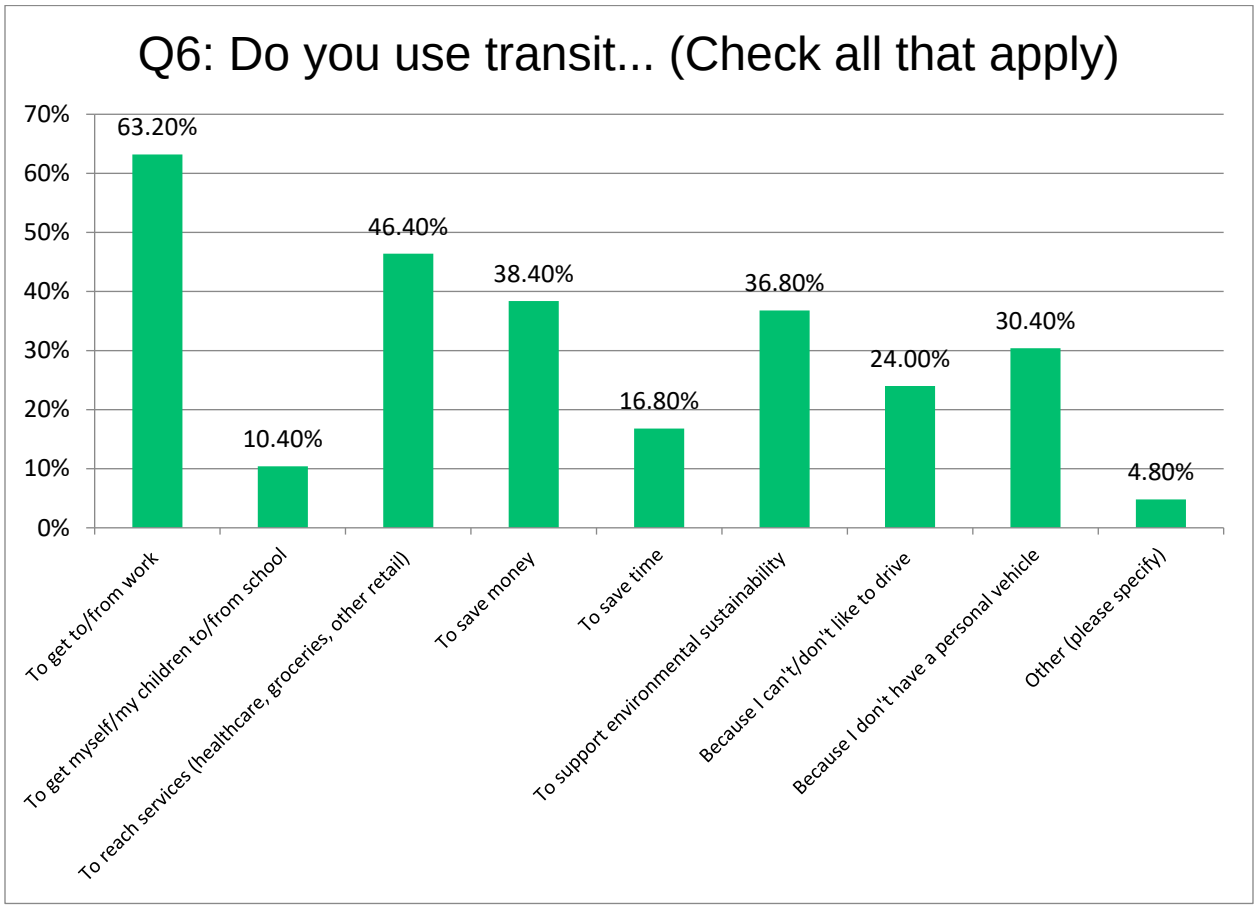
N= 127


Q4: What type of transit do you use?
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
91.74%
8.26%
Fixed route or circulator service (ex. service where you wait at a stop and get the bus at a scheduled time)
Demand response service (ex. paratransit or transit service that you call and schedule a pick up)

N= 121

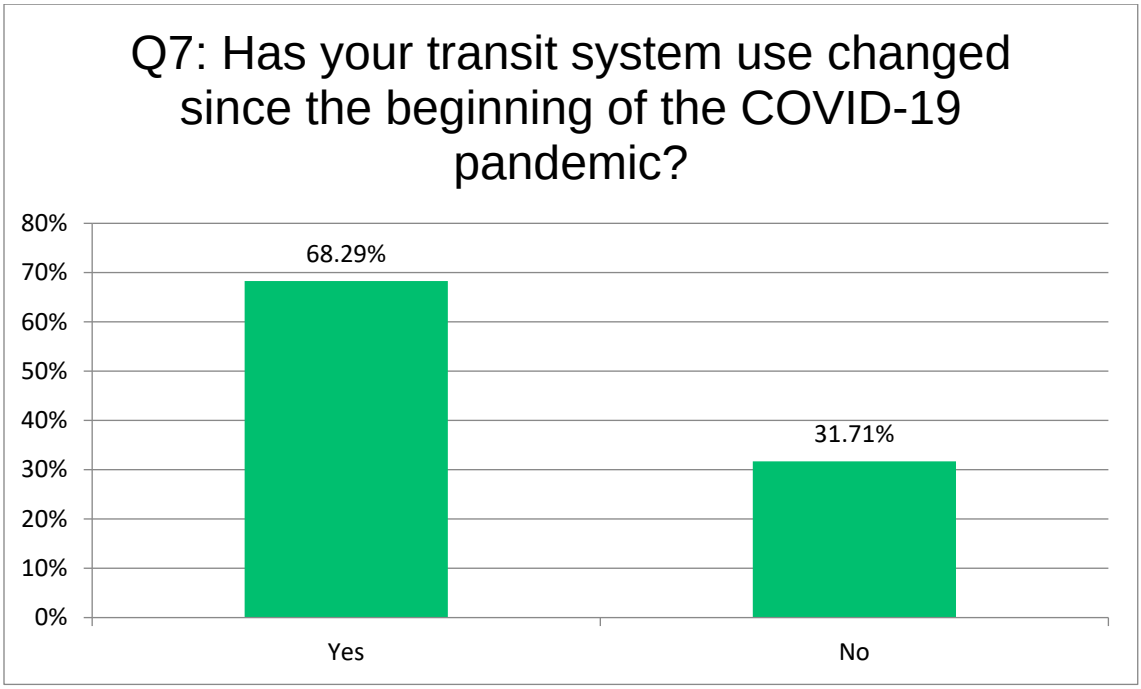

Q5: Do you primarily use transit to travel within Orange County or do you primarily travel beyond Orange County?
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
88.80%
11.20%
Within
Beyond

N= 125


Q6: Do you use transit... (Check all that apply)
70%
60%
50%
40%
30%
20%
10%
0%
63.20%
10.40%
46.40%
38.40%
16.80%
36.80%
24.00%
30.40%
4.80%
To get to/from work
To get myself/my children to/from school
To reach services (healthcare, groceries, other retail)
To save money
To save time
To support environmental sustainability
Because I can't/don't like to drive
Because I don't have a personal vehicle
Other (please specify)

Other (please specify):
My husband and I are a one-car family.
Broke leg
Because UNC doesn't have many parking lots
To decrease congestion on the roads, one car at a time.
Don’t want to pay for parking where I work (UNC)
Transportation with my bike to places that are unsafe to ride to (like the tobacco trail)

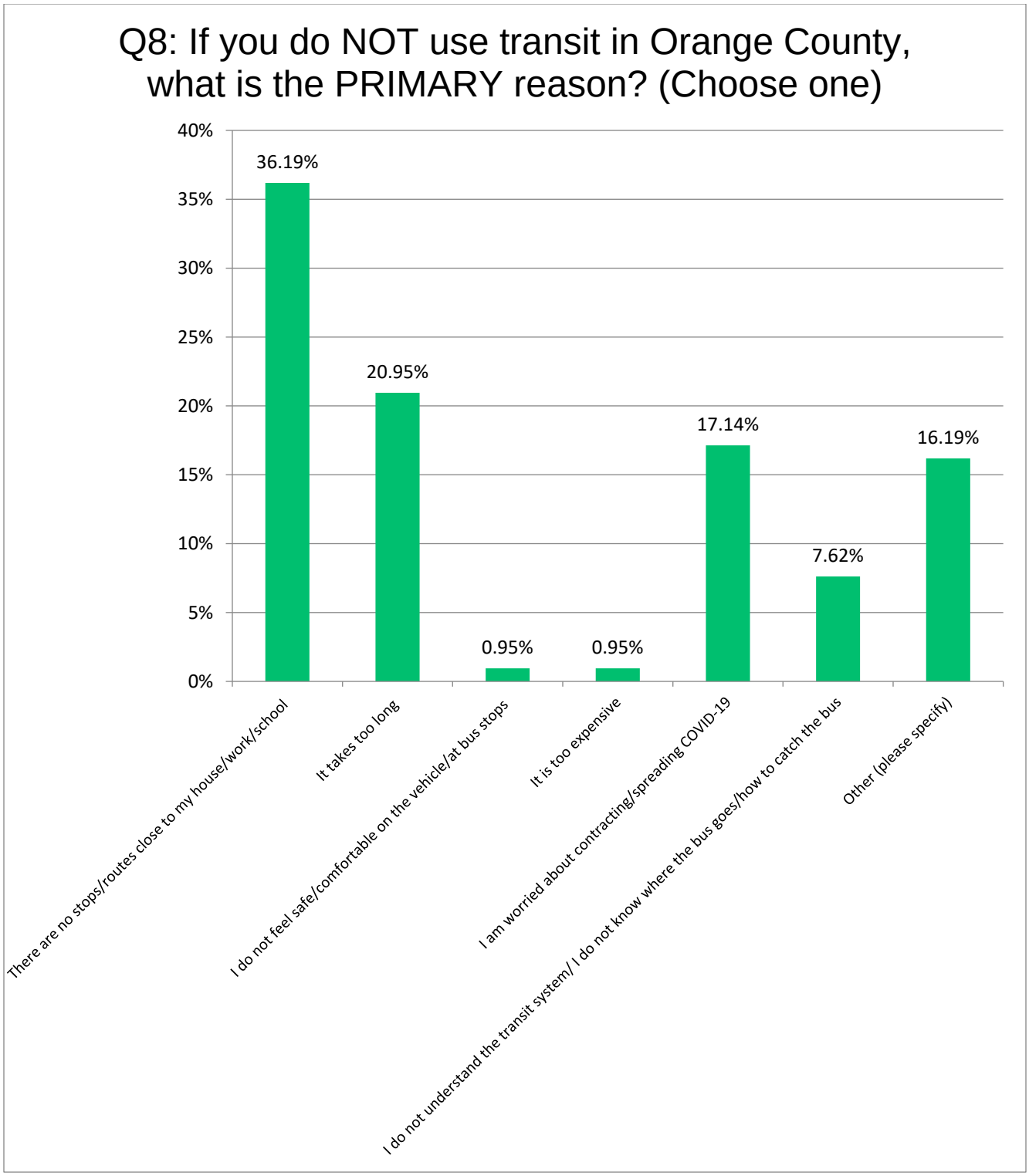
N=125



If yes, how has it changed?
Ride CH Transit less since F bus is suspended. Going to aHillsborough a lot less and Durham not at all
I work remotely and don't need to go anywhere for work.
Do not currently commute so no CHT rides
I do not compute to the office. I work from home since 3/17.
I stopped leaving the house lol.
Many less trips due to isolating
Use less frequently
avoid taking public transit
I have stopped taking public transit
I don't use public transit much since the pandemic, because I am still able to walk most places or drive when necessary
I no longer commute to work, because I must work from home.
I don't know I have only rode a month
I use the transit less because of concerns about covid. I am going fewer places
I have not ridden since start of COVID restrictions
Only taking absolutely essential trips
Have not used transit but 1 time

I don't ride it because I come in to work much less and I daisy chain errands when I do come in.
Working from home as much as possible
Less use.
I use the bus less often to go to the grocery store.
Almost completely stopped using transit.
Do not use it.
greatly reduced
Have not used public transit since the beginning of the pandemic
When I wasn't reporting to work, I wasn't riding transit. I resumed when I started reporting to work again.
JFX is not running
using personal vehicle more; only when traveling to UNC for extended period of time (where parking payment is a deterrent)
I have been working from home, no need to ride bus these days.
Route not running
I've been working from home.
I haven't been on it.
teleworking
I don't leave the house
Not using it at the moment
Working from home more than 99% of the time.
The F Route shut down, so now I only bike
I used to take public transit 5 days/week and now I have taken the bus 3 times in the last six months.
Work from home most of the time.
My office has been closed and employees are not allowed to return until next year at the earliest, so I have been 100% working from home since mid-March.
I have been riding much less to leave space for essential workers
I work from home now so ride much less often
Used much less since the Stay at Home order
Reduced use due to remote work
The meetings I attended are now virtual, so no need to travel

N= 123


Q8: If you do NOT use transit in Orange County, what is the PRIMARY reason? (Choose one)
40%
35%
30%
25%
20%
15%
10%
5%
0%
36.19%
20.95%
0.95%
0.95%
17.14%
7.62%
16.19%
There are no stops/routes close to my house/work/school
It takes too long
I do not feel safe/comfortable on the vehicle/at bus stops
It is too expensive
I am worried about contracting/spreading COVID-19
I do not understand the transit system/ I do not know where the bus goes/how to catch the bus
Other (please specify)

N=105

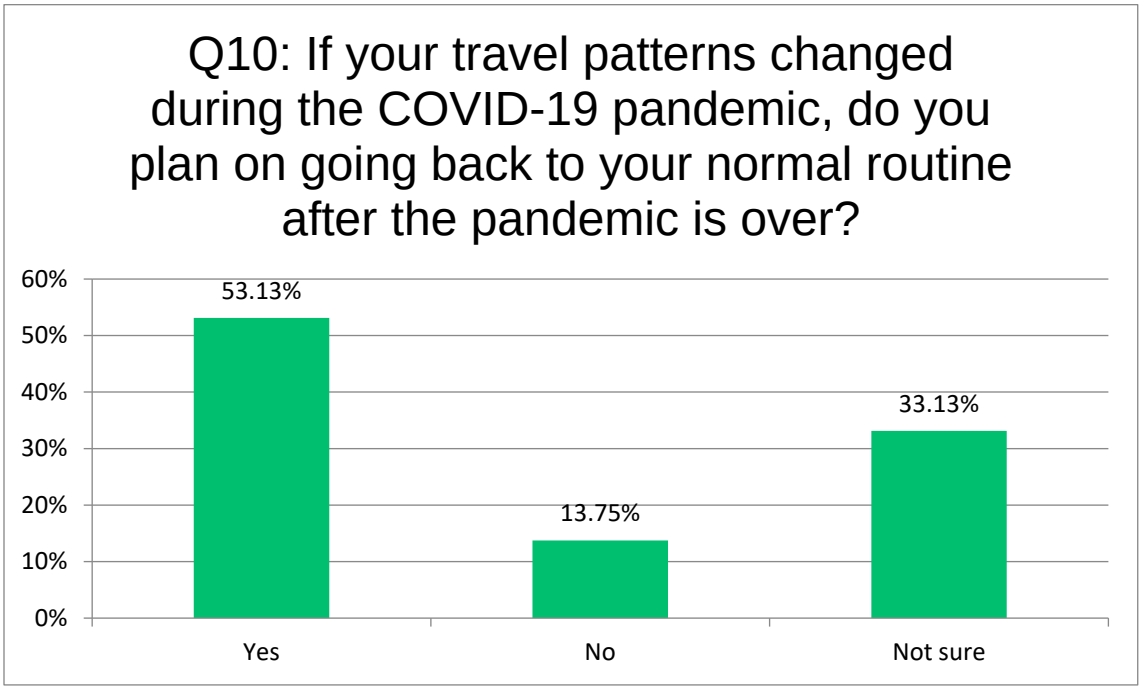
Q9: If you do NOT use transit in Orange County, what is the PRIMARY reason? (Choose one)

Responses
Less travel, less visits to stores and restaurants.
I bought an e-bike so that I don't have to shower at work. I also work more days entirely from home than previously.
Staying at home a lot more.
I work from home, so I don't have reason to travel nearly as often. I've also been traveling by bicycle a lot more.
Yes, I am mostly at home, working remotely. Additionally, my husband's company has gone all remote and he is working remotely.
No travel
Working from home
Yes, working from home.
I don't drive to and from many places that I used to frequent.
Yes, my trips are greatly reduced
Not leaving home as much for anything
Use car more often
Yes, i no longer drive my son to school.
The pick up time and how many people can be on the bus at one time
Yes - when and where I go
Yes no job so I have to save $
Wearing mask
Much less driving, no more commuting, more walking and biking.
Work from home has increased
I work remotely for one job, when I used to take public transit to the university several days a week. My other job is outside of Orange county and there is no public transit to it, so I drive.
I am now working 100% remotely
I travel to work 3 days a week instead of 5
I walk or drive more - normally, I would take the bus a lot to get to campus, etc.
Yes. Travel MUCH less because I'm working from home and not commuting from Hillsborough to RTP every day
Yes. I am teleworking.
I spend more time at home and do not commute to work.
Yes - less frequent riding because of COVID
Morning route changed to Chapel Hill Transit 420
Yes. When the insanity of a mild flu was foisted upon us as a dangerous killer, the buses were reduced to such an extent that prohibited using them much. I plan on going back to normal routines but the government is bent on destroying society. What will they do next to damage us?
The buses do not come as they used to
Times
I work from home 3 days a week.
I travel much less now due to COVID-19.
I travel less
Yes - not being able to go in buildings; too many restrictions
Go to work less often
We go to town a lot less often.
Yes, I have not used bus since social distancing restrictions began.
Staying home more. Driving much less.
I live north of town (in Carrboro's Northern Transition Area), and I go into town a lot less.
We go out less.
No longer go to Chapel Hill from Hillsborough on a weekly basis.
less travel, light rail wouldn't help
Yes - working from home
Not taking the bus
Yes. See answer to #3.
Not traveling as much, working remotely...for now.
If I can't walk there, I don't go. I get groceries and laundry done via delivery services
Yes, I only come in to the office occasionally and I daisy-chain errands when I do come in.

Yes, I stay home more.
Yes working from home as much as possible so not riding the bus
Yes. I work from home 100% now since my office is closed.
I use the bus less often to go to the grocery store.
Yes, I am no longer commuting to work.
Primarily sheltering in place
Yes, I work from home.
Yes, I mostly stay home except for medical service and grocery shopping
Working from home 3-4 days per week.
Yes - I now work from home, whereas I used to commute to campus every day using Chapel Hill transit
Didn't commute at all mid-March through July. Only came back to the office in August
Yes, I am currently working from home.
I travel everywhere less
Work from home
I am not using buses anymore for now
I now work from home 95% of the time.
I travel less
Yes - going into the workplace less frequently. About 2/3 of the time.
I would definitely not take any public transit at this time.
I work from home instead of going into the office in Durham. I rarely have dinner out and grocery shop just once a week.
primarily traveling less, except for shopping, takeout dining. Mainly avoiding on-campus, Franklin St., other parts where mask-averse, dangerous people may be around
Working from home. I haven't been on a bus since March when UNC went virtual due to COVID.
Yes, I am home and staying closer to home than normal. Still furloughed from my job, so less need to go out.
I stay home most of the time
Work from home
Now working from home.
Yes, I travel much less. I am retired and spent 1-2 days a week visiting isolated elders in their homes. Currently I contact them by phone. I no longer attend exercise classes at senior center 2-3 days a week. I'm doing virtual classes. My social life is curtailed in that I no longer visit local or out of state friends, eat in restaurants or attend concerts and art exhibitions.
Yes, I rarely go anywhere but grocery store and wal-mart and to pickup takeout food from restaurants. Normally I would go to church, library, shopping mall, restaurants that are all over the Triangle, parks, farmstands, nurseries, visiting friends up and down the east coast and so on.
Much less travel
I don't go into town as much
I have been working at home
Yes, I work from home now and am traveling far less
teleworking
I don't leave the house, I don't understand why you needed to ask this again?
I used to bike to UNC campus 80% of the time and ride the bus the remaining 20%, but now I primarily work from home, so I don't need to go there nearly as frequently.
No trips further than adjacent counties. Trips to stores only occasional. Driving cut at least 50%
Ya casi no me subo al camión porque tengo miedo contagiarme del COVID-19 y contagiar a mi familia ya que alguien mayor de 65 años vive conmigo y yo estoy embarazada. *I hardly get on the bus anymore because I am afraid of catching COVID-19 and infecting my family since someone over 65 lives with me and I am pregnant.*
I no longer ride the bus because it takes too long to walk to the CW Route with the F Route closed
I work from home. Because I work from Home I don't trip chain which means instead of taking the bus to work and then running errands with the bus, I drive to errands.
Working from home, nice weather to ride a bike and fear of covid means using the bus less, but this is temporary for me
I barely use motorized transportation of any kind now. In addition to giving up commuting, I've also abstained from most recreational and shopping travel. We get groceries every other week, and go to the farmer's market on off

weeks to supplement with fresh food, and otherwise barely shop at all. Mostly takeout from local restaurants and occasionally hardware store trips. I've walked a lot more, though, both in my neighborhood as well as in other areas of the town and county.
Less long distance travel, more local travel
Yes, I travel much less without trips to school or work.
Reduced travel overall due to remote work and limited social gatherings
Yes. I barely go anywhere. Groceries twice a month, farmers mkt each week, and doctor appts. That's it.

N= 136



N= 160

Q11: If you currently ride transit in Orange County, what is one thing that could be done to enhance the County's transit system?

Responses
It's fine
Don't know
Love it as is, need Sat.
This is my first time
Saturday service
Do not currently ride due to no stops being close to my house (Thompson Apartments)
Memory schedules and CH Transit schedules that make transfers easier
Better information to help not regular transit riders choose to make periodic trips via transit versus using their car.
More reliable information on Nextbus and/or updates if a bus is running late or is too full to pick up riders.
Have extra disposal masks if a person doesn't have one at the stop pick up location
May move out of the area by the time things re-opening (for work).
I do not ride. I would need to study routes and schedules to determine if it provides a practical alternative to using my passenger car.

Better bus stops with benches and bike racks. Consistent information in NextBus and Transloc. CH Transit predicted times are inaccurate
More integration among busses, More routes and increased frequency (especially for NS route)
More direct connections to RTP office parks
Coordinate bus schedule with hospital shifts so if I take bus in the morning I can be sure it will be available to return in the evening
don't know
More frequently
Later hours, weekend service
Having it so the scheduling is for the weekend as well
Being able to understand routes would help me. I plan to learn more once the Seymour Center opens.
Nothing seems wrong
Weekend service and more county coverage
later hours
Nothing
Everything is great
Shelters
Expanded
Run it on Saturday
Nothing
More buses along extremely busy routes (such as the NS)
More frequent bus service
Better regional connections
light rail
I would like to see bus services on the weekend.
Better connectivity to Durham and RTP.
Greater frequency and later service.
Visit all O.C.
Sunday bus rides
Later service/weekend service
Earlier/later rides; rides on Sat/Sun
Add different stops on areas that's not on route
More frequent and expanded service
More frequent buses, more often
Free
More frequent service; expanded service; more stops
I don't know I have only rode the bus a month
Nothing
Stop closer to my home
One thing that could be done is to have late buses like have them run till 8PM
Get more nice people like y'all
I like multiple buses showing up every 10 minutes.
Better shock system
More stops in route to chapel hill
Extending the time
None
More hours of operation
Nothing
More routes to connect folks to work
Nothing
Don't ride all over the county in route
Stop at Cornwallis Hills
Run later
Pick me up at my house
Nothing
Everything is good
Early morning rides to start by 7 AM; end at 7PM will be convenient to others
Bus with better shock absorbers
More stops so you don't have one or two specific stops from Hillsborough to Chapel Hill

Earlier rides like 6 AM and later like 5-6PM
More bus often
Earlier service; all day service
Stop close to me
More frequent routes
From speaking with other seniors, I know it would be great to have accessible transportation to and from doctors' appointments and grocery stores.
Ensure frequent and easy connections to regional employment destinations.
Don't currently ride transit. Wish the bus schedule from H'boro to CH was more widely available.
its inefficient, wastes resources, and should be limited and focused
More Rural stops Near Carrboro
Better evening and weekend service. New weekend service helps
Move to electric buses. I hate smelling and listening to many buses idling on Franklin St. all day long. (I work on E. Franklin St. above the bus stops).
I don't take it because usually the rides take double or more the time it would take me in my car.
It would be great to have shelters at all bus stops
I appreciate the recent updates a lot, and practically speaking (aside from buses that run more often) it serves my needs well.
Make the Carrboro/Durham route more bi-directional
More frequent service
To be actually useful, I would need a service like Uber
Defund GoTriangle and use funds to increase CHT and Hillsborough service, make any ride originating in CHT fare-free, invest in point-to-point private/public partnership.
More buses on my route
When I have ridden before it was limited to once per week at the most since the route takes so long. Since the buses usually only have 2-3 people on them, could the routes be sped up by using smaller vans instead?
More bus stops closer to grocery stores
Buses need to come more frequently, more reliably, and reach necessary areas. Often, taking a bus to the store or something takes about 3x as long as if I could take a car and is a lot more stressful.
A useable phone app that can plan your routes, shows routes, Schedules, arrival times, etc.
enhanced bus stops, bus stop shelters etc. so that you can sit and wait for buses while maintaining social distance
When I want to ride the bus in town, I quite often decide not to because I would have to pay to park my car and then the buses don't come often enough to be a good alternative to just driving.
Increased frequency ; better on time performance
We need service routes along Old NC 86.
I'm concerned that as I get older I'll need to rely on public transportation more and there aren't any public transportation opportunities where I live outside of Carrboro. Reach a little further out into the countryside.
more service outside of city limits
Making Planning routes/stops clearer
more stops with shelters
better communication system for rider alerts
PLEASE get Chapel Hill Transit to have a functioning website with CORRECT information AND a public communications team for route changes and disruptions. They never communicate anything and makes it REALLY hard to use the bus.
Better pedestrian bicycle connections to stops with safe crossings
safe shelters with lighting, seating and trash disposal as well as bus turn out to prevent traffic congestion from bus stops with traffic signal prioritization would be a great / low cost improvements.
More frequency so a schedule is not needed
If we are talking about only within the county, take a look at where people have been getting on and off the bus during the pandemic, and what routes they are taking. These are our transit dependent folks .... make those stops better, make those routes more frequent.
BRT, more frequent service, posting live updates of upcoming bus arrivals at every stop, nice bus shelters, crosswalks, and speed reduction/enforcement/traffic calming near stops
A light rail system that connects us to Durham County and concentrates new development to the transit corridor it creates. Since we ruined that, the next best thing would be a BRT system that is so fast, frequent, high quality, and has enough dedicated right-of-way that is it almost indistinguishable from light rail.
run the 7-day bus routes in Chapel Hill/Carrboro until 11 pm, at least on Thu/Fri/Sat
Increased frequency on key routes to improve feasibility of using multiple routes to reach destinations.
Longer service hours for PM trips

More advertising and publicity about where the buses go. Also, better connections between the systems.

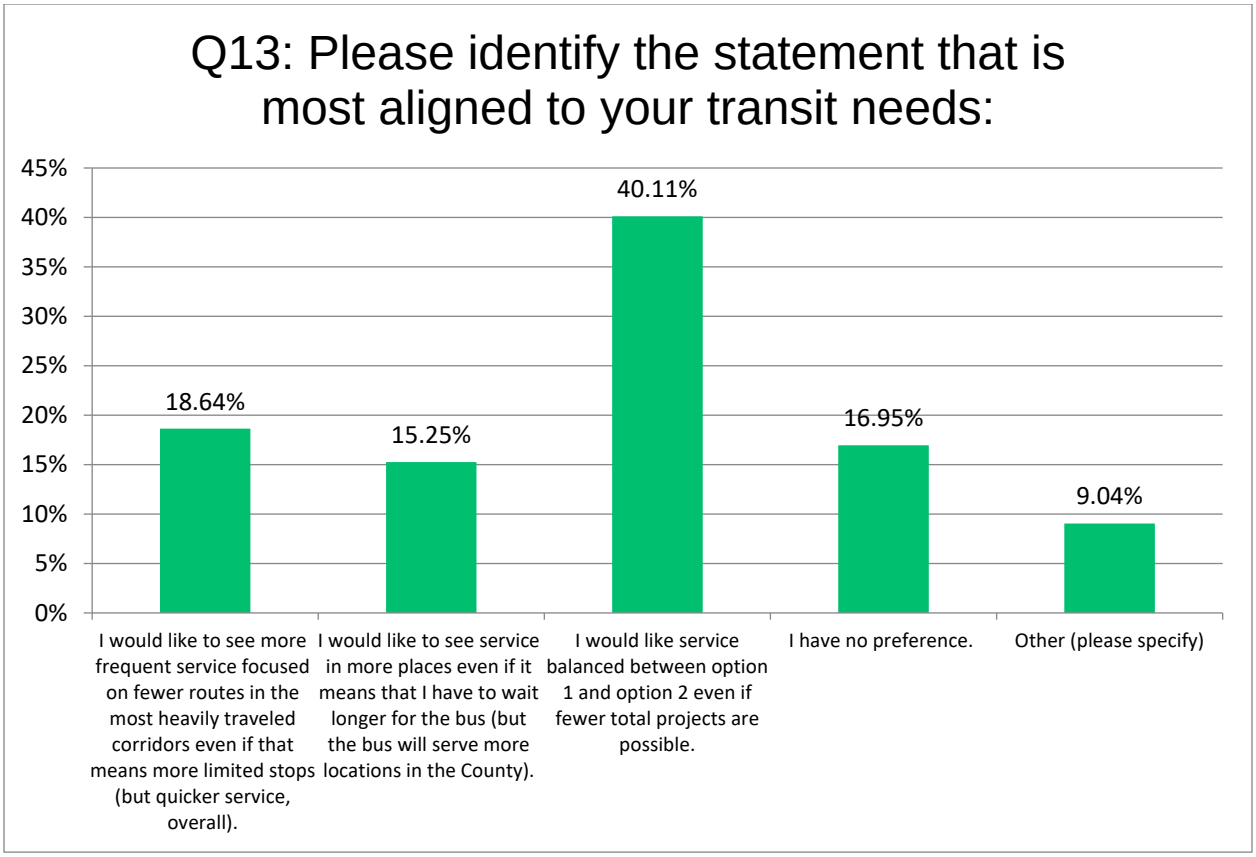
N= 124

Q12: If you do NOT currently ride transit in Orange County, what is one thing that could be done to make transit a desirable option for you?

Responses
It's alright
More stops along Hwy 86
end of pandemic.
I ride transit
During the pandemic, I really don't know what could be done by Orange County to make transit a desirable option. It feels more like a last resort.
closer park and ride location.
I'm retired. So, I do not need transit to reach an office. I can understand how transit would be beneficial if routing & scheduling made commuting easier and more economical. My drives are so customized to my particular needs on any particular day that I have difficulty picturing how transit would benefit my travel desires/needs on a consistent basis. I am not against transit, having used buses as a child and trains when traveling in Europe and elsewhere. But between Hillsborough and other Triangle places that I frequent, I have difficulty imagining how transit systems could become so convenient that I'd opt for using them instead of my car.
More direct connections to RTP office parks
Regional travel in a timely manner
A bus stop near my home.
ok
They do a great job, the drivers, so nothing
Being clear about bus stops
Signs with routes and times, easy to read guides
stops closer to my destination
More buses along extremely busy routes so that timing is accurate and I'm not passed by if the bus is too full
more access to routes
Bus Rapid Transit with direct routes.
More service. If you can't feasibly have fixed routes that serve Hillsborough maybe there's an opportunity for demand-response or on demand solutions that would connect us with the rest of the county and region?
Better and faster routing to RTP.
More stops, closer to destinations and more frequency.
Nothing
Use it to go to work
Better access to routes that connect to destinations
It must cover more area (more stops) and take less time.
No long distance riding
More frequent routes
I need transport that I don’t have to schedule days in advance—a day or two is okay, but more may be difficult
Not sure - we live in the rural area
Nothing
Put the stop and bus route near my house back.
More frequent bus service close to my house (which is difficult, as I live in the rural part of greater Carrboro).
Routine service to my area is economically untenable. If I were not able to drive, I would appreciate pickup service.
More widely available bus schedule, including frequency of buses and where they stop.
nothing, I will never use it
More frequent buses. The bus I take comes every 30 minutes.
Expand routes
Routes in my area

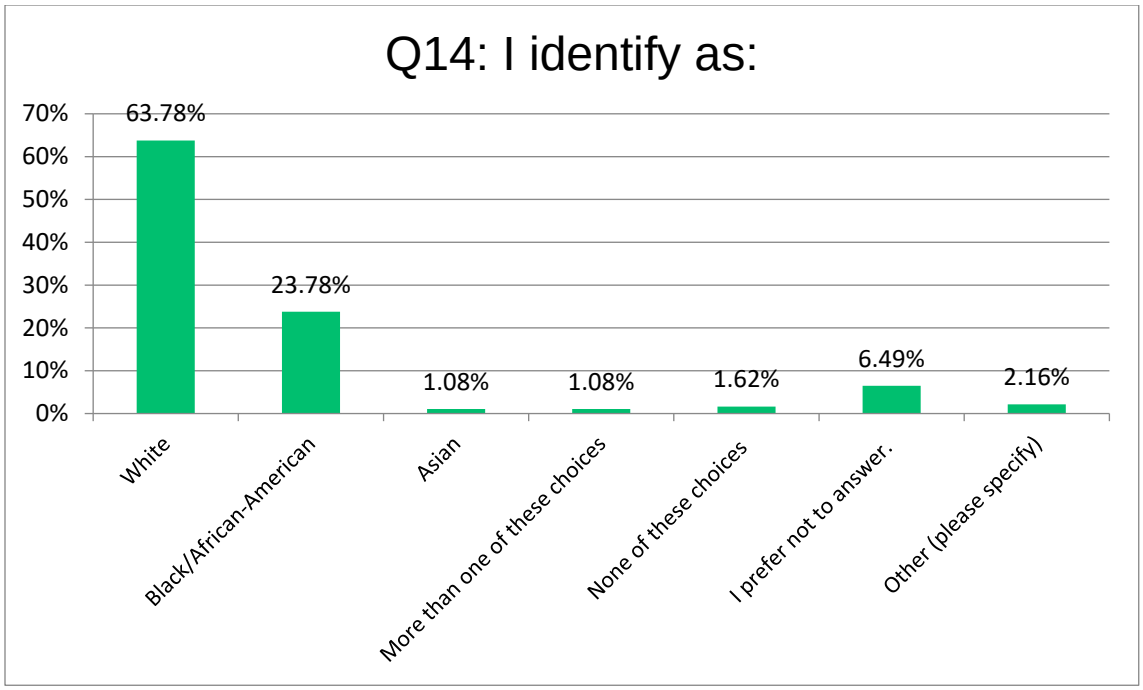
More direct routes with fewer stops
Have a shuttle service from a park and ride to the Transit Center in the Durham/RTP. My office is in the RTP and I live in Hillsborough and for me to take the transit I would have to take bus through three counties, causing a 2hr ride.
Add a stop at Lake Hogan Farms that goes to downtown Carrboro and Chapel Hill.
More frequent service
Publicity
Better linkage with regional transit plans
Advertise precautions being taken to limit the risk of COVID
Weekend routes. At this point, I go to Hillsborough for recreation on the weekends.
Masks enforced upon entering the buses. Open windows and no HVAC use until the pandemic situation is under control
Decrease the time between buses and decrease total travel time. Maybe add express routes with smaller vehicles.
Stops closer to the services I use
Easier connection to Triangle Transit options for RTP. Also, would like to see transit options for Heritage Hills/Smith Level past the Carrboro High School.
Well, it would have been really nice to have kept the Durham/Orange Light Rail. Buses do not excite me like rail!
Free park and ride
Have regular routes in the county that go to major destinations like the hospital, Walmart, medical offices.
If there was more access to bus stops and it was free.
Regular routes outside town.
I live in rural OC about 13 mi from both Hillsboro and Carrboro. I think on demand rides sponsored by the county at a reduced fare would be beneficial to many rural folks.
Stops outside of town.
Not interested at present. Public transit is to limiting to freedom of choice regarding location and schedule options.
more service outside of city limits
Have a closer stop to my house
PSAs about how transit hasn't been a super spreader vector
Stops near my home
Better communication system for rider alerts, a system in place to track routes for ALL buses, adherence to the posted schedule
100% compliance with distancing and masks.
Service little river township. Otherwise, I'd have to drive town which defeats the whole point
see #6
Que tengan camiones corriendo mas seguido y no vallan con mas de 10 -15 personas por camión. Que sea obligatorio que usen mascarilla dentro del camión. H*ave buses running more often and do not go with more than 10 -15 people per bus. Make it mandatory that they wear a mask inside the bus.*

N= 124



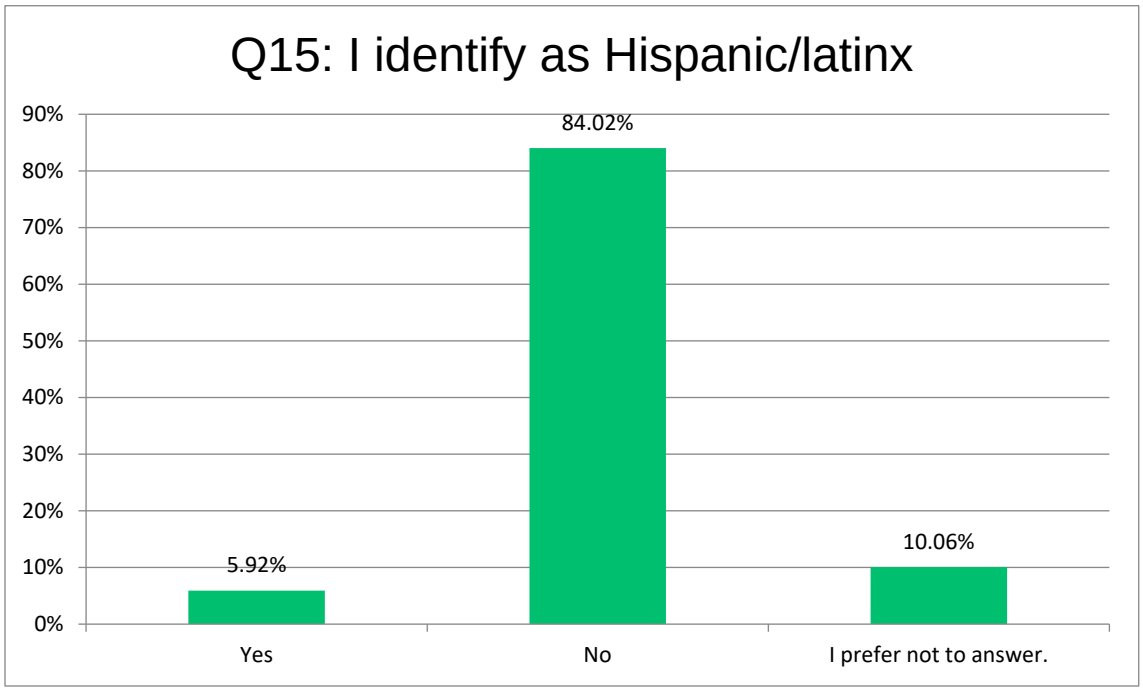
Other (please specify
Free rides
hobo travel
Exact schedule, especially after 7pm the bus often arrives different time, or never arrived although that is scheduled (e.g. Line 800).
I am please with the bus
Don't know what the best options are until I learn a lot more.
what a biased question... my view is limit the wasteful transit system
I need irregular but reliable service from home to doctor
More overall service. Reliable weekly service in-spite of UNC schedule.
Whatever will increase ridership to the greatest degree. For the moment, the routes as they exist don't serve me, but I would be an occasional user. More important to me is that the maximum number of cars are displaced from the roads.
Need more bike/ped (shared use/greenways) connectivity.
I would like to see investment in on demand rides and future oriented services like driverless vehicles.
I have no transit needs at this time.
I would continue using my car, no need for public transit
I would like which ever of these two options can be demonstrated to serve the highest overall quantity of trips and reduce miles traveled in single-occupancy vehicles the most.
Would like to see transportation improvements that prioritized bus lanes and bus service over car lanes.

N= 177

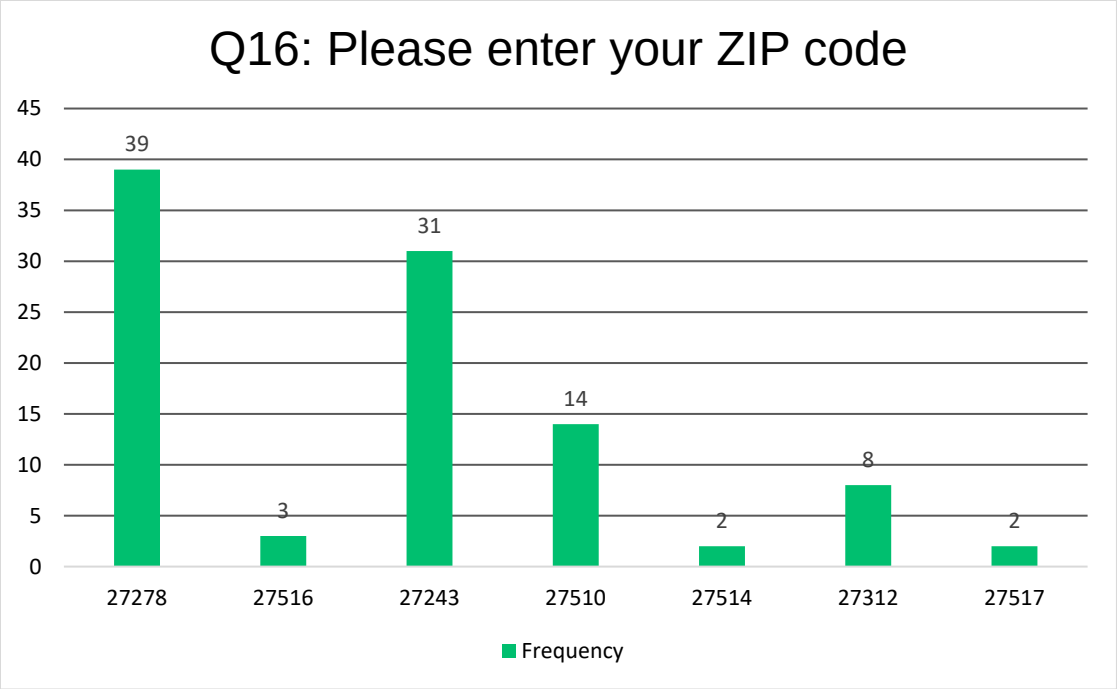


Other (please specify)
Hispanic
??
N/A
Mexicano Americano

N= 185



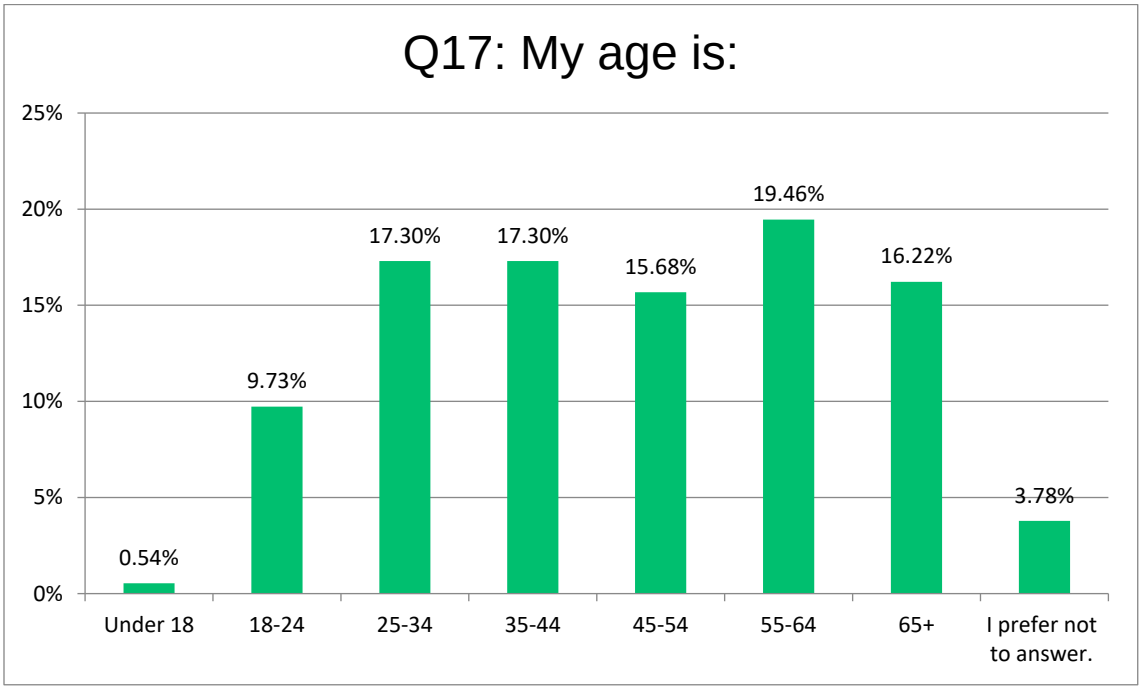
N= 169



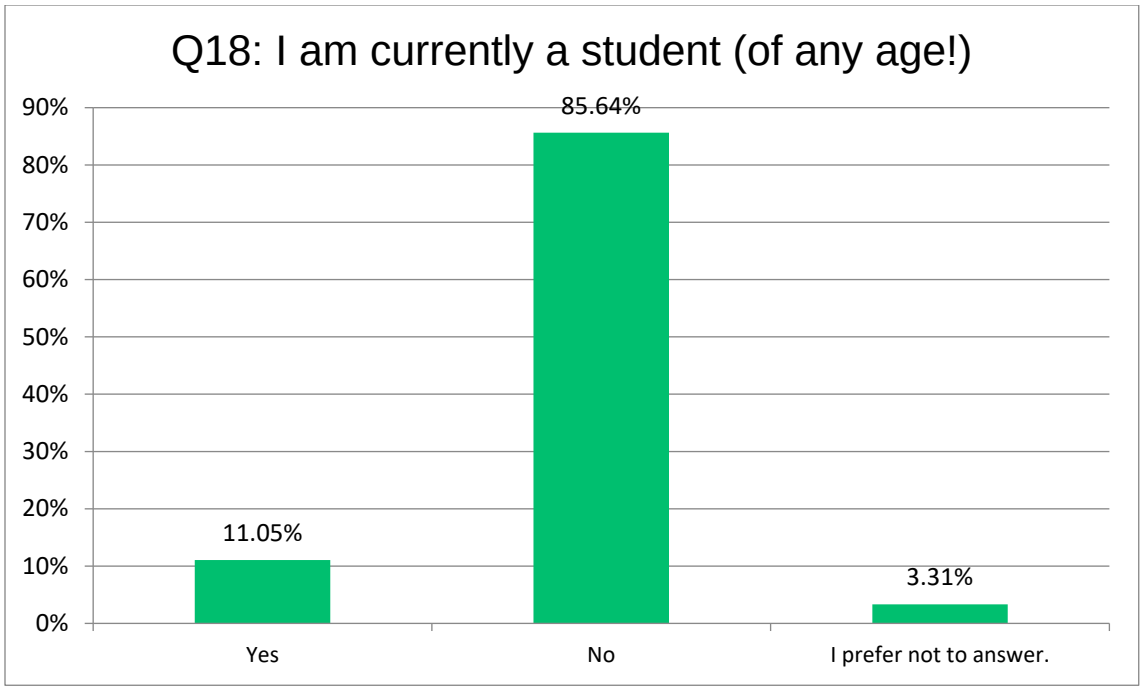
The following ZIP codes had one respondent each:

27889	27714	27707	27705	27701	27599
27572	27527	27519	27513	27215	27503

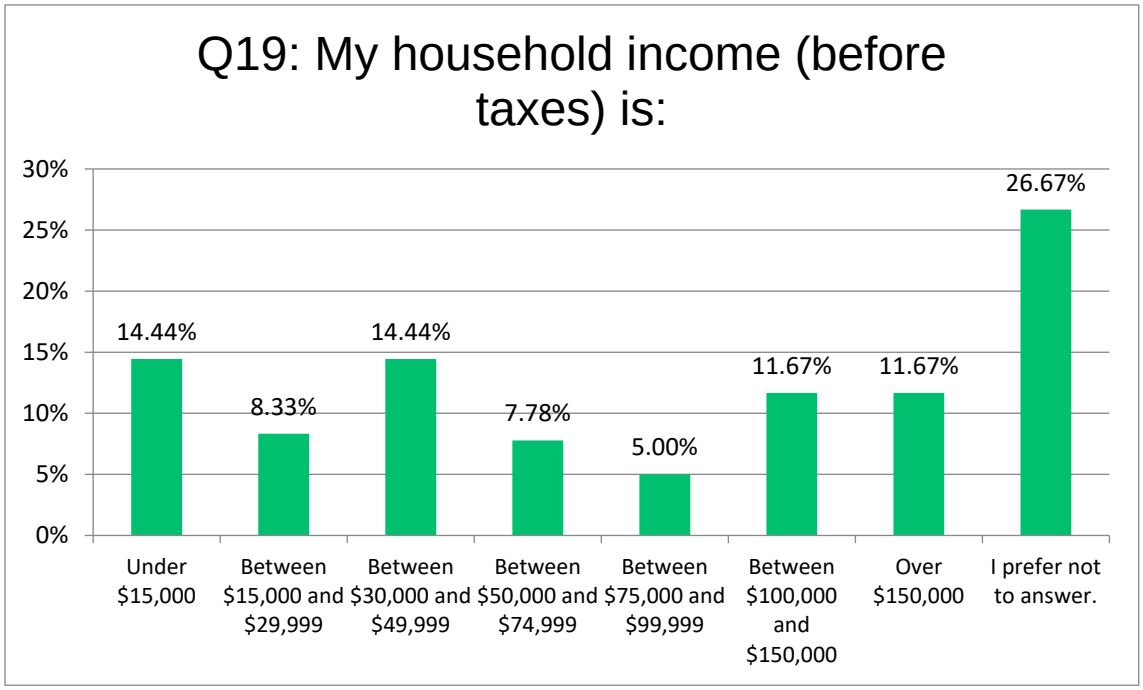
N= 165



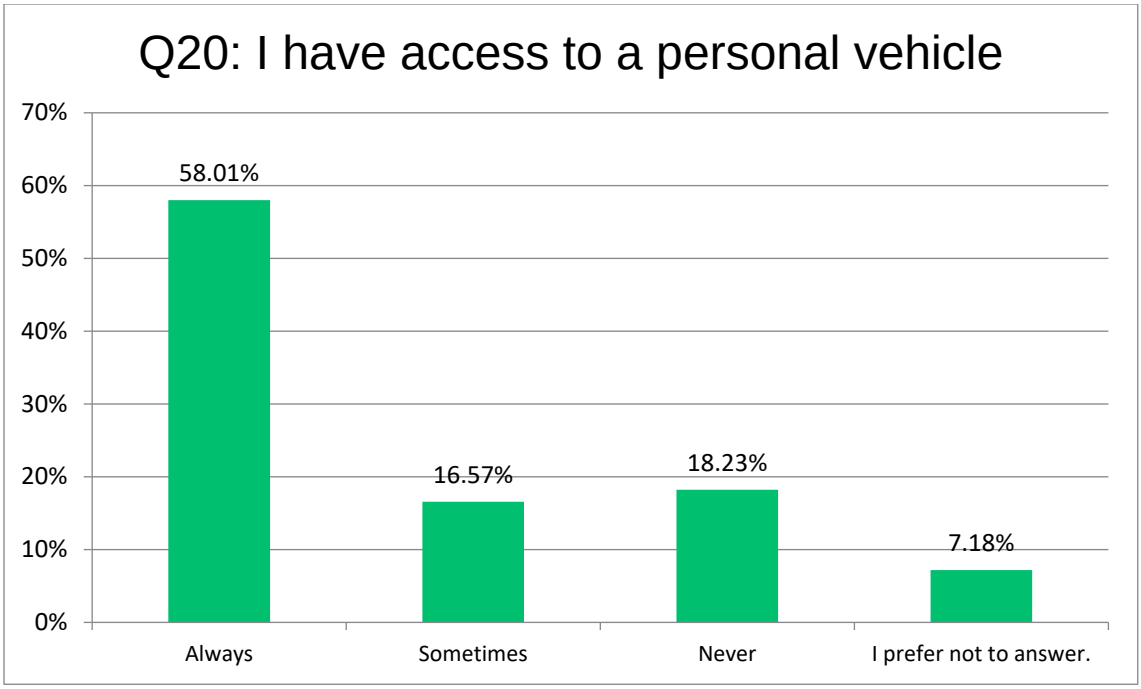
N= 185


Q18: I am currently a student (of any age!)
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
85.64%
11.05%
3.31%
Yes
No
I prefer not to answer.

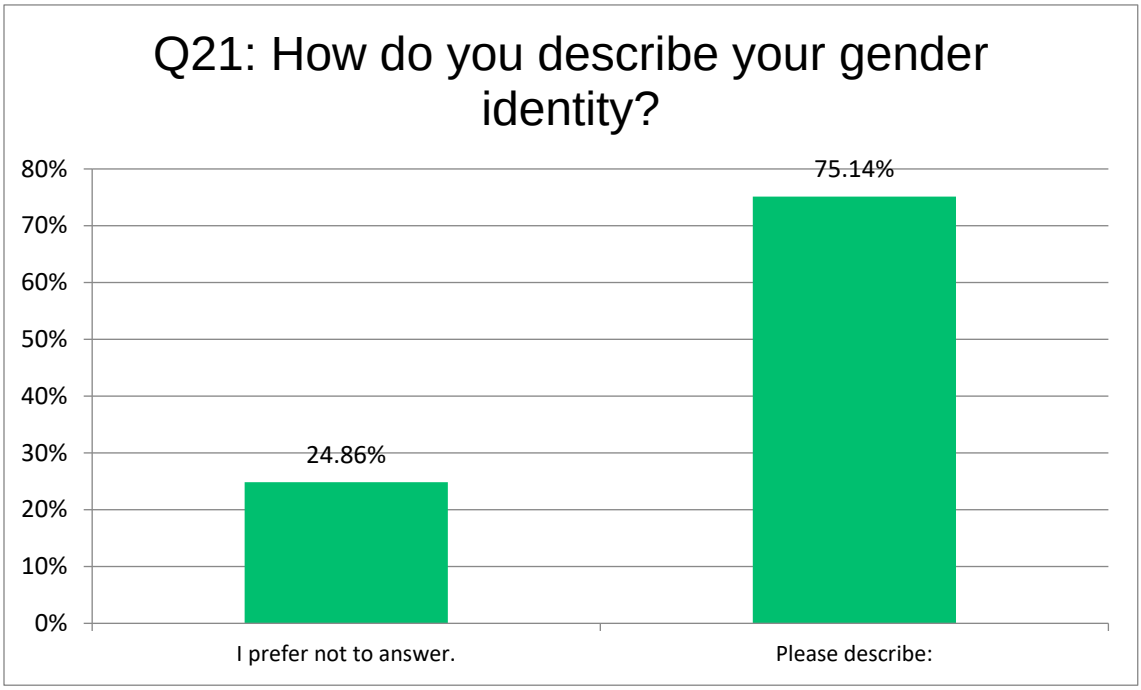
N= 181


Q19: My household income (before taxes) is:
30%
25%
20%
15%
10%
5%
0%
14.44%
8.33%
14.44%
7.78%
5.00%
11.67%
11.67%
26.67%
Under $15,000
Between $15,000 and $29,999
Between $30,000 and $49,999
Between $50,000 and $74,999
Between $75,000 and $99,999
Between $100,000 and $150,000
Over $150,000
I prefer not to answer.

N= 180

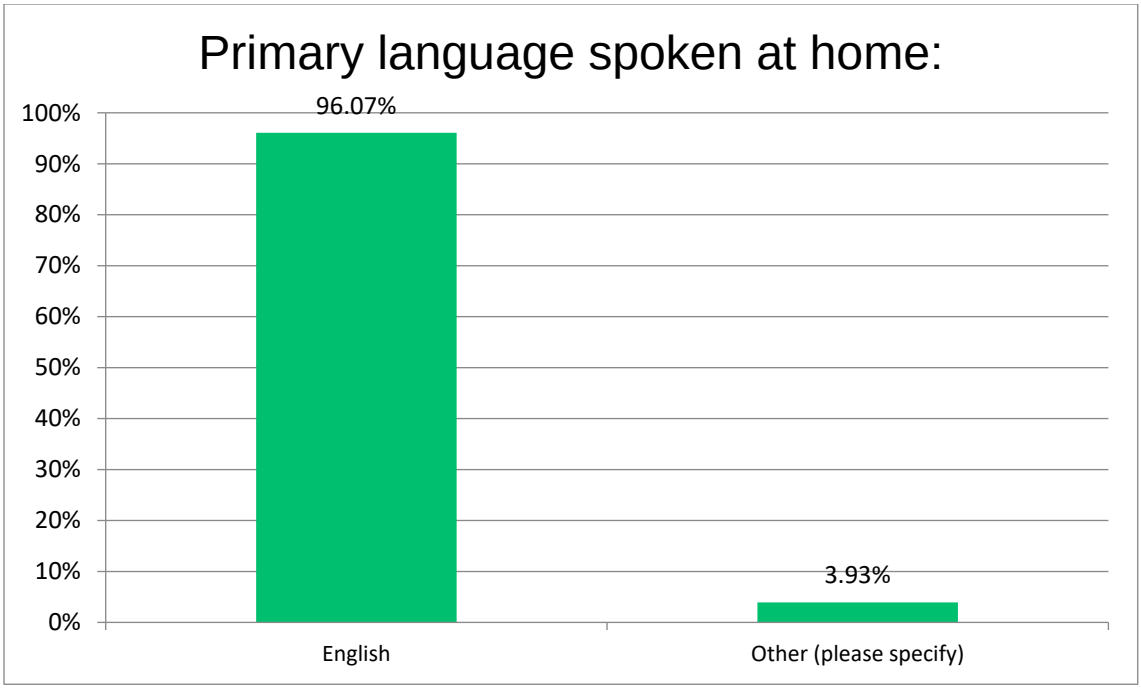


N= 181



Gender Identity	
Male	59
Transgender Woman	1
Female	65
Non-binary	1
Gender fluid	1
None	1

N= 173



Other (please specify:
Portuguese
Spanish
Chamorro (from Guam)
N/A
N/A
Japanese
Ingles y Español

N= 178