Chapel Hill Transit: Short-Range Transit Plan

Final Report

March 2020

NELSON
NYGAARD

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1 INTRODUCTION

This report represents the final element of the Chapel Hill Transit (CHT) Short-Range Transit Plan (SRTP) effort. The SRTP serves as a roadmap for the next 10 years to position the agency for continued financial and operational success. The purpose of this report is to summarize the background conditions in which CHT operates, provide a comprehensive evaluation of existing service characteristics and system performance, and make recommendations for the future. The planning process included examining the existing market and operating conditions, engaging in public and stakeholder outreach, developing and refining alternative service scenarios, identifying long-term strategic issues facing the agency, and recommending a series of next steps necessary for implementing the SRTP.

Project Goals

At the outset of the planning process, a Technical Committee and Policy Committee were established to allow for in-depth discussion and informed decision-making on the part of CHT's Partners Committee. Both committees included representatives from the Town of Chapel Hill, Town of Carrboro, and UNC-Chapel Hill. The goal of the Technical Committee was to review recommendations and ask clarifying questions before presentations were made to the Partners Committee as a whole; the goal of the Policy Committee was to provide strategic direction, review work products and recommendations, and make recommendations to the Partners Committee.

CHT's SRTP Technical Committee and Policy Committee developed six guiding principles designed to inform the future of transit service in Chapel Hill. The six goals are as follows:

- **Improve transit mode shift.** Improving weekend service throughout the system, how often buses arrive, making service simpler and easier to understand, and providing more all-day service were strategies identified to improve transit mode shift in the community.
- **Increase ridership.** Recommendations developed as part of the SRTP process improve weekend service, increase service frequency, and make service more direct to increase ridership in the system.
- **Create high frequency transit corridors.** The SRTP Preferred Alternative improves service frequencies in the highest demand areas of the service area, including East Franklin Street and Martin Luther King Jr. Boulevard, to provide a series of high frequency transit corridors.
- **Emphasize equity.** Recommendations considered transit need as part of the service planning effort, and recommendations result in minimal change to existing service coverage to ensure transit service continues to be provided where it is needed most.
- **Improve weekend service.** Better weekend service was an important priority identified by the community, and short-term service recommendations will greatly expand the level of service offered on weekends.
- **Enhance the convenience of living without a private vehicle.** By improving existing service frequency, directness of service, Saturday service, and the availability of Sunday service,

recommendations developed as part of the SRTP will enhance the convenience of living without a private vehicle in Carrboro and Chapel Hill.

Report Organization

In addition to this Introduction, the document consists of eight chapters, as well as seven appendices, which are summarized below:

- **Chapter 2** reviews a variety of local planning and development efforts in the CHT service area.
- **Chapter 3** reports current and projected population and employment characteristics and reviews transit propensity and travel demand.
- **Chapter 4** provides an overview of trends of CHT ridership, revenue hours, and operating expenses.
- **Chapter 5** provides a peer review assessment for eleven transit agencies that are similar in scope and size to CHT.
- **Chapter** 6 summarizes the service scenario development process, identifies the proposed preliminary service concepts, and highlights the preferred alternative that was developed through public outreach and stakeholder engagement based on public perceptions of the preliminary service concepts. This chapter also details recommended changes in service and alignment for individual routes and sub-areas of the CHT service area.
- **Chapter 7** evaluates a series of long-term strategic issues facing the agency, including identifying the issue, assessing the challenges, financial implications, and next steps for the agency.
- **Chapter 8** summarizes the ongoing public outreach and stakeholder engagement processes occurring throughout the SRTP development process.
- **Chapter 9** identifies next steps necessary to continue the SRTP planning process and move toward the implementation of recommendations.
- **Appendix A** provides route summary tables and charts that give insight to passenger loads, boardings, and alightings.
- **Appendix B** provides ridership maps of boardings and alightings for each route.
- **Appendix C** shows the individual route recommendation maps, service span, and frequency for the Preferred Alternative.
- **Appendix D** provides verbatim comments from the online survey used in Phase I public outreach.
- **Appendix E** provides verbatim comments from the online survey used in Phase II public outreach.
- **Appendix F** provides verbatim comments from the online survey used in Phase III public outreach.

2 PLAN REVIEW

Current transit planning efforts in the Chapel Hill-Carrboro metropolitan area exist within a broader planning context that has evolved over time. Accounting for existing plans, rider and community surveys, and planned development provides a foundation for the SRTP to identify rider priorities, future transportation projects, and potential increases in demand for service. This planning context is used to inform the development of the SRTP and ensure alignment with the project goals. This section reviews that planning context in three main components:

Survey Review. This section presents the results of three surveys administered in the region:

- (1) The Chapel Hill Transit (CHT) Passenger Survey (2016)
- (2) The GoTriangle On-Board Survey (2016)
- (3) The University of North Carolina-Chapel Hill (UNC-Chapel Hill) Campus Commuting Survey (2015)

Plan Review. This section reviews 10 planning documents that will provide regional context and impact transit planning and operations in the Chapel Hill region:

- (1) Carrboro Vision 2020 (2000)
- (2) Carrboro Comprehensive Bicycle Transportation Plan (2009)
- (3) The Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC) 2035 Long Range Transportation Plan (2009)
- (4) UNC Transportation & Parking Five-Year Plan (2017)
- (5) Chapel Hill 2020 (2012)
- (6) Chapel Hill Bike Plan (2014)
- (7) CHT North-South Corridor Study (2016)
- (8) Draft Chapel Hill Mobility and Connectivity Plan (2017)
- (9) Orange County Transit Plan (2017)
- (10) GoTriangle Station Area Market Analysis (2017)

Development Review. This review assesses the development context within the CHT service area, including mixed-use, residential, and commercial developments that are likely to impact CHT service in the future.

Findings from this chapter contextualize future transit planning work in Chapel Hill by identifying transit rider behaviors and perceptions, enumerating the region's planning goals, highlighting consistent visions, and identifying potential impacts of future growth on transit planning and operations.

KEY FINDINGS

Survey Review

The following are key findings from the CHT, GoTriangle, and UNC Survey review:

- Most of the transit users surveyed were younger, lower income, students or professionals. This includes 52% of UNC-Chapel Hill students who identified as a transit commuter. CHT appears to have a higher percentage of student ridership than GoTriangle, which focuses more on regional and commuter service.
- Between CHT and GoTriangle, most transit riders want to see expanded service on weekends and evenings. Other common responses were more frequent service and better on-time performance. Expanded weekend and evening service can improve access to employment opportunities and community events.
- Despite high transit use by UNC-Chapel Hill students, employees are driving to work at the highest rates observed since 2004. Anecdotally, it appears that this is a result of employees living outside of the immediate Chapel Hill vicinity, a lack of regional fixed-route transit, and an increase in park-and-ride user fees.
- The most common purposes for transit trips are to and from work and school. Additionally, over half of transit riders are students, over a quarter are professionals or skilled technicians, and 38% of riders don't have access to a private automobile.

These survey results suggest that resources should be targeted towards ensuring the on-time performance of buses, expanding weekend service, and improving connections between CHT and regional service providers.

Plan Review

The following are key findings from the plan review:

- **Regional Transit.** The regional plans from DCHC, Orange County, and CHT prioritize investments in regional fixed route transit including commuter and connector bus service, rail, and BRT. Specific projects and initiatives include the CHT North-South Corridor BRT plan on MLK Jr Blvd, the Durham-Orange Light Rail Project, a new Amtrak station in Hillsborough, and expanding existing bus services to reach underserved communities throughout the region.
- **Regional Growth.** Population and employment growth is expected to continue into the future, inducing additional demand for regional and local transit. In areas like the North-South BRT corridor, transit capacity is already constrained, and additional service improvements may be necessary to keep pace with growing demand.
- **Bike and Pedestrian Networks.** Local comprehensive, bike, and pedestrian plans emphasize developing safe and comfortable pedestrian networks with connections to transit routes. UNC-Chapel Hill has developed a primary and secondary pedestrian network that aligns with existing and planned transit improvements on MLK Jr Blvd, South Rd, Manning Dr, and Fordham Blvd. The Draft Chapel Hill Mobility and Connectivity Plan also calls for the formation of a bicycle network with established hubs throughout Chapel Hill. Accessibility improvements currently in development include enhancing bus shelters, lighting, real-time information, sidewalk connectivity, and crosswalk improvements.
- **Connections to Transit.** An emergent theme throughout the planning documents is integrating bicycle and pedestrian networks with existing transit routes and planned transit improvements.

The Chapel Hill Bike Plan calls for integrating bicycle and transit infrastructure improvements to encourage additional ridership and multimodal connectivity.

Development Review

The following are key findings from the development review:

- **Large Mixed-Use Developments.** A notable development trend in Chapel Hill is the emergence of large, multi-building, campus-style, mixed-use developments including Carraway Village, Obey Creek, Glen Lennox, and UNC-Chapel Hill's Carolina North Campus. These developments are high trip generators, containing residential, commercial, and office space.
- **Proximity to Transit.** These large-scale mixed-use developments are located adjacent to existing transit corridors on MLK Jr Blvd and Fordham Blvd. This provides both an opportunity and a challenge to expand services, meet growing demand, and capture additional ridership.

SURVEY REVIEW

This section describes the findings from three surveys that have implications for transit in Chapel Hill. The surveys were administered to CHT and GoTriangle users, as well as students and employees at UNC-Chapel Hill. These surveys provide contextual information about rider behavior, customer perceptions, and priorities for future transit improvements and enhancements.

- CHT Passenger Survey (2016).
- GoTriangle On-Board Survey (2016).
- UNC Campus Commuting Survey (2015).

CHT Passenger Survey (2016)

This 2016 survey was the third passenger survey conducted by CHT and the first since 2012. The primary objective of the survey was to gather input from riders and identify ways to improve transit services that better meet the needs of users. Survey questions covered a range of topics including frequency of use, purpose of trips, ridership by choice or necessity, means of access to the system, and levels of satisfaction. Key findings from the survey include:

- The demographic information from the survey indicates that the majority of CHT riders had an income under $30,000 (51%), were students (55%), and were under the age of 35 (77%).
- The most frequently mentioned destinations of riders were work (47%) and college (46%).
- The majority of CHT riders (68%) used public transit at least five days per week; additionally, 62% of riders indicated that they had access to another vehicle that they could have used to make the trip.
- Eighty-nine percent of riders rated the overall quality of CHT as either excellent or good, with 91% saying they were most satisfied with how safe riders feel on the bus.
- Seventy-seven percent said they were least satisfied with the availability of bus service on either Saturday or Sunday.
- Sixty-eight percent of riders stated that the timeliness of buses was the most important aspect of service.
- The features that would most encourage riders to use CHT more often were more frequent service (49%), more service offered later in the evenings (43%), and more service offered on Saturday (39%) and Sunday (36%).
- Thirty-eight percent of survey respondents do not have access to another vehicle that they could have used to make their trip.

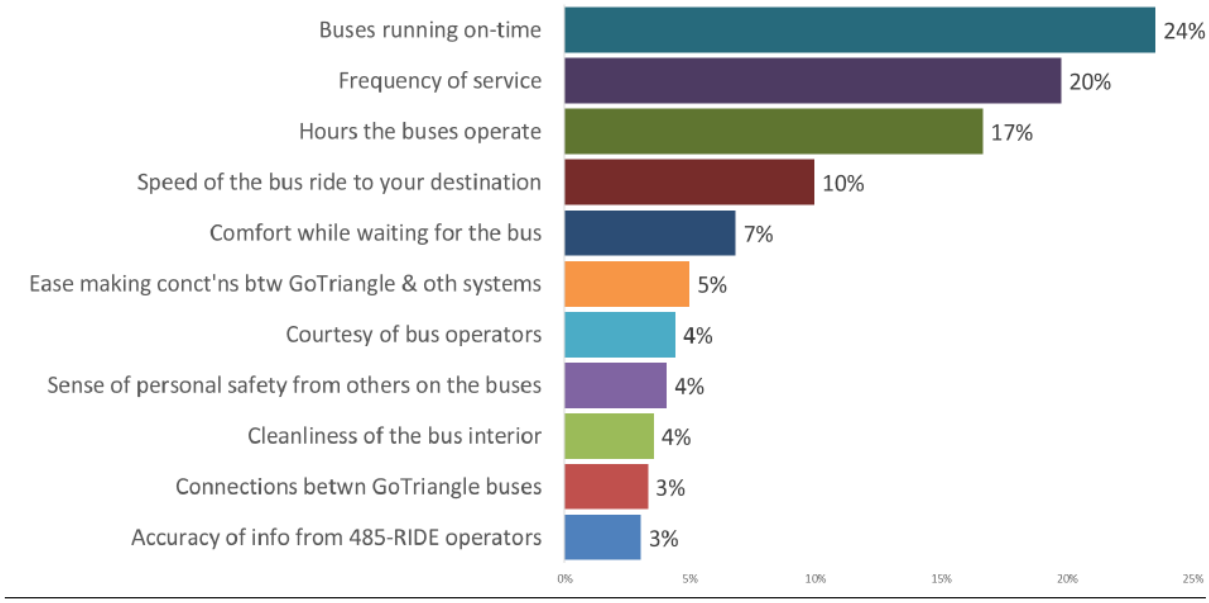
The 2016 passenger survey notes that the most important criteria for decision making are targeting resources toward services with the highest importance to customers and where customers are least satisfied. These survey results suggest that resources should be targeted towards ensuring the timeliness of buses and expanding weekend service.

GoTriangle On-Board Survey (2016)

The 2016 GoTriangle On-Board Survey was intended to provide updated information on customer perceptions and satisfaction with the service and agency branding changes made since the previous survey in 2013. The survey was used to gather new information on customer priorities for service improvements, how fares are paid, the use of ridesharing, and preference for service change communications. Key findings from this survey include:

- The demographic information from the survey indicates that the majority of riders (52%) are under the age of 35, 30% of riders are students, 33% had an income lower than $25,000, and 27% had an income higher than $75,000.
- The overall satisfaction score decreased from 71% rating the service excellent or very good in 2013 to 67% in 2016. It cannot be shown in the survey data, but anecdotal information suggests that extensive construction in the service area created delays and resulted in poor on-time performance for many routes.
- The top three service qualities cited most often as desired improvements were buses running on time (24%), frequency (20%), and hours of service (17%) (Figure 2-1)
- 70% of riders used GoTriangle to get to or from work, up from 63% in 2013. Additionally, 13% of riders used GoTriangle to get to or from college or vocational school.
- GoTriangle service appears to attract more professionals and commuters than students when compared to CHT. This is likely due to their focus on regional transit, rather than local service in the Town of Chapel Hill.
- 68% of riders have access to a private vehicle and are thus using GoTriangle service by choice, not necessity.

Figure 2-1 GoTriangle Areas for Improvement



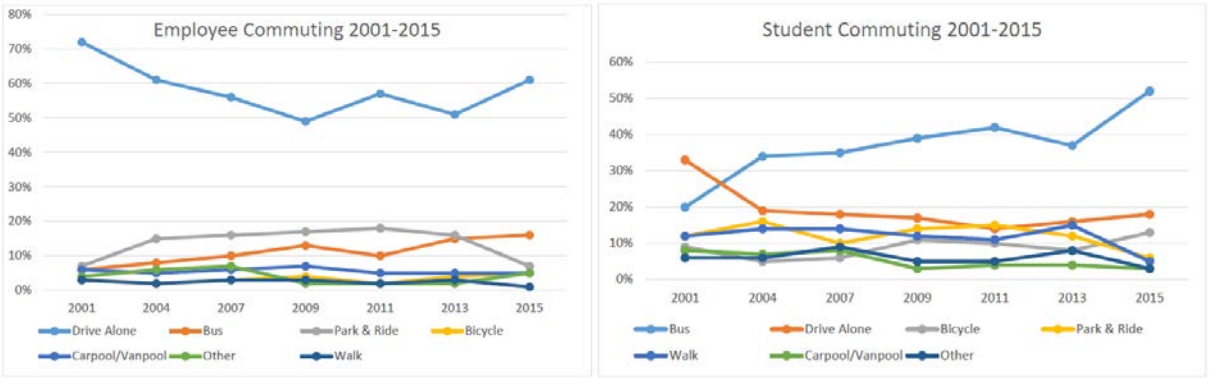
Source: GoTriangle Onboard Surveys 2016

UNC-Chapel Hill Campus Commuting Survey (2015)

The UNC-Chapel Hill Campus Commuting Survey was first conducted in 1997 to gather data on the various travel modes used to reach campus and the origins and destinations of both students and employees. This survey was repeated in 2001, 2004, 2007, 2009, 2011, 2013, and is now completed every other year. The information gathered from these surveys helps the UNC-Chapel Hill Department of Transportation and Parking and the Town of Chapel Hill plan for their respective transportation needs. The year-to-year trends from these surveys are shown in Figure 2-2. Key findings from this 2015 survey include:

- The percentage of employees who drive alone to campus increased to 61%, the highest level since 2004.
- Park-and-ride utilization by employees decreased from 16% to 7%, the lowest percentage since 2001, due in part to the introduction of fees to access park-and-ride lots.
- Student transit ridership increased from 37% in 2013 to a high of 52% in 2015, with 43% using CHT local service and 9% using regional bus service. This increase appears to be mostly at the expense of walking, which decreased from 15% to 5%.
- The top three reasons for students not to take transit were irregular schedules, the bus taking too long compared to a car, and the bus running too infrequently near their home.
- Both students and employees cited more frequent and faster bus service as the top two factors to make them reconsider driving to campus.

Figure 2-2 UNC Campus Commuting Survey Trends



Source: 2015 UNC Campus Commuting Survey

PLAN REVIEW

This section describes the findings from 11 planning documents that have implications for transit service in Chapel Hill. These documents include plans from a metropolitan planning organization (MPO), a county, transit agencies, towns, and UNC-Chapel Hill. Each plan relates to different components of the overall transportation network, in different planning jurisdictions, and in different planning horizon timeframes. Collectively, the backgrounds and key findings from these plans create the regional and local context of transit development in the CHT service area.

- Carrboro Vision 2020 (2000)
- Carrboro Comprehensive Bicycle Transportation Plan (2009)
- DCHC 2035 Long Range Transportation Plan (2009)
- UNC Transportation & Parking Five-Year Plan (2011)
- Chapel Hill 2020 (2012)
- Orange County Bus & Rail Investment Plan (2012)
- Chapel Hill Bike Plan (2014)
- CHT North-South Corridor Study (2016)
- Draft Chapel Hill Mobility and Connectivity Plan (2017)
- Orange County Transit Plan (2017)
- GoTriangle Station Area Market Analysis (2017)

Carrboro Vision 2020 (2000)

The Vision 2020 plan serves as the Comprehensive Plan for the Town of Carrboro, which establishes general programs, policies, and development goals for the town through the 2020 horizon year. The transportation section of the plan focuses on planning, public transportation, and bicycle and pedestrian traffic.

Planning

This section is primarily concerned with fostering connectivity between transit and cooperation between local and regional agencies.

Similar to the Chapel Hill Mobility and Connectivity Plan, Carrboro Vision 2020 calls for the implementation of a connector road policy, as well as cooperation with Chapel Hill and other regional entities to provide connections between regional transit services. The plan also recommends a passenger rail connection between the Horace Williams property, through Carrboro's downtown and the main campus of UNC-Chapel Hill.

Public Transportation

There are two main policies contained in the public transportation section:

(1) The system should continue to facilitate access to youth activities, special events, and educational opportunities at UNC-Chapel Hill and should enhance access to employment opportunities, including through additional park-and-ride lots.

(2) Carrboro should expand its participation in regional organizations and planning for the community bus system in a way that equitably shares costs with Chapel Hill and UNC-Chapel Hill.

Bicycle and Pedestrian Traffic

This section of the plan designates the development and maintenance of bicycle and pedestrian paths as a high priority. It also calls for the town to establish bicycle and pedestrian connections to other jurisdictions, contributing to a more regional and comprehensive network.

Carrboro Comprehensive Bicycle Transportation Plan (2009)

This plan provides a comprehensive approach toward identifying existing and future bicycle needs and deficiencies, a route network to address those deficiencies, and implementation strategies for the development of quality bicycle facilities and programs. The plan has four primary goals to achieve this vision:

- To have bicycling as a viable transportation alternative throughout the town and for all trip purposes.
- A continuing process for reviewing, updating, and implementing bicycle-related policies.
- A robust comprehensive bicycle program that incorporates engineering, education, encouragement, enforcement and evaluation programs.
- A safe and accessible network of bicycle facilities.

Bicycle Network Recommendations

A needs analysis was conducted as part of the existing conditions report, which indicated that demand for a more accessible, safe, and functional bicycle system continues to grow in Carrboro. Although Carrboro is nationally recognized for being a bicycle-friendly town, citizens have expressed concern about cyclist safety and a desire for more and better bicycle facilities.

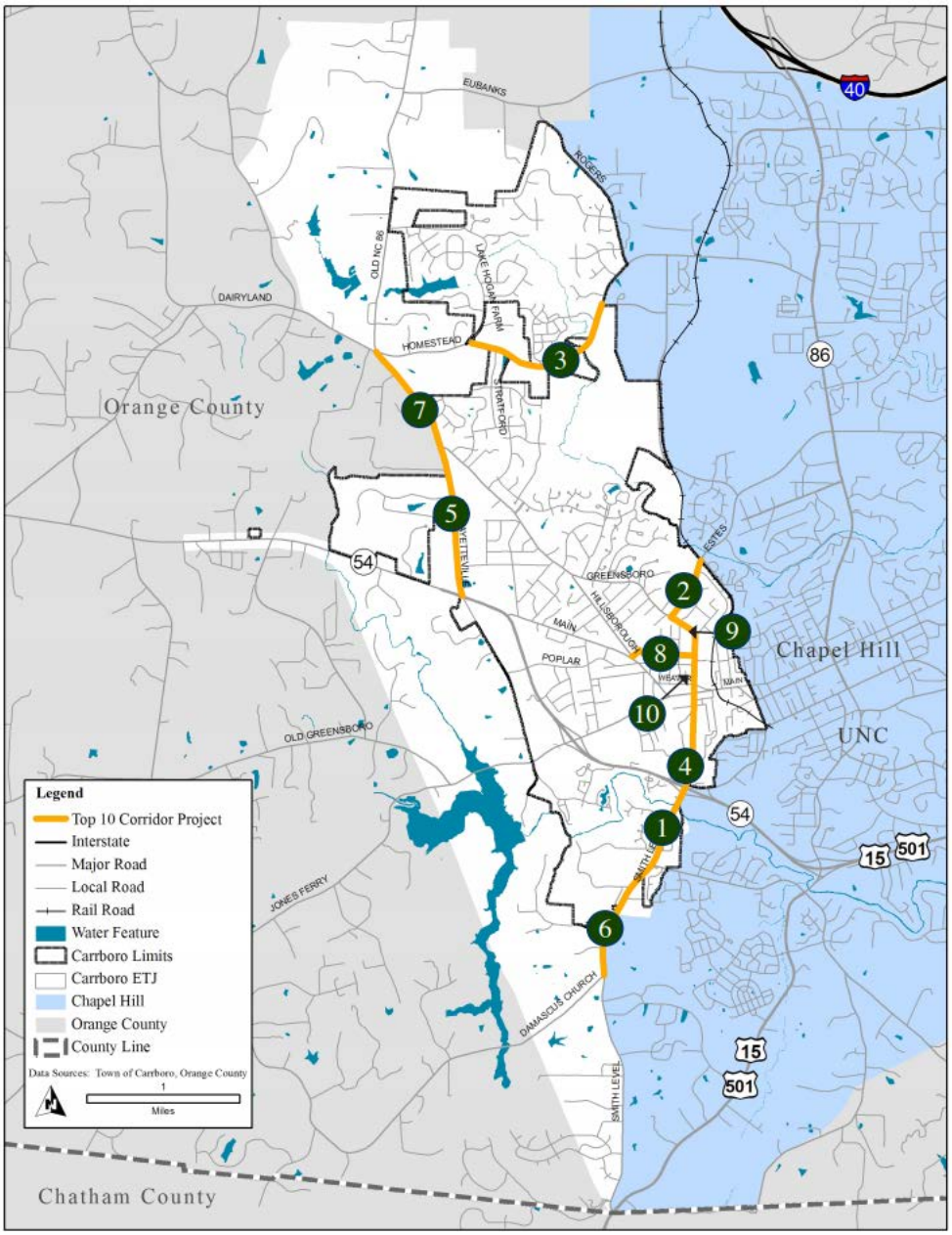
This plan recommends an additional 54 miles of bicycle facilities, including paved shoulders, bicycle lanes, sharrows, sidepaths, intersection improvements, and off-road trails. The ten highest priority corridors, based on public requests for improvements, are shown in Figure 2-3. These facilities are recommended through a phased and prioritized implementation schedule. Additional recommended improvements include re-striping, repaving, or signage installation with few actual roadway alterations.

Program and Policy Recommendations

The Carrboro bike plan follows a comprehensive approach that calls for more than just improvements to the bicycle network. The plan recommends programs pertaining to education, encouragement, and enforcement. These programs include locally organized events and activities and the development of a citizens' bicycle advocacy group to champion recommendations, implementation strategies, and improvements to the plan.

Policy recommendations in this plan are primarily updates to supersede the existing policies from the 1989 bicycle plan. These updates include expanding bicycle parking ordinances for new developments, updated design guides allowing additional bicycle facilities, and enhanced programming alternatives.

Figure 2-3 High Priority Bicycle Corridor Map



Source: Carrboro Comprehensive Bicycle Transportation Plan, 2009

DCHC 2035 Long Range Transportation Plan (2009)

This document contains the 2035 Long Range Transportation plan for two organizations: the Capital Area Metropolitan Planning Organization (CAMPO) and the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC), which guides future investments in roads, transit services, bicycle and pedestrian facilities and related transportation activities and services to match expected growth in the region.

The DCHC MPO establishes a set of goals and performance targets within this planning framework intended to establish a strong overall transportation system.

Plan Goals

The DCHC has established nine distinct goals for achieving their vision for regional transportation:

- **Overall Transportation System.** A safe, sustainable, efficient, attractive, multi-modal transportation system that supports local land use; accommodates trip-making choices; maintains mobility; protects the environment and neighborhoods; and improves the quality of life for urban area residents.
- **Multi-Modal Street and Highway System.** An attractive multi-modal street and highway system that allows people and goods to move safely, conveniently, and efficiently.
- **Public Transportation System.** A convenient, accessible, and affordable public transportation system, provided by public and private operators, that enhances mobility and economic development.
- **Pedestrian and Bicycle System.** A pedestrian and bicycle system that provides a safe alternative means of transportation, allows greater access to public transit, supports recreational opportunities, and includes off-road trails.
- **Integration of Land Use and Transportation.** A transportation plan that is integrated with local land use plans and development policies.
- **Protection of Natural Environment and Social Systems.** A multi-modal transportation system, which provides access and mobility to all residents, while protecting public health, natural environment, cultural resources, and social systems.
- **Public Involvement.** An ongoing program to inform and involve citizens throughout all stages of the development, update, and implementation of the Transportation Plan.
- **Safety and Security.** Continue to improve transportation safety and ensure the security of the transportation system.
- **Freight Transportation and Urban Goods Movement.** Improve mobility and accessibility of freight and urban goods movement.

Performance Targets

The DCHC established a series of performance targets based on 2005 existing conditions, a 2035 no-build scenario, and adopted 2035 projection data. These targets are set at three different levels, good, better, and best.

Recommendations

Transit recommendations are comprised of three critical elements:

- **Bus.** A significant expansion of bus service throughout the Triangle, adding new routes to communities presently without service, and improvements to headways at existing transit agencies.
- **Rail.** 56 miles of light rail transit connecting Chapel Hill, Durham, Research Triangle Park, Morrisville, Cary, Raleigh, and North Raleigh.
- **Circulators.** High-frequency (every 10 minutes) short-distance services linking major activity centers to regional and intercity rail services.

The bus transit improvements called for in the plan include expanding service, providing more frequent service, coordinating service with rail development, establishing new circulator services, incorporating new technologies with bus tracking, and improved communication with riders. The plan also calls for enhanced transit on the MLK Jr Blvd corridor in Chapel Hill, something that was studied in greater detail in the 2016 CHT North-South Corridor Study.

Light rail transit development is a departure from past long range plans that focused on passenger rail service which could not be operated outside of existing rail corridors. This new focus on light rail development provides the opportunity for passenger rail service to depart from rail corridors and operate closer to population centers, employment centers, and transit-oriented developments along roadways. The exact alignment and timing of these fixed guideway investments will be decided with additional, more detailed studies.

Figure 2-4 DCHC 2035 Performance Targets

No.	Mobility Targets	2005	2035 (no build)	2035	Good	Better	Best
1	VMT Per Capita (daily miles)	28.5	31.6	32.0	29.1	27.5	24.5
2	Percent of Peak Period VMT at Congestion (V/C > 1)	3.0%	10.4%	3.7%	12.0%	8.0%	4.0%
3	Average Travel Time: all peak trips (daily minutes)	16.6	20.5	18.3	19	17	15
4	Transit Mode Share: all trips	2.4%	2.3%	3.3%	3.0%	5.0%	8.0%
5	Percent SOV Trip Share: work trips	81.8%	82.3%	81.2%	78.4%	74.3%	66.0%
6	Percent Non-motorized Trip Share: all trips	7.1%	6.8%	6.8%	9%	11%	15%
7	Greenhouse Gas Change (community target)	--	--	+49%	-10%	-20%	-30%
8	Cost of Congestion (in million $)	$351	$1,211	$496	$1,030	$848	$666
9	Percent of EJ Population within ¼ mile of transit	58%	59%	85%	65%	75%	85%

Source: DCHC 2035 Long Range Transportation Plan, 2009

UNC Transportation & Parking Five-Year Plan (2017)

The Transportation & Parking Five-Year Plan is primarily a financial plan analyzing projected expenditures and revenues related to the University's transportation and parking system. Major findings regarding the use of services, facilities expansion, and cost of providing fare-free transit services are highlighted below:

- CHT's projected cost increases to sustain the current levels of local fare-free transit service represented a $1.5 million annual increase by 2021/22.
- The projected cost increases to sustain the current levels of regional fare-free transit services represented a $1,056,837 annual increase by 2021/22.
- Park-and-ride lots are well-utilized and there is currently a deficit of on-campus parking, according to UNC-Chapel Hill's Development Plan.
- The UNC Healthcare System has plans to add 700 new employees in 2019.

Chapel Hill 2020 (2012)

Chapel Hill 2020 is the comprehensive plan for the Town of Chapel Hill, which communicates a cohesive vision for the town, identifies several big ideas for the future, outlines goals for achieving this vision, and provides implementation strategies for the plan.

The Big Ideas

The Chapel Hill 2020 public outreach process was conducted in six separate theme groups resulting in five key ideas for the future. The big ideas focus on transportation and connectivity, encouraging business and cultural development, ensuring an adequate housing supply, and supporting neighborhood and community engagement. These concepts are highlighted as follows:

- Implement a bikeable, walkable, green communities plan by 2020.
- Create an entrepreneurial enterprise hub in the Rosemary Street corridor.
- Create entertainment/dining/arts hubs to capitalize on Chapel Hill's strengths as a recreational destination.
- Increase the ratio of workforce housing by 2020 and develop a plan for student housing in the community.
- Establish a structure to support community and neighborhood engagement in a proactive manner.

These overarching concepts are intended to address the Chapel Hill 2020 vision to be a multicultural university town that celebrates connections and choice.

Getting Around

The mobility section of Chapel Hill 2020 is referred to as Getting Around. This section calls for a holistic transportation system that includes connected pedestrian, bicycle, recreation, automobile, and transit systems with supportive, flexible strategies and policies that include parking, transit, and bikeways as a key strategy to minimize growth related congestion.

Specific improvements mentioned in the plan include expanded bicycle and pedestrian connections, public transportation opportunities such as bus rapid transit, light rail, and park-and-ride options. The plan does not propose specific projects but does highlight priority focus areas, including downtown, north MLK Jr Blvd, south MLK Jr Blvd, Highway 54, north 15-501, and south 15-501. These focus areas are identified based on economic importance, development opportunities, existing transit service, and regional connectivity potential.

Implementation

The implementation schedule for Chapel Hill 2020 prioritizes clear consensus activities, which are the most achievable components of the plan. These include focus area studies and regulatory updates, including the Estes Drive Corridor study, a downtown development plan, and the Martin Luther King Jr. Boulevard Corridor study.

The Chapel Hill 2020 plan also identifies a town council, which is responsible for evaluating changing conditions and assumptions in order to provide updates to the plan. This includes analyzing and prioritizing action items to address conflicts and evaluating new ideas to improve the document and help achieve the plan's vision.

Chapel Hill Bike Plan (2014)

The purpose of the Chapel Hill Bike Plan is to provide the town with a set of prioritized infrastructure improvements, policies, and program recommendations that will guide decisions and investments for the future. The plan articulates four distinct goals:

- Improve the safety of bicycling for all types of riders.

- Foster the development of a culture where bicycling is an accepted and viable mode choice in Chapel Hill.
- Develop a connected network of bicycle facilities in coordination with greenways throughout Chapel Hill.
- Increase bicycle use for all types of trips.

Recommendations

Recommendations from the bike plan include physical infrastructure investments prioritized into short-term and long-term project lists, changes to policies and programs, and additional data gathering and reporting. The plan also proposes maintaining GIS datasets on existing bicycle facilities, bicycle counts, and bicycle collision data to monitor infrastructure changes and their impacts on ridership and safety.

Physical Infrastructure

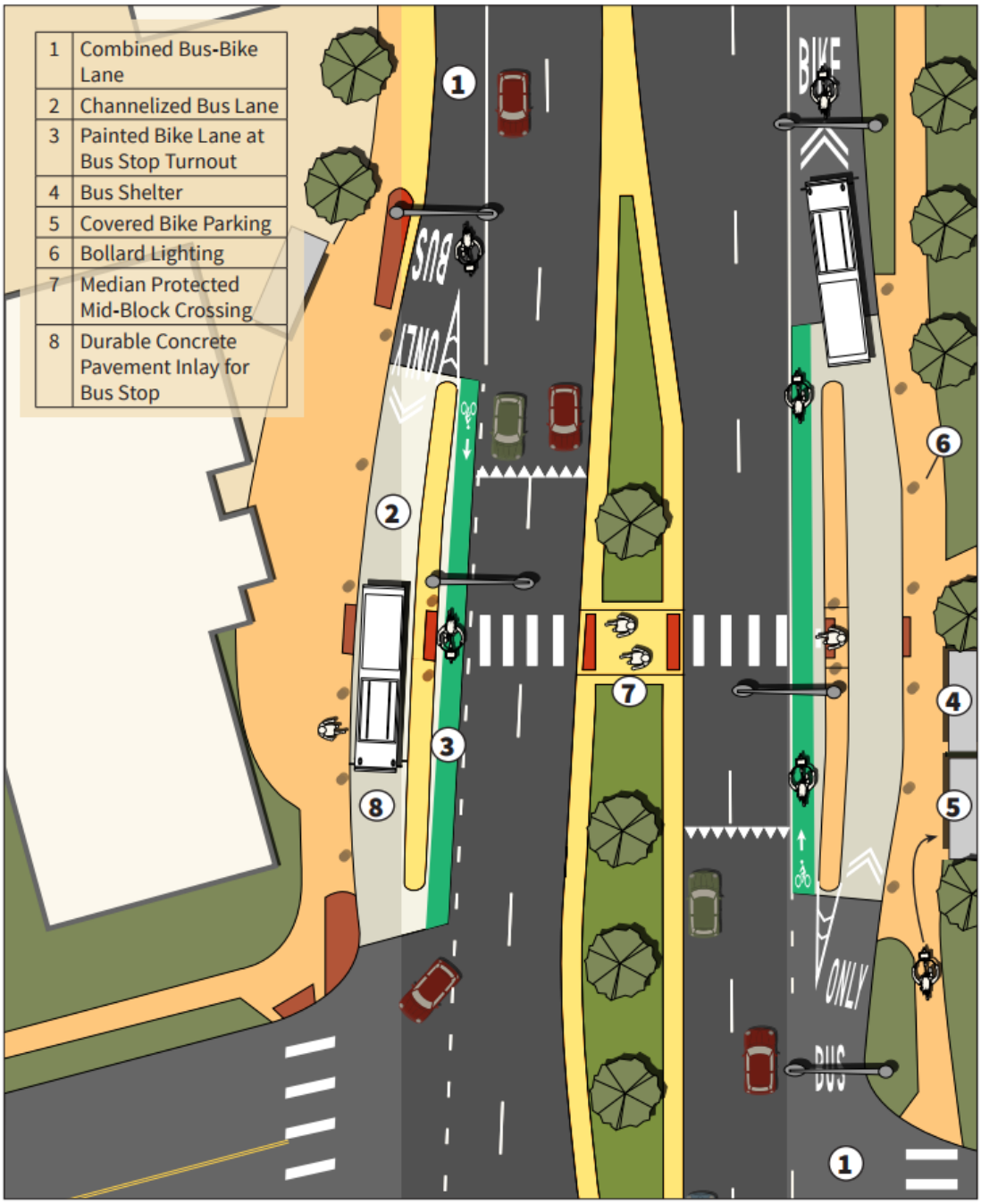
The plan also prioritizes investment in the physical infrastructure needed to complete a bicycle network that serves the needs of bicyclists of all ages and skill levels. The primary network is estimated at $16.5 million to complete over a 10-year period. This infrastructure includes various levels of bicycle paths, lanes, and signage, as well as adequate street lighting and bicycle-oriented traffic signals. These components can be used to provide access to transit and create additional connectivity within the multimodal transportation system, shown in Figure 2-5. These improvements are recommended throughout Chapel Hill, including on high priority transit corridors like Estes Drive, MLK Jr Blvd, Fordham Blvd and Franklin Street.

The bike mobility plan calls for the development of pavement marking plans for the Short-Term Priority Network, adding new bicycle facilities during street paving when possible, and providing a minimum green signal clearance interval for bicyclists at all intersections, among other improvements.

Policies and Programs

In addition to physical infrastructure, the bike mobility plan also recommends changes to local policy and programs. These changes include revisions to the town design manual to ensure new street designs are accommodating and safe for bicyclists, including bike considerations in focus area plans and land use management updates, creating annual reports on bicycle and vehicular collisions, and partnering with the Town of Carrboro for an annual open streets event. These policies are aimed at providing more information to cyclists and creating a more welcoming environment for them to ride.

Figure 2-5 Integration between Bicycle and Transit Networks



Source: Chapel Hill Bike Plan, 2014

CHT North-South Corridor Study (2016)

The North-South Corridor Study was intended to identify and evaluate a series of transit investment alternatives for implementation within an 8.2-mile study corridor running along MLK Jr Blvd, South Columbia Street, and US 15-501 South (Fordham Blvd). The locally preferred alternative, shown in Figure 2-6, is a combination mixed traffic/dedicated lane BRT route that will connect the Eubanks Road park-

and-ride with the Southern Village park-and-ride. This route provides direct connections to the UNC hospitals.

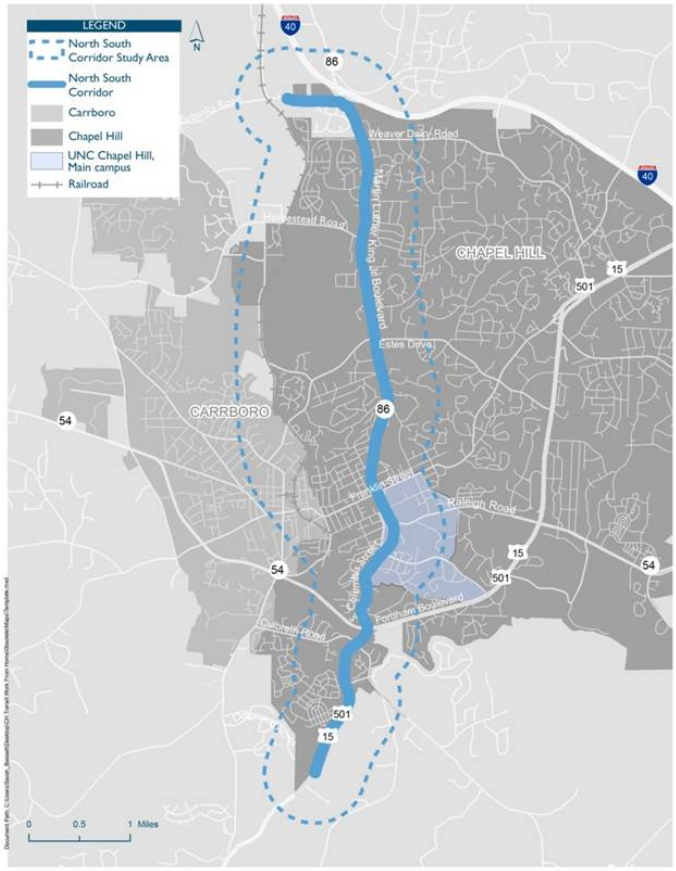
This study was conducted in order to address several project needs within the corridor:

- CHT ridership has increased by more than 20 percent between 2005 and 2012, and buses often operate at capacity during weekday peak hours on multiple routes. Demand is straining capacity, which is reducing operational efficiency and resulting in schedule slippage and bus stacking.
- Chapel Hill is comparatively young, but its fastest growing demographic is over age 65. Both of these demographic groups are increasingly choosing transit for either lifestyle, environmental, economic, or mobility reasons (senior citizens).
- Major development opportunities at the northern and southern ends of the corridor will fundamentally reshape mobility patterns and needs within the corridor.
- Multimodal transportation investments are necessary to accommodate anticipated increases in travel demand resulting from planned development within the corridor.
- Chapel Hill—and the surrounding region—has demonstrated a commitment to sustainable growth strategies in their adopted plans and policies.

The locally preferred alternative was developed following an extensive evaluation process, which analyzed ridership capacity, consistency with local plans and policies, economic development opportunity, environmental impacts, capital costs, and community support. These criteria were applied to no build, BRT, streetcar, light rail, and commuter rail scenarios.

Following the adoption of the locally preferred alternative and entry into the Small Starts Project Development process, at the time of this report, the project is currently undergoing the NEPA environmental clearance process, and funding for construction and operation must be identified. Construction is anticipated to take approximately 18 months with the project opening for revenue service in 2020.

Figure 2-6 North-South Corridor Locally Preferred Alternative



Source: CHT North-South Corridor Study, 2016

Draft Chapel Hill Mobility and Connectivity Plan (2017)

The purpose of this draft mobility plan is to expand upon existing transportation planning efforts to enhance bicycle and pedestrian connections and access to transit. The plan's overarching goal is to achieve a 35% combined commute mode share of bicycling, walking, and transit in Chapel Hill by 2025. The plan calls for leveraging findings from the Chapel Hill Greenways Master Plan, the Chapel Hill Bike Plan, and the 2020 Comprehensive Plan to provide an updated design toolkit for improving on-street networks that provide safe and convenient corridors and connections. This plan is currently in draft form and seeking public comment.

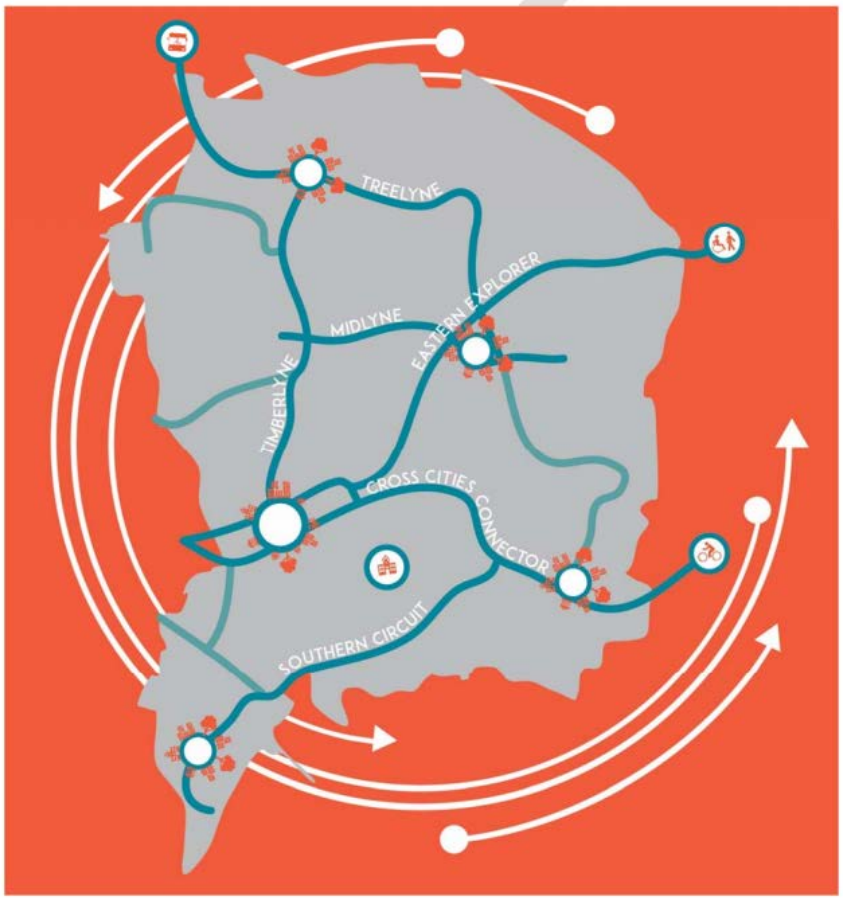
Recommendations

The mobility plan organizes its recommendations into three main categories: new facilities, programs and policies, and culture and mindset. The plan calls for on-street greenway connectors to link greenway trails through priority corridors and to develop multiuse connections to the regional greenway system that link Chapel Hill to a greater regional network. These priority corridors are shown in Figure 2-7.

The mobility plan also recommends several new policies, including updating the sidewalk priority ranking criteria, implementing a sidewalk microgap program, and increasing bike parking requirements for transit stations. Finally, the plan recommends developing mobility performance and annual reporting metrics, including continuous bike and pedestrian counts. This reporting provides the framework for showcasing tangible benefits of bike and pedestrian improvements to the community.

The plan identifies MLK Jr Blvd as the most heavily traveled corridor for CHT with up to 13 buses per hour on seven routes. However, pedestrian and bicycle connectivity to transit stops are hindered by sidewalk gaps, limited sidewalk buffers, and long distances between marked crosswalks. Short-term recommendations for this corridor are focused on pedestrian improvements like filling sidewalk gaps; increasing sidewalk widths and buffers from Ashley Forest Road to Northfield Road; and adding pedestrian crossings to intersections at Barclay Road, New Stateside Drive, Piney Mountain Road, and Westminster Drive. Long-term

Figure 2-7 Priority Bicycle and Pedestrian Corridors



Source: Draft Chapel Hill Mobility and Connectivity Plan, 2017

recommendations include adding buffered bike lanes, coupled with the North-South Corridor Study BRT line, to transform the corridor into a true complete street.

Anticipated growth along the Fordham Blvd corridor has raised additional concerns about improving multimodal connectivity, particularly in the southern portion of the corridor near UNC-Chapel Hill's South Campus and the Obey Creek development. Recommended improvements for this area include improved bike lanes, pavement markings, and constructing a greenway connector from Mt. Carmel Church Road to Fan Branch Trail to improve access to transit stops along the corridor.

Orange County Transit Plan (2017)

The 2017 Orange County Transit Plan (OCTP) is based upon the 2012 Orange County BRIP and outlines progress to date on original BRIP proposals. Which cites growing traffic congestion, air quality concerns, and income-based transit access as reasons for expanding transit services. The Orange County BRIP is also contextualized by the Special Transit Advisory Commission (STAC) recommendations and the passage of HB 148, which allows counties in North Carolina to hold referenda to fund transit projects with voter-approved sales tax measures.

The Orange County Transit Plan includes four primary elements:

- New bus service
- New Amtrak rail station
- New light rail service
- Martin Luther King Jr. Boulevard (MLK Jr Blvd) improvements

New bus service in Orange County has been expanded by approximately 24,000 annual hours (about 59% of the original goal of 40,950 annual hours over the 25-year life of the plan, and 69% of the possible 34,650 hours to add in the first five years), primarily through more frequent service, longer service spans, and new routes. Seven new buses have been purchased and some bus facilities improvements have been made.

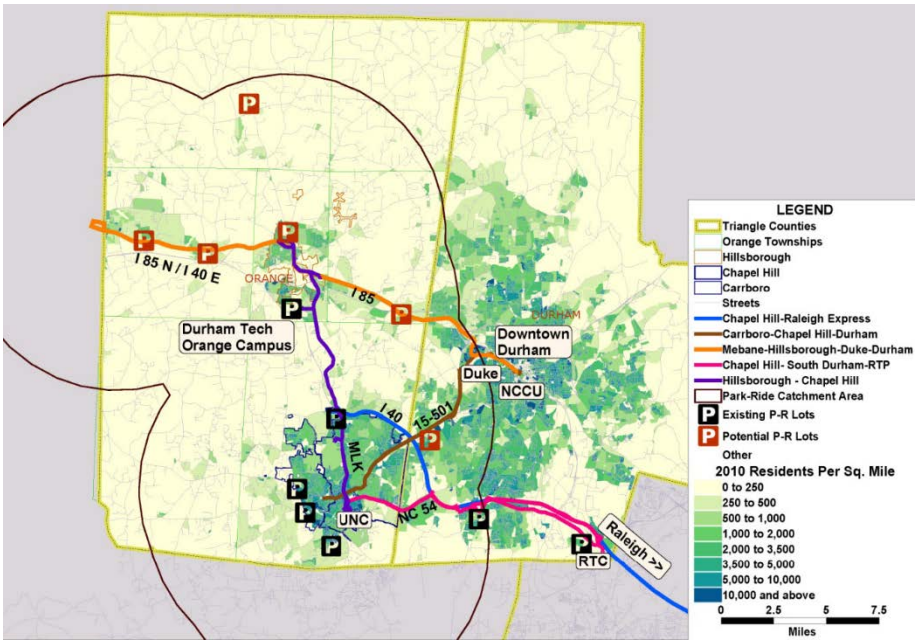
New light rail connecting Orange County to Durham County However, since the development of the OCTP, the planned Durham-Orange Light Rail project has been canceled.

The new Amtrak station planned for Hillsborough is identified in the 2017 OCTP as a North Carolina Department of Transportation project that is now scheduled for construction in fiscal years 2019 and 2020.

The MLK Jr Blvd improvement project planned in the 2012 BRIP have been re-titled the 'North-South Corridor Study' and has undergone a locally-preferred alternative (LPA) identification process. CHT is currently in the process of bringing three designs of the Bus Rapid Transit (BRT) project into requisite environmental and public review processes. The Federal Transit Administration has admitted the project into Small Starts Project Development.

The OCTP presents a robust financial plan and includes a schedule of unfunded planning and project needs. It also develops an implementation process to translate project proposals into reality.

Figure 2-8 Orange County Transit Plan Bus Service

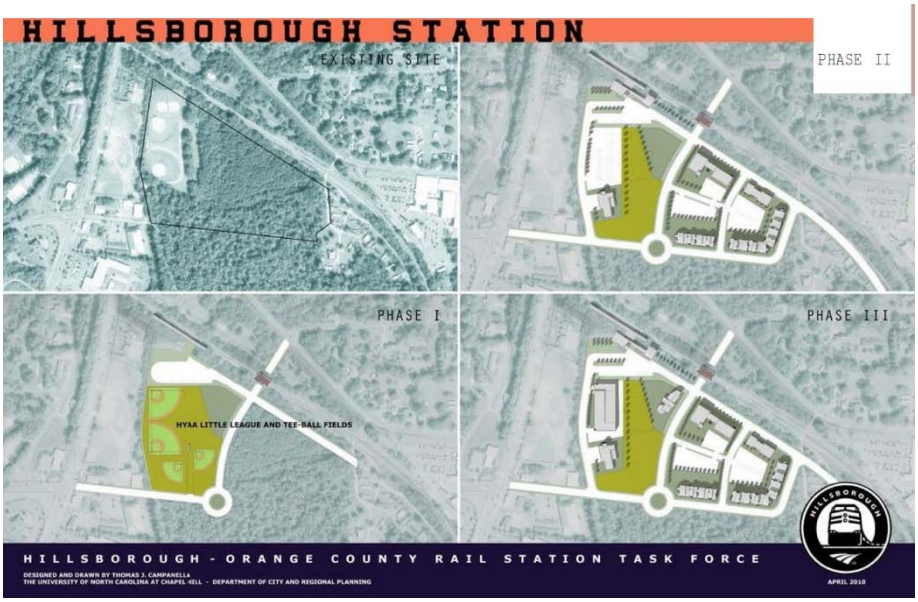


Source: Orange County BRIP (2012

Hillsborough Amtrak Station

A Hillsborough Amtrak station was outlined in the Orange County BRIP and continued in the Orange County Transit Plan. The plan calls for a 20-acre municipally owned lot to be developed into a rail station, municipal service buildings and offices, a civic events space, and high-density mixed-use development. The station is planned for a 2020 opening year.

Figure 2-9 Orange County BRIP Amtrak Station

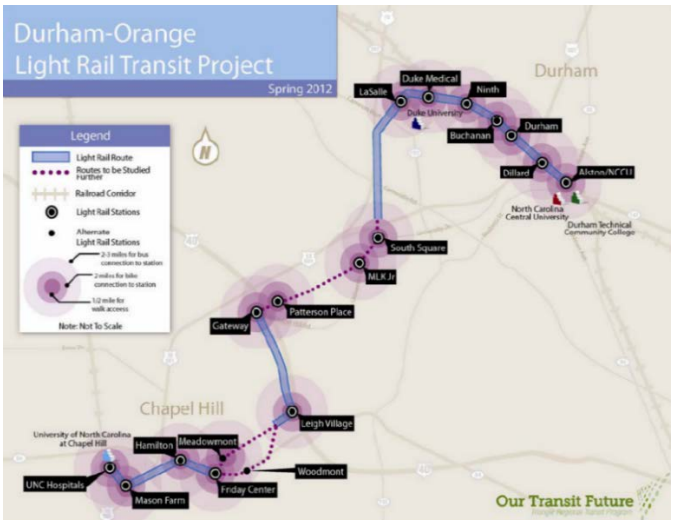


Source: Orange County BRIP (2012)

Durham-Orange Light Rail Service

New light rail service connecting Orange County to Durham County is planned for in the Orange County Transit Plan, which is well coordinated with the Durham investment plan. The Orange County light rail plans include slightly more detailed financials than those presented in their Durham County counterpart, and calls for a 2026 opening year. Since the development of the OCTP, the Durham-Orange Light Rail Project has been canceled.

Figure 2-10 Orange County BRIP Light Rail Service

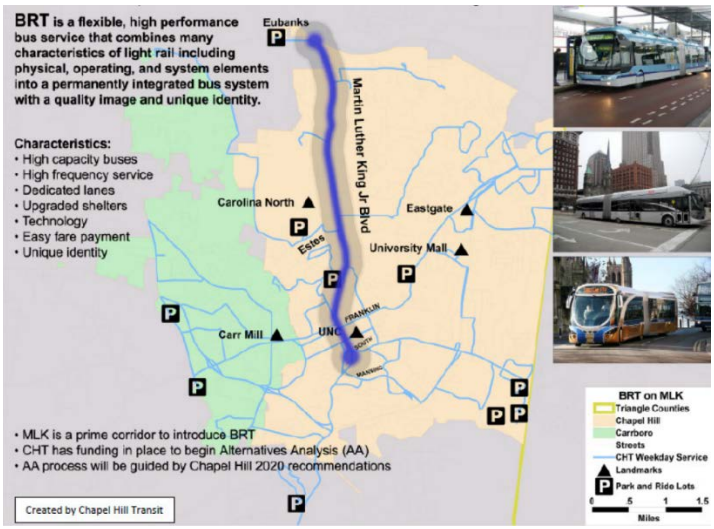


Source: Orange County BRIP (2012)

Martin Luther King Jr. Boulevard Improvements

Major improvements to the MLK Jr Blvd corridor were planned in the Orange County BRIP and continued in the Orange County Transit Plan. The document calls for intermittent exclusive bus lanes and other preferential transit treatments, and plans for capital funding from the state of North Carolina and the federal government. This plan calls for completion of the lanes in 2019. The project is explored in more detail in the 2016 CHT North-South Corridor Study.

Figure 2-11 Orange County BRIP Martin Luther King Jr. Boulevard Improvements



Source: Orange County BRIP (2012)

GoTriangle Station Area Market Analysis (2017)

This document is the result of station area planning and an economic development study for the Durham-Orange Light Rail project connecting central Durham to central Chapel Hill. The analysis provides a preliminary review of economic data concerning the development and supply of building types and projects growth rates into the future. Although the Durham-Orange Light Rail project was cancelled after the release of this document, the findings may still be relevant for future high-capacity transit studies or assessing the market for transit within the region.

Findings

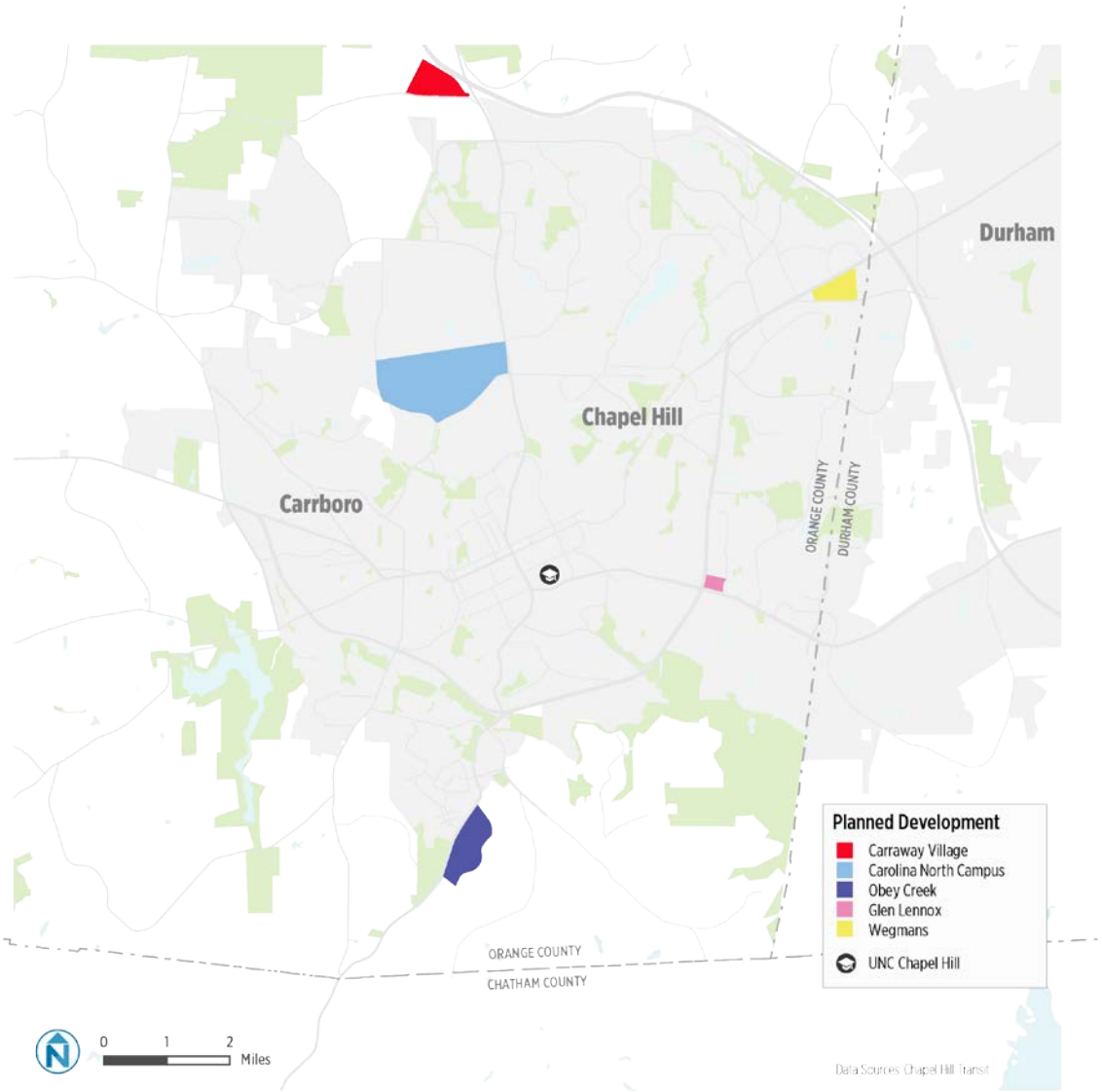
The Triangle Region has consistently grown at 3.5%-5.0% per year, even during recent recessions. This growth would generate more than enough demand to fill up new supply on developable land around station sites. With overall growth expected to continue, the rail submarkets in Chapel Hill, Central Durham, and Southwest Durham are in a strong competitive position to attract new companies, stores, and residents. If rail transit is not constructed, suburban growth in Orange County, Southwest Durham, and Chatham County are the most likely alternative markets to supply growing demand.

This market analysis demonstrates that the Triangle Region is likely to continue growing at a strong pace. However, how and where that growth occurs is dependent upon local and regional policy decisions. With appropriate investments and policies, regional growth can be directed away from neighboring rural and exurban areas and towards more walkable and transit-adjacent communities. This approach could leverage sustainable development patterns to attract jobs, expand the local tax base, and enhance existing neighborhoods. This concentration of growth would necessitate changes in local transit service to serve these populations and provide enhanced connectivity to regional transit service.

DEVELOPMENT REVIEW

The Town of Chapel Hill, and the greater Research Triangle region, are experiencing significant population and employment growth, which impacts local and regional transit providers. Figure 2-13 shows the locations of five major planned developments in Chapel Hill.

Figure 2-12 Planned Developments in Chapel Hill



Carraway Village Mixed-Use Development

Carraway Village, previously named The Edge, is a proposed mixed-use development to be located along Eubanks Road just west of MLK Jr Blvd in Chapel Hill. The project is anticipated to be fully completed in 2018 in two phases of construction. The first phase of the project will have 400 multi-family residential units and 8,400 square feet of retail space, while phase two could have up to 25 acres of new commercial development with a mix of retail, office, and hotel space. A conceptual site plan is shown in Figure 2-13.

Public transportation service to the development site is excellent, particularly due to the planned BRT service on MLK Jr Blvd. Pedestrian and bicycle access and connectivity is limited in the area surrounding this development. Trip generation calculations from the project's Traffic Impact Study estimate 8,460 net new trips will be generated daily by 2019. Of these new trips, approximately 20% are expected to rely on transit, walking, or bicycling.

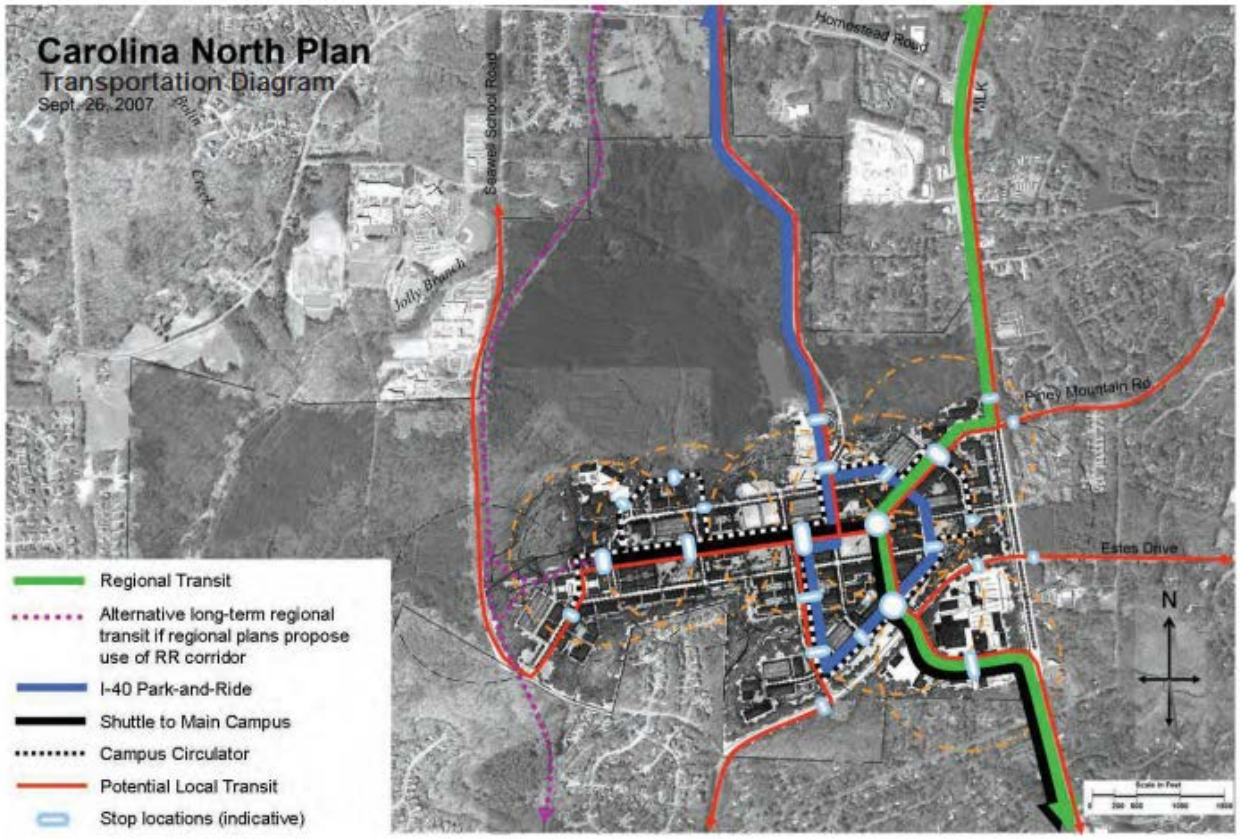
Figure 2-13 Carraway Village Conceptual Site Plan

Source: Town of Chapel Hill, Carraway Village Concept Plan Review, 2011

UNC Carolina North Campus

Carolina North is a 250-acre expansion campus located on the west side of MLK Jr Blvd two miles north of UNC-Chapel Hill's Main Campus. The site is in Orange County and straddles the boundary between the Towns of Chapel Hill and Carrboro. Carolina North is intended to be a public-private partnership development featuring academic and research facilities, housing, and commercial developments. The proximity of this campus to existing and planned transit service makes it a likely hub for CHT service to link the new campus with the Main Campus and downtown Chapel Hill. In addition to the DCHC Long Range Transportation Plan, which includes fixed guideway transit serving Main Campus from Durham, CHT is also studying BRT implementation on MLK Jr Blvd, which would add both local and regional transit access to the Carolina North Campus. The Carolina North Campus is shown in relation to existing local and regional transit alternatives in Figure 2-14.

Figure 2-14 Carolina North Transportation Plan



Source: UNC 2007 Carolina North Plan

Obey Creek Mixed-Use Development

The Obey Creek Mixed-Use Development is a 120-acre development site located across Fordham Boulevard from the Southern Village area of UNC-Chapel Hill's South Campus. The development proposes adding 600 dwelling units, 375,000 square feet of office-commercial space, 350,000 square feet of retail space, and a 100,000 square foot hotel with 130 rooms. Illustrative plans for the development are shown in Figure 2-15.

Three existing transit routes serve the proposed development area, and it will be close to the proposed BRT corridor. The traffic impact analysis estimates that by 2022 this development will result in over 2,500 total daily transit boardings. This includes residents, employees, and shoppers living in or visiting the Obey Creek Development. This concentrated increase in ridership may impact the decisions of local and regional transit service providers.

Figure 2-15 Obey Creek Illustrative Plan

Source: Town of Chapel Hill, Obey Creek Design Guidelines, 2015

Glen Lennox Shopping Center

Glen Lennox is an existing mixed-use development located on Raleigh Road and Fordham Boulevard that plans to redevelop to provide a total of 440 residential dwelling units, 21,276 square feet of commercial/retail space, and 5,084 square feet of office space. This project is to be constructed in phases over a 20-year period.

The trip generation calculation for this project estimates that additional transit capacity will be necessary to accommodate increased ridership to and from the Glen Lennox Redevelopment. Initial estimates of peak hour demand indicate that 288 AM peak hour, 127 noon peak hour, and 352 PM peak hour trips are estimated in the 2028 buildout scenario. Given that fixed route service to Glen Lennox is provided on the G, S, and V routes, the total transit capacity provided by existing service may need to be increased to meet future demand.

Wegmans Supermarket

The Wegmans Supermarket is a proposed commercial grocery store to be located on Old Durham Road on the east side of Fordham Boulevard. This would be a redevelopment project of the existing Performance Motorworks site. The project proposes constructing a grocery store with approximately 130,000 square feet of floor area and parking for 750 vehicles. The traffic impact analysis estimated that this development would attract 538 additional daily transit riders by 2019. While the additional ridership estimate may be optimistic, the project recommends constructing transit stop improvements for stops serving the current CHT routes CL, and D at Old Durham Road and Cooper Street.

3 MARKET ANALYSIS

This chapter analyzes 2010 U.S. Census data for population and employment, as well as projected 2040 population and employment according to the Triangle Regional Model Service Bureau. This analysis is used to identify areas with high population and employment density to determine if CHT is providing service to high demand areas or if there are gaps in the service network. Additionally, analyzing the projected 2040 population and employment densities identifies areas of expected future demand to inform service changes moving forward. This market analysis plays a key role in determining how effective the current CHT system alignment is at serving areas with high transit demand, how this pattern is likely to change in the future, and how service could be altered to better meet the needs of the community.

This chapter also examines transit propensity and travel demand in the CHT service area using population and employment density and 2014 U.S. Census Longitudinal Employer-Household Dynamics (LEHD) data to determine the concentrations of low-wage jobs and the commute patterns for people working in Chapel Hill and Carrboro.

KEY FINDINGS

- Population and employment are clustered around the UNC-Chapel Hill Main Campus, downtown Chapel Hill, and downtown Carrboro.
- Projected employment growth is expected to occur along the 15-501 corridor in addition to the areas of existing high employment density: UNC-Chapel Hill Main Campus, downtown Chapel Hill, and downtown Carrboro.
- Low-wage employment is concentrated around the UNC-Chapel Hill Main Campus, Mason Farm, and the 15-501 corridor, and follows the same general distribution of all employment in the area.
- Over 60% of employees working in Orange County are commuting from Orange County or Durham County.

POPULATION

Chapel Hill had a 2010 population of approximately 58,500, and Carrboro had close to 18,650 people. Both communities grew considerably in the past decade, adding about 18% in Chapel Hill and 17% in Carrboro. A large portion of recent population growth is affiliated with UNC-Chapel Hill, including students, faculty, and staff.

The ties to UNC-Chapel Hill are visible in the spatial distribution of population and population density (Figure 3-1). The greatest concentration of Chapel Hill residents is located in the southwestern portion of the town, close to the UNC-Chapel Hill campus, downtown Chapel Hill, and the area just north of campus. Likewise, Carrboro, which is physically much smaller than Chapel Hill, also has a greater concentration of residents in the southern half of town, closest to UNC-Chapel Hill.

Population growth is also expected to lead to increased density. While many parts of the community will remain very low density (Figure 3-2), UNC-Chapel Hill, downtown Chapel Hill, downtown Carrboro, and

the area west of campus in the southwestern corner of Carrboro and Chapel Hill are projected to become denser. Given restrictions on parking in and around the UNC-Chapel Hill campus, these areas are dependent on excellent transit services to ensure destinations are accessible.

Figure 3-1 Chapel Hill and Carrboro – 2010 Population

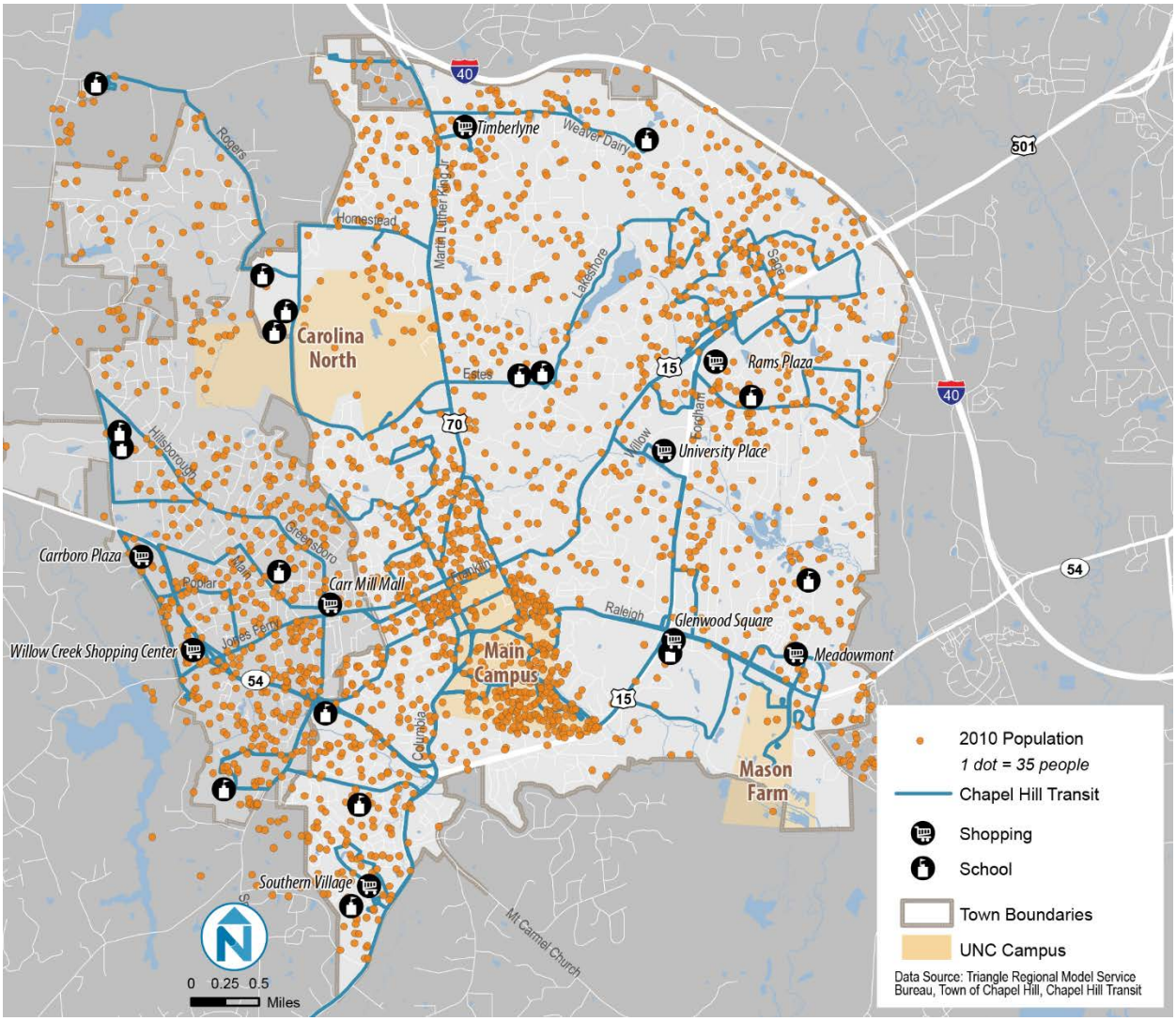
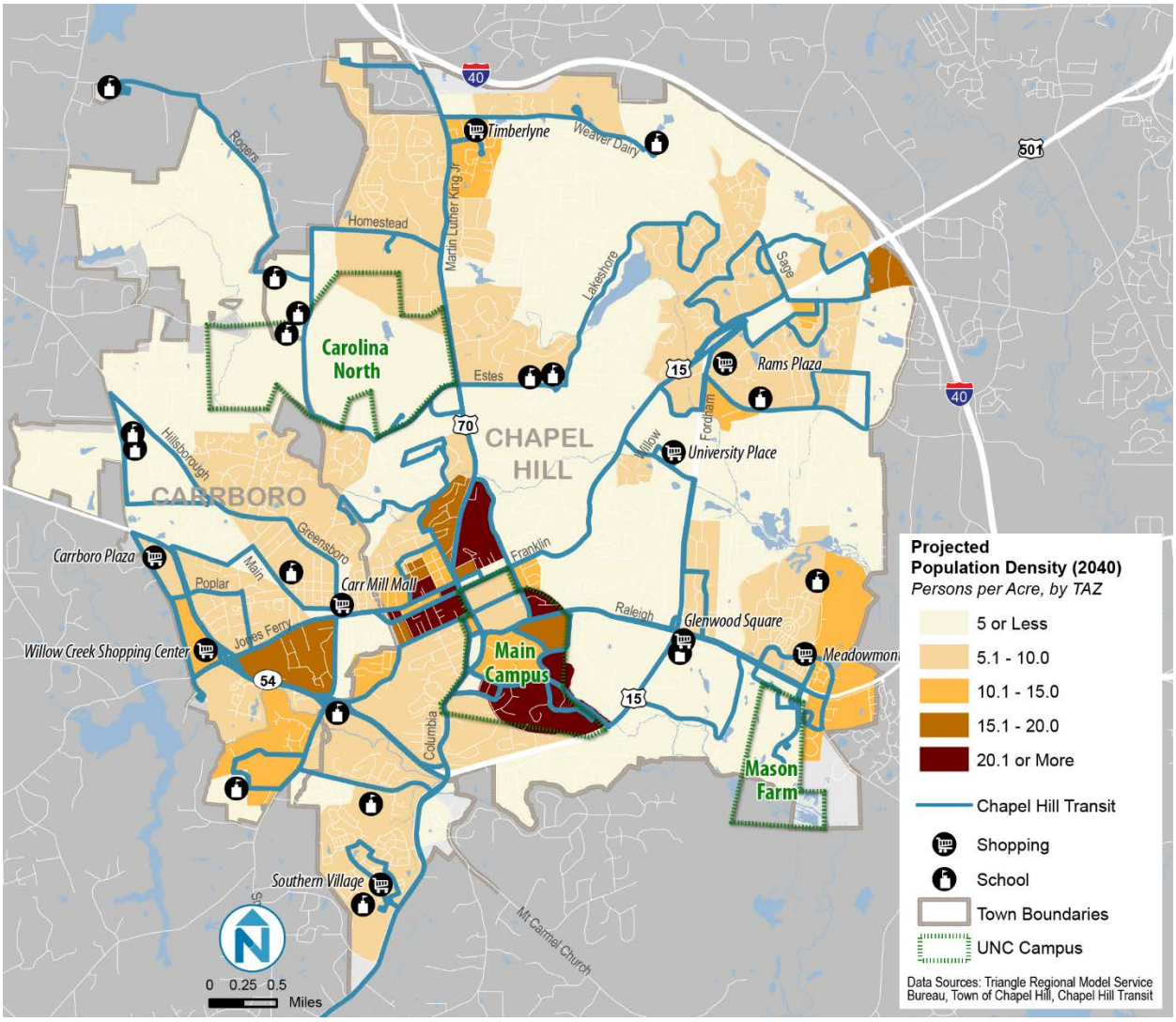


Figure 3-2 Chapel Hill and Carrboro – Projected Population Density 2040



EMPLOYMENT

UNC-Chapel Hill is a major employer not only for Carrboro and Chapel Hill, but also the Triangle Region. UNC-Chapel Hill has 11,900 employees, and the UNC Health Care System employs an additional 9,500. Other major community employers are the Chapel Hill-Carrboro Schools and Orange County Schools, with 2,138 and 1,157 employees respectively. The old Blue Cross/Blue Shield of North Carolina headquarters, now owned by The North Carolina State Employee's Credit Union, is an additional major employer, with capacity for over 1,200 employees. The presence of these major employers puts Carrboro and Chapel Hill in a fairly unique position. While many communities suffer a jobs-housing imbalance due to being largely residential, Carrboro and Chapel Hill are skewed by being job rich. In a community of roughly 75,000 individuals, there are 57,000 jobs (employment in 2010 is shown in Figure 3-3). Consequently, a large proportion of the people working at UNC-Chapel Hill or in Chapel Hill or Carrboro do not live in the community.

Most of the job growth is associated with the area around the main UNC-Chapel Hill campus as well as Carolina North and the US-15 corridor, with high density employment also forecast for the areas near Rams Plaza, Blue Hill District, East Gate Shopping Center, and University Place (Figure 3-4). These high density employment areas will become critical employment markets in the future and will be important destinations for regional transportation services.

Figure 3-3 Chapel Hill and Carrboro – 2010 Employment

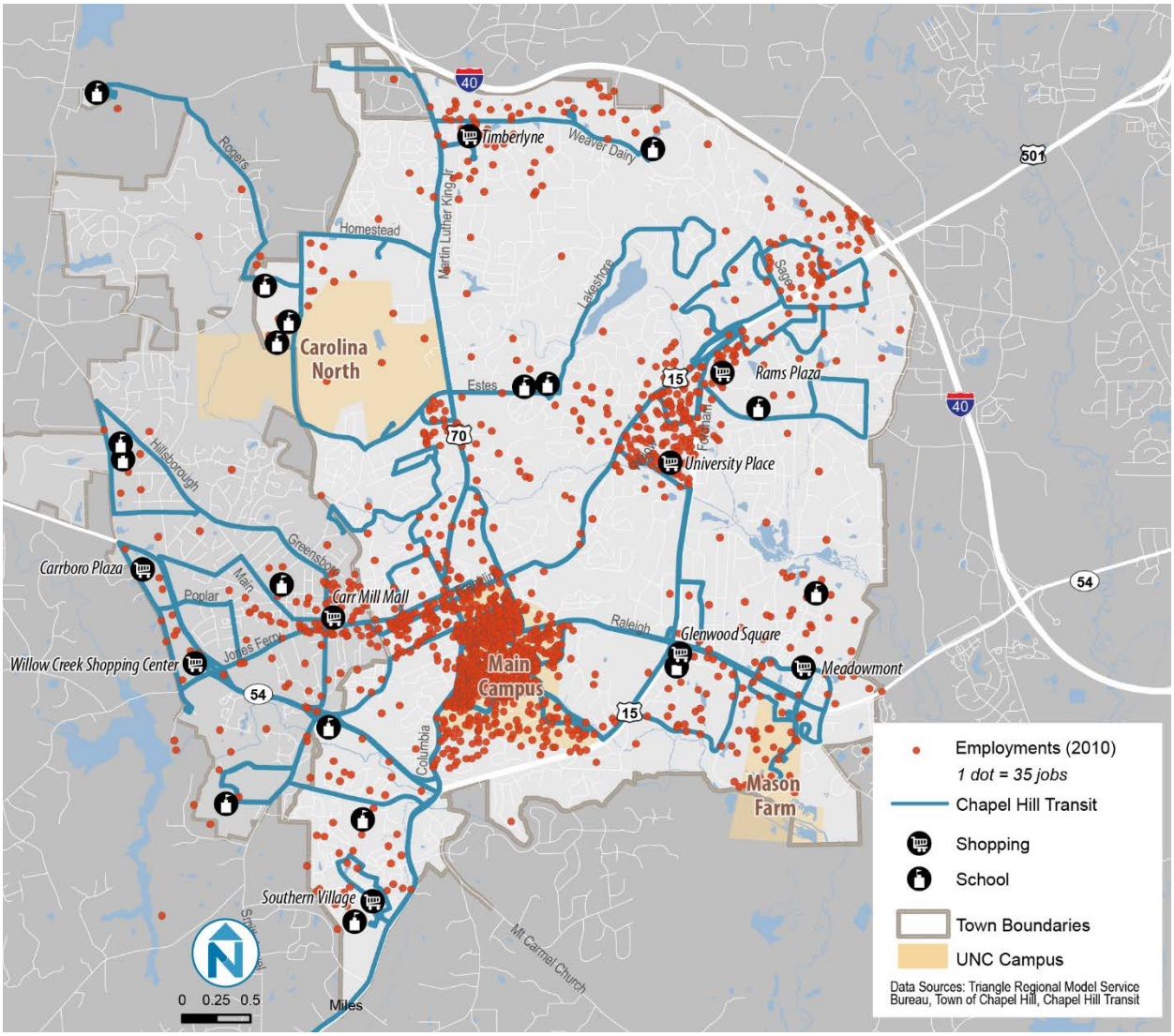
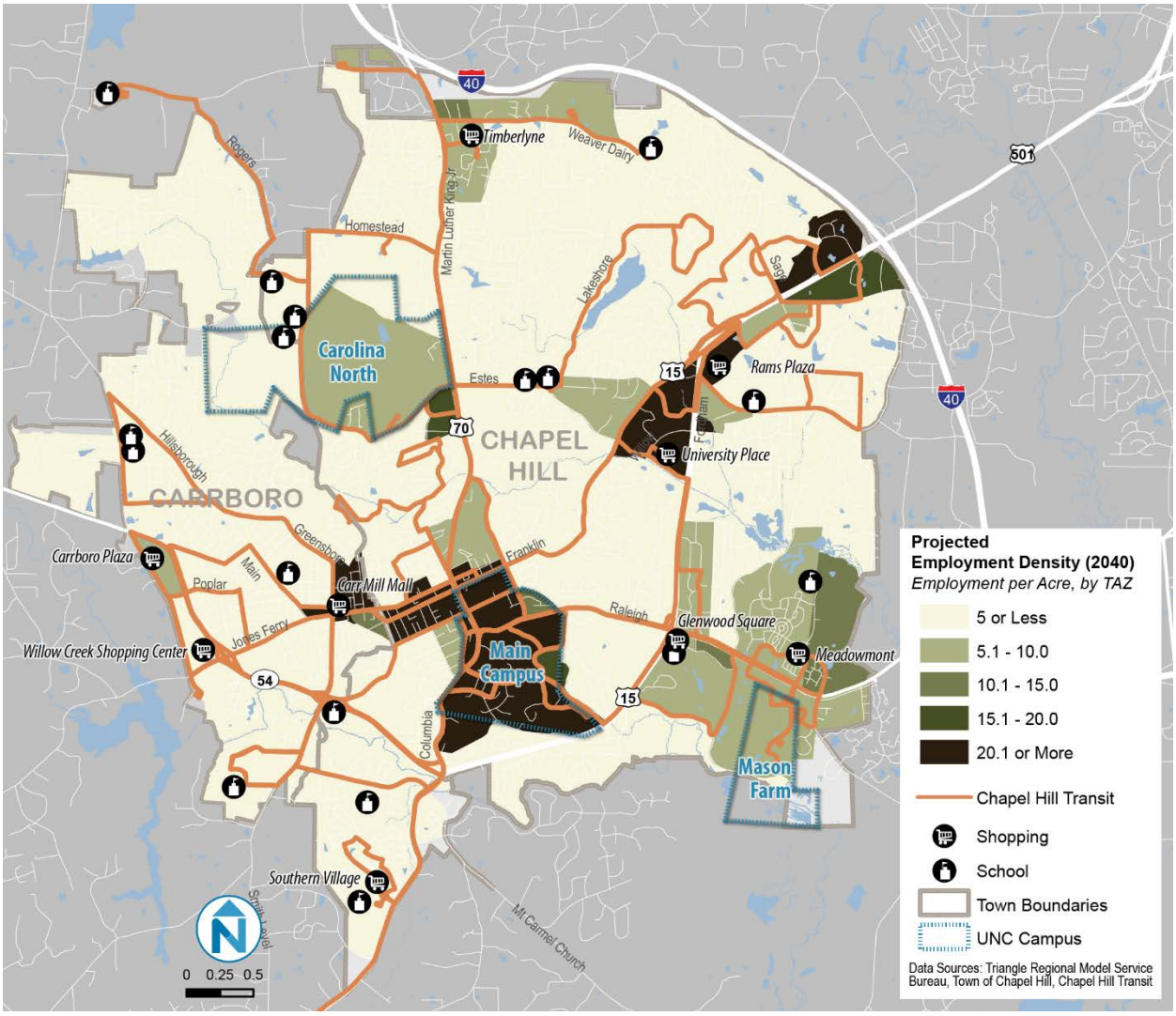


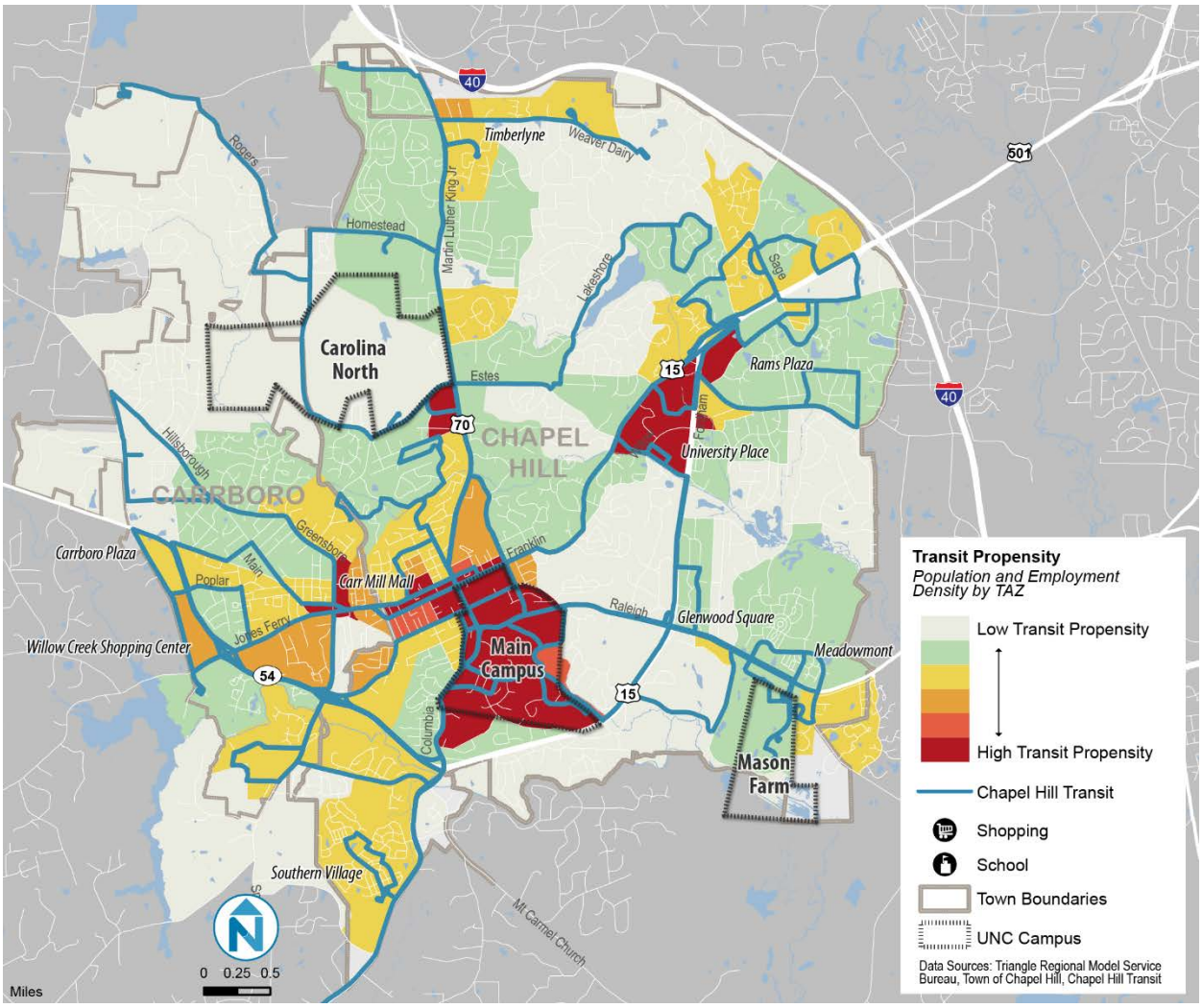
Figure 3-4 Chapel Hill and Carrboro – Projected Employment Density 2040



TRANSIT PROPENSITY

Looking at the existing population and employment density in Carrboro and Chapel Hill and translating these densities into transit demands or potential service levels (Figure 3-5), shows that despite being a small town, there are several parts of the community that can—and already do—support very frequent transit service. These areas are largely centered around the UNC-Chapel Hill campus, but also include the areas around University Place and Rams Plaza as well as downtown Chapel Hill and downtown Carrboro. Large parts of Carrboro, especially in the south end, have a higher propensity to take transit.

Figure 3-5 Chapel Hill and Carrboro – Estimated Transit Propensity 2010



EMPLOYMENT AND TRAVEL DEMAND

Commuting to work comprises 16% of all person trips and 30% of all transit trips in the US.[1] Job locations can be used as a proxy for travel demand, representing the "destination" for commute trips, while population density represents the "origin."

Figure 3-6 presents job density in Chapel Hill and Carrboro according to U.S. Census Longitudinal Employer-Household Dynamics (LEHD) data from 2014. As discussed previously, UNC-Chapel Hill is the largest employer in the area, with employment clusters on the main campus and Mason Farm. Employment clusters are also found in central and northeast Chapel Hill, including:

- Downtown Chapel Hill
- US 15-501 corridor
- Carr Mill Mall

Americans with lower incomes are especially likely to be transit riders.[2] While job locations represent the potential destinations for all commute trips, the locations of low wage jobs represent potential destinations for commute trips made via transit. Figure 3-7 presents low wage job density according to 2014 LEHD data. Low wage employment density in Chapel Hill and Carrboro largely mirrors the density of all jobs. Low wage jobs are focused in several specific zones:

- Downtown Chapel Hill and Carrboro
- The US 15-501 corridor
- Mason Farm campus area and the Hwy-54 corridor

In addition to examining the location of employment, LEHD data may be used to assess commute patterns. Figure 3-8 shows the percent of people living in Alamance County, Chatham County, Durham County, Orange County, or Wake County that work in Orange County. Of people that live in these five counties and work in Orange County, 39% of people live and work in Orange County, nearly 25% travel from Durham County, and 17% travel from Wake County. Fewer people commute from Alamance County and Chatham County, at 12% and 9%, respectively.

Figure 3-9 shows the largest work travel patterns in Orange County between census block groups. Only two block groups showed large numbers of attractions from regional census block groups—UNC-Chapel Hill's campus and Mason Farm, which likely shows high trip levels due to affiliation with UNC-Chapel Hill. Strong trip origins to the UNC-Chapel Hill area are present within the existing CHT service area—in particular, the Eubanks Park-and-Ride and residential neighborhoods north and east of UNC in Chapel Hill and Carrboro. Several areas outside of the CHT service area also exhibit strong trip patterns. For instance, work travel patterns are strong to both Durham County and Chatham County.

[1] AASHTO 2013 http://traveltrends.transportation.org/Documents/B2_CIA_Role%20Overall%20Travel_web_2.pdf

[2] Pew Research Center 2016 http://www.pewresearch.org/fact-tank/2016/04/07/who-relies-on-public-transit-in-the-u-s/

Figure 3-6 Chapel Hill and Carrboro: 2014 Employment

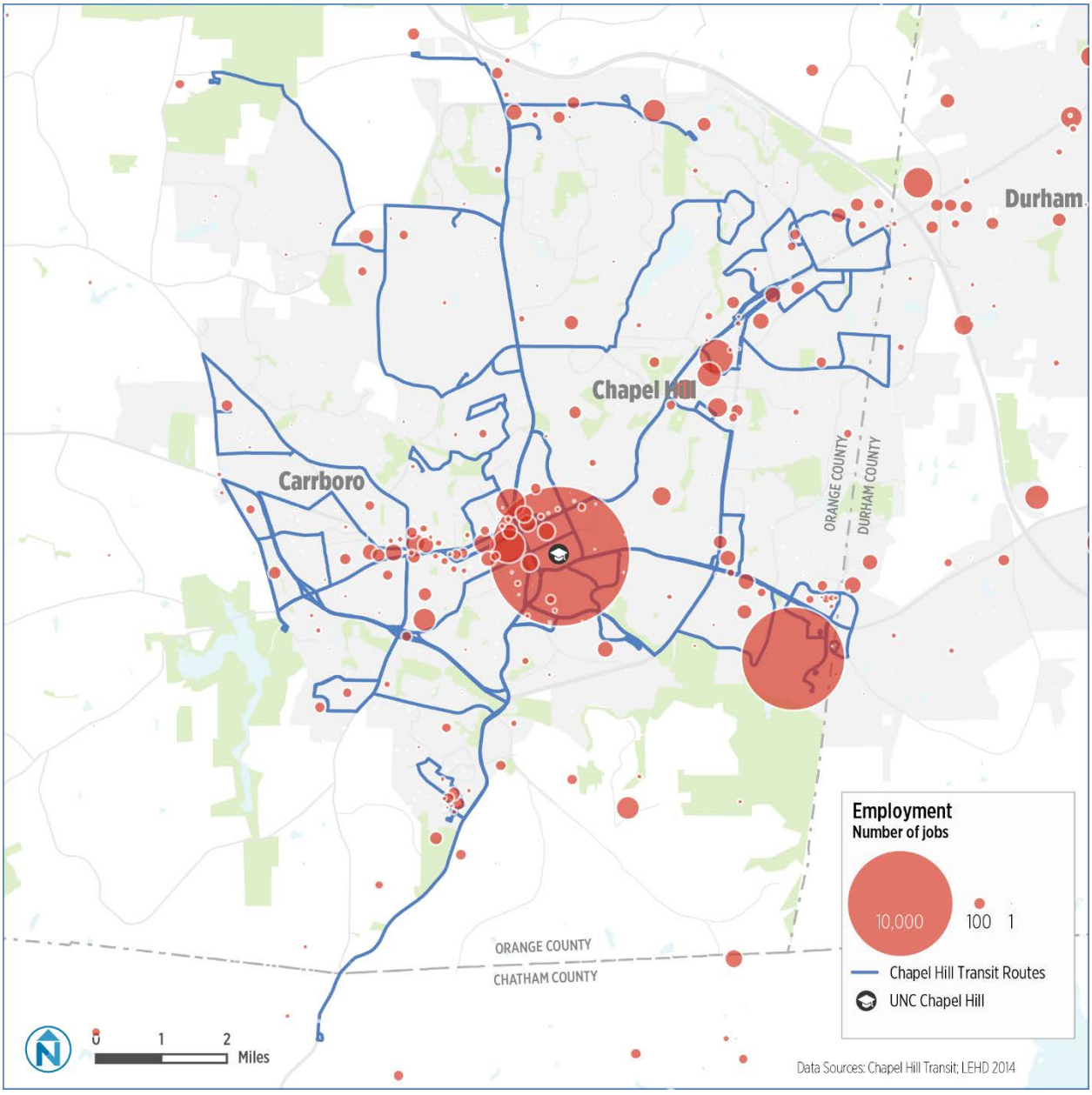


Figure 3-7 Chapel Hill and Carrboro: 2014 Low Wage Employment

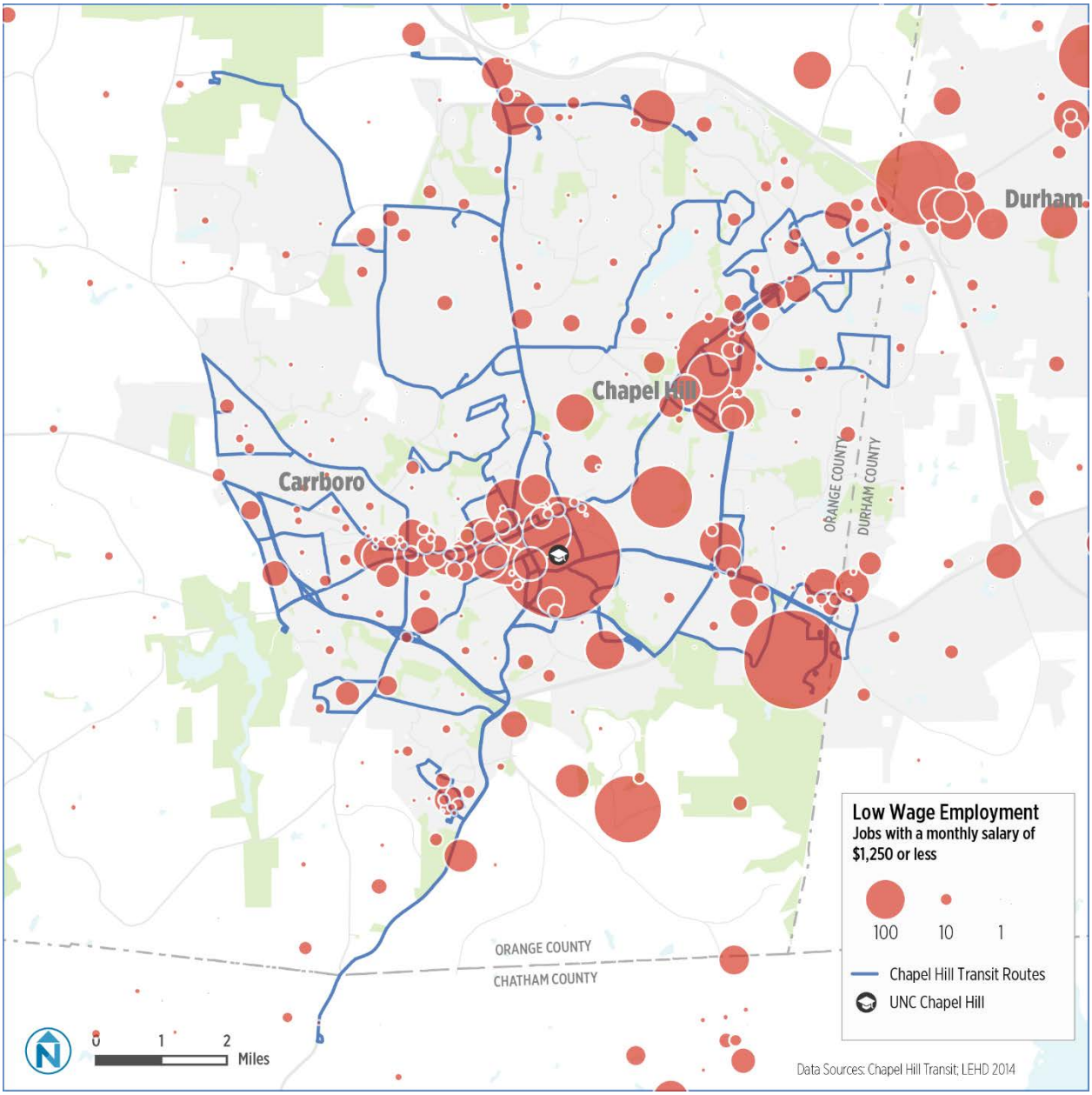


Figure 3-8 Five Home Counties of Workers Employed in Orange County

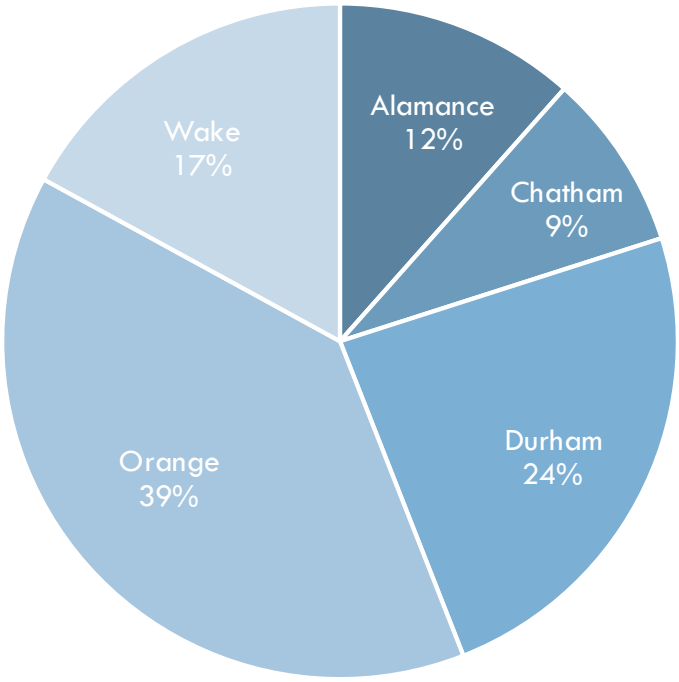
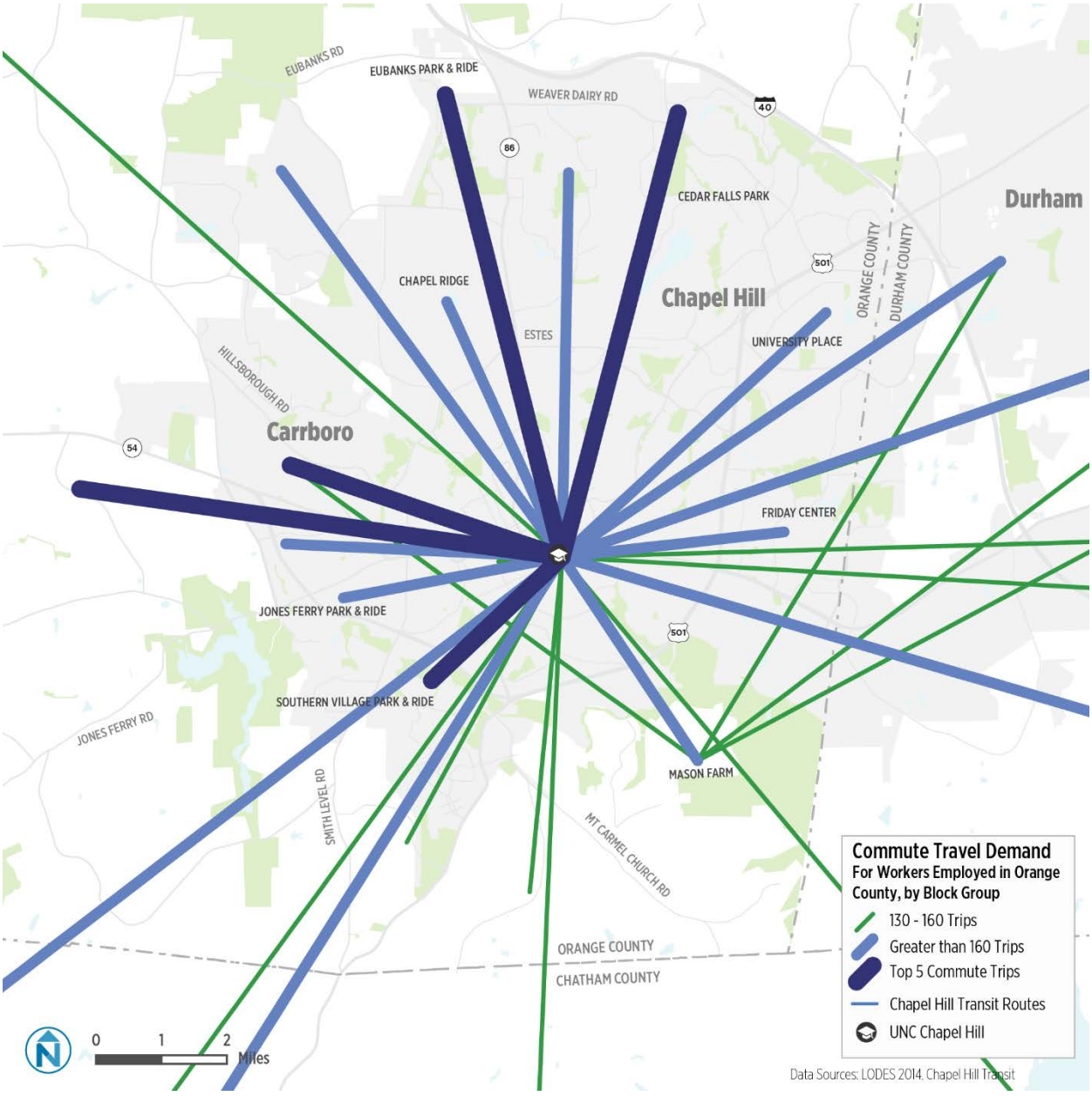


Figure 3-9 Travel Demand Patterns for Workers Employed in Orange County



4 TREND ANALYSIS

This Trend Analysis chapter puts CHT operations into context and sets the foundation for the SRTP. It describes certain key indicators for the agency between 2001 and 2015—in particular ridership, revenue hours, and operating expenses. This time period includes data prior to the agency shifting to fare free operation in January 2002.

Additional route-level information is available in Appendix A and B. Appendix A provides route summary tables and charts that give insight to passenger loads, boardings, and alightings, and Appendix B provides ridership maps of boardings and alightings for each route.

This chapter describes CHT using three key transit indicators for the years 2001 through 2015: ridership, revenue hours, revenue miles, and operating expenses. Ridership reveals how many people are using transit, revenue hours refer to the amount of transit service that is available, and operating expenses explain how revenue is spent for transit operations. Identifying ongoing trends in ridership, revenue, and operating expenses allows the SRTP to assess which aspects of CHT operations are performing well, where there is room for improvement, and how these factors may influence each other.

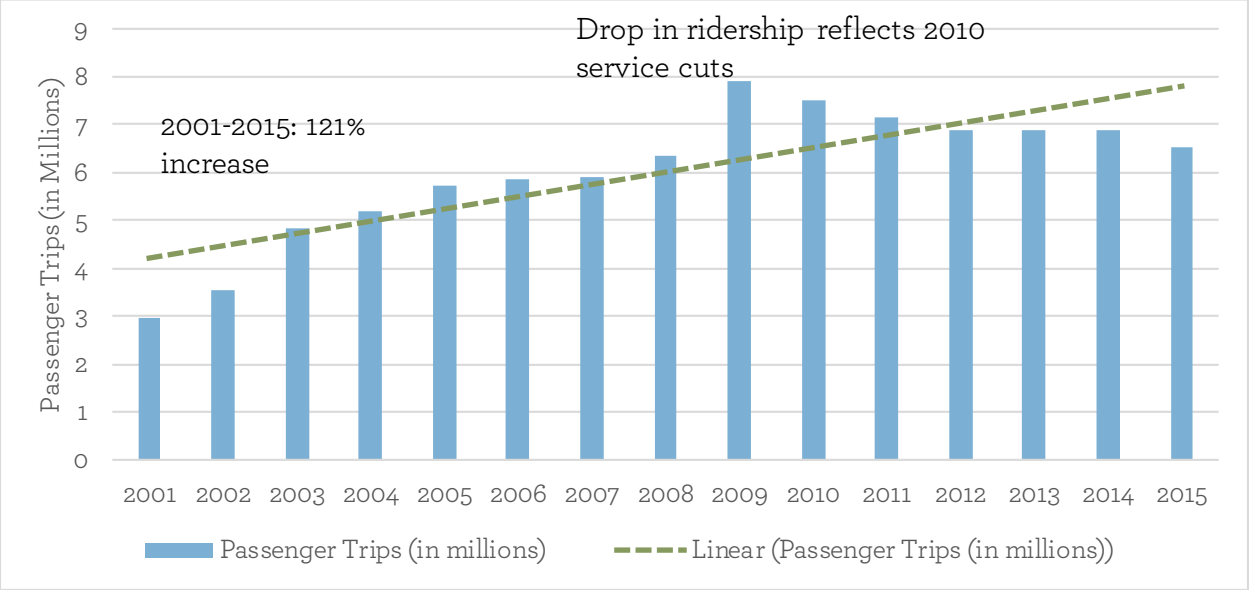
KEY FINDINGS

- Between 2001 and 2009, ridership more than doubled, increasing from 3 million trips to 7.9 million over the nine-year period.
- By 2012 ridership had decreased by 13% from its 2009 peak. Between 2001 and 2010, revenue hours for CHT increased from 93,648 to 167,218, before dropping to 154,855 in 2015.
- The increase in both ridership and revenue hours suggests that CHT was increasingly well-used between 2001 and 2015, and that investment in transit service grew correspondingly. However, both ridership and service have been declining since 2010.

RIDERSHIP

Ridership with CHT, measured in annual passenger trips, has grown dramatically over the past decade. In 2002, CHT transitioned to a fare-free system, which had a major impact on ridership. By 2003, there was a 63% increase in ridership as compared to 2001, the last year of the fare system. Between 2001 and 2009, ridership more than doubled, increasing from 3 million trips to 7.9 million over the nine-year period. By 2012 ridership had decreased by 13% from its 2009 peak. The drop in service after 2009 was due primarily to service cuts implemented in 2010. Since 2011, ridership has slowly declined. Figure 4-1 presents yearly passenger trips between 2001 and 2015.

Figure 4-1 Yearly Ridership, 2001 – 2015

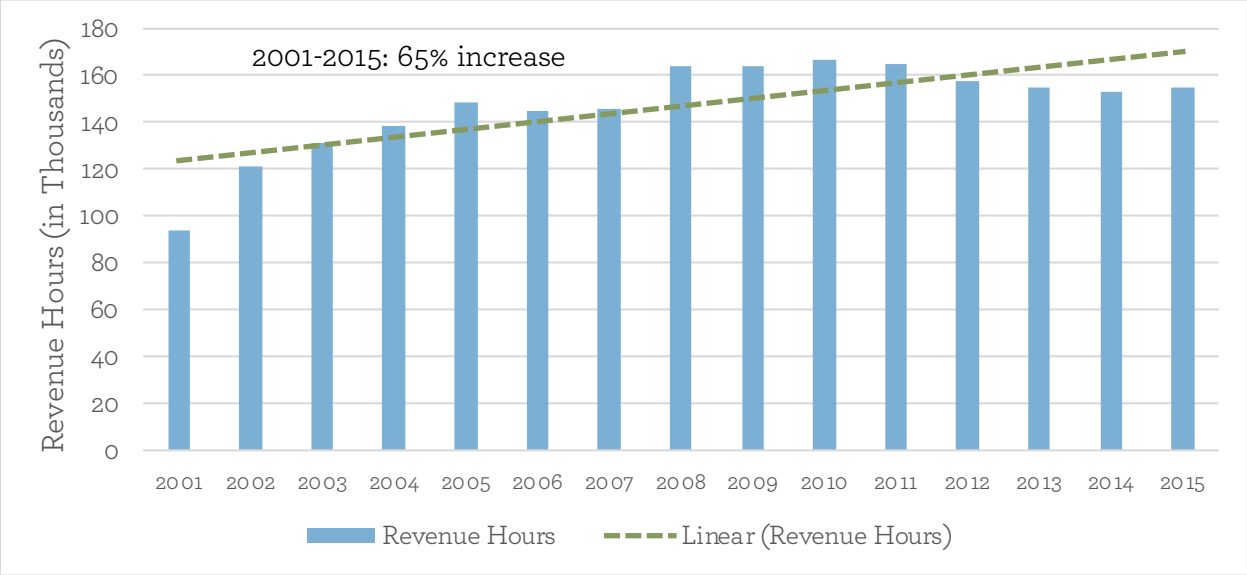


Source: Nelson\Nygaard adapted from National Transit Database

REVENUE HOURS

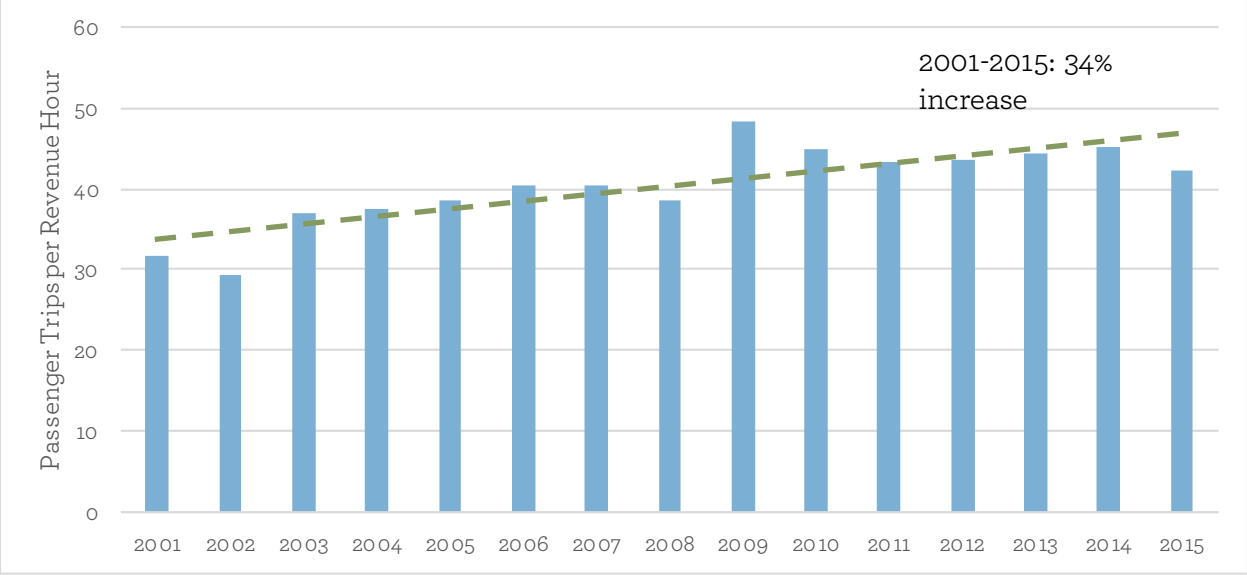
In addition to ridership, revenue hours increased over the period from 2001-2015. Between 2001 and 2010, revenue hours for CHT increased from 93,648 to 167,218, before dropping to 154,855 in 2015. Yearly passenger trips per revenue hour followed a similar trend, but only experienced a 34% increase from 2001-2015. Passenger trips per revenue hour initially slightly fell from 2001 to 2002 (31.6 in 2001 and 29.3 in 2002) and peaked in 2009 at 48.3 passenger trips per revenue hour. In other words, transit operations expanded from 2001 until 2010 and then contracted slightly thereafter. Figure 4-2 presents yearly revenue hours and Figure 4-3 shows passenger trips per revenue hour between 2001 and 2015.

Figure 4-2 Yearly Revenue Hours, 2001 – 2015



Source: Nelson\Nygaard adapted from National Transit Database

Figure 4-3 Yearly Passenger Trips per Revenue Hour, 2001 – 2015



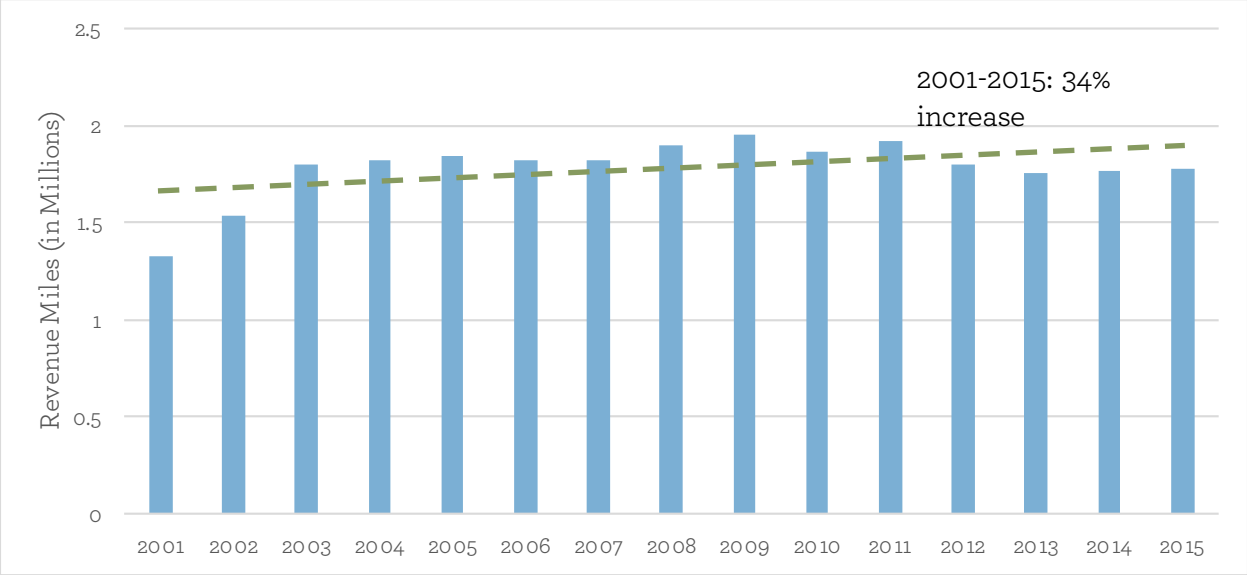
Source: Nelson\Nygaard adapted from National Transit Database

REVENUE MILES

Annual revenue miles experienced a more gradual increase from 2001-2015 (34% increase) compared to annual ridership and annual revenue hours (Figure 4-4). However yearly passenger trips per revenue mile saw a 65% increase due to the large increase in ridership in the same time period. Accordingly, passenger trips per revenue mile peaked in 2009 at 4.1, the same year that ridership peaked (Figure 4-5).

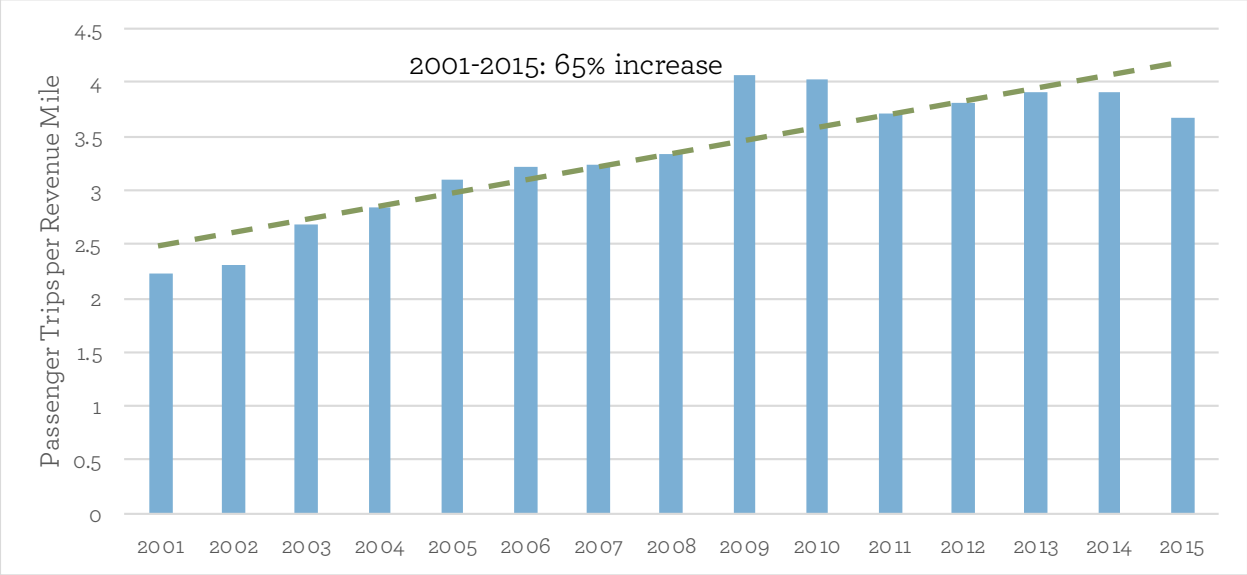
The increase in both ridership, revenue hours, and revenue miles suggests that CHT was increasingly well utilized between 2001 and 2015, and that investment in transit service grew correspondingly. However, changes in 2010 have had a negative impact on both ridership, revenue hours, and revenue miles.

Figure 4-4 Yearly Revenue Miles, 2001 – 2015



Source: Nelson\Nygaard adapted from National Transit Database

Figure 4-5 Yearly Passenger Trips per Revenue Mile, 2001 – 2015



Source: Nelson\Nygaard adapted from National Transit Database

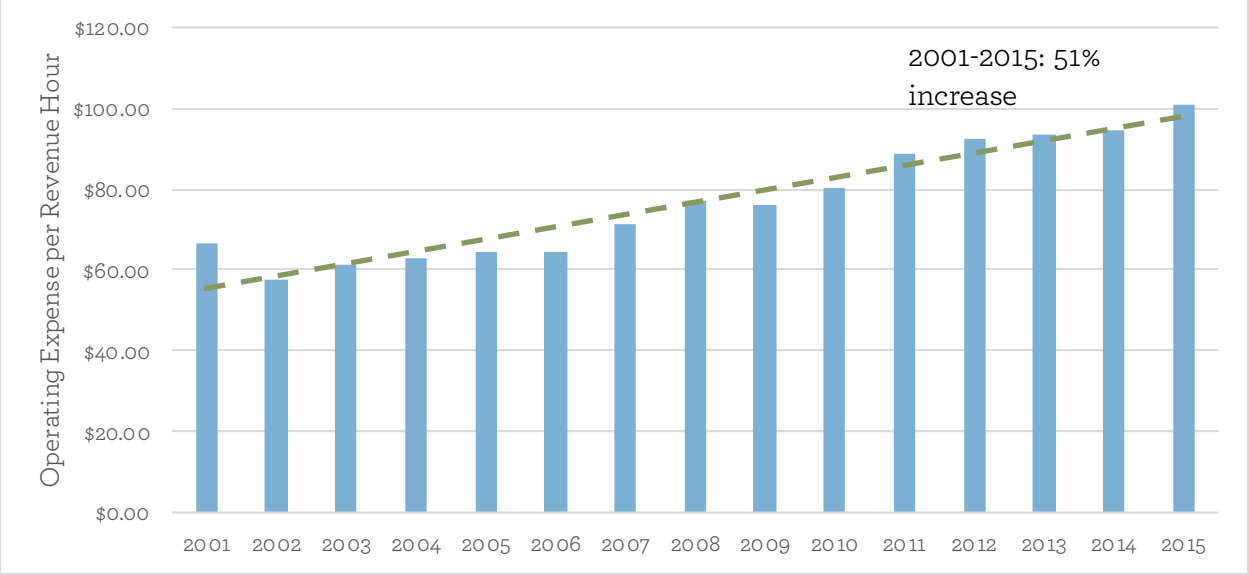
OPERATING EXPENSES

At the same time as ridership, revenue hours, and revenue miles had been rising, operating expenses have been trending in a similar direction. Between 2001 and 2015, operating expenses have more than doubled, from $6.3 million to $15.6 million. Figure 4-6 presents operating expenses and passenger trips for CHT between 2001 and 2015. Operating expense per revenue hour followed the same pattern with a 51% increase from 2001 – 2015 (Figure 4-7). Operating expenses increased over this time period as a result of inflation, increasing service, and through capital funding mechanisms.

Figure 4-6 Passenger Trips and Operating Expenses, 2001 – 2015

Source: Nelson\Nygaard adapted from National Transit Database

Figure 4-7 Operating Expense per Revenue Hour, 2001 – 2015



Source: Nelson\Nygaard adapted from National Transit Database

5 PEER REVIEW

There are few standards of performance to measure how well public transit agencies perform in comparison to industry benchmarks. This phenomenon is primarily related to the fact that most transit agencies in the United States are in public ownership. As a result, each community chooses to weigh the investment value in this public asset on a different basis. Even so, many transit agencies still seek methods to judge their overall performance against the backdrop of community needs and interests.

Although few transit agencies have "twins" that operate identically and function as direct side-by-side comparisons, comparing service practices and performance among a group of peer agencies helps facilitate best practices. Most agencies share some characteristics with others, and those common characteristics can form a basis for comparison based on some number of compatibility factors. The federal government has required agencies to report operating data for many years through the National Transit Database (NTD). Data used in this analysis is derived from NTD, with the most recent operational statistics coming from 2015. Transit agencies were compared based on performance indicators, effectiveness measures, and efficiency measures.

This chapter builds on the trend analysis conducted in Chapter 4 to provide additional context for CHT operations by drawing a comparison between similar peer agencies.

KEY FINDINGS

- CHT productivity in terms of passengers per revenue mile and revenue hour is similar to other peer systems. CHT also ranks well in terms of service availability (measured as vehicle miles per service area capita).
- CHT's number of revenue miles between failures have been steadily decreasing, and by 2015 occur at approximately an average level when compared with peers. However, given CHT's excellent performance in the earlier period of the 10-year timeframe, the trend indicates a degradation of service overall.
- Overall, CHT's operating costs have grown more expensive. CHT performs at an average level in terms of operating expense per passenger trip but less well when compared to the peer group in terms of operating expense per revenue hour and revenue mile.
- CHT fixed-route services were notably more effective than those of peer agencies in terms of passenger trips per revenue mile from approximately 2006 to 2010, and CHT was 12.0% above the group average by 2015.

PEER AGENCIES

Peer agencies were initially identified with an eye to gaining insights into the organizational structure of CHT by looking at the performance of transit agencies with similar characteristics. As part of identifying peers, a long list of similarly sized and positioned agencies was created. The initial list was further narrowed by selecting peer agencies serving a major university and operating within a city or county

government. This list was shared with CHT staff, and some adjustments were made based on their knowledge and experience.

The resulting peer agencies are Regional Transit System (RTS) in Gainesville, FL; CyRide in Ames, IA; the Athens Transit System (ATS) and University of Georgia (UGA) Campus Transit in Athens, GA; StarMetro in Tallahassee, FL; Centre Area Transportation Authority (CATA) in State College, PA; GoRaleigh in Raleigh, NC; Winston-Salem Transit Authority (WSTA) in Winston-Salem, NC; Lexington Transit Authority (Lextran) in Lexington, KY; GoDurham in Durham, NC; and the Greensboro Transit Authority (GTA) in Greensboro, NC. This analysis includes information about fixed-route and demand response operations.

One key difference between CHT and the peer agencies is that CHT operates fully fare free. However, it is not unusual for transit agencies to offer free or discounted student passes.

Figure 5-1 Peer Review Agencies

Agency Name	Location	Governance	Major University	Student Enrollment	Service Area Population
CHT	Chapel Hill, NC	City Department	UNC Chapel Hill	29,135	80,218
RTS	Gainesville, FL	City Department	University of Florida	52,286	163,990
CyRide	Ames, IA	City Agency	Iowa State University	36,321	58,100
ATS/UGA Campus Transit	Athens, GA	County Department/ University	University of Georgia	36,130	119,980
StarMetro	Tallahassee, FL	City Department	Florida State University	41,867	162,310
CATA	State College, PA	Independent Agency	Penn State University	99,133	104,360
GoRaleigh	Raleigh, NC	Independent Agency	North Carolina State University	33,989	347,729
WSTA	Winston-Salem, NC	Independent Agency	Wake Forest	7,591	199,555
Lextran	Lexington, KY	Independent Agency	University of Kentucky	30,131	295,803
GoDurham	Durham, NC	City Department	Duke University	14,832	240,017
GTA	Greensboro, NC	City Department	UNC Greensboro	19,653	269,666

Performance Indicators

Performance indicators include passenger trips, revenue hours, revenue miles, and total operating expense. CHT's performance in relation to the peer group is shown in Figure 5-2.

Figure 5-2 Performance Indicators (2015)

Fixed-Route Service

Measure	CHT	Peer Group Minimum	Peer Group Maximum	Peer Group Average	CHT % from Average
Passenger Trips	6,533,944	3,240,427	12,968,909	6,411,113	1.9%
Revenue Hours	154,855	122,680	302,943	184,009	-15.8%
Revenue Miles	1,775,953	1,263,680	3,552,939	2,098,450	-15.4%
Total Operating Expense	$15,615,251	$9,221,270	$23,483,731	$15,423,289	1.2%

Demand Response Service

Measure	CHT	Peer Group Minimum	Peer Group Maximum	Peer Group Average	CHT % from Average
Passenger Trips	53,438	11,566	223,915	111,866	-52.2%
Revenue Hours	21,553	4,024	108,925	51,882	-58.5%
Revenue Miles	262,353	39,862	1,644,187	774,497	-66.1%
Total Operating Expense	$2,677,752	$202,175	$7,116,898	$2,869,893	-6.7%

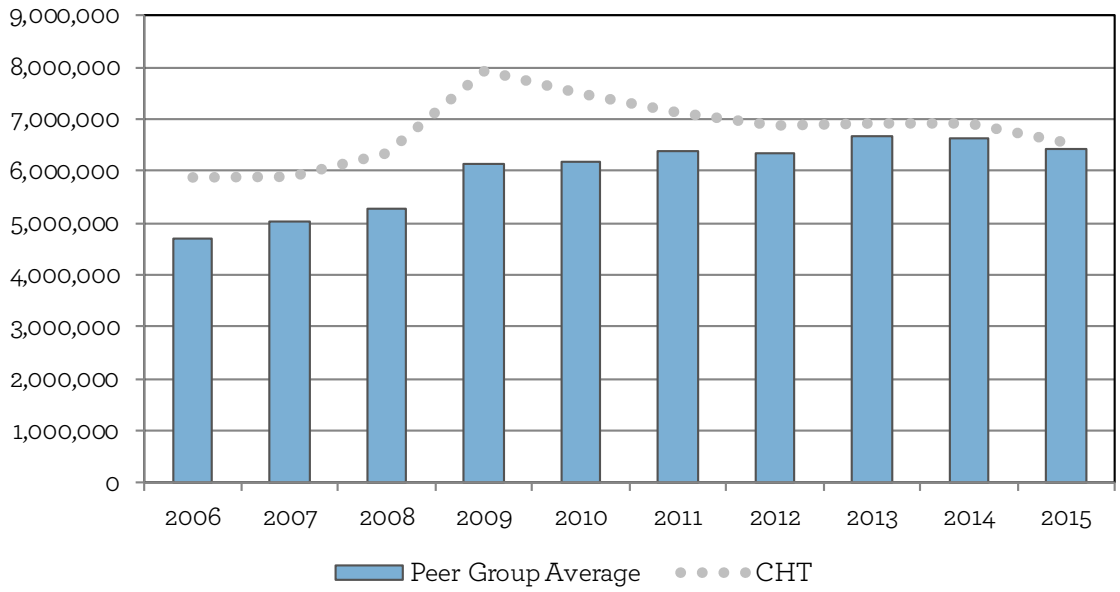
Source: NTD

The following figures illustrate CHT's performance in relation to each peer agency over a 10-year period.

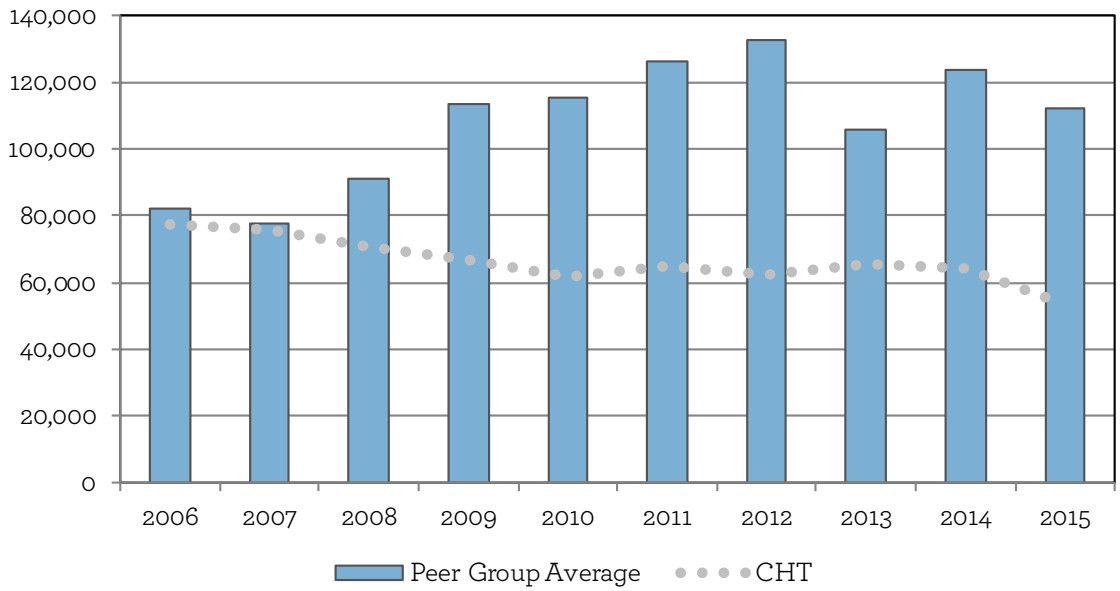
- For passenger trips (Figure 5-3), CHT has historically ranked above the peer group average for fixed-route service, with the exception of RTS, CATA, and ATS/UGA Campus Transit. However, CHT ranked far below the group average for demand response service.
- For the majority of the 10-year timeframe, CHT's revenue hours and revenue miles for both fixed-route and demand response service have held relatively steady compared with the rest of the peer group. (Figure 5-4 and Figure 5-5).
- CHT has seen a steadily increasing trend in total operating costs for fixed-route and demand response services (Figure 5-6). By 2015, CHT fixed-route service ranked higher than the group average by 1.2%, indicating that those services are more expensive than the peer group average despite fewer revenue hours, and revenue miles. CHT's demand response service, however, ranks 6.7% lower than the peer group average for operating costs.

Figure 5-3 Passenger Trips (2006-2015)

Fixed-Route Service



Demand Response Service

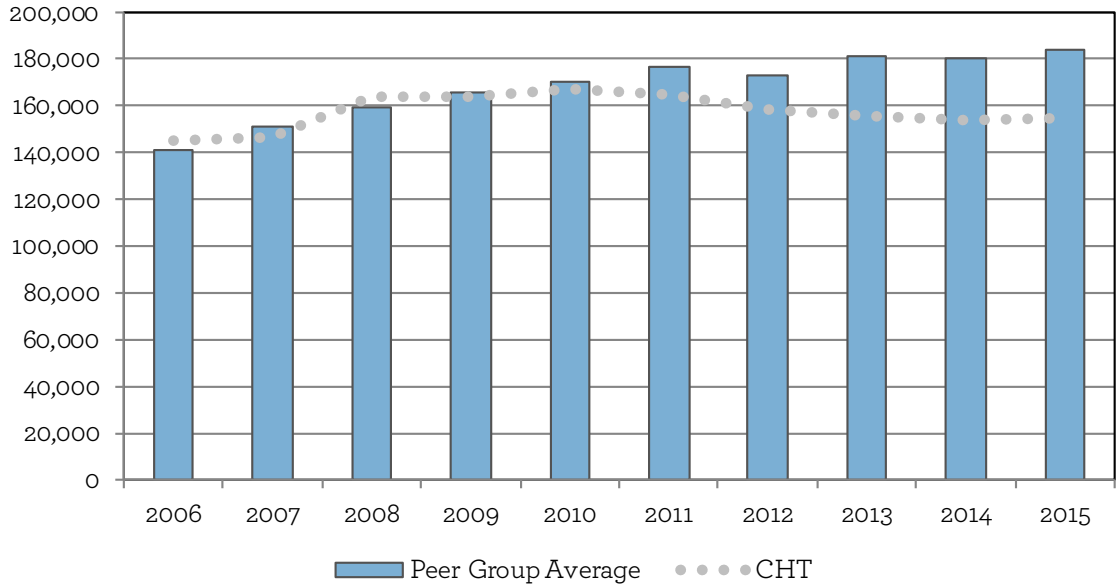


Note: ATS/UGA Campus Transit is excluded from the analysis prior to 2009 due to unavailability of data from NTD.

GoRaleigh Demand Response Service data changed from being reported as "directly operated" in 2006-2007 to "purchased transportation" in 2009-2012, with a significant increase in passenger trips that similarly impacted the peer group average. GoRaleigh is excluded from the analysis in 2008, 2013, 2014, and 2015 due to unavailability of data from NTD.

Figure 5-4 Revenue Hours (2006-2015)

Fixed-Route Service



Demand Response Service

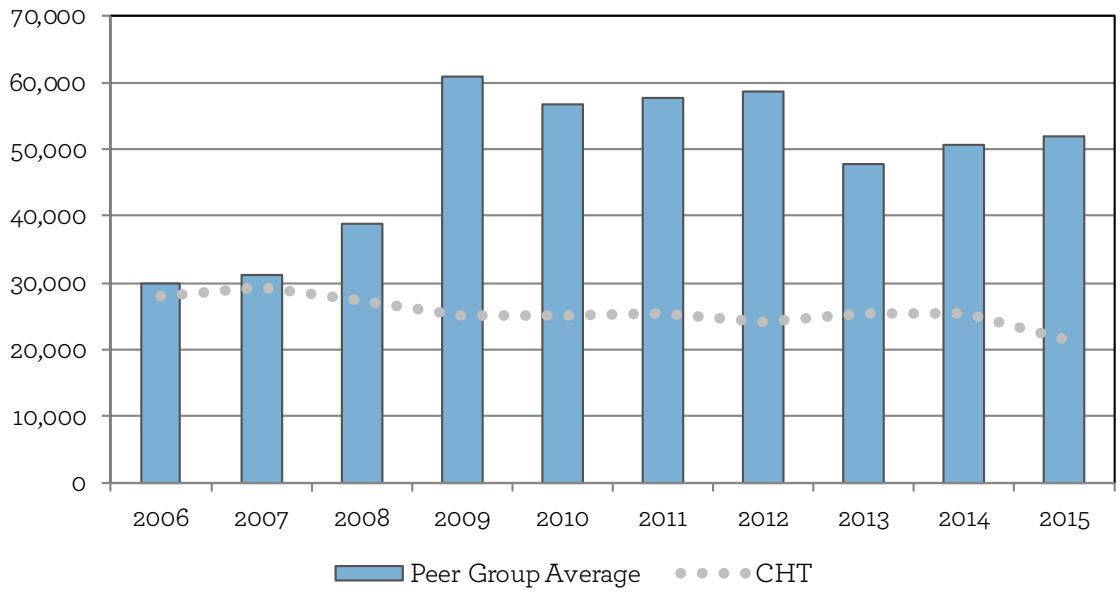


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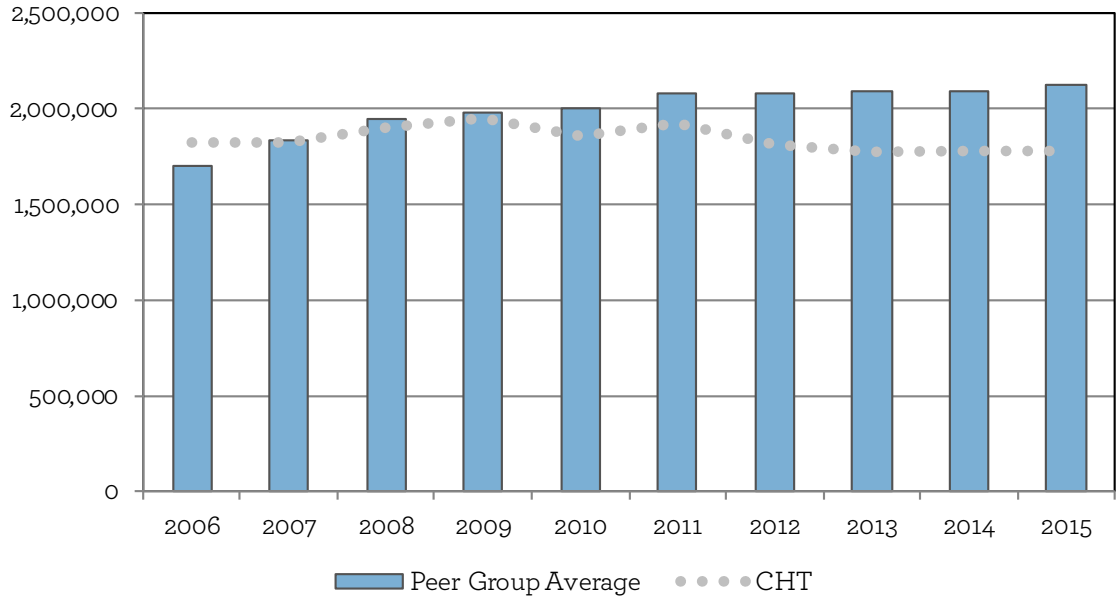
Figure 5-5 Revenue Miles (2006-2015)

Fixed-Route Service



Demand Response Service

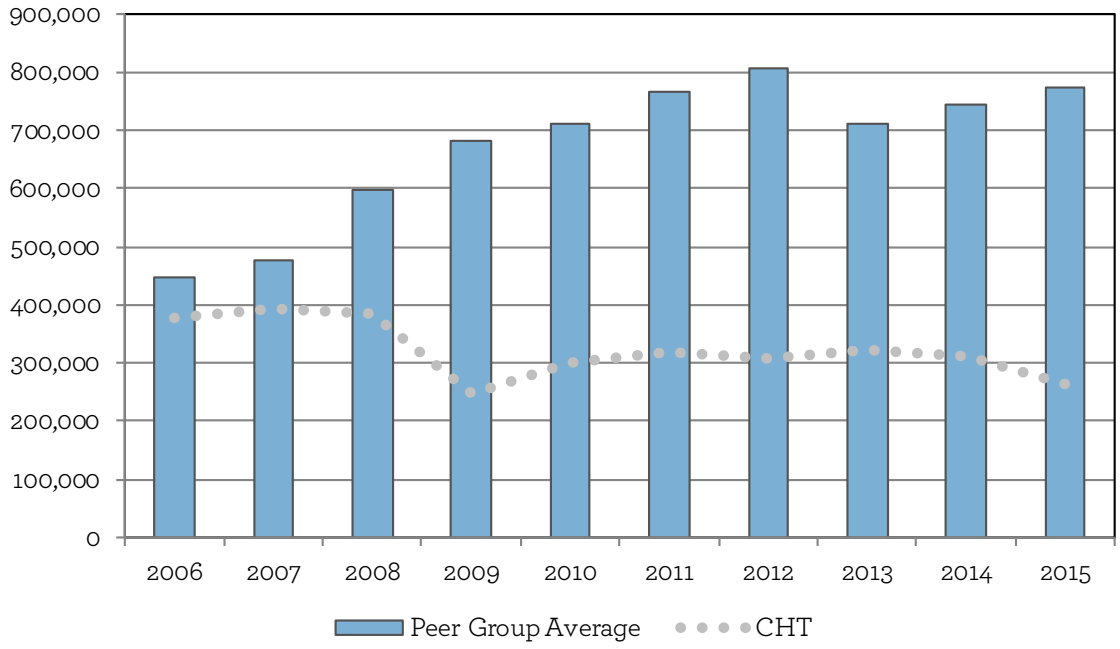


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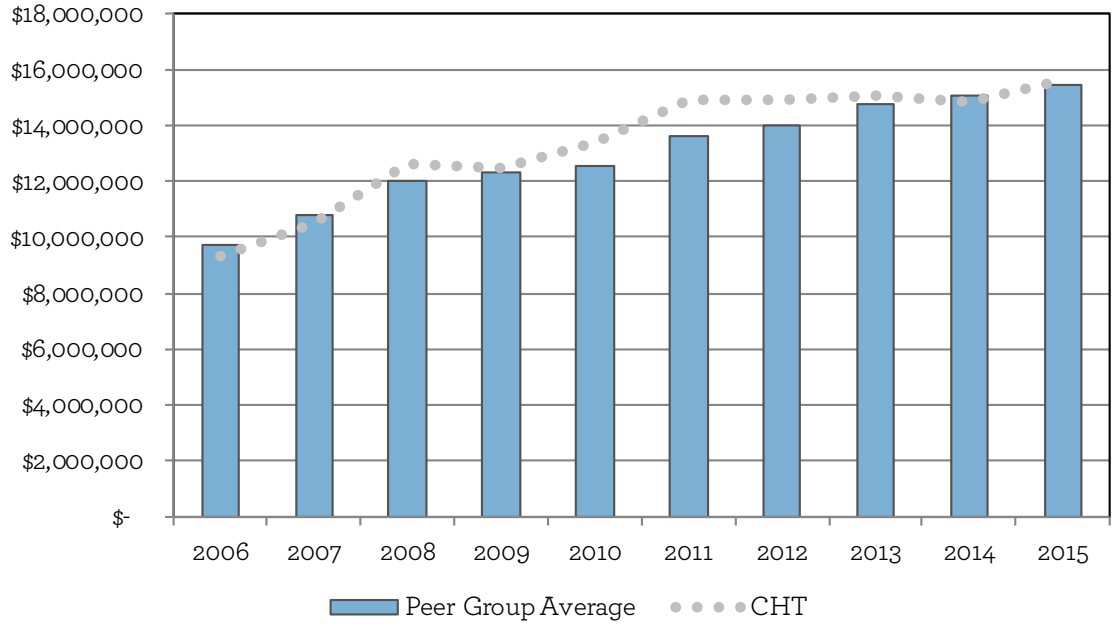
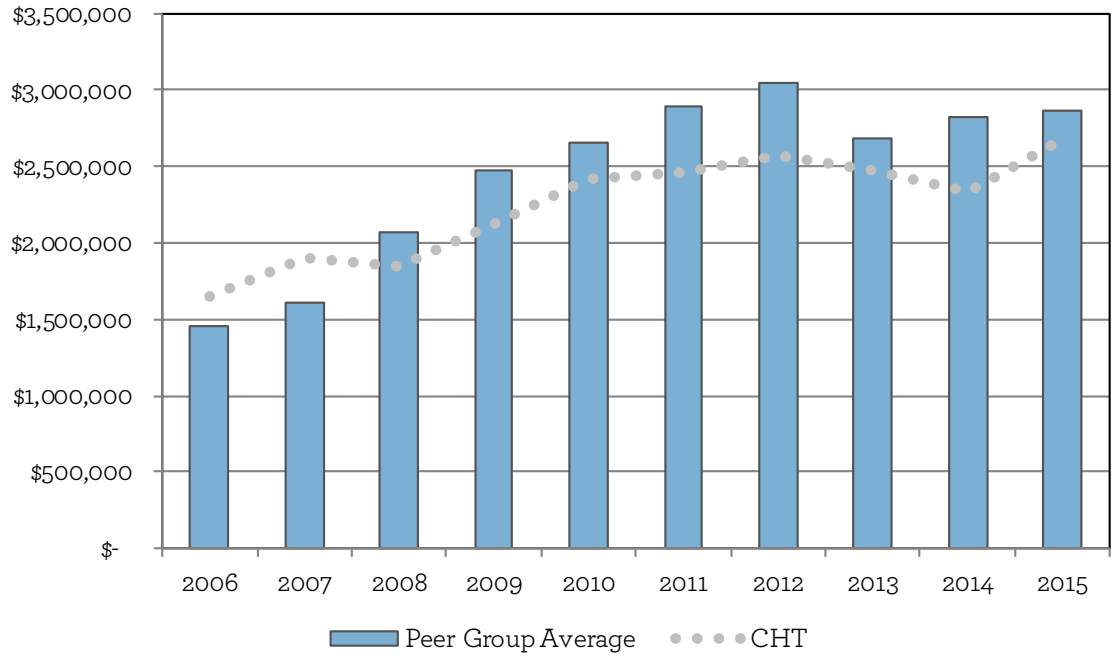
Figure 5-6 Total Operating Expense (2006-2015)

Fixed-Route Service



Demand Response Service



Note: ATS/UGA Campus Transit is excluded from the analysis prior to 2009 due to unavailability of data from NTD.

GoRaleigh Demand Response Service data changed from being reported as "directly operated" in 2006-2007 to "purchased transportation" in 2009-2012, with a significant increase in total operating expense that similarly impacted the peer group average. GoRaleigh is excluded from the analysis in 2008, 2013, 2014, and 2015 due to unavailability of data from NTD.

Effectiveness Measures

Effectiveness measures include passenger trips per revenue mile, passenger trips per revenue hour, vehicle miles per capita, and revenue miles between failures. CHT's measures in relation to the peer group are shown in Figure 5-7.

Figure 5-7 Effectiveness Measures (2015)

Fixed-Route Service

Measure	CHT	Peer Group Minimum	Peer Group Maximum	Peer Group Average	CHT% from Average
Passenger Trips Per Revenue Mile	3.68	1.85	7.79	3.28	12.0%
Passenger Trips Per Revenue Hour	42.19	17.94	73.05	36.56	15.4%
Vehicle Miles Per Capita	24.54	6.63	24.54	14.62	67.9%
Revenue Miles Between Failures	6,020	2,980	13,217	7,213	-16.5%
Average Age of Fleet	9.55	6.85	14.49	9.00	6.1%

Demand Response Service

Measure	CHT	Peer Group Minimum	Peer Group Maximum	Peer Group Average	CHT% from Average
Passenger Trips Per Revenue Mile	0.20	0.09	0.29	0.17	18.4%
Passenger Trips Per Revenue Hour	2.48	1.46	3.01	2.21	12.3%
Vehicle Miles Per Capita	3.99	0.75	7.31	3.99	0.0%
Average Age of Fleet	7.22	2.86	9.75	5.51	31.0%

Source: NTD

Note: ATS/UGA Campus Transit is excluded from the analysis prior to 2009 due to unavailability of data from NTD.

Data for Revenue Miles between Failures under Demand Response Service for many of the systems was not available from NTD and is excluded from the analysis.

The following figures illustrate CHT's effectiveness measures in relation to each peer agency over a 10-year historical period.

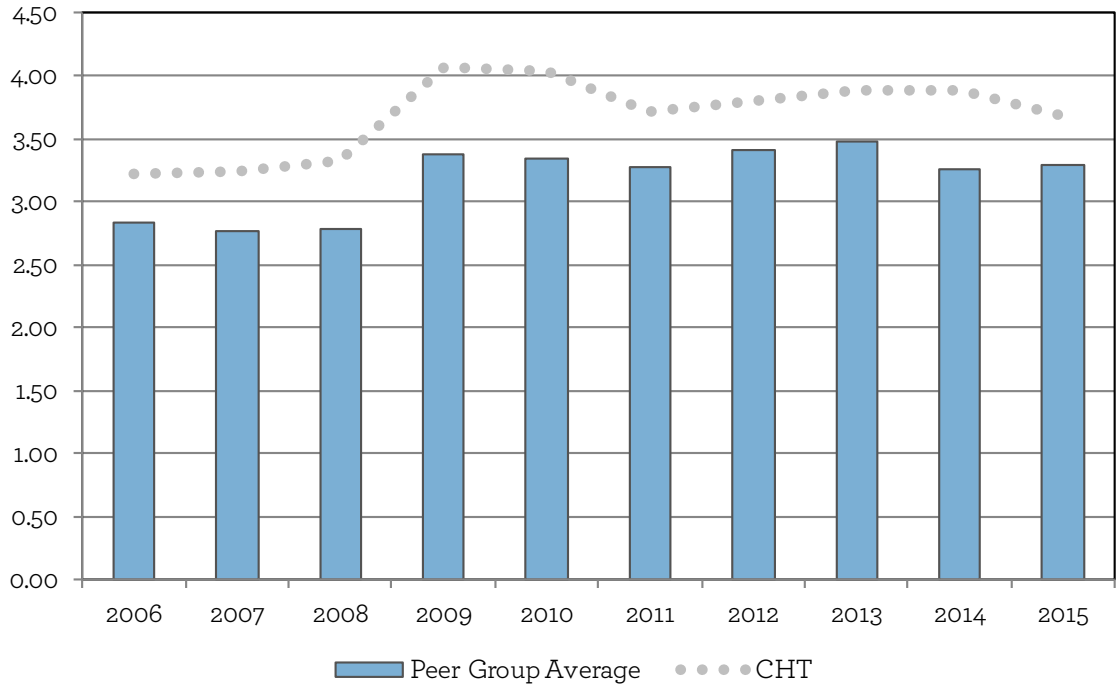
- CHT fixed-route services were notably more effective than those of peer agencies in terms of passenger trips per revenue mile from approximately 2006 to 2010, and CHT was 12.0% above the group average by 2015 (Figure 5-8). This relatively high performance is likely correlated with CHT's fare free operation.
- During the 10-year period, CHT fixed-route service has performed better than the peer group in terms of passenger trips per revenue hour, with the exception of ATS/UGA Campus Transit, CATA, and CyRide. CHT ranked 15.4% above the peer group average in 2015 (Figure 5-9).
- CHT fixed-route service has consistently ranked well above the peer group average in terms of vehicle miles per service area capita (Figure 5-10). CHT was 67.9% above the group average in 2015, indicating a high availability of transit services compared to services offered in peer cities.
- While the peer group average has held relatively steady in terms of revenue miles between failures, CHT fixed-route service has experienced a noted decline in this measure, indicating a degradation of service quality as vehicle failures occur more frequently (Figure 5-11).
- Average fleet age is shown in Figure 5-12. As the peer group's fixed-route service average fleet age has decreased slightly over time, CHT's has increased over the 10-year period. Revenue

miles between failures is often related to average fleet age, as reliability decreases with older vehicles. The normal replacement age for a bus is roughly 12 years. CHT's fare free system may also create heavier peak commute patterns, resulting in a larger, less well-utilized fleet.

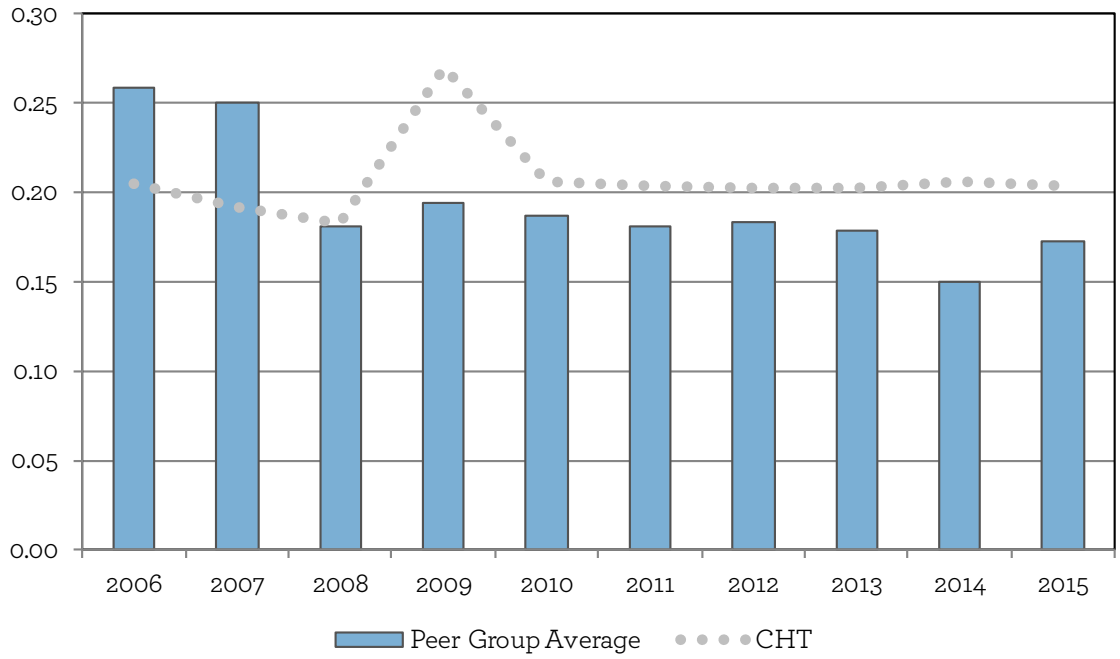
- CHT's demand response service showed similar trends, ranking above the peer group average for all effectiveness measures.

Figure 5-8 Passenger Trips per Revenue Mile (2006-2015)

Fixed-Route Service



Demand Response Service

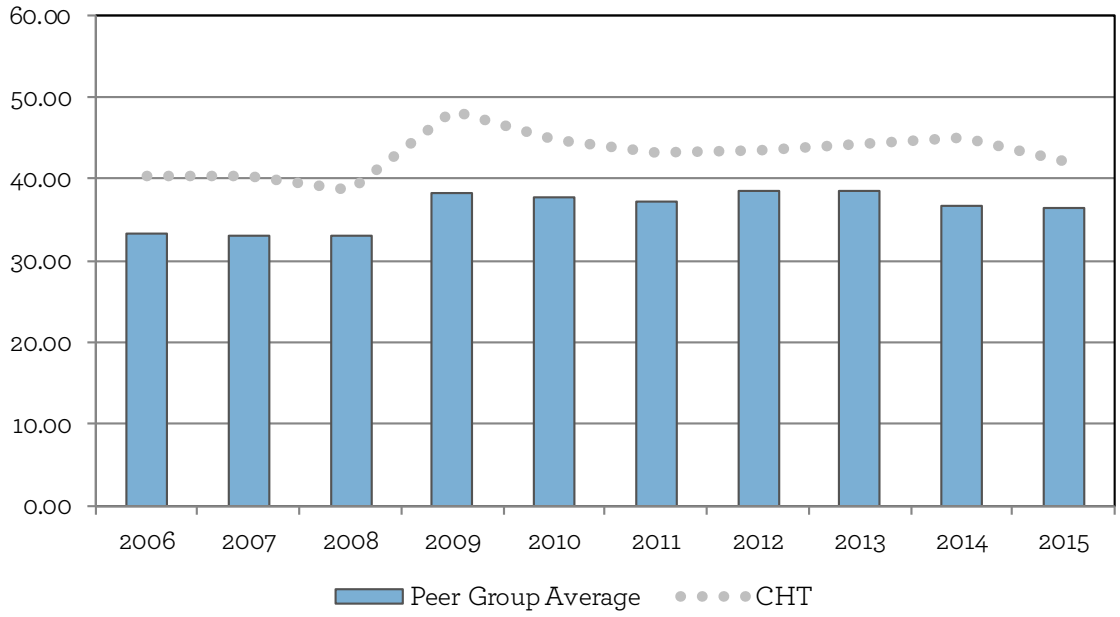


Note: ATS/UGA Campus Transit is excluded from the analysis prior to 2009 due to unavailability of data from NTD.

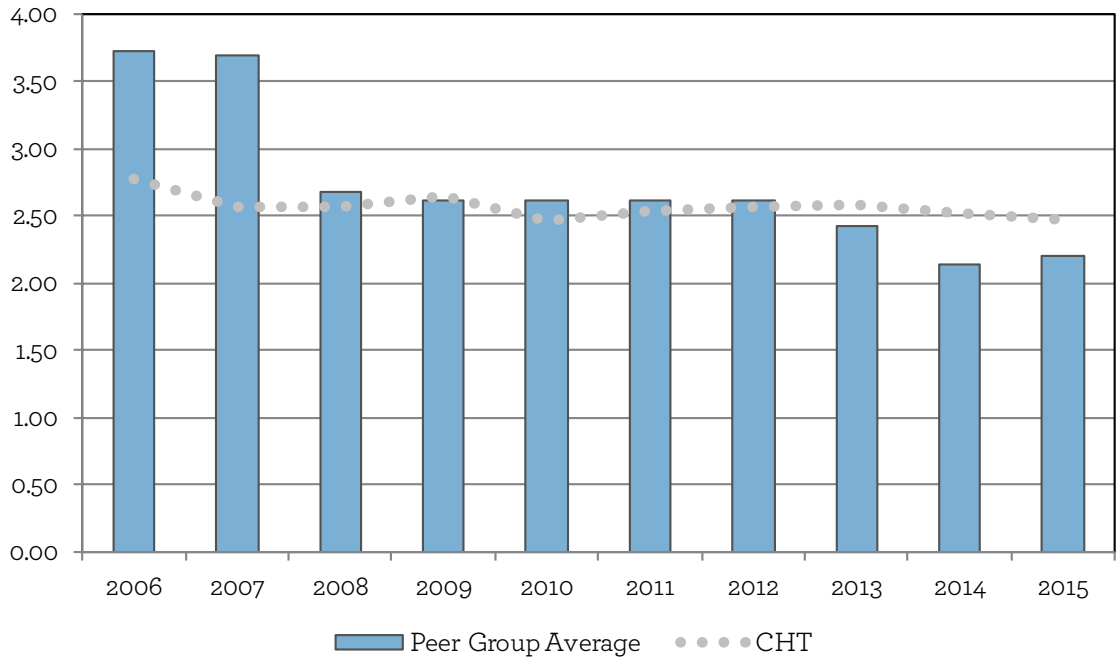
GoRaleigh Demand Response Service data changed from being reported as "directly operated" in 2006-2007 to "purchased transportation" in 2009-2012, with a significant decrease in passenger trips per revenue mile that similarly impacted the peer group average. GoRaleigh is excluded from the analysis in 2008, 2013, 2014, and 2015 due to unavailability of data from NTD.

Figure 5-9 Passenger Trips per Revenue Hour (2006-2015)

Fixed-Route Service



Demand Response Service



Note: ATS/UGA Campus Transit is excluded from the analysis prior to 2009 due to unavailability of data from NTD.

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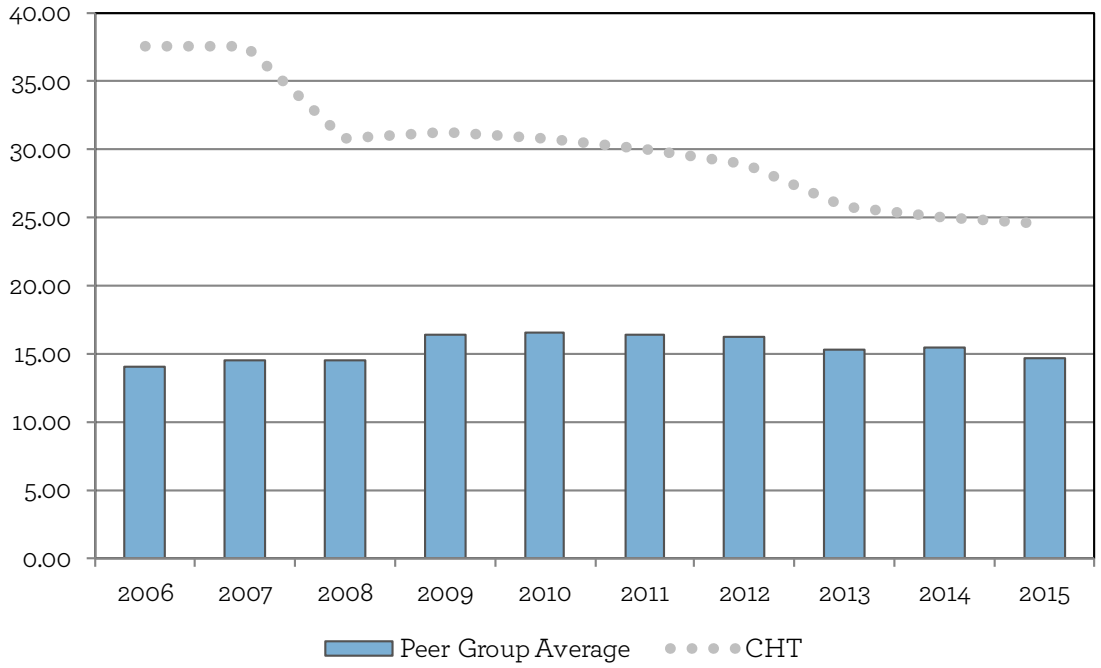
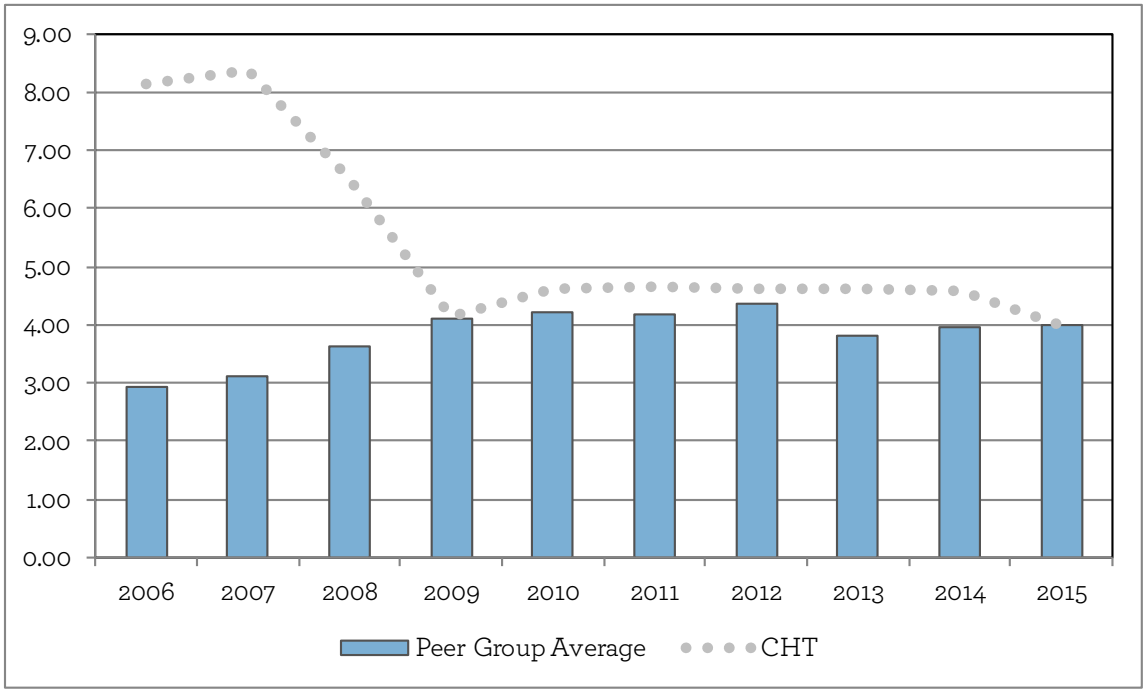
Figure 5-10 Vehicle Miles per Service Area Capita (2006-2015)

Fixed-Route Service



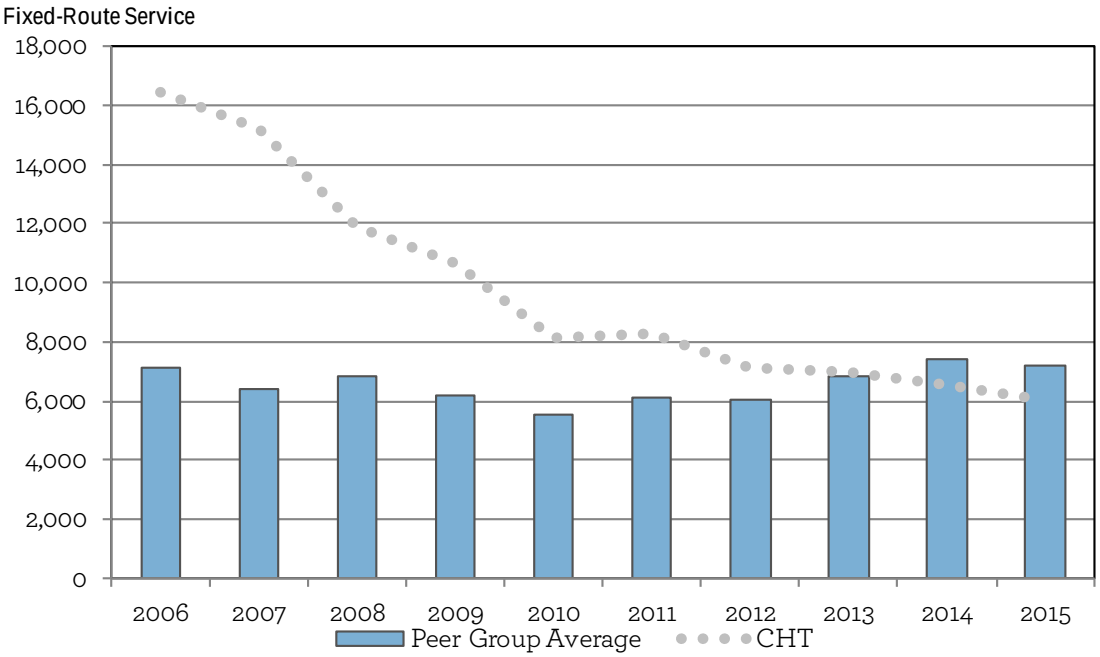
Demand Response Service



Note: ATS/UGA Campus Transit is excluded from the analysis prior to 2009 due to unavailability of data from NTD.

GoRaleigh Demand Response Service data changed from being reported as "directly operated" in 2006-2007 to "purchased transportation" in 2009-2012, with a significant increase in vehicle miles per service area capita that similarly impacted the peer group average. GoRaleigh is excluded from the analysis in 2008 due to unavailability of data from NTD.

Figure 5-11 Revenue Miles between Failures (2006-2015)

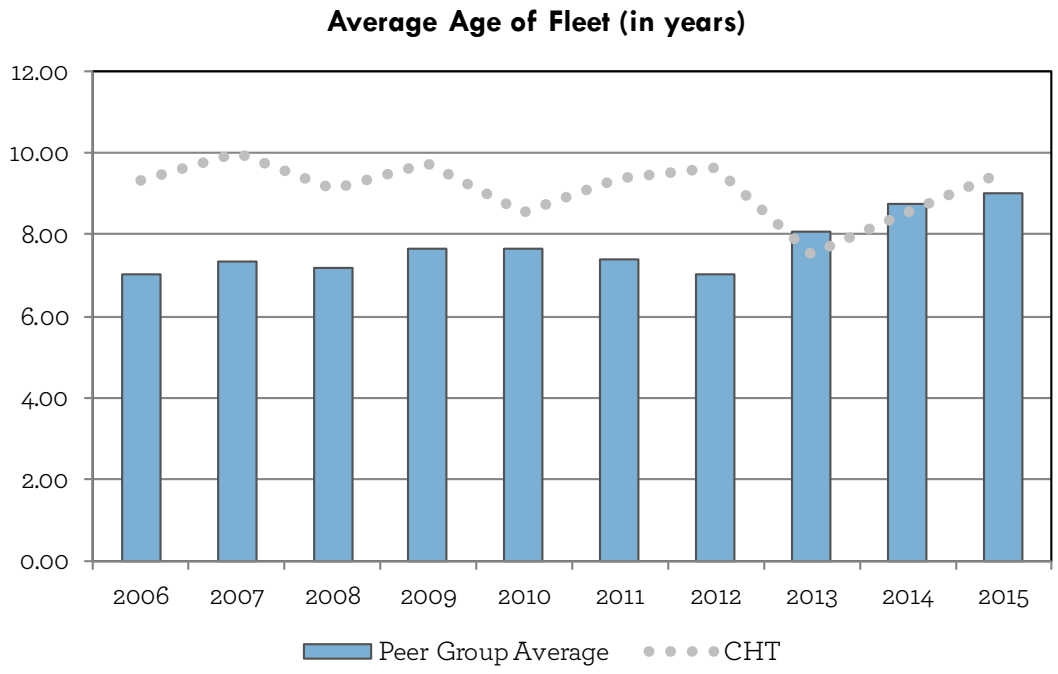


Note: ATS/UGA Campus Transit is excluded from the analysis prior to 2009 due to unavailability of data from NTD.

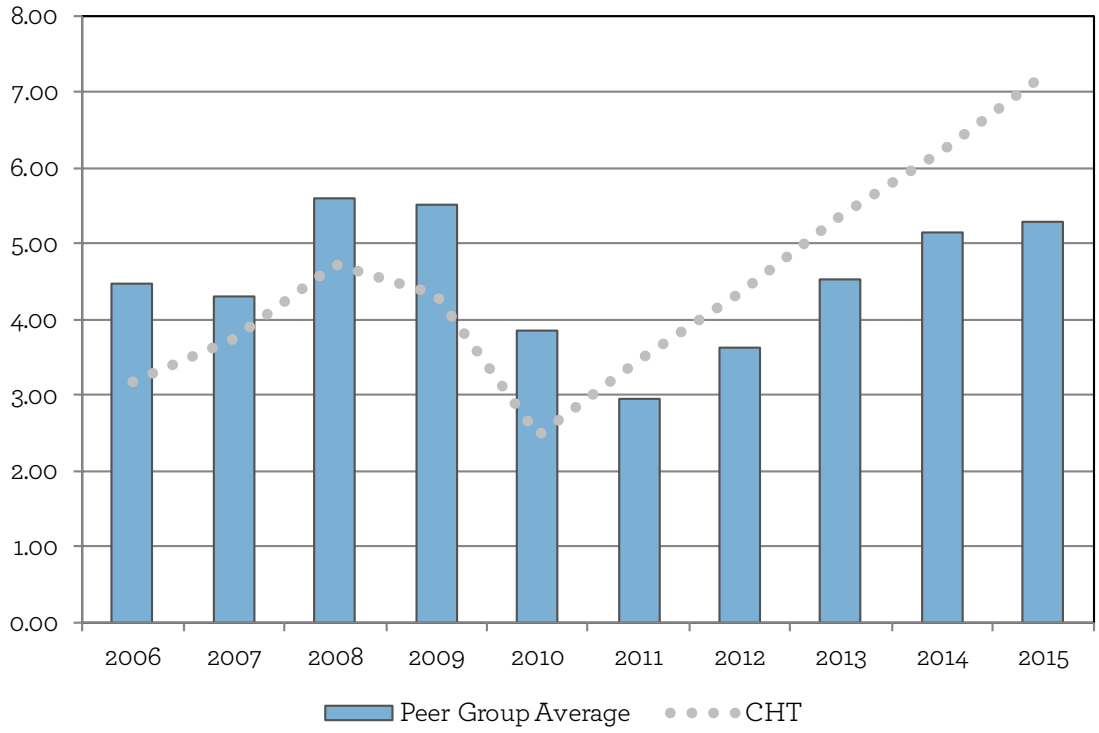
Data for Revenue Miles Between Failures under Demand Response Service for many of the systems was not available from NTD, so is excluded from the analysis.

Figure 5-12 Average Age of Fleet (2006-2015)

Fixed-Route Service



Demand Response Service



Note: ATS/UGA Campus Transit is excluded from the analysis prior to 2009 due to unavailability of data from NTD.
Data for Average Age of Fleet under Demand Response Service for many of the systems was not available from NTD.

Efficiency Measures

Efficiency measures include operating expense per passenger trip, operating expense per revenue hour, and operating expense per revenue mile. CHT's measures in relation to the peer group can be seen in Figure 5-13.

Figure 5-13 Efficiency Measures (2015)

Fixed-Route Service

Measure	CHT	Peer Group Minimum	Peer Group Maximum	Peer Group Average	CHT % from Average
Operating Expense Per Passenger Trip	$2.39	$0.87	$4.91	$2.81	-14.9%
Operating Expense Per Revenue Hour	$100.84	$63.67	$111.43	$85.94	17.3%
Operating Expense Per Revenue Mile	$8.79	$6.06	$9.97	$7.46	17.9%

Demand Response Service

Measure	CHT	Peer Group Minimum	Peer Group Maximum	Peer Group Average	CHT % from Average
Operating Expense Per Passenger Trip	$50.11	$15.64	$99.97	$35.08	42.9%
Operating Expense Per Revenue Hour	$124.24	$44.45	$136.33	$69.64	78.4%
Operating Expense Per Revenue Mile	$10.21	$3.17	$10.21	$4.92	107.6%

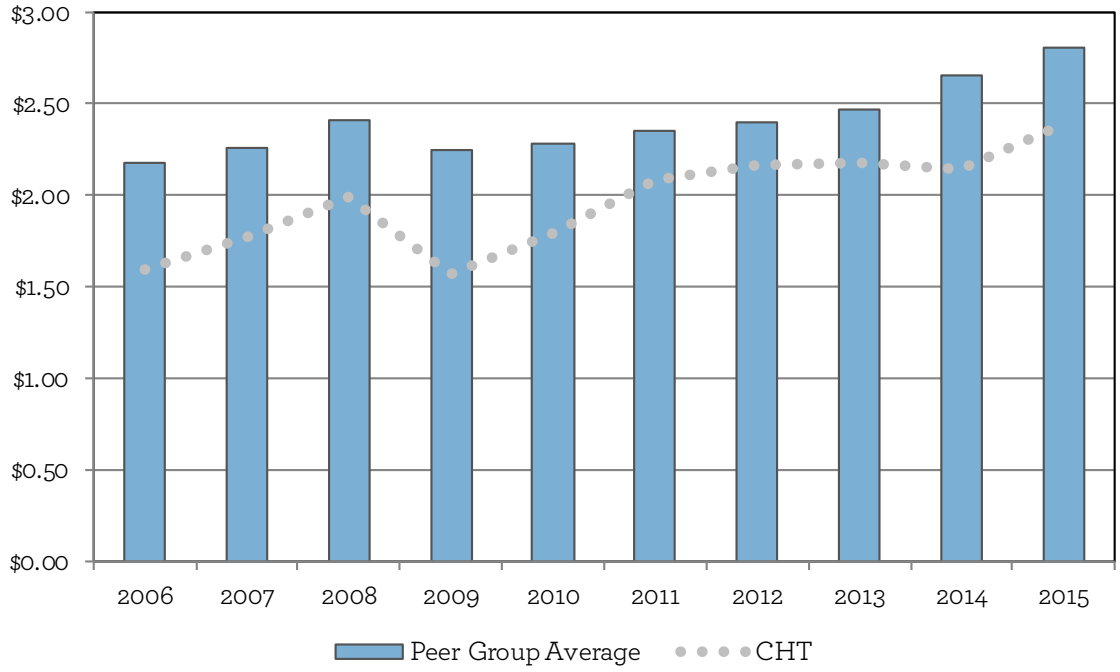
Source: NTD

The following figures illustrate CHT's efficiency measures in relation to each peer agency over a 10-year timeframe.

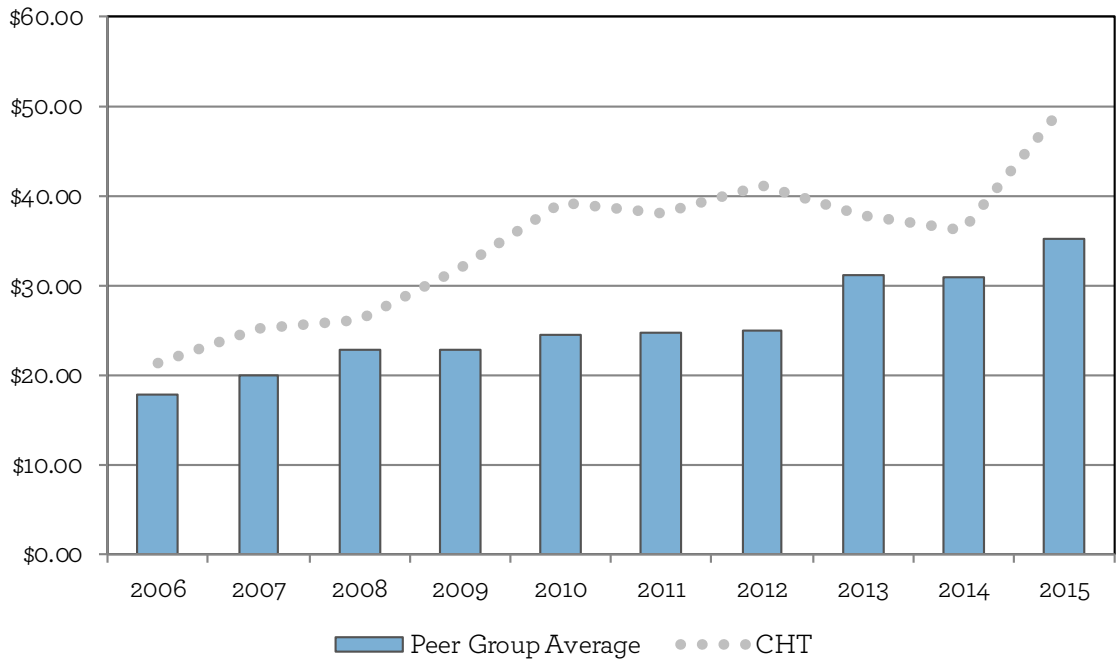
- CHT's performance in terms of operating expense per passenger trip for fixed-route service has varied over the 10-year period when compared to peers. By 2015, CHT performed approximately average compared to the peer group, though operating expense per passenger trip for demand response service was higher than average (Figure 5-14).
- CHT's operating costs for fixed-route service in terms of revenue hours and revenue miles have been slightly higher than the peer group over the 10-year period, and by 2015 CHT ranked above the peer group to a notable degree—approximately 15-20% for each indicator (Figure 5-15 and Figure 5-16).
- CHT's demand response service has historically had higher operating costs than the peer group, reaching almost double the peer group average in 2015.

Figure 5-14 Operating Expense per Passenger Trip (2006-2015)

Fixed-Route Service



Demand Response Service



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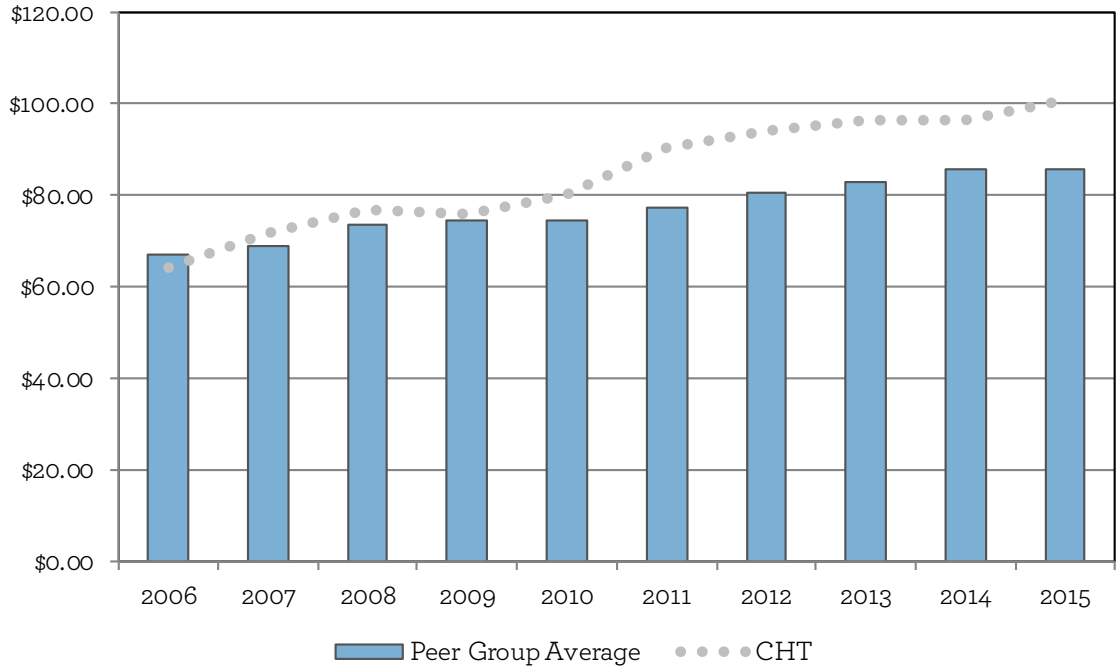
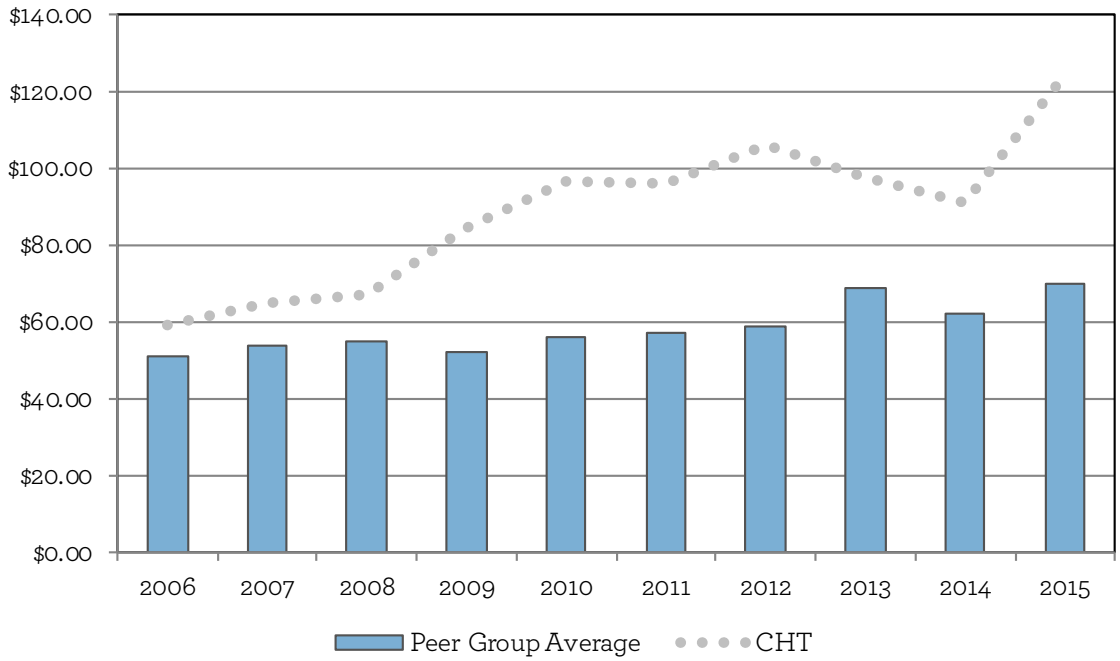
GoRaleigh Demand Response Service data changed from being reported as "directly operated" in 2006-2007 to "purchased transportation" in 2009-2012, with a significant increase in operating expense per passenger trip that similarly impacted the peer group average. GoRaleigh is excluded from the analysis in 2008 due to unavailability of data from NTD.

Figure 5-15 Operating Expense per Revenue Hour (2006-2015)

Fixed-Route Service



Demand Response Service

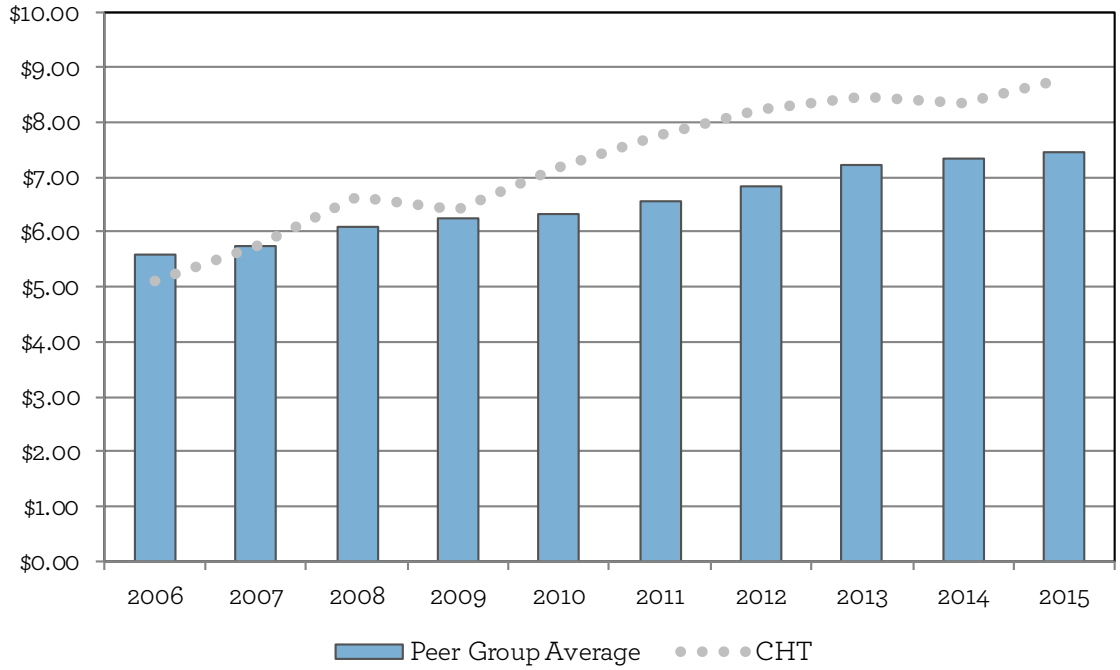


Note: ATS/UGA Campus Transit is excluded from the analysis prior to 2009 due to unavailability of data from NTD.

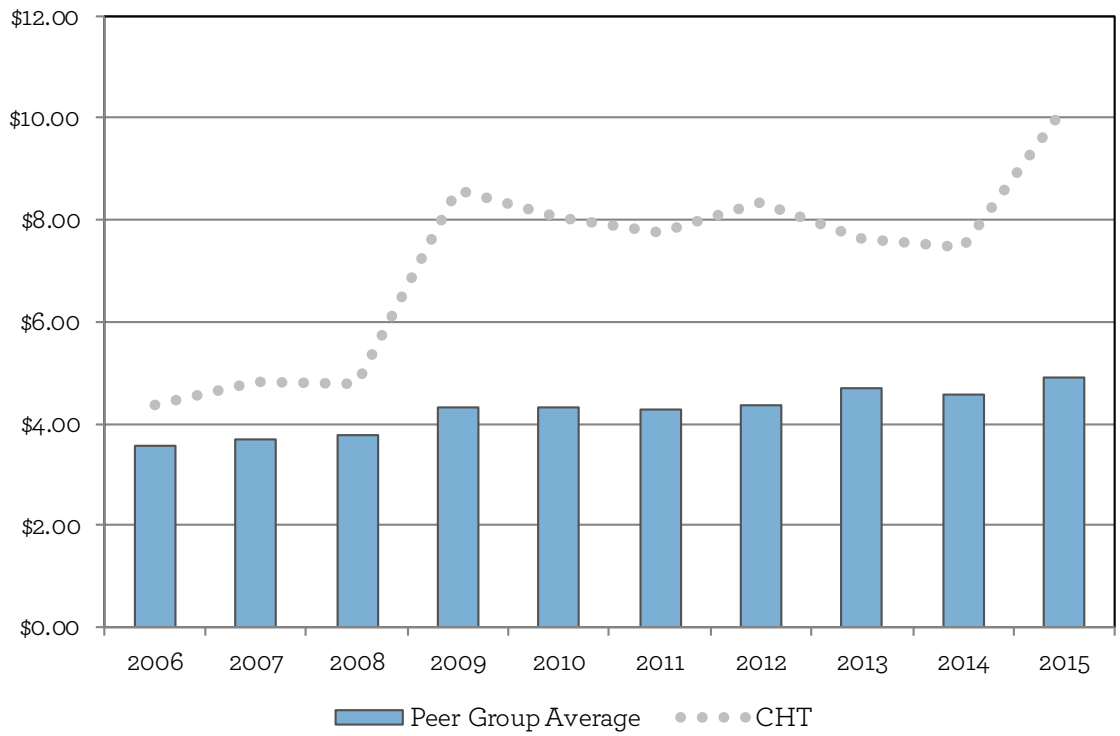
GoRaleigh Demand Response Service data changed from being reported as "directly operated" in 2006-2007 to "purchased transportation" in 2009-2012, with a significant decrease in operating expense per revenue hour that balanced the peer group average with the addition of ATS/UGA Campus Transit. GoRaleigh is excluded from the analysis in 2008 due to unavailability of data from NTD.

Figure 5-16 Operating Expense per Revenue Mile (2006-2015)

Fixed-Route Service



Demand Response Service



Note: ATS/UGA Campus Transit is excluded from the analysis prior to 2009 due to unavailability of data from NTD.
GoRaleigh is excluded from the analysis in 2008 due to unavailability of data from NTD.

6 PREFERRED ALTERNATIVE

Short-term recommendations for CHT were developed using public input, market conditions, and existing ridership patterns. Initially, three scenarios were developed that represent different principles of route planning and areas of emphasis. Following a public outreach and comment period, a final fiscally constrained Preferred Alternative was developed to address operational issues, future growth, industry standard best practices for route design, and meet project goals established by SRTP Technical Committee and Policy Committee members.

BEST PRACTICES FOR ROUTE DESIGN

While it is unlikely that a single service type will meet the competing mobility needs of all transit users in Chapel Hill and Carrboro, there are certain best practices that can be applied to nearly all transit services to improve the overall passenger experience.

- Service should be simple: First and foremost, service should be designed so that it is easy to use and intuitive to understand. This applies not only to the routing and scheduling of service, but also to the information presented to customers at the stop and on passenger information materials.
- Routes should operate along a direct path: The fewer directional changes a route makes, the easier it is to understand. Conversely, circuitous alignments are disorienting and difficult to remember. Routes should not deviate from the most direct alignment unless there is a compelling reason, such as to provide service to a major ridership generator. In such cases, the benefits of operating the route off of the main route must be weighed against the inconvenience caused to passengers already on board.
- Route deviations should be minimized: As described above, service should be as direct as possible. Consistent with this idea, the use of route deviations—traveling off the most direct route—should be minimized. However, there are instances when deviating service from the most direct route is appropriate—for example, to provide service to major shopping centers, employment sites, schools, and medical centers. In these cases, the benefits of the deviation must be weighed against the inconvenience caused to passengers already on board. Route deviations should be implemented only if:
  - The deviation will result in an increase in overall route productivity.
  - The number of new passengers that will be served is equal to or greater than 25% of the number of passengers who would be inconvenienced by the additional travel time on any particular deviated trip.

  In most cases, route deviations should be provided on an all-day basis. Exceptions are during times when the sites that the route deviations service have no activity—for example, route deviations to major employment centers with shift workers may not need to serve those locations between shift changes.

- Major routes should operate along arterials: Key corridor and mainline routes should operate on major roadways and avoid deviations to provide local circulation. Riders and potential transit users typically have a general knowledge of an area's arterial road system and use that knowledge for geographic points of reference. The operation of bus service along arterials makes transit service faster and easier for riders to understand and use.
- Routes should be symmetrical: Routes should operate along the same alignment in both directions to make it easy for riders to know how to get back to where they came from. In cases where such operation is not possible due to one-way streets or turn restrictions, routes should be designed so that the opposite directions parallel each other as closely as possible.
- Service design should maximize service: The distance and travel time of a route determine how efficiently a bus can operate. Service should be designed to maximize the time a vehicle is in service and minimize the amount of time it is out-of-service. Since the length of the route and the time it takes to make each trip impacts how long of a layover is required at each end and how many buses are needed to provide the service, it is often more efficient to extend a route to pick up a few more passengers and limit the amount of layover time.

These best practices offer a foundation for the improvement of transit service throughout Chapel Hill.

PRELIMINARY SERVICE SCENARIOS

Convenient and cost-effective transit service requires an appropriate balance of coverage, frequency, and service span. Prior to developing any recommendations, this study assessed existing ridership patterns, on-time performance, travel patterns, and demographic data. Public meetings and an online survey indicated that improving service frequency, expanding service hours and adding new local destinations are some of the improvements desired most by riders and non-riders.

As a result of these efforts, three preliminary scenarios to improve CHT service were developed that do not require additional operating costs and that each emphasize unique improvements and route planning principles:

- Scenario 1 makes modest changes to bus routing and aims to improve weekday service frequency.
- Scenario 2 also makes modest changes to bus routing and aims to improve weekend service.
- Scenario 3 takes a more transformative approach, designing a new system "from scratch" based on observed ridership trends and areas with unmet demand.

The results of Phase II outreach, discussed in Chapter 8, show that the public was more supportive of Scenario 2 than Scenario 1 or Scenario 3. These results are indicative of general support for improving weekend service. These results also suggest that riders place a high priority on maintaining coverage service within neighborhoods. Individual comments, shown in Appendix F, indicate that there is also support for improving frequency on overcrowded routes and providing a direct east-west service. These findings and priorities were incorporated into the Preferred Alternative.

PREFERRED ALTERNATIVE OVERVIEW

Short-term recommendations for CHT were developed using public input, market conditions, and existing ridership patterns. Key themes for service improvements identified during public outreach include:

- High frequency transit core (service every 15 minutes or better) with supporting lower-frequency routes (service approximately every 60 minutes)
- Improved weekend service throughout the system, with a focus on Sunday service
- Improved frequency on overcrowded routes
- Making service simpler and easier to understand
- Maintaining existing service area coverage

The Preferred Alternative makes modest changes to bus routing and aims primarily to improve service frequency on key routes, maintain service area coverage, simplify service, and improve weekend service. It modifies 15 routes, eliminates four, and leaves five unchanged.

Figure 6-1 and Figure 6-2 provide a system map and summary of service proposed as part of the Preferred Alternative.

Weekday Peak Period Service

During peak period service from approximately 6 AM to 9 AM and 3 PM to 6 PM (Figure 6-3), high frequency service (every 15 minutes or better) would be offered on Routes CCX, CM, JFX, J, NS, NU, FCX, RU, and U. Routes D and CL would provide a combined 10-minute frequency on East Franklin Street. The remaining routes maintain coverage throughout the service area with frequencies between 20-60 minutes.

Weekday Midday Service

During the midday time period (Figure 6-4) from approximately 9 AM to 3 PM, high frequency service (every 15 minutes or better) would be offered on routes NS, RU, and U. Routes D and CL would provide a combined 15-minute or better frequency on East Franklin Street. The remaining routes would operate with frequencies between 20-60 minutes.

Saturday and Sunday Service

In the Preferred Alternative, weekend service is dramatically improved over what is currently offered (Figure 6-5). Saturday and Sunday service would be provided on Routes A, CM, CW, D, J, N, and NS; existing Saturday and Sunday service would be maintained for Route NU and U.

Since the Preferred Alternative adds new Saturday and Sunday service along Martin Luther King Jr. Boulevard on Route NS, weekend service currently offered on Route T would be eliminated. Weekend-only Routes FG and JN would be removed and replaced by new weekend services.

Figure 6-1 Preferred Alternative System Map

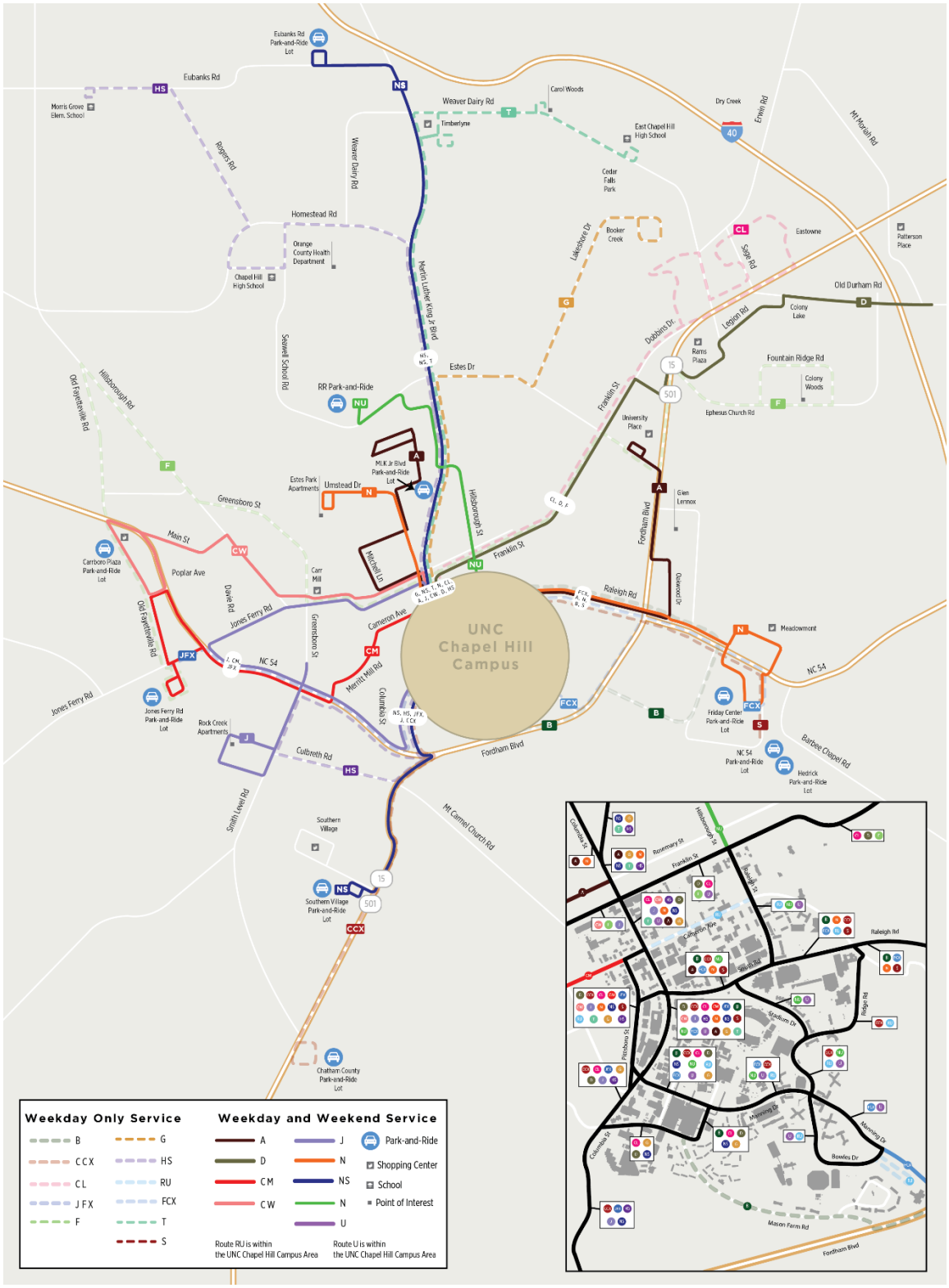


Figure 6-2 Preferred Alternative Service Summary

Route	Summary of Changes	Frequency (minutes between buses)					Service Span	Peak Buses
		Morning Peak	Midday	Afternoon Peak	Night	Weekend		
A	Modified alignment to serve Hamilton Road and University Place.	60	60	60	60	60	6:30 AM - 8:30 PM (M-F) 8:00 AM - 7:00 PM (Sat-Sun)	1
B	Modified alignment to serve Ronald McDonald House and operate all-day.	30	30	30	-	-	7:00 AM - 6:00 PM (M-F)	1
CCX	No immediate change to this route would be recommended. If capacity issues emerge on Route NS, this route would deviate to address demand near Southern Village.	15	40	15	20	-	6:00 AM - 8:00 PM (M-F)	3
CL	The alignment of this route would be modified to provide service to Eastowne Drive, Coleridge Dr, Sage Road, and Dobbins Drive. Service would be removed from Erwin Road north of Old Oxford Road. The area south of US 15-501 that is no longer served by this route will continue to be served by Route D.	20	30	20	60	-	6:30 AM - 10:00 PM (M-F)	3
CM	This route alignment would be simplified to remove the extension on Manning Drive to the Family Medical Center to provide more frequent and direct service. Frequency would be improved, and areas no longer served by Route CM would continue to be served by Route RU.	15	30	15	30	30	6:30 AM - 6:30 PM 9:00 AM - 6:00 PM (Sat-Sun)	2
CPX	This route would be replaced by modified Routes CM and JFX.	-	-	-	-	-	-	-
CW	Simplify route by removing the portion travelling down W Poplar Avenue to the Jones Ferry Road Park-and-Ride. Instead the route will serve a loop between NC 54, Old Fayetteville Road, and W Poplar Avenue.	20	30/60	30	60	60	7:00 AM - 9:00 PM (M-F) 8:30 AM - 6:30 PM (Sat-Sun)	3
D	Simplify route by removing the southern loop operating on Culbreth Road and providing service in both directions along Legion Road, Old Chapel Hill Road, and Mt. Moriah Road. The areas removed from service will continue to be served by Routes CL, HS, and J.	20	30	20	60	60	6:30 AM - 10:00 PM (M-F) 8:00 AM - 7:00 PM (Sat-Sun)	3
F	Modify route by removing the deviation to University Place and extending service to Carrboro Plaza and Jones Ferry Park-and-Ride lots. No weekend service would be offered.	60	60	60	60	-	6:30 AM - 9:30 PM (M-F)	2
FCX	No Change to alignment or service span. Morning peak frequency is reduced to seven minutes to provide additional running time and improve on-time performance. Midday service would be added between 10:45 AM and 12:15 PM, operating every 15 minutes.	7	15	10	20	-	5:00 AM – 8:30 PM (M-F)	5
G	The alignment for this route would be altered to provide service from Lakeshore Drive to UNC-Chapel Hill campus only. No weekend service would be offered.	60	60	60	-	-	7:00 AM - 6:00 PM (M-F)	1
HS	Simplify route by removing the loop connecting Seawell School Road and Estes Drive and extending service further south on Martin Luther King Jr. Boulevard into UNC-Chapel Hill and Culbreth Road. Service would no longer operate on Hillsborough Street or Franklin Avenue.	35	35	35	35	-	6:00 AM - 8:00 PM (M-F)	2
HU	This route would be replaced by modified Route B.	-	-	-	-	-	-	-
J	Weekend service would be added.	15	20	15	40	40	6:30 AM - 12:00 AM (M-F) 8:00 AM - 9:00 PM (Sat) 8:00 AM - 7:00 PM (Sun)	6
JFX	Simplify route by removing the loop at Old Fayetteville Road and West Poplar Avenue. Service hours extended to operate all day and provide evening service to Jones Ferry Park-	15	15	15	15	-	6:30 AM - 8:00 PM (M-F)	2

Route	Summary of Changes	Frequency (minutes between buses)					Service Span	Peak Buses
		Morning Peak	Midday	Afternoon Peak	Night	Weekend		
	and-Ride after 6:30pm, when Route CM stops running. The areas removed from service would continue to be served by Route CM.							
N	Weekday and weekend route alignment would be altered to provide service to Meadowmont Village. Route N would replace portions of existing Route V.	60	60	60	60	60	6:30 AM - 8:00 PM (M-F) 8:00 AM - 7:00 PM (Sat-Sun)	1
NS	Weekend service would be added.	7.5	15	10	30/40	40	5:30 AM - 11:30 PM (M-F) 8:00 AM - 9:00 PM (Sat) 8:00 AM - 7:00 PM (Sun)	10
NU	This route would be simplified to provide service in both directions on Hillsborough.	12/15	20	20	40	40	7:00 AM - 10:30 PM (M-F) 11:30 AM - 11:30 PM (Sat-Sun)	4
RU	No change.	10	15	10	15	-	7:00 AM - 8:30 PM (M-F)	3
S	Service would be removed from Manning Drive and US 15-501 to improve on-time performance.	10	20/35	10	25	-	6:30 AM – 8:00 PM (M-F)	3
T	Alignment would be shortened through UNC campus. No weekend service would be provided.	60	60	60	-	-	7:00 AM - 6:00 PM (M-F)	1
U	No change.	15	15	15	15/25	25	7:00 AM - 8:00 PM (M-F) 10:30 AM - 7:00 PM (Sat-Sun)	2
V	This route would be replaced by a modified Route N and existing service on Route NS.	-	-	-	-	-	-	-
FG	This existing Saturday-only route would be eliminated and replaced by new weekend service on Route A.	-	-	-	-	-	-	-
JN	This existing Saturday-only route would be eliminated and replaced by new weekend service on Route J and Route N.	-	-	-	-	-	-	-

Figure 6-3 Preferred Alternative Peak Frequency

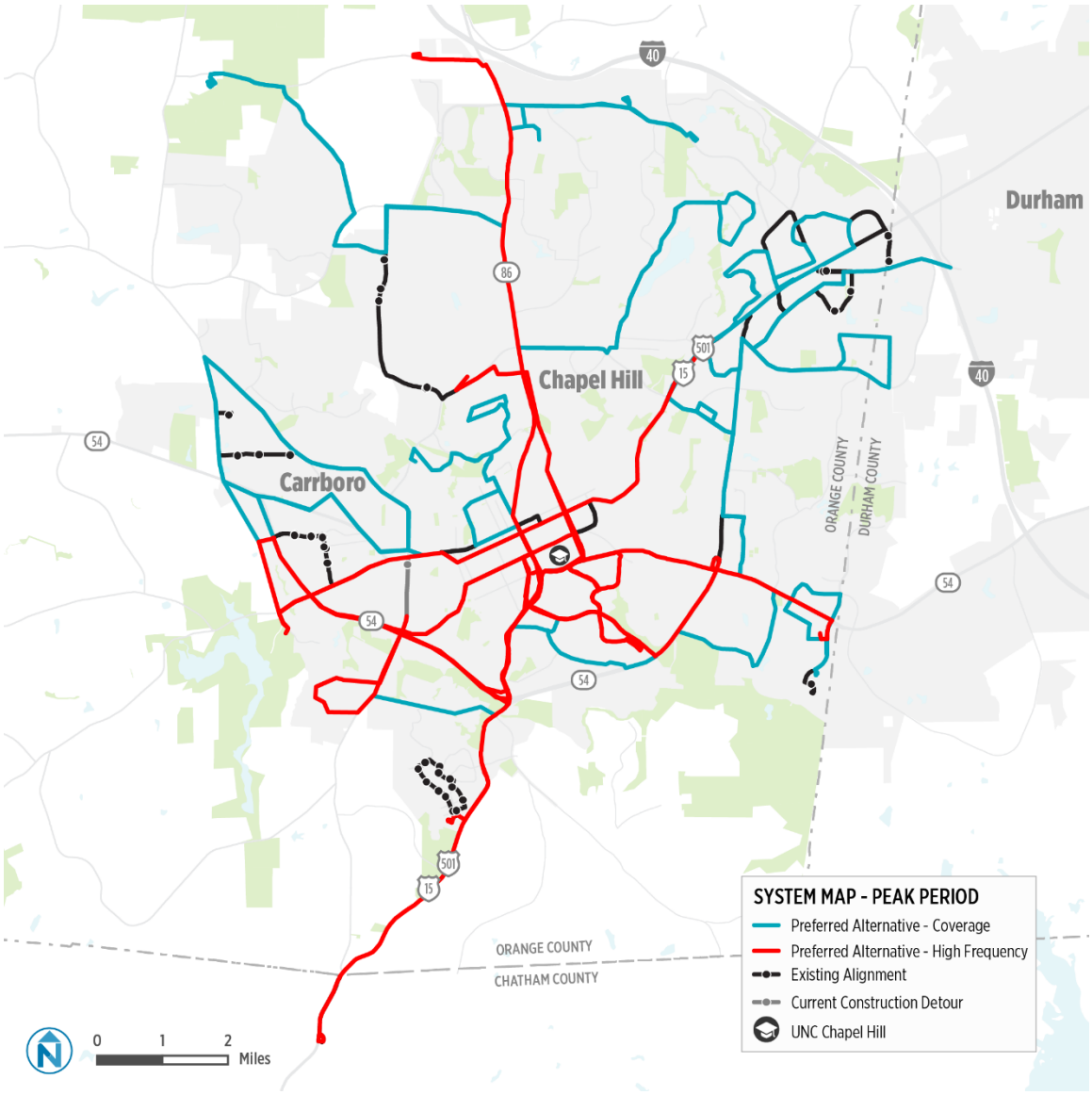


Figure 6-4 Preferred Alternative Midday Frequency

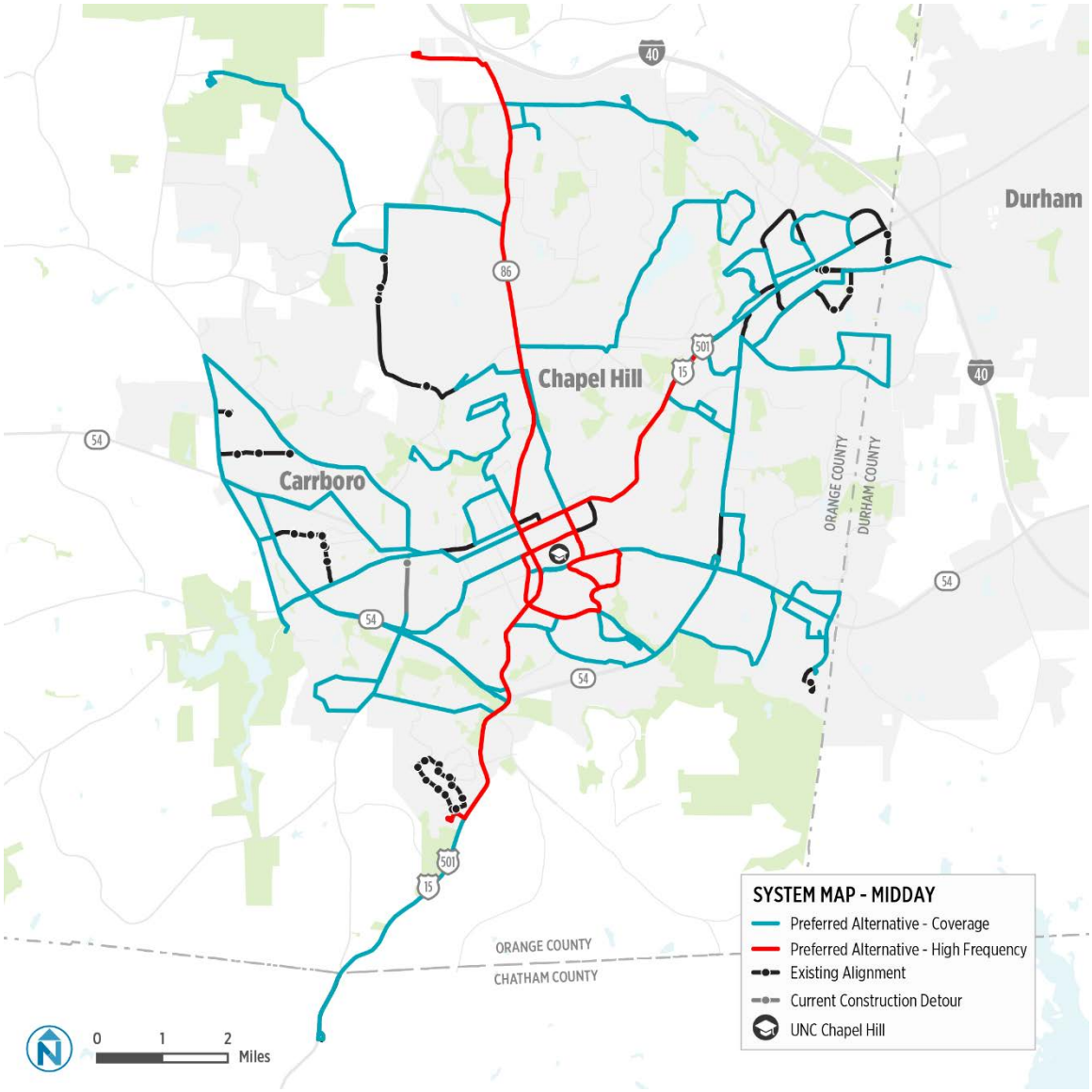
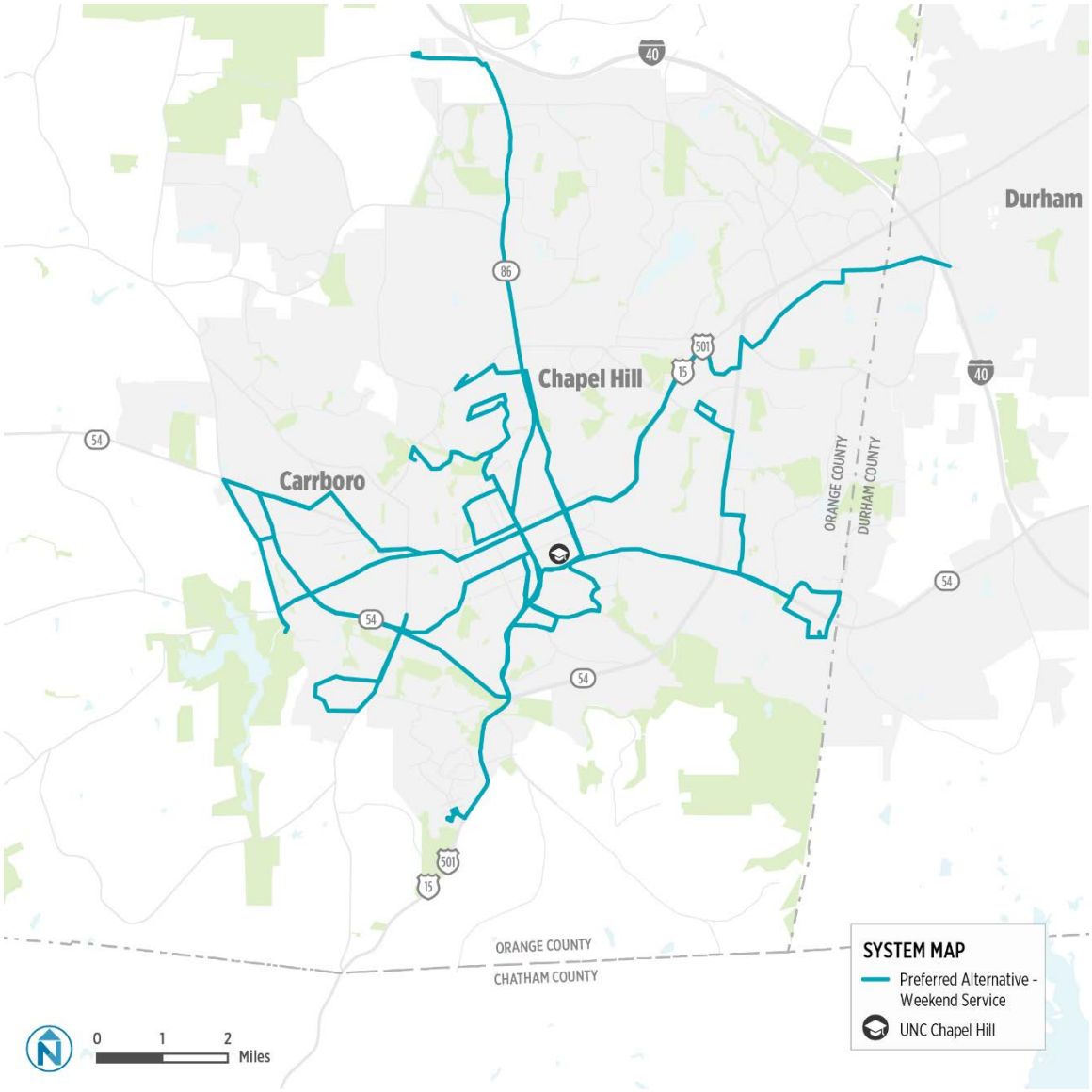


Figure 6-5 Preferred Alternative Weekend Route Network



ALIGNMENT WITH PROJECT GOALS

As summarized in Figure 6-6, the Preferred Alternative improves and aligns with the principles established at the beginning of the planning effort.

Figure 6-6 Preferred Alternative and CHT's Project Goals

Project Goal	Preferred Alternative Impacts	
Improve Transit Mode Shift	Preferred Alternative improves weekend service throughout the system, improves how often buses arrive, make service simpler and easier to understand, and provides more all-day service, which will help improve transit mode shift in the community.	✓
Increase Ridership	Preferred Alternative improves weekend service, increases service frequency, and makes service more direct, which will lead to increased ridership.	✓
Create High Frequency Transit Corridors	Preferred Alternative improves service frequencies in the highest demand areas, including East Franklin Street and Martin Luther King Jr. Boulevard to provide a series of high frequency transit corridors.	✓
Emphasize Equity (Provide Transit Service where It Is Most Needed)	Preferred Alternative considered transit need as part of the service planning effort, and recommendations result in minimal change to existing service coverage.	✓
Improve Weekend Service	Preferred Alternative will provide Saturday and Sunday service on Routes A, CM, CW, D, J, N, NS, NU, and U.	✓
Enhance the Convenience of Living without a Private Vehicle	Preferred Alternative improves existing service frequencies, improves the directness of service, improves Saturday service, and dramatically increases the availability of Sunday service to enhance the convenience of living without a private vehicle.	✓

INDIVIDUAL ROUTE RECOMMENDATIONS

The section describes the individual route recommendations. Route maps are available in Appendix C.

Route A

Route A's alignment would be significantly changed. Service to Colonial Heights would continue, as would service to UNC-Chapel Hill's campus. The alignment would be modified to serve Hamilton Road and University Place, including service to Glen Lennox Apartments.

While Route A will no longer operate on Hillsborough Street, Martin Luther King Jr Boulevard, Stadium Drive, Ridge Road, Manning Drive, or Pittsboro Street; however, these locations would continue to be served by Routes NS, HS, and N.

Weekend service will be added to Colonial Heights, and locations including Glen Lennox, Hamilton Road, and University Place will have new Sunday service and improved span of service on Saturdays.

Route B

The alignment of Route B would be modified to serve Ronald McDonald House and would no longer operate on US 15-501 between Manning Drive and Raleigh Road. Route B would operate with all-day service instead of peak-only service.

Route B does not currently have weekend service, and no weekend service would be offered in the Preferred Alternative.

Route CCX

Route CCX would be unchanged in the Preferred Alternative.

Route CL

The alignment of Route CL would be simplified to provide an all-day, consistent route serving Eastown Drive, Sage Road, Dobbins Drive, Erwin Road, Old Oxford Road, Summerfield Crossing Road, and E. Franklin Street. A modified Route D would serve areas south of US 15-501.

A portion of Sage Road, Erwin Drive, and Standish Drive would no longer be served in the Preferred Alternative. These areas are all within 1/2 mile of proposed service under the Preferred Alternative. Passengers currently accessing the system in these areas would be able to continue using the system at stops on US 15-501, Erwin Road, Old Sterling Drive, or Sage Road.

Route CL would operate will all-day service instead of peak only service. Route CL would be scheduled to offset Route D's trips on East Franklin Street, so passengers on Franklin Street will have access to service that arrives every 10 minutes during peak periods and every 15 minutes during midday.

No weekend service would be offered on Route CL.

Route CM

Route CM would be shortened to remove the extension on Manning Drive to the Family Medical Center. Frequency would be improved to every 15 minutes during peak periods and every 30 minutes at other times, including Saturday and Sunday.

Areas no longer served by Route CM would continue to be served by Route RU. In the Preferred Alternative, Sunday service would be added to Route CM so it would operate seven days per week.

Route CPX

In August 2019, the parking lease agreement at Carrboro Plaza will expire. Anyone parking at Carrboro Plaza will need to drive an additional mile to the Jones Ferry Park-and-Ride. Due to the Park-and-Ride no longer being in service, Route CPX should be deleted. Route JFX will be modified to serve portions of NC 54 currently served by Route CPX. In addition, Route JFX will operate all day on weekdays.

Route CW

To improve travel times, Route CW would be simplified to eliminate a series of route deviations. Instead of operating from W Poplar Avenue to the Jones Ferry Road Park-and-Ride, the route will serve a loop between NC 54, Old Fayetteville Road, and W Poplar Avenue. Passengers currently utilizing service on the W Poplar Ave and Davie Road loop would have to walk to transit stops on NC 54 or Jones Ferry Road, less than ½ mile away.

Sunday service would be added to Route CW in the Preferred Alternative so that the route would operate seven days per week.

Route D

Route D is a strong performer in the CHT network, but a large one-way loop along both sides of US 15-501 introduces out-of-direction travel for many existing riders. To improve route directness, the route would be simplified to operate in two directions along Legion Road and Old Chapel Hill Road. Route D would no longer serve Sage Road, as a revised Route CL would serve Sage Road. Lakeview Drive would also no longer be served by Route D. Existing passengers currently utilizing stops on Lakeview Drive would be within 1/2 mile of service and would be able to access stops on Old Chapel Hill Road.

Along E. Franklin Street ,Route D's schedule will be coordinated with the proposed Route CL schedule, s passengers will have access to service that arrives every 10 minutes during peak periods.

In South Chapel Hill, Route D service to Culbreth Road would be replaced by a restructured Route HS.

In the Preferred Alternative, Sunday service would be added to Route D so that the route would operate seven days per week.

Route F

Route F is one of the few routes in the CHT network that does not deviate to serve UNC Hospital. The Preferred Alternative alignment would continue to connect Colony Woods and Carrboro. However, to reduce travel times and make service more direct, the alignment for Route F would be modified to serve University Place in two directions; service removed from Franklin Street and Elliot Road would continue to be served by Route CL and Route D.

To provide more connection points for passengers in Carrboro, service would be extended to Carrboro Plaza and the Jones Ferry Road Park-and-Ride, while service along Carol Street would be removed. Passengers accessing the system from these areas would be within ½ mile of the proposed system and would be able to continue reaching service on Hillsborough Road or Old Fayetteville Road.

Weekend service would not be offered on Route F due to low levels of demand.

Route FCX

The alignment and service span of Route FCX would be unchanged. The frequency during the morning peak period would be reduced to every seven minutes. This provides additional running time for the route, improving on-time performance. Midday service would be added between 10:45 AM and 12:15 PM when service is currently not operated with a frequency of 15 minutes.

Service on Route FCX will correspond to the existing Route FCX span of service, starting at 5:00 AM and ending at 8:30 PM.

Route FCX does not currently have weekend service, and no weekend service would be offered in the Preferred Alternative.

Route G

Two recommendations are made for Route G. Due to low ridership, the frequency on the Lakeshore Drive segment would be reduced to every 60-minutes. The route terminus would be at the UNC-Chapel Hill's campus only. Route G service to University Place along South Road and Raleigh Road would be replaced by a modified Route A.

No weekend service would be offered on Route G, though existing Route G locations now served by the modified Route A would have both Saturday and Sunday service.

Route HS

Route HS is currently the only route in the CHT network that does not serve downtown Chapel Hill or UNC-Chapel Hill's campus; as a result, it is one of the lowest performing routes in the system. To increase the ridership potential of this route, Route HS should be extended to UNC Chapel Hill's campus via MLK and Columbia Street. Service on Estes Drive and Seawell School Road would be eliminated. In addition, Route HS would be extended to serve Culbreth Road, replacing existing Route D service.

Service removed from Estes Drive would continue to be served by Route NU. Passengers currently accessing the system through Seawell School Road and Estes Drive would have to

walk to stops at Chapel Hill High School or at the intersection of Estes Drive and Seawell School Road, both less than 1 mile away.

Route HS would operate all-day from 6:00 AM until 8:00 PM on weekdays. No weekend service would be provided.

Route HU

In the Preferred Alternative, Route HU would be replaced by a restructured Route B, which would serve the Ronald McDonald House every 30 minutes all day. Existing Route HU riders from the Friday Center area would continue to have the option of parking at either the NC 54 or Friday Center park-and-ride and using the restructured Route S.

Route J

Route J is a very strong performer in the existing CHT system; as such, the alignment for Route J would be unchanged in the Preferred Alternative. However, weekend service would be added so that the route operates seven days per week.

Route JFX

Due to the August 2019 closure of the Carrboro Plaza Park-and-Ride and associated deletion of Route CPX, both span and alignment changes will be made for Route JFX. Route JFX will operate on NC 54 and Jones Ferry Road and no longer operate on Old Fayetteville Road. The route would only provide service to Jones Ferry Park-and-Ride between 6:30 PM and 8:00 PM. Areas no longer served by Route JFX would continue to be served by Routes F, CW, and CM. Midday service would be provided on JFX as well.

Route JFX does not currently have weekend service, and no weekend service would be offered in the Preferred Alternative.

Route N

Route N is proposed to be extended to Meadowmont Village, which will . Service would operate every 60 minutes all day. Route RU will continue to provide service to existing Route N stops on the southern UNC campus.

Weekend service would be offered on Route N so that the route operates seven days per week. Existing Saturday service is provided on Route JN.

Route NS

Route NS is another incredibly strong performer in the CHT system, and its existing alignment is proposed for conversion to Bus Rapid Transit (BRT) premium service in the future. As such, the alignment of Route NS in the Preferred Alternative would be the same as the existing alignment.

To help meet existing demand and support planned future improvements to this route, frequency would be improved during the morning peak period, and weekend service would be added so the route operates seven days per week.

Route NU

Route NU would be simplified to remove the loop traveling on Martin Luther King Jr Boulevard. Instead, this route would provide service in both directions on Hillsborough Street and make a loop through UNC Hospitals. Peak frequency would be improved to every 12 to 20 minutes.

Weekend service would be provided on Route NU in the Preferred Alternative during the same hours offered today.

Route RU

Route RU would be unchanged in the Preferred Alternative.

Route S

In the Preferred Alternative, the alignment of Route S would be modified to remove service from Manning Drive and US 15-501. Instead, the route will operate from the NC 54 Park-and-Ride along Raleigh Road, South Road, Pittsboro Street, and Columbia Street. All areas currently served by Route S would continue to served by Route FCX. The route would operate with the same span and frequency as today.

Route T

Service on Route T is currently offered at irregular intervals, and much of the alignment is duplicated by other routes in the system. With this in mind, the alignment for Route T in the Preferred Alternative would be shortened to remove the loop through the UNC campus and UNC Hospitals so that service can be provided at regular 60-minute frequency. Service along much of the route would continue to be duplicated by other routes in the system.

Service to Carol Woods should be provided on-demand in the outbound direction. If no one requests a stop, Route T will not enter Carol Woods on the way to East Chapel Hill High. Inbound trips would continue to stop at Carol Woods.

Weekend service is currently offered on Route T. However, since the Preferred Alternative adds new Saturday and Sunday service on Route NS on MLK, removing the need to operate Route T on weekends. Weekend service offered on Route T would be replaced by the Route NS service.

Route U

Route U would be unchanged in the Preferred Alternative.

Route V

Existing service on Route V is provided at irregular intervals, and much of the alignment is duplicated by other routes in the system. In the Preferred Alternative, portions of Route V would be removed and replaced by a modified Route N, and frequent service to the Southern Village Park-and-Ride would continue to be offered on Route NS.

Service into the Southern Village residential development would be removed due to low ridership. Passengers currently accessing the system would be able to continue accessing the system at the Southern Village Park-and-Ride, which is within 1 mile of the existing alignment.

UNFUNDED IMPROVEMENTS

As part of the SRTP planning process, a number of desirable service improvements were identified that could not be achieved within the existing budget. Over the next few years, CHT should continue to evaluate available funding and pursue partnerships to advance implementation of these improvements.

Suggested improvements include the following:

- New or enhanced weekend service on Route CL, D, J, and NS
- Frequency improvements on Route CW, J, and NS
- Weekday service span improvements on Route HS
- Improved connections and service to new areas, including Patterson Place, Estes Drive and the West NC 54 corridor

The estimated total operating cost for these improvements is approximately $3 million, and proposed service would require an additional 10 peak vehicles to operate (Figure 6-7).

Figure 6-7 CHT Unfunded Improvements

Route	Unfunded Service Improvement Summary				Frequency (minutes between buses)			Service Span
		Additional Revenue Hours	Additional Peak Vehicles	Additional Annual Operating Cost	Peak	Midday	Night/ Weekend	
CL	Add weekend service.	1,300	0	$130,000	20	30	60	6:30 AM - 10:00 PM (M-F) 8:00 AM - 9:00 PM (Sat) 8:00 AM - 7:00 PM (Sun)
CW	Improve midday service to 30 minutes.	1,500	0	$150,000	20/ 30	30	60	7:00 AM - 9:00 PM (M-F) 8:30 AM - 6:30 PM (Sat-Sun)
D	Extend service to Patterson Place and provide Saturday service until 9 PM.	5,300	1	$540,000	20	30	60	6:30 AM - 10:00 PM (M-F) 8:00 AM - 9:00 PM (Sat) 8:00 AM - 7:00 PM (Sun)
J	Improve morning peak frequency to every 10 minutes and offer 15-minute service until noon. Provide Saturday service until 11 PM and Sunday service until 9 PM.	3,200	2	$320,000	10/ 15	15/20	40	6:30 AM - 12:00 AM (M-F) 8:00 AM - 11:00 PM (Sat) 8:00 AM - 9:00 PM (Sun)
NS	Improve morning peak frequency to every 6 minutes. Provide Saturday service until 11 PM and Sunday service until 9 PM.	2,300	3	$230,000	6/10	15	30/40	5:30 AM - 11:30 PM (M-F) 8:00 AM - 11:00 PM (Sat) 8:00 AM - 9:00 PM (Sun)
West NC 54	New weekday peak-only service from White Cross to UNC-Chapel Hill.	1,500	1	$150,000	70	-	-	6:30 AM - 9:30 AM; 3:30 PM - 6:30 PM (M-F)
Estes Drive	New crosstown service connecting UNC-Chapel Hill, University Place, and Glen Lennox via Estes Drive.	12,900	3	$1,300,000	30	30	30/45	6:30 AM - 8:30 PM (M-F) 8:00 AM - 7:00 PM (Sat-Sun)
Total		28,400	10	$2,870,000				

7 LONG-TERM STRATEGIC ISSUES

While developing a transportation plan, there is a degree of uncertainty surrounding the future planning and operating context. These uncertainties are represented by a number of developmental, operational, and interagency variables that occur over a 10-year planning horizon. Analyzing these variables and assessing probabilities and outcomes for CHT provides insight into the role the transit agency will play in the future. Initiatives and variables analyzed include:

- Bus Rapid Transit (BRT) Implementation
- Regional Transit Service Coordination
- Regional Transit Initiatives
- Transportation System Planning
- Environmental Impacts
- Future Development
- Park-and-Ride Corridors
- Transit Hubs

This chapter describes the current conditions of these variables, identifies the potential opportunities they present for CHT, and makes recommendations based on literature review, technical analysis, and an assessment of probabilities and outcomes.

KEY FINDINGS

- The North-South BRT Corridor would provide the opportunity to simplify CHT service while providing a high capacity, high frequency route on the highest ridership corridor in the system.
- Effectively leveraging shared corridors may allow CHT to forestall making capital expenditures by allowing GoTriangle to absorb excess ridership demand in the service area.
- CHT should consider a complete streets policy and a policy to emphasize specific modes on certain corridors in order to foster an effective multimodal transportation system with limited right-of-way.
- Adding electric vehicles to the CHT fleet may be a viable option for meeting environmental goals, however, there are currently reliability concerns regarding electric vehicle technology that should continue to be monitored.
- Future developments are likely to increase demand for transit in the future, payment-in-lieu and transportation benefit districts may be viable options to offset impacts.
- There is sufficient capacity in existing park-and-ride lots to meet short-term demand, but in the long term, CHT should consider new park-and-ride facilities in White Cross and Chatham County.
- Due to high projected bus volumes at the UNC hospitals, CHT should explore developing a transit hub with space for pullouts and for bus layover.

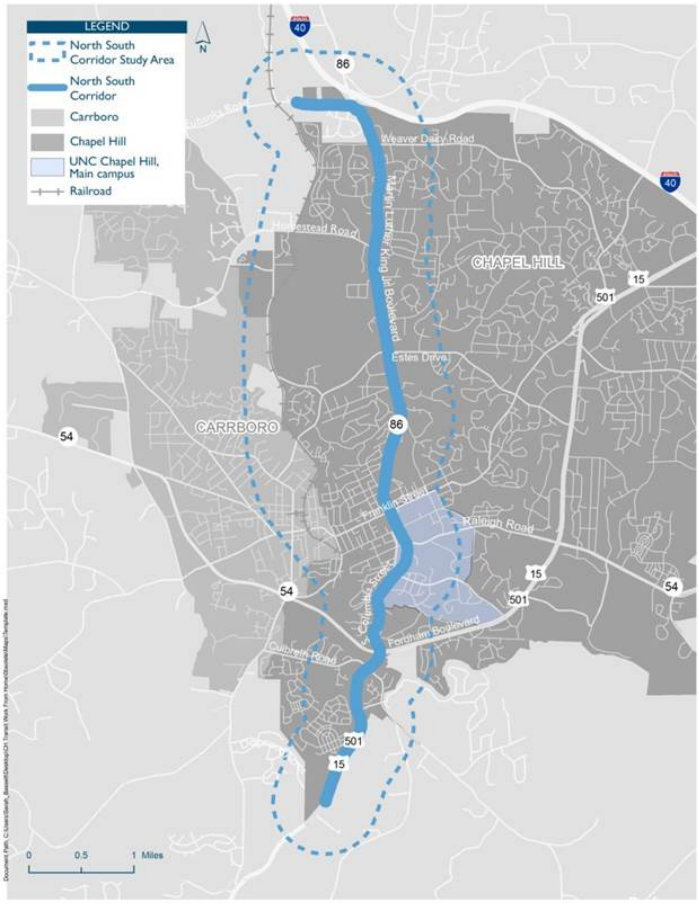
BUS RAPID TRANSIT IMPLEMENTATION

Introduction

Potential implementation of the North-South BRT corridor in Chapel Hill will have widespread implications for how the transit system functions. This evaluation considers the potential opportunities associated with developing and implementing BRT, as well as integrating local and regional services with the new BRT system. The Martin Luther King Jr. Boulevard corridor is the highest transit ridership corridor in the CHT service area. Transit demand in the corridor is expected to increase as large residential developments are completed over the next few years. The North-South BRT project is intended to create additional transit capacity and provide a high quality service to meet this growing demand.

Before BRT integration can start, the project needs final federal approvals, identified funding sources, engineering and design for infrastructure investments, and analysis for potential route extensions.

Figure 7-1 BRT Locally-Preferred Alternative



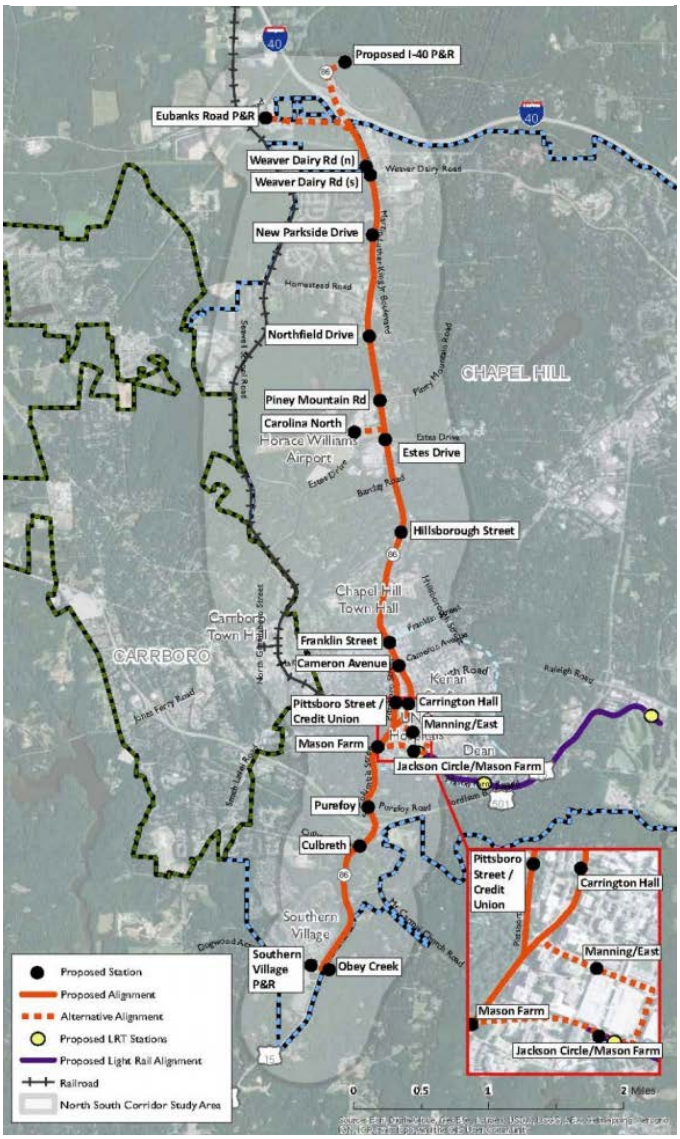
Current Conditions

The North-South Corridor Study project is currently in the environmental and preliminary design phase and has not yet finalized the level of service or infrastructure improvements that will be associated with the final design. The BRT project has not yet reached the 30% design phase and projected costs may be subject to change. As of May 2018, an additional extension providing east-west service from the Eubanks Road Park-and-Ride to Durham Technical Community College is still being analyzed for feasibility and may impact service recommendations upon completion of the assessment.

The existing Orange County Transit Plan includes $6 million in funding for this project, significantly less than the $30 million previously allocated. This amount of funding is insufficient to cover the local match requirement needed to secure federal funding, potentially jeopardizing construction and implementation of the BRT system. There is currently a $94 million funding gap, up to 80% of which may be federally funded, that must be bridged before the project can move out of project development and into implementation. The project must first secure about $12 million in non-federal funding in order to qualify for the next round of Small Starts Grants and become eligible for additional federal funding.

While securing funding remains a major concern before moving the project forward, a Locally Preferred Alternative (LPA) has been developed from the study. The LPA is a combination mixed traffic/dedicated lane BRT route that will connect the Eubanks Road Park-and-Ride lot with the Southern Village Park-and-Ride lot along Martin Luther King Jr. Boulevard, South Columbia Street, and US 15-501. This alignment would operate on the major north-south transit corridor in Chapel Hill.

Figure 7-2 Proposed BRT Stations



Opportunities

Service Simplification and Feeder Service

The implementation of BRT on the main north-south transit corridor in Chapel Hill provides an opportunity for CHT to simplify service by reducing duplicative services on Martin Luther King Jr. Boulevard and South Columbia Street and establish feeder services with connections at BRT stations. This opportunity is largely dependent on the final alignment, level of service, and infrastructure treatments for the BRT system. Investing in feeder services may result in additional transfers for passengers, so improved travel times and frequent service on the BRT system will be necessary to maintain high levels of ridership and customer satisfaction.

The 2015 Service Plans Technical Memorandum recommended eliminating Route NS and modifying Routes A, NU, V, T, and G to provide complementary east-west services connecting to the BRT corridor. The underlying local CHT service is likely to continue operating as it does currently with only small changes to improve accessibility to the BRT line. While some services would be truncated and focused on encouraging transfers to BRT, it is likely that Routes A, HS, and T will continue to provide underlying local service after BRT implementation. This is to provide capacity during peak times and also to serve areas where the BRT does not stop. Also, feeder service may also be provided by on-demand type services that use smaller vehicles to serve nearby neighborhoods and destinations.

Enhanced Regional Coordination

Establishing a high frequency transit spine along Martin Luther King Jr. Boulevard provides an opportunity for increased coordination with other regional transit agencies, including GoTriangle. The

northern terminus of the LPA, the Eubanks Road Park-and-Ride, currently serves CHT local routes and GoTriangle Route CRX. There is also potential to alter CHT and GoTriangle route alignments to serve the Southern Village Park-and-Ride Lot at the southern terminus of the LPA. Rerouting regional buses to serve these park-and-ride lots with seamless BRT connections to UNC Hospitals and downtown Chapel Hill would further simplify service. Additionally, limiting the number of transit vehicles operating in mixed-traffic travel lanes throughout the built-up areas near downtown Chapel Hill and the UNC campus may reduce service delays throughout the system. Any efficiency gains, however, must be compared to BRT vehicle capacity and the travel time impacts on those with longer commutes.

Additional High Capacity Transit Corridors

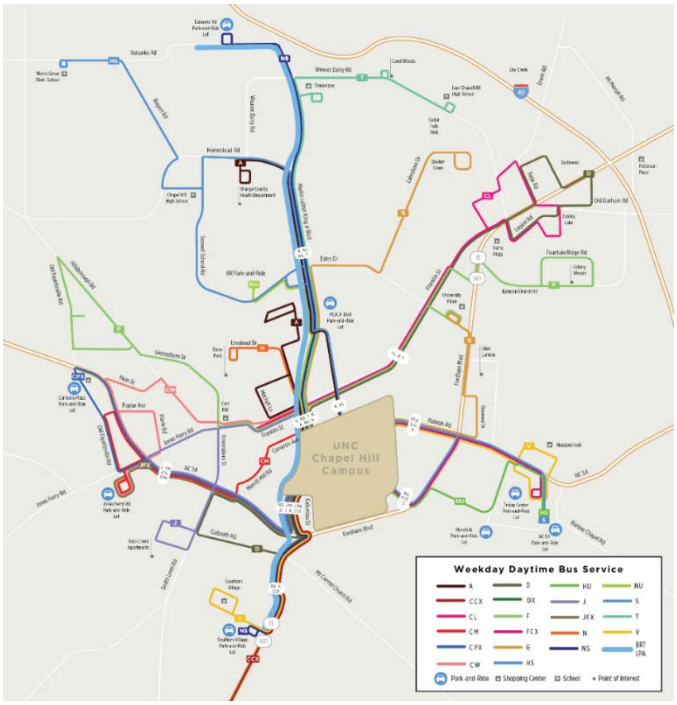
While planning work in recent years has focused on implementation of the North-South BRT corridor, there is also interest in looking at additional corridors for high capacity transit. In particular, an east-west alignment operating along Franklin Street from Eastowne/Patterson Place through Carrboro is of interest for additional study in the future. High capacity transit service on the NC 54 corridor may also be of interest.

Financial Implications

It is not anticipated that implementation of the North-South BRT will result in any savings to the existing system; rather, infrastructure improvements associated with the North-South BRT route would improve operating speeds and efficiency, make the service more attractive for riders, and meet future need for transit along this corridor.

Preliminary cost estimates for the LPA assume between $97 and $106 million in capital costs (2015 dollars) and a systemwide annual operating/ maintenance cost of $3.4 million (2015 dollars). Additional funding sources for both capital and operating costs, including local funding match, must still be identified before the project can move forward.

Figure 7-3 Proposed BRT Alignment and Existing CHT Service



Next Steps

The implementation of BRT on the Martin Luther King Jr. Boulevard corridor is still in the developmental stages and has not yet identified adequate funding sources to move into project implementation.

While BRT implementation provides the opportunity to restructure local services, the primary goal is to address future transit demand, not to reduce the costs for providing existing services. Meeting future demand is critical, especially as new residential development along Eubanks Road comes on-line and increases ridership potential. Without implementing the North-South BRT corridor, service frequency for Route NS will need to be increased to address growing demand on the corridor.

REGIONAL TRANSIT SERVICE COORDINATION

Introduction

Regional coordination has become increasingly important among agencies such as CHT, GoTriangle, Orange County Public Transportation (OPT), GoDurham, Piedmont Authority for Regional Transportation (PART), and Chatham Transit. Ensuring effective and productive coordination with regional providers creates opportunities for improved performance and customer satisfaction on the CHT system—in particular, identifying and leveraging opportunities on shared transit corridors through interagency coordination.

Current Conditions

CHT currently operates in a service area that overlaps with other agencies, and there is opportunity to improve services through enhanced collaboration and policy integration. Existing services are both complementary and supplementary, with most services operating on major corridors, including Martin Luther King Jr. Boulevard, NC 54, US 15-501, Columbia Street, Raleigh Road, and Franklin Street. Major transfer opportunities exist at Eubanks Road Park-and-Ride, UNC Hospitals, and UNC-Chapel Hill Campus. While many of these services are supplemental and should theoretically work together to accommodate the high transit demand on the corridors, CHT's fare free policy makes their services more attractive to riders. Subsequently, these services have become competitive rather than complementary.

From a service perspective, GoTriangle Routes 400, 405, 800, 800S, 805, and CRX operate within the CHT service area providing service to the Eubanks Road Park-and-Ride Lot, UNC Student Union, and UNC Hospitals. Additionally, GoTriangle Route 420 is operated by CHT and provides service during peak periods; midday service along the same alignment is offered by OPT. PART provides service from Greensboro to UNC-Chapel Hill via Burlington, Graham, and Mebane. Chatham Transit offers the CT Express between Siler City and UNC-Chapel Hill. While CHT and GoDurham services do not currently connect, there is opportunity for future service coordination at Patterson Place and The Streets at Southpoint.

Opportunities

Leverage Shared Transit Corridors

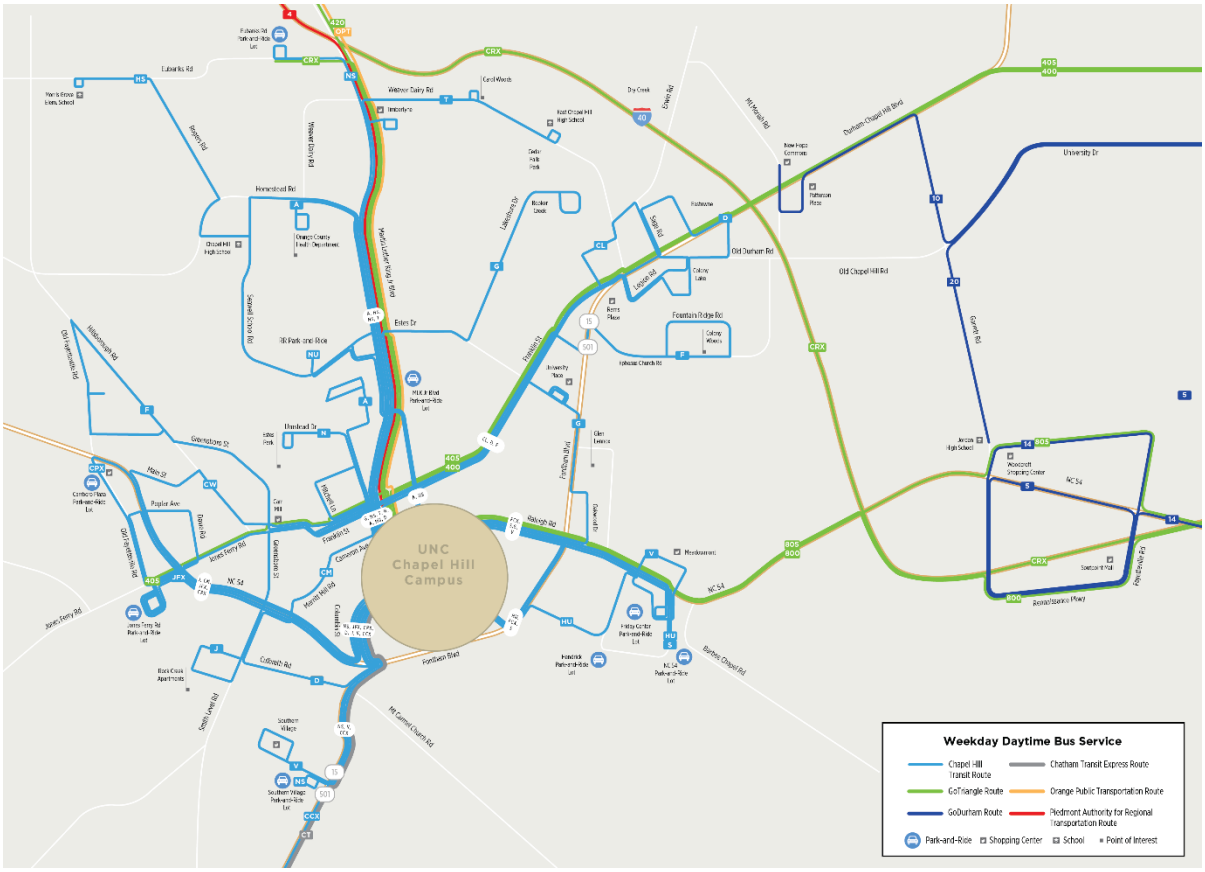
Enhanced coordination between CHT and other regional service agencies would provide the opportunity to identify and leverage shared transit corridors, including NC 54, US 15-501, Martin Luther King Jr. Boulevard, Raleigh Road, South Road, and Columbia Street. This entails identifying areas of overlapping service and analyzing operations and transfers to invest in the most efficient regional transit services, regardless of operator. Additionally, CHT service currently approaches, but does not serve, Patterson Place or The Streets at Southpoint shopping centers, two high ridership locations served by GoTriangle and GoDurham. Coordination with these agencies will allow CHT to determine if it is practical to expand to reach these destinations in the future.

Investigate Additional Partnership Opportunities with UNC-Chapel Hill

CHT currently partners with UNC-Chapel Hill for a variety of functions, including drug and alcohol training required by the Federal Transit Administration (FTA), allowing the general public to access campus transportation services, and providing service to meet ADA requirements. CHT should continue

to investigate opportunities to leverage the existing relationship with UNC-Chapel Hill, including coordination with UNC Hospitals for transportation needs and the potential to partner for public safety functions.

Figure 7-4 CHT and Regional Services



Maximize Demand Response Resources

Currently, CHT operates paratransit service in the urban areas of Orange County, while OPT and Chatham Transit provide service in rural areas. There is opportunity to consider consolidation of paratransit service in Orange County to better meet the needs of riders, as well as facilitating easier integration with region-wide services. Consolidated paratransit service would allow for coordinated dispatching and potential cost savings for the county as a whole.

Pursue Coordinated Fare Policy

One major difference between CHT and other regional operators is CHT's fare free policy. This policy creates an incentive for passengers to take CHT service instead of other regional options since they can use the service for free; in some cases, this results in GoTriangle, OPT, PART, or Chatham Area Transit routes operating with excess capacity. Charts showing average daily boardings per trip on East Franklin Street suggest that GoTriangle service is underutilized, particularly in the inbound direction. Coordinating on fare policies to create a system for transfers or free fares within the CHT service area would create a more efficient transit system and better balance capacity between the competing services.

Adjusting these fare disparities may incentivize additional passengers to ride GoTriangle service instead of CHT service on their high ridership corridors, which are currently over capacity. Creating this incentive would likely have financial impacts for both agencies—for example, reducing GoTriangle fares may require a subsidy from CHT. In return, CHT may have more flexibility to delay capital expenditures and operating costs associated with adding capacity to meet growing demand on high ridership routes.

Figure 7-5 Average Daily Boardings per Trip within the CHT Service Area Travelling toward Chapel Hill

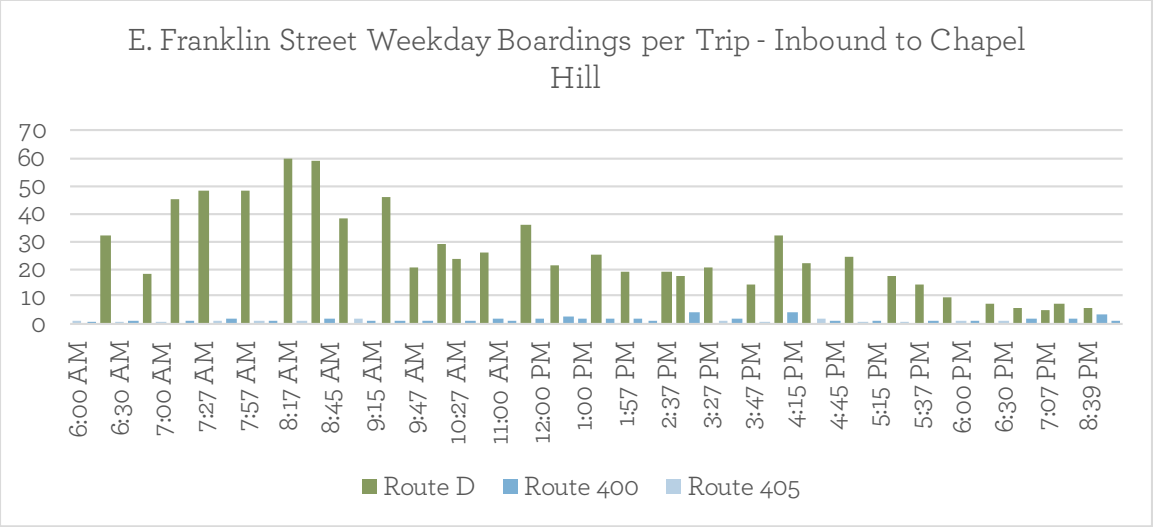
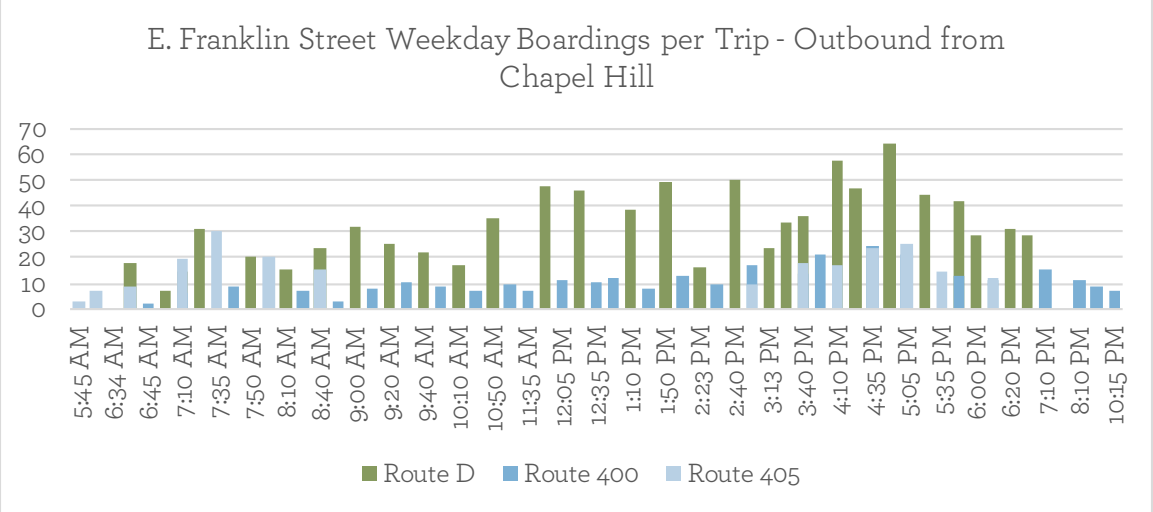


Figure 7-6 Average Daily Boardings per Trip within the CHT Service Area Travelling away from Chapel Hill



Financial Implications

Potential financial implications related to regional transit service coordination are primarily focused around improved efficiency through coordination. The fare discrepancy issue between CHT and GoTriangle may have significant implications for operating costs between the agencies.

CHT's Routes D and NS are already operating near capacity, with ridership expected to continue growing in the future. To meet this demand, CHT may need to deploy additional vehicles or increase service frequency, both of which will increase capital and operating costs for the agency.. To provide a sense of scale, improving service frequency on Route NS to operate every 6 minutes during the morning peak period would require three additional vehicles (approximately $1.5 million in capital costs) and 1,900 revenue hours (approximately $192,000 in annual operating costs). Adding one additional vehicle to Route D during the AM and PM peak periods would require an additional 1,400 revenue hours (approximately $141,000).

Successful coordination with GoTriangle to provide fare free service in this area would reduce the capacity strain currently facing CHT and allow them to postpone the purchase and deployment of additional vehicles. Such an agreement may require CHT to provide a per passenger subsidy to GoTriangle or engage in some other cost sharing program, but this may result in a net gain for CHT's finances by not having to invest in new vehicles or service hours.

Next Steps

CHT should continue to think regionally in the years ahead. As CHT, OPT, and GoTriangle develop short-range transit plans, the agencies should identify shared interests, maintain regular contact, and have ongoing discussions regarding priorities, fare policies, and service planning. A coordinated regional approach to transit service can help each entity ensure regional resources are used as effectively as possible. This coordination should be used to improve the development of transit hubs, access to park-and-rides, and implementation of BRT.

GoTriangle currently operates high frequency service (every 10-30 minutes) between UNC and The Streets at Southpoint and between UNC and Patterson Place—thus complementary service with seamless transfer opportunities would allow CHT to improve service in other areas of the system while providing reliable transit service to these destinations.

CHT should also explore partnerships with other regional agencies operating in underserved areas outside of the existing service area—including Alamance and Chatham Counties, where many local employees reside—to ensure there are viable travel options for passengers. In addition to coordinated service, CHT should continue to pursue opportunities for fare policy partnerships with regional providers.

REGIONAL TRANSIT INITIATIVES

Introduction

The regional plans from the Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC MPO), Orange County, and CHT prioritize investments in regional fixed-route transit service, including commuter and connector bus service, rail, and BRT. Specific projects and initiatives include the Chapel Hill North-South Corridor BRT Study, the Durham-Orange Light Rail Project, a new Amtrak station in Hillsborough, and expanding existing bus services to reach underserved communities throughout the region.

Transit agencies throughout the region responsible for their own planning and service operations include GoTriangle, OPT, GoDurham, GoRaleigh, and GoCary. As of August 2018, each of these agencies are currently conducting SRTP processes to assess existing services and provide future recommendations and implementation plans.

Other regional planning studies include a comprehensive fare analysis in Durham and Wake County, the Wake County Major Investment Study, and the Wake County Bus Plan. These planning initiatives will identify preferred alignments for BRT and local bus services in Wake County, as well as provide recommendations for integrating regional fare policies between agencies.

Current Conditions

The 2017 Orange County Transit Plan outlines several regional transit initiatives, including expanded regional bus service, the Hillsborough Amtrak Station, Durham-Orange LRT, and the North-South BRT Corridor. These regional initiatives have significant impacts directly on CHT service alignments and opportunities to integrate transfers for regional travelers. The DCHC MPO's 2035 Long Range Transportation Plan recommends a significant expansion of bus service throughout the research triangle region and developing a 56-mile light rail system connecting Chapel Hill, Durham, Research Triangle Park, Morrisville, Cary, Raleigh, and North Raleigh. Additionally, SRTPs occurring throughout the region, including GoTriangle, GoDurham, and OPT, will analyze existing transit services and make recommendations for future service improvements occurring within or near the CHT service area. Since the adoption of this plan, the Durham-Orange Light Rail has been canceled and will not be implemented.

Opportunities

The DCHC MPO Long Range Transportation Plan and Orange County Transit Plan identify a suite of regional transit initiatives that will duplicate existing CHT service or provide transfer potential for regional travelers, including the Hillsborough Amtrak Station, expanded regional bus services, and regional LRT systems. These priorities provide both an opportunity for improved regional connections throughout Chapel Hill, Carrboro, and Orange County and a challenge for identifying the future of local service.

In addition to regional transit service, coordination about park-and-ride access and the development of transit hubs can be used to ensure smoother transfers and improve regional accessibility. Impacts to local CHT service are explored in more detail in the Park-and-Ride Corridors section of this document. Concurrent SRTPs provide the opportunity to coordinate future transit development among CHT, GoTriangle, GoDurham, and OPT to provide service in rural Orange County—for example, service along the west NC 54 corridor—and to popular destinations near the edge of the service area, like Patterson Place and the Streets at Southpoint.

Financial Implications

There are no significant costs associated with this issue.

Next Steps

The regional plans and SRTPs from DCHC, Orange County, and CHT prioritize investments in regional fixed route transit, including commuter and connector bus service, rail, and BRT. Specific projects and initiatives include the CHT North-South Corridor BRT plan on Martin Luther King Jr. Boulevard, , a new Amtrak station in Hillsborough, and expanding existing bus services to reach underserved communities throughout the region. Outreach and coordination with other agencies to develop integrated regional transit policies and services can improve transfer opportunities and regional accessibility.

TRANSPORTATION SYSTEM PLANNING

Introduction

Transit agencies and cities across the nation are developing and implementing strategies to improve first- and last-mile connections to transit services, stops, and stations to facilitate a seamless and convenient travel experience and attract more riders. CHT transit plans can be significantly strengthened by accounting for policies and recommendations established in related transportation system planning documents, including pedestrian, bicycle, and mobility plans for the surrounding towns and UNC-Chapel Hill. This integrated system planning approach can prioritize first mile-last mile connectivity and complete streets policies to increase ridership, bolster the multimodal transportation system, and improve accessibility to transit.

Current Conditions

The Chapel Hill Mobility and Connectivity Plan calls for complete streets on Martin Luther King Jr. Boulevard, Franklin Street, Fordham Boulevard, and US 15-501. This would help to create a multimodal network that allows pedestrian and bicycle-friendly routes connecting to major destinations in Chapel Hill and Carrboro.

The Chapel Hill Bike Plan calls for improved bicycle access to transit centers and reduced conflicts between bicycles and pedestrians near transit stops. The plan also recommends integrating bicycle infrastructure and storage facilities at major transit stops. These recommendations are intended to promote safety and accessibility for pedestrians and bicyclists accessing the transit network.

Figure 7-7 Chapel Hill Mobility and Connectivity Multimodal Network

Opportunities

Integrating transportation system recommendations into CHT transit plan development provides the opportunity to make routes more accessible for bicyclists and pedestrians, particularly by improving infrastructure near major transit stops.

While implementing complete streets policies is beneficial for improving safety and accessibility for pedestrians and bicyclists, they can be challenging to implement in areas with limited roadway space. Complete streets policies on Martin Luther King Jr. Boulevard specifically could impact the development of fast and reliable BRT in this corridor. A possible approach to complete streets in the community is to emphasize bus infrastructure on certain corridors and bicycle infrastructure on others, creating a network of streets that emphasize specific travel modes; however, it should be noted that identifying and designating preferred modes on specific corridors may be a contentious issue.

Another potential solution is to implement newer interventions, such as transit islands, designed to enhance safety for all users. This is a particularly important consideration on corridors with a significant grade change that are also slated for transit enhancements—such as potential future East-West BRT implementation on East Franklin Street. Regardless of ultimate policy decisions and formal designations, considering how to effectively provide facilities for all multimodal street users will be an important priority moving forward.

Less infrastructure-intensive improvements, such as providing adequate bicycle storage at transit stops near major bicycling corridors and integrating stops with the UNC Tar Heel Bikes bikeshare program, are easier to accomplish in the short-term. Additionally, some agencies[1] have specialty racks to allow bikes on board transit vehicles, allowing for improved integration for bicycle users and faster boarding compared to front-loading bicycle racks. Other agencies[2] use front-loading bicycle racks designed for three bicycles instead of two to help facilitate additional options for cyclists.

Autonomous Transit

Automation will reach different types of transit on different timelines. Medium-occupancy autonomous shuttle models are already in testing. Mass transit includes some elements of autonomy now, but full autonomy will likely lag behind adoption of autonomous technology in personal vehicles, despite transit operations having the most to gain from automation.

Overall, autonomous vehicles (AVs) are projected to increase vehicle miles traveled and associated congestion. However, autonomous transit could operate far more efficiently than personal AVs in terms of total person-movement or throughput, especially in dedicated lanes or guideways.

Autonomous transit, if thoughtfully guided, has the potential to increase the type and frequency of transit service available. Some transit agencies are beginning to plan now for shifts in travel demand, curbside access, procurement, and safety requirements.

Transit agencies and cities can create the ideal operating environments for autonomous vehicles by creating separate, dedicated operating lanes—an advantage that private vehicles do not have.

[1] Community Transit (Snohomish County, WA) *Swift* BRT service is one example

[2] King County Metro and Sound Transit (Seattle, WA) use front-loading racks manufactured by Sportworks with capacity for three bicycles

To help facilitate an integrated transportation system, CHT should prioritize improving the following:

Figure 7-8 Transportation System Planning Improvements

Improvement	Description
Connectivity	Pedestrian walkways and bicycle infrastructure providing safe routes and access to transit stops. This includes installation of newer innovations such as transit islands to better facilitate bike and bus interaction.
Wayfinding	Signs and maps along major bicycle and pedestrian routes that identify the locations of transit stops.
Pedestrian Improvements	Adding new pedestrian crossings and sidewalk improvements around transit stops and stations.
Bicycle Storage	Providing both short term and long term bicycle storage and parking at major transit hubs. Bicycle parking should be secure, highly visible, and protected from the elements.
On-Board Bike Integration	Investing in onboard integration for bikes in the form of front-loading bike racks with capacity for three bicycles or by allowing riders to carry their bikes onboard on higher capacity transit (such as future BRT and LRT systems).
Bike Share near Transit	Incorporating bike share stations near major transit stops.

Figure 7-9 Pedestrian Connectivity and Wayfinding Improvements

Figure 7-10 Off- and On-Board Bicycle Storage

Figure 7-11 Bicycle Lane and Transit Islands

Figure 7-12 Bike Share Integration

Financial Implications

Improving bicycle infrastructure and facilities would create additional costs for CHT, the town of Chapel Hill, and UNC-Chapel Hill. Costs for developing bicycle infrastructure vary based on complexity of the intervention—for example, from less expensive bike lane striping to more expensive buffered bike lanes and separated multi-use paths. However, since these improvements are comprised of capital costs, they may be eligible for a variety of grant funding options.

Next Steps

Taking an integrated transportation system approach to planning generally produces benefits for pedestrians, bicyclists, and transit riders, but it is important to clearly articulate competing priorities while developing infrastructure improvements and recommendations. Integrating Tar Heel Bikes bikeshare with popular CHT stops near the UNC Campus, planning for the potential integration of dockless bikeshare and/or electric scooters, and providing adequate bicycle storage and pedestrian safety improvements near major transit stops are more easily accomplished than major infrastructure overhauls.

Figure 7-13 Tar Heel Bikes

In terms of long-range priorities, incorporating AASHTO bicycle and pedestrian design guidelines into new high capacity transit developments, as called for in the Chapel Hill Bike Plan, would help create a more integrated, multimodal transportation system.

Figure 7-14 Existing Locations of Tar Heel Bikes Stations

ENVIRONMENTAL IMPACTS

Introduction

This evaluation provides a high-level environmental analysis of CHT operations and capital plans to evaluate consistency with the Town of Chapel Hill's carbon reduction pledge and UNC-Chapel Hill's Three Zeros Environmental Initiative. While these policies are intended to inform decision-making across the spectrum of carbon emissions, water usage, and waste reclamation, transit is a key component of both pledges.

Current Conditions

The Town of Chapel Hill Carbon Reduction Pledge calls for a 60% reduction in greenhouse gas emissions by 2050 (from 2005 levels), with a milestone of 15% reduction by 2015. UNC's Three Zeros Initiative takes an integrated approach to reducing its environmental footprint with the goals of zero net water usage, zero waste to landfills, and zero net greenhouse gas emissions.

Figure 7-15 UNC-Chapel Hill's Three Zeros Initiative

Transit use reduces carbon footprints compared to driving a private automobile, at a rate of about 20 pounds of carbon emissions per day.[3] In 2016, CHT eliminated approximately 10.5 million in vehicle miles traveled by other modes—more than 400 times around the Earth in one year. Increasing transit ridership by facilitating a mode switch from driving alone is in accordance with the Town and UNC's environmental goals.

Increasing the fuel efficiency of the bus fleet is also an important consideration. The CHT fleet is currently comprised of a combination of vans, light transit vehicles, standard buses, and articulated buses. The fleet features a mixture of diesel and hybrid vehicles that operate with various fuel efficiencies. CHT has been replacing older buses with newer clean diesel buses to further reduce overall emissions as older vehicles are replaced and removed from the fleet. There currently is interest in exploring deployment of electric vehicles and the potential for solar facilities to reduce the environmental impacts of operating the transit system.

Opportunities

CHT plays a key role in reducing carbon emissions for the Town of Chapel Hill and UNC by facilitating transportation mode shifts from private automobiles to transit use. The primary challenge for CHT in this regard is to reduce carbon emissions by continuing to replace older vehicles in the fleet and

[3] Source: http://www.townofchapelhill.org/home/showdocument?id=15334

exploring potential alternative fuel sources, including operating electric vehicles and utilizing solar power at transit facilities.

Operate a Mixed Vehicle Fleet

Trends suggest that diesel might not be the fuel of the future. There are opportunities to improve emissions reductions and efficiencies by continuing to strategically operate a mixed fleet of vehicles. Regionally, GoRaleigh is beginning to operate Compressed Natural Gas (CNG) vehicles. Smaller buses are more fuel efficient than larger buses; however, since operations and maintenance costs account for about 90% of the cost of operating the vehicle, the financial benefits of these fuel savings are not significant. Replacing older, less fuel efficient vehicles with newer vehicles will also continue to improve emissions in CHT's fleet.

Electric Vehicles

In addition to newer, more fuel efficient clean diesel buses, investing in electric vehicles could result in significant emissions reductions for CHT. Compared to diesel buses, electric vehicles generally have higher capital costs, but lower operating costs.

Electric vehicles have started to be implemented by a select number of transit agencies across the U.S.—for example, the Antelope Valley Transit Authority in California has embarked on an ambitious plan to turn over their entire fleet (85 buses) by the end of 2018. As of May 2018, CHT has placed a bid to add electric buses to their fleet, but any future capital expenditure is tentative.

Overall, there are several considerations that need to be evaluated for selecting appropriate route(s) for electric bus service:

- Bus Range: One of the challenges with electric vehicles is the distance a bus can travel before needing to be recharged. Although battery technology is improving, CHT would need to consider manufacturer recommendations and test results for the vehicle range under the worst case conditions (i.e., fully loaded with auxiliary loads such as heat or air conditioning).
- Charging Station Locations: Using electric buses also requires an investment in charging stations. Charging station locations need to be secured at appropriate locations along a route to take full advantage of battery charging opportunities. The number and location of charging stations needed on a route depend on maximum speed required along the route, number of stops, service hours, operating speeds, and driver shift schedules.

The success of electric bus implementation depends on the understanding of operations and maintenance personnel. The specific recommendations for personnel requirements include:

- Bus Safety Review: A safety review of the bus engineering and operational safeguards is a good practice. Reviewing how high voltage power lines are routed and identified in the engine bay is important to assuring the safety of operations and maintenance staff.

- Maintenance Personnel Training: A maintenance personnel qualification training program should be established to assure that only staff that have received the proper training are allowed to perform maintenance on the battery-powered buses.
- Bus Operator Procedures Update and Training: Bus operators have an impact on how well buses perform in service. Bus operating manuals/procedures need to be updated, and drivers must be trained on bus operating parameters including the operation of the charging system.

Figure 7-16 Electric Bus Considerations

Pros	Cons
Zero mobile emissions	High initial capital costs (charging stations, vehicle price)
Energy to charge buses can be from renewable sources	Adequate layover time must be provided at charging station locations
Higher efficiency in stop-and-go driving	Routes must be scheduled so only one bus charges at a time
Silent and smooth ride has been credited with contributing to ridership increases	Technology is developed, but not fully refined.
Battery technology is continually improving	Battery life and full lifecycle cost is currently unknown

Source: Nelson\Nygaard adapted from TCRP Report 146: Guidebook for Evaluating Fuel Choices for Post-2010 Transit Bus Procurements (2010)

The electric bus market has developed two distinct options for charging, with some variations of these anticipated as the technology develops and matures:

- Extended Range or Overnight Charging: This option allows the bus to operate similarly to a standard diesel bus on-route. With bus manufacturers claiming 150 to 180 miles per charge, this generally equates to the daily mileage of most urban-service transit operations. Recently, one manufacturer has added the option of an on-route boost charge that can extend the range of the bus using the same technology as the quick charge option—essentially a smaller charger that gives the batteries a partial charge to extend the range.
- Fast or Quick Charge: This option allows the bus to travel 30 to 40 miles on a route and return to a station for a 10 to 15-minute recharge of the batteries. The charge time can vary with the distance the bus travels between charges. This option is also evolving with the ability to adjust the charge cycle to the distance of the route.

Buses that renew the electric charge through the service day currently seem to be the most popular option for deploying electric buses. At the same time, buses that use slow-discharge battery packs are continually gaining range. One electric bus manufacturer claims their buses will travel 200 miles in normal operations. This trend is worth watching, as it may be possible to begin electric bus deployment with on-line rapid charging stations and complete the changeover with slow-discharge battery packs where the buses are charged at the end of the service day.

Figure 7-17 King County Metro (Seattle, WA) Electric Bus

Solar Power Generation

Transit agencies are ideal candidates for solar installations because they require large amounts of electricity to operate and because they typically have large facilities with roofs or yards that can host solar arrays. Both large-scale solar arrays and small-scale solar installations can help reduce energy costs, reduce greenhouse gas emissions, and improve operating efficiencies for transit agencies. Agencies like Valley Metro, LA Metro, and IndyGo have invested in large solar fields near or attached to their operations facilities.

The CHT building located on Millhouse Road is a potential candidate for solar power generation given the available space for installation surrounding the building, on the roof, above bus canopies, and due to the close proximity to the Town of Chapel Hill Public Works building, a potential partner in developing shared energy resources.

Financial Implications

The emissions benefits for electric vehicles are higher than for clean diesel and would help support local environmental initiatives. At the same time, capital costs are notably higher. Electric vehicles themselves are more costly than diesel vehicles and require additional charging infrastructure including fast charge stations, maintenance facility chargers, and installation costs. Operating costs are generally lower for electric vehicles based on current fuel efficiency, fuel costs, and reduced maintenance needs (fewer moving parts). The feasibility of transitioning to an electric fleet may depend on the availability of grant funding for capital improvements and acquisitions.

Figure 7-18 Alternative Fuels Capital Cost Summary

Property	Diesel	Electric
New Vehicle Cost (Each)	$450,000	$750,000
Facility Conversion	-	$865,000

Source: Proterra, CHT, National Transit Database, U.S. Department of Energy Efficiency and & Renewable Energy

Note: Electric bus facility conversion amount includes one fast charge station, one maintenance facility charge station, and installation; additional fast-charge stations would likely be necessary to support CHT operations. Fast-charge stations are estimated to cost $600,000 each, plus installation.

Figure 7-19 Alternative Fuels Cost Summary

Property	Diesel	Electric
Fuel Economy (Miles/Gallon)	3.2	1.73 kWh/mile
Fuel Cost per Gallon	$2.96	$0.08/kWh
Estimated Annualized Fuel Savings (Cost)	-	$1,358,042
Annual Propulsion System Maintenance Savings (Cost)	-	$125,319
Annual Facility Maintenance and Operation Savings (Cost)	-	$89,513
Total Operations Savings (Cost)	-	$1,572,873

Source: Proterra, CHT, National Transit Database, U.S. Department of Energy Efficiency and & Renewable Energy

Note: Annualized savings and costs based on 1,790,266 vehicle revenue miles, which is what CHT operated in 2016 for the fixed route system.

Next Steps

To better communicate the carbon reduction propensity of the CHT system, a "value proposition" about the environmental benefits of CHT service could be developed to articulate consistency with Town and UNC-Chapel Hill goals. CHT should also continue to retire old vehicles and purchase newer, more efficient vehicles as their capital budget allows. The potential for integrating electric vehicles into the fleet or investing in solar technology should continue to be investigated; however, a careful analysis of the risks, benefits, and opportunities of investing in electric vehicles or solar facilities should be taken before committing resources.

As of August 2018, CHT was awarded a grant for purchase of two electric vehicles. CHT should continue to evaluate vehicle reliability and improvements in technology to facilitate local operation, which includes considerations such as grade and hot summer temperatures.

FUTURE DEVELOPMENT

Introduction

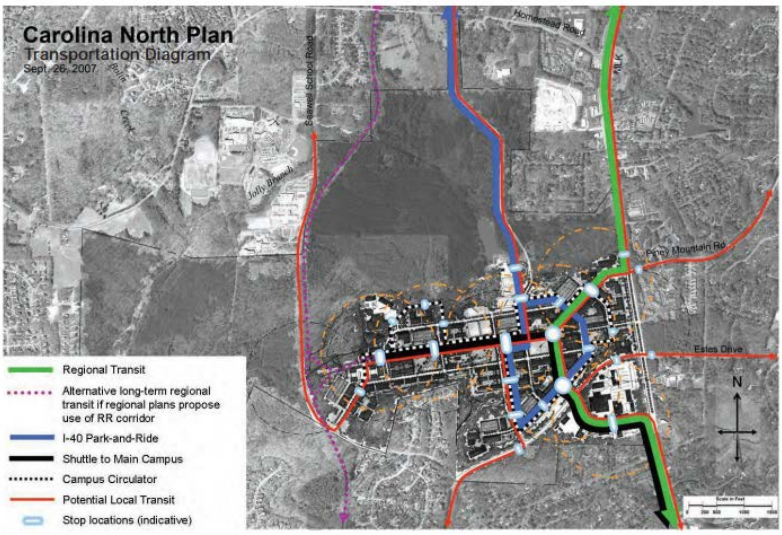
Planned mixed-use, residential, and commercial developments within the CHT service area have the potential to create new demand for transit and overwhelm the capacity of buses on existing routes. Identifying the locations and impacts of future development on the transit system is a necessary ongoing process to ensure efficient, high-performing transit service.

Current Conditions

Current large-scale developments with potential impacts include:

- Carraway Village
- Obey Creek
- Glen Lennox
- Carolina North Campus
- Blue Hill District
- East 54
- Chatham Park
- Carolina Square
- Amity Station
- Grove Park
- UNC Hospitals Eastowne Campus
- Additional growth on the main UNC campus and at the UNC Hospitals.

Figure 7-20 Carolina North Campus Proposed Transportation Access



These developments contain at least 200 new residential units each, and in the case of Blue Hill District and Carolina North Campus are larger developments consisting of multiple buildings and uses that may become major commercial and residential destinations. While these developments are dispersed throughout the service area, they are all located on a few key corridors: Martin Luther King Jr. Boulevard, Franklin Street, NC 54, and US 15-501. These developments are served by a combination of CHT routes, including Route G, NS, T, N, A, NU, D, HS, CL, D, V, S, HU, FCX, and CCX.

Additionally, development will continue occurring in Chatham Park, as well as Durham and Wake counties that will have impacts on regional transit and interagency coordination.

Opportunities

New residential developments provides an opportunity for CHT to improve ridership and route efficiency. The impacted routes should be considered for increased service frequency in order to capture increased demand and improve service to rapidly developing areas.

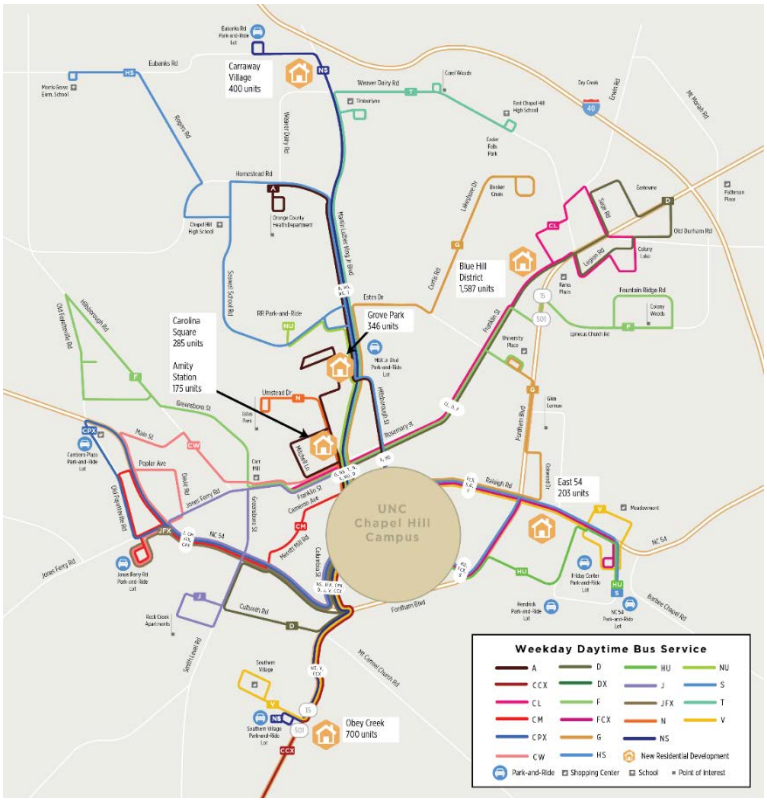
In particular, the new developments on Routes NS (400+ units on the north portion and 700 units on the south portion) and Route D (1,200+ units) are very likely going to require additional peak resources and buses. For such large-scale residential developments, CHT needs to plan ahead to ensure that sufficient buses and operating hours are available. There is potential for GoTriangle service to

accommodate a portion of this expected ridership growth through interagency collaboration and potential fare policy adjustments.

Financial Implications

Increased development intensity along transit corridors is likely to increase demand for transit in the area. Identifying these developments and increasing transit capacity to meet this growing demand will require additional capital and operating expenditures. Monitoring these developments and forecasting the necessary timeframe for making improvements will allow CHT to make strategic investments and expenditures. In this way, CHT may plan and schedule their capital and operational improvements, rather than addressing capacity issues as they arise, rather than when the agency may lack sufficient available funding.

Figure 7-21 Proposed Residential Developments and Existing Chapel Hill Transit Service



CHT should continue to investigate opportunities for "payment-in-lieu," transit improvement districts, or other methods designed to ensure new developments are paying their fair share to meet increased demand on the transit system. The existing transit payment-in-lieu policy is designed to establish a method to assess a fee supporting transit infrastructure improvements necessary to meet anticipated increase in service demand generated by a new development. Changes to the existing payment-in-lieu policy would require legislative action. Opportunities for operating funding support should also be pursued.

CHT should evaluate the potential of establishing a transit improvement district or transportation benefit district as a mechanism for funding additional transportation improvements. These are legislatively authorized, independent taxing districts established for the purpose of funding transportation improvements in a given area. These districts could impose fees in the form of taxes or licensing fees to provide additional funding for transit improvements.

Next Steps

In order to continuously improve and maintain service performance, CHT should develop an ongoing strategy for identifying and analyzing impacts of new developments. This strategy can be used to tailor transit services based on areas of future transit demand, determined by the number of new residential units in planned developments. There may be opportunities for development agreements with new apartment buildings or large employers allowing CHT to provide input in the development review process and provide comments related to bus service integration.

PARK-AND-RIDE CORRIDORS

Introduction

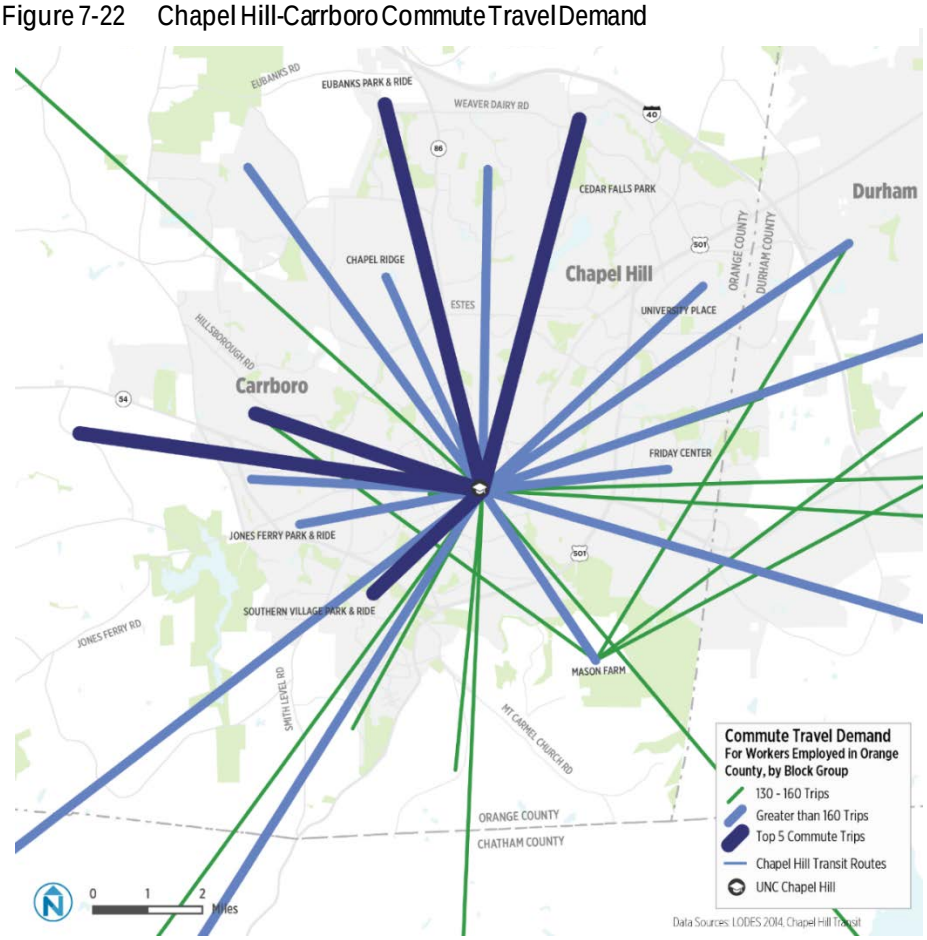
Chapel Hill, Carrboro, and UNC-Chapel Hill all have growth plans that depend on CHT to mitigate parking and traffic concerns. CHT's primary park-and-ride strategy has been focused on the east NC 54 corridor, but as traffic patterns continue to evolve, additional park-and-ride capacity or changes to park-and-ride policy may be necessary. This section identifies the existing and potential markets for park-and-rides based on capacity, utilization, and commute trends. Identifying development patterns near downtown Chapel Hill and UNC, as well as in areas outside Orange County, and the impacts that they have on existing park-and-ride lots may influence future policies and planning strategies for CHT.

Current Conditions

There are currently nine park-and-rides served by CHT and GoTriangle; however, five of these are reserved for UNC students, staff, and faculty—Friday Center, Martin Luther King Jr. Boulevard, NC 54 East, Chatham County, and the Hedrick Building. Park-and-ride lots available for public use are located on Eubanks Road, Jones Ferry Road, Carrboro Plaza, and Southern Village.

A travel demand analysis identified the most common origins for commutes ending in the town of Chapel Hill. The most common commutes originate in the north side of Chapel Hill, from the west in Carrboro and the NC 54 corridor, and from the area surrounding the Southern Village Park-and-Ride Lot. Other high volume commute trips originate in Durham, University Place, Friday Center, Mason Farm, and Chatham County.

Figure 7-22 Chapel Hill-Carrboro Commute Travel Demand



Current commute patterns indicate that the majority of trips into Chapel Hill from outside of Orange County are originating in Chatham and Durham Counties. These trips would currently be able to access the Chatham County Park-and-Ride Lot, served by Route CCX, or the Southpoint Park-and-Ride lot, served by GoTriangle Routes CRX, 800, and 805.

Beginning in 2013, Chapel Hill and UNC began charging for use of park-and-ride lots. Overall, these charges have created some capacity at the lots because some people have been discouraged from using the lots, while others have started to walk instead of driving to them. This change in parking policy provides some context for the low utilization rates in some park-and-ride lots, though most town officials expect the lots to return to pre-charge utilization levels in the long term[4].

Figure 7-23 CHT Park-and-Ride Lots and Utilization Rates

Park-and-Ride Lot	Capacity	Pre-Fee Utilization Rate	Utilization (September 2016)	Utilization Rate
Eubanks	395	89%	175	44%
Southern Village	400	100%	282	71%
Carrboro Plaza	145	91%	20	14%
Jones Ferry	443	54%	78	18%
Friday Center*	871	-	752	86%
NC 54 East*	512	-	87	17%
Hedrick*	278	-	36	13%
Chatham*	550	-	129	23%
MLK*	40	-	40	100%

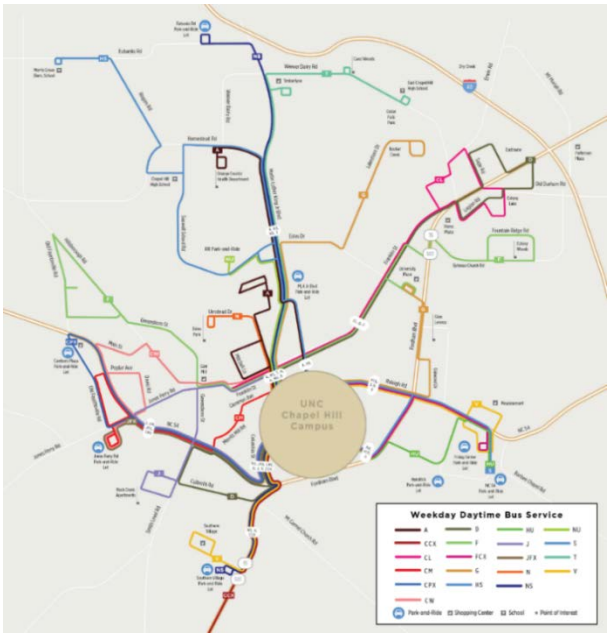
* UNC-Chapel Hill-managed park-and-ride lot

Opportunities

The park-and-ride system inherently comes with tradeoffs in terms of service productivity, land use, and environmental impacts. One benefit of park-and-ride lots is that they can expand the transit service area to lower density, suburban areas that could otherwise not support fixed-route transit service; density is effectively created by allowing passengers to drive to one location to access the bus.

CHT's park-and-ride model utilizes a mix of close in and far out park-and-ride lots including a cluster just outside of UNC's Campus around NC 54 with further out lots located on Eubanks Road, Carrboro Plaza, Jones Ferry Road, and Chatham County. Close-in park-and-ride lots are generally more expensive to maintain due to the relatively high value of land that has strong redevelopment potential. However, their service costs are lower because of the short distances to/from UNC's campus.

Figure 7-24 Chapel Hill Park-and-Ride Lots and Existing CHT Service



[4] As of summer 2018, this is beginning to play out in the NC 54 East corridor, as ridership on GoTriangle Routes 800 and 805 is decreasing while a corresponding increase in ridership is occurring on CHT Route FCX.

More distant park-and-ride lots require a longer transit trip and may be less attractive to potential users. However, a longer transit trip means riders are spending less time traveling in automobiles. Potential park-and-ride lots may be considered west of Chapel Hill in White Cross and south of Chapel Hill in Chatham County. Regional growth is expected to occur in Chatham County and Alamance County, and there is interest in working with Orange County Public Transportation (OPT) and Piedmont Authority for Regional Transportation (PART) to consider partnering on park-and-ride and service development to address demand from these areas.

In the future, the Carolina North campus presents a challenge to address the 30,000 commuters that would be traveling to the area. Identifying current capacity and demand across the existing park-and-ride system will provide greater insight into locating new park-and-ride facilities to serve this population.

Financial Implications

In recent years, traffic volumes on the west NC 54 corridor have continuously increased, largely due to trips from Alamance County. To intercept regional commute trips further from the urbanized area and support access to jobs for rural Orange County residents, a park-and-ride at White Cross is proposed.

Depending on the level of service investment and operator, costs for fixed-route service originating in White Cross and ending at UNC-Chapel Hill could range from approximately $90,000 to $530,000. Peak-only service offered every 60 minutes would result in the lowest level of investment. No capital costs for park-and-ride construction are included, though it can be assumed that some level of investment and maintenance would be required.

Figure 7-25 Illustrative West NC 54 Service Cost Summary: White Cross to UNC-Chapel Hill (Weekdays Only)

Service Type	Frequency: Peak	Frequency: Off-Peak	Service Span	Vehicle Requirement	Annual Operating Cost Estimate (Varies Depending on Operator)
Peak Only	60	--	6:30 AM - 9:30 AM; 3:30 PM - 6:30 PM	1	$90,000 to $150,000
All Day	60	60	6:00 AM - 9:00 PM	1	$220,000 to $380,000
All Day with 30-Minute Peak Service	30	60	6:00 AM - 9:00 PM	2	$300,000 to $530,000

Next Steps

Most existing park-and-rides have capacity to address any near-term demand increases. In the future, the primary markets for park-and-ride use are likely to be from Chatham, Durham, and Alamance Counties. There are opportunities for CHT to intercept more trips from rural and suburban areas, particularly in the White Cross and Chatham County areas. CHT should prioritize coordinating with other regional transit service providers (OPT, GoTriangle, etc.) to identify locations for new park-and-ride facilities to the south and west to serve commuters from Chatham and Alamance Counties.

TRANSIT HUBS

Introduction

Transit hubs are designated off-street facilities that are useful for reducing delays in heavily congested areas, providing a safe and comfortable environment for passengers to make transfers, and that provide sufficient space for buses to dwell during layover periods between routes. Transit hubs can provide space for both stop bays, which provide separation from general purpose traffic for the bus to stop, or layover bays, which allow buses to pull out of service for recovery time at the end of their trip before starting the next one. Layover recovery time is an essential component of transit operations and is built into the schedule in order to recover from delays, allow opportunities to wait if a trip is running ahead of schedule, and ensure reliable scheduling in congested areas.

Developing transit hubs is a key strategy for reducing transit vehicles dwelling on streets and facilitating transfers at high ridership locations. Effective transit hubs provide passenger benefits and performance improvements by separating the bus from general purpose traffic in select locations. High ridership and transfer locations in downtown Chapel Hill, Patterson Place, and at the UNC Hospitals are primary locations to analyze the feasibility of transit hubs.

Current Conditions

CHT does not currently have any transit hubs outside of their park-and-ride lots; however, there are several high ridership transit stops that may be candidates for investing in transit hub development. Potential transit hub locations are designated as primary or secondary based on the existing and projected buses per hour serving the location, bus layover activity, and potential for transfers.

Primary Transit Hubs:

- Manning Drive/East Drive at the UNC Hospitals: This location currently has room for approximately four buses to serve the area at a single time. This is adequate for existing bus volumes, but does not account for layover and recovery needs for routes terminating at this location. Buses must travel multiple blocks in highly congested conditions to find space for layover and recovery.

Secondary Transit Hubs:

- Franklin Street & Columbia Street: There is no designated layover space for routes in downtown Chapel Hill, including at Franklin Street & Columbia Street. Buses do occasionally lay over in this area for one to five minutes, though space is limited to one to two buses. When possible, operators will leave the previous time point late to avoid laying over in this area. There are a number of physical constraints in the area that would make development difficult, but this could serve as a key location for evening and night services.
- South Road at the UNC Student Union: South Road at the UNC Student Union currently has space for two buses. Recovery is not scheduled at this stop, but it still occurs. There are nearby facilities for operators to take breaks. From a right of way perspective, there is insufficient space available to develop off street facilities; however, there is potential for improving bus stop amenities and providing pedestrian improvements to increase visibility of the bus stop.

Opportunities

Manning Drive/East Drive at the UNC Hospitals

The UNC Hospitals stop is currently served by 25 routes operated by CHT and GoTriangle, resulting in 53 buses per hour in each direction during the peak hour. Given the high volume of bus traffic in this area, no CHT routes have designed layover here; however, GoTriangle Route 400 does have layover designated at this stop. Currently, the main stop has sufficient space for approximately four buses in the northbound direction and two buses in the southbound direction.

There is currently no designated area for layover at the UNC Hospital. The number of bus bays, as documented above, are not sized to allow for layover. GoTriangle, PART, and potentially CHT routes could all end at the Hospital, but do not due to lack of layover space. Buses are travelling out of direction in congested areas to stage and have recovery. Layover space for each route terminating near the Hospital is desirable.

Figure 7-26 Existing Bus Pullout Space on Manning Drive at UNC Hospitals

Franklin Street & Columbia Street

The Franklin Street & Columbia Street route is served by a total of 10 CHT and GoTriangle routes. The development near Franklin Street & Columbia Street has relatively small building setbacks, which severely limits the ability of CHT to construct a fully separated transit center. This location has no designated layover occurring and has space for one to two buses at a time. Route J sometimes uses this area as a "recovery" stop. During evening times, when services run much less frequently, transfers to other routes could happen at this location, but this is difficult because multiple buses cannot line up to facilitate transferring.

To account for future growth in transit services, CHT could consider adding a transit hub near the Franklin Street / Columbia Street intersection. This could consist of expanding the existing on-street stalls or be an off-street facility.

Figure 7-27 Striped Bus Pullout Area and On Street Parking at Franklin Street and Columbia Street

South Road at the UNC Student Union

The South Road and UNC Student Union stop is served by eight CHT and GoTriangle routes. Like Franklin Street & Columbia Street, this location has relatively small building setbacks, which severely limits the ability of CHT to make large-scale capital improvements. This location does not have any designated layover occurring; however, it does happen occasionally. There is a 180-foot long pullout in the westbound direction, but no corresponding pullout in the eastbound direction.

Given the passenger and bus volumes at this location, upgraded passenger amenities such as expanded shelters are appropriate. In addition, an eastbound pullout, where buses can load passengers without blocking traffic, should be considered.

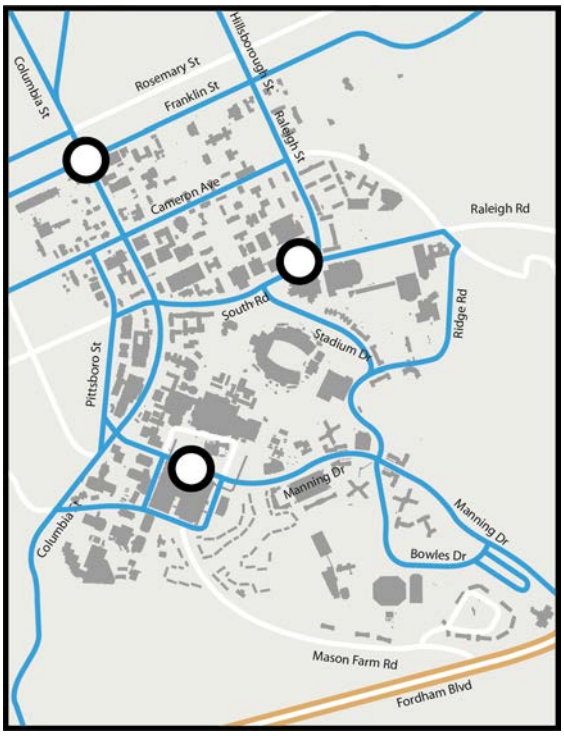
Figure 7-28 Bus Pullout on South Road at the UNC Student Union

Financial Implications

Identifying and constructing transit hubs will result in a capital expenditure for the sake of improving operational efficiency. Inadequate layover space increases dwell times and average travel times for routes serving some of the most popular destinations in the CHT system. Improving dwell times and operational efficiency will prevent unnecessary expenditures on deploying addition vehicles to maintain schedules.

The costs and benefits associated with transit hubs can vary based on the level of investment and infrastructure improvements. For example, the North Boulder Mobility Hub is a proposed transit hub in Boulder, CO with a projected opening in 2019. This transit hub is a fully separated location with bus bays for four standard buses and one articulated bus, short-term car share parking, integrated bike share and secure bike storage, and a driver relief station. The North Boulder Mobility Hub is projected to cost $3.1 million.

Figure 7-29 Potential Transit Hub Locations



Next Steps

Transit hubs are effective for improving performance in dense, congested areas. Separating bus operations and stop locations from general traffic reduces conflicts with automobiles, facilitates transfers, and provides a more pedestrian-friendly transit stop. Three of the highest ridership stops in the CHT system are located in dense, congested areas of Chapel Hill; however, limited right-of-way at these locations presents a challenge for physically developing the infrastructure necessary to complete a full transit hub. Patterson Place is also a viable location for a transit hub, although CHT does not currently provide service to the development.

Figure 7-30 North Boulder Mobility Hub (Boulder, CO)

8 PUBLIC OUTREACH

Public outreach and stakeholder engagement in for the CHT SRTP occurred over three distinct phases:

- Phase I occurred during September and October of 2017 and utilized the online Design Your Transit System survey tool to identify priorities and trade-offs for transit service improvements. Open-ended comments for phase I outreach are shown in Appendix D.
- Phase II occurred during January and February of 2018 and used an online survey to present the changes for the three proposed service scenarios. This phase was used to gauge perceptions of proposed service changes and input was used to develop the Preferred Alternative. Open-ended comments for phase II outreach are shown in Appendix E.
- Phase III occurred during September and October of 2018 and used an online survey to present and seek input on the proposed service changes in the Preferred Alternative. Open-ended comments for phase III outreach are shown in Appendix F.

All three phases of outreach incorporated multiple in person, public outreach events in downtown Chapel Hill, downtown Carrboro, the UNC-Chapel Hill Campus, and the UNC Hospitals. Attendees were encouraged to ask questions about proposed service changes, voice concerns, and were directed to provide feedback using the online survey tools.

KEY FINDINGS

Phase I

- The highest priority transit improvements were more evening service, serving new local destinations, and more local Saturday service.
- Desired transit improvements were prioritized on their ability to expand service and improve service frequency.
- Transit users were more focused on improving connections to transit, adding new local destinations, and adding frequency to commuter routes.
- Non-transit users were focused on increasing service on weekends and evenings.
- The most common reasons respondents did not take transit is because the service is inconvenient, does not go where they need it to, or it takes too long.

Phase II

- Survey respondents are significantly more supportive of the changes proposed in the scenario that emphasized weekend service improvements.
- There is support for increasing frequency on overcrowded routes, including Route J, Route NS, and Route D, as well as providing weekend service on Route NS.
- Eliminating segments of Route D, Route F, Route G, and Route V will be challenging for some passengers.

- UNC students are more supportive of improved frequency on the busiest routes than UNC staff, UNC faculty, or non-UNC affiliated respondents, indicating students' preference for improved weekday service frequency.
- Respondents living outside of the Chapel Hill-Carrboro area are more likely to be UNC staff and are supportive of all three scenarios.
- There is support for a high frequency east-west route, but not at the expense of eliminating neighborhood coverage service.

Phase III

- Respondents were generally supportive of the changes proposed to Routes NS, J, CW, and NU.
- There was initial opposition to the changes proposed to Routes FCX, JFX, and S. Open-ended comments indicated a perception of lost service due to the removal of Route FCX and Route JFX, as well as longer travel times due to the alignment of Route S.
- Concerns over proposed routes were addressed and service changes were clarified to ensure that the same stops, service area, and service level is maintained in these areas.
- Changes following public feedback include:
  - Modifying the Route CL alignment to serve Sage Road, Erwin Road, Old Oxford Road, and Summerfield Crossing Road.
  - Operating Route HS all day.
  - Removing service from Old Fayetteville Road and West Poplar Avenue on Route JFX.
  - Adding service to Old Fayetteville Road and West Poplar Avenue on Route CM.
  - Route FCX would operate on the same alignment as it currently does. Morning peak frequency would be reduced to every seven minutes to allow for improved on-time performance, and midday service would be added.
  - Route S would be modified to serve North Campus at Student Union/Fetzer Gym.

PHASE I OUTREACH

Prior to the development of any service recommendations, a first phase of public outreach was held. The purpose of this outreach round was to understand improvement priorities for both users and non-users. Open houses were held in Carrboro, Chapel Hill, UNC Hospital, and on UNC-Chapel Hill's campus. These open houses were supplemented by an on-line survey, called the "Design Your Transit System."

Design Your Transit System

Survey respondents were asked to design their ideal transit system by selecting specific improvements with a cost associated for implementation. Respondents had a predetermined budget to work with, limiting the combination of possible improvements for their system. This required respondents to focus on prioritizing the most important service improvements while maintaining a realistic budget for practical implementation. The survey contained 16 distinct improvements:

- More Sunday Service: "Operate routes that have demand for Sunday service"
- More Evening Service: "Operate more routes in the evening and offer better service frequency"
- More Local Circulation: "Operate service oriented to local neighborhoods"
- More Midday Service: "Provide more buses between peak times, during the middle of the day"

- More Local Saturday Service: "Increase the number of routes that operate on Saturdays"
- New Local Destinations: "Increase services to places other than the UNC campus and UNC Hospital facility"
- More Regional Service: "Provide more bus routes that travel to regional job and retail centers"
- More Frequent Commuter Service: "Operate routes with more frequency during morning and afternoon commute times"
- Enhanced Bus Stops: "Put more amenities at more bus stops, such as shelters, benches, lighting, and signage"
- Improve Online Information: "Redesign web site to provide more and clearer information oriented toward the passenger, such as service alerts"
- Improve Print Information: "Redesign transit maps and schedules so they show transfer points to other CHT routes and to regional services, such as GoTriangle"
- Expand Real-Time Service Information: "Expand real-time information so it is available in more locations"
- Improve Connections between Bikes and Buses: "Retrofit buses to carry more than two bicycles on the front of vehicles. Add more and better bike parking at bus stops, including racks and lockers"
- New Car Share Program: "Implement car sharing at park-and-rides and major transit stops"
- Improve Greenway Connections: "Create more and better connections from bus stops to local greenways and trails"
- New Bike Share Program: "Implement bike sharing program so bikes are available at major bus stops and transfer locations"

After selecting their desired improvements, respondents were given the opportunity to participate in a follow-up survey about their impressions on the Design Your Transit System budget, improvements, factors influencing their decision making process, and their primary mode of transportation.

Survey Results

Overall Results

Overall, 281 people responded to the Design Your Transit System Survey, and 224 people responded to the additional follow up survey. On average, respondents selected six distinct improvements with their allotted budget. Figure 8-1 shows how frequently respondents selected each of the 16 improvements. The most commonly selected improvement was more evening service (60%), followed by new local destinations (56%), more local Saturday service (55%), more Sunday service (54%), and expanded real-time service information (54%).

Respondents were also asked to rank the factors influencing their improvement selections from 1 to 6, with 1 being the most important and 6 the least important. These responses were collectively scored in Figure 8-2 to show their relative importance, with higher scores being more important than lower scores. The two most important decision-making factors were making transit available in more places at more times of day (4.93/6) and making it easier for more people to use the bus (4.38/6). This suggests that improvements in the Design Your Transit Survey were prioritized on their ability to expand service and improve service frequency.

Figure 8-1 Design Your Transit System Survey Results

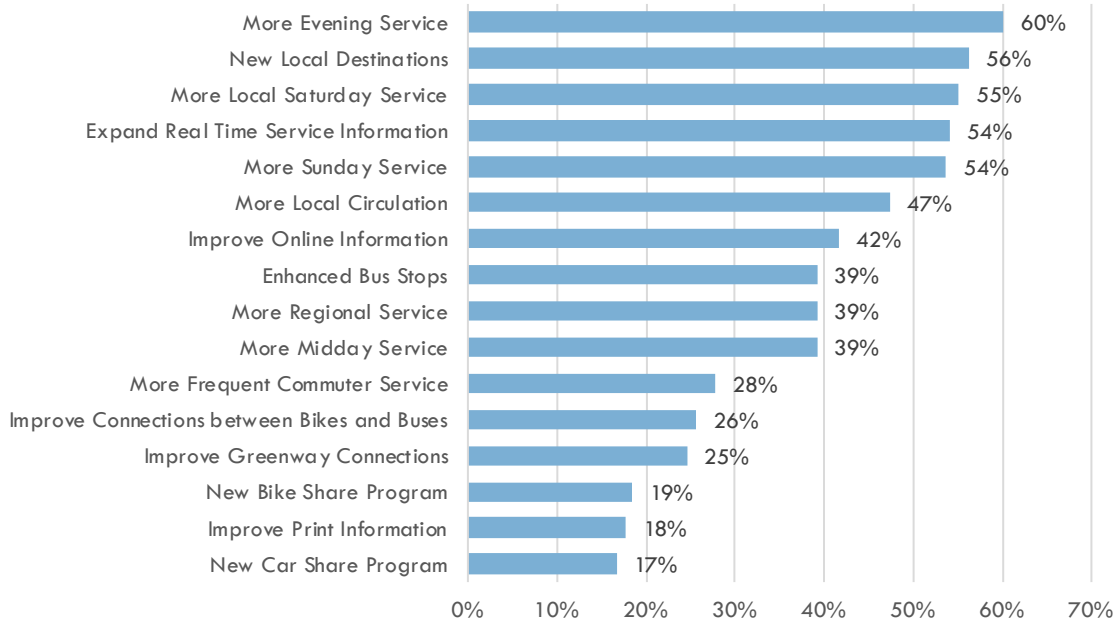
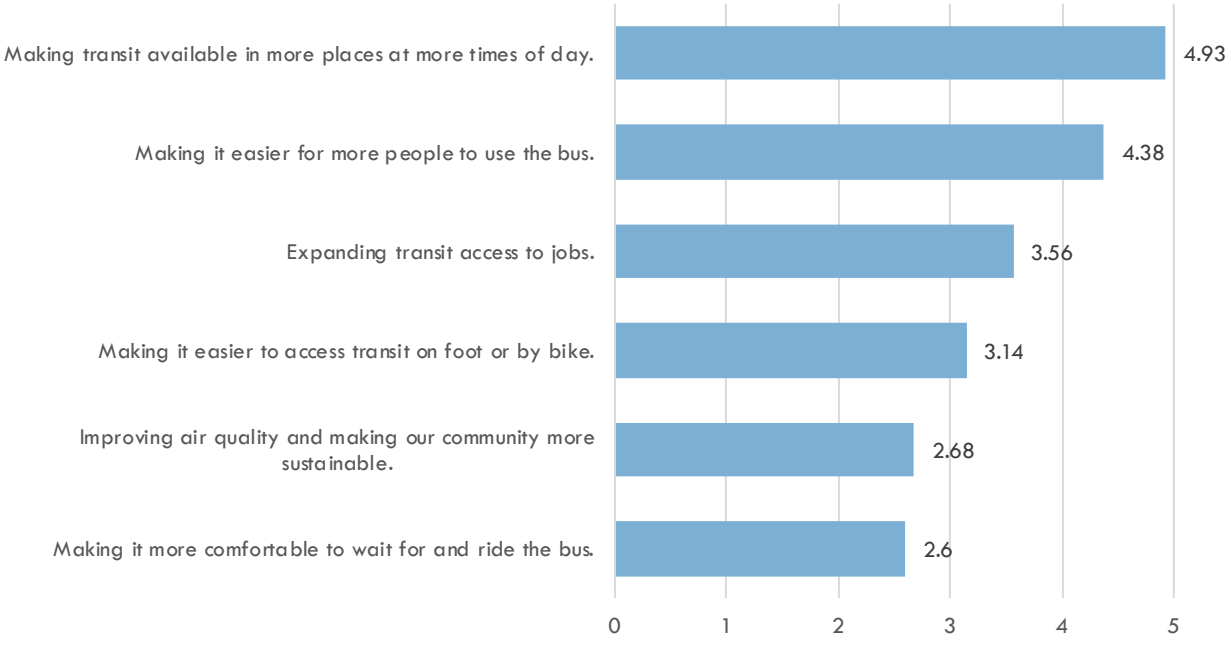


Figure 8-2 Importance of Decision Making Factors



Transit Users vs. Non-Transit Users

The selected improvements and decision-making factors were analyzed independently for transit users and non-transit users. Transit users' selected improvements were generally more focused on improving connections to transit, adding new local destinations, and adding frequency to commuter routes, while non-transit users' selections were focused on increasing service on weekends and evenings, as shown in Figure 8-3 and Figure 8-4. Both groups of users have strong preferences for expanding service on Saturdays, improving local circulation, and adding enhanced bus stops. Sixty-five survey respondents did not identify as either a transit user or a non-transit user, thus priorities may differ from the overall analysis of survey respondents.

In a direct comparison between the differences of transit users and non-transit users' selected improvements, 49% of transit users selected improve greenway connections compared to only 34% of non-transit users. Similarly, 17% of transit users selected new carshare programs and improved connections between bikes and buses compared to 8% and 10%, respectively, for non-transit users. Transit users also preferred adding new local destinations—63% compared to 52% of non-users—and running more frequent commuter service, at 34% compared to 22% of non-transit users. Transit users also place a much stronger emphasis on multimodal connectivity for the transportation system than non-transit users.

The most commonly selected improvement for non-transit users was adding more local Saturday service (84%), followed by more evening service (69%), and more Sunday service (66%). More Saturday service was also the second most commonly selected improvement for transit users, though at a smaller rate than for non-transit users (68%). Both groups also had a high preference for adding more local circulation, with 79% of transit users and 75% of non-transit users selecting this option.

Figure 8-3 Design Your Transit System Survey Results for Transit Users

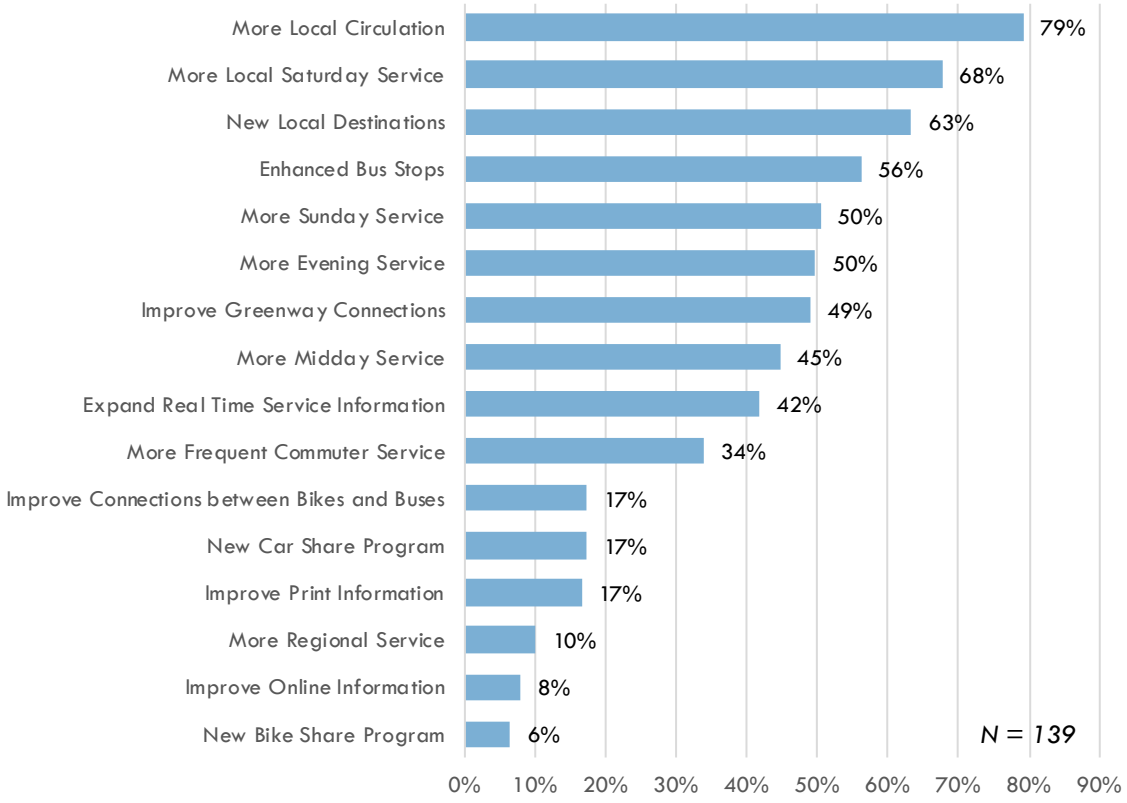
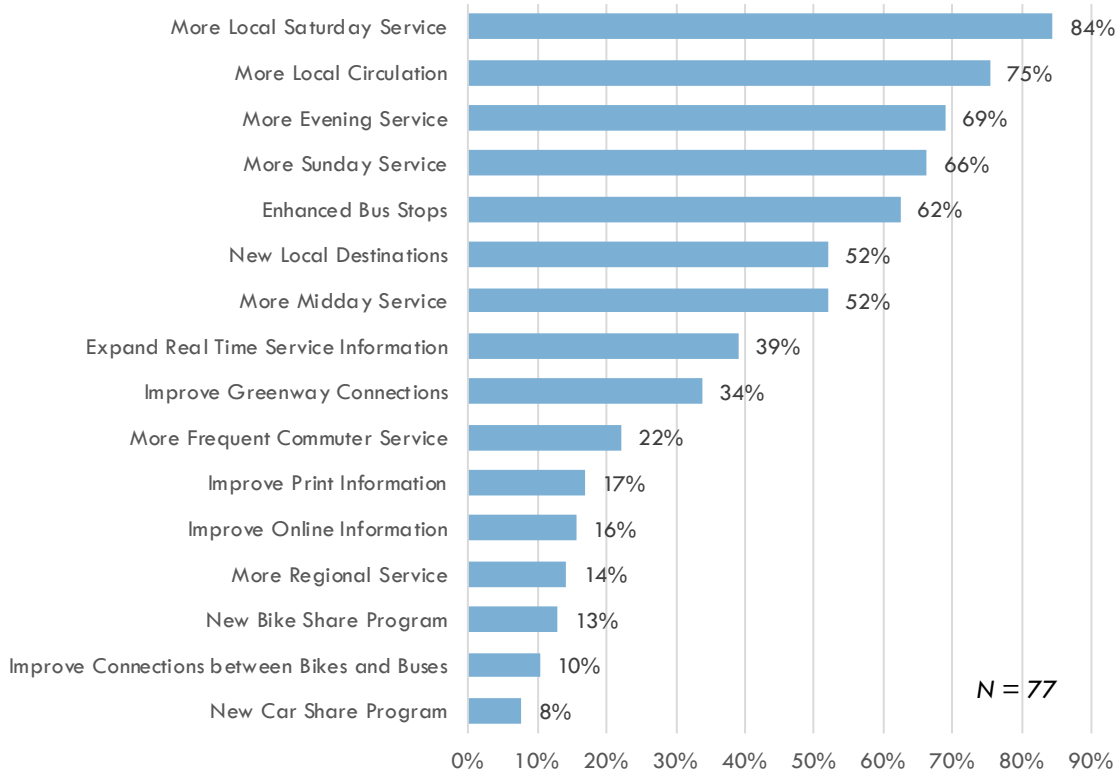


Figure 8-4 Design Your Transit System Survey Results for Non-Transit Users



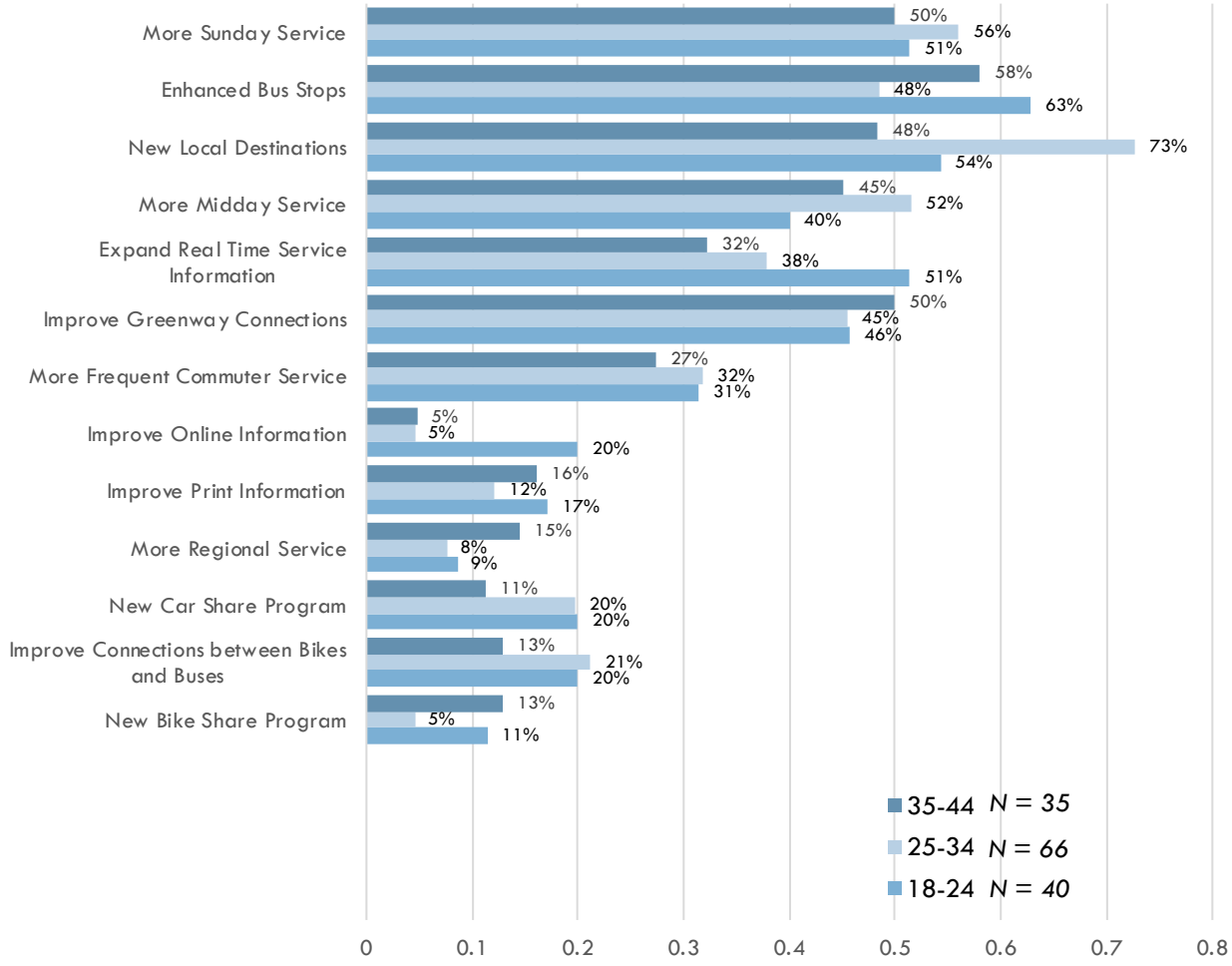
Age Group Analysis

The selected improvements and decision-making factors were also analyzed for respondents in three age groups: 18-24, 25-34, and 35-44. These age groups represent the college age (18-24), young professional (25-34), and professional (35-44) populations. Eighty-three percent of both the college age and young professional groups regularly use transit; however, only 40% of the professional population identified as regular transit users.

The college age population expressed stronger preferences for expanding real-time information and improving online information than the other groups, as shown in Figure 8-5. The young professional population prioritized more local circulation and new local destinations at a much higher rate than the other two groups. The professional group prioritized more regional service at a higher rate than the college age or young professional group.

These stated preferences suggest different commute behaviors for the age groups, with the younger college age population likely living near campus with shorter, less predictable commutes, the young professional population living closer to the downtown area commuting with local service, and the professional population living further away from downtown relying more heavily on regional service.

Figure 8-5 Design Your Transit System Survey Results – Age Group Analysis

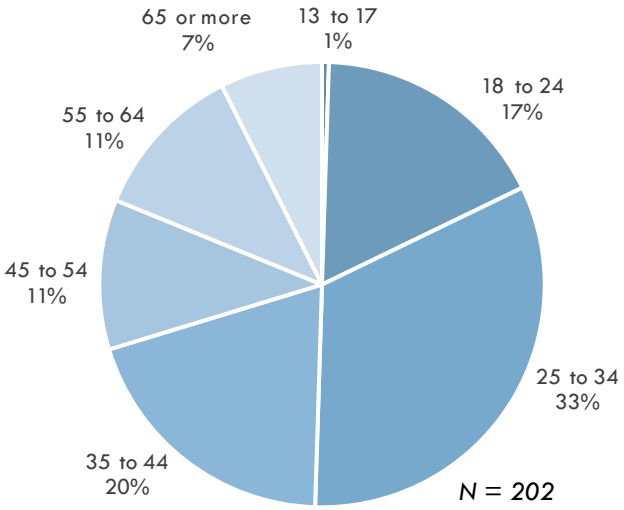


Who Responded to the Survey?

Age of Respondent

The largest number of respondents to the survey were between the ages of 25 and 34 (33%), followed by ages 35 to 44 (20%), and then ages 18 to 24 (17%), as shown in Figure 8-6. This suggests that the majority of the survey respondents are working age, between 25 and 44, and that a significant portion of the respondents are college age, between 18 and 24.

Figure 8-6 Phase I - Age of Survey Respondents



Primary Mode of Transportation

The primary mode of transportation for online survey respondents, as shown in Figure 8-7, is driving alone (43%) followed by transit (37%). Walking (9%), bicycling (6%), and carpooling (5%) are utilized significantly less than driving alone and transit. However, the majority of respondents (64%) indicated they regularly use transit, as shown in Figure 8-8. This suggests that many respondents regularly use transit as a secondary mode of transportation.

Figure 8-7 Phase I - Primary Mode of Transportation

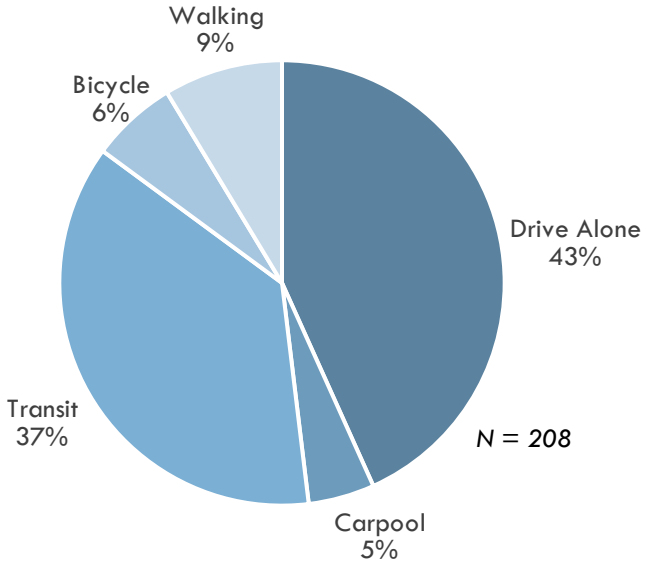
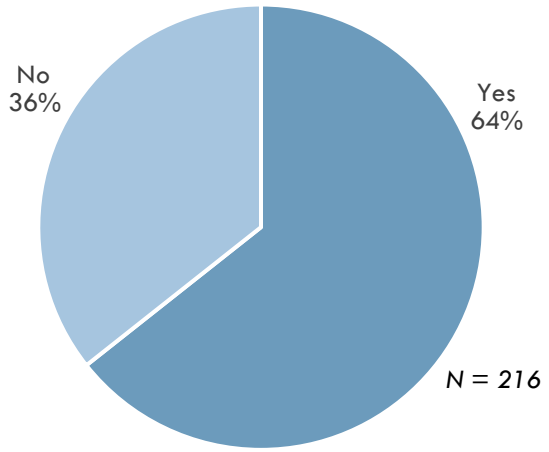


Figure 8-8 Phase I - Regular Transit Use



Why or Why Not Use Transit?

When asked why they choose to use other means of transportation (Figure 8-9) the majority of respondents said that the service doesn't go where they need it to (66%), the schedules don't match their needs (53%), or the service takes too long (50%). This indicates that convenience and timeliness are important factors when deciding to take transit or not. Similarly, Figure 8-10 shows these same responses as the top three reasons respondents don't take transit more often.

Figure 8-9 Phase I - Reasons to use transportation other than transit

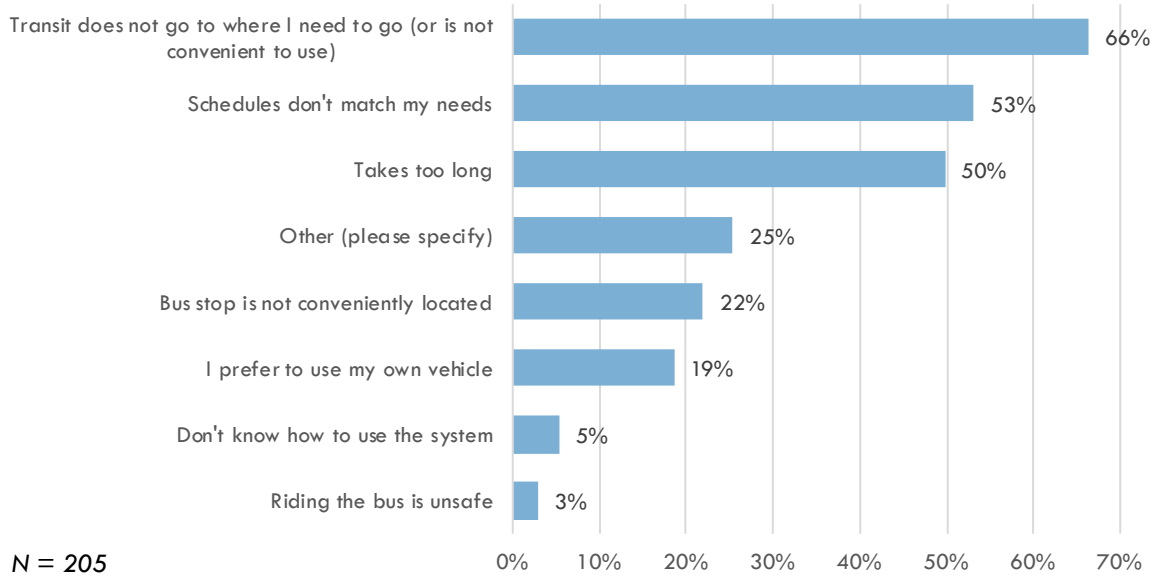
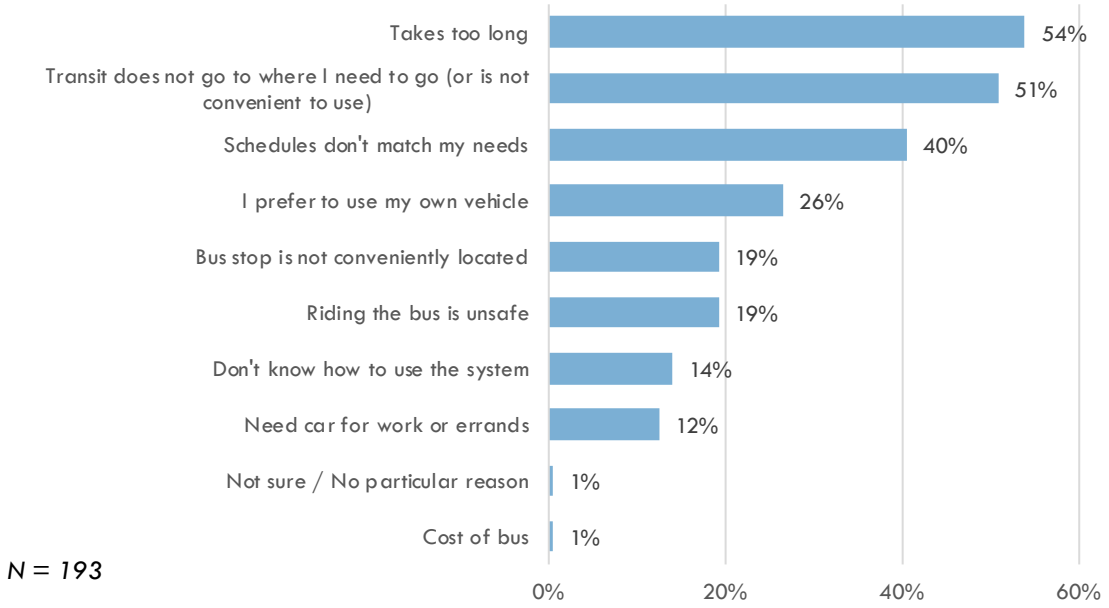


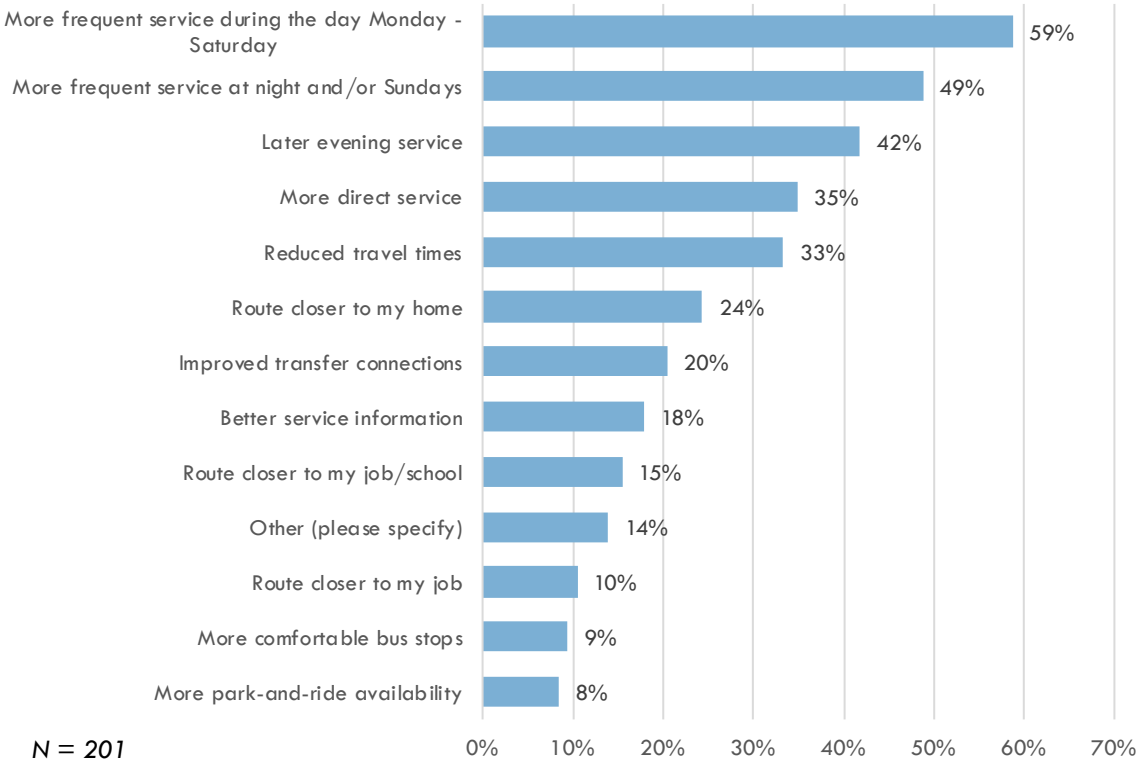
Figure 8-10 Phase I - Reasons not to take transit more often



Improvements to Transit Service

When asked what improvements would make respondents more likely to use transit service (Figure 8-11), the most common responses were more frequent daytime service between Monday and Saturday (59%), more frequent service at night and/or Sundays (49%), and later evening service (42%). This indicates that the primary concern for survey respondents is a lack of service frequency. In addition to service frequency, respondents also expressed a desire to add more direct service (35%) and to reduce travel times (33%). This suggests that conveniences such as direct service and faster travel are important factors, but less important than service frequency and scheduling.

Figure 8-11 Phase I - What improvements that would cause you to use transit more often



PHASE II OUTREACH

Phase II outreach began after three different service scenarios had been developed. Scenario 1 makes modest changes to bus routes and aims to improve weekday service frequency. Scenario 2 also makes modest changes to bus routes and aims to improve weekend service. Scenario 3 takes a more transformative approach, designing a new system from scratch based on observed ridership trends and areas with unmet demand. As with Phase I outreach, four open houses and an online survey were used to garner feedback. Nearly 2,000 responses were gathered.

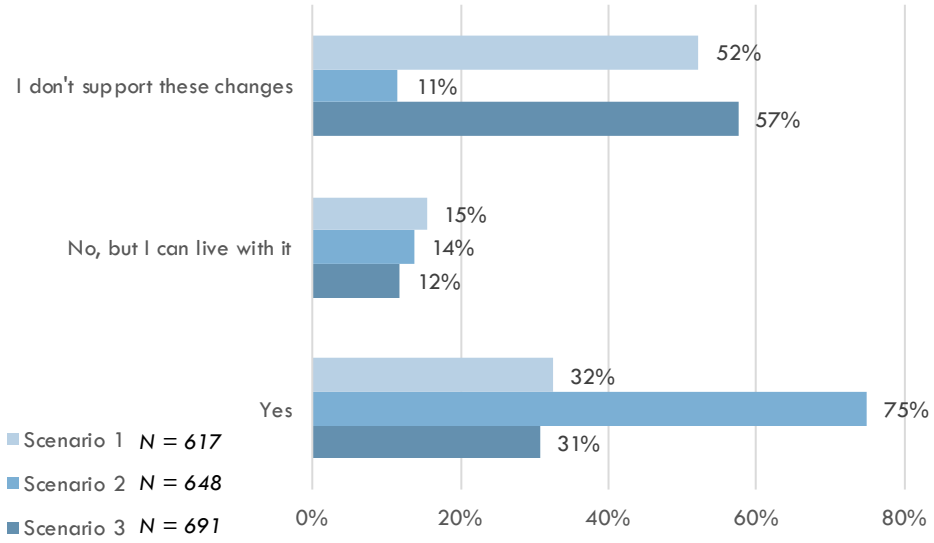
Survey Results

Overall Results

The survey presented the three proposed service alternatives. Survey respondents were asked to identify their level of support for each of the three scenarios and were given the opportunity to provide comments on the scenarios and individual routes within the scenarios.

Overall, survey respondents were much more supportive of Scenario 2 than of Scenario 1 or Scenario 3 (Figure 8-12). The majority of respondents do not support Scenario 1 (52%) or Scenario 3 (52%), while the majority of respondents do support Scenario 2 (75%). These responses are indicative of general support for improving weekend service.

Figure 8-12 Do you support these proposed service changes?

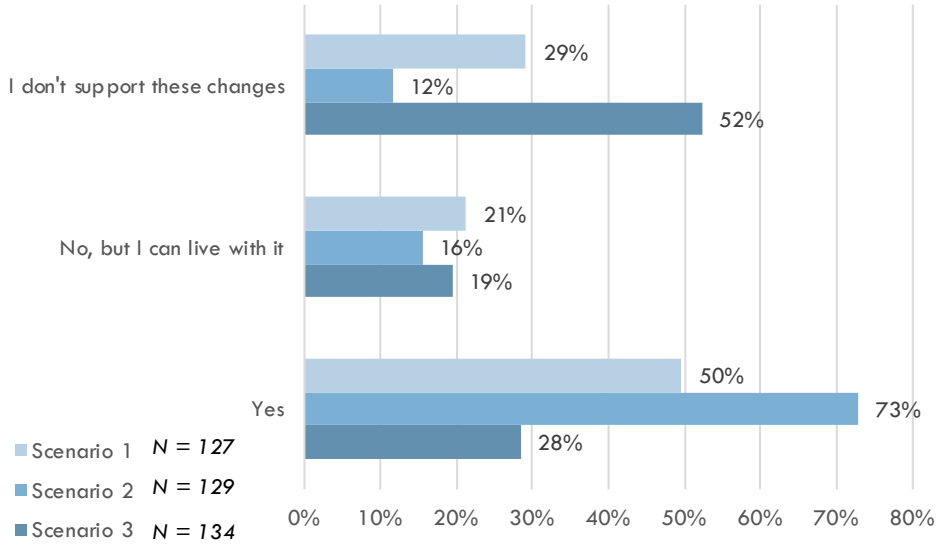


UNC Affiliation Analysis

Survey responses were analyzed based on the respondents' reported affiliation with UNC-Chapel, either student, staff, faculty, or no affiliation. Staff, faculty, and non-affiliated respondents generally followed the same overall trend, with strong support for Scenario 2 and less support for Scenario 1 and Scenario 3.

However, 50% of UNC students support the changes in Scenario 1, with an additional 21% stating that they don't support the changes, but can live with them (Figure 8-13). This difference may be indicative of college students' preferences for improved weekday service frequency due to irregular schedules. Extended service hours, improved service frequency, and more direct service would make commuting to and from the campus area more convenient throughout the day for UNC students.

Figure 8-13 Do you support these proposed service changes? – UNC Students



Home Zip Code Analysis

Survey respondents were analyzed according to their reported home zip codes and split into three categories: Chapel Hill, Carrboro, and other areas[1]. Respondents were sorted into these categories if any part of the zip code overlaps with the Towns of Chapel Hill or Carrboro. For instance, the 27516 zip code covers portions of Chapel Hill and Carrboro, so the 232 respondents from this zip code were placed into both the Chapel Hill and Carrboro groups.

The majority of respondents (65%) identified as Chapel Hill residents, while 27% identified as Carrboro residents, and 8% identified as residents outside of the Chapel Hill-Carrboro area. Chapel Hill residents are generally representative of the overall survey results; however, Carrboro residents are more likely to be UNC students (Figure 8-16) and non-Chapel Hill-Carrboro residents (Figure 8-18) are more likely to be UNC staff.

The results from Chapel Hill and Carrboro residents are representative of the overall survey results; however, respondents living outside of the Chapel Hill-Carrboro area are more supportive of all three scenarios (Figure 8-19). Residents outside of the Chapel Hill-Carrboro area are more likely to utilize commuter services, which were generally unchanged in the three scenarios.

[1] **Chapel Hill zip codes: 27514, 27515, 27516, 27517, 27599, 27707; Carrboro zip codes: 27510, 27516**

Figure 8-14 UNC Affiliation of Chapel Hill Residents

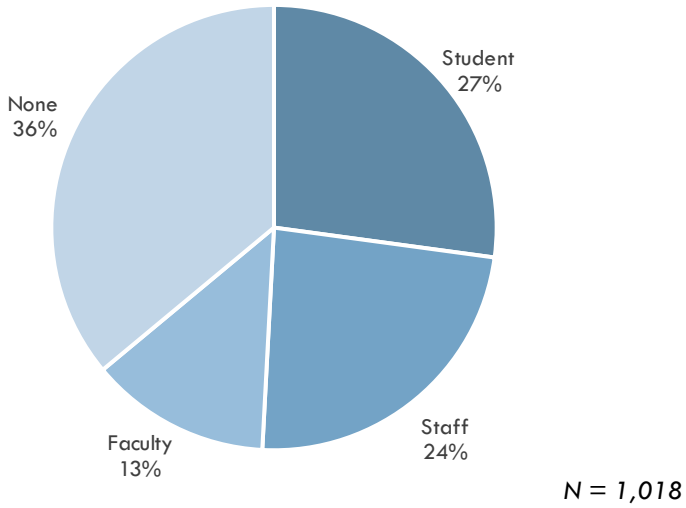


Figure 8-15 Do you support these proposed service changes? – Chapel Hill Residents

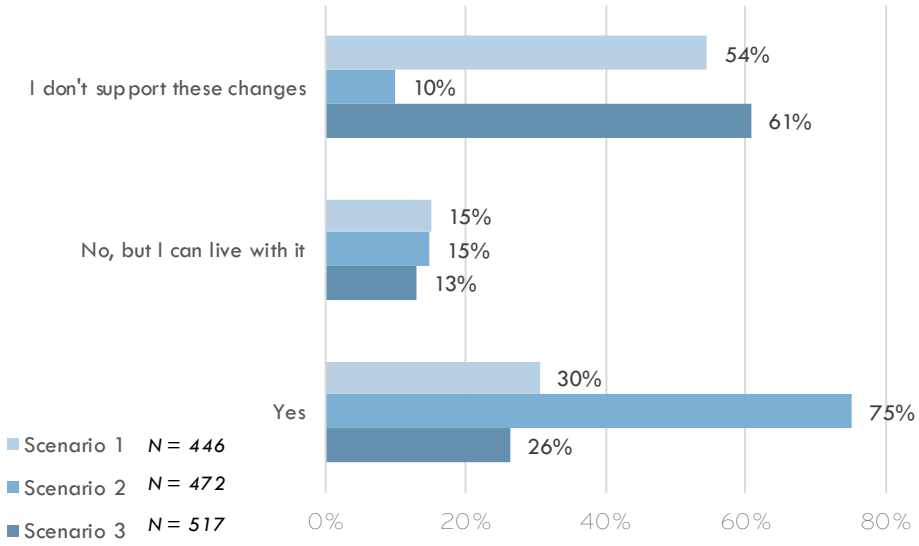


Figure 8-16 UNC Affiliation of Carrboro Residents

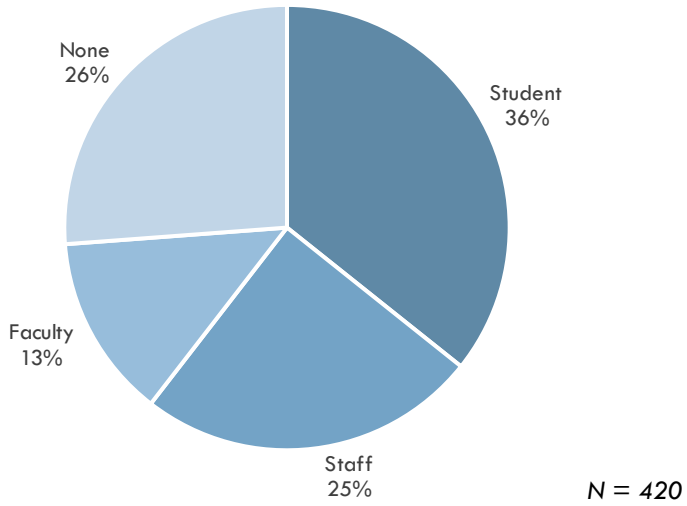


Figure 8-17 Do you support these proposed service changes? – Carrboro Residents

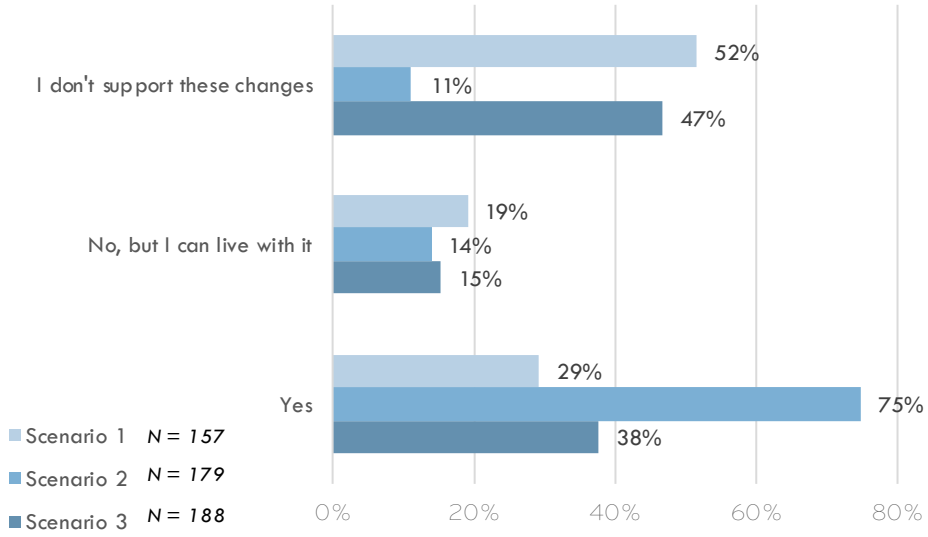


Figure 8-18 UNC Affiliation of Non-Chapel Hill/Carrboro Residents

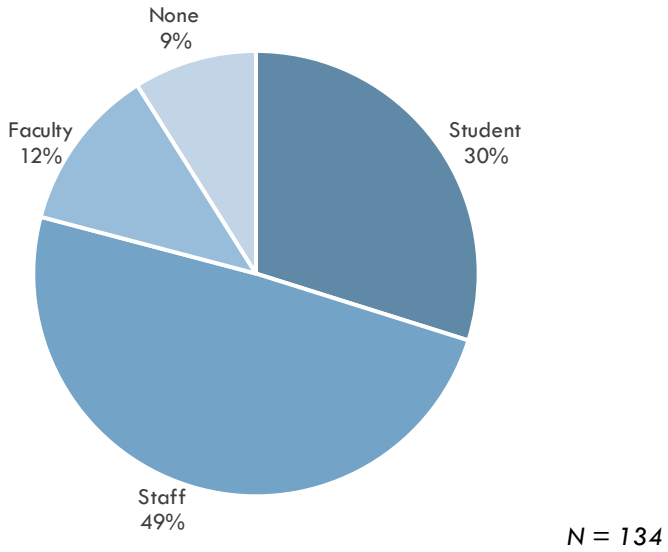
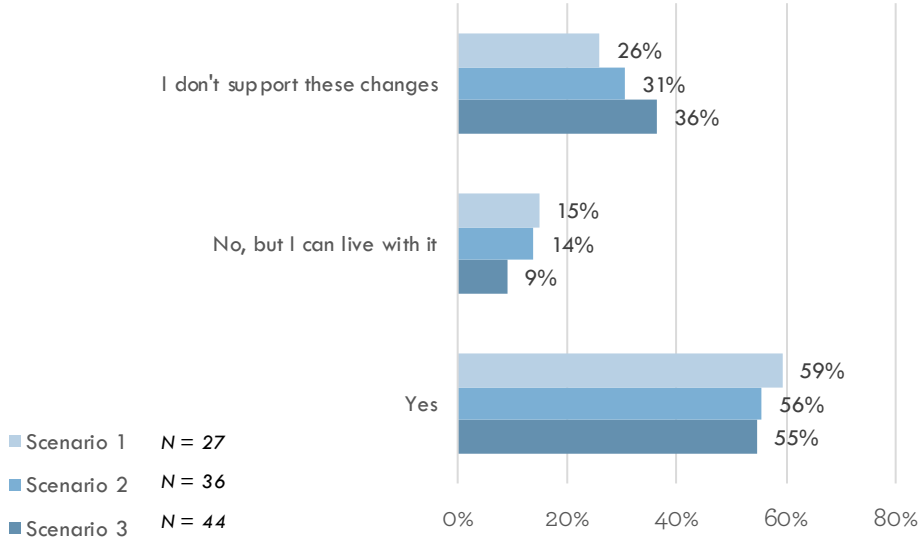


Figure 8-19 Do you support these proposed service changes? – Non-Chapel Hill/Carrboro Residents



Open-Ended Comments Analysis

Survey respondents left nearly 1,400 individual comments pertaining to the three proposed service scenarios. Individual comments were thoroughly reviewed and used to identify priorities for service improvements and to assess the level of support for proposed elements of the service scenarios. Overall, survey respondents emphasized support for increasing frequency on overcrowded routes, including Route J, Route NS, and Route D. There was also significant support for providing weekend service on Route NS and for operating weekend service on Route J along the same alignment as weekday service. Survey respondents had mixed opinions regarding service to Patterson Place. Some respondents thought it would be a useful service; however, others felt that it would not be an appropriate use of local tax dollars to provide service outside of the community. Respondents also voiced support for Route EW in Scenario 3, but not at the expense of coverage in other areas that are currently served.

There is minimal support for On-Demand Zones or partnerships with ridesharing companies (i.e., Uber, Lyft). Responses also indicated that eliminating segments of Route D, Route F, Route G, and Route V would be challenging for some passengers.

The general takeaway from the comments received for each scenario were as follows:

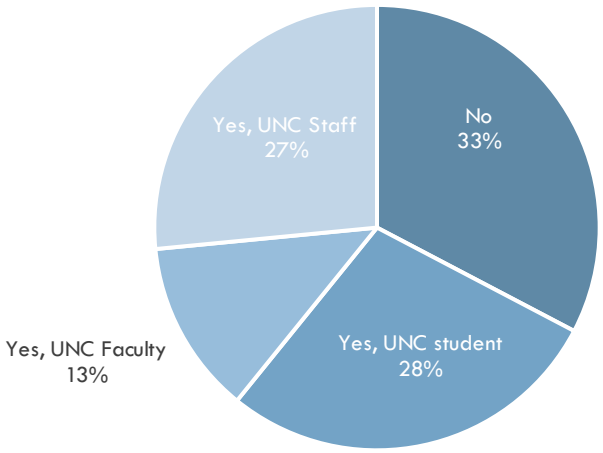
- Scenario 1: Scenario does not solve enough issues with the current system to warrant change.
- Scenario 2: There is strong support for improving weekend service.
- Scenario 3: The proposed changes are too sweeping and smaller adjustments to the services may be more appropriate. The coverage losses were too big considering the other improvements.

Who Responded to the Survey?

UNC Affiliation

The largest number of respondents to the survey did not have any affiliation with UNC (33%), and UNC Students (28%), UNC Staff (27%), and UNC Faculty (13%) represented the remainder of responses, as shown in Figure 8-20. This suggests that the survey respondents are representative of a diverse population of students, non-students, and UNC employees.

Figure 8-20 Phase II - UNC-Chapel Hill Affiliation

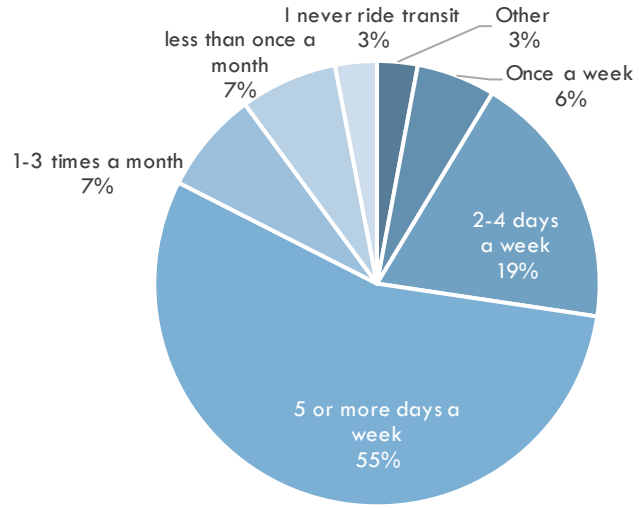


N = 1,187

Frequency of Transit Use

The majority of survey respondents ride transit five or more days per week (55%), as shown in Figure 8-21. Additionally, 19% of respondents ride transit between two and four days per week. This indicates that the majority of respondents (74%) are regular transit riders, utilizing transit at least twice per week.

Figure 8-21 Phase II - Frequency of Transit Use

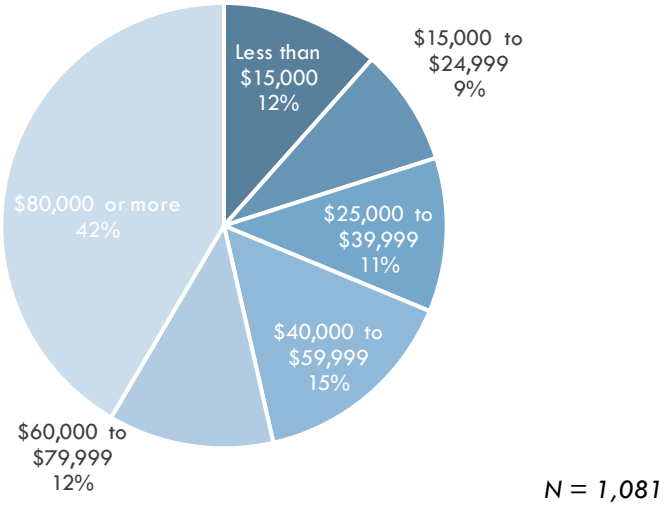


N = 1,188

Household Income

The majority of survey respondents have household incomes of at least $60,000 per year, shown in Figure 8-22, with 12% earning between $60,000 and $79,999 and 42% earning $80,000 or more. The remaining income levels are split relatively evenly. This indicates that all income levels are represented in the survey; however, the majority of respondents are generally higher income households.

Figure 8-22 Phase II - Household Income



PHASE III OUTREACH

Phase III outreach was conducted to gather feedback about the Preferred Alternative in September and October 2018. The Preferred Alternative incorporated the findings of Phase II and sought to balance customer feedback received. As with the other outreach phases, four meetings and an online survey were used to gather feedback. Nearly 500 responses were received.

Survey Results

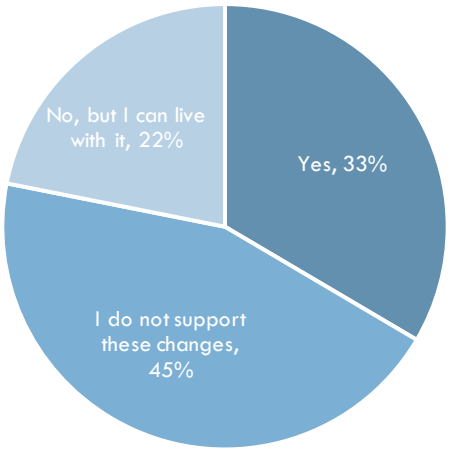
Overall Results

Survey respondents were asked if they support the changes proposed in the Preferred Alternative and were given the opportunity to provide additional input and comments on individual route changes. Overall results are shown in Figure 8-23. About one-third of respondents said that they supported the changes, while slightly over half of respondents (55%) either supported the changes or did not support them but can live with it.

While many respondents were supportive of the recommended changes, including improved weekend service and improved frequency, proposed changes to Routes FCX, JFX, and S received particularly unsupportive feedback in the survey. An assessment of the open-ended comments for these routes indicated that there was a perception that services currently provided by Route FCX and JFX would be removed, that travel times on Route S would be increased due to restructuring, or that respondents generally misunderstood the recommendations.

Subsequent revisions to recommendations addressed concerns over proposed routes, and service changes were clarified to ensure that the stops, service area, and service level are maintained in the service area.

Figure 8-23 Do you support the changes in The Preferred Alternative?



N=448

Preferred Alternative Response to Public Feedback

To address comments received and respond to public feedback, final recommendations (described in more detail in Chapter 6) make the following changes:

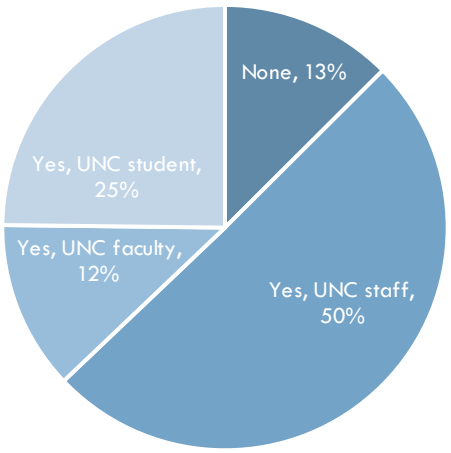
- Route CPX/JFX: Due to the August 2019 closure of the Carrboro Plaza Park-and-Ride and associated deletion of Route CPX, both span and alignment changes will be made for Route JFX. Route CM and Route JFX will provide 15-minute service connecting Jones Ferry Park-and-Ride and the UNC Hospitals, replicating the existing service provided by Route CPX. Service will also operate all day on Route JFX but will only extend to Jones Ferry Park-and-Ride between 6:30 PM and 8:00 PM.
- Route HS: In the Preferred Alternative, Route HS service would operate all day from 5:30 AM to 6:30 PM to address concerns of respondents needing to travel during the midday time period, particularly along Culbreth Road.
- Route CL: Some respondents expressed concerns about loss of coverage in the Preferred Alternative, particularly along Sage Road. The revised recommendations make an adjustment to Route CL's alignment to reinstate service in this area and along Erwin Road, Old Oxford Road, and Summerfield Crossing Road.
- Route FCX/S: The alignment and service span of Route FCX would be unchanged from the existing service. Morning peak frequency would be reduced to every seven minutes, providing additional running time for the route to improve on-time performance. Midday service would also be added to Route FCX. Route S would be modified to serve North Campus at Student Union/Fetzer Gym and would operate with the same service span and frequency as the existing route.

Who Responded to the Survey?

UNC Affiliation

The largest number of respondents to the survey identified as UNC Staff (50%), with an additional 25% and 12% identifying as UNC Students and UNC Faculty, as shown in Figure 8-24. Thirteen percent of respondents had no UNC affiliation. This suggests that survey responses are more representative of UNC-affiliated transit riders, particularly UNC staff commuting to work.

Figure 8-24 Phase III - UNC-Chapel Hill Affiliation

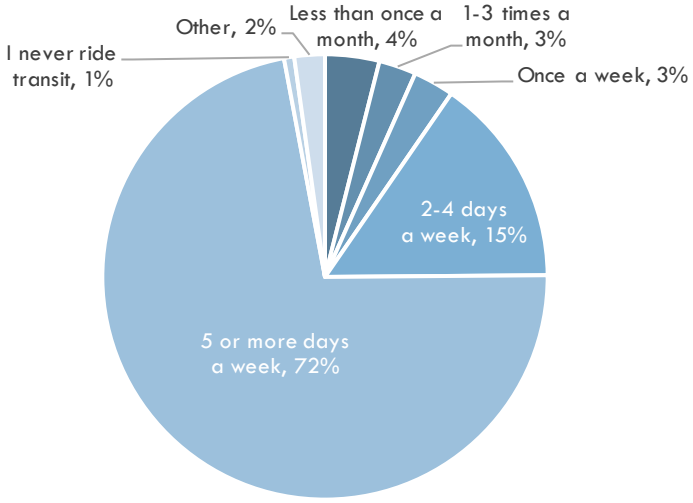


N = 407

Frequency of Transit Use

The majority of survey respondents ride transit five or more days per week (72%), as shown in Figure 8-25. Additionally, 15% of respondents ride transit between two and four days per week. This indicates that the majority of respondents (87%) are regular transit riders, utilizing transit at least twice per week.

Figure 8-25 Phase III - Frequency of Transit Use

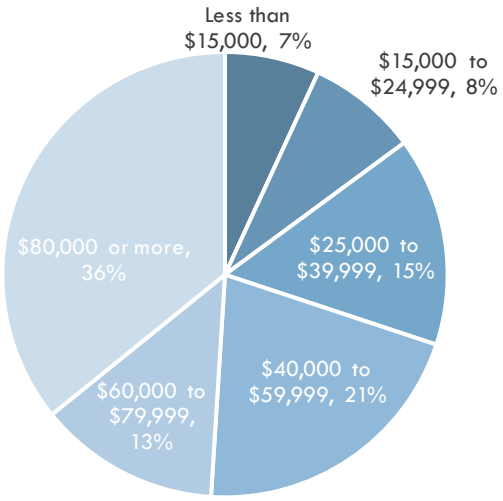


N = 406

Household Income

The majority of survey respondents have household incomes of at least $40,000 per year, as shown in Figure 8-26, with 21% earning at between $40,000 and $59,999, 13% earning between $60,000 and $79,999, and 36% earning $80,000 or more. The remaining income levels are split relatively evenly. This indicates that all income levels are represented in the survey; however, the majority of respondents are generally higher-income households.

Figure 8-26 Phase III - Household Income



N = 349

9 NEXT STEPS

This report represents the final element of the CHT SRTP planning process. It builds upon previous planning work to provide recommended service changes based on route planning standards, identified public priorities, existing market and operating conditions, and extensive public and stakeholder outreach.

While the SRTP takes a comprehensive approach to operational improvements within the agency, many of the next steps in the process will require coordination with external agencies as well. Chapter 7 of this report describes the opportunities, challenges, and financial implications associated with the future of transit in the Chapel Hill-Carrboro area, and there are a series of next steps required to continue the planning process and move toward implementation.

Crucial next steps to continue improving CHT service and ensuring future viability of the agency are described in Figure 9-1. These elements are also described in greater detail in this chapter.

Figure 9-1 CHT Next Steps for Implementation

Element	Next Steps
Monitor System Performance	CHT should continue monitoring performance and ridership at the stop and route level. Following the implementation of the Preferred Alternative, it may be necessary to make small adjustments to schedules or service frequency.
Finance and Develop a BRT System	The planned North-South BRT project currently has a $12 million funding gap that must be bridged before the project will be eligible for federal grant funding. CHT should continue exploring funding mechanisms for the North-South BRT Project, as well as investigating a potential complementary East-West BRT line.
Investigate Service Expansion and Transfer Opportunities with Regional Providers	CHT should coordinate with GoTriangle and GoDurham to determine if it is practical to expand to serve Patterson Place.
Maximize Demand Response Resources	There is opportunity to consider consolidation of paratransit service in Orange County to better meet the needs of riders, as well as facilitating easier integration with region-wide services.
Pursue Coordinated Fare Policy	CHT should continue to pursue opportunities for fare policy partnerships with regional providers. In return, CHT may have more flexibility to delay capital expenditures and operating costs associated with adding capacity to meet growing demand on high ridership routes.
Coordinate Multimodal Transportation Network Development	CHT should continue to work with the Town of Chapel Hill, Town and Carrboro, and UNC-Chapel Hill to identify shared interests and leverage opportunities to foster an effective multimodal transportation system for all users.
Monitor Improvements to Electric Vehicle Technology	CHT should continue monitoring the progress and development of electric vehicle technology and allow it to mature before making large-scale investments.
Identify Funding to Meet Transit Demand Associated with New Developments	New large-scale developments planned in Chapel Hill are expected to increase demand for transit on some of the system's most congested routes. CHT should investigate opportunities to incorporate payment-in-lieu programs and transit improvement districts to increase funding options for transit infrastructure and service.
Evaluate Future Park-and-Ride Service Strategy	CHT should continue to explore the opportunity for new park-and-ride-based service and re-evaluate the existing park-and-ride service model in conjunction with regional travel patterns.
Coordinate Transit Hub Development	The UNC Hospitals stop currently serves 53 buses per hour in each direction and is a highly space-constrained location. Creating an off-street facility for bus layover and passenger loading will be a crucial step for system performance. CHT should continue to coordinate with UNC Hospitals and GoTriangle to plan for this improvement.

Monitor System Performance

While the SRTP development is based on observed operating conditions, once service changes are implemented, they may not perform as expected. Projected travel times and demand for service may vary after implementation, and it may be necessary to make small adjustments to schedules, alignments, or service frequency to be responsive to unforeseen demand, capacity, and scheduling issues. To ensure the system continues to perform at a high level, it will be necessary for CHT to continue monitoring performance and ridership at the stop and route level.

Finance and Develop a BRT System

The planned North-South BRT project currently has a $12 million funding gap that must be bridged before the project will be eligible for federal grant funding. CHT should continue exploring funding mechanisms for the North-South BRT project. During Phase II Outreach, a proposed dedicated East-West route was positively received by survey respondents. There is an opportunity for CHT to begin planning for a potential East-West BRT line to complement the North-South BRT project.

Investigate Service Expansion and Transfer Opportunities with Regional Providers

CHT service currently approaches, but does not serve, Patterson Place—a high ridership location served by GoTriangle and GoDurham. Coordination with these agencies will allow CHT to determine if it is practical to expand to reach this destination in the future.

Maximize Demand Response Resources

Currently, CHT operates paratransit service in the urban areas of Orange County, while OPT and Chatham Transit provide service in rural areas. There is opportunity to consider consolidation of paratransit service in Orange County to better meet the needs of riders, as well as facilitating easier integration with region-wide services. Consolidated paratransit service would allow for coordinated dispatching and potential cost savings for the county as a whole.

Pursue Coordinated Fare Policy

One major difference between CHT and other regional operators is CHT's fare free policy. This policy creates an incentive for passengers to take CHT service instead of other regional options since they can use the service for free; in some cases, this results in partner agency routes operating with excess capacity. CHT should continue to pursue opportunities for fare policy partnerships with regional providers. In return, CHT may have more flexibility to delay capital expenditures and operating costs associated with adding capacity to meet growing demand on high ridership routes.

Coordinate Multimodal Transportation Network Development

Taking an integrated approach to transportation system planning generally produces benefits for pedestrians, bicyclists, and transit riders, but it is important to clearly articulate competing priorities while developing infrastructure improvements and recommendations. In the Chapel Hill-Carrboro area, there will continue to be opportunities to meet the needs of all users. CHT should continue to work with the Town of Chapel Hill, Town and Carrboro, and UNC-Chapel Hill to identify shared interests and leverage opportunities to foster an effective multimodal transportation system.

Monitor Improvements to Electric Vehicle Technology

Ongoing bus replacement will continue to have financial implications for CHT. As CHT's fleet continues to age, strategic capital planning, bus replacement, and ongoing fleet modernization will be necessary to ensure financial sustainability of the agency while meeting environmental goals. There is interest in incorporating electric vehicles into the fleet; however, concerns exist with existing electric vehicle technologies related to operating on steep grades and in hot climates—elements relevant in Chapel Hill and Carrboro. CHT should continue monitoring the progress and development of electric vehicle technology and allow it to mature before making large-scale investments.

These two corridors present the strongest opportunities for frequent, high-capacity transit in the CHT system. As regional transit investments continue to grow, CHT should capitalize on these opportunities to develop a strong transit core and foster regional transit integration.

Identify Funding to Meet Transit Demand Associated with New Developments

New large-scale developments planned in Chapel Hill are expected to increase demand for transit on some of the system's most congested routes. As large residential and mixed-use developments continue to emerge in Chapel Hill and Carrboro, the agency will have an opportunity to engage with developers and the local governments to develop strategies for mitigating impacts on transit demand. CHT should investigate opportunities to incorporate payment-in-lieu programs, as well as the potential for transit improvement districts, to help meet funding needs for transit infrastructure and service and address increased demand on the transit system.

Evaluate Future Park-and-Ride Service Strategy

Most existing park-and-ride lots in the CHT service area have sufficient capacity to address any near-term demand increases.

In the future, the primary markets for park-and-ride use are likely to be from Chatham, Durham, and Alamance Counties. CHT should also prioritize coordinating with other regional transit service providers (OPT, GoTriangle, etc.) to capitalize on shared service in these new corridors.

Coordinate Transit Hub Development

Coordinating with the UNC Hospitals and GoTriangle on the development and operations of a transit hub located at the UNC Hospitals stop will be a key partnership for minimizing delays and ensuring on-time performance of transit service at one of the busies stops in the CHT system. The UNC Hospitals stop currently serves 53 buses per hour in each direction and is a highly space-constrained location. Given the limited right-of-way available for transit improvements, coordinating with UNC Hospitals on potential facility locations and with GoTriangle on shared operating priorities will be critical for coalition building throughout the process.

Creating an off-street facility for bus layover and passenger loading will be a crucial step for system performance.