

GOFORWARD: WAKE TRANSIT PLAN WESTERN WAKE COMPREHENSIVE OPERATIONS ANALYSIS

Final Report

October, 2018



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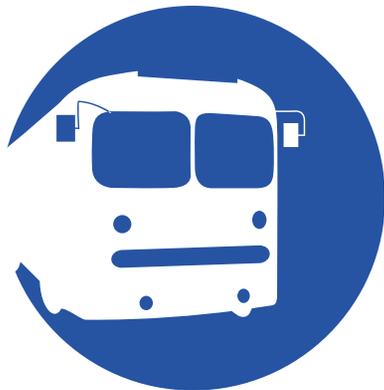
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Introduction

The Town of Cary began operating transportation services in August 2001 as C-Tran. First operating as a door-to-door service, C-Tran expanded to general public service in 2002, started providing fixed route services in 2005, and re-branded as GoCary in 2016. Today, GoCary operates six fixed routes and eligibility based door-to-door services (Figure 11).

The majority of GoCary's current riders are transit-dependent and rely on the service for access to jobs, education, social services, and daily errands. While the population of western Wake County continues to grow, GoCary ridership has fallen in recent years. In 2014, GoCary served about 300,000 riders. In 2015, that number dipped to 280,000 and fell further in 2016 to 250,000. Though ridership has seen a decline, the significant population and employment growth in the area suggests that the potential for transit ridership in western Wake County is likely higher than what is currently being realized.

The aim of the GoForward: Wake Transit Plan, Western Wake Comprehensive Operations Analysis, is to identify potential transit ridership in the Towns of Cary, Apex, and Morrisville and assess the strengths and opportunities of transit service in western Wake County. This means serving existing riders better, attracting new riders, and improving productivity. The recommendations in this report are based on the included Market Analysis, Service Analysis, and the impact of local citizens and their planning staff.

Guiding Principles

Transit services are most successful when they are easy to use and intuitive to understand. Therefore, the analysis and recommendations presented in this document are grounded in a set of guiding principles aimed at creating a simple, yet highly functional transit system.

These principles include the following:



Service Should Operate at Regular Intervals:

In general, people remember repeating patterns more easily than they remember irregular sequences.



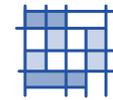
Routes Should Operate Along a Direct Path:

The fewer directional changes a route makes, the easier it is to understand. Circuitous alignments are disorienting and difficult to remember.



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.



Routes Should Serve Well Defined Markets:

The purpose of every transit route should be clear to current and prospective riders. Routes should include strong anchors, and a mix of origins and destinations.



Service Should Be Well Coordinated:

At major transfer locations, schedules should be coordinated to the greatest extent possible to minimize waiting time between connected services.

Market Analysis

Overview of Transit Demand

Transit ridership is a function of the underlying demand for public transit services and the attractiveness of the service that is provided. The underlying demand for transit is driven by a number of factors which are particularly important:



Population and population density

Since transit relies on having more people in close proximity to service, higher population density makes it feasible to provide higher levels of service.



Employment and employment density

The location and density of jobs is a strong indicator of transit demand, as traveling to and from work accounts for the most frequent type of transit trip.



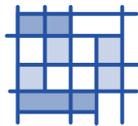
Major activity centers

Large employers, universities, hospitals, and other high-activity areas attract large volumes of people and can generate a large number of transit trips.



Socio-economic characteristics

Differences in socio-economic characteristics mean that different groups of people are more or less likely to use transit. For example, households with many cars are much less likely to use transit than those with one or none.



Development patterns

In all urban areas, there is a strong correlation between development patterns and transit ridership. In areas with denser development, mixed-use development, and a good pedestrian environment, transit can be very convenient, making it attractive and well used.



Travel Flows

People use transit to get from one place to another. Transit routes are designed to serve corridors with high travel flow volume.

Density and Transit Demand

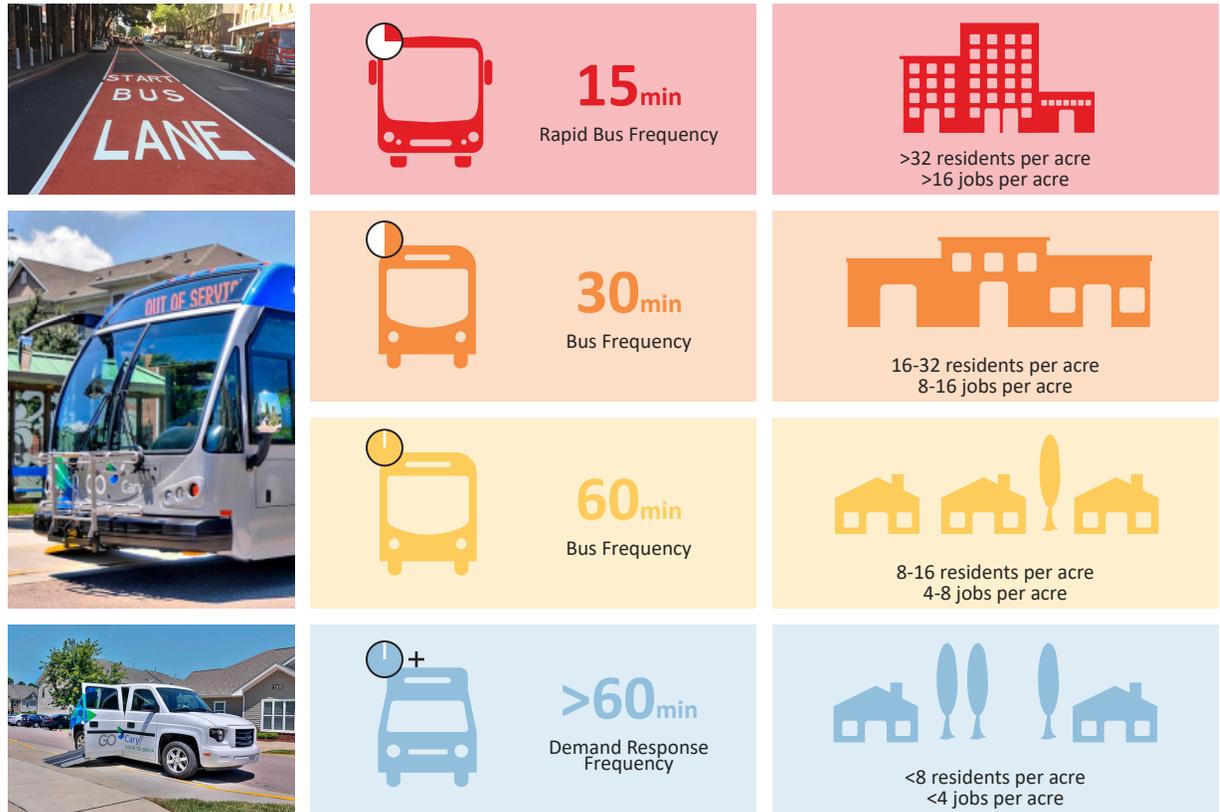
More than any other factor, population and employment density will determine the underlying demand for transit. This is because:

- The reach of transit is generally limited to within one-quarter to one-half mile of a transit route. As a result, the size of the travel market is directly related to the density of development in that area.
- Transit service frequencies, in turn, are closely related to market size. Bigger markets support more frequent service, while smaller markets can support only less frequent service.
- To attract travelers who have other options, such as automobiles, transit must be relatively frequent—at least every 30 minutes.

Places with large numbers of people, jobs, and other activities produce the greatest demands for transit service.

As a result, population density (residents per acre) and employment density (jobs per acre) provide an indicator of just how much demand there is for transit in a particular area. Higher population and job densities can support higher levels of transit service.

Figure 1: Supported Transit Frequency Increases with Land Use Density





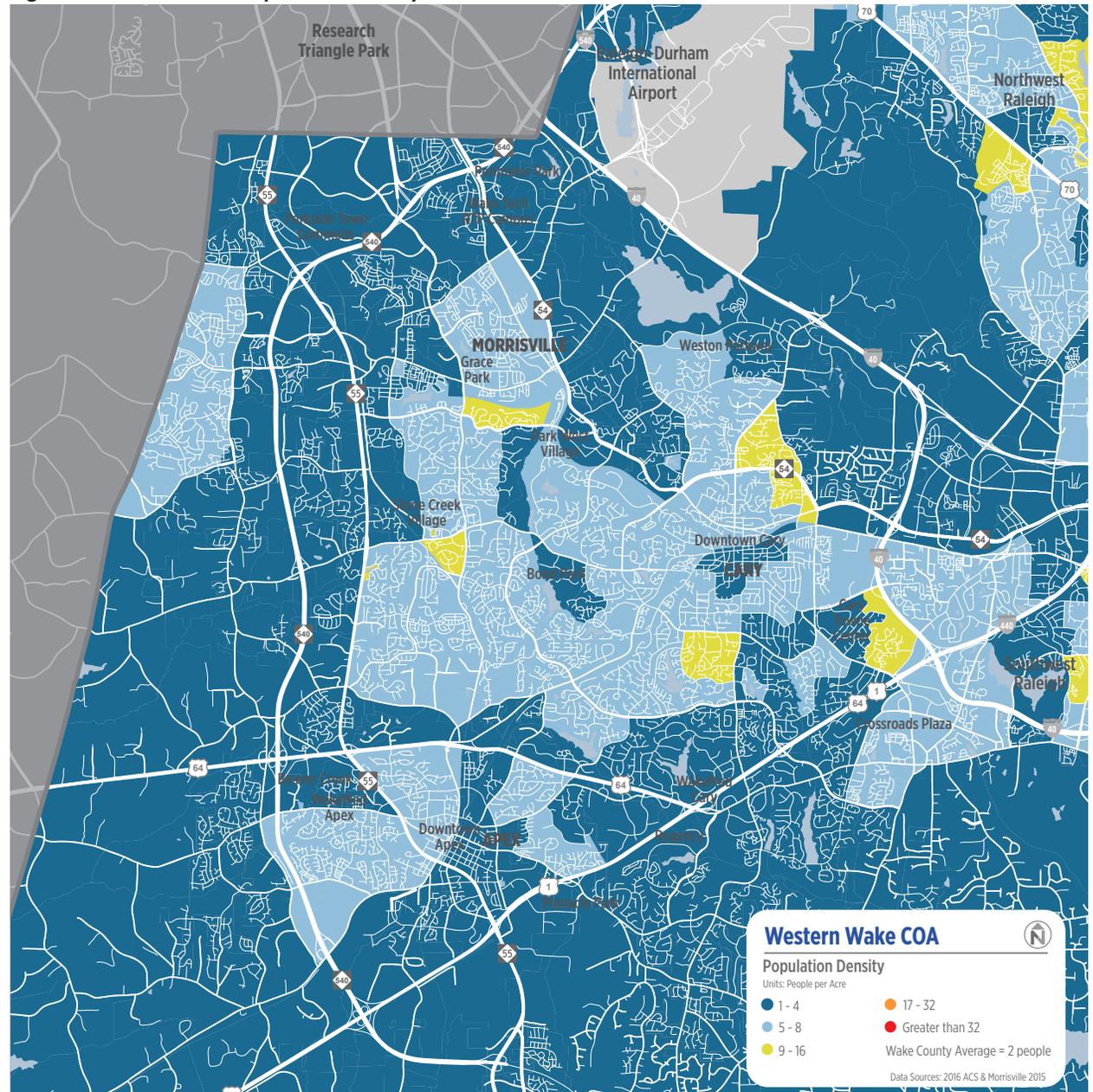
Population-Based Demand

Population densities are one of the two strongest indicators of both where the demand for transit is the highest and where it will work best.

In 2016, there were nearly 240,000 people living in western Wake County. The region is comprised of the Towns of Apex, Cary, Morrisville, and the surrounding unincorporated area. Today, the highest population densities are focused in the following areas:

- Northern Cary near Harrison Avenue and Maynard Road
- Southern Cary near Kildaire Farm Road and Maynard Road
- In Morrisville near Morrisville Parkway and Davis Drive
- Western Cary near High House Road and Davis Drive

Figure 2: Western Wake Population Density



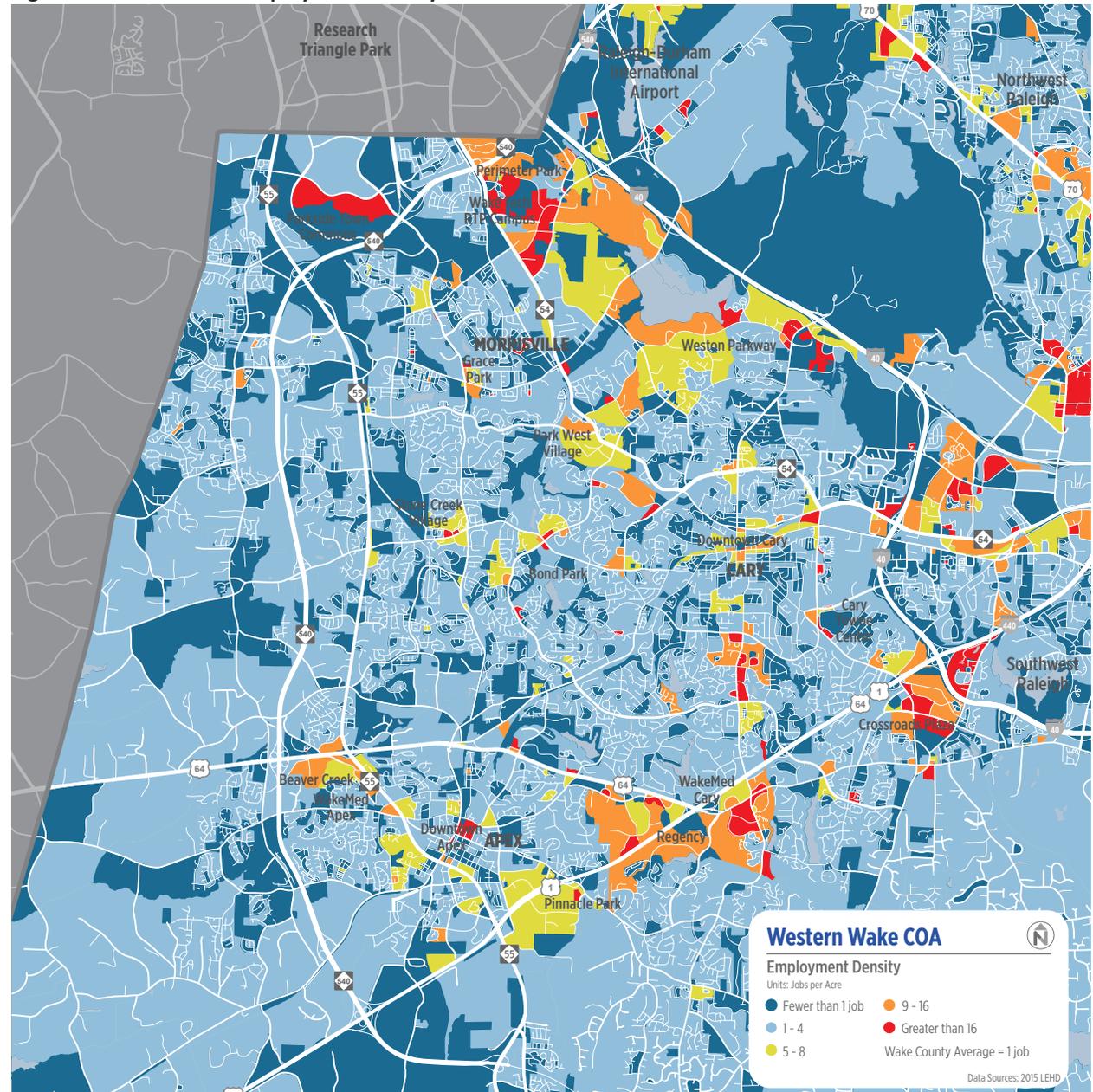
Employment Based Demand

Employment densities are another one of the two strongest indicators of underlying transit demand.

As densities grow, the demand for transit grows, particularly with respect to more frequent service. In 2016, there were nearly 140,000 jobs in western Wake County. Unlike population density, job density is more highly focused along key corridors and concentrated areas of the region. The highest job densities are focused in the following areas:

- Downtown Cary
- Downtown Apex
- Northern Morrisville to the south of the Research Triangle Park. Namely the areas of Green Woods, Imperial Point, and Weston Lakeside.
- Crossroads Plaza
- The Highway 1 and Highway 64 intersection to the east of Apex

Figure 3: Western Wake Employment Density



Transit Demand

In addition to population density, socioeconomic characteristics influence transit demand. National research shows that certain population groups have a higher propensity for transit use than the overall population. This combined propensity represents the overall existing demand for transit.

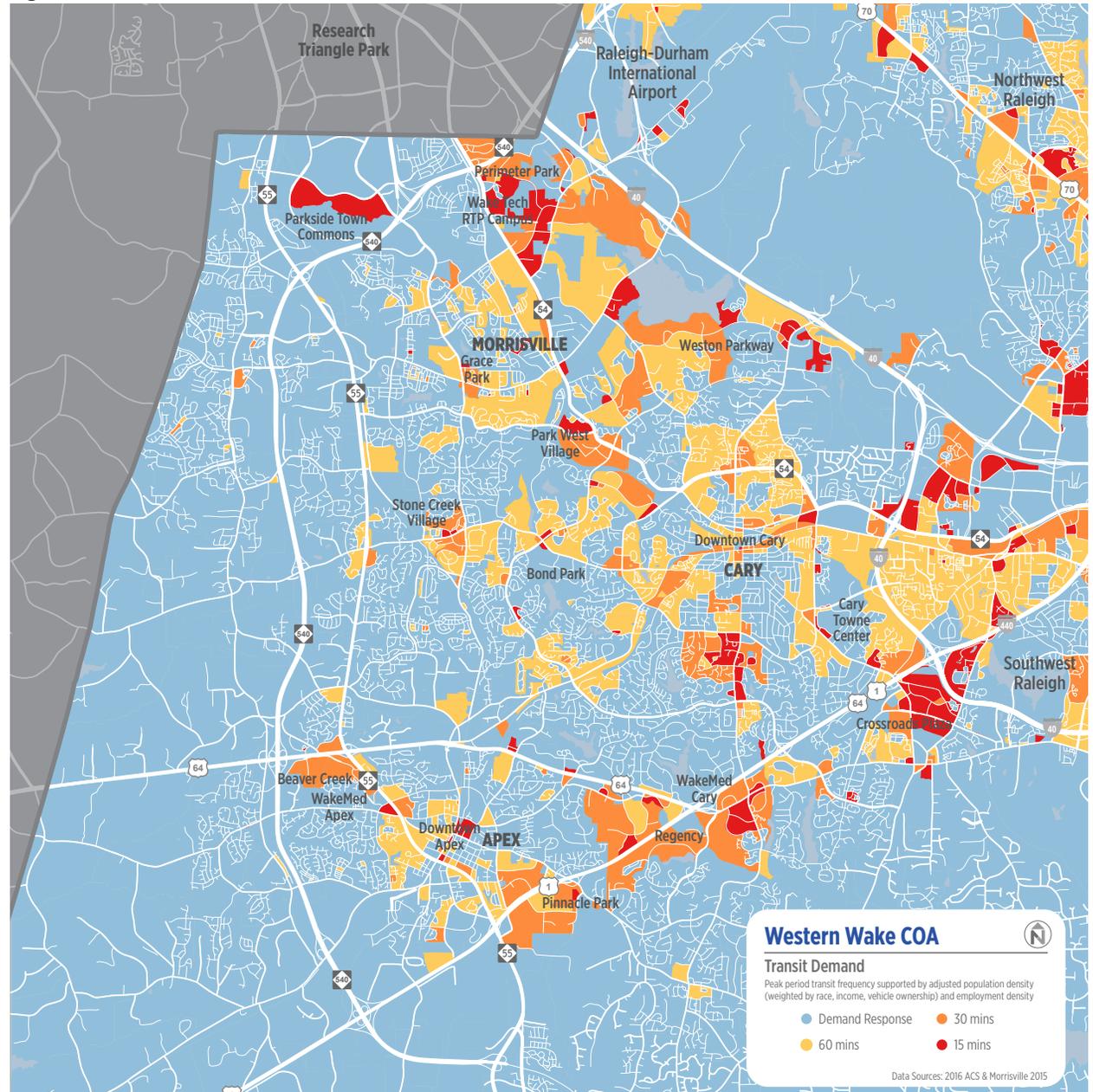
Differences in transit propensity are heavily based on vehicle ownership, race and ethnicity, and annual income.

When significant numbers of individuals and households from high-transit demand groups cluster together, they can influence the underlying demand for transit to an extent that is not captured when only considering total population. To take this into account, the population-based transit propensity was adjusted based on relative existing transit use differences between these groups and the population as a whole.

Transit index factors were developed for each demographic characteristic, as shown in Table 1, measuring the likelihood of each group to use transit relative to Wake County’s general population. These factors were then applied to the population at the Census Block Group level, calculating a transit propensity factor for each Block Group. A map of these transit index factors shows where residents are generally more likely (red) or less likely (blue) to use transit, based on their socioeconomic characteristics.

Note that this transit demand analysis is based on 2016 and 2015 data. Demographic shifts and developments currently under construction, or completed after 2016, are not represented.

Figure 4: Western Wake Transit Demand



In general, areas with higher demand for transit are dispersed throughout western Wake County. Notable areas with high demand include:

- Wake Tech RTP Campus
- Crossroads Plaza
- Park West Village
- WakeMed Cary
- Downtown Apex
- WakeMed Apex

Below are the transit index factors developed for each demographic characteristic featured within the transit propensity calculation.

Table 1: Transit Propensity by Demographic Group

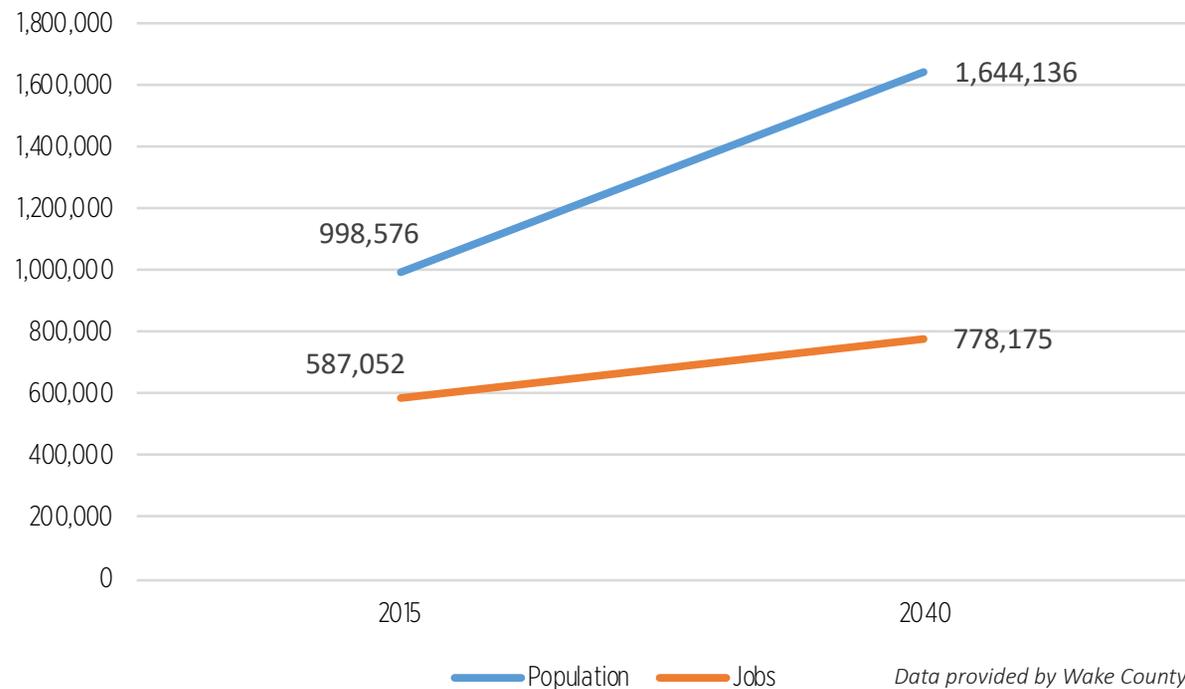
Demographic Group	Transit Propensity
Race and Ethnicity	
White Alone	0.38
Black or African-American	2.49
Asian	2.43
Other Race	1.18
Hispanic or Latino	1.06
Vehicle Ownership	
No Car	13.95
One or More Cars	0.79
Annual Income	
Below the Poverty Level	2.12
At 100% - 150% of Poverty Level	3.91

Looking Beyond COA Timeframe: Transit Demand in 2040

Looking ahead, demand for transit in western Wake County will be affected by significant increases in population and employment.

Between 2015 and 2040, the county’s population is expected to grow by 65% reaching 1.65 million residents by 2040, while employment will increase by 33%, to nearly 800,000 jobs. It is anticipated this growth will increase transit demand in the existing areas as well as create new pockets of transit demand.

Figure 5: Projected Population and Employment Growth in Wake County 2015-2040





Minority Demand

Minority residents are considered to be those who identify as a race other than White alone or ethnically as White Hispanic/Latino. These populations tend to use transit more often than non-minorities.

This due in part to a lower likelihood to have access to a vehicle, as well as an increased likelihood to live farther away from their place of employment than non-minorities.

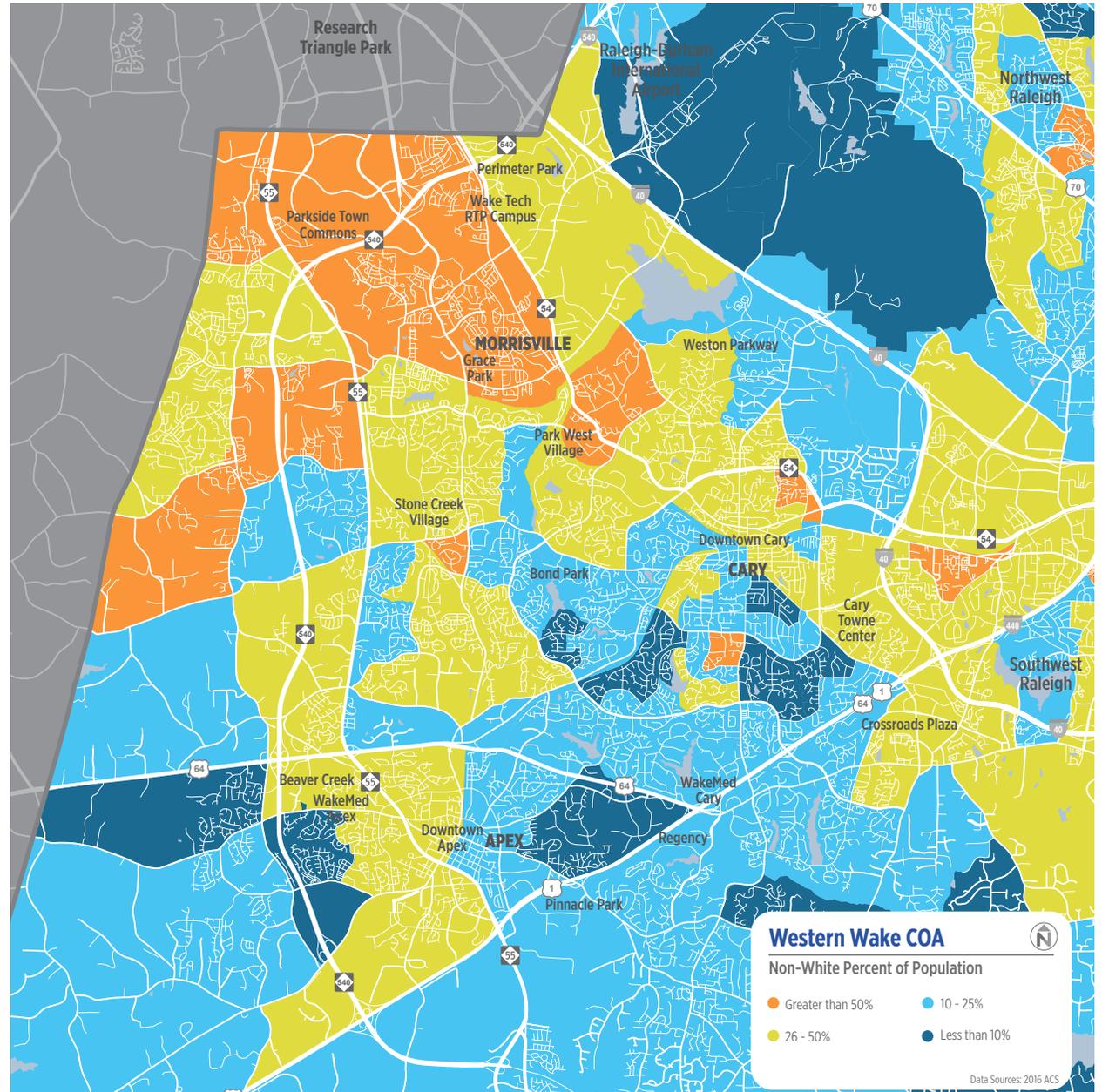
Within western Wake County non-minority individuals make up 67% of the total population, while minority populations comprise the remaining 33%. There are higher concentrations of minority

Table 2: Race/Ethnicity in Western Wake County

Race/Ethnicity	Population	Percent
White	158,120	67%
Black or African-American	16,520	7%
Asian	35,400	15%
Other Race	11,800	5%
Non-White Hispanic or Latino	14,160	6%

Data Source: 2016 ACS

Figure 6: Western Wake Minority Population Distribution



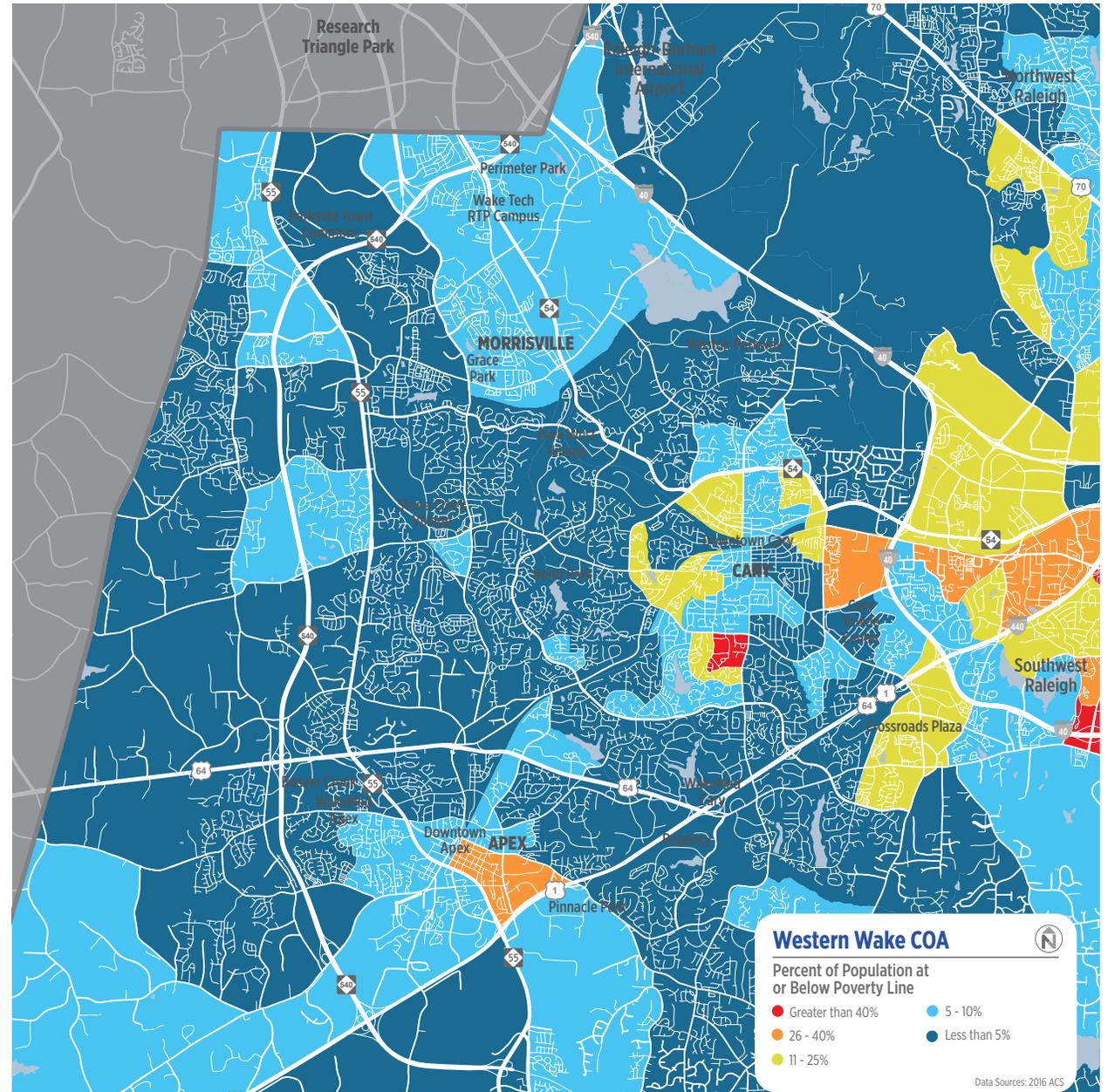
Income Demand

Low-income residents tend to use transit to a greater extent than those with higher incomes.

This is because transit provides significant cost savings over automobile ownership and use.

Approximately 10,000 or 4% of households in western Wake County have incomes below the poverty line. A higher percentage of low-income individuals exist in Cary and Apex.

Figure 7: Western Wake Low-Income Population Distribution



Travel Flows

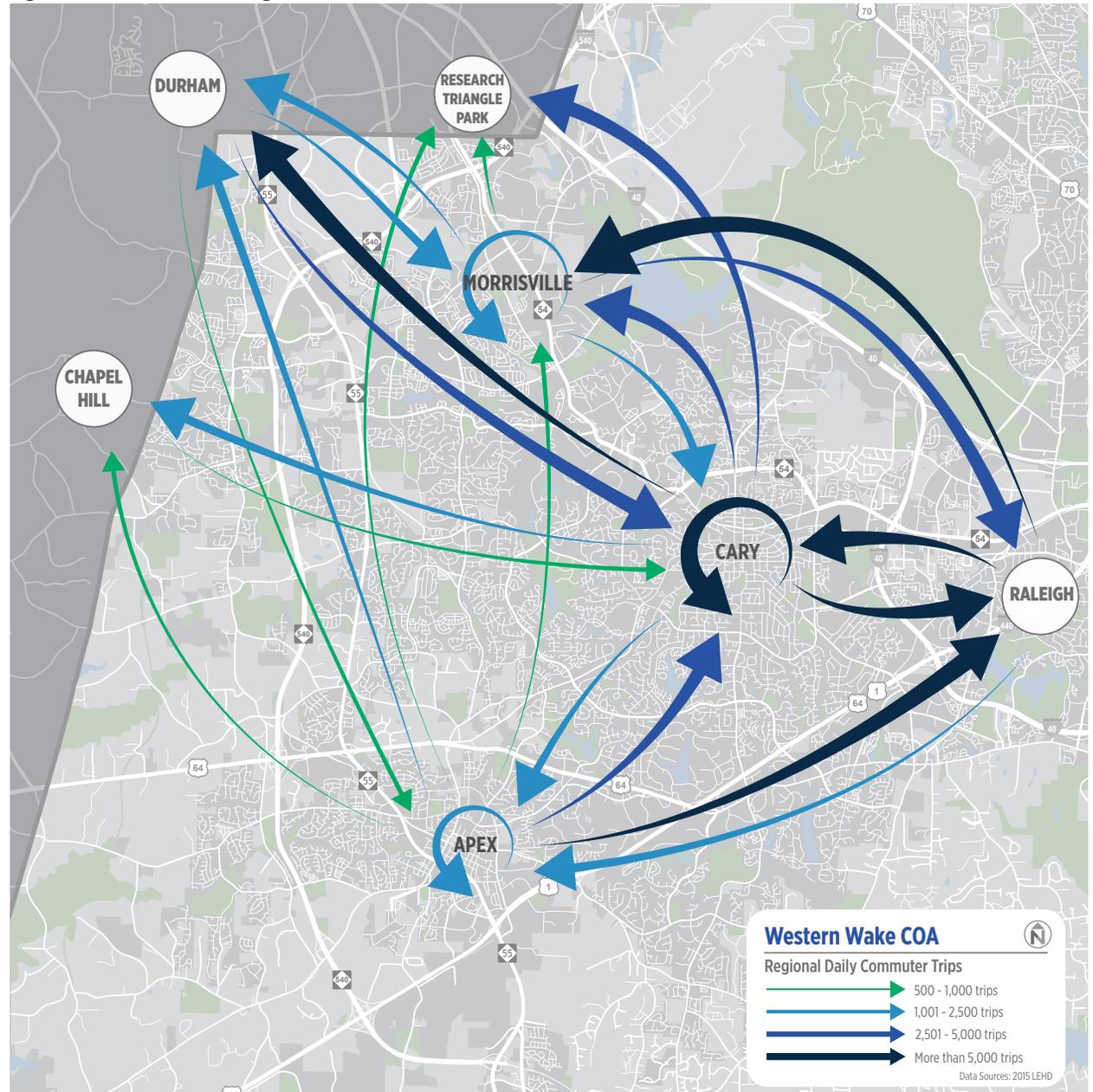
For transit to be effective, it must take people from where they are to where they want to go.

People also travel for many reasons, including to and from work and school, and for shopping, medical, recreation, social, and other purposes. Transit serves a wide variety of trips, but for all transit systems, work trips are particularly important. This is because nationally nearly half of all transit trips are work related and because service that connects key employment areas often serves multiple purposes. For example, hospitals are large employment centers but also provide medical related trips. Similarly, commercial centers often represent a concentration of jobs, but also provide access to shopping.

Regional Commute Trips – All Modes

Looking at trips made by western Wake County residents, the highest volume of trips are focused between western Wake County and Raleigh. Significant volumes are also located within the Town of Cary and from the Town of Cary to Durham.

Figure 8: Western Wake Regional Travel Flows

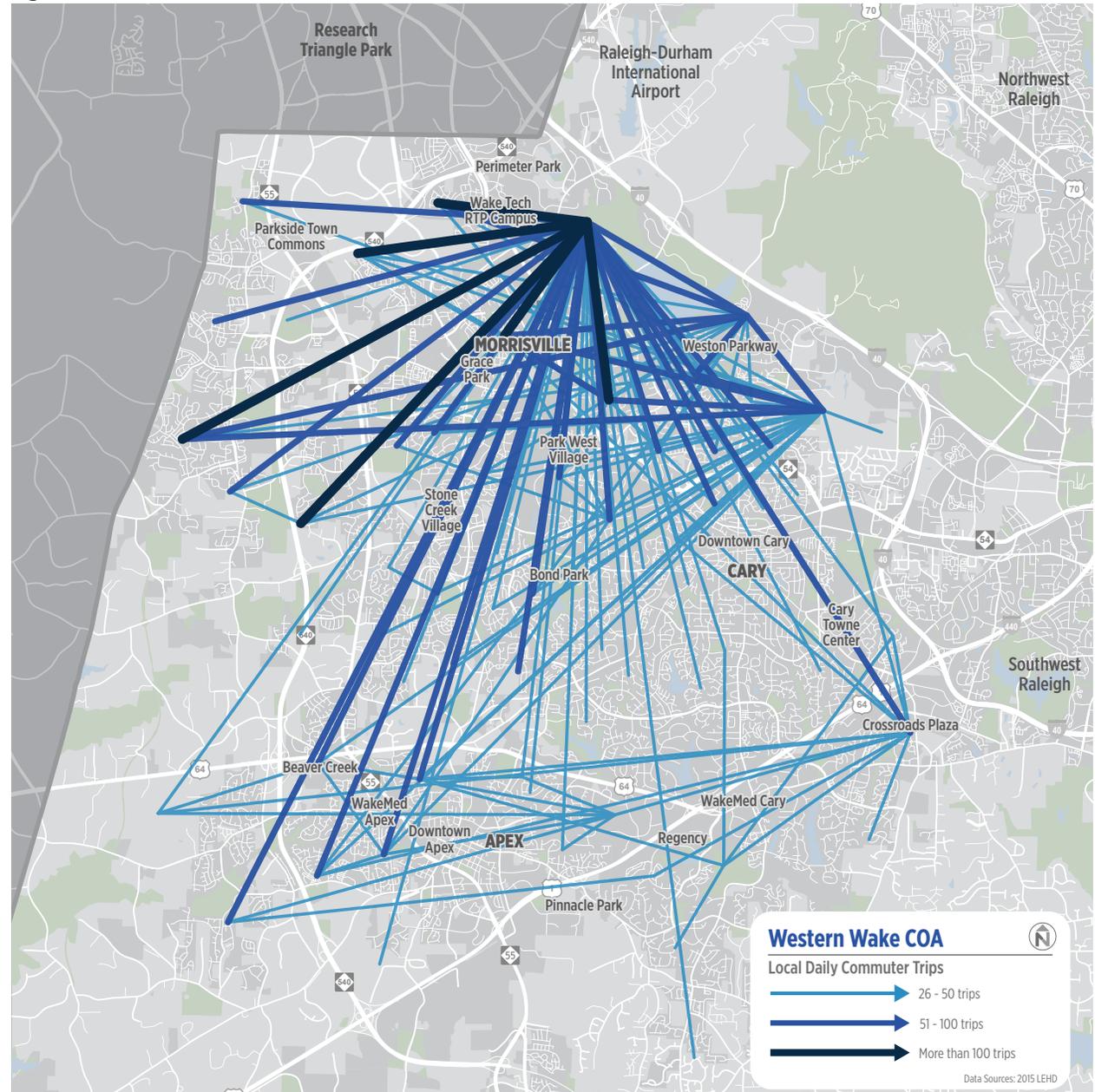


Travel Flows Continued

Local Commute Trips – All Modes

Localized trips in western Wake County are heavily orientated to northern Morrisville. Significant volumes are also shown between the northwestern most edge of the study area along the Triangle Expressway corridor.

Figure 9: Western Wake Local Travel Flows



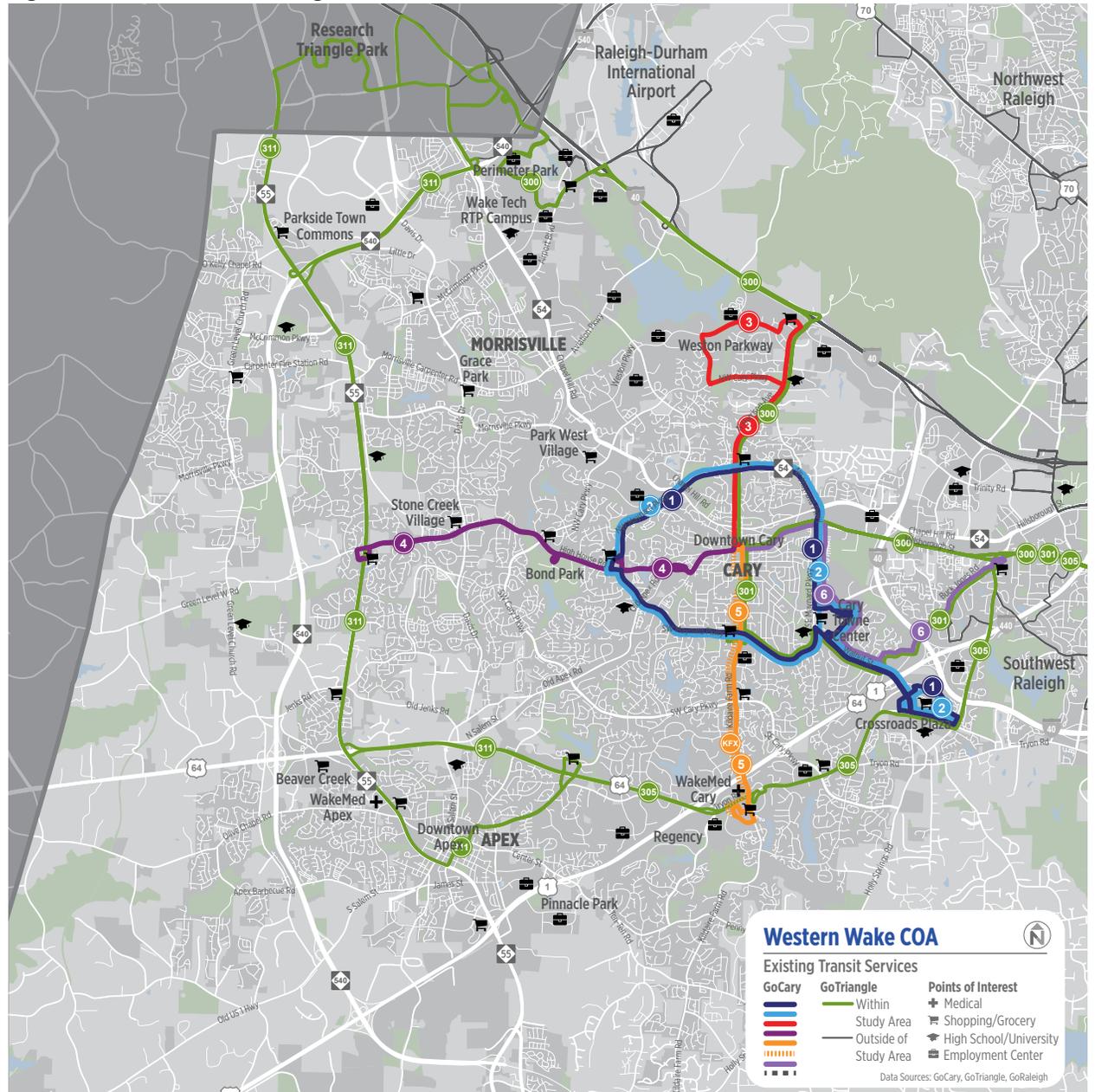


Major Activity Centers

Activity centers generate additional demand for transit.

These include large employers, hospitals and healthcare centers, universities, and entertainment destinations. Today, many major activity centers in western Wake County are not easily accessible by transit service. In particular, Morrisville and Apex have significant concentrations of activity centers and large employers currently being underserved. Of these two, Apex currently features a higher level of regional transit service. However, both destinations lack local service and could be better connected to transit services in Cary, Raleigh, and the Research Triangle Park.

Figure 10: Western Wake Existing Transit and Points of Interest





Service Analysis

System Introduction

Today, GoCary offers six fixed routes and eligibility based door-to-door services. Except for the Maynard Loop routes, all other routes begin service from the downtown intermodal transit hub, Cary Depot (Figure 11).

Monday through Saturday, most routes operate at a frequency of 30 minutes for most of the service day, before operating at a 60 minute frequency in the evening. The Maynard Loop routes operate at a 60 minute frequency all day. All routes generally operate from 6:00 a.m. to 10:00 p.m., with minor variances, from Monday through Saturday. Sundays reduce service spans and frequencies to hourly service from 7:00 a.m. to 9:00 p.m. (Table 3).

The regular cash fare on any fixed route is \$1.50, with no transfer offered. Various passes are also available to use with one-day passes for \$3.00, 7-day passes for \$14.50, and 31-day passes for \$54.00. Additionally, there are regional passes that can be used on any service within the triangle region (GoCary, GoTriangle, GoRaleigh, and GoDurham).

A discount is given to certain individuals for fares and passes. Individuals who pay a reduced fare must show proof of eligibility when boarding the bus.

Individuals who are eligible to receive a discount include:

- Students aged 13-18 with a student ID from the enrolled school
- Seniors aged 60 and over
- Persons with disabilities
- All children aged 12 and under; Free

Discounted one-way fares and passes for GoCary services are half the price of regular fares. Discounts for regional services are 4/9^{ths} of full fare.

Table 3: GoCary Schedule Statistics

Route	Span of Service	Weekday Frequency (Min)			
		AM Peak	Midday	PM Peak	Evening
Route 1 - Maynard CW	Monday - Saturday: 6:00 a.m. - 10:00 p.m. Sunday: 7:00 a.m. - 9:00 p.m.	60	60	60	60
Route 2 - Maynard CCW	Monday - Saturday: 6:00 a.m. - 10:00 p.m. Sunday: 7:00 a.m. - 9:00 p.m.	60	60	60	60
Route 3 - Harrison	Monday - Saturday: 6:00 a.m. - 9:30 p.m. Sunday: 7:00 a.m. - 8:30 p.m.	30	30	30	60
Route 4 - High House	Monday - Saturday: 6:00 a.m. - 10:00 p.m. Sunday: 7:00 a.m. - 9:00 p.m.	30	30	30	60
Route 5 - Kildaire Farm	Monday - Saturday: 6:00 a.m. - 10:00 p.m. Sunday: 7:30 a.m. - 9:00 p.m.	30	30	30	60
Kildaire Farm Express	Monday - Friday: 4:10 p.m. - 5:30 p.m.	-	-	30	-
Route 6 - Buck Jones	Monday - Saturday: 6:00 a.m. - 10:00 p.m. Sunday: 7:00 a.m. - 9:00 p.m.	30	30	30	60

Figure 11: GoCary System Map

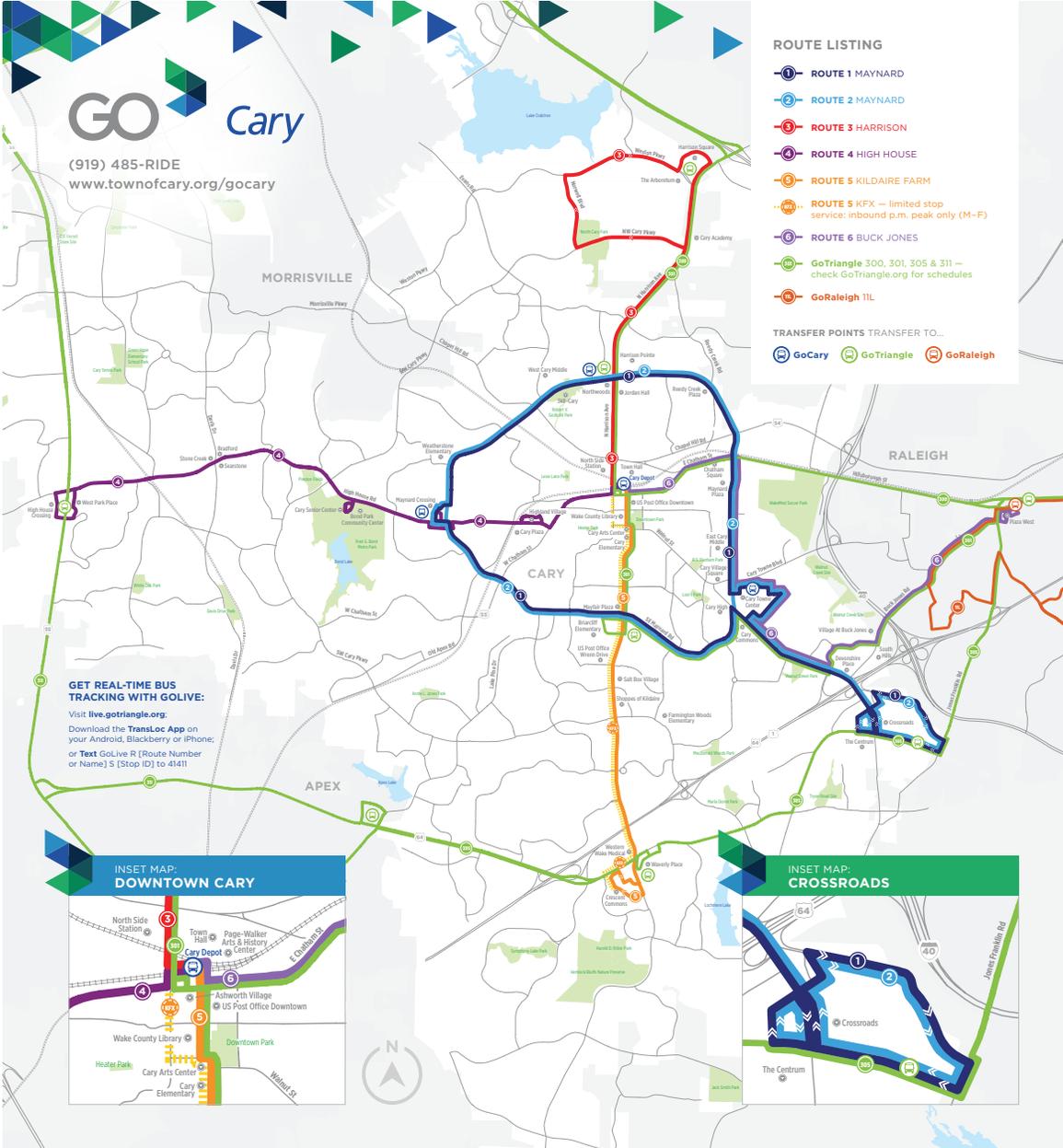


Figure 12: Average Weekday Ridership

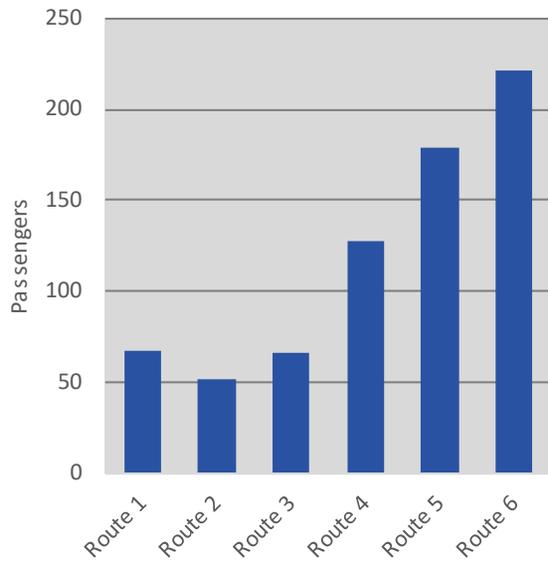


Figure 13: Weekday Ridership per Revenue Hour

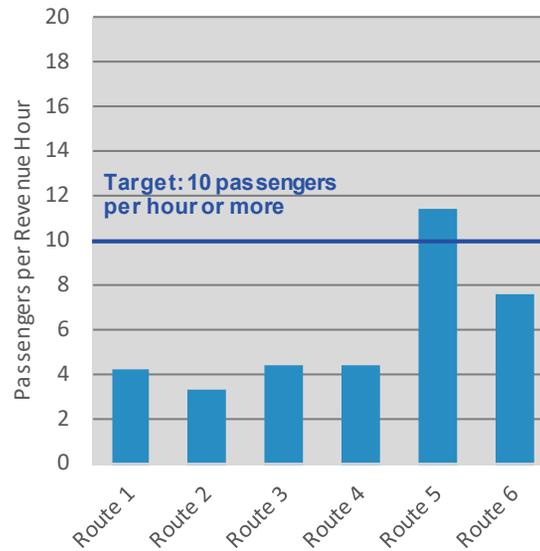
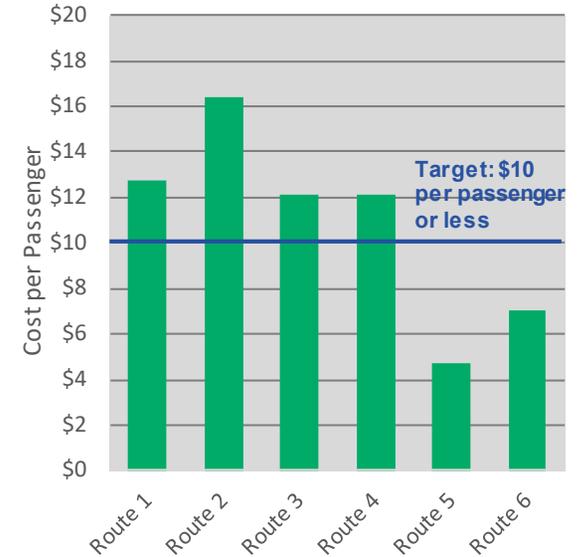


Figure 14: Weekday Cost per Passenger



Service Performance

The majority of GoCary services do not meet the productivity targets set in the GoForward: Wake Transit Plan. Ridership information used in this section and for the following route profiles was obtained through a ridecheck of GoCary services on all service days. This ridecheck data was then compared against data collected by GoCary through their Automated Passenger Counts (APCs) in order to better represent an average service day.

Average Weekday Ridership

Route 6 has the highest overall ridership in the system with over 200 passengers per weekday, on average. Routes 1, 2, and 3 all have well below 100 riders per weekday (Figure 12).

Ridership per Revenue Hour

Route 5 has the highest ridership per revenue hour in the system with over 11 passengers per hour, on average. It is also the only route to meet the ridership per revenue hour performance target. While Route 6 has higher overall ridership, Route 5 performs better, since it is shorter in length. Due to the length of Route 4 and the low ridership on Routes 1, 2, and 3, all of these routes have a ridership per revenue hour of around four or less (Figure 13).

Cost per Rider

Route 5 has the lowest cost per passenger, costing about \$5 per passenger on an average weekday. Routes 5 and 6 both have costs per passenger lower than the performance target. Routes 1, 2, 3, and 4 all exceed the target, with Route 2 having the highest cost per passenger at just over \$16 per passenger (Figure 14).

The following sections examine each route independent of the other routes. For each route, an explanation is given for the design of the service, the ridership by stop and trip, the productivity of the route, the on-time performance of the route, and potential service improvements.

Route 1

Maynard (Clockwise)

Service Design

Route 1 operates two different segments. The first segment operates as a clockwise loop along Maynard Road to make connections with all other Cary routes outside of the main transfer point in Downtown Cary. The second segment operates between Cary Towne Center and Crossroads Plaza via Walnut Street (Figure 15). Route 1 provides service to Cary High School, Mayfair Plaza, Maynard Crossing, Northwoods Market, Chatham Square, Maynard Plaza, Cary Village Square Shopping Center, and multiple housing complexes. Customers can transfer between Route 1 and Route 2 along the entire route. Transfers to other Cary services can be made at the Mayfair Plaza, Maynard Crossing, Northwoods Market, Cary Towne Center, and along Walnut Street. Transfers to regional services can be made at Crossroads Plaza and along SE Maynard Road and Walnut Street.

Monday through Saturday, Route 1 operates from 6:00 a.m. to 10:00 p.m. every 60 minutes. Sunday service operates hourly from 7:00 a.m. to 9:00 p.m. Route 1 has a single service pattern for all service days (Table 4).

Figure 15: Route 1 Map

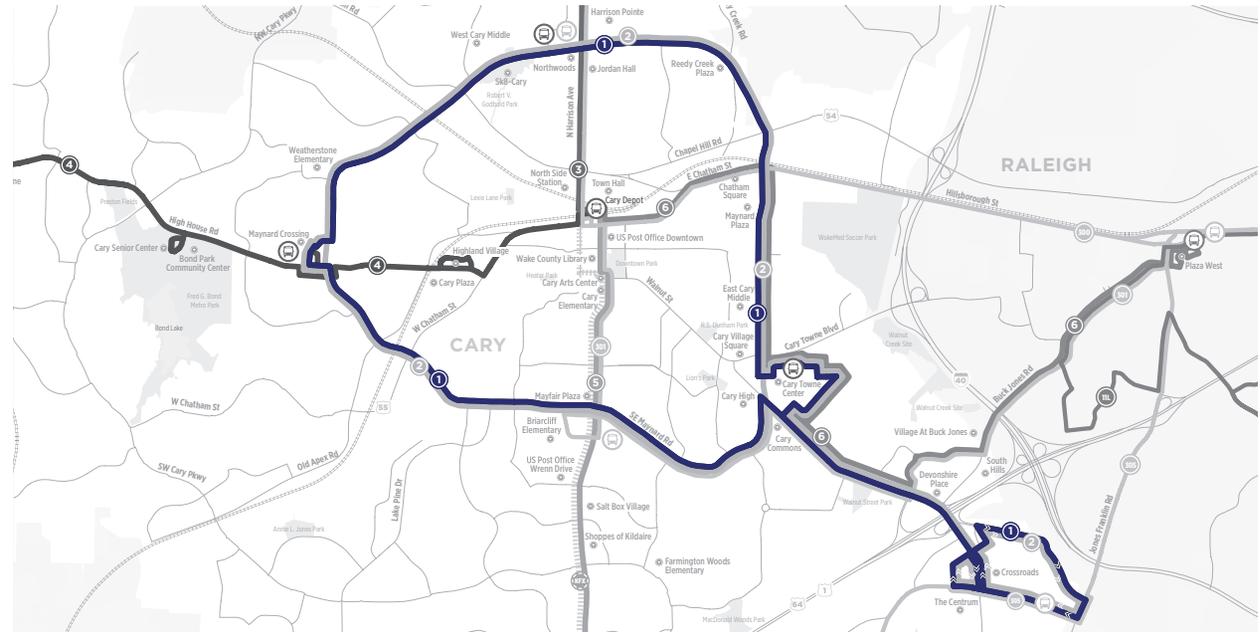


Table 4: Route 1 Service Schedule Statistics

Service Day	Span of Service	Frequency (Min)	Daily Trips (Outbound/Inbound)
Weekday	6:00 a.m. to 10:00 p.m.	60	16/16
Saturday	6:00 a.m. to 10:00 p.m.	60	16/16
Sunday	7:00 a.m. to 9:00 p.m.	60	14/14

Ridership by Stop

Weekday

The highest weekday ridership stops on Route 1 are located at the Cary Towne Center, with about 15 boardings per weekday, and near Northwoods Market with each stop having about five boardings per weekday.

Both areas serve large retail centers and are locations where customers can transfer to other transit services. Additionally, the stops to the east of Northwoods Market serve multiple apartment complexes. All other stops have less than five boardings per weekday (Figure 16 & Figure 17).

Weekend

Saturday ridership has a similar pattern as weekdays, except with around 81% of weekday ridership. Sundays have a similar pattern but with significantly less ridership, about 57% of Saturday ridership.

Figure 16: Route 1 Weekday Ridership by Stop Chart

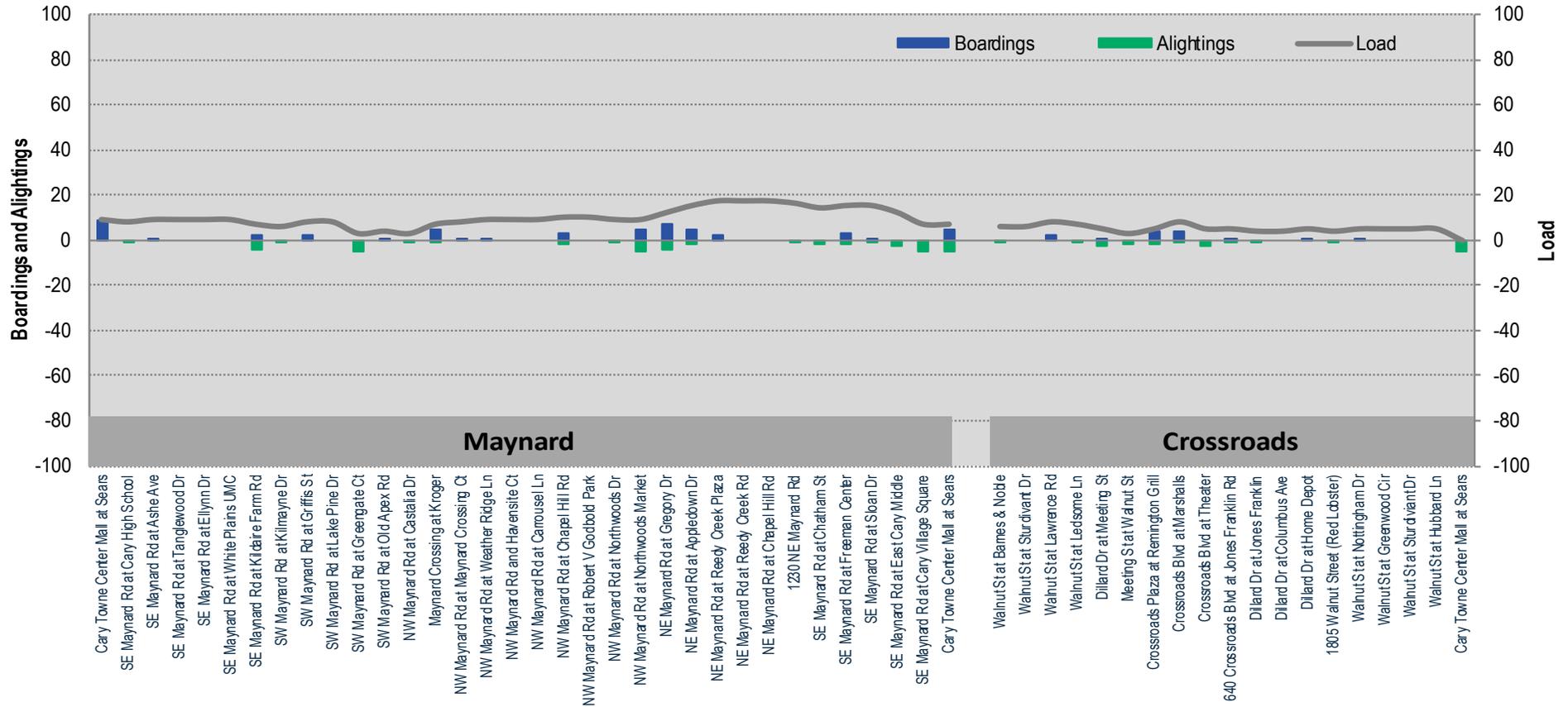
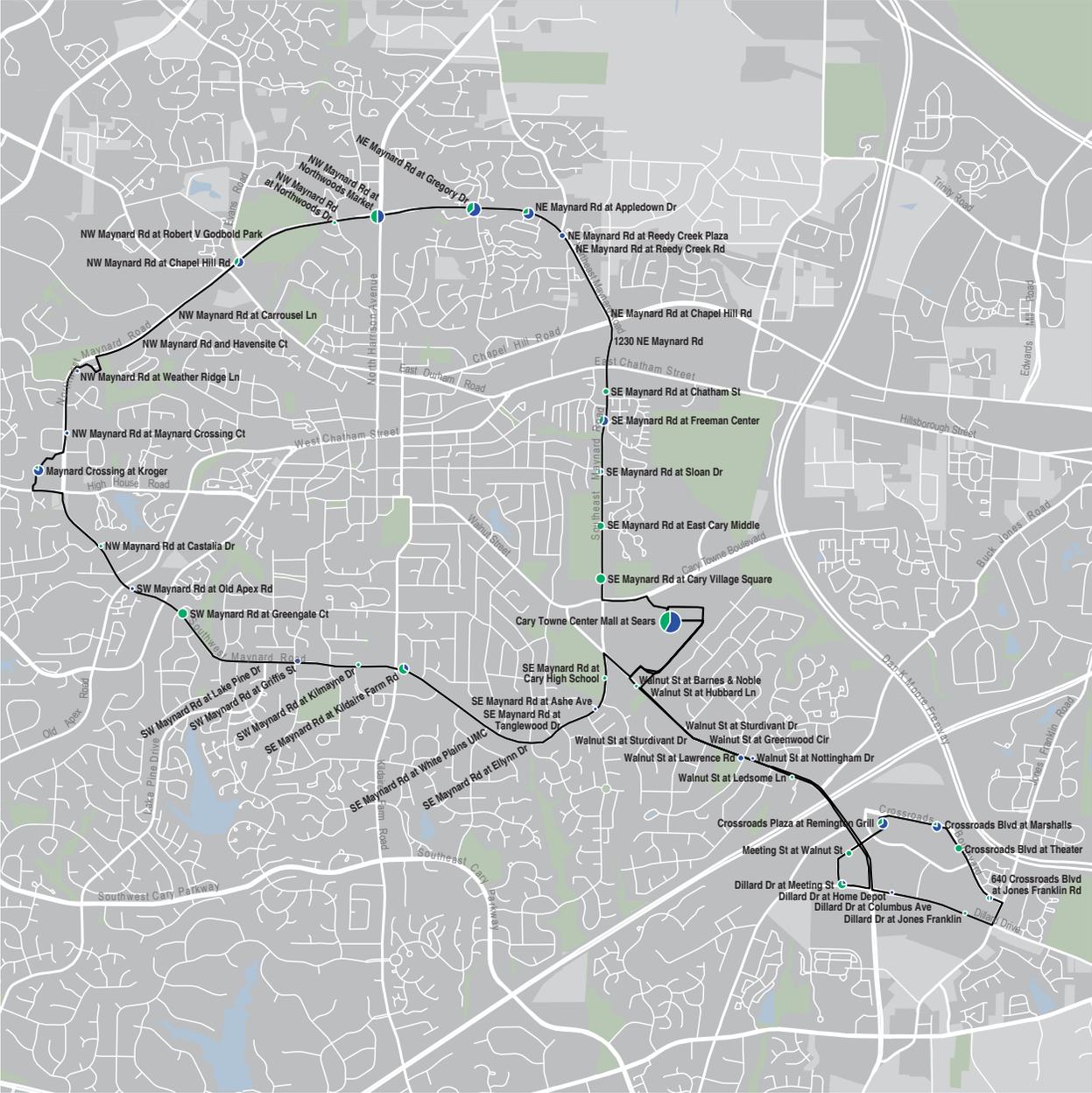
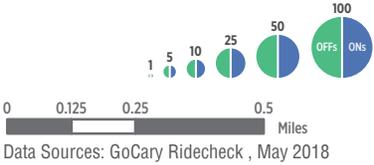


Figure 17: Route 1 Weekday Ridership by Stop Map



Route 1 Weekday Activity

Boardings and alightings by stop
circle size indicates total activity



Data Sources: GoCary Ridecheck , May 2018

Ridership by Trip

Weekday

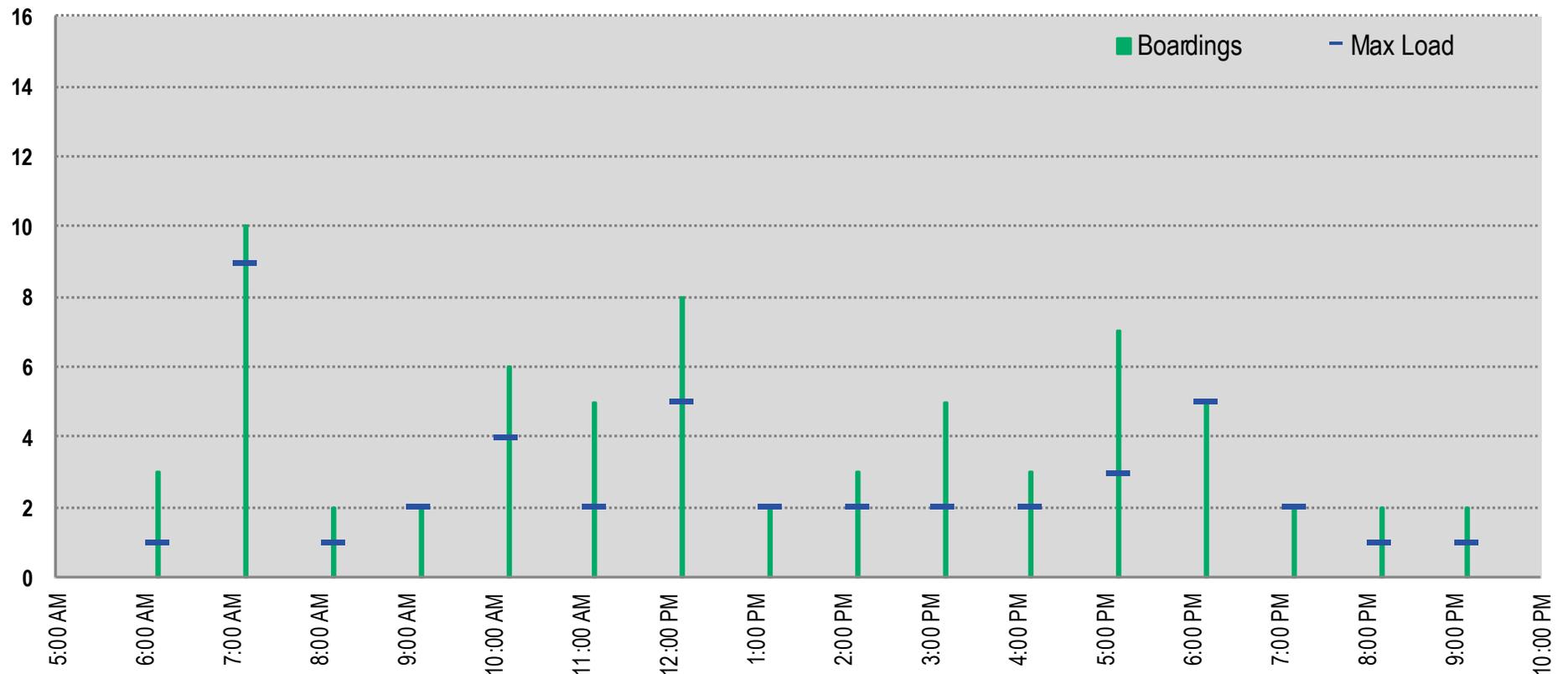
On weekdays, Route 1 ridership is highest in the morning (Figure 18). During this period, the 7:10 a.m. trip has about 10 boardings. Other periods with higher ridership include a few midday trips and during the typical evening commute.

A high number of midday boardings is usually associated with shopping, medical, and school trips. Most trips have a maximum load close to the total number of boardings per trip, meaning there is little turnover along the route, although some trips during the midday have lower max loads.

Weekend

On Saturdays, Route 1 ridership is similar to weekdays with the highest ridership trip in the morning and higher ridership periods during the evening. On Sundays, ridership is low across the service day. The number of boardings per trip are significantly less, with the highest trip only generating four boardings.

Figure 18: Route 1 Weekday Ridership by Trip Chart



Service Productivity

Route 1 ranks 4th of the 6 local routes in the study area in terms of weekday ridership and 5th of 6 in terms of ridership per hour (Table 5). On average, the route carries 67 passengers, or 4.2 passengers per hour, on weekdays. On Saturdays, Route 1 carries 54 passengers, or 3.4 passengers per hour. Route 1 does not meet the passenger per revenue hour target (10 per hour) established in the GoForward: Wake Transit Plan for any service day.

On weekdays, the operating cost of Route 1 is \$12.77 per passenger. On weekends, the cost per passenger increases to \$15.84 per passenger on Saturdays and \$24.15 per passenger on Sundays. Route 1 does not meet the cost per passenger target (\$10 per passenger) for any service day.

Table 5: Route 1 Service Productivity Table

Service Day	Average Daily Ridership	Passenger per Revenue Hour	Passenger per Revenue Hour Target	Cost per Passenger	Cost per Passenger Target
Weekday	67	4.2	10	\$12.77	\$10.00
Saturday	54	3.4	10	\$15.84	\$10.00
Sunday	31	2.2	10	\$24.15	\$10.00

On-Time Performance

On weekdays, most timepoints and trips for Route 1 do not operate on time (Table 6). GoCary measures on-time performance based on how each trip runs compared to the schedule. Trips are considered on time if they leave the scheduled timepoint zero minutes early and up to five minutes late.

Timepoints along the Maynard Loop are more likely to be served late on weekdays. Weekends are more likely to be served on time, with Sundays having the most number of on-time departures. Across all service days, trips are often late, indicating that the route does not have enough time in the schedule.

Table 6: Route 1 On-Time Performance by Timepoint

Timepoint	On Time	Weekday Trips Early	Late	Saturday Trips On Time	Sunday Trips On Time
Maynard Loop	42%	0%	58%	78%	93%
Cary Towne Center	50%	0%	50%	67%	100%
SE Maynard & Kildaire Farm	38%	0%	62%	73%	79%
Maynard Crossing	38%	0%	62%	81%	100%
NW Maynard & Northwoods Market	50%	0%	50%	81%	93%
SE Maynard & East Cary Middle School	38%	0%	62%	81%	86%
Cary Towne Center	38%	0%	62%	81%	100%
Crossroads	66%	0%	34%	66%	95%
Walnut & Lawrence	50%	0%	50%	56%	92%
Crossroads & Marwills	63%	0%	37%	69%	100%
Walnut & Nottingham	75%	0%	25%	38%	86%
Cary Towne Center	75%	0%	25%	100%	100%

Potential Service Improvements

Opportunities to strengthen Route 1 are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

- **Shorten Crossroads Loop & Adjust Schedule Time.** Many of the timepoints along Route 1 are consistently served late. By adding more time into the schedule and ensuring enough recovery time, the on-time performance of Route 1 can be better. Since there is only one minute of recovery time in the schedules now, the route has to be shortened to gain additional time. By shortening the Crossroads Loop, additional time can be gained for the route.
- **Add More Pedestrian Infrastructure.** Many stretches of road along the route have paired stops with no safe crossings for pedestrians. For example, there are no marked crosswalks across SE Maynard Road on the 1.5 mile stretch between Kildaire Farm Road and Walnut Street. Marked crosswalks need to be added in order for customers to be safely served in both directions.
- **Demand Response.** Recent improvements in demand response services make them a preferred option for services generating less than seven passengers per hour. Demand response options provide a higher level of customer service for the same cost in these areas of lower productivity. Consider operating a demand response service in place of the existing fixed route.
- **Combine Services with Route 2 from Crossroads to Cary Depot and Discontinue Maynard Loop.** The majority of the ridership for Route 1 is at Crossroads Plaza and Cary Towne Center. Ridership may increase to these areas by focusing service to directly serve these areas and connect to the Cary Depot. Simplifying service by combining Routes 1 and 2 can increase the frequency and reliability of service to Crossroads Plaza and make it easier for customers to understand the service.



Route 2

Maynard (Counter-Clockwise)

Service Design

Route 2 operates two different segments. The first segment operates as a counter-clockwise loop along Maynard Road to make connections with all other Cary routes outside of the main transfer point in Downtown Cary. The second segment operates between Cary Towne Center and Crossroads Plaza via Walnut Street (Figure 19). Route 2 provides service to Cary Village Square Shopping Center, Maynard Plaza, Chatham Square, Northwoods Market, Maynard Crossing, Mayfair Plaza, Cary High School, and multiple housing complexes. Customers can transfer between Route 2 and Route 1 along the entire route. Transfers to other Cary services can be made at the Mayfair Plaza, Maynard Crossing, Northwoods Market, Cary Towne Center, and along Walnut Street. Transfers to regional services can be made at Crossroads Plaza and along SE Maynard Road and Walnut Street.

Monday through Saturday, Route 2 operates from 6:00 a.m. to 10:00 p.m. every 60 minutes. Sunday service operates hourly from 7:10 a.m. to 9:10 p.m. Route 2 has a single service pattern for all service days (Table 7).

Figure 19: Route 2 Map

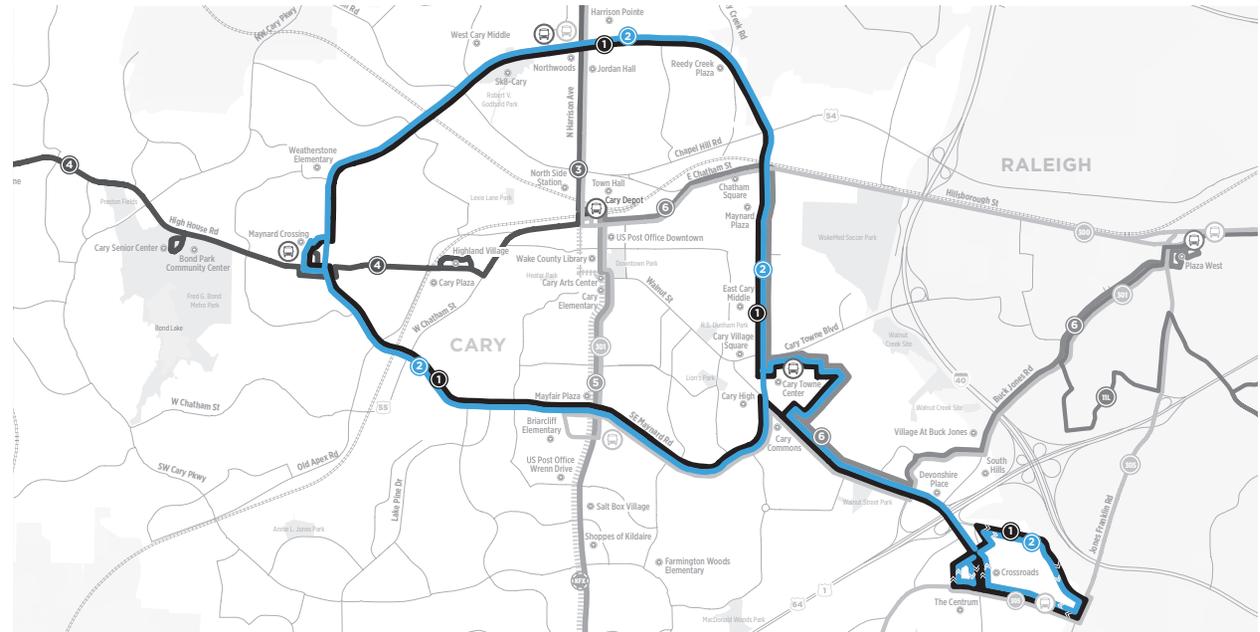


Table 7: Route 2 Service Schedule Statistics

Service Day	Span of Service	Frequency (Min)	Daily Trips (Outbound/Inbound)
Weekday	6:00 a.m. to 10:00 p.m.	60	16/16
Saturday	6:00 a.m. to 10:00 p.m.	60	16/16
Sunday	7:00 a.m. to 9:00 p.m.	60	14/14

Ridership by Stop

Weekday

The highest weekday ridership stops on Route 2 are located at the Cary Towne Center, with about 15 boardings per weekday, and at Crossroads Plaza, with a combined 10 boardings per weekday.

Both areas serve large retail centers and are locations where customers can transfer to other transit services. All other stops have less than five boardings per weekday (Figure 20 & Figure 21).

Weekend

Saturday ridership on Route 2 is higher than weekday ridership. Ridership is highest at Cary Towne Center and somewhat higher at other retail areas. Sundays have a similar pattern to Saturdays but with significantly less ridership, about 37% of Saturday ridership.

Figure 20: Route 2 Weekday Ridership by Stop Chart

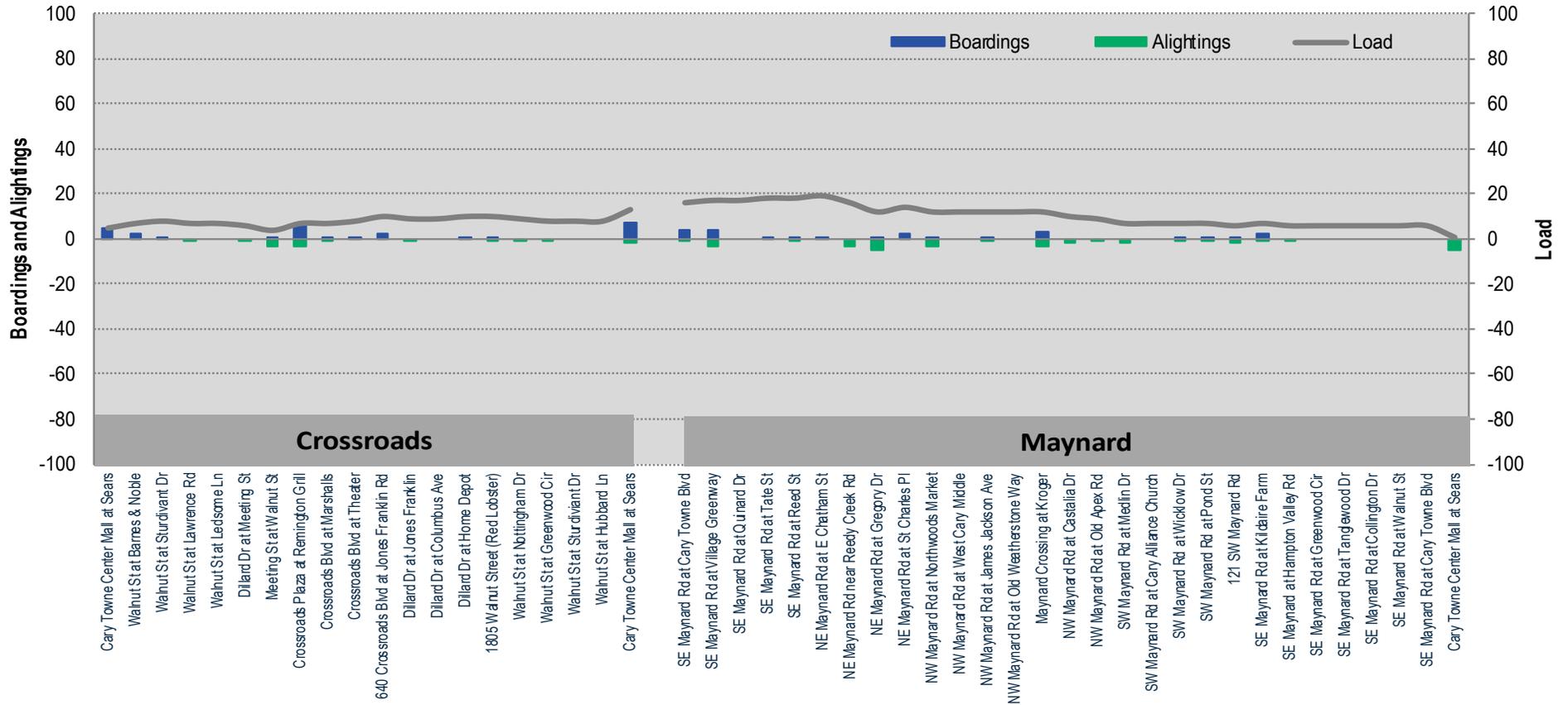
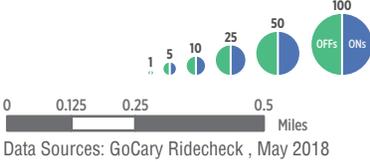


Figure 21: Route 2 Weekday Ridership by Stop Map



Route 2 Weekday Activity

Boardings and alightings by stop
circle size indicates total activity



Ridership by Trip

Weekday

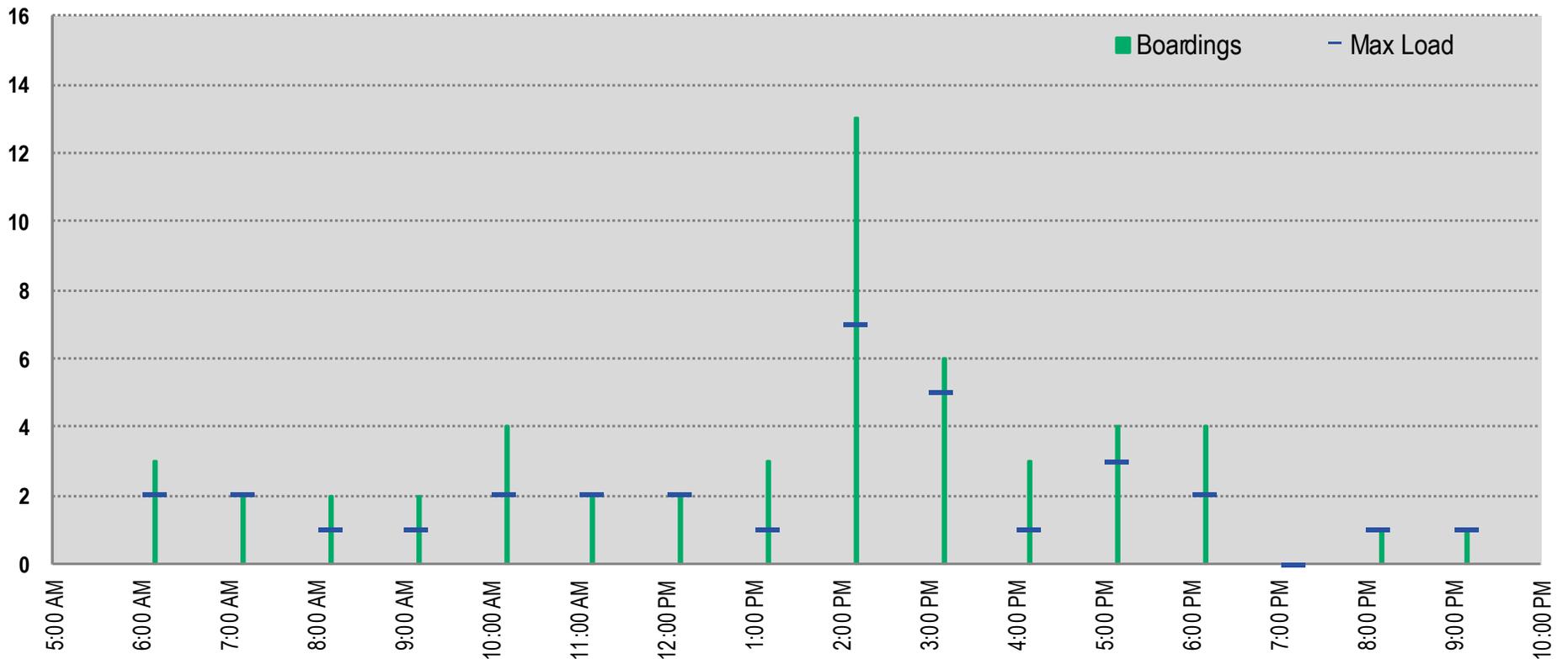
On weekdays, Route 2 ridership is highest in the afternoon (Figure 22). During this period, the 2:10 p.m. trip has 13 boardings. A high number of boardings during the midday is usually associated with shopping, medical, and school trips.

Most trips have a maximum load close to the total number of boardings per trip, meaning there is little turnover along the route, although some trips during the midday have lower max loads.

Weekend

On Saturdays, Route 2 ridership has two different peaks, one in the morning and a larger peak in the evening. Morning trips host about six boardings, while from 3:10 to 5:10 p.m., trips generate six to ten passengers per trip. On Sundays, ridership is highest in the morning, with about four boardings per trip. Overall, Sunday ridership is much lower than weekdays or Saturdays.

Figure 22: Route 2 Weekday Ridership by Trip Chart



Service Productivity

Route 2 ranks 6th of the 6 local routes in the study area in terms of weekday ridership and 6th of 6 in terms of ridership per hour (Table 8). On average, the route carries 52 passengers, or 3.3 passengers per hour, on weekdays. On Saturdays, Route 2 carries 63 passengers, or 3.9 passengers per hour. Route 2 does not meet the passenger per revenue hour target (10 per hour) established in the GoForward: Wake Transit Plan for any service day.

On weekdays, the operating cost of Route 2 is \$16.45 per passenger. On weekends, the cost per passenger decreases to \$13.58 per passenger on Saturdays but then increases to \$32.55 per passenger on Sundays. Route 2 does not meet the cost per passenger target (\$10 per passenger) for any service day.

Table 8: Route 2 Service Productivity Table

Service Day	Average Daily Ridership	Passenger per Revenue Hour	Passenger per Revenue Hour Target	Cost per Passenger	Cost per Passenger Target
Weekday	52	3.3	10	\$16.45	\$10.00
Saturday	63	3.9	10	\$13.58	\$10.00
Sunday	23	1.6	10	\$32.55	\$10.00

On-Time Performance

On weekdays, most Route 2 timepoints on the Crossroads segment are not served on time, while a majority of Maynard Loop timepoints are served on time (Table 9). GoCary measures on-time performance based on how each trip runs compared to the schedule. Trips are considered on time if they leave the scheduled timepoint zero minutes early and up to five minutes late.

Weekends are more likely to be served on time, with Saturdays having the most number of on-time departures. Across all service days, trips are most likely to be late, indicating that the route does not have enough time in the schedule.

Table 9: Route 2 On-Time Performance by Timepoint

Timepoint	Weekday Trips			Saturday Trips On Time	Sunday Trips On Time
	On Time	Early	Late		
Crossroads	40%	3%	57%	83%	79%
Cary Towne Center	31%	0%	69%	80%	71%
Walnut & Lawrence	31%	0%	69%	75%	79%
Crossroads & Remington Grill	40%	0%	60%	100%	86%
Walnut & Nottingham	60%	13%	27%	75%	79%
Maynard Loop	64%	2%	34%	76%	73%
Cary Towne Center	67%	13%	20%	81%	64%
SE Maynard & Village Greenway	63%	0%	37%	81%	71%
NW Maynard & Northwoods Market	63%	0%	37%	75%	64%
Maynard Crossing	69%	0%	31%	75%	77%
121 SW Maynard Rd	50%	0%	50%	60%	77%
Cary Towne Center	75%	0%	25%	80%	86%

Potential Service Improvements

Opportunities to strengthen Route 2 are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

- **Shorten Crossroads Loop & Adjust Schedule Time.** Many of the timepoints along Route 2 are consistently served late. By adding more time into the schedule and ensuring enough recovery time, the on-time performance of Route 2 can be better. Since there are only three minutes of recovery time in the schedules now, the route has to be shortened to gain additional time. By shortening the Crossroads Loop, additional time can be gained for the route.
- **Add More Pedestrian Infrastructure.** Many stretches of road along the route have paired stops with no safe crossings for pedestrians. For example, there are no marked crosswalks across SE Maynard Road on the 1.5 mile stretch between Kildaire Farm Road and Walnut Street. Marked crosswalks need to be added in order for customers to be safely served in both directions.
- **Demand Response.** Recent improvements in demand response services make them a preferred option for services generating less than seven passengers per hour. Demand response options provide a higher level of customer service for the same cost in these areas of lower productivity.
- Consider operating a demand response service in place of the existing fixed route.
- **Combine Services with Route 1 from Crossroads to Cary Depot and Discontinue Maynard Loop.** The majority of the ridership for Route 2 is at Crossroads Plaza and Cary Towne Center. Ridership may increase to these areas by focusing service to directly serve these areas and connect to Cary Depot. Simplifying service by combining Routes 1 and 2 can increase the frequency and reliability of service to Crossroads Plaza and make it easier for customers to understand the service.



Route 3

Harrison

Service Design

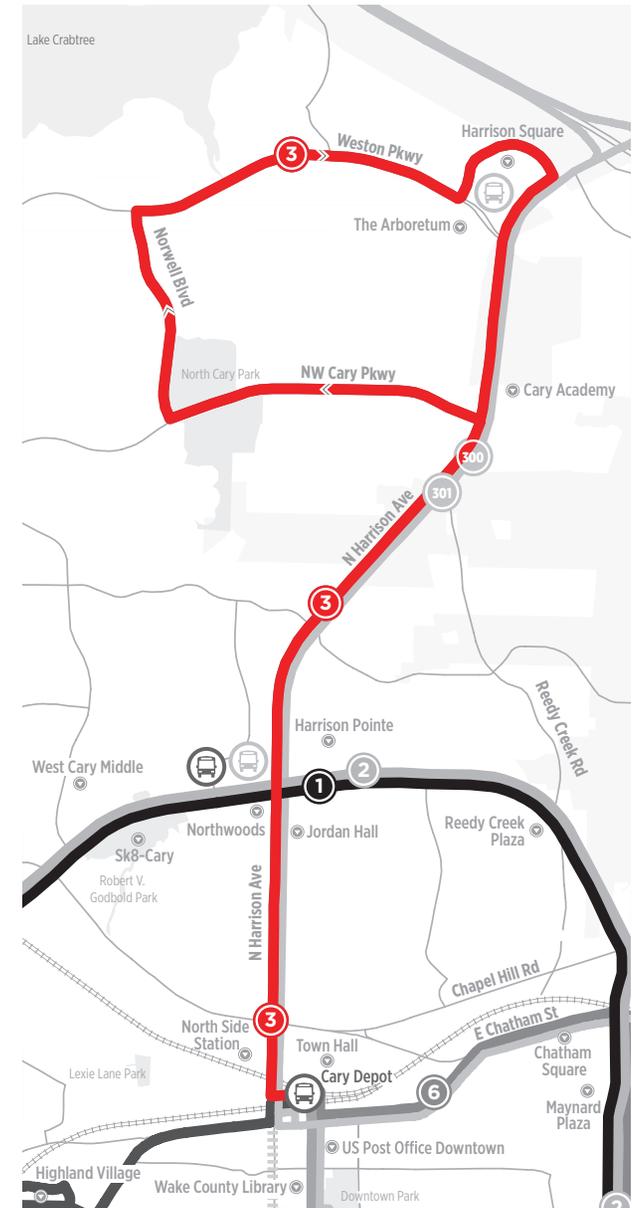
Route 3 operates between Downtown Cary and Harrison Square via the Northwoods Shopping Center. The route travels primarily along N Harrison Avenue, NW Cary Parkway, and Weston Parkway (Figure 23). Route 3 provides service to Cary Academy, large employers along Weston Parkway, and multiple housing complexes along Harrison Avenue and NW Cary Parkway. Customers can transfer between Route 3 and other Cary services at the Cary Depot and at Northwoods Shopping Center. Transfers to regional services can be made at Cary Depot, Harrison Square, and along the length of N Harrison Avenue.

Monday through Saturday, Route 3 operates from 6:00 a.m. to 8:00 p.m. every 30 minutes and then every 60 minutes to the end of service at 9:30 p.m. Sunday service operates hourly from 7:00 a.m. to 8:30 p.m. Route 3 has a single service pattern for all service days (Table 10).

Table 10: Route 3 Service Schedule Statistics

Service Day	Span of Service	Frequency (Min)	Daily Trips (Outbound/Inbound)
Weekday	6:00 a.m. to 9:30 p.m.	30	30/30
Saturday	6:00 a.m. to 9:30 p.m.	30	30/30
Sunday	7:00 a.m. to 8:30 p.m.	60	14/14

Figure 23: Route 3 Map



Ridership by Stop

Weekday

Apart from the Cary Depot, the highest weekday ridership stops on Route 3 are located at Harrison Square, Northwoods Shopping Center, and the Hermitage at Beechtree apartments. Each of these stops have about 5 boardings per weekday. All other stops generate three or fewer boardings per weekday (Figure 24, Figure 25, & Figure 26).

Weekend

Saturday ridership has a similar pattern as weekdays, except with around 76% of weekday ridership. Sundays have a similar patterns but with significantly less ridership, about 54% of Saturday ridership.

Figure 24: Route 3 Weekday Outbound Ridership by Stop Chart

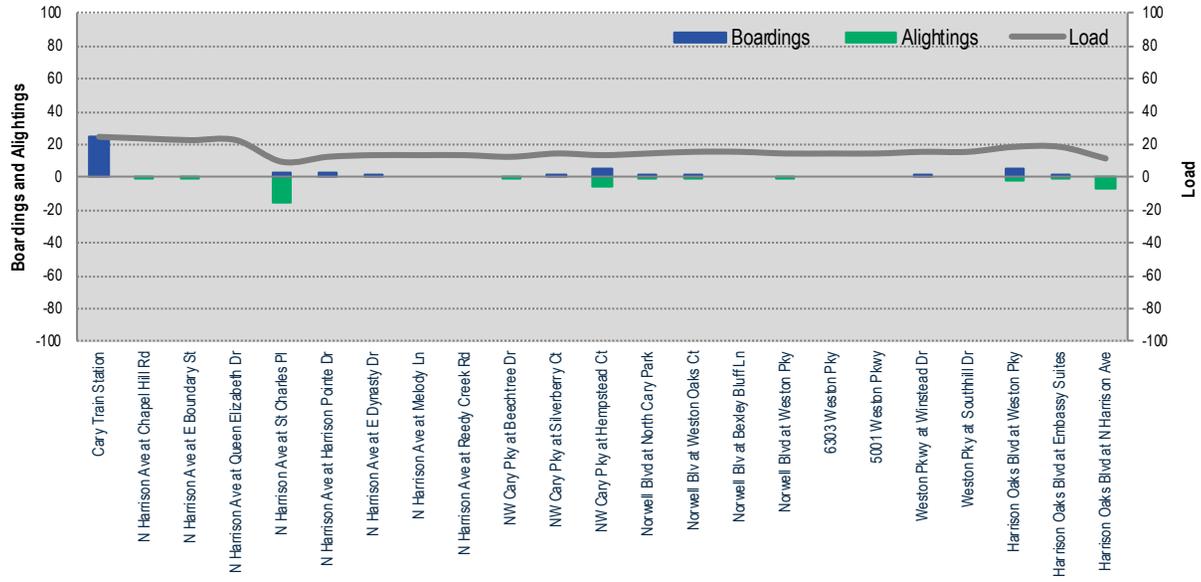


Figure 25: Route 3 Weekday Inbound Ridership by Stop Chart

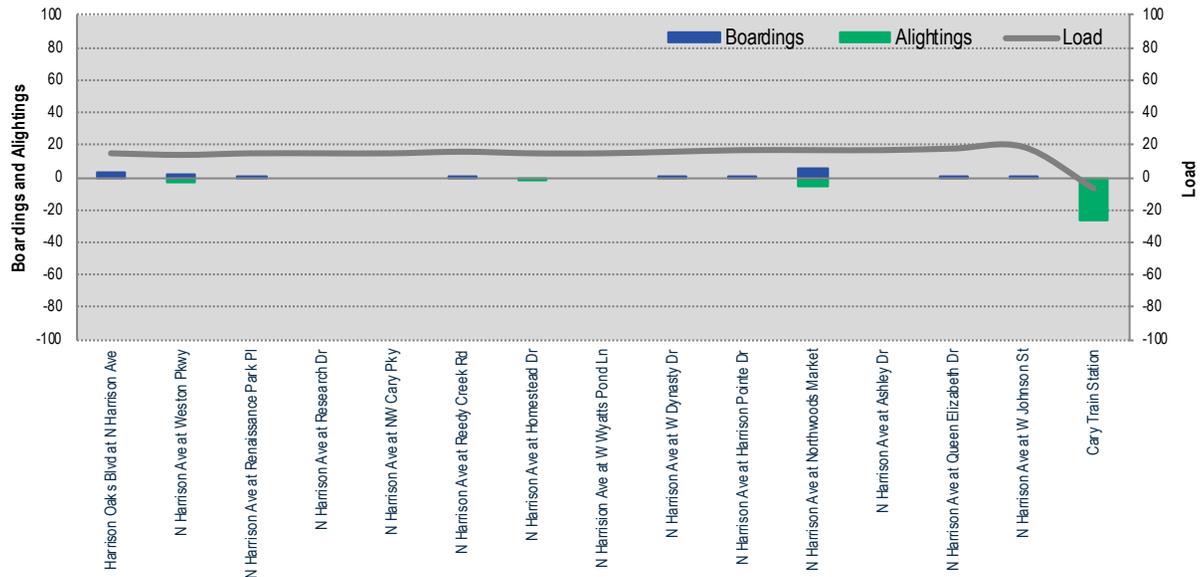
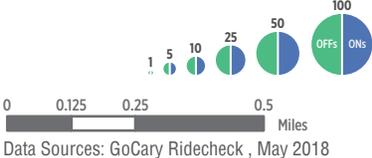


Figure 26: Route 3 Weekday Inbound Ridership by Stop Map



Route 3 Weekday Activity

Inbound boardings and alightings by stop
circle size indicates total activity



Ridership by Trip

Weekday

On weekdays, Route 3 ridership is highest in the morning in the outbound direction (Figure 27 & Figure 28). During this period, the 8:30 a.m. trip generates six boardings. All other periods have four or fewer boardings per trip. Most outbound trips have a maximum load close to the total number of boardings per trip, meaning there is little turnover along the route. Many inbound trips have max loads that are higher than the number of boardings. These trips have customers boarding the bus in the outbound direction and staying on in the inbound direction. This will often occur on large one-way loops, such as on the NW Cary Parkway, Norwell Boulevard, and Weston Parkway loop.

Weekend

On Saturdays, Route 3 ridership is the highest during the afternoon in the outbound direction. On Sundays, ridership is similar to Saturdays, with the highest number of boardings in the afternoon. Almost all trips after 5:00 p.m. on Saturday and Sunday have no ridership.

Figure 27: Route 3 Weekday Outbound Ridership by Trip

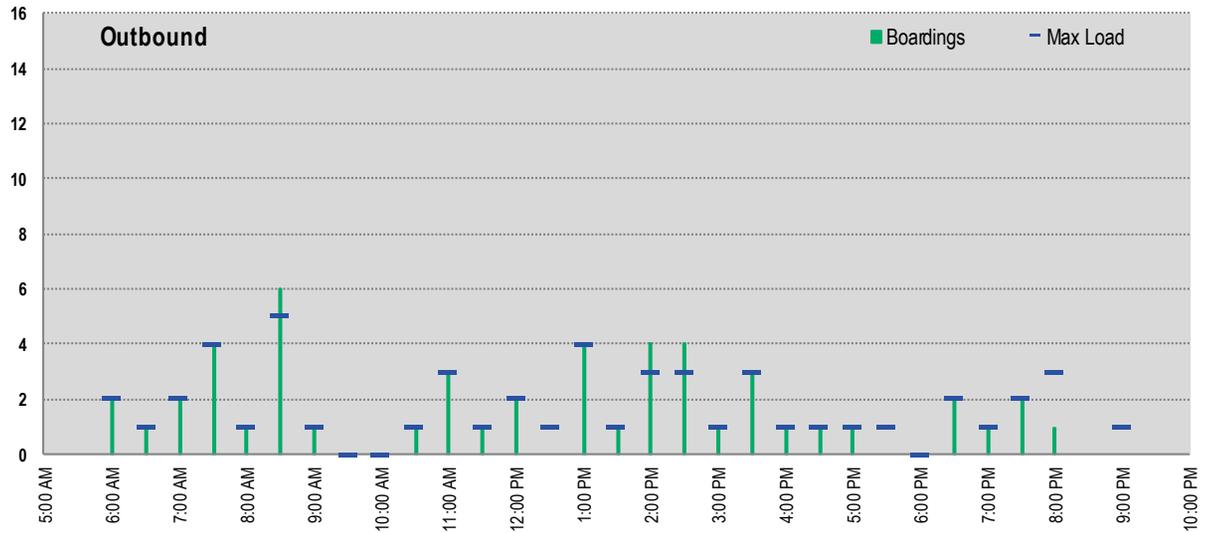
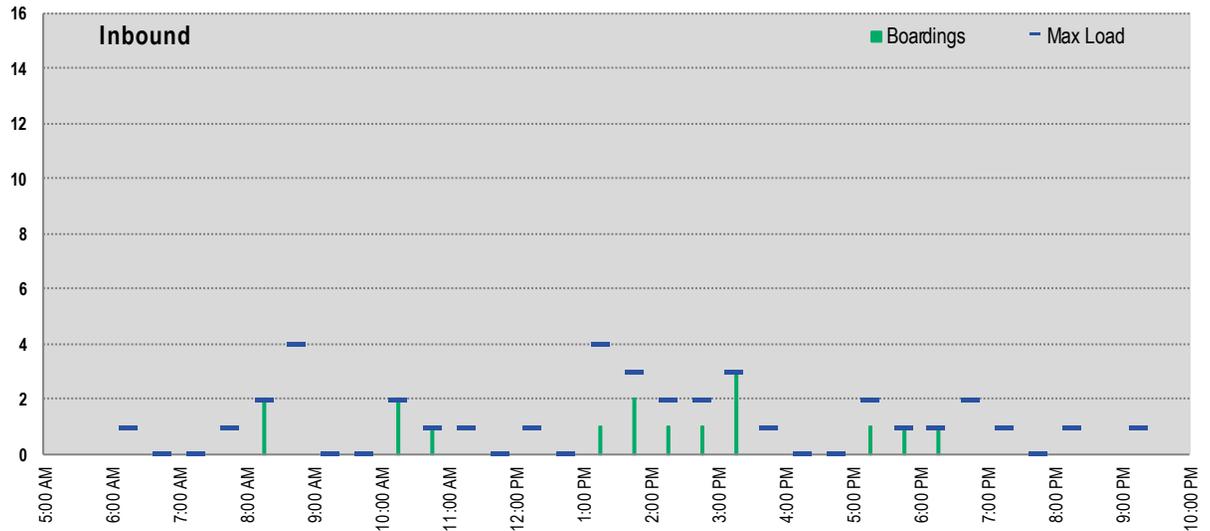


Figure 28: Route 3 Weekday Inbound Ridership by Trip



Service Productivity

Route 3 ranks 5th of the 6 local routes in the study area in terms of weekday ridership and 4th of 6 in terms of ridership per hour (Table 11). On average, the route carries 66 passengers, or 4.4 passengers per hour, on weekdays. On Saturdays, Route 3 carries 50 passengers, or 3.3 passengers per hour. Route 3 does not meet the passenger per revenue hour target (10 per hour) established in the GoForward: Wake Transit Plan for any service day.

On weekdays, the operating cost of Route 3 is \$12.15 per passenger, and increases on Saturdays to \$16.04 per passenger. Sunday costs decrease to \$13.86 per passenger, due to fewer operating hours. Route 3 does not meet the target (\$10 per passenger) for cost per passenger for any service day.

Table 11: Route 3 Service Productivity Table

Service Day	Average Daily Ridership	Passenger per Revenue Hour	Passenger per Revenue Hour Target	Cost per Passenger	Cost per Passenger Target
Weekday	66	4.4	10	\$12.15	\$10.00
Saturday	50	3.3	10	\$16.04	\$10.00
Sunday	27	3.9	10	\$13.86	\$10.00

On-Time Performance

Most timepoints and trips for Route 3 operate on time (Table 12). GoCary measures on-time performance based on how each trip runs compared to the schedule. Trips are considered on time if they leave the scheduled timepoint zero minutes early and up to five minutes late.

Most timepoints are likely to be served late rather than early. Weekends are more likely to be served on time, with Saturday trips having the most number of on-time departures. Similar to weekdays, when weekend timepoints are not served on time, they are more likely late, indicating the need to evaluate the schedule for reliability issues. Across all service days, Northwoods Market in the inbound direction is often served early.

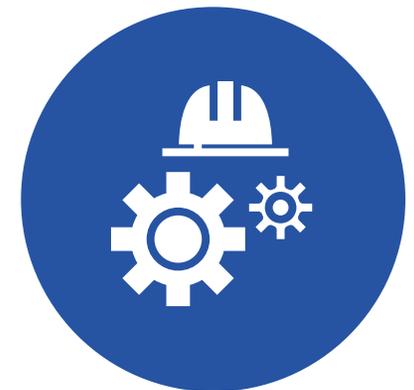
Table 12: Route 3 On-Time Performance by Timepoint

Timepoint	Weekday Trips			Saturday Trips On Time	Sunday Trips On Time
	On Time	Early	Late		
Outbound	76%	0%	24%	90%	87%
Cary Depot	80%	0%	20%	97%	92%
Northwoods Market	72%	0%	28%	83%	86%
Norwell & Cary Parkway	75%	0%	25%	90%	79%
Harrison Square	75%	0%	25%	90%	93%
Inbound	74%	4%	22%	90%	83%
Harrison Square	75%	0%	25%	93%	86%
Northwoods Market	61%	13%	26%	77%	64%
Cary Depot	87%	0%	13%	100%	100%

Potential Service Improvements

Opportunities to strengthen Route 3 are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

- **Discontinue Cary Parkway and Weston Parkway Loop and Adjust Schedule Time.** With the implementation of the Weston Parkway route in FY19, a portion of Route 3 will be duplicated. As many trips for Route 3 and interlined Route 5 run late, eliminating the large end loop on Route 3 would provide enough additional layover time in the schedules to increase on-time performance. Additionally, schedules will need to be adjusted to avoid serving some timepoints early.
- **Demand Response.** Recent improvements in demand response services make them a preferred option for services generating less than seven passengers per hour. Demand response options provide a higher level of customer service for the same cost in these areas of lower productivity. Consider operating a demand response service in place of the existing fixed route.
- **Add More Pedestrian Infrastructure.** Many stretches of road along the route have paired stops with no safe crossings for pedestrians. Often it is half a mile between crosswalks across Harrison Avenue. Marked crosswalks need to be added across Harrison Avenue in order for customers to be safely served in both directions.



Route 4

High House

Service Design

Route 4 operates between Downtown Cary and the High House Crossing Shopping Center. The route travels primarily along High House Road and W Chatham Street (Figure 29). Route 4 provides service to Highland Village Apartments, Maynard Crossing, Bond Park, Preston Corners Shopping Center, and Stone Creek Village. Customers can transfer between Route 4 and other Cary services at the Cary Depot and Maynard Crossing. Transfers to regional services can be made at Cary Depot and High House Crossing.

Monday through Saturday, Route 4 operates from 6:00 a.m. to 8:00 p.m. every 30 minutes and then every 60 minutes to the end of service at 10:00 p.m. Sunday service operates hourly from 7:00 a.m. to 9:00 p.m. Route 4 has a single service pattern for all service days (Table 13).

Figure 29: Route 4 Map

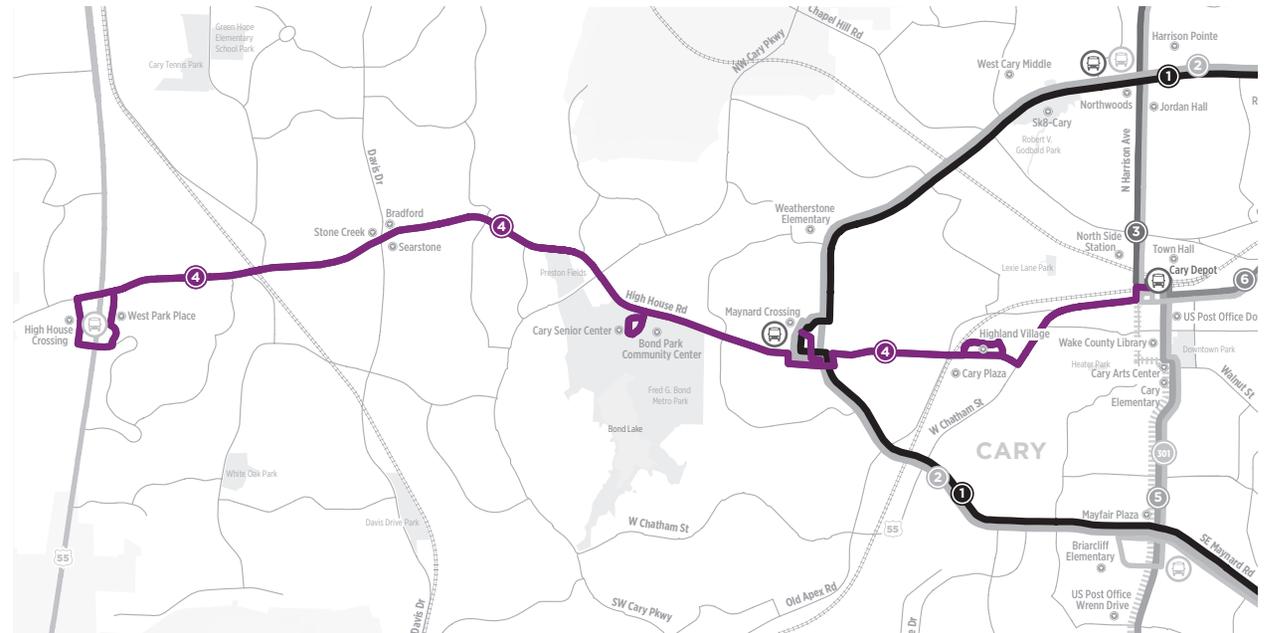


Table 13: Route 4 Service Schedule Statistics

Service Day	Span of Service	Frequency (Min)	Daily Trips (Outbound/Inbound)
Weekday	6:00 a.m. to 10:00 p.m.	30	29/29
Saturday	6:00 a.m. to 10:00 p.m.	30	29/29
Sunday	7:00 a.m. to 9:00 p.m.	60	14/14

Ridership by Stop

Weekday

Apart from the Cary Depot, the highest weekday ridership stops on Route 4 are located at Maynard Crossing and at Highland Village Apartments with about 20 boardings per weekday. Maynard Crossing serves a large retail center with a grocery store and is a location where customers can transfer to other transit services. Other areas with more than 10 boardings per weekday include the pair of stops at High House Crossing (High House Crossing Shopping Center and NC 55 Highway at Walmart). All other stops generate fewer than 10 boardings (Figure 30, Figure 31, & Figure 32).

Weekend

Saturday ridership has a similar pattern as weekdays, except with around 70% of weekday ridership. Sundays has similar patterns but with significantly less ridership, about 47% of Saturday ridership.

Figure 30: Route 4 Weekday Outbound Ridership by Stop Chart

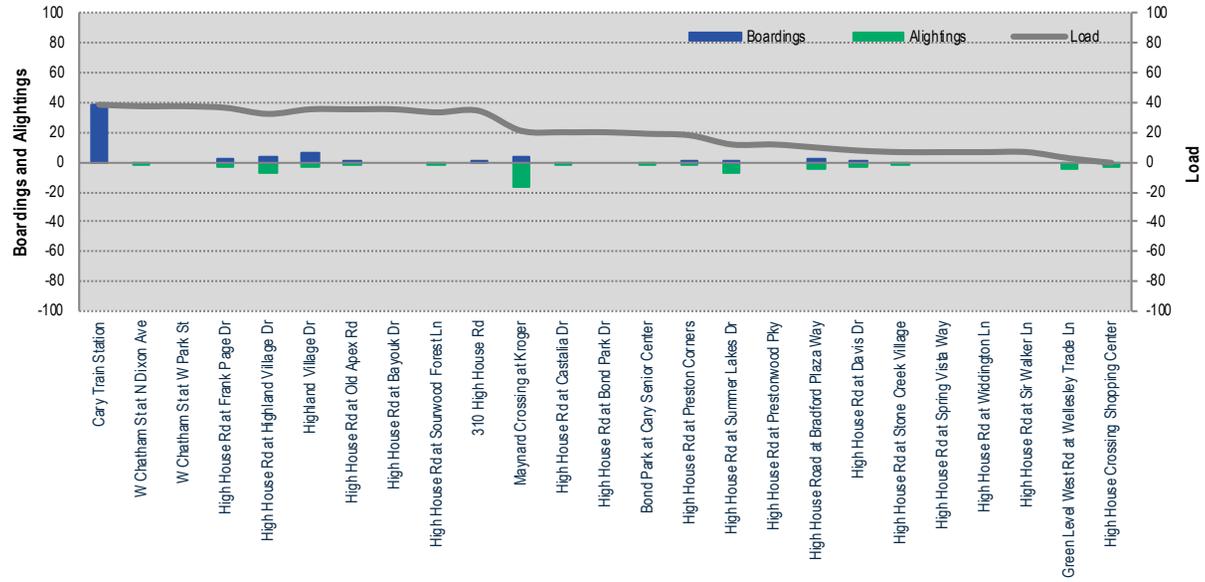


Figure 31: Route 4 Weekday Inbound Ridership by Stop Chart

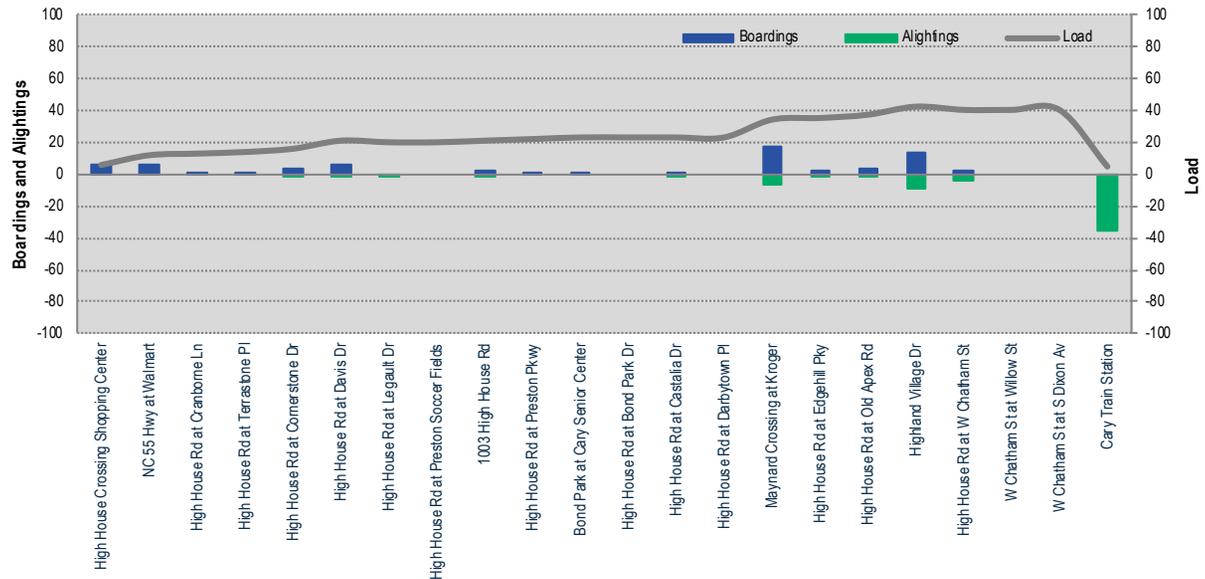
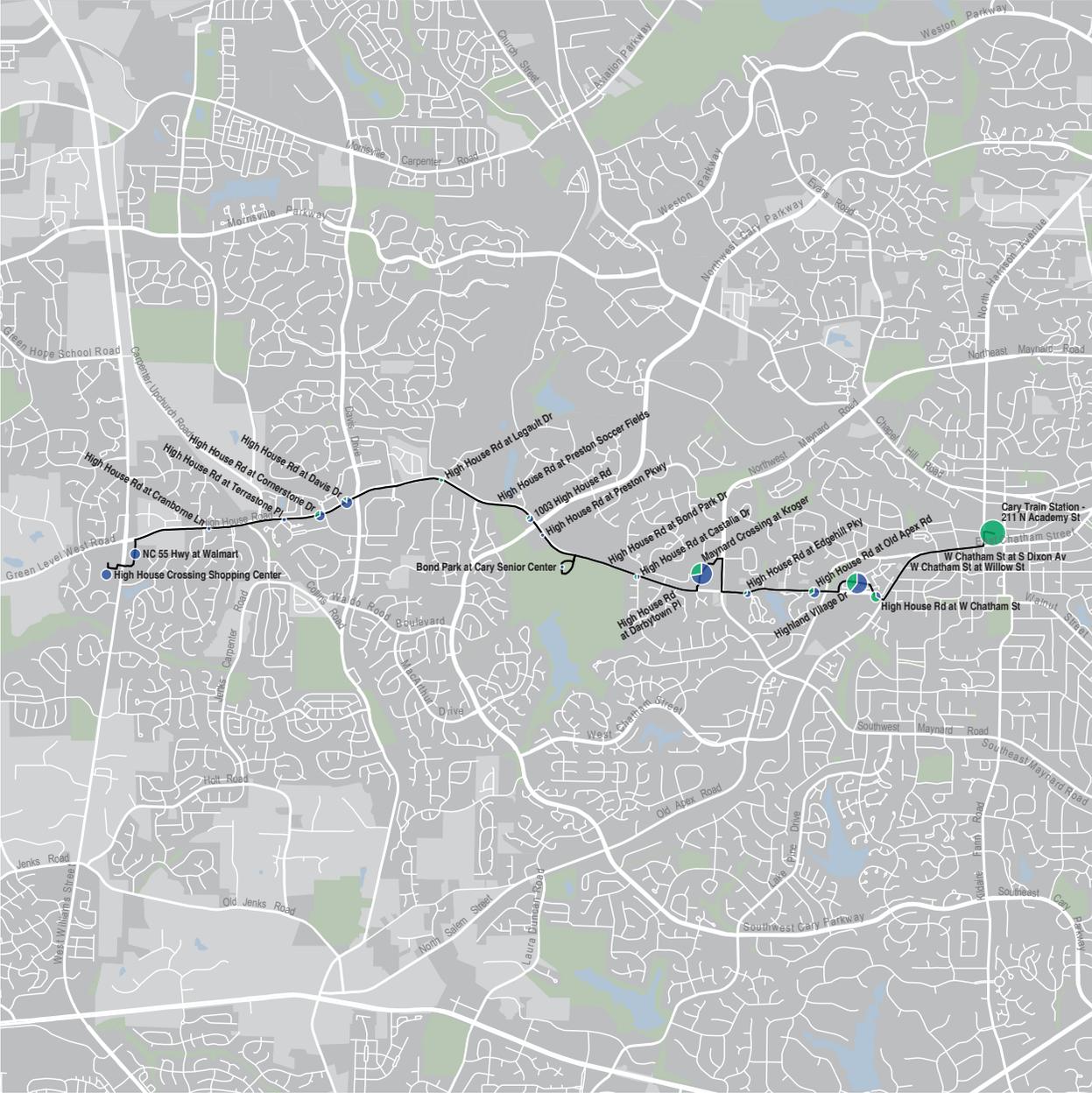
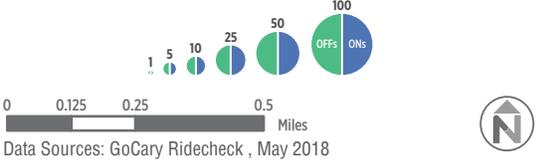


Figure 32: Route 4 Weekday Inbound Ridership by Stop Map



Route 4 Weekday Activity

Inbound boardings and alightings by stop
circle size indicates total activity





Ridership by Trip

Weekday

On weekdays, Route 4 ridership is highest during the afternoon and evening in the inbound direction (Figure 33 & Figure 34). During this period, trips generally range between four to six boardings each. Although there are times with slightly higher ridership, trips on Route 4 have fairly consistent ridership throughout weekdays. This usually indicates that the route is utilized by typical commuters and associated with shopping trips. Other periods with higher ridership include mornings in both directions.

Most outbound trips have a maximum load close to the total number of boardings per trip, meaning there is little turnover along the route. Inbound trips have slightly more turnover as max loads are not as high compared to boardings. In both directions, some max loads are higher than the number of boardings. These trips have customers boarding the bus in one direction and staying on in the opposite direction.

Weekend

On Saturdays, Route 4 ridership is highest in the morning outbound and in the evening inbound. These are likely trips out to the shopping areas located along the route. On Sundays, ridership is highest in the morning in both directions potentially indicating travel to places of worship.

Figure 33: Route 4 Weekday Outbound Ridership by Trip

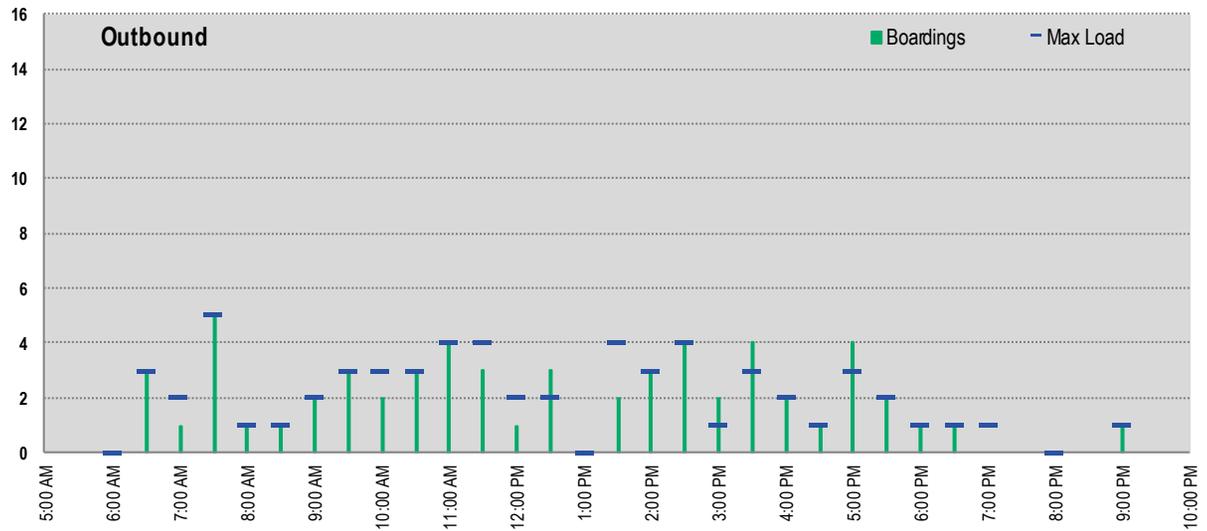
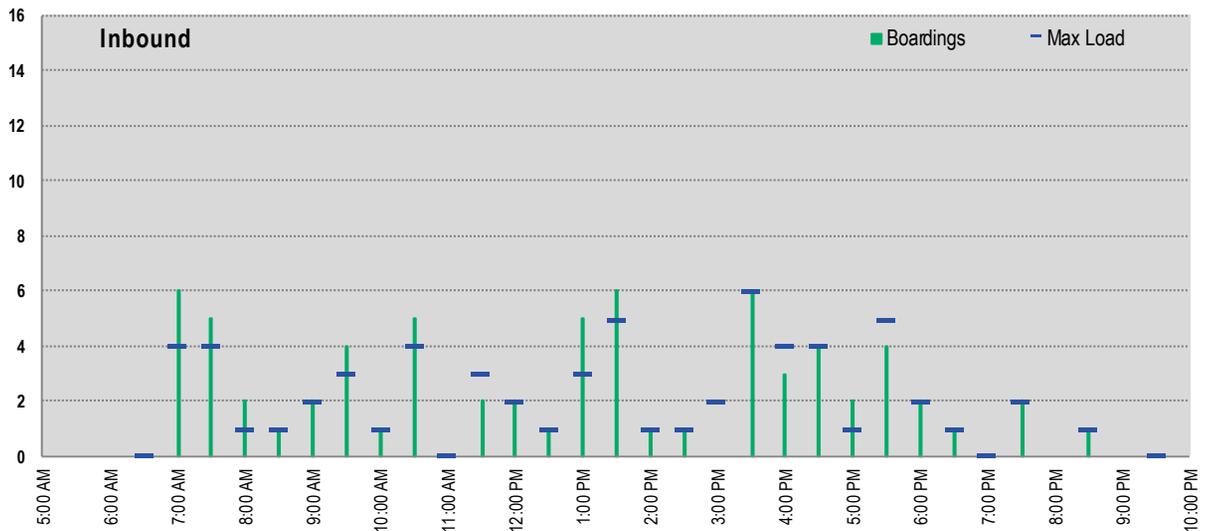


Figure 34: Route 4 Weekday Inbound Ridership by Trip



Service Productivity

Route 4 ranks 3rd of the 6 local routes in the study area in terms of weekday ridership and 3rd of 6 in terms of ridership per hour (Table 14). On average, the route carries 128 passengers, or 4.4 passengers per hour, on weekdays. On Saturdays, Route 4 carries 89 passengers, or 3.1 passengers per hour. Route 4 does not meet the passenger per revenue hour target (10 per hour) established in the GoForward: Wake Transit Plan for any service day.

On weekdays, the operating cost of Route 4 is \$12.11 per passenger, and increase to \$17.42 per passenger on Saturdays and \$17.82 per passenger on Sundays. Route 4 does not meet the target (\$10 per passenger) for cost per passenger for any service day.

Table 14: Route 4 Service Productivity Table

Service Day	Average Daily Ridership	Passenger per Revenue Hour	Passenger per Revenue Hour Target	Cost per Passenger	Cost per Passenger Target
Weekday	128	4.4	10	\$12.11	\$10.00
Saturday	89	3.1	10	\$17.42	\$10.00
Sunday	42	3.0	10	\$17.82	\$10.00

On-Time Performance

Most timepoints and trips for Route 4 operate on time (Table 15). GoCary measures on-time performance based on how each trip runs compared to the schedule. Trips are considered on time if they leave the scheduled timepoint zero minutes early and up to five minutes late.

Timepoints near the end of the outbound segment are less likely to be served on time. Weekends are less likely to be served on time, with Saturday outbound trips having the least number of on-time departures. Across all service days, Stone Creek outbound is often late, while the bus is then early to arrive at High House Crossing. Inbound trips are often early at Bond Park and Maynard Crossing. Many trips are both early and late, indicating the need to evaluate the schedule for reliability issues.

Table 15: Route 4 On-Time Performance by Timepoint

Timepoint	Weekday Trips			Saturday Trips On Time	Sunday Trips On Time
	On Time	Early	Late		
Outbound	77%	9%	14%	64%	74%
Cary Depot	92%	0%	8%	83%	100%
Maynard Crossing	88%	8%	4%	76%	93%
Bond Park/Cary Senior Center	92%	0%	8%	72%	93%
Stone Creek	58%	0%	42%	43%	79%
High House Crossing	54%	38%	8%	43%	7%
Inbound	82%	11%	7%	79%	94%
High House Crossing	92%	0%	8%	71%	100%
Stone Creek	85%	4%	11%	79%	93%
Bond Park/Cary Senior Center	67%	26%	7%	64%	79%
Maynard Crossing	71%	25%	4%	82%	100%
Cary Depot	96%	0%	4%	96%	100%

Potential Service Improvements

Opportunities to strengthen Route 4 are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

- **Adjust Schedule Time.** Some of the timepoints along Route 4 are consistently served early or late. Adjusting the time on the schedules will allow more trips to serve timepoints on time.
- **Move Bond Park Stop.** The deviation into Bond Park at Senior Center adds time to the route for an average of one boarding per weekday. Consolidating and moving the two stops at the Senior Center and at Bond Park Drive to Maury Odell Place still serves the senior and community centers at Bond Park while providing more direct service for other passengers.
- **Discontinue Highland Village Loop.** The deviation into Highland Village adds time to the route to serve a stop that is only a few hundred feet from High House Road. Moving the stop on High House Road provides more direct service for all other passengers.
- **Demand Response.** Recent improvements in demand response services make them a preferred option for services generating less than seven passengers per hour. Demand response options provide a higher level of customer service for the same cost in these areas of lower productivity. Consider operating a demand response service in place of the existing fixed route.
- **Add More Pedestrian Infrastructure.** Many stretches of road along the route have paired stops with no safe crossings for pedestrians. For example, there is only one marked crosswalk (at Maynard Crossing) on the two mile stretch between Highland Village and Preston Corners. Marked crosswalks need to be added across High House Road in order for customers to be safely served in both directions.



Route 5

Kildaire Farm

Service Design

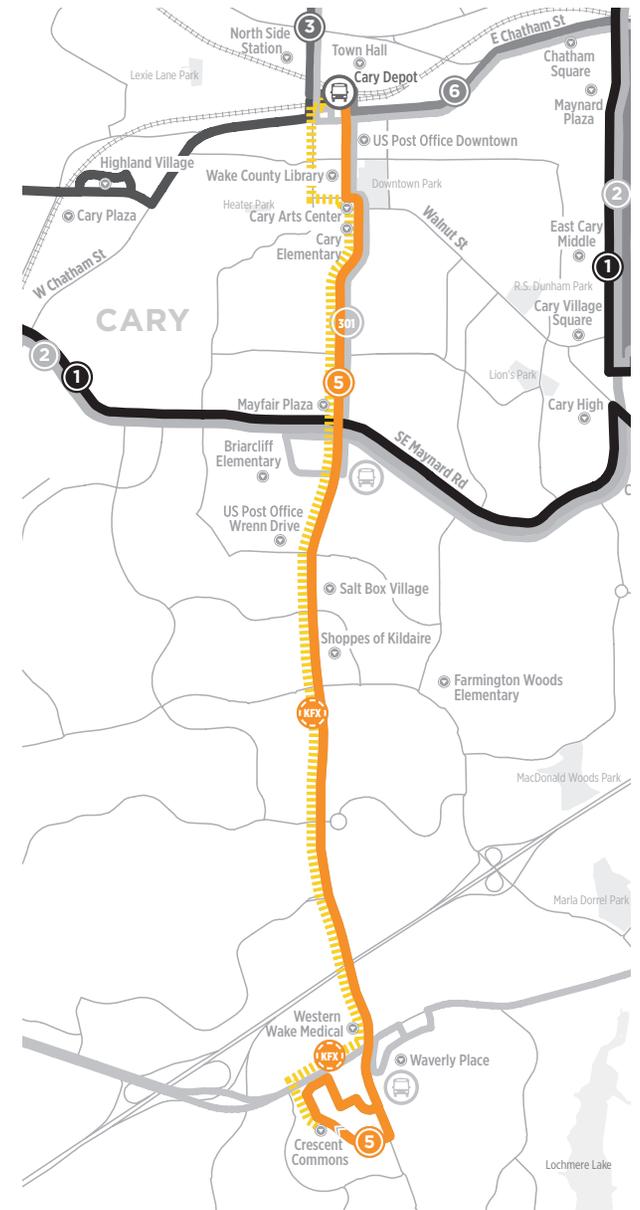
Route 5 operates between Downtown Cary and Crescent Commons Shopping Center. The route travels primarily along Kildaire Farm Road (Figure 35). Route 5 provides service to Mayfair Plaza, Salt Box Village Shopping Center, Shoppes of Kildaire, WakeMed Cary, and multiple housing complexes. Customers can transfer between Route 5 and other Cary services at the Cary Depot and at Mayfair Plaza. Transfers to regional services can be made at Cary Depot, Mayfair Plaza, near Crescent Commons, and along Kildaire Farm Road between downtown and Maynard Road.

Monday through Saturday, Route 5 operates from 6:00 a.m. to 8:00 p.m. every 30 minutes and then every 60 minutes to the end of service at 10:00 p.m. Sunday service operates hourly from 7:30 a.m. to 9:00 p.m. (Table 16). Route 5 has two service patterns. The primary pattern runs on all service days, and consists of local service from Cary Depot to Crescent Commons. The second service pattern is a limited stop service from Crescent Commons to Cary Depot with a stop at Mayfair Plaza. The service, called the Kildaire Farm Express (KFX), operates three weekday afternoon inbound trips.

Table 16: Route 5 Service Schedule Statistics

Service Day	Span of Service	Frequency (Min)	Daily Trips (Outbound/Inbound)
Weekday	6:00 a.m. to 10:00 p.m.	30	30/33
Saturday	6:00 a.m. to 10:00 p.m.	30	30/30
Sunday	7:30 a.m. to 9:00 p.m.	60	14/14

Figure 35: Route 5 Map





Ridership by Stop

Weekday

Apart from the Cary Depot, the highest weekday ridership stops on Route 5 are located at the Walmart at Crescent Commons with about 48 boardings per weekday. Other high ridership stops are the paired stops at Kildaire Plaza (Kildaire Farm Rd at Farmington Woods Dr & Kildaire Farm Rd at Wrenn Dr) with about 16 boardings. All other stops generate ten or fewer boardings per weekday (Figure 36, Figure 37, & Figure 38).

Weekend

Saturday ridership has a similar pattern as weekdays, except with around 58% of weekday ridership. Sundays have a similar patterns but with significantly less ridership, about 31% of Saturday ridership.

Figure 36: Route 5 Weekday Outbound Ridership by Stop Chart

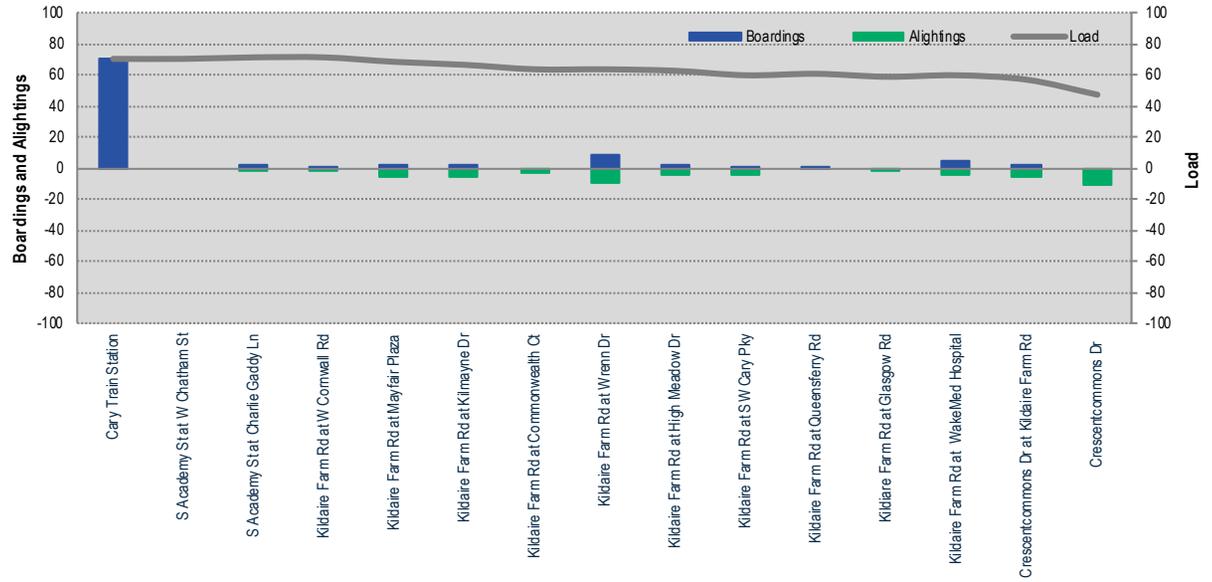


Figure 37: Route 5 Weekday Inbound Ridership by Stop Chart

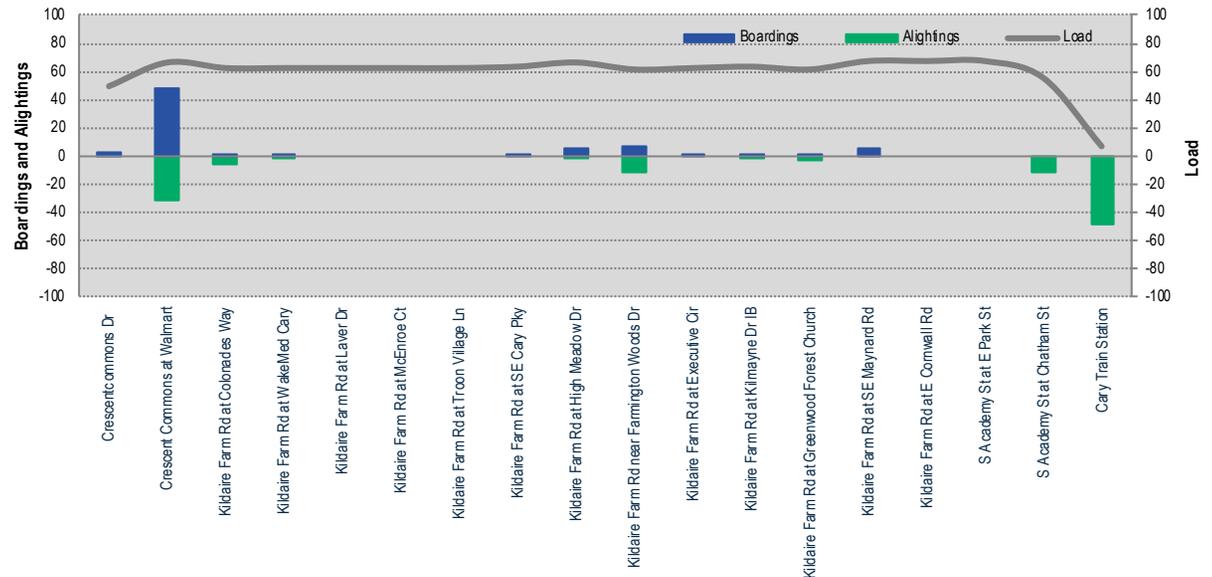
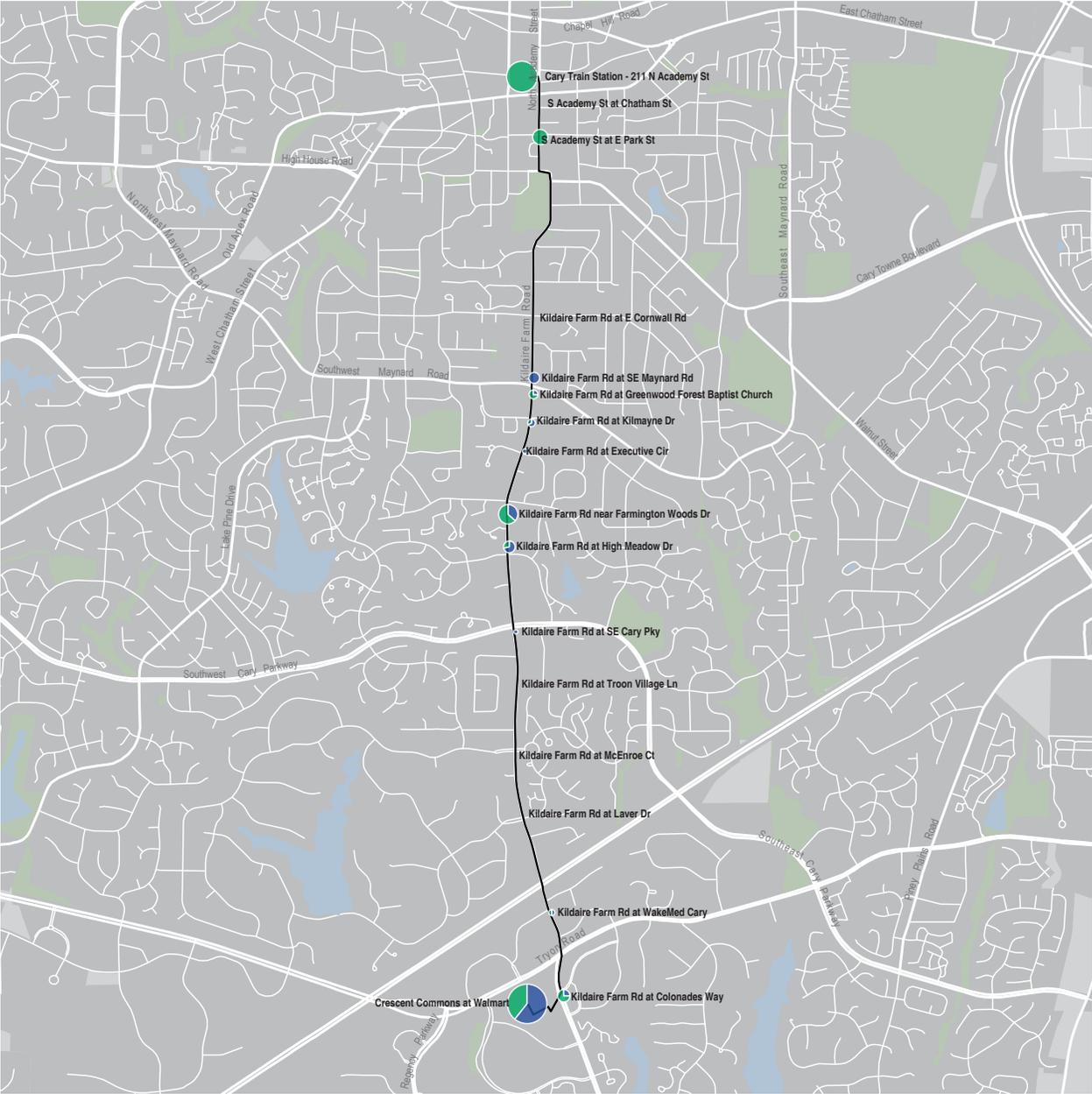


Figure 38: Route 5 Weekday Inbound Ridership by Stop Map



Route 5 Weekday Activity

Inbound boardings and alightings by stop
circle size indicates total activity



0 0.125 0.25 0.5 Miles
Data Sources: GoCary Ridecheck , May 2018



Ridership by Trip

Weekday

On weekdays, Route 5 ridership is highest in the late morning in the outbound direction (Figure 39 & Figure 40). During this period, trips generate about six to eight boardings each. A few trips in the midday in both directions generate eight to eleven boardings. Most outbound trips have a maximum load close to the total number of boardings per trip, meaning there is little turnover along the route. Many inbound trips have max loads that are higher than the number of boardings. These trips have customers boarding the bus in the outbound direction and staying on in the inbound direction. This is likely due to the high number of alightings at the Walmart in Crescent Commons, which is in the inbound direction.

Weekend

On Saturdays, Route 5 is similar to weekdays with ridership the highest during the morning in the outbound direction. Most Saturdays trips have less than four boardings. On Sundays, ridership is similar to weekdays and Saturdays, with the highest number of boardings in the morning.

Figure 39: Route 5 Weekday Outbound Ridership by Trip

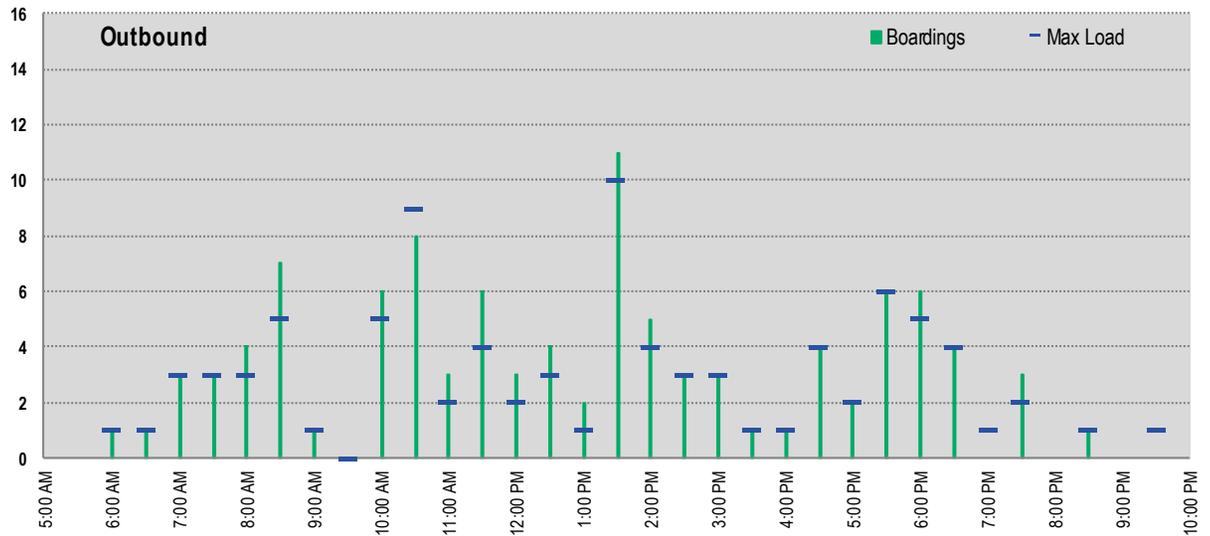
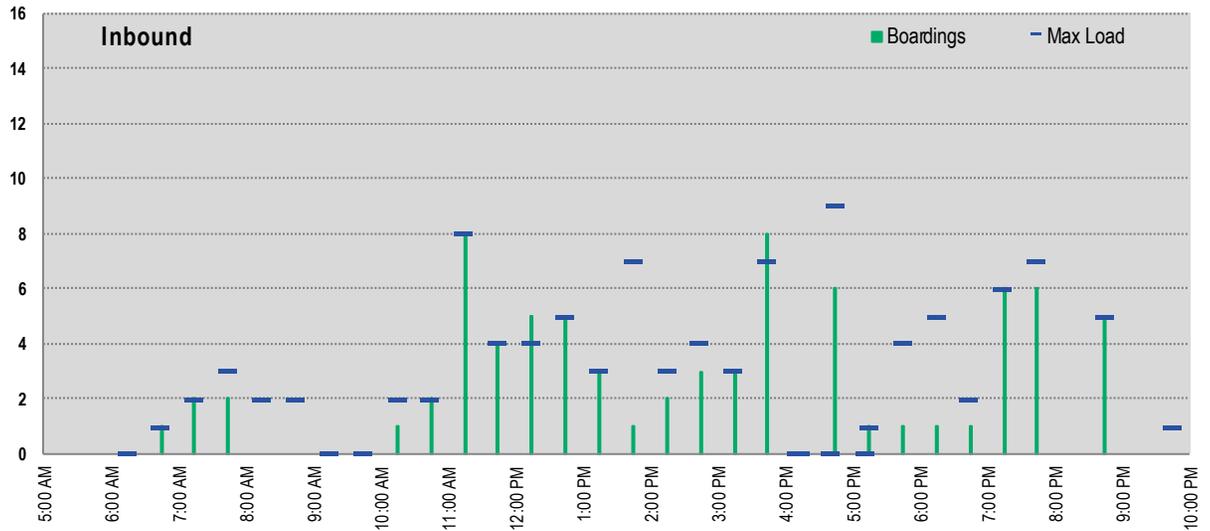


Figure 40: Route 5 Weekday Inbound Ridership by Trip



Service Productivity

Route 5 ranks 2nd of the 6 local routes in the study area in terms of weekday ridership and 1st of 6 in terms of ridership per hour (Table 17). On average, the route carries 179 passengers, or 11.4 passengers per hour, on weekdays. On Saturdays, Route 5 carries 103 passengers, or 6.9 passengers per hour. Route 5 meets the passenger per revenue hour target (10 per hour) established in the GoForward: Wake Transit Plan for weekdays, but not Saturday or Sunday.

On weekdays, the operating cost of Route 5 is \$4.70 per passenger, and increases on Saturdays to \$7.79 per passenger. Sunday costs increase to \$11.70 per passenger, due to particularly low ridership. Route 5 meets the target (\$10 per passenger) for cost per passenger on weekdays and Saturdays.

Table 17: Route 5 Service Productivity Table

Service Day	Average Daily Ridership	Passenger per Revenue Hour	Passenger per Revenue Hour Target	Cost per Passenger	Cost per Passenger Target
Weekday	179	11.4	10	\$4.70	\$10.00
Saturday	103	6.9	10	\$7.79	\$10.00
Sunday	32	4.6	10	\$11.70	\$10.00

On-Time Performance

Most timepoints and trips for Route 5 operate on time (Table 18). GoCary measures on-time performance based on how each trip runs compared to the schedule. Trips are considered on time if they leave the scheduled timepoint zero minutes early and up to five minutes late.

Most timepoints are likely to be served late rather than early. On weekdays, Mayfair Plaza in the inbound direction is often served late. Weekends are more likely to be served on time, with Sunday trips having the most number of on-time departures. Similar to weekdays, when weekend timepoints are not served on time, they are more likely late, indicating the need to evaluate the schedule for reliability issues.

Table 18: Route 5 On-Time Performance by Timepoint

Timepoint	Weekday Trips			Saturday Trips On Time	Sunday Trips On Time
	On Time	Early	Late		
Outbound	80%	2%	18%	90%	91%
Cary Depot	91%	0%	9%	93%	100%
Mayfair Plaza	82%	0%	18%	97%	86%
WakeMed Cary	70%	4%	26%	87%	77%
Crescentcommons Dr	77%	5%	18%	83%	100%
Inbound	68%	2%	30%	93%	93%
Crescentcommons Dr	82%	0%	18%	97%	100%
Mayfair Plaza	52%	5%	43%	87%	86%
Cary Depot	70%	0%	30%	97%	92%

Potential Service Improvements

Opportunities to strengthen Route 5 are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

- **Adjust Schedule Time.** Many of the timepoints along Route 5 are consistently served late. By adding more time into the schedule and ensuring enough recovery time, the on-time performance of Route 5 can be better.
- **Weekend Demand Response.** Recent improvements in demand response services make them a preferred option for services generating less than seven passengers per hour. Demand response options provide a higher level of customer service for the same cost in these areas of lower productivity. Consider operating a weekend demand response service in place of the existing fixed route.
- **Discontinue KFX.** On average, less than one person a day takes any of the three inbound KFX trips. This speciality service requires an additional bus and adds unnecessary operating costs.
- **Add More Pedestrian Infrastructure.** Many stretches of road along the route have paired stops with no safe crossings for pedestrians. Often it is half a mile between crosswalks across Kildaire Farm Road. Marked crosswalks need to be added across Kildaire Farm Road in order for customers to be safely served in both directions.



Route 6

Buck Jones

Service Design

Route 6 operates between Downtown Cary and the Plaza West Shopping Center via the Cary Towne Center. The route travels primarily along E Chatham Street, SE Maynard Road, and Buck Jones Road (Figure 41). Route 6 provides service to Chatham Square, Cary Village Square Shopping Center, and multiple housing complexes. Customers can transfer between Route 6 and other Cary services at the Cary Depot, at Cary Towne Center, and along Maynard Road and Walnut Street. Transfers to regional services can be made at Cary Depot and Plaza West Shopping Center.

Monday through Saturday, Route 6 operates from 6:00 a.m. to 10:00 p.m. every 30 minutes. Sunday service operates hourly from 7:00 a.m. to 9:00 p.m. Route 6 has a single service pattern for all service days (Table 19).

Figure 41: Route 6 Map

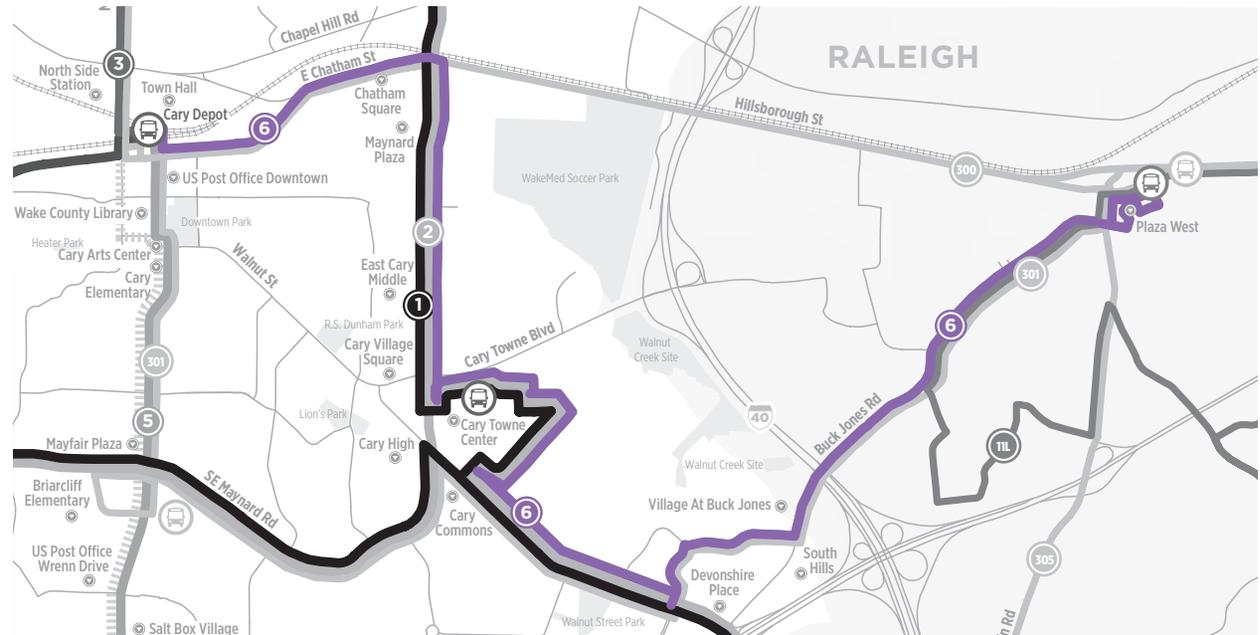


Table 19: Route 6 Service Schedule Statistics

Service Day	Span of Service	Frequency (Min)	Daily Trips (Outbound/Inbound)
Weekday	6:00 a.m. to 10:00 p.m.	30	29/29
Saturday	6:00 a.m. to 10:00 p.m.	30	29/29
Sunday	7:00 a.m. to 9:00 p.m.	60	14/14



Ridership by Stop

Weekday

Apart from the Cary Depot, the highest weekday ridership stops on Route 6 are located at the Cary Towne Center and the Plaza West Shopping Center with about 25 boardings per weekday. Both areas serve large retail centers and are locations where customers can transfer to other transit services. Other areas with more than 15 boardings per weekday include: the pair of stops at Williamsburg Manor (Donaldson Drive at Hamilton Court and Donald Drive at Patrick Circle) and the pair of stops at SE Maynard Road and Tate Street. These stops serve higher density apartments and mobile estates. All other stops generate fewer than 10 boardings (Figure 42, Figure 43, & Figure 44).

Weekend

Saturday ridership has a similar pattern as weekdays, except with around 72% of weekday ridership. Sundays has similar patterns but with significantly less ridership, about 29% of Saturday ridership.

Figure 42: Route 6 Weekday Outbound Ridership by Stop Chart

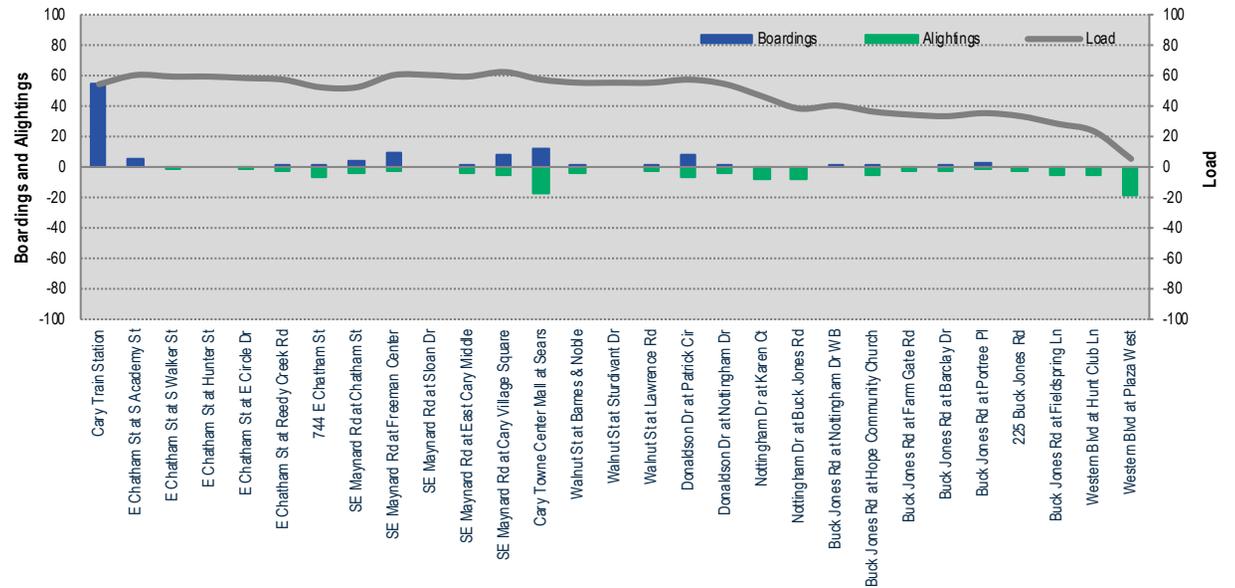


Figure 43: Route 6 Weekday Inbound Ridership by Stop Chart

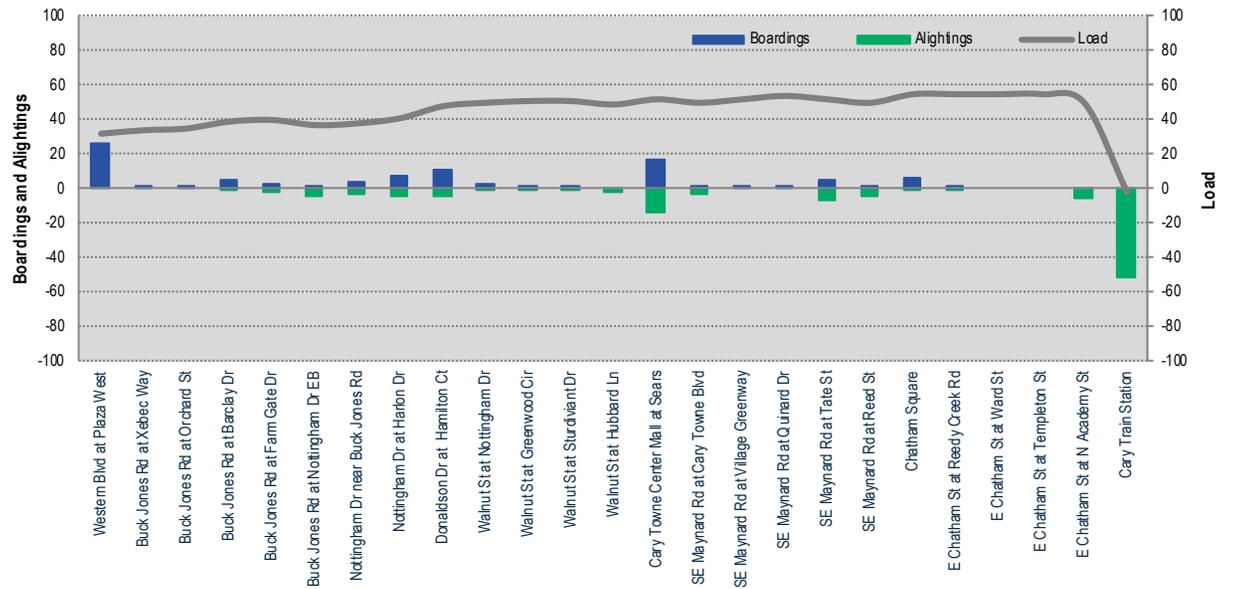
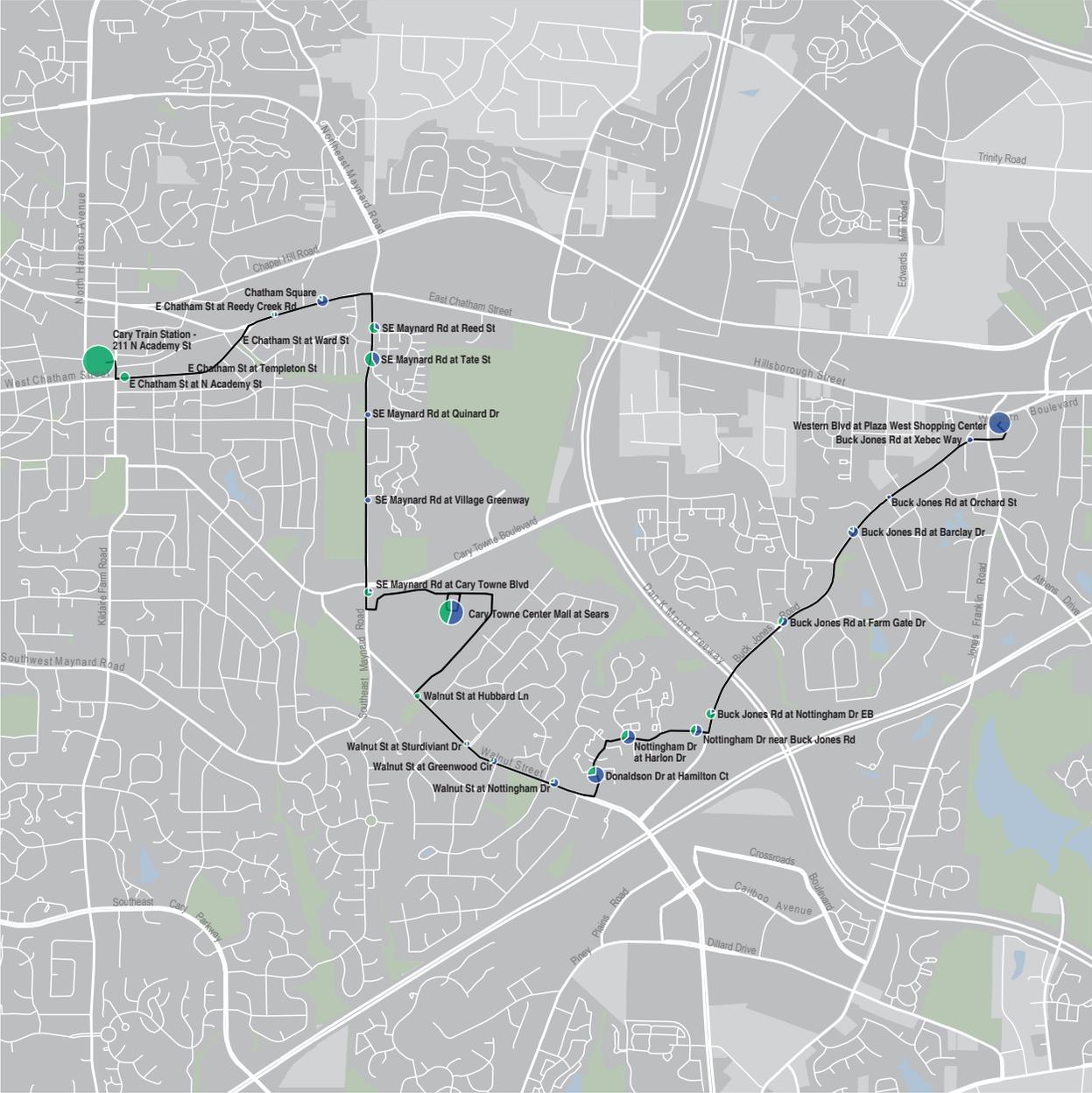
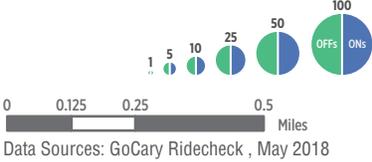


Figure 44: Route 6 Weekday Inbound Ridership by Stop Map



Route 6 Weekday Activity

Inbound boardings and alightings by stop
circle size indicates total activity



Ridership by Trip

Weekday

On weekdays, Route 6 ridership is highest during the midday in the outbound direction (Figure 45 & Figure 46). During this period, two trips have about 10 boardings each. A high number of boardings during the midday is usually associated with shopping, medical, and school trips. Other periods with higher ridership include afternoons in the outbound direction and in the morning in the inbound direction. Most trips have a maximum load close to the total number of boardings per trip, meaning there is little turnover along the route. Some max loads are higher than the number of boardings. These trips have customers boarding the bus in one direction and staying on in the opposite direction. This can be seen in the 11:00 a.m. inbound trip or the 6:30 p.m. outbound trip.

Weekend

On Saturdays, Route 6 ridership is similar to weekdays with midday and evening trips having the highest ridership. On Sundays, ridership is highest in the late morning and midday, although the number of boardings per trip is significantly less, with the highest trip only generating 5 boardings. Often shopping trips are associated with higher weekend midday ridership.

Figure 45: Route 6 Weekday Outbound Ridership by Trip

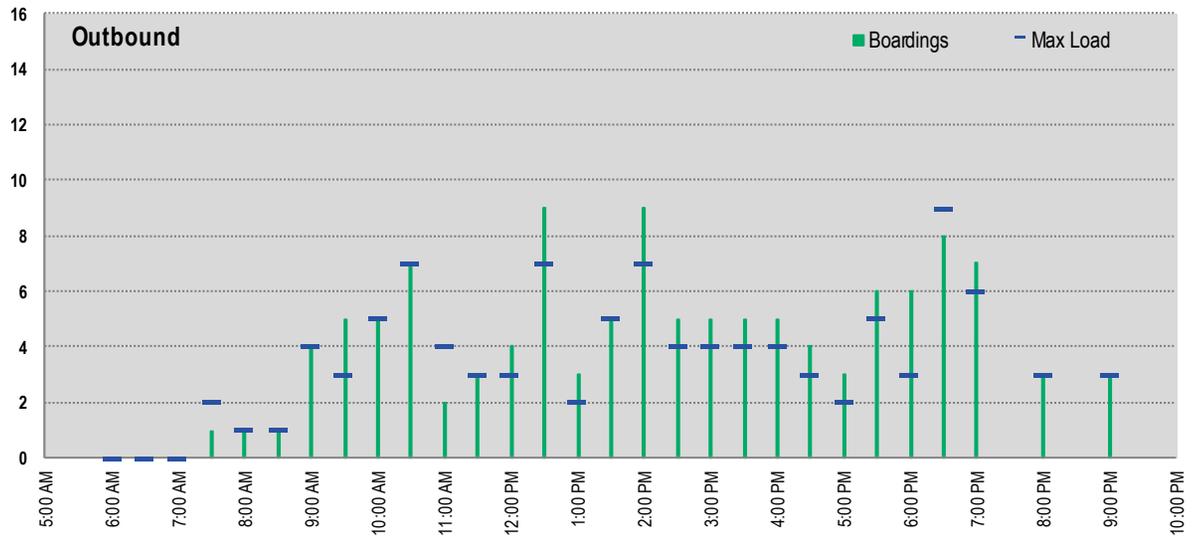
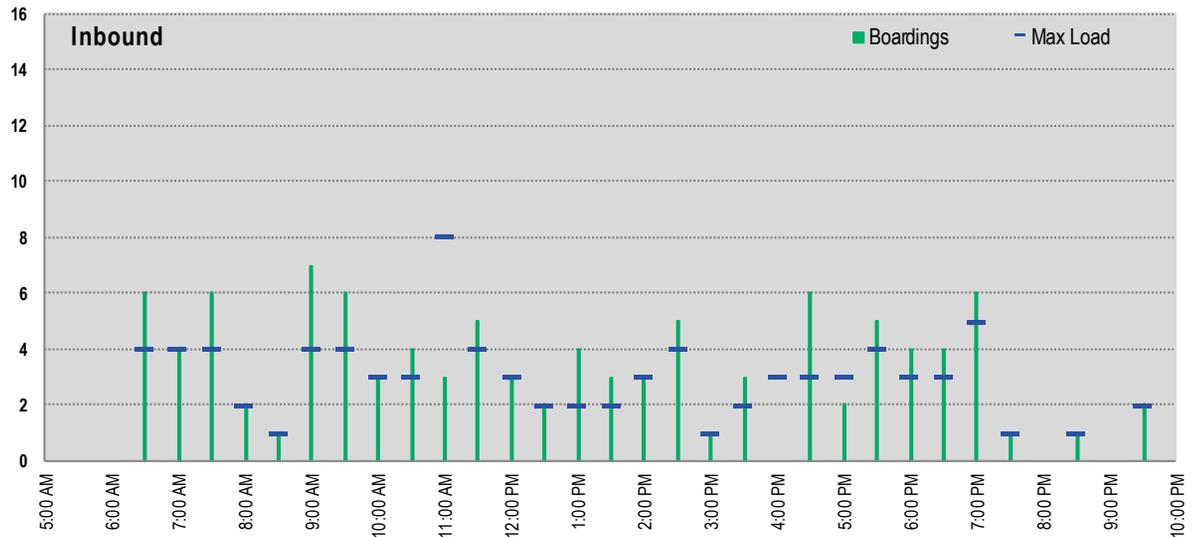


Figure 46: Route 6 Weekday Inbound Ridership by Trip



Service Productivity

Route 6 ranks 1st of the 6 local routes in the study area in terms of weekday ridership and 2nd of 6 in terms of ridership per hour (Table 20). On average, the route carries 221 passengers, or 7.6 passengers per hour, on weekdays. On Saturdays, Route 6 carries 160 passengers, or 5.5 passengers per hour. Route 6 does not meet the passenger per revenue hour target (10 per hour) established in the GoForward: Wake Transit Plan for any service day.

On weekdays, the operating cost of Route 6 is \$7.02 per passenger, and on Saturdays is \$9.69 per passenger. Weekdays and Saturdays meet the target for cost per passenger (\$10 per passenger), but Sundays have a higher cost of \$16.27 and do not meet the target.

On-Time Performance

Most timepoints and trips for Route 6 operate on time (Table 21). GoCary measures on-time performance based on how each trip runs compared to the schedule. Trips are considered on time if they leave the scheduled timepoint zero minutes early and up to five minutes late.

Timepoints near the end of the route are more likely to be served late. Weekends are less likely to be served on time, with Saturday outbound trips having the least number of on-time departures. Weekend trips are both early and late, indicating the need to evaluate the schedule for reliability issues. Chatham Square in the inbound direction is often served early.

Table 20: Route 6 Service Productivity Table

Service Day	Average Daily Ridership	Passenger per Revenue Hour	Passenger per Revenue Hour Target	Cost per Passenger	Cost per Passenger Target
Weekday	221	7.6	10	\$7.02	\$10.00
Saturday	160	5.5	10	\$9.69	\$10.00
Sunday	46	3.3	10	\$16.27	\$10.00

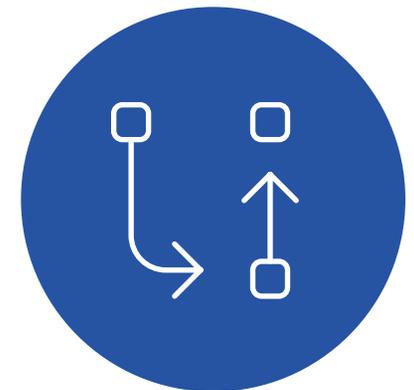
Table 21: Route 6 On-Time Performance by Timepoint

Timepoint	On Time	Weekday Trips Early	Late	Saturday Trips On Time	Sunday Trips On Time
Outbound	87%	5%	8%	83%	86%
Cary Depot	88%	0%	12%	96%	100%
Chatham Square	81%	4%	15%	87%	85%
Cary Towne Center	92%	4%	4%	85%	85%
Donaldson & Patrick	86%	8%	4%	78%	92%
Plaza West	85%	8%	8%	70%	67%
Inbound	92%	4%	4%	87%	89%
Plaza West	85%	0%	15%	82%	92%
Donaldson & Patrick	96%	0%	4%	93%	75%
Cary Towne Center	100%	0%	0%	89%	92%
Chatham Square	80%	20%	0%	77%	85%
Cary Depot	100%	0%	0%	96%	100%

Potential Service Improvements

Opportunities to strengthen Route 6 are listed below. Some suggestions may be contradictory, as there is usually more than one approach to improving a route.

- **Add More Pedestrian Infrastructure.** Many stretches of road along the route have paired stops with no safe crossings for pedestrians. For example, there is only one marked crosswalk (at Village Greenway) on the one mile stretch of Maynard Road between Chatham Street and Cary Towne Boulevard. Marked crosswalks need to be added in order for customers to be safely served in both directions.
- **Split into Two Routes.** Many customers are riding the entire route, which takes about 30 minutes from end to end. Consider splitting the route into two separate routes.
 - **Crossroads:** One route serving Crossroads via Crossroads Boulevard to Walnut Street and continuing along the current alignment past Cary Towne Center.
 - **Plaza West:** One route providing direct service from Plaza West to Cary Depot via Buck Jones Road, Walnut Street, and Academy Street. Route would be more direct by not serving the front door of Cary Towne Center and would serve new stops on Walnut Street between Maynard Road and Kildaire Farm Road.
- **Earlier Weekday Service.** The first few trips inbound on weekdays have relatively high ridership, which may indicate demand for earlier service. This demand could be met by an earlier one-hour headway trip on weekdays.
- **Adjust Schedule Time.** Some of the timepoints along Route 6 are consistently served early or late. Particularly with early trips, adjusting the time on the schedules will allow more trips to serve timepoints on time.
- **Weekend Demand Response.** Recent improvements in demand response services make them a preferred option for services generating less than seven passengers per hour. Demand response options provide a higher level of customer service for the same cost in these areas of lower productivity. Consider operating a weekend demand response service in place of the existing fixed route.





Public Outreach

Public Meetings

Throughout the Western Wake COA, high priority was placed on giving the community an opportunity to participate. The project team provided several chances for the public to provide input and feedback, allowing people to share ideas in whatever way was most convenient and comfortable for them. Through both online and in-person activities, local bus riders and other community members expressed their needs, ideas, and visions.

Six public meetings were held during the course of the study - two in Cary, two in Apex, and two in Morrisville. All meetings were held in the evening and followed an open house format. Meeting attendees were given an opportunity to review presentation boards, rank their service improvement priorities, and provide input on existing and future western Wake transit services. Meeting times and locations were publicized on each Town's website, announced on Twitter, and informational postcards were distributed at local activity centers.

While the second round of public meetings solely covered western Wake, the first round was held alongside outreach for the Wake County GoForward Plan - a transit study encompassing the entire county and the Research Triangle. As a result, a rich variety of voices were heard. Comments were collected from individuals who applied a highly concentrated, localized viewpoint as well as those who approached transit in western Wake as part of a larger regional network.

Figure 47: First Round of Public Meetings with Market Analysis and Trade-off Questions

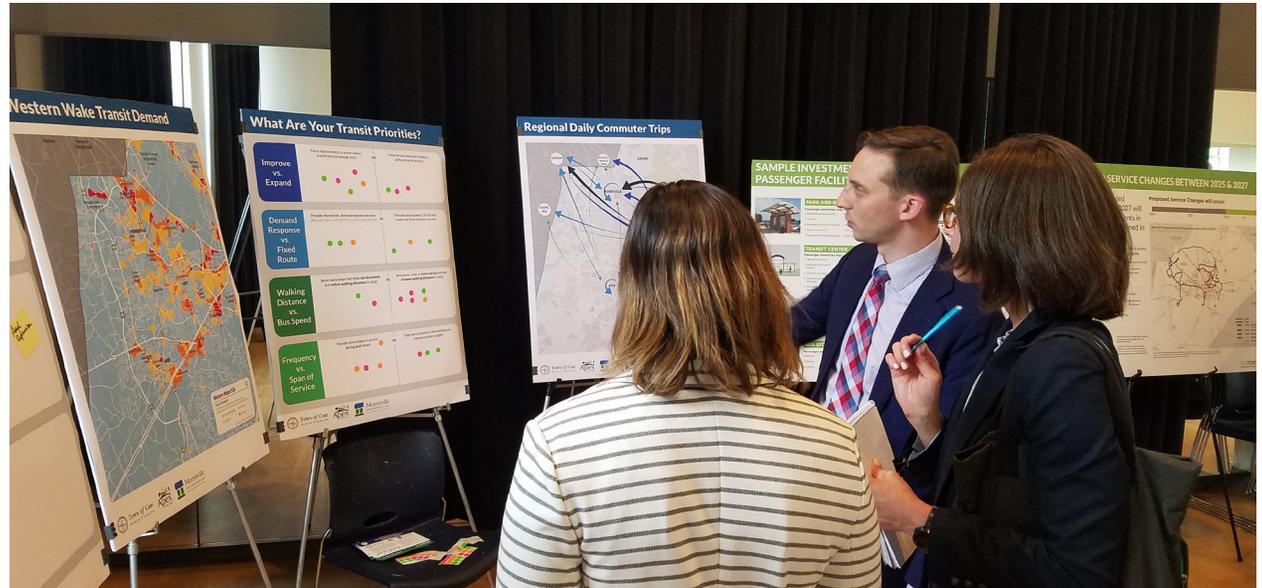


Figure 48: Second Round of Public Meetings with Scenarios



Survey Analysis

To complement the study’s technical analyses, the study team conducted a surveying effort targeting residents of the three communities. The online survey asked residents specific trade-off questions to better understand what types of improvements they would like to see.

Just over 100 respondents completed the survey. Key findings from the survey include the following:

- **Expanding service to new areas** is of particularly high priority, specifically in Apex and Morrisville where no local service currently exists.
- **Fixed route service is preferred** over Demand Response service at a rate of about 2 to 1.
- **Respondents were evenly split** on whether they preferred slower service with shorter walking distances to stops and faster service with longer walking distances to stops.
- Though only slightly, **more frequent peak hour service is preferred** to an expanded span of service with earlier morning and later evening trips.

Though Cary had the highest attendance at public meetings, the majority of online survey respondents lived in Apex. Survey participation had the following geographic breakdown:

- **Apex:** 79%
- **Cary:** 10%
- **Morrisville:** 3%

Survey questions can be found in Appendix A.

Figure 49: Results of Trade-Off Questions



Service Recommendations

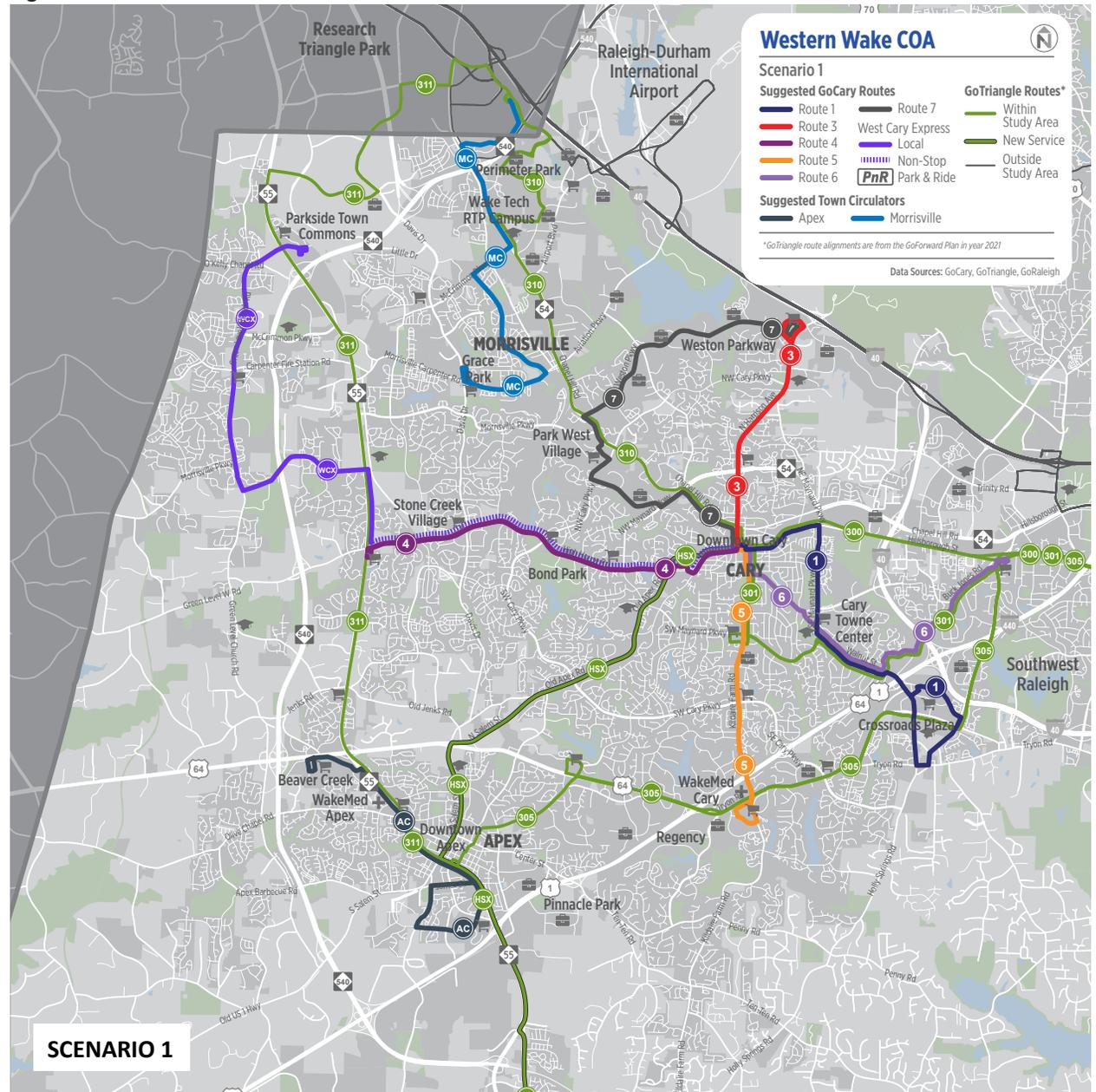
Development of Service Scenarios

To address the service issues and opportunities identified through the market analysis, service analysis, and public input, the study team developed two preliminary service redesign scenarios. Both scenarios incorporated service improvement ideas that emerged throughout the Study. Each also represented a fundamentally different design approach to meet transit needs.

Scenario 1 focused on expanding local fixed route services in the communities of Apex, Morrisville, and Cary. It simplified core services by discontinuing service along the Maynard Loop and, more generally, reducing deviations into shopping centers. This scenario added the West Cary Express which provided local service to western Cary and express service into Downtown Cary. Additionally, local circulator routes were introduced in both Apex and Morrisville.

Scenario 2 focused on providing coverage-focused microtransit service. Much like Scenario 1, this scenario sought to simplify core services by discontinuing service on the Maynard Loop and reducing deviations into shopping center parking lots. Scenario 2 involved the creation of three microtransit zones - North, South, and West - within Cary to connect with fixed route service at designated transfer points. It also called for the creation of microtransit zones in Apex and Morrisville (see page 59).

Figure 50: Service Recommendations - Scenario 1



Scenario Feedback

In August 2018, a series of public meetings were held in Cary, Morrisville, and Apex to gather feedback on the two service redesign scenarios. The study team presented the proposed service network and schedule for each scenario at the public meetings. Attendees were encouraged to vote for their preferred scenario and leave comments related to either scenario on comment sheets.

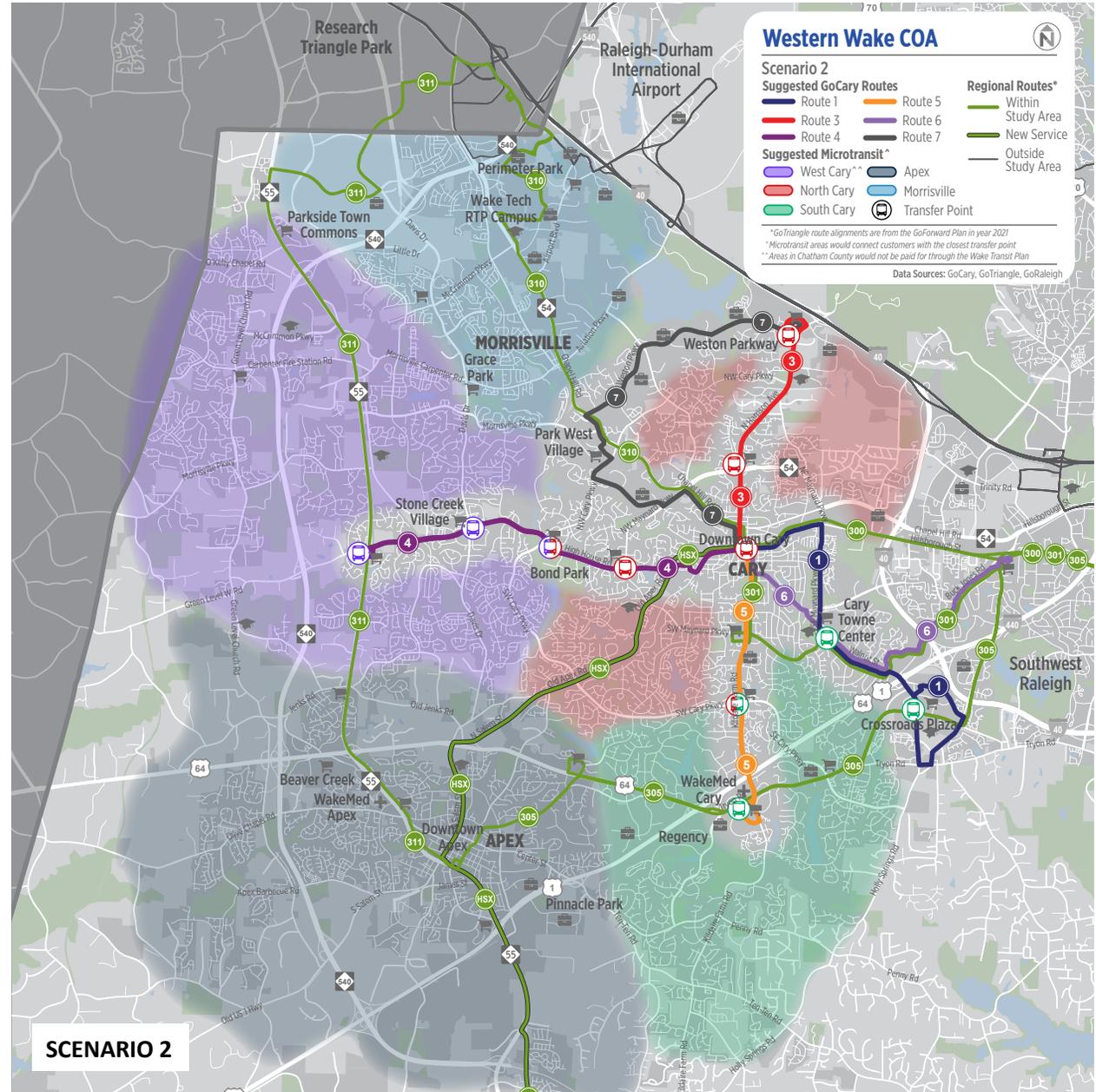
Respondents who preferred Scenario 1 favored the focused expansion of service in West Cary as well as fixed circulator service in Morrisville and Apex. It was frequently expressed that the predictability of fixed route service was desirable and perceived as more reliable.

Respondents who preferred Scenario 2 favored the flexibility of microtransit service, and noted the benefit of covering a larger area.

Microtransit

New on-demand services are increasingly becoming part of public transit networks, particularly for serving times and places with lower demand than would support fixed routes. One such service is microtransit - personal or shared transit service with designated pick-up and drop-off locations that does not run a fixed schedule. Trips are set up by riders ahead of time by contacting the service provider to arrange travel times and origin-destination locations. Ride requests can be made over the phone, by way of the internet, or via applications.

Figure 51: Service Recommendations - Scenario 2



Final Recommendations

Alignment Changes

Based on the feedback received online and at the August 2018 public meetings, the study team developed a recommended short-range service redesign scenario. The recommended scenario includes elements from both Scenario 1 and Scenario 2, as well as new recommendations developed in response to public and stakeholder feedback. Figure 52 illustrates the physical network associated with this final recommended scenario.

Route 1 Maynard (CW) + Route 2 Maynard (CCW)

Route 1 and Route 2 will be combined into a single route, to be named Route 1 Crossroads, with one terminal at the Cary Depot and the other at Crossroads Plaza. Rather than circulating the Maynard Loop, departing from the Cary Depot the route will travel east on E Chatham Street to Chatham Square before heading south on SE Maynard Road to Cary Towne Center. From there the route will continue southeast along Walnut Street to Crossroads Plaza before completing a turnaround using Tryon Road, Jones Franklin Road, and Dillard Drive.

Route 3 Harrison

The outbound alignment of Route 3 Harrison will be only slightly modified to shorten the length of the northern terminal loop reducing runtime. Departing from the Cary Depot, the route will head north along N Harrison Avenue to Harrison Square. At Harrison Square the route will turn around using Harrison Oaks Boulevard and Weston Parkway before returning down N Harrison Avenue to the Cary Depot. This alignment discontinues low ridership segments along Weston Parkway, Norwell Boulevard, and the NW Cary Parkway.

Route 4 High House

Route 4 High House will continue to serve Downtown Cary and Stone Creek Village. It will operate along its current alignment with minor streamlining. The and circuitous deviations into shopping centers and the Senior Center will be discontinued in favor of more direct service. However, service to Highland Village will continue.

Route 5 Kildaire Farm

Route 5 Kildaire will continue to operate along its current alignment along Kildaire Road with minor streamlining. The route will still serve Downtown Cary, WakeMed Cary, and shopping centers along Kildaire Road at the intersections of Tryon Road, SE Cary Parkway, and SW Maynard Road. The circuitous deviations into shopping centers will be discontinued in favor of more direct service.

Route 5 KFX Kildaire Farm Express

Route 5 KFX service will be discontinued due to low ridership.

Route 6 Buck Jones

Route 6 Buck Jones' alignment will change to provide more direct service between the Cary Depot and Cary Towne Center. Rather than traveling from the Cary Depot east along E Chatham Street and south on SE Maynard Road to reach Cary Towne Center, the route will travel from the Cary Depot down S Harrison Avenue and southeast along Walnut Street. The route will then travel northeast along Buck Jones Rd, as it currently does, to Plaza West Shopping Center. From here, the route will provide express service to the State Fairgrounds. When this extension occurs, the route will be re-numbered 9B Buck Jones to complement GoRaleigh Route 9 Hillsborough.

Route 7 Weston Parkway

This new service will connect businesses along Weston Parkway to the Park West Village shopping center and Downtown Cary. Departing from the Cary Depot terminal, the route will head northwest along Chapel Hill Road to the Maynard Loop. It then takes NW Maynard Road to James Jackson Avenue and serves Park West Village before joining Weston Parkway, accessing Harrison Square.

Apex Circulator

This new route, financed by the Town of Apex, will serve Downtown Apex and provide connections to both GoCary and GoTriangle services. The route will serve residences and activity centers at Beaver Creek before traveling southeast down NC 55 to WakeMed Apex. Farther down NC 55, the route serves the Walmart Supercenter using S Hughes Street and the Apex Peakway.

Route HSX Holly Springs-Apex-Cary Express

This new express route will provide weekday peak commuter service between Holly Springs, Apex, and Cary via E Williams Street, NC 55, N Salem Street, and Old Apex Road. This service will provide connections between the communities of southwestern Wake County.

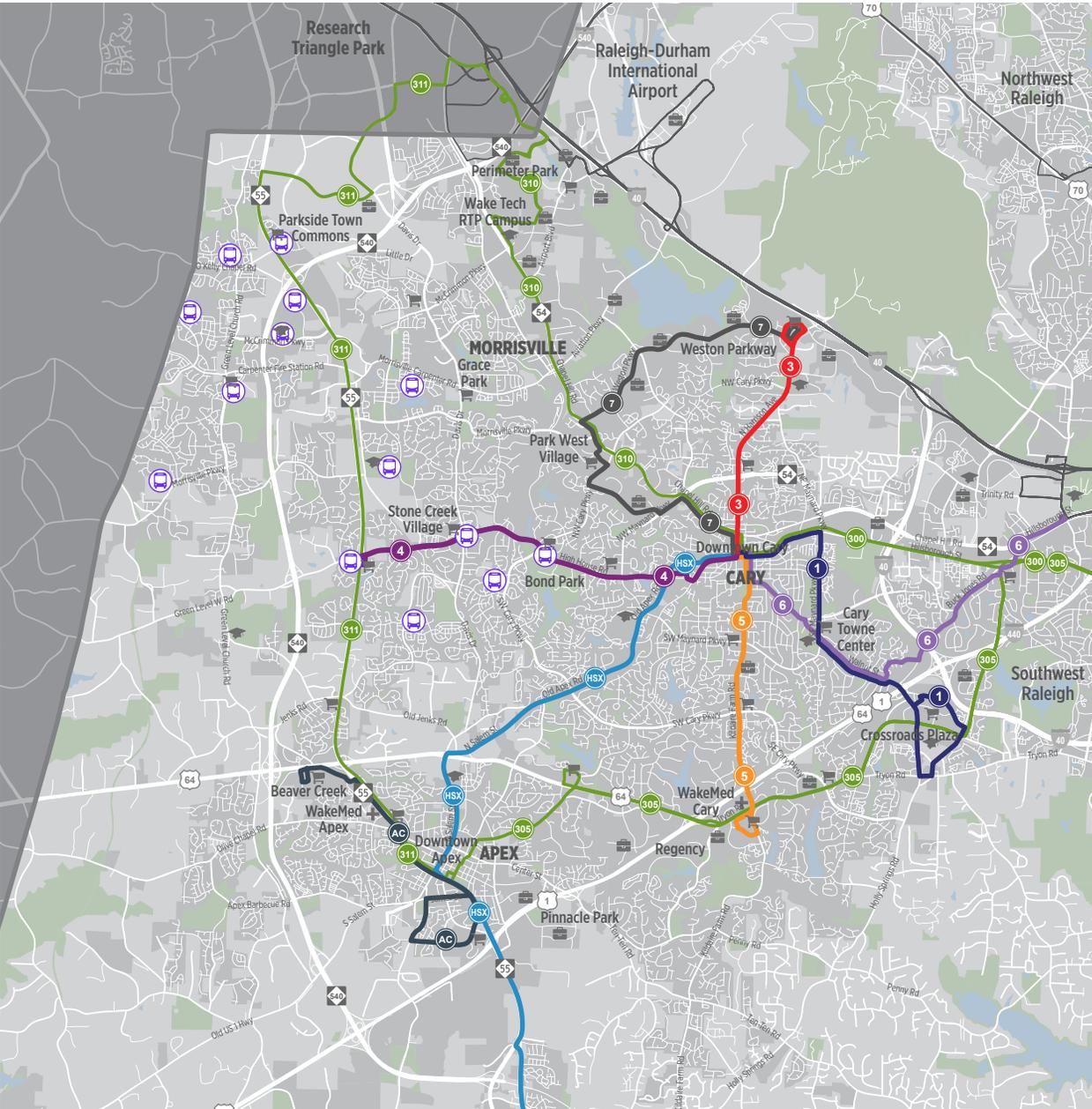
West Cary Microtransit

Microtransit service will be offered in West Cary. This demand-response style service offers pick-ups and drop-offs at 14 designated nodes. These 14 nodes offer connection to fixed route service offered by GoCary, GoRaleigh, and GoTriangle.

Morrisville

It is recommended that further analysis be conducted regarding future transit service options.

Figure 52: Western Wake Recommended Service Map



Western Wake COA



Final Recommendations - FY21

- | | | |
|--|------------------|---------------------------|
| GoCary Routes | | GoTriangle Routes* |
| Route 1 (Dark Blue) | Route 5 (Orange) | Within Study Area (Green) |
| Route 3 (Red) | Route 6 (Purple) | Outside Study Area (Grey) |
| Route 4 (Purple) | Route 7 (Black) | |
| Holly Springs Express^ (Light Blue) | | |
| Apex Circulator** (Black) | | |
| West Cary Microtransit Node (Bus icon) | | |

*GoTriangle route alignments are from the GoForward Plan in year 2021
 **Paid for by the Town of Apex
 ^GoTriangle route operated by GoCary

Note: ADA Service Not Shown Data Sources: GoCary, GoTriangle, GoRaleigh

Schedule Changes

Cycle times that are multiples of 60 allow for the greatest range of clock-face schedules. Clockface schedules are schedules that result in buses serving a particular stop at the same time every hour (e.g. 1:10, 2:10, etc., or 1:00, 1:30, 2:00, etc.). Clock-face frequencies make it easy to coordinate connections at key hubs and simplify schedules.

Clock-face schedules are proposed for all of the recommended routes, and recovery times are projected to fall between 10 and 20 percent of total cycle time for every route. When recovery time is less than 10 percent of total cycle time, there is a high risk of poor on-time performance because there is insufficient layover between trips. Conversely, if there is more than 20 percent recovery time in a schedule, buses are sitting unproductively.

When comparing existing and recommended schedules, several changes stand out. Firstly, Route 1 Crossroads will operate with 30 minute headways during the AM peak, Midday, and PM peak rather than its current 60 minute all-day frequency. Frequency and span of Routes 3, 4, 5, and 6 remain as they currently are. Route 5 KFX is discontinued and Route 7 Weston Parkway is added, operating at 30 minute headways during peak periods and 60 minute headways during all other service periods. Microtransit will operate on weekdays between 6:30 a.m. and 6:30 p.m.

The Apex Circulator will operate Monday through Saturday from 6:00 a.m. to 10:00 p.m. and Sunday 7:00 a.m. to 9:00 p.m. with a 60 minute all-day frequency. Route HSX Holly Springs Express provides three round trips, one each hour, during each peak period on weekdays.

Table 22: GoCary Existing Schedule Statistics - Weekday Frequencies by Period of Day (Minutes)

Route	Span of Service	AM Peak	Midday	PM Peak	Evening
Route 1 - Maynard (clockwise)	Monday - Saturday: 6:00 a.m. - 10:00 p.m. Sunday: 7:00 a.m. - 9:00 p.m.	60	60	60	60
Route 2 - Maynard (counter-clockwise)	Monday - Saturday: 6:00 a.m. - 10:00 p.m. Sunday: 7:00 a.m. - 9:00 p.m.	60	60	60	60
Route 3 - Harrison	Monday - Saturday: 6:00 a.m. - 9:30 p.m. Sunday: 7:00 a.m. - 8:30 p.m.	30	30	30	60
Route 4 - High House	Monday - Saturday: 6:00 a.m. - 10:00 p.m. Sunday: 7:00 a.m. - 9:00 p.m.	30	30	30	60
Route 5 - Kildaire Farm	Monday - Saturday: 6:00 a.m. - 10:00 p.m. Sunday: 7:30 a.m. - 9:00 p.m.	30	30	30	60
Route 6 - Buck Jones	Monday - Saturday: 6:00 a.m. - 10:00 p.m. Sunday: 7:00 a.m. - 9:00 p.m.	30	30	30	60
Route 5 Express - KFX	Monday - Friday: 4:00 p.m. - 5:30 p.m.	-	-	30	-

Table 23: GoCary Recommended Schedule Statistics - Weekday Frequencies by Period of Day (Minutes)

Route	Span of Service	AM Peak	Midday	PM Peak	Evening
Route 1 - Crossroads	Monday - Saturday: 6:00 a.m. - 10:00 p.m. Sunday: 7:00 a.m. - 9:00 p.m.	30	30	30	60
Route 3 - Harrison	Monday - Saturday: 6:00 a.m. - 9:30 p.m. Sunday: 7:00 a.m. - 8:30 p.m.	30	30	30	60
Route 4 - High House	Monday - Saturday: 6:00 a.m. - 10:00 p.m. Sunday: 7:00 a.m. - 9:00 p.m.	30	30	30	60
Route 5 - Kildaire Farm	Monday - Saturday: 6:00 a.m. - 10:00 p.m. Sunday: 7:30 a.m. - 9:00 p.m.	30	30	30	60
Route 7 - Weston Parkway	Monday - Saturday: 6:00 a.m. - 10:00 p.m. Sunday: 7:00 a.m. - 9:00 p.m.	30	60	30	60
Route 6 - Buck Jones	Monday - Saturday: 6:00 a.m. - 10:00 p.m. Sunday: 7:00 a.m. - 9:00 p.m.	30	30	30	60
West Cary Microtransit	Monday - Friday: 6:30 a.m. - 6:30 p.m.	-	-	-	-
Route HSX - Holly Springs-Apex-Cary Express	Monday - Friday: 6:00 a.m. - 9:00 a.m. 4:00 p.m. - 7:00 p.m.	60	-	60	-

Vehicles

GoCary leases 14 vehicles that are a mix of 30 ft buses, 35 ft buses, and cutaways. This fleet includes both vehicles in operation as well as those serving as spares.

In FY2019, with the discontinuation of Route 2 Maynard and Route 5 KFX alongside the addition of Route 7 Weston Parkway, GoCary will require 10 vehicles during peak service. Route HSX begins in FY2020 increasing peak vehicle needs by two buses. The implementation of the West Cary microtransit in FY2021 results in the need for one additional peak vehicle. This raises the required peak vehicle count to 13 in FY2021 (see Table 24). Given the current 14 vehicle fleet, and a group of spares accounting for 20% of the peak fleet, two additional vehicle leasing will be needed between now and the end of FY2021 to bring the total fleet up to 16 buses.

Given both current and anticipated ridership loads, it is suggested that all service in western Wake be provided by cutaway vehicles.

This would require the current 30ft and 35ft vehicles be replaced with cutaways at the end of their useful life. This has several benefits as cutaways are 1/4 the price of a 30-35ft bus and are slightly cheaper to maintain. This would simplify capital planning and ensure consistency of service for riders.

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Figure 53: GoCary Cutaway



Table 24: Vehicle and Bus Stop Needs

		FY2019	FY2020	FY2021
Vehicles	Peak Vehicles Needed	10	12	13
	Description	Discontinued Route 2 reduces vehicle need by 1. Addition of Route 7 increases vehicle need by 2.	Route HSX service begins. Increases vehicle need by 2.	West Cary microtransit service begins. Increases vehicle need by 1
New or Enhanced Bus Stops	Type 1 - Basic Bus Stop	41 new stops for Route 7. 16 new stops for new segments of Route 1 and Route 6.	No Additions	14 microtransit nodes. 40 new stops for the Apex Circulator
	Type 1 Cost	\$1,140,000	\$0	Cary = \$280,000; Apex* = \$800,000
	Type 2 - Bus Stop with Shelter	No Additions	No Additions	No Additions
	Type 2 Cost	\$0	\$0	\$0
Total Costs	Bus Stops Cost	\$1,140,000	\$0	Cary = \$280,000; Apex* = \$800,000
	Vehicles Cost	\$0	\$0	Apex* = \$150,000

Bus Stops

This recommended scenario will require the implementation of new bus stops. Because waiting for the bus is a significant part of every transit trip, well-designed bus stops enhance the transit experience, decrease perceived wait times, and can contribute to increased ridership. Conversely, poorly designed bus stops can decrease customer satisfaction, and make transit less attractive to potential new riders. Investing in high quality bus stops is often a low-cost, high-reward strategy for transit agencies.

Apart from being a strong investment in future ridership, bus stops must meet Federal requirements regarding accessibility. All new or improved bus stops and passenger waiting areas must conform to the ADA requirements as laid out in the Department of Transportation ADA standards for Transportation Facilities (2006). These standards specify a variety of requirements for platform surface, widths, and connectivity to surrounding sidewalk infrastructure and shelter facilities. Additionally, all stops should include clear signage. Additional amenities such as benches, shelters, and trash cans should be provided, as appropriate, depending on the level of passenger activity and stop type. Table 24 shows future bus stop needs by service.

While the Town of Cary has established their own bus stop guidelines regarding costs and amenities, certain key bus stop design characteristics are essential for ensuring a high quality transit experience. While it is not possible for every stop to be perfectly designed, there are a number of principles for good bus stop design and locations:

- **Convenient, Comfortable, and Safe Locations:** Bus stops should be located in places where passengers will feel comfortable and safe waiting for transit service. Stop locations should be well lit, and offset from fast moving traffic. Transit customers often view stops located near major activity centers as the most attractive and safe.
- **Visible and Easily Identifiable:** Bus stops should be located in places where passengers can easily find them, and where they are easily visible to bus drivers. Bus stops should present a strong brand identity through signage. This helps customers identify available services.
- **Pedestrian and Bicycle Access:** Nearly all transit riders are pedestrians or bicyclists at some point in their journey. Therefore, it is important that each bus stop have a safe and defined pathway to and from local destinations that is accessible to riders of all abilities.
- **Information on Available Services:** All bus riders and potential riders need certain basic information to use a transit service: Can I get to where I want to go from this stop? When will the next bus arrive? While much of this information can now be accessed using a smart phone, transit riders continue to value basic route and schedule information at each bus stop.

Figure 54: Highland Village Bus Stop



Operating Costs

Table 25 shows the recommended revenue hours and corresponding operating costs for all proposed service. Routes that are shown together in one row are proposed for interlining. Interlining is the practice of operating a single bus or group of buses on multiple routes. Interlining is often used to optimize cycle times and recovery times. For example, if one route has insufficient recovery time while another has excessive recovery time, interlining the routes can result in a cycle with an optimal mix of running time and recovery time.

The recommended service redesign scenario would result in 180 daily weekday revenue hours, 150 daily Saturday revenue hours, and 86 daily Sunday revenue hours. By comparison, the existing GoCary service (Routes 1, 2, 3, 4, 5, 6, and KFX) accounts for 121 weekday revenue hours, 120 Saturday revenue hours, and 70 Sunday revenue hours. Assuming 253 weekday, 52 Saturday, and 56 Sunday/holiday service days per year, the proposed service would result in 43% more annual revenue hours than the current service.

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Closing Remarks

The changes recommended here ultimately seek to meet the transit needs of western Wake County. Through a comprehensive analysis of market demands, service opportunities, and community needs these recommendations provide immediate improvements and establish a transit network to support future improvements.

Table 25: Revenue Hours and Operating Costs - Expressed in 2019 dollars

	Daily Revenue Hours	Cost per Revenue Vehicle Hour	Daily Cost	Annual Cost
Weekday				
Route 1 + 3 + 5	60	\$84.99	\$5,099.40	\$1,290,148.20
Route 4 + 6	58	\$84.99	\$4,929.42	\$1,247,143.26
Weston Parkway	23	\$84.99	\$1,954.77	\$494,556.81
West Cary Microtransit	12	\$84.99	\$1,019.88	\$258,029.64
Apex Circulator*	16	\$84.99	\$1,359.84	\$344,039.52
Route HSX	12	\$84.99	\$1,019.88	\$258,029.64
Saturday				
Route 1 + 3 + 5	60	\$84.99	\$5,099.40	\$265,168.80
Route 4 + 6	58	\$84.99	\$4,929.42	\$256,329.84
Weston Parkway	16	\$84.99	\$1,359.84	\$70,711.68
Apex Circulator*	16	\$84.99	\$1,359.84	\$70,711.68
Sunday				
Route 1 + 3 + 5	28	\$84.99	\$2,379.72	\$133,264.32
Route 4 + 6	28	\$84.99	\$2,379.72	\$133,264.32
Weston Parkway	16	\$84.99	\$1,359.84	\$76,151.04
Apex Circulator*	14	\$84.99	\$1,189.86	\$66,632.16



Appendix A

Public Outreach Survey

Trade-off Questions

Each question will present two transit service change options. Within each pair, please select which option you prefer.

1. Improve vs. Expand

Option A: Focus improvements in places where transit service already exists.

Option B: Focus on service expansion to places without transit service.

2. Walking Distance vs. Bus Speed

Option A: Service many stops that make service slower but reduce walking distance to stops.

Option B: Serve fewer stops for faster service but that increase walking distances to stops.

3. Demand Response vs. Fixed Route

Option A: Provide shared ride, demand response service (like Lyft/Uber or the Research Triangle Park Go OnDemand Shuttle).

Option B: Provide low frequency (30-60 min) traditional fixed route bus service.

4. Frequency vs. Span of Service

Option A: Provide more frequent service during peak hours.

Option B: Start service earlier in the morning and end service later at night.

Demographic Questions

Knowing more about who you are will provide a better sense of how needs and preferences may vary by geographic or demographic characteristics.

1. Where do you live?

Option A: Cary

Option B: Apex

Option C: Morrisville

Option D: Other (please specify)

2. Which race/ethnicity best describes you?

Option A: American Indian or Alaskan Native

Option B: Asian/Pacific Islander

Option C: Black or African American

Option D: Hispanic

Option E: White/Caucasian

Option F: Multiple/other ethnicity (please specify)

3. What is your approximate average household income?

Option A: \$0-\$16,999

Option B: \$17,000-\$24,999

Option C: \$25,000-\$49,999

Option D: \$50,000-99,999

Option E: \$100,000 and up

4. What is your age?

Option A: Please specify

Open Response Questions

What are some of your specific ideas for the transit future of western Wake County? Please share your vision.

1. What is the number one thing you would like to see to improve transit service in western Wake County (Cary, Apex, and Morrisville)?

2. Is there an area you would like to see served by transit? (Please provide the location and nearest crossroads)



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