CAPITAL AREA

BUS TRANSIT DEVELOPMENT PLAN

FINAL REPORT

October 2011

Prepared for

Capital Area Metropolitan Planning Organization
City of Raleigh/Capital Area Transit
Triangle Transit
Cary Transit
North Carolina State University Wolfline
Wake County

Prepared by

HDR Engineering, Inc. of the Carolinas

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1 Background & Introduction

The Capital Area Bus Transit Development Plan (TDP) presents a framework for long-range transit service and capital improvements aimed at improving mobility options for the Capital Area region. Preparation of this community-based plan included a collaborative effort among multiple municipalities, agencies, businesses, community leaders, and the residents of the Capital Area region.

In September 2010, the Capital Area Metropolitan Planning Organization (CAMPO), and the City of Raleigh/Capital Area Transit (CAT), engaged HDR Engineering, Inc. of the Carolinas (HDR) and its subconsultants to complete the Capital Area Bus Transit Development Plan for service in the CAMPO jurisdiction. Partners in the study were the Town of Cary (C-Tran), Triangle Transit (TTA), North Carolina State University Wolfline, and Wake County. This report outlines the plan's major findings and recommendations.

1.1 Study Overview

This study involved the preparation of a bus transit development plan for the CAMPO region in anticipation of significant population and employment growth by 2035. According to current projections, the CAMPO jurisdiction is projected to grow in population from 880,490 in 2005 to 1,951,717 in 2035. The employment is projected to grow from 439,715 jobs to 906,523 jobs over the same period. These are growth rates of 122% in population and 106% in employment over a 30-year period. This growth is likely to result in increased demand for enhanced transportation and mobility choices for the region. However, this growth also presents several potential challenges such as worsening air quality and increased traffic congestion.

The TDP calls for the development of an enhanced bus system that complements a potential long-range transit rail system. Enhancing the existing bus service system will allow the region to meet future economic and environmental sustainability initiatives: including improving quality of life, reducing environmental impacts, and ensuring the long-term economic vitality for the region. Addressing these initiatives by investing in the future bus service system will improve mobility choices, increase regional connectivity between major activity and employment centers, create new jobs, and reduce the impacts of traffic congestion.

The TDP's initial planning horizon was set at 2035, reflecting the planning horizon used for the current Long Range Transportation Plan (LRTP) and the available travel demand model runs and projections. As the TDP process progressed, the planning horizon was adjusted to 2040 to reflect the new planning horizon that will be used in the update of the LRTP. Service and capital plans were developed for 2015, 2020, and 2030, with ultimate cost projections out to 2040.

1.1.1 Relationship to Rail Studies

TTA is conducting an Alternatives Analysis (AA) for future rail investment in the entire Triangle region, encompassing Wake, Durham, and Orange Counties. The AA is examining multiple rail corridors both within individual counties and across county borders. Both commuter rail (using existing/expanded freight tracks) and light rail transit (LRT) technologies are being considered[1].

The AA is focused on specific rail corridors, and does not include an analysis of the overall transportation needs in the three counties. Each county is developing its own bus service plans that consider transit connections to the rail corridors and service beyond the corridors throughout the individual counties. At the conclusion of the study process, the rail plans and bus plans will be merged into a comprehensive transit plan for the region. It is anticipated that this comprehensive plan will be taken to the voters in each county to solicit their approval on implementing a half-cent sales tax dedicated to funding the transit program. Each county must conduct its own referendum and these referendums are anticipated to be held in 2011 or 2012.

This TDP is based upon the assumption that the commuter rail service connecting Garner to Durham and the light rail service from north Raleigh to Cary would be in place. Should either of these facilities be delayed or the limits changed, adjustments will be required to this TDP. Depending upon the magnitude of the rail changes, the impacts to the bus plan could be marginal (extending a route to a different station location or changing the implementation date), or major, such as if one of the technologies is eliminated. In that latter case, more significant changes to the bus plan will be required, including potentially evaluating Bus Rapid Transit along some corridors.

1.1.2 Three-Year Raleigh Bus Plan

At the completion of this TDP, a three-year bus plan will be prepared for the CAT service in Raleigh. This three-year plan will build upon the long-range concept plan described in this document and will describe route-by-route and year-by-year changes for the initial three years after additional transit funding becomes available and any interim improvements that can be accomplished with existing resources prior to new monies being available.

1.1.3 Components of the Bus Transit Development Plan

The TDP is intended to serve as a guide in developing a transit vision, outlining existing findings, and implementing recommendations. The plan presents a series of transit service and capital improvement recommendations aimed at accomplishing these objectives.

The main components of the transit development plan include:

[1] For current information on the AA study, refer to the project website, http://www.ourtransitfuture.com/.

- An examination of existing routes and plans
- Considerations of existing and future demographic, land use, and travel patterns
- Input from citizens and stakeholders on existing and proposed future service expansions
- Recommendations for new service, enhancements made to existing service, and capital facility improvements based on the results from previous components
- A phased financial forecasting plan identifying operating and capital costs associated with implementing the recommendations of the transit development plan

1.1.4 TDP A "Living Document"

The TDP represents a look forward to 30 years in the future. As such, a certain amount of educated guesswork is required, with its inherent uncertainties. Who would have projected 30 years ago the development of the personal computer, compact discs/DVDs, and the internet?

Between now and 2040 circumstances will undoubtedly change and the TDP will need to be revised and updated accordingly. Consequently, the routes depicted here will be implemented according to such future conditions and public comment at the time of implementation, available funding, and approval processes of the respective operators and local jurisdictions, and in keeping with the terms of the interlocal agreements being developed between the County and the municipalities on how any new revenues (such as from the sales tax) will be shared.

1.2 Study Area

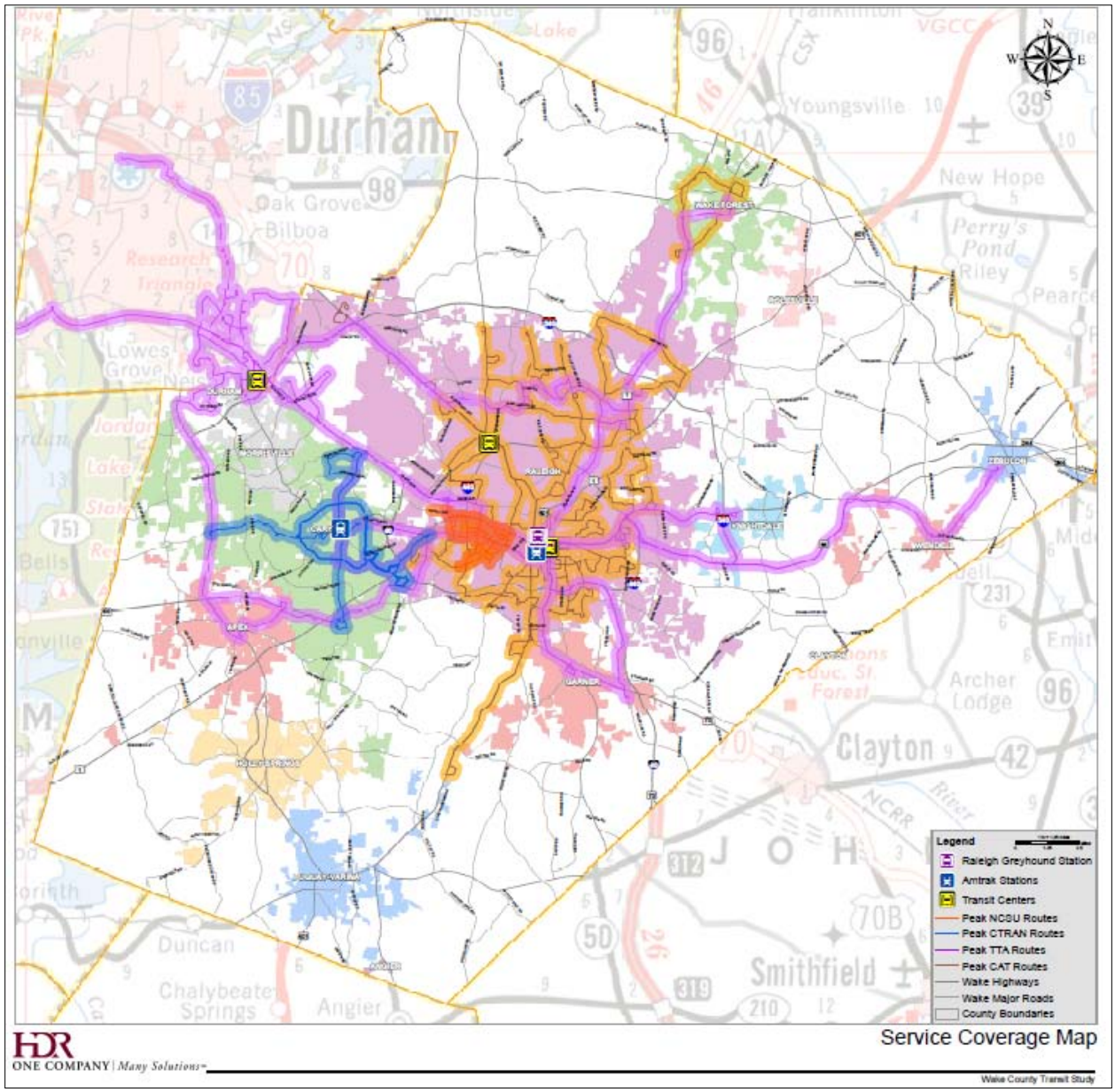
The study area for the TDP includes the entire CAMPO region. This area principally includes Wake County but also parts of Franklin, Granville, Harnett, and Johnston counties, including the municipalities of Angier, Clayton, Creedmoor, Franklinton, and Youngsville. Additionally, service from Wake County into the Research Triangle Park (RTP) in Durham County was examined.

The study area, along with existing bus service provided by CAT, C-Tran, TTA, and Wolfline is shown in **Exhibit 1-1**.

1.3 Study Team

To ensure the goals and recommendations of the TDP reflect the interests and considerations of all persons in the CAMPO region, considerable effort was made to incorporate the input of public officials, representatives of key civic organizations and public agencies, and the general public. An assembled project team consisting of a study steering committee, local transit and transportation partners, and HDR consultants guided and monitored study progress.

Exhibit 1-1
Study Area & Existing Coverage



1.3.1 Core Study Steering Committee

The core study steering committee consisted of major stakeholder representatives and transit operators. These included members from CAMPO, the City of Raleigh/CAT, the Town of Cary, NCSU Wolfline, and Wake County. This study would not have been possible without their long hours of dedication and insights to the project. The Steering Committee included:

David Eatman	City of Raleigh/CAT – PM	Ray Boylston	Town of Cary/C-Tran
Carmalee Scarpitti	City of Raleigh/CAT	Danny Johnson	Town of Fuquay-Varina
Ken Bowers	City of Raleigh	Brian O'Sullivan	NCSU Wolfline
Eric Lamb	City of Raleigh	Erik Landfried	Triangle Transit
Edison Johnson	CAMPO	Jonathan Parker	Triangle Transit
Chris Lukasina	CAMPO	Tim Gardiner	Wake County
Kenneth Withrow	CAMPO		

1.3.2 Local Transit and Transportation Partners

In addition to the Steering Committee, many other individuals played an important role in the development of this TDP. These individuals were made up of members from the Technical Coordinating Committee of CAMPO. The following were part of the project team:

Reed Huegerich	Town of Apex	Fleming El-Amin	City of Raleigh
Shelby Powell	CAMPO	Roberta Fox	City of Raleigh
Amy Ward	CAMPO	Mike Kennon	City of Raleigh
Kyle Ward	CAMPO	Joe Milazzo	Regional Transportation Alliance
Diane Wilson	CAMPO	Thomas Lloyd	Town of Rolesville
Juliet Andes	Town of Cary	John Hodges-Copple	Triangle J Council of Governments
Danny Johnson	Town of Fuquay-Varina	Patrick McDonough	Triangle Transit
Brad Bass	Town of Garner	Jennifer Rogers	Triangle Transit
Gina Clapp	Town of Holly Springs	John Tallmadge	Triangle Transit
Kendra Stephenson	Town of Holly Springs	Don Willis	WCTS
Stephanie Sudano	Town of Holly Springs	Tim Maloney	Wake County
Chris Hills	Town of Knightdale	Chip Russell	Town of Wake Forest
Ashley Kaade	Town of Morrisville	David Bergmark	Town of Wendell
Alison Carpenter	NCSU Wolfline	Teresa Piner	Town of Wendell
Tom Kendig	NCSU Wolfline	Bo Dobrzenski	Town of Zebulon
George Adler	City of Raleigh	Mark Hetrick	Town of Zebulon

1.3.3 Consulting Team

The consulting team for this study was led by HDR Engineering, Inc. of the Carolinas (HDR). Assisting HDR was Planning Communities LLC responsible for stakeholder involvement and AJM Consulting responsible for ridership data gathering. The following were principal team members on this project:

Robert Bush	HDR Project Manager	Jessica Tisdale	HDR
Maggie Adams	HDR	Brett Wallace	HDR
Marcus Arnold	HDR	Karen Campblin	Planning Communities
Claire Brinkley	HDR	Kevin Hall	Planning Communities
Michael Ousdahl	HDR	Andy Mundew	AJM Consulting
Mike Surasky	HDR		

2 Study Area Characteristics

Detailed existing demographic, land use, and travel pattern analyses were prepared to describe the market for transit in the study area. This analysis generated data regarding ridership propensity, transit-supportive density, and travel patterns to help recommend areas for new or improved transit service. This chapter also discusses the results of a complete passenger boarding and alighting count, ridership survey, and public involvement process survey, which together provide additional insights regarding service preferences and propensity to ride new or improved transit services.

2.1 Ridership Propensity

Transit ridership propensity measures the inclination or likelihood of using public transit. A higher propensity toward an action means a greater likelihood to do the action. Propensity can be quantified such that someone with a propensity of "2" is twice as likely to do something, such as take transit, as someone with a propensity of "1".

HDR examined the 2000 U.S. Census data on a Census Block Group basis to identify those areas with characteristics most likely to support transit service[2]. To identify the transit propensity for each of the block groups, 10 demographic indicators were considered. Each indicator was carefully selected based upon industry research regarding the potential users of transit. The background analysis is contained in Transit Cooperative Research Program[3] *Report 28: Transit Markets of the Future, The Challenges of Change.* The specific factors examined in order of their propensity included:

- Population density
- Percentage of households without cars
- Percentage of persons with mobility limitations
- Percentage of persons with work disabilities
- Percentage of persons who were not White, non-Hispanic
- Percentage of recent (< 10 years) immigrants
- Percentage of low-income (<$20,000) households
- Percentage of female persons
- Percentage of persons in the workforce age 65 or older
- Percentage of persons in the workforce age 30 or younger

[2] At the time of this study, necessary information from the 2010 Census was not available.
[3] The Transit Cooperative Research Program is part of the Transportation Research Board of the National Research Council. Its extensive publications are available free at http://www.tcrponline.org.

An index for each of these factors was developed in order to determine the relative rank of the Block Group compared with the highest ranked Block Group for that factor. These indexes were then weighted to develop a Composite Score for each Block Group. The weights for each factor are based upon the industry research.

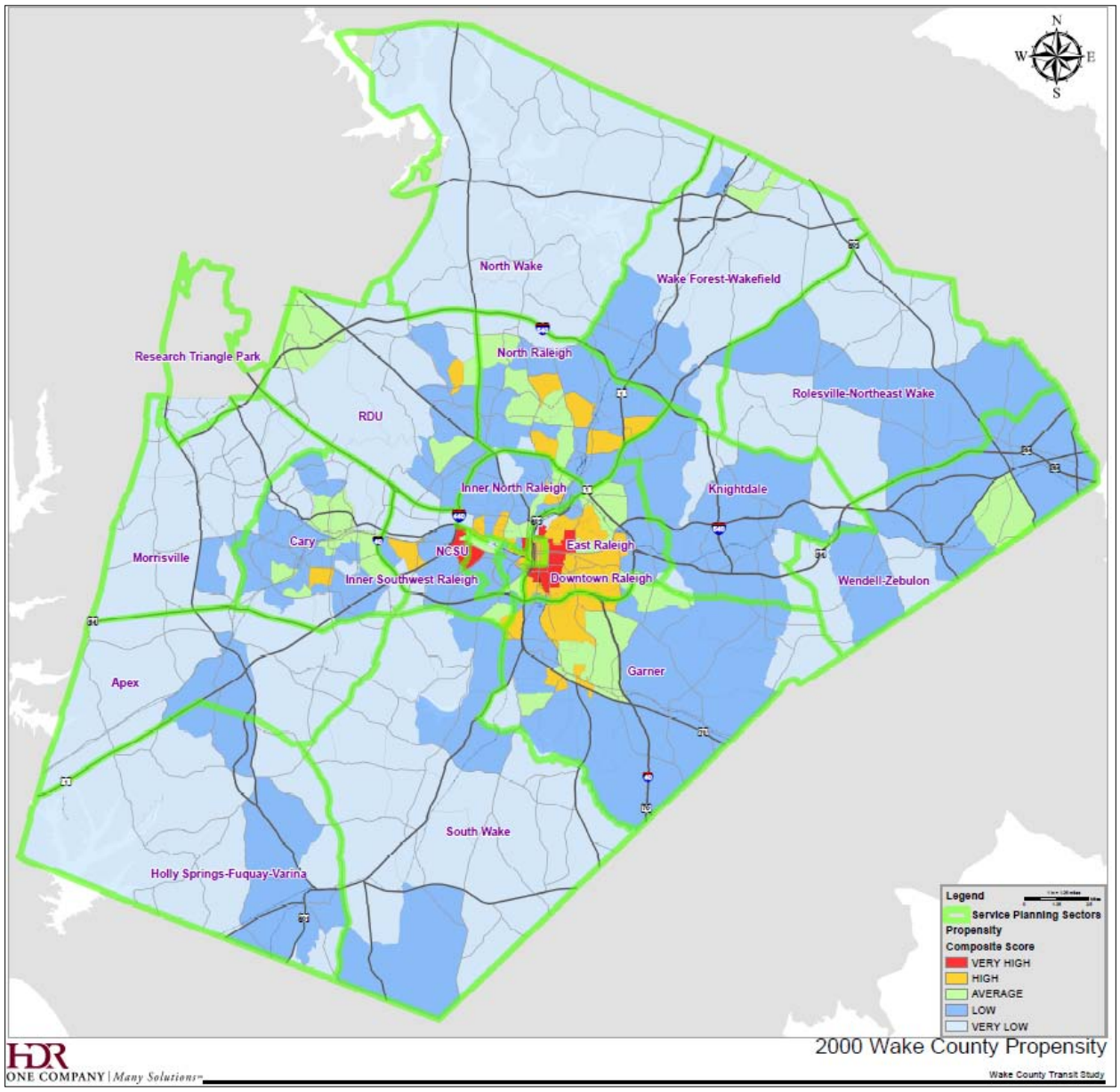
The composite scores were statistically grouped into five categories, from "very low" to "very high" based upon their relationship to the scores of the other Block Groups. **Exhibit 2-1** shows the relative ranking of the Block Groups in Wake County for transit propensity. As the exhibit illustrates in red and yellow, the concentration of residents with the highest propensity to use transit service is in the immediate area of the City of Raleigh central business district (CBD); eastern portions of the City of Raleigh (especially along the Poole Rd. and Martin Luther King Jr. Blvd. corridors); southern portions of the City of Raleigh (especially along the Rock Quarry Rd. and Garner Rd. corridors); and in the vicinity of the NCSU campus (especially along the Western Blvd. corridor).

As a caution, this information is based upon the 2000 Census; the 2010 Census information has not yet been released in sufficient detail to provide the same level of analysis. It is unlikely that the predominant area of transit propensity has changed much, although the dramatic population growth in Wake County between 2000 and 2010 is likely to have increased the propensity in all urban block groups.

2.2 Transit Supportive Density

Transit industry research provides guidance on whether an area is "transit supportive". This analysis is described in the *TCRP Report 100: The Transit Capacity and Quality of Service Manual.* "Transit supportive" areas are determined by the density of the population and employment within a given area such as a "Traffic Analysis Zone (TAZ). The higher the density, the more transit service that can be supported. According to the TCRP report, a density of at least three housing units per gross acre (about eight people), or a density of at least four jobs per acre are necessary to support hourly bus service. An equivalent combination of housing and jobs would have the same effect. Overall, the number of jobs counts twice as much as the population when calculating transit-supportive density.

Exhibit 2-1
Ridership Propensity



The data for the transit supportive density analysis comes from the Triangle Regional Model. This model provides data on a TAZ basis for both population and employment. Based upon the above ratios, the transit supportive density can be calculated. **Exhibit 2-2** illustrates the transit supportive density results for the CAMPO region in 2035. The scale of equivalent population/square mile used in the exhibit should be viewed as a general guide and not an absolute requirement for the different service levels.

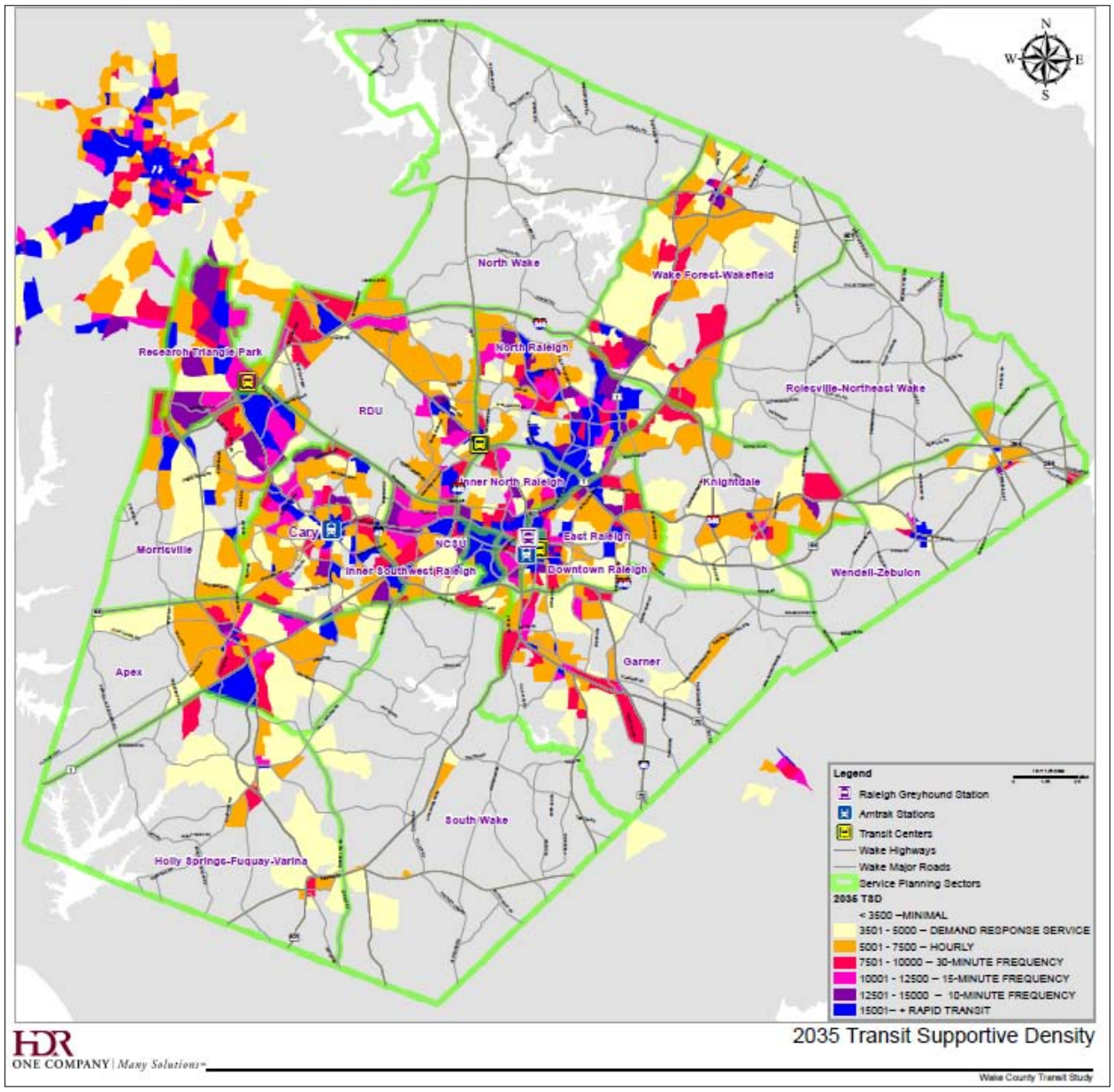
Several TAZs possess sufficient density under this analysis to support the most intensive capital projects and frequent transit services. Notable concentrations include areas in the immediate vicinity of the City of Raleigh CBD, areas surrounding the NCSU campus, northern portions of the City of Raleigh (especially along the Six Forks Rd. corridor, Falls of Neuse Rd. corridor, Atlantic Ave. corridor, and the Capital Blvd. corridor); the immediate vicinity of the Town of Cary downtown, and the Perimeter Park area in Morrisville. These locations are indicated by the blue shading on the map.

Exhibit 2-2 shows several areas that will be challenging to offer an appropriate level of service. These areas include locations that have high density, but are relatively isolated from other dense locations such as Wake Forest, Wendell-Zebulon, Knightdale, and Garner.

Notable, too, are the number of areas within Wake County that do NOT warrant regular bus service. These areas consist of farmland and single-family residential areas. Fixed route, local bus service would not be productive in these areas, such as in the north around Falls Lake, far eastern portions of the county, and the southern portion between Fuquay-Varina and Garner. Such areas are more appropriately served by rural, demand-response or park & ride services.

Concentrations in the vicinity of the Research Triangle Park must be viewed cautiously as they are likely heavily influenced by the presence of a few large employers. RTP is in the midst of preparing a 50-year master plan that will call for changing the development pattern in the park, moving away from strictly a suburban, forested office park model that has guided past development. The new plan is likely to call for some intensification and diversity of development in some areas.

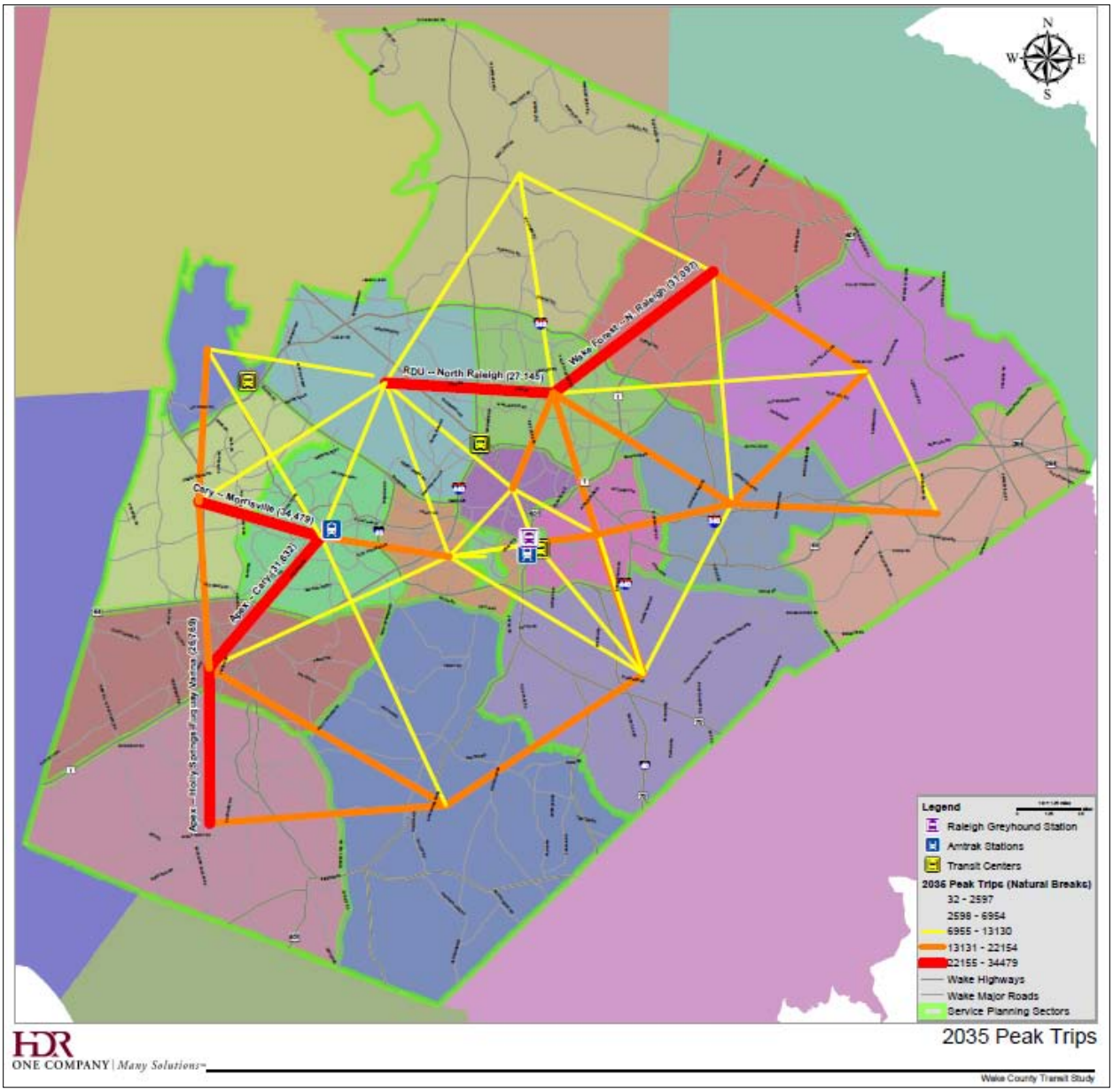
Exhibit 2-2
2035 Wake County Transit Supportive Density



2.3 Travel Patterns

The Triangle Regional Model, which reflects current land use and comprehensive plans, provides an indication of the major travel patterns in the CAMPO region. **Exhibit 2-3** presents a desire line analysis of projected 2035 daily peak trips between paired origins & destinations for the CAMPO region. Lines reflect major travel patterns from the center of each zone, and do not imply specific origin and destination points. For clarity's sake, minor travel patterns are not shown.

Exhibit 2-3
Wake County Travel Patterns



The results of the desire line analysis demonstrate several major travel patterns. These include Apex-Holly Springs-Fuquay-Varina, Apex-Cary, Cary-Morrisville, Raleigh Durham International Airport (RDU)-North Raleigh, and Wake Forest-North Raleigh. Existing transit service in the CAMPO region remains primarily characterized by radial route structures, which carry passengers from outlying suburban centers to the City of Raleigh CBD area. If a current passenger needed to travel between outlying activity centers, they are most likely required to take a route downtown and complete a transfer in

order to get to their destination. The results indicate the need for more crosstown local and commuter bus services in order to more efficiently connect the major activity centers outside of the Raleigh CBD.

2.4 Passenger Boarding and Alighting Counts

To better understand existing transit ridership trends, a complete boarding and alighting count was conducted for CAT and CTran using on-board counter personnel or "checkers". Similar checks were not done for the Triangle Transit and Wolfline routes since these systems collect such data using Automatic Passenger Counters (APCs). A manual boarding and alighting count is the most intensive data gathering effort a system can do since it requires a counter to be on the bus during all hours of operation over a single day. Most transit systems only conduct this type of count on an infrequent basis due to the labor effort required, with a timeframe of conducting such a count every two to five years.

The boarding and alighting count was conducted for all existing CAT routes in September 2010 and all CTran routes in October 2010. During the count, the checkers recorded all boardings and alightings for each stop on a trip-by-trip basis. The following sections provide an overview of the ridership findings of the check by system operator.

The boarding & alighting counts are described in more detail in a separate Technical Memorandum prepared as part of the TDP.

2.4.1 CAT

2.4.1.1 *Daily Ridership*

Daily ridership, defined as total boardings, for the CAT system was about 18,700. Alighting information was also recorded to identify active destination locations. **Exhibit 2-4** shows the route-by-route results for the total count. The top five routes in terms of daily riders are:

1. Route 15: Wake Med
2. Route 1: Capital
3. Route 7: South Saunders
4. Route 4: Rex Hospital
5. Route 2: Falls of Neuse

Generally, the lowest ridership routes are all CAT early morning and late evening services. The ridership levels encompass not only the lower usage per trip, but also the shorter span of service for these routes as compared with their daytime counterparts. Overall, CAT boardings increased by 3,435 or 24% over the previous boarding and alighting count completed in 2008.

Exhibit 2-4
Weekday CAT Ridership

Route Code	Route	BY DIRECTION Ons	Offs	Total	COMPLETE ROUTE Ons	Offs	Total	Rank
10	Capital OB	1236	986	2222				
11	Capital IB	758	1029	1787	1994	2015	4009	2
20	Falls of Neuse OB	595	517	1112				
21	Falls of Neuse IB	483	553	1036	1078	1070	2148	5
30	Glascock OB AM	39	17	56				
31	Glascock IB AM	97	115	212				
32	Glascock OB PM	136	91	227				
33	Glascock IB PM	34	81	115	306	304	610	22
40	Rex Hospital OB Wkdy	605	584	1189				
41	Rex Hospital IB Wkdy	482	510	992	1087	1094	2181	4
50	Biltmore Hills OB	409	253	662				
51	Biltmore Hills IB	230	376	606	639	629	1268	10
60	Crabtree OB	394	326	720				
61	Crabtree IB	361	417	778	755	743	1498	8
70	South Saunders OB	610	491	1101				
71	South Saunders IB	601	713	1314	1211	1204	2415	3
72	Carolina Pines EB	236	228	464				
73	Carolina Pines WB	152	160	312	388	388	776	18
80	Northclift OB	309	251	560				
81	Northclift IB	212	271	483	521	522	1043	13
82	Sawmill Connect EB	107	84	191				
83	Sawmill Connect WB	73	96	169	180	180	360	25
100	Longview OB	332	204	536				
101	Longview IB	136	243	379	468	447	915	16
110	Avent Ferry OB AM	131	118	249				
111	Avent Ferry IB AM	278	298	576				
112	Avent Ferry OB PM	466	422	888				
113	Avent Ferry IB PM	186	232	418	1061	1070	2131	6
114	Buck Jones Connect OB	234	164	398				
115	Buck Jones Connect IB	70	140	210	304	304	608	23
120	Method OB	438	223	661				
121	Method IB	501	714	1215	939	937	1876	7
130	Chavis Heights Loop	327	333	660	327	333	660	21
150	Wake Med OB	1632	1128	2760				
151	Wake Med IB	576	1094	1670	2208	2222	4430	1
152	Trawick Connect OB	499	379	878				
153	Trawick Connect IB	210	331	541	709	710	1419	9
160	Oberlin OB	352	331	683				
161	Oberlin IB	258	281	539	610	612	1222	11
180	Worthdale OB	389	275	664				
181	Worthdale IB	218	332	550	607	607	1214	12

Route Code	Route	BY DIRECTION Ons	Offs	Total	COMPLETE ROUTE Ons	Offs	Total	Rank
190	Apollo Heights OB	275	229	504				
191	Apollo Heights IB	232	278	510	507	507	1014	14
210	Caraleigh Loop	475	469	944	475	469	944	15
220	State Street OB	266	154	420				
221	State Street IB	168	273	441	434	427	861	17
232	Millbrook Connect EB	136	92	228				
233	Millbrook Connect WB	168	212	380	304	304	608	23
242	North Crosstown EB	149	155	304				
243	North Crosstown WB	215	209	424	364	364	728	20
252	Triangle Town Cen Loop	371	371	742	371	371	742	19
262	Early East OB	5	1	6				
263	Early East IB	3	6	9	8	7	15	38
270	Southeast OB	20	15	35				
271	Southeast IB	5	10	15	25	25	50	36
280	Southwest OB	10	5	15				
281	Southwest IB	4	9	13	14	14	28	37
292	North Night Conn OB	34	27	61				
293	North Night Conn IB	11	18	29	45	45	90	34
300	Northeast OB	26	6	32				
301	Northeast IB	20	40	60	46	46	92	33
320	Sanderford Road OB	111	87	198				
321	Sanderford Road IB	40	58	98	151	145	296	26
332	Glenwood-Creedmoor O	17	5	22				
333	Glenwood-Creedmoor I	13	25	38	30	30	60	35
350	Poole Road OB	82	69	151				
351	Poole Road IB	14	28	42	96	97	193	28
360	Garner Station OB	89	80	169				
361	Garner Station IB	41	57	98	130	137	267	27
370	North Hills OB	36	30	66				
371	North Hills IB	18	33	51	54	63	117	31
380	Blue Ridge OB	54	49	103				
381	Blue Ridge IB	33	42	75	87	91	178	29
390	Cameron Village OB	33	31	64				
391	Cameron Village IB	40	42	82	73	73	146	30
700	Brier Creek Ex OB	34	25	59				
701	Brier Creek Ex IB	17	26	43	51	51	102	32
SYSTEMWIDE		**18,657**	**18,657**	**37,314**				

Source: 2010 CAT Boarding and Alighting Count

2.4.1.2 *Major Activity Locations*

From the stop level ridership information, the major activity locations for the system can be identified. The top location, not surprisingly, is the Moore Square Station Transit Mall in downtown Raleigh. Moore Square is the focal point for most of CAT's routes. There were 5,902 boardings and 4,704 alightings at Moore Square, which combined are 28% of all trip ends (boardings & alightings) in the CAT system. Note that this activity level does not include the R-Line, which was not counted, nor does it include the Triangle Transit routes that serve downtown Raleigh.

Moore Square

In Downtown Raleigh as a whole, excluding Moore Square, there were 450 boardings and 1,558 alightings, or 5% of all trip ends. The imbalance between the boardings and alightings at Moore Square and the rest of downtown, and their imbalance in opposite directions, indicates that many people will get off their bus at their destination in downtown, but will walk to Moore Square to board their bus for their return trip. For all of downtown, total transit activity would also need to consider the R-Line and Triangle Transit routes. During FY 2010, the R-Line had about 650 daily boardings (1300 trip ends) all of which would be in downtown, and the Triangle Transit routes serving downtown had about 2,000 daily boardings. Assuming half of the TTA boardings occurred in downtown (potentially a generous assumption), another 1,000 daily boardings (or 2,000 trip ends) would have occurred in downtown.

This information allows a very broad estimation of the potential capture rate of downtown employment. According to the Raleigh *2030 Comprehensive Plan*, downtown Raleigh has about 37,500 employees, including both private and governmental workers. Assuming about 1,500 CAT riders are destined to downtown, reflected by the number of alightings away from Moore Square, and assuming that they are all destined to downtown for work, then about 1,500 individuals commute via CAT. Another 1,000 individuals commute via Triangle Transit for a total of about 2,500 individuals. This calculation does not include the R-Line riders, who are likely transferring or using transit to travel among various downtown locations and not for their work commute. Given these assumptions, approximately 6.7% (2,500/37,500) of the downtown workforce commutes via transit.

Aside from downtown, four broad areas had more than 1,000 trip ends on CAT. These areas are Wake Med, Triangle Town Center, Crabtree Valley Mall, and NC State. Ridership at these locations represent boardings/alightings at stops in the general vicinity, so will include riders that are transferring or that are destined to nearby locations and not necessarily the hospital, malls, or university. **Exhibit 2-5** shows the major transit locations for CAT, including Moore Square and downtown. Collectively, these five activity centers plus Moore Square account for 50% of all trip ends in the CAT system.

Exhibit 2-5
Major CAT Transit Activity Centers

Activity Center	Boardings	Alightings	Total Trip Ends	Percent of System
Moore Square	5,902	4,704	10,606	28%
Wake Med	1,242	1,132	2,374	6%
Raleigh CBD (outside Moore Square)	450	1,558	2,008	5%
Triangle Town Center	613	711	1,324	4%
Crabtree Valley Mall	597	646	1,243	3%
NC State University	501	522	1,023	3%

Source: 2010 CAT Boarding and Alighting Count

2.4.1.3 *Load Factors*

The maximum passenger load for each bus trip was calculated. This "max load" is used to ensure that the buses are properly sized for the passenger loads, and to identify routes where more or less frequent service could be warranted.

Trips were identified where the number of passengers exceeded 42 passengers, the weighted average number of seats on CAT buses. While standees are typically tolerated during peak hours, an excessive number of standees should be avoided, and generally every passenger should have a seat during off-peak hours.

Results indicate that only 10 trips (out of 1,169) had weekday max loads in excess of 42 passengers, with the largest load being 63 passengers. The routes that did have max loads in excess of 42 passengers were Route 15 Wake Med (6 trips); Route 1 Capital (1 trip); Route 2 Falls of Neuse (1 trip); Route 7 South Saunders (1 trip); and Route 11 Avent Ferry (1 trip).

2.4.2 CTRAN

2.4.2.1 *Daily Ridership*

Daily ridership, defined as total boardings, for the CTran system was about 630. Alighting information was also recorded to identify active destination locations. **Exhibit 2-6** shows the route-by-route results for the total count. The top ridership route in the system is Route 6 Buck Jones while the lowest ridership route in the system is Route 3 Harrison Avenue. For Routes 1 and 2, which follow the same routes in opposite directions, the ridership information reports the "tail" from Maynard to Crossroads Plaza as the "Crossroads Loop". The results indicate that for these routes, the short stretch to Crossroads carries about half the ridership on these routes.

Exhibit 2-6
Weekday CTran Ridership

#	Route	BY DIRECTION Ons	Offs	Total	COMPLETE ROUTE Ons	Offs	Total	Rank
10	Maynard Loop	41	34	75				
11	Crossroads Loop	38	45	83	79	79	158	4
20	Maynard Loop	34	34	68				
21	Crossroads Loop	34	34	68	68	68	136	5
30	Harrison Avenue OB	29	16	45				
31	Harrison Avenue IB	16	25	41	45	41	86	6
40	High House Rd OB	49	66	115				
41	High House Rd IB	65	52	117	114	118	232	3
50	Kildaire Farm OB	98	79	177				
51	Kildaire Farm IB	48	71	119	146	150	296	2
60	Buck Jones OB	66	79	145				
61	Buck Jones IB	112	95	207	178	174	352	1
SYSTEMWIDE		**630**	**630**	**1260**				

Source: 2010 Boarding and Alighting Count

2.4.2.2 *Major Activity Locations*

The top activity location is the Cary Train Station, with 123 boardings and 119 alightings, or 19% of the total CTran trip ends. This is the major transfer point among the CTran routes, TTA, and Amtrak. Other major locations include the Cary Towne Center with 49 boardings and 60 alightings as well as the Crescent Commons area with 51 boardings and 49 alightings. Together, these three activity center areas accounted for 36% of all trip ends for CTran.

2.4.2.3 *Load Factors*

CTran passenger count data were examined to identify those trips where the number of passengers on board at any point exceeded 18 passengers, the weighted average number of seats on CTran buses. Results indicate that no trips reached max load capacity. Nearly all trips, 186 out of 188, had a maximum of 9 or fewer passengers on board for a given trip. Just 2 out of 188 trips, both on Route 5 Kildaire Farm, had higher max loads. Both high "max load" trips on Route 5 carried 12 passengers.

2.5 Rider On-board Surveys

In order to gain a better understanding of current transit users within the region, an on-board ridership survey was administered in October and November 2010. Four separate surveys were administered for each transit agency in the CAMPO region: CAT, CTran, TTA, and Wolfline. Survey forms were available in English and Spanish versions. The survey asked questions regarding riders' trip characteristics, ridership habits, demographic information, and recommendations for improvements.

The rider surveys are described in detail in a separate Technical Memorandum prepared as part of the overall study.

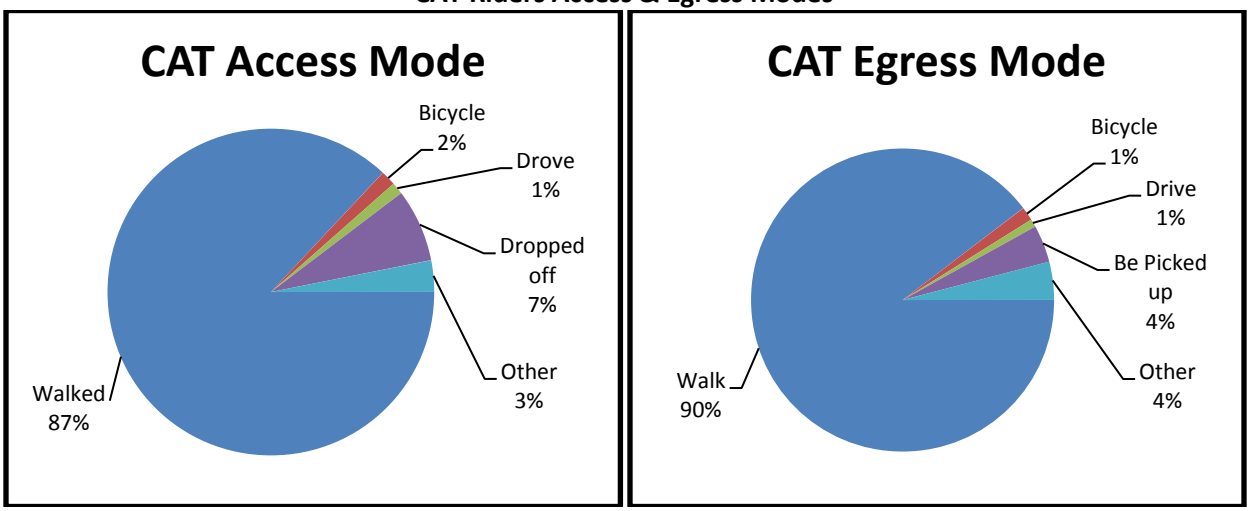
2.5.1 CAT Rider Survey Results

The CAT rider survey sampled routes over an average weekday period. Overall, a total of 2,131 total responses were received. This sample size is accurate at the 90% confidence level, plus or minus 1.7% for systemwide statistics. The results presented below reflect the weighting of responses based on the number of responses received by each route.

2.5.1.1 *CAT Trip Characteristics*

The survey asked riders both what mode they used to get to their surveyed bus as well as what mode they planned to use once they got off. **Exhibit 2-7** shows the responses. Overwhelmingly, the vast majority of riders walked to and from the bus, reinforcing the notion that most transit users are pedestrians on one or both ends of their trip. These results emphasize the importance of a connective sidewalk network to ensure the safety of current transit users as well as a means to attract future riders.

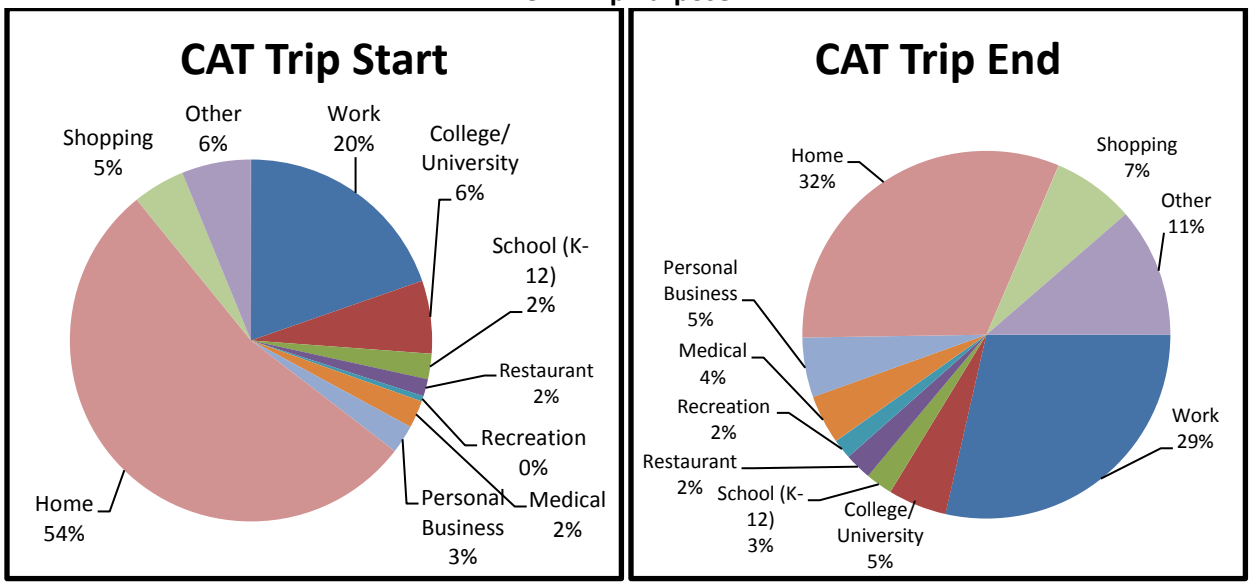
Exhibit 2-7
CAT Riders Access & Egress Modes



Source: 2010 Rider Survey

When asked about the purpose of their trip, phrased as "Where did you come from before you got on this bus?" and "Where are you going now?" the majority of riders (54%) said their origin was from home, while just under half (46%) were coming from a different location. On the destination end, the plurality of riders (32%) was returning home. **Exhibit 2-8** shows the results.

Exhibit 2-8
CAT Trip Purpose



Source: 2010 Rider Survey

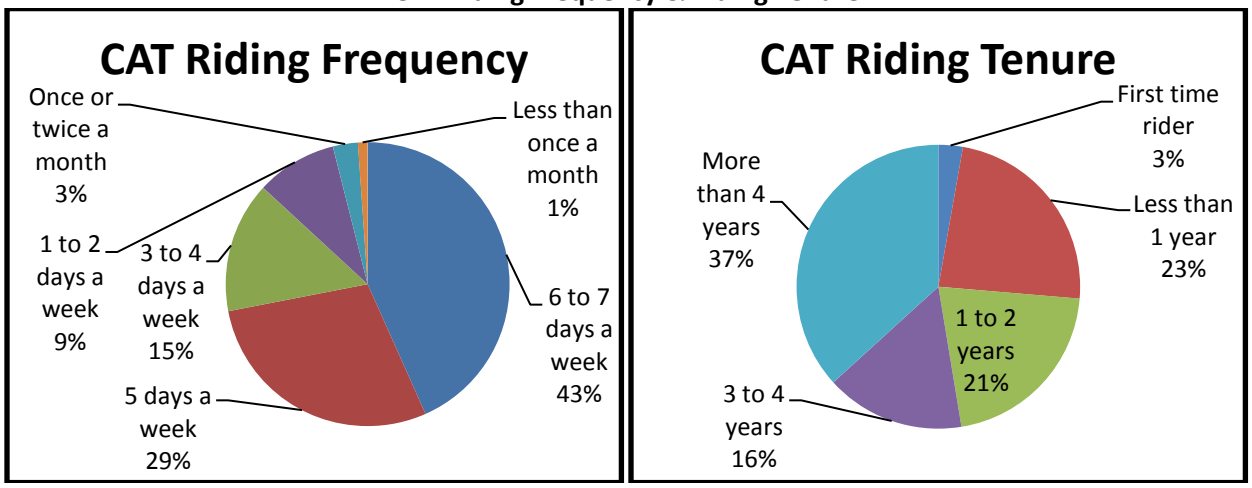
Besides "home," the major origin and destination was for "work" comprising 20% of the origins and 29% of the destinations. "Shopping" was the next highest with 5% of the origins and 7% of the destinations followed by "college/university" with 6% of the origins and 5% of the destinations.

2.5.1.2 *CAT Rider System Use*

Riders were asked how frequently they use CAT's bus service. As illustrated in **Exhibit 2-9**, most CAT riders ride the bus six to seven days per week. These results provide evidence of riders' reliance on the CAT system as their primary source of travel. These findings were demonstrated in the complete boarding and alighting counts, which indicated Saturday ridership (11,659 boardings) capturing approximately 62% of weekday ridership (18,657 boardings).

Riders were also asked how long they have been riding CAT. The majority of riders, roughly 53%, have been riding CAT for at least three years. Approximately a quarter of riders were relatively new to the system riding CAT for less than a year. In order for CAT to continue to grow its system, it is vital that efforts are made to hold on to these new riders. A general rule-of-thumb is that it costs five times as much to replace a customer as it does to keep an existing customer.

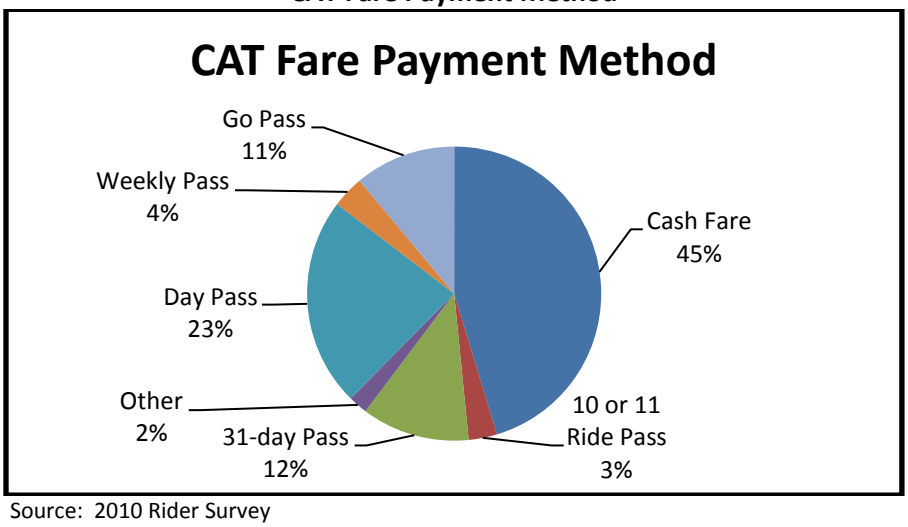
Exhibit 2-9
CAT Riding Frequency & Riding Tenure



Source: 2010 Rider Survey

Riders were asked "How did you pay for your bus fare?" As shown in **Exhibit 2-10**, a plurality of riders uses cash for paying their fare. Almost a quarter of riders make use of day passes while regional, monthly, or weekly passes appear to be used to a lesser extent in fare payments. Reducing cash farebox payments provide greater efficiency and time savings during the boarding process. Providing additional pass incentives, combined with increased marking efforts, may increase the use of passes in fare payments.

Exhibit 2-10
CAT Fare Payment Method



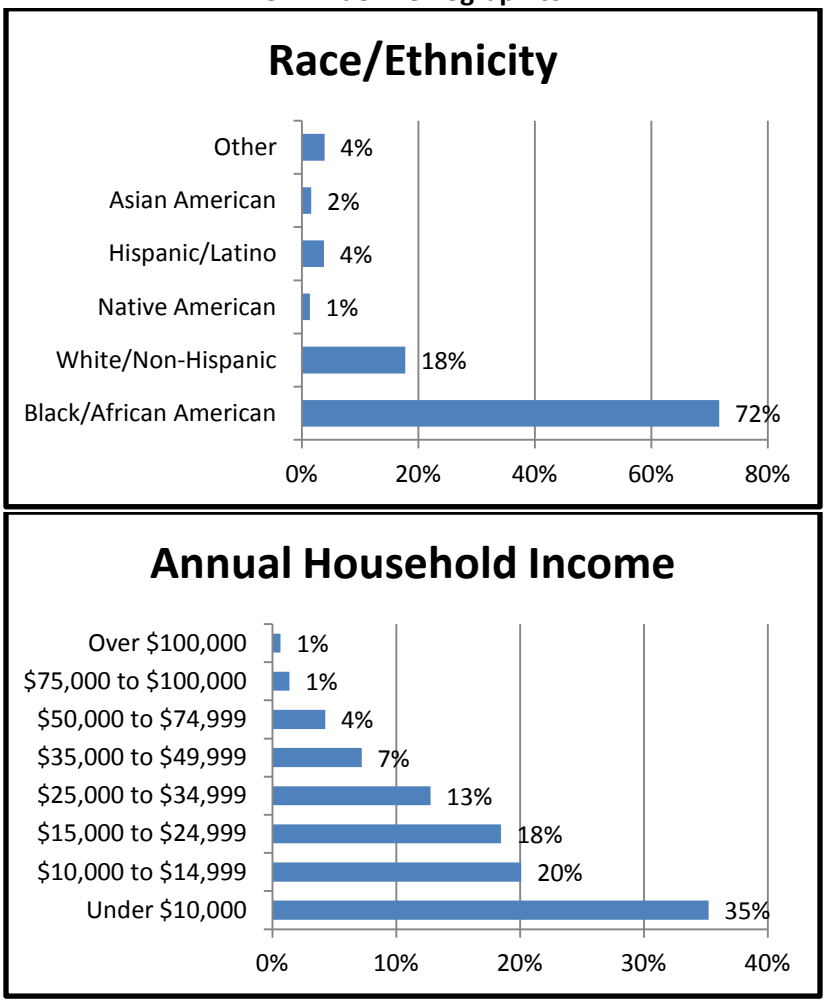
Source: 2010 Rider Survey

2.5.1.3 *CAT Rider Demographics*

To gain an understanding of who uses the bus, riders were asked questions regarding their race/ethnicity and household income, and reasons for using the bus. The demographic findings are shown in **Exhibit 2-11**.

The race/ethnicity of CAT riders is nearly three-quarters Black/African American. As with most transit systems, the household income level for the majority of users is under $15,000 annually. This contrasts to the share of higher income households, which accounted for just 6% of respondents earning over $50,000.

Exhibit 2-11
CAT Rider Demographics

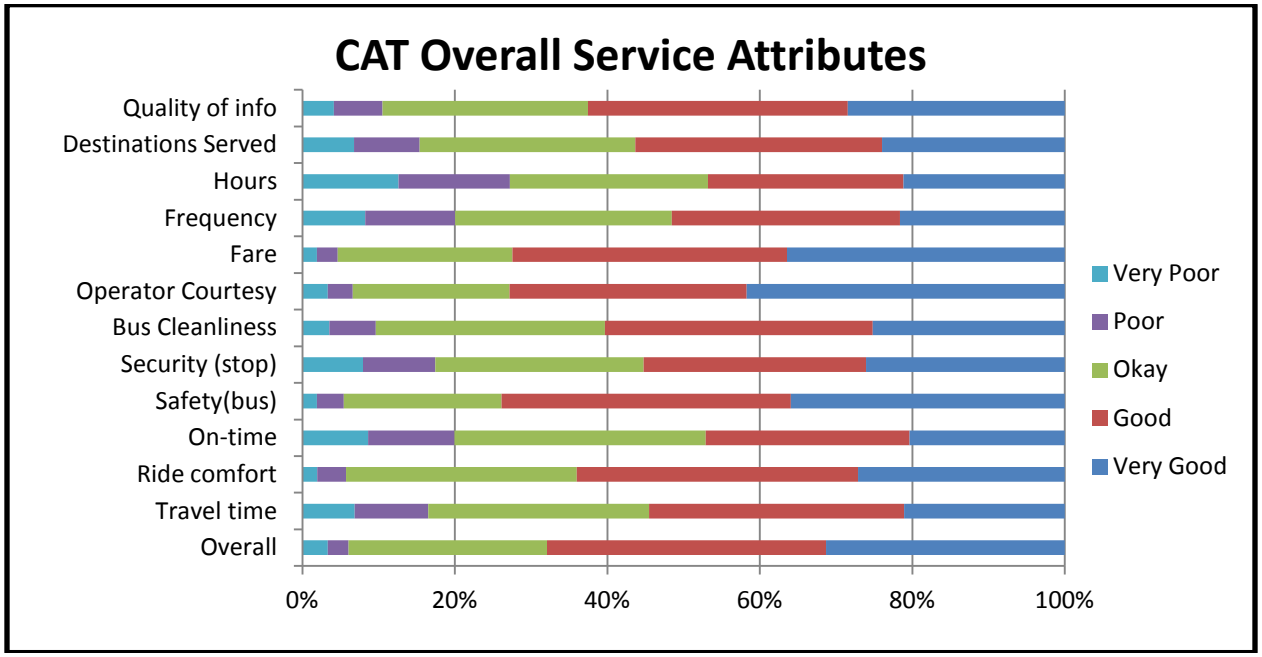


Source: 2010 Rider Survey

2.5.1.4 *CAT Recommendations for Improvements*

Riders were asked for their rating of the CAT system as a whole and for several distinct aspects. The results are shown in **Exhibit 2-12**. Overall, riders were satisfied with CAT's bus services. A large majority of riders, approximately 68%, said existing overall service was either good or very good. A small percentage of riders, just over 5%, felt existing service was either poor or very poor. On a scale of 1 to 5 with 1 being very poor and 5 being very good, the overall ranking is 3.90, "Good".

Exhibit 2-12
CAT Service Attribute Evaluation



Source: 2010 Rider Survey

On a weighted basis, the top scoring attributes, all with a composite score better than 4.0 are:

- Operator courtesy
- Safety on the bus
- Fare

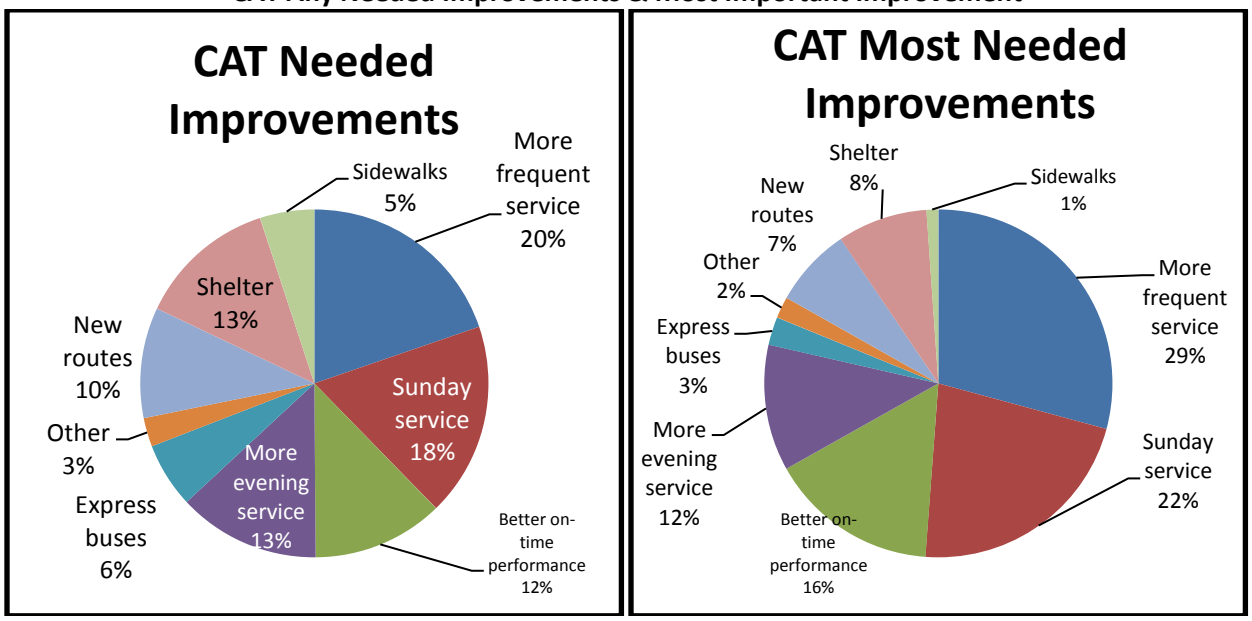
The lowest scoring attributes, all with a composite score below 3.5 are:

- Hours of service
- On-time performance
- Frequency

Even riders with generally positive views of CAT's service many had suggestions on how to improve the service. The responses are shown in **Exhibit 2-13.**

Given unlimited choices, riders evenly distributed their suggestions for improvement among several service variables. More frequent service, Sunday service, more evening service, shelters, better on-time performance, and the desire for new routes all received at least 10% of the responses. Given only *one* choice, the desire for more frequent service, service on Sundays, and better on-time performance maintained their positions as the top three choices, but "more evening service" rose to be the fourth most needed improvement.

Exhibit 2-13
CAT Any Needed Improvements & Most Important Improvement



Source: 2010 Rider Survey

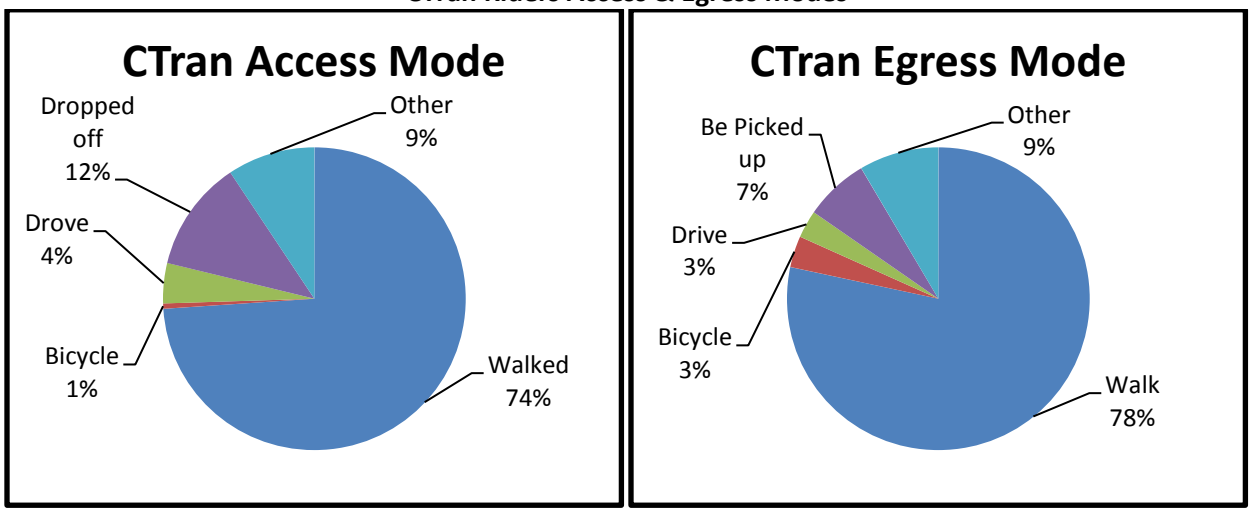
2.5.2 CTran Rider Survey Results

The CTran rider survey sampled all CTran routes over an average weekday period. Overall, a total of 143 total responses were received. This sample is accurate at the 90% confidence level, plus or minus 5.7% for systemwide statistics. The results presented below reflect weighting of responses based on the number of responses received by each route. The questions presented below provide a snapshot of the major questions from the CTran rider survey.

2.5.2.1 CTran Trip Characteristics

The rider survey asked about the mode of travel they used to get to their surveyed bus as well as what mode they planned to use once they got off. **Exhibit 2-14** illustrates the surveyed riders' responses. A large majority of riders walked to and from the bus. As with the CAT survey, these results emphasize the importance of a connective sidewalk network to ensure the safety of current transit users as well as a means to attract future riders.

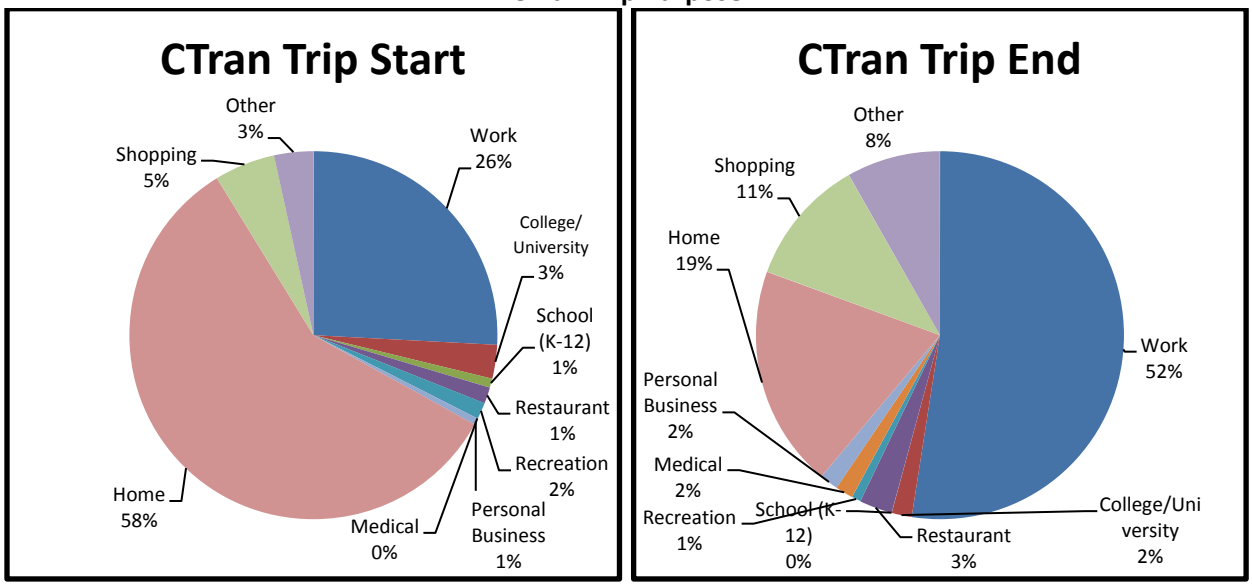
Exhibit 2-14
CTran Riders Access & Egress Modes



Source: 2010 Rider Survey

When asked about the purpose of their trip, the majority of riders (58%) said their trip origin was home, while just under a third (26%) were from work. On the destination end, the majority of riders (52%) were on their way to work, with roughly a fifth (19%) were on their way home. Besides "home" and "work" trip purposes, "shopping" was the third highest with 5% of the origins and 11% of the destinations. **Exhibit 2-15** shows the results.

Exhibit 2-15
CTran Trip Purpose



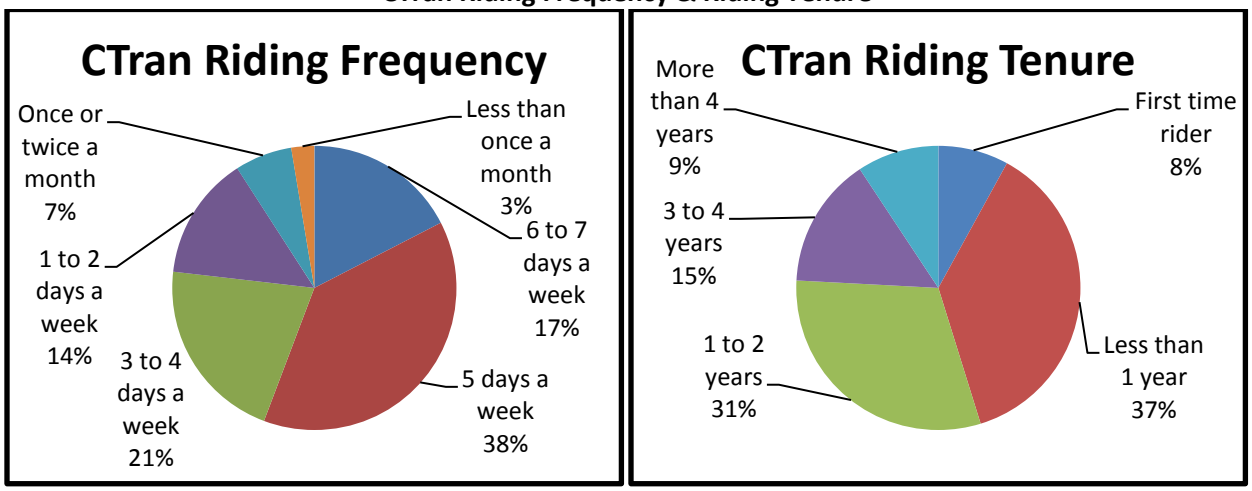
Source: 2010 Rider Survey

2.5.2.2 CTran Rider System Use

As shown in **Exhibit 2-16**, most CTran riders ride the bus five days per week. These results suggest that most CTran riders use the bus for traditional (Monday through Friday) work commute purposes, further bolstering the findings on CTran riders' trip purposes indicating "home" and "work" as the major origin and destination points for users.

Riders were also asked how long they have been using CTran. The majority of CTran riders are relatively new to the system, which is to be expected due to the relative newness of the system itself having begun service in 2002. Pluralities of riders, approximately 45%, are new to the system and have been riding CTran for less than a year. Taken together, roughly three-quarters (76%) of users have been riding CTran for less than two years. As CTran's system continues to grow, it is vital that efforts are made to hold on to these new riders.

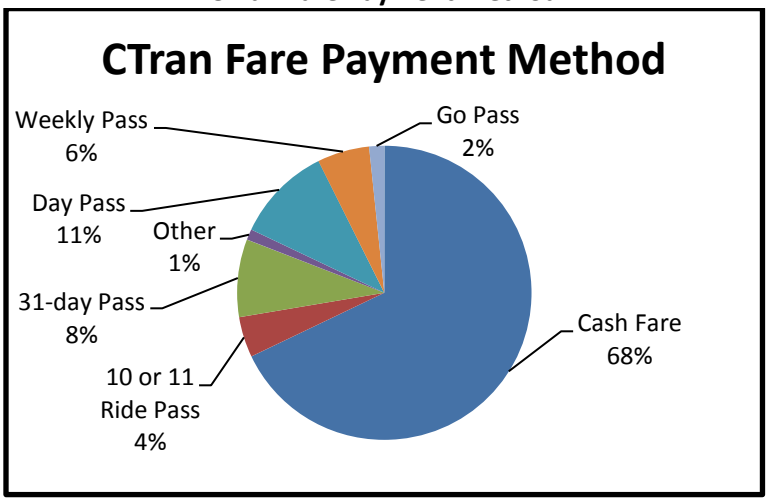
Exhibit 2-16
CTran Riding Frequency & Riding Tenure



Source: 2010 Rider Survey

Riders were asked about their method of fare payment. Results, shown in **Exhibit 2-17**, indicate that a majority (68%) of riders used cash when paying their fare. Just over a quarter (27%) of riders use some form of a daily, weekly, monthly, or regional pass in paying their fare. Reducing cash farebox payments provide greater efficiency and time savings during the boarding process. Providing additional pass incentives, including promoting regional passes among the Triangle's transit agencies, may increase the use of passes in fare payments.

Exhibit 2-17
CTran Fare Payment Method



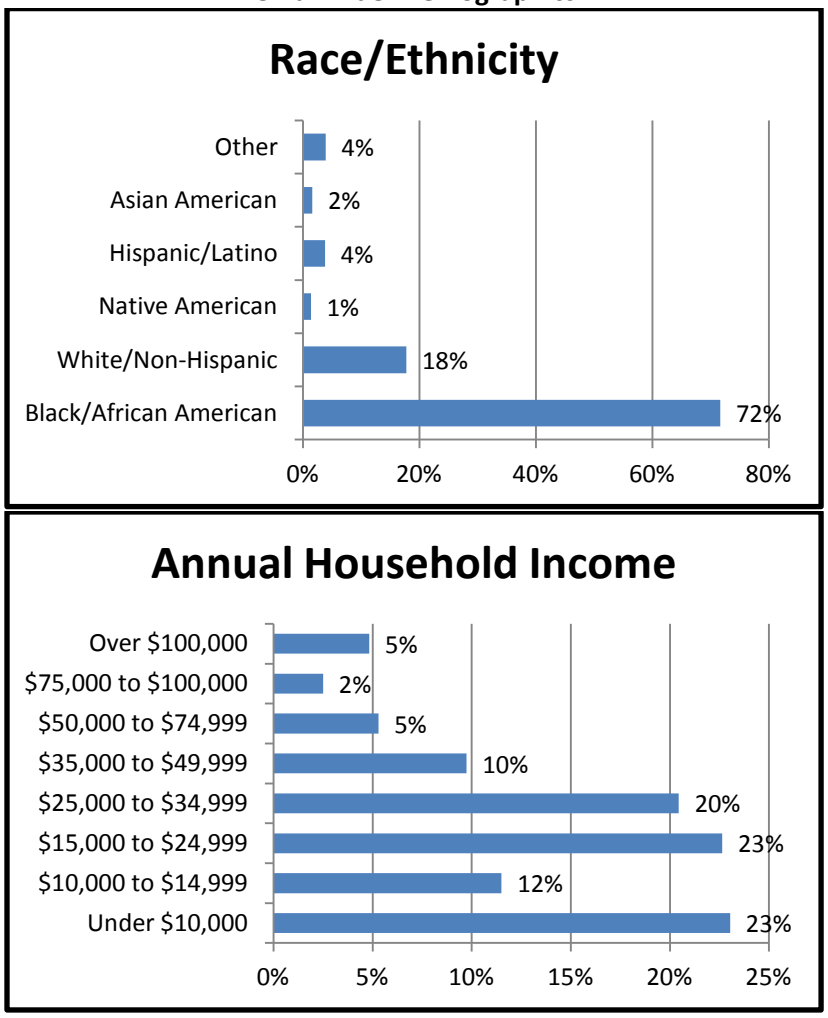
Source: 2010 Rider Survey

2.5.2.3 CTran Rider Demographics

To gain an understanding of who uses the bus, riders were asked questions regarding their race/ ethnicity and household income. The demographic findings are illustrated in **Exhibit 2-18**.

The race/ethnicity of CTran riders is nearly three-quarters Black/African American. White/non-Hispanic riders were the next highest percentage at 18%. The distribution of household income among surveyed riders was fairly even between low and moderate income households. The share of higher income households, classified by those making over $50,000, accounted for just 12% of survey respondents.

Exhibit 2-18
CTran Rider Demographics

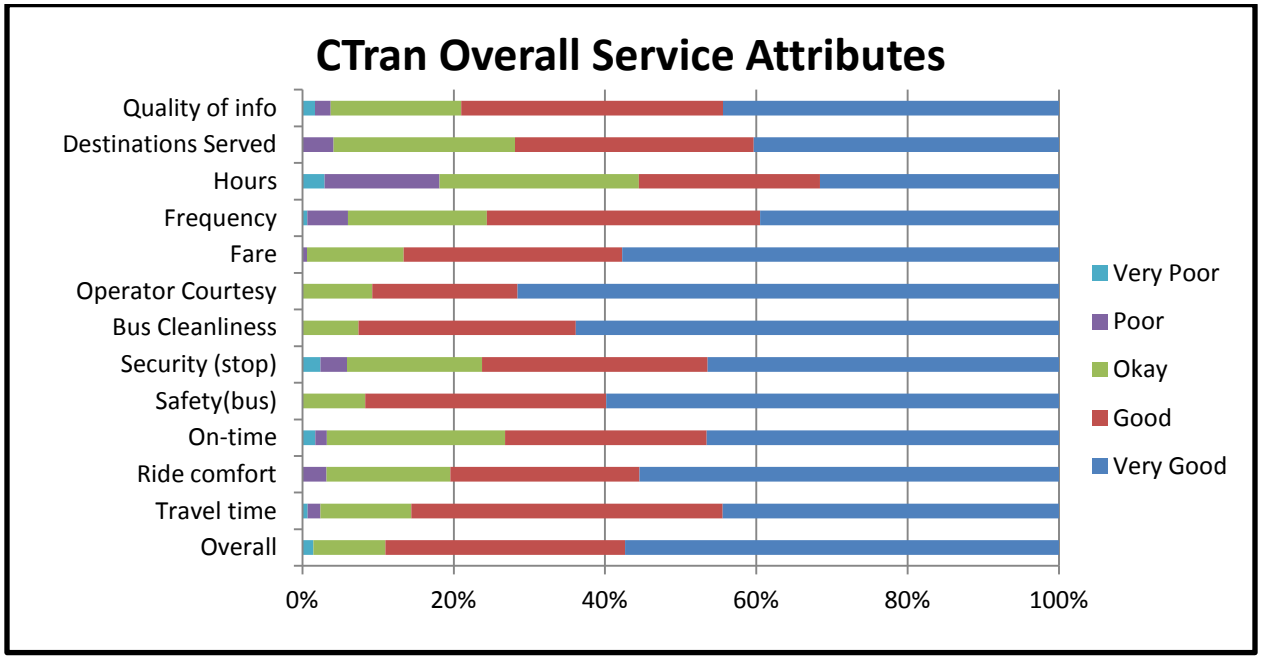


Source: 2010 Rider Survey

2.5.2.4 CTran Recommendations for Improvements

Riders were asked for their rating of the CTran system as a whole and for several distinct aspects. The results are shown in **Exhibit 2-19**. Overall, riders were satisfied with CTran's bus services. The vast majority of riders, approximately 89%, felt existing service was either "good" or "very good". A small percentage of riders, roughly 10%, felt existing service was "okay" while just 1% reported service as "very poor". On a scale of 1 to 5 with 1 being very poor and 5 being very good, the overall ranking is 4.44, "Good" to "Very Good".

Exhibit 2-19
CTran Service Attribute Evaluation



Source: 2010 Rider Survey

On a weighted basis, the top scoring attributes, all with a composite score better than 4.5 are:

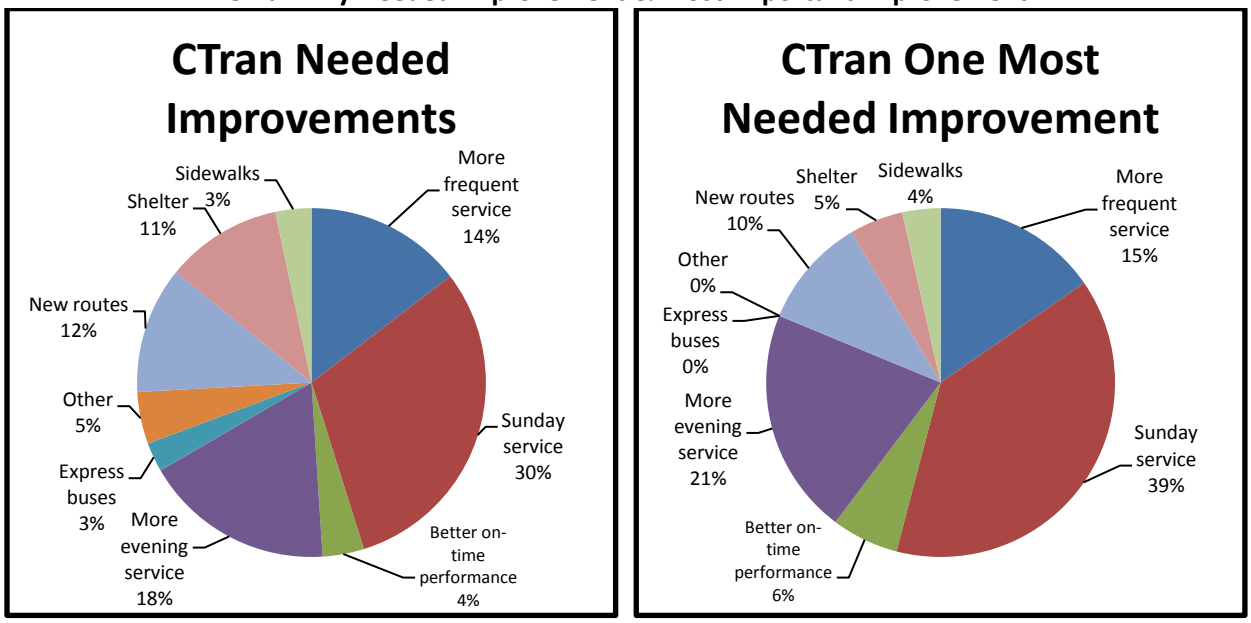
- Operator courtesy
- Bus cleanliness
- Safety on the bus

The lowest scoring attributes, all with a composite score below 4.1 are:

- Service hours
- Frequency
- Destinations served

While riders were generally positive about CTran's service, many had suggestions on how to improve the service. The suggestions are shown in **Exhibit 2-20**.

Exhibit 2-20
CTran Any Needed Improvement & Most Important Improvement



Source: 2010 Rider Survey

Given unlimited choices, most CTran riders reported a desire for increased service. This included a plurality reporting a desire for adding Sunday service. More evening service, higher frequent service, the desire for new routes, and more bus shelters all received at least 10% of responses. Given only one choice, the desire for Sunday service, more evening service, and more frequent service all rose in importance receiving at least 15% of votes.

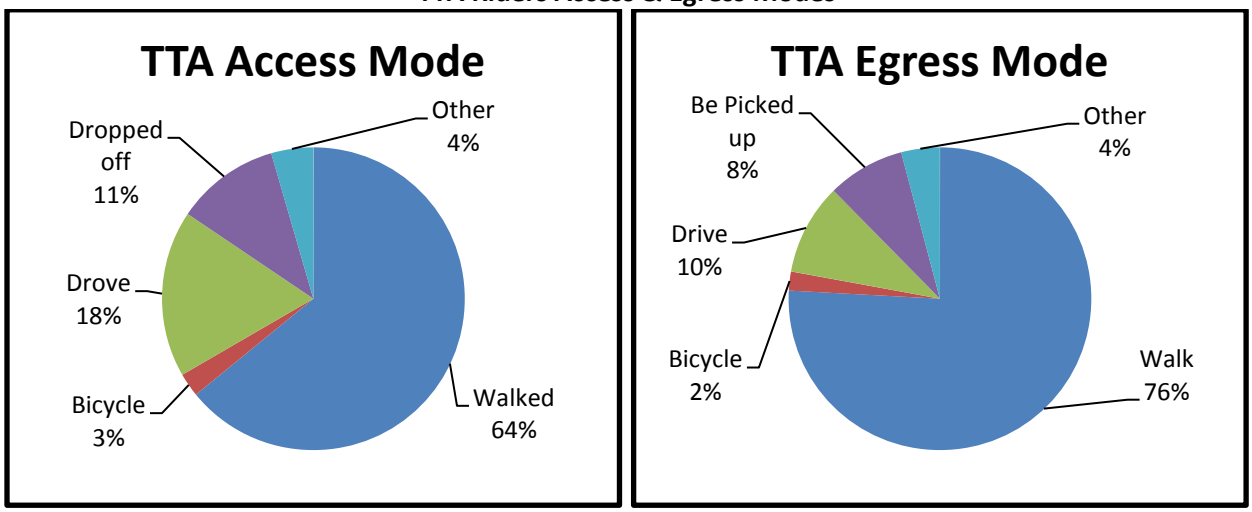
2.5.3 TTA Rider Survey Results

The TTA rider survey sampled a majority of TTA routes over an average weekday period. Overall, a total of 649 total responses were received. This sample size is accurate at the 90% confidence level, plus or minus 2.8% for systemwide statistics. The results presented below reflect weighting of responses based on the number of responses received by each route. The questions presented below provide a snapshot of the major questions from the TTA rider survey.

2.5.3.1 TTA Trip Characteristics

The rider survey asked riders both what travel mode they used to get to their surveyed bus as well as what travel mode they planned to use once they got off. As seen in **Exhibit 2-21**, most riders walked to and from the bus. These results emphasize the importance of a connective sidewalk network to ensure the safety of current users as well as a means to attract future riders. Besides walking, the next most popular mode was the automobile for both access and egress. This finding was likely influenced by TTA's large pool of choice riders who use the bus primarily for work commute trip purposes.

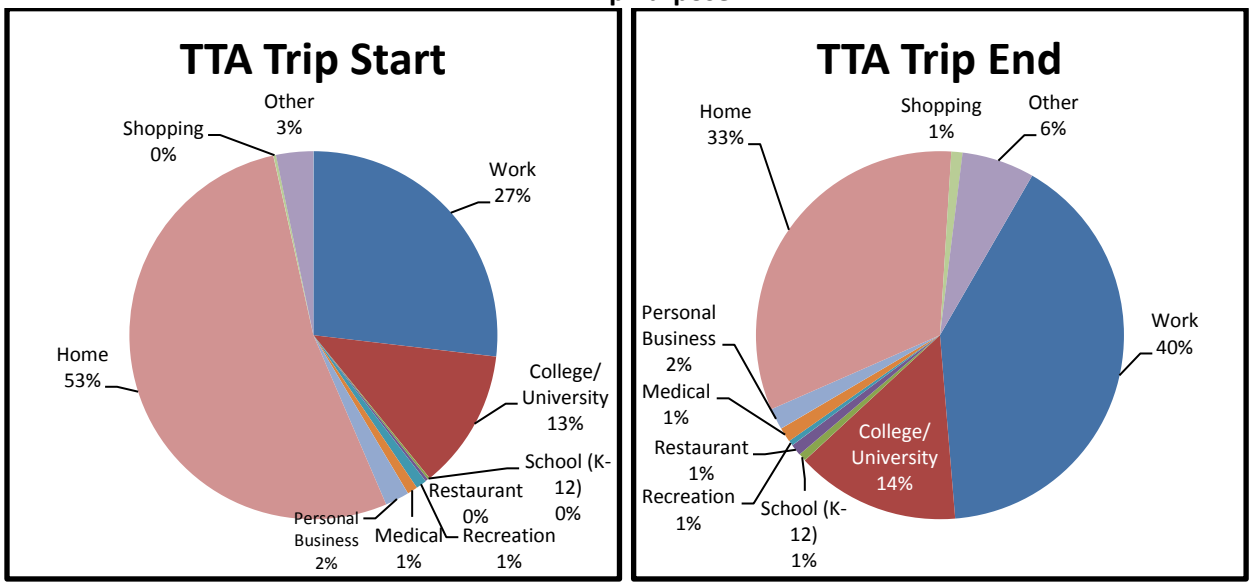
Exhibit 2-21
TTA Riders Access & Egress Modes



Source: 2010 Rider Survey

When asked about the purpose of their trip, the majority of riders (53%) indicated that their origin was from home, while just over a quarter (27%) were from work. On the destination end, a plurality of riders (40%) were on their way to work, while a third (33%) were on their way home. Besides "home" and "work" trip purposes, "college/university" was the next highest with 13% of the origins and 14% of the destinations. **Exhibit 2-22** shows the results.

Exhibit 2-22
TTA Trip Purpose



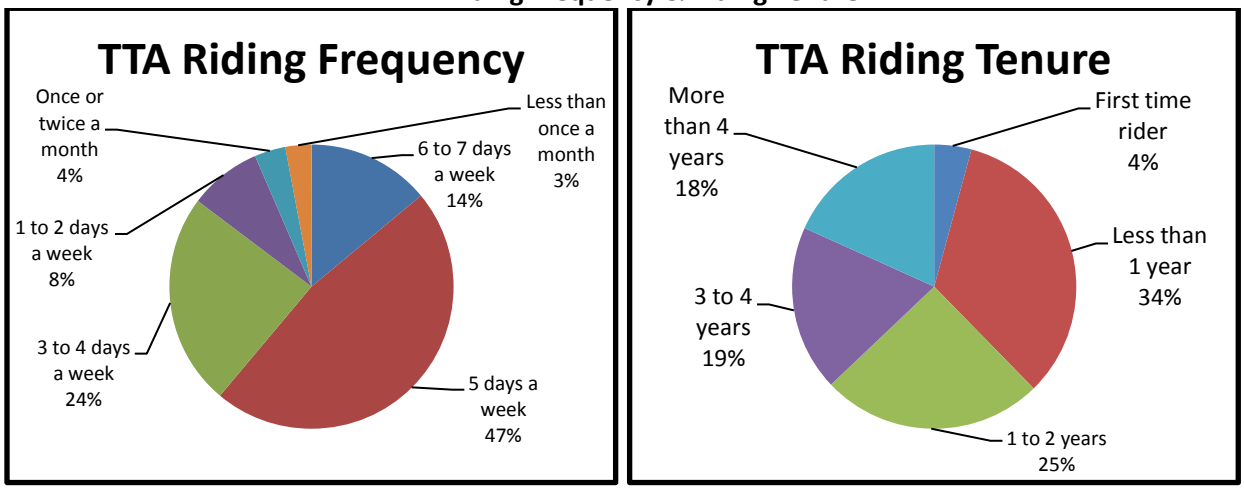
Source: 2010 Rider Survey

2.5.3.2 TTA Rider System Use

Riders were asked how frequently they use TTA's bus service. As illustrated in **Exhibit 2-23**, most TTA riders ride the bus five days per week. These results likely demonstrate that most TTA riders use the bus for work commute purposes, further bolstering the findings on TTA riders' trip purposes indicating "home" and "work" as the major origin and destination points for users.

Riders were also asked how long they have been using TTA. Results indicate a fairly even distribution of riding tenure with a slight skew toward riders who are relatively new to the system. Pluralities of riders, approximately 34%, are new to the system and have been riding TTA for less than a year. Besides new riders, TTA also has a large share of longer tenured users. Survey results indicate over a third (37%) of TTA users have been riding the bus at least three years while a quarter have been riding at least one year.

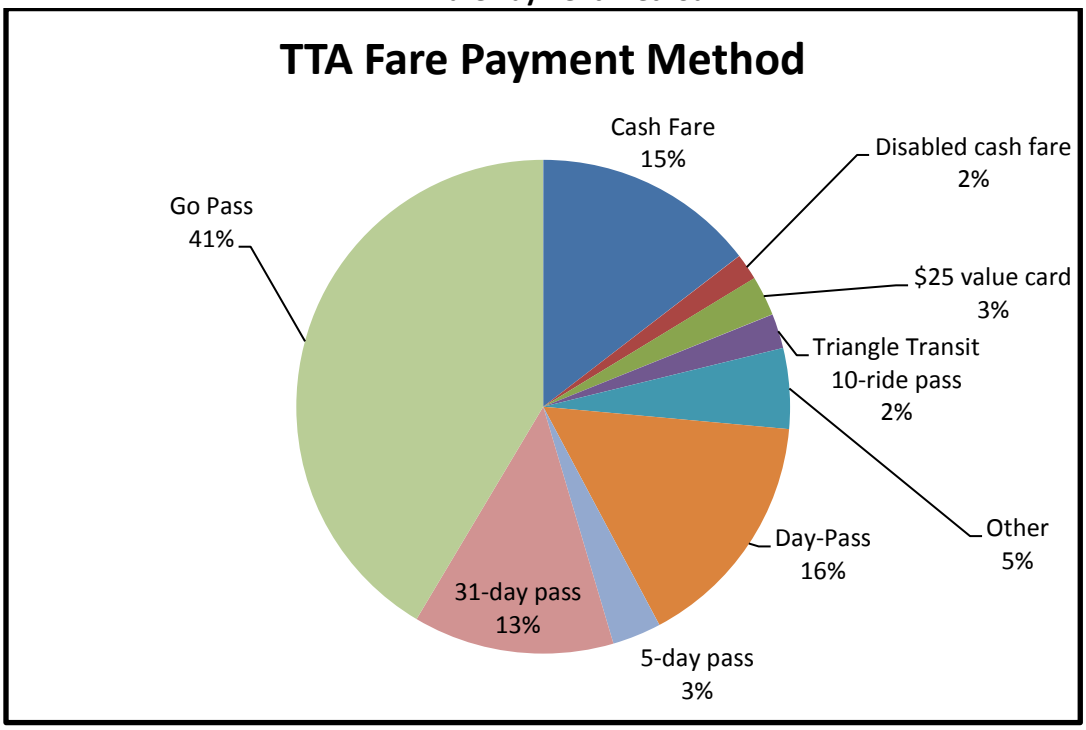
Exhibit 2-23
TTA Riding Frequency & Riding Tenure



Source: 2010 Rider Survey

Riders were asked "How did you pay for your bus fare?" Results shown in **Exhibit 2-24** indicate that a plurality (41%) of riders use the "Go Pass" while over a third use some other form of a pass in paying their fare. Taken together, roughly three-quarters of fare payments are made using passes. These results are likely influenced both by TTA's choice rider market as well as the fact that it charges the highest fare among the Triangle's regional transit service providers. Continuing to increase the share of fare payments made using passes will aid in providing greater efficiency and time savings during the boarding process.

Exhibit 2-24
TTA Fare Payment Method



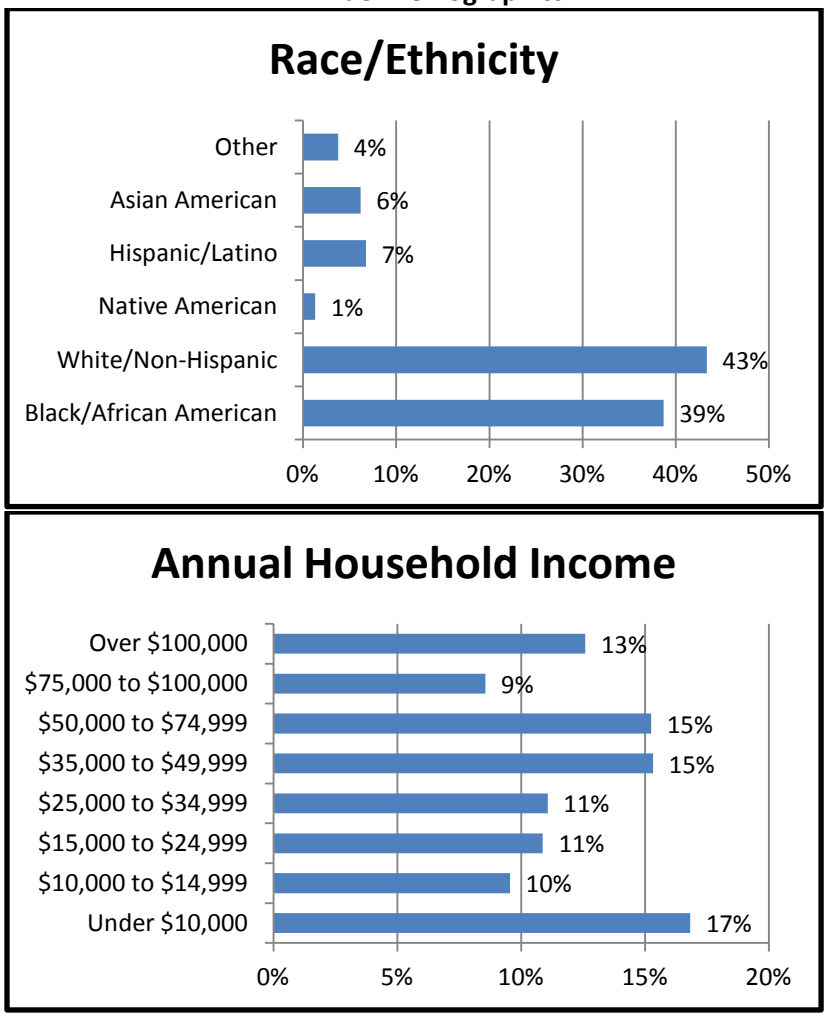
Source: 2010 Rider Survey

2.5.3.3 TTA Rider Demographics

To gain an understanding of who uses the bus, riders were asked questions regarding their race/ethnicity and household income. The demographic findings are presented in **Exhibit 2-25**.

Mostly White/Non-Hispanic and Black/African American riders use TTA. In terms of income, surveyed riders were fairly evenly distributed across low, moderate, and high income households. This fairly even distribution across income levels likely reflects the influence of TTA's high proportion of choice-riders, which includes many students who use the system as a means to commute to college campuses across the Triangle region.

Exhibit 2-25
TTA Rider Demographics

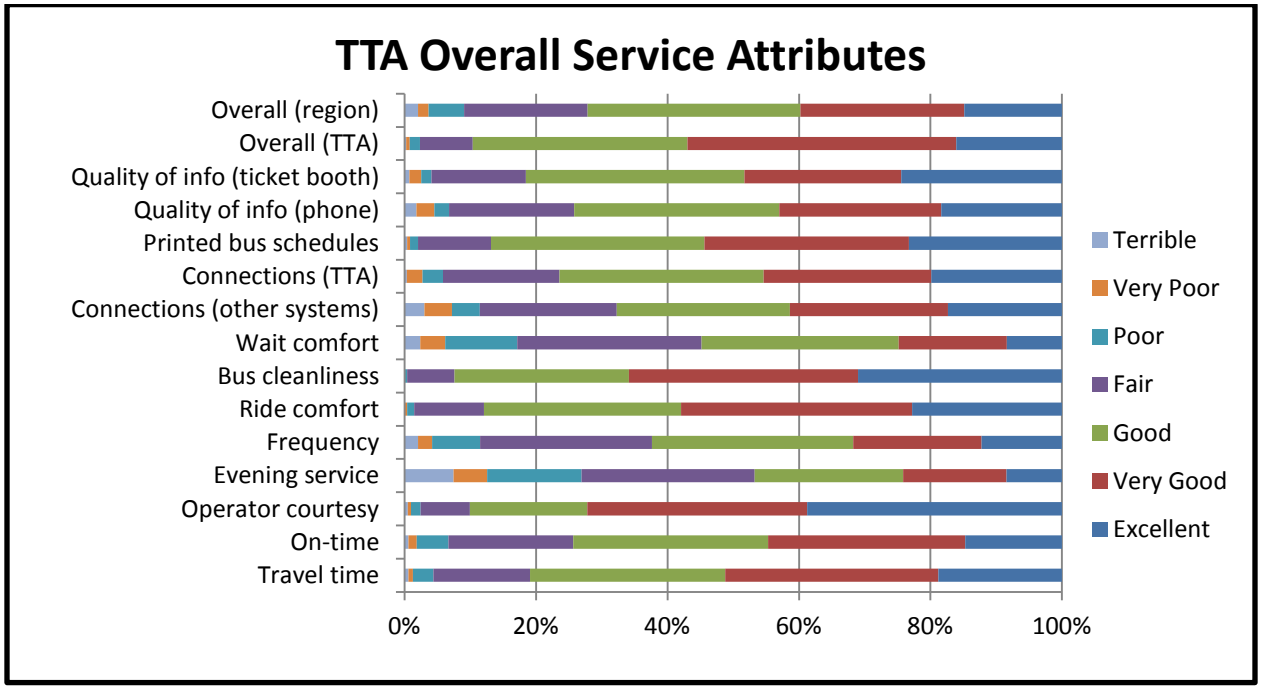


Source: 2010 Rider Survey

2.5.3.4 TTA Recommendations for Improvements

Riders were asked for their rating of TTA service as a whole and for several specific areas. The results are shown in **Exhibit 2-26**. Overall, riders were satisfied with TTA's bus service. The vast majority, nearly 90% of surveyed riders, rated existing overall service as good, very good, or excellent. A small percentage, just 2%, felt existing service was either poor or very poor. On a scale of 1 to 7 with 1 being terrible and 7 being excellent, the overall ranking for TTA is 5.59, "Good" to "Very Good".

Exhibit 2-26
TTA Service Attribute Evaluation



Source: 2010 Rider Survey

On a weighted basis, the top scoring attributes, all with a composite score better than 5.65 are:

- Operator Courtesy
- Bus cleanliness
- Ride comfort

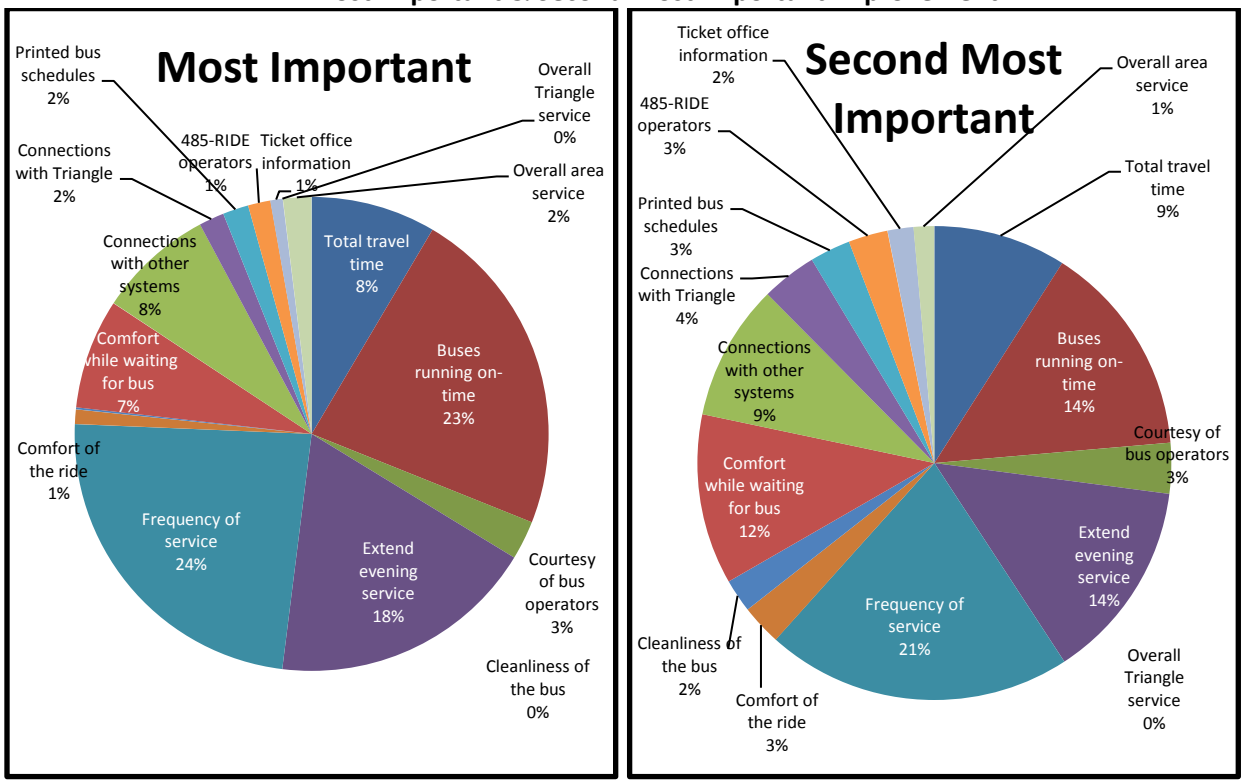
The lowest scoring attributes, all with a composite score less than 5.0 are:

- Frequency
- Wait comfort
- Evening service

Even though riders were generally positive about TTA's service, most had suggestions regarding improvements to the service. The results are shown in **Exhibit 2-27**.

Surveyed riders indicated increasing frequency of service, improving on-time performance, and extending evening service were the most important improvements. Similar results were also found when riders were asked regarding the second most important improvement. However, wait comfort increased in importance and ranked 4th overall as a desired improvement.

Exhibit 2-27
TTA Most Important & Second Most Important Improvement



Source: 2010 Rider Survey

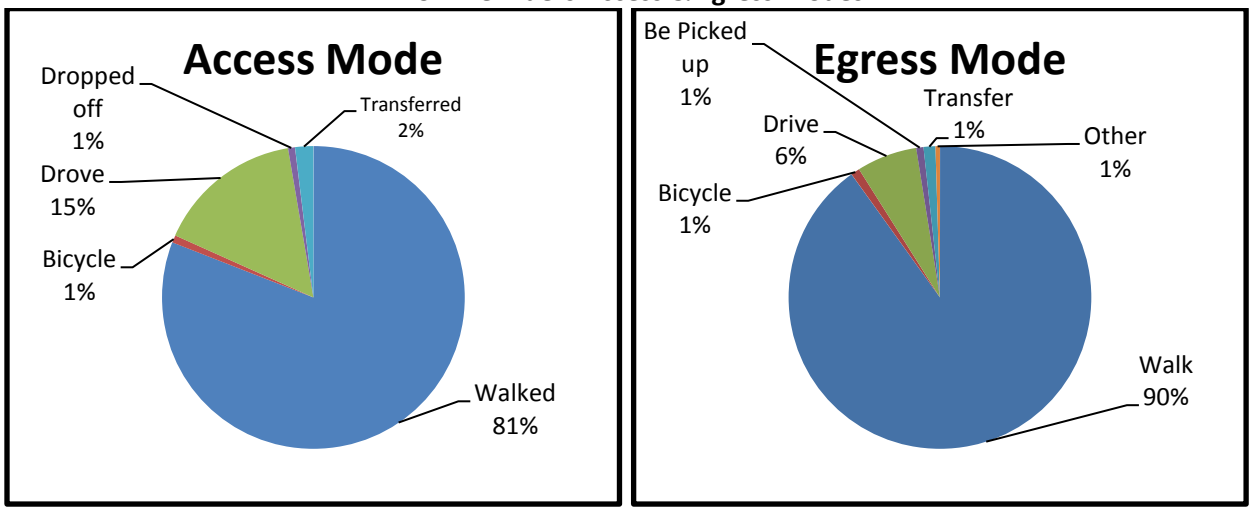
2.5.4 Wolfline Rider Survey Results

The Wolfline rider survey sampled all Wolfline routes over an average weekday period. Overall, a total of 1,960 responses were received. This sample size is accurate at the 90% confidence level, plus or minus 1.7% for systemwide statistics. The results presented below reflect the weighting of responses based upon the number of responses received by each route. The questions presented below provide a snapshot of the major questions from the TTA rider survey.

2.5.4.1 Wolfline Trip Characteristics

The survey asked riders about the travel mode used to get to the bus and the mode they planned to use once they got off. **Exhibit 2-28** shows the responses. The vast majority of riders walked to and from the bus, which is to be expected given the pedestrian-oriented nature of NC State's campus setting as well as how transit riders typically access services. Besides walking, driving was the next highest with 15% of the access mode split and 6% of the egress mode split. This is likely explained by NC State's paid parking policies in the immediate area surrounding the main campus. Such policies have enhanced the popularity of free Park-and-Ride lots on the periphery of the campus which is served by Wolfline.

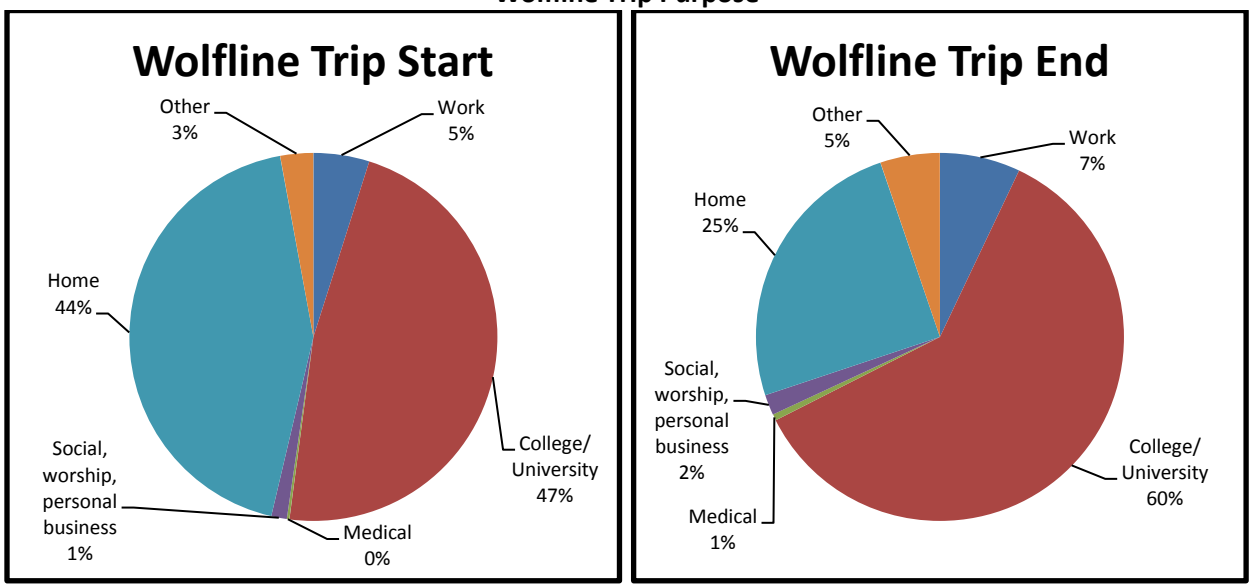
Exhibit 2-28
Wolfline Riders Access & Egress Modes



Source: 2010 Rider Survey

When asked about the purpose of their trip, riders were either originating at the college/university (47%) or at home (44%). On the destination end, the majority of riders were on their way to the college/university while roughly a quarter were returning home. Besides "college/university" and "home" trip purposes, "work" was the next highest trip purpose with 5% of the origins and 7% of the destinations. **Exhibit 2-29** shows the results.

Exhibit 2-29
Wolfline Trip Purpose

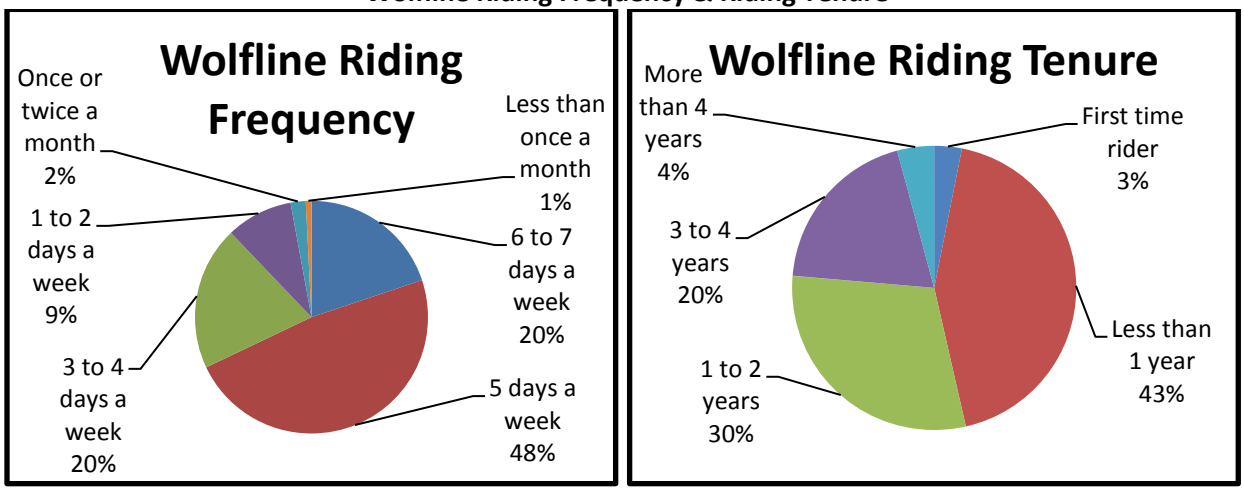


Source: 2010 Rider Survey

2.5.4.2 Wolfline Rider System Use

Riders were asked how often they use Wolfline's bus service. **Exhibit 2-30** shows most Wolfline riders ride the bus five days a week. This result is likely heavily influenced by NC State's student, faculty, and staff populations that commute to the campus five days a week for University business. The riding tenure was clustered between zero and four years, which reflects the heavy student population using the Wolfline as a campus commuting tool around NC State.

Exhibit 2-30
Wolfline Riding Frequency & Riding Tenure

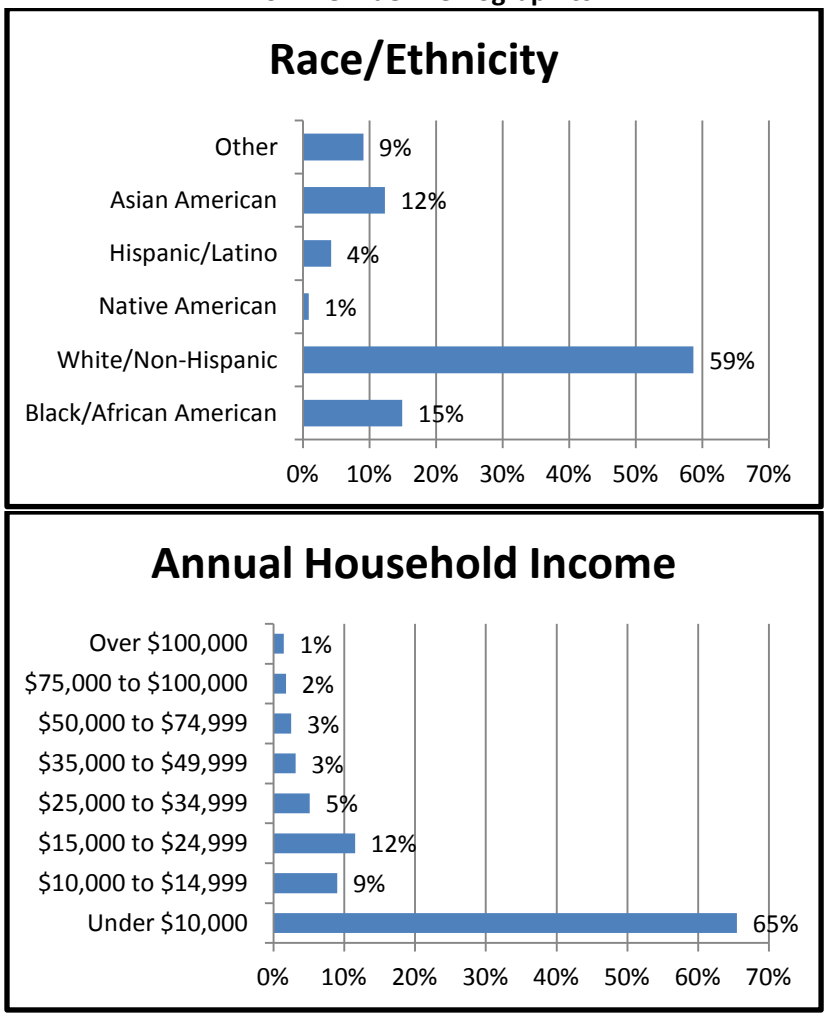


Source: 2010 Rider Survey

2.5.4.3 Wolfline Rider Demographics

To gain an understanding of who uses the bus, riders were asked questions regarding their race/ethnicity and household income. The demographic findings are presented in **Exhibit 2-31**.

Exhibit 2-31
Wolfline Rider Demographics



Source: 2010 Rider Survey

About 60% of Wolfline riders are White/Non-Hispanic, with 15% identifying themselves as Black/African American and 12% as Asian American. Given that the majority of Wolfline's ridership is students, it is not unexpected that the household income level for the majority of riders is under $10,000.

2.5.5 Trip Purpose Summary

The previous sections provided details on the trip origins and destinations of the riders for each system. **Exhibit 2-32** summarizes this information for each system. In this table, "home" has been excluded as a trip purpose and home-to-home trips are also not included in the totals. The purpose allocation assigned all trips with home on one end to the other trip purpose, e.g. home-to-work was all assigned to the work trip purpose. For trips that went between two other destinations, such as work-to-school, half

the trips were allocated to each trip purpose. Wolfline did not provide as many trip choices since the survey instrument was relatively short due to the limited time riders spent on the bus.

Exhibit 2-32
Summary Trip Purpose

	CAT		CTran		TTA		Wolfline	
Trip Purpose	**Total**	**Percent**	**Total**	**Percent**	**Percent**	**Percent**	**Total**	**Percent**
Work	6,734	44.6%	283	64.6%	1,534	62.7%	878	9.4%
College/University	1,516	10.0%	20	4.5%	525	21.5%	7,690	82.3%
School (K-12)	605	4.0%	2	0.4%	22	0.9%		
Restaurant	475	3.1%	17	3.9%	19	0.8%		
Recreation	270	1.8%	7	1.6%	27	1.1%		
Medical	923	6.1%	7	1.6%	50	2.0%	45	0.5%
Personal Business	985	6.5%	8	1.8%	76	3.1%	228	2.4%
Shopping	1,460	9.7%	54	12.4%	21	0.9%		
Other	2,147	14.2%	40	9.1%	172	7.0%	499	5.3%
TOTAL	**15,114**	**100%**	**438**	**100%**	**2,446**	**100%**	**9,340**	**100%**
Above total excludes home-to-home, and home as a trip purpose								
The Wolfline survey did not provide all the choices available on the other surveys; personal business included social and worship.								

Source: 2010 Rider Survey

The major trip purpose on the three municipal systems was for work trips, with nearly two-thirds of the trips for this purpose on both the CTran and Triangle Transit systems. CAT had a plurality of trips for this purpose. Wolfline notably had almost 10% of its trips for work. Not surprisingly, the vast majority of trips on the Wolfline service were related to school trips to the university. Triangle Transit also showed a significant percentage of trips, over 1-in-5 for this trip purpose, with CAT also showing a large percentage of college/university related trips. Another significant trip purpose was for shopping on both the CAT and CTran systems, at around 10% of the trips. These findings convey the benefits of having a transit system in place by providing mobility for residents to engage in productive activities that benefit the overall economy of the Triangle.

2.5.6 Choice Indicators

The rider survey asked two questions of riders to gain insights into why the riders used bus service instead of some other travel mode, and which travel mode they would take if bus service was not provided. **Exhibit 2-33** provides the responses for why riders used the bus. Riders could select more than one option on this question.

Exhibit 2-33
Reason for Using Bus

	CAT		CTran		TTA		Wolfline		Total Wake County	
Reason for Using Bus	Total	Percent	Total	Percent	Percent	Percent	Total	Percent	Total	Percent
I prefer the bus over my car	1,258	6.6%	59	10.2%	797	16.1%	1,505	13.8%	3,620	10.2%
I choose to ride the bus	1,283	6.8%	62	10.6%	220	4.4%	836	7.7%	2,400	6.8%
The bus is my only option	11,179	59.0%	255	43.7%	993	20.1%	3,147	28.9%	15,573	44.0%
To save money on driving costs	1,639	8.6%	69	11.8%	945	19.1%	3,780	34.8%	6,432	18.2%
My employer helps pay the fare	245	1.3%	14	2.4%	315	6.4%	33	0.3%	606	1.7%
I ride for free with Go Pass	949	5.0%	16	2.8%	748	15.1%	275	2.5%	1,988	5.6%
Better for the environment	1,118	5.9%	54	9.2%	684	13.8%	662	6.1%	2,517	7.1%
Other	1,284	6.8%	54	9.3%	241	4.9%	638	5.9%	2,217	6.3%
TOTAL	18,954	100%	582	100%	4,943	100%	10,876	100%	35,355	100%

Source: 2010 Rider Survey

Overall, the major reason for using the bus for all systems was because "The bus is my only option," selected by 44% of the riders. These riders are those typically considered as "transit dependent" and they ranged from 59% of the CAT users to 20% of the TTA users. The majority of the riders, 56%, indicated that they had at least some choice in why they used the bus. The message is that far from the view of many in the general public, transit riders are not just those who have no other option.

Several themes emerged that may be useful in conveying the value of transit should any new funding sources be pursued. About 25% of the riders had some reason related to cost, with most indicating that they used the bus "To save money on driving costs" with others indicating they used the bus because their employer helped share the cost or provided a Go Pass. The cost aspects were particularly important to TTA and Wolfline riders. About 17% overall found the bus to be more attractive than other travel modes, as indicated by those responding "I prefer the bus over my car" and "I choose to ride the bus." Finally, about 7% indicated their main reason for using the bus was because it was more environmentally friendly. TTA riders were particularly responsive to this reason.

A second question provides further insight into the impact of bus service. **Exhibit 2-34** shows how riders would travel if no bus service was available. Only one choice was permitted for this question.

Exhibit 2-34
Alternative Mode if No Bus Service

	CAT		CTran		TTA		Wolfline		Total Wake County	
Alternative Mode	Total	Percent	Total	Percent	Percent	Percent	Total	Percent	Total	Percent
Use car	2,624	17.0%	91	22.5%	1,199	49.0%	3,362	36.4%	7,276	26.4%
Bicycle	837	5.4%	29	7.1%	48	2.0%	1,115	12.1%	2,028	7.4%
Use a taxi	2,371	15.3%	42	10.4%	191	7.8%	182	2.0%	2,786	10.1%
Ride with a friend	3,518	22.8%	92	22.6%	392	16.0%	759	8.2%	4,760	17.3%
Walk	2,425	15.7%	78	19.3%	59	2.4%	3,317	36.0%	5,879	21.4%
I would not make this trip	3,676	23.8%	73	18.0%	557	22.8%	491	5.3%	4,797	17.4%
TOTAL	15,450	100%	405	100%	2,446	100%	9,225	100%	27,526	100%

Source: 2010 Rider Survey

The greatest shift would be to one of the non-motorized modes, either walking or bicycling, primarily due to the large numbers of Wolfline riders that would shift to one of these modes. About 28% of the overall ridership in Wake County would shift to these modes. Another 27% would shift to one of the shared-ride modes, either carpooling/vanpooling or taxis. These modes predominate for CAT and CTran riders. About 26% of all riders on the Wake County services would shift to the single-occupant vehicle. The greatest shift would occur with TTA and Wolfline riders. Such a shift has substantial implications on traffic congestion and air quality. The lowest impact of having no bus service is the 17% of riders who would no longer make their trip. This measure is some indicator of the amount of discretionary travel that is occurring since riders must find a way to get to work or school. While 17% is the lowest amount of travel shifting, it has much larger societal implications as these riders become more isolated and less able to enjoy the benefits of mobility.

2.6 Public Involvement

The general public was given a number of opportunities to provide input on desired service improvements. These opportunities included:

- TTA Joint Alternatives Analysis Public Workshops - September 2010
    - City of Raleigh, Chavis Community Center, September 14, 2010
    - Town of Wake Forest, September 15, 2010
    - Town of Morrisville, September 22, 2010
    - City of Garner, September 23, 2010
- TTA Joint Alternatives Analysis Public Workshops- March 2011
    - Triangle Town Center - Tuesday, March 22
    - Mt. Peace Baptist Church - Monday, March 28
    - Cary Senior Center in Bond Park, March 29
    - McKimmon Center, NCSU, March 30
    - Research Triangle Foundation, March 31
- Stakeholder Facilitated Meetings
    - City of Raleigh, Urban Design Center - December 10, 2010
    - Town of Cary, Herbert C. Young Community Center, January 4, 2011
    - Town of Knightdale, Town Hall, January 6, 2011
    - Southeast Raleigh, Biltmore Hills Community Center, February 23, 2011
- Presentations
    - Planning Directors Meeting - November 19, 2010
    - County Managers Meeting - December 8, 2010
    - Growth Issues Task Force April 6, 2011
    - CAMPO TCC January 6, 2011
    - CAMPO TAC January 11, 2011
- Meetings with CAT Bus Operators
    - October 20 & 22, 2010

Additionally, members of the consulting team attended regularly scheduled council meetings with Town of Cary, Town of Morrisville, and Durham County.

Further meetings will be held that focus on the short term improvements just for the CAT system.

2.6.1 TTA Joint Alternative Analysis Public Workshop Comments

The September 2010 round of joint workshops with TTA were very preliminary and principally served to introduce the TDP project.

A second round of TTA workshops was held in March 2011, where meeting attendees were asked to review the 2035 Wake County existing and proposed bus transit system map. Handouts included project factsheets, Vol 1 – September 2010 and Vol 2. – March 2011 and a series of three maps: 2035 Wake County Bus System – Commuter Routes, 2035 Wake County Bus System – Local Routes and 2035 - Western Wake County Bus System.

A separate memorandum provides details about specific comments. The general themes that emerged from this series of workshops were:

- Provide more frequent service
- Recommend focus on particular high density/specific service area
- Reduce travel time
- Improve connections and transfers
- Provide more local and commuter routes
- Expand bus amenities
- Extend service hours – weekends, later hours, holidays

2.6.2 Stakeholder Meeting Results

Four stakeholder meetings were held throughout Wake County – two in Raleigh and one each in Cary and Knightdale. A summary of the major issues and solutions is provided below:

Summary of Issues

- Across all three locations, stakeholders were largely concerned with the current quantity and quality of transit service. Within this issue category, participants in Raleigh and Cary were particularly concerned with the frequency and extent of transit coverage, while those in Knightdale were especially concerned with the provision of service to outlying areas.

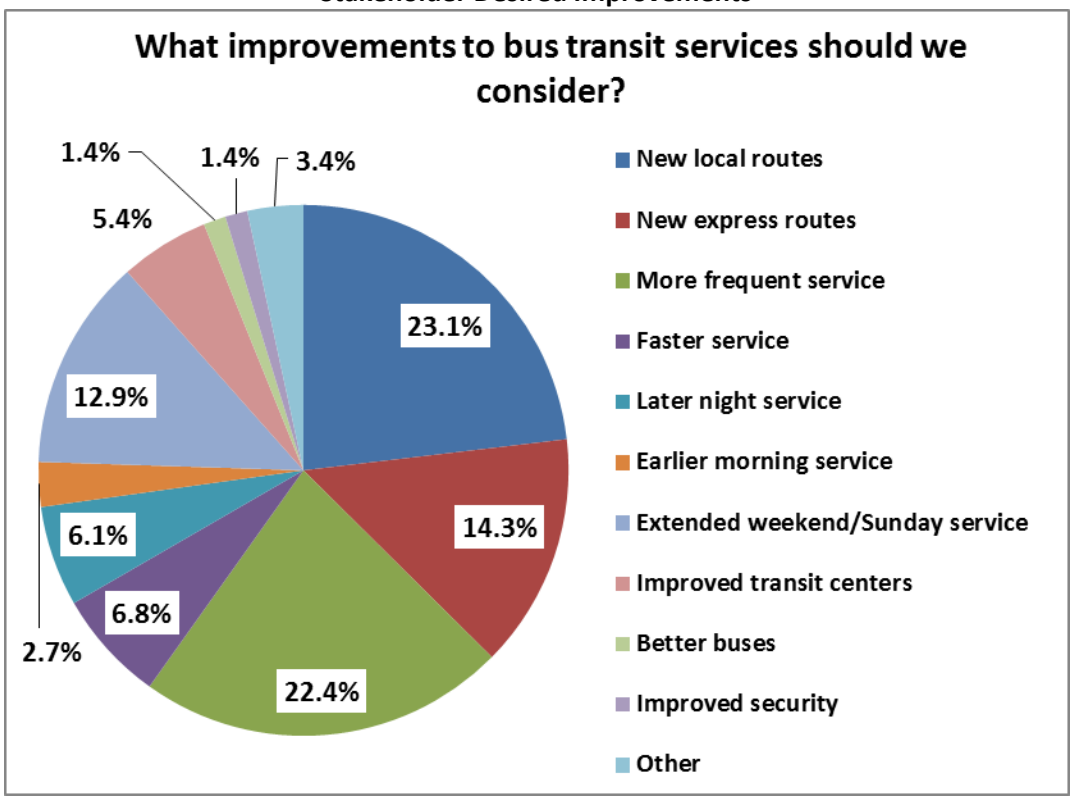
- Stakeholders cited education and awareness as relatively prominent issues, although this was less important in Knightdale, likely due to the more pressing need for service coverage among outlying communities.
- Funding issues were cited in all three locations, although they were prioritized more highly in Raleigh. Again, this likely reflects the extent of existing service in Raleigh compared to other locations in the region, making Raleigh residents more concerned with funding than with the provision of new service.
- Development patterns were cited as an issue in all three locations, although these were more prominent in Cary and Knightdale, which exhibit current land use patterns less supportive of transit than those existing in Raleigh.
- Inter-municipal coordination was viewed as a primary issue in Cary and an important issue in Knightdale. This concern was not as prevalent in Raleigh, again perhaps due to its prominence within the region.
- Additional issues were expressed related to transit-friendly amenities, although these were not the most prominent among stakeholders.
- Lack of bus shelters, need for more service routes, and more frequent service.

Summary of Solutions

- Across the region, stakeholders widely supported service improvements, inter-municipal coordination, and the encouragement of transit-supportive growth patterns as key solutions. However, these proposed solutions were prioritized differently at the four meeting locations:
    - Raleigh participants were widely supportive of service improvements, particularly to existing services; this likely reflects the current extent of service in the Raleigh area.
    - Participants in Cary were more concerned with coordination among municipalities and among systems, although service improvements (in terms of both quality and quantity) were also commonly proposed.
    - Knightdale stakeholders most frequently proposed solutions related to growth patterns and land use, perhaps due to the less-supportive patterns currently characterizing outlying communities.
    - SERA participants focused on the need for providing bus shelters as a service improvement, as well as general service needs.
- Proposed solutions related to funding were most prevalent in Raleigh but less prominent in Cary, Knightdale, and at the Southeast Raleigh Association (SERA) meeting.
- Education and awareness campaigns were cited as potential solutions in three of the four sessions, SERA being the exception. They were also not a priority in Knightdale, where service coverage is currently less extensive.
- Participants in Cary and Knightdale called for greater coordination among, and even potential consolidation of, transit services across the region.

A short comment form was distributed at the stakeholder meetings. **Exhibit 2-35** shows the distribution of the recommended improvements. As with other groups, the major improvements desired are new local routes, more frequent service, new express routes and weekend service. Faster service, later night service, and improved transit centers are also areas for improvements.

Exhibit 2-35
Stakeholder Desired Improvements



3 Mobility Recommendations

After collecting information and data on existing transit service in the CAMPO region, the Project Team began the process of developing long-range recommendations for the TDP. The objectives for the recommendations were:

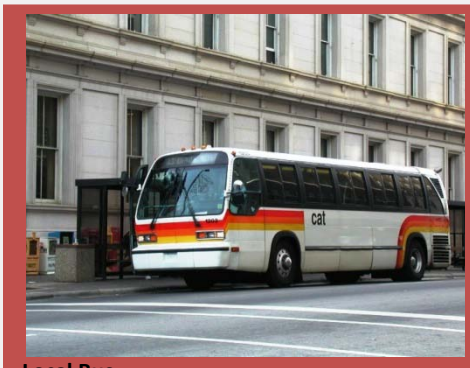
- To establish minimum service frequencies and span of service for all routes
- To fill in gaps of existing service coverage based upon propensity and density results
- To add routes to address unmet travel patterns
- To identify heavily used corridors for more intensive transit service
- To increase general public services in the outlying areas of the region by increasing demand-response and selectively offering neighborhood circulator services
- To connect outlying municipalities to downtown Raleigh through premium commuter services
- To add weekend service where warranted
- To provide more passenger amenities (transit centers, park-and-ride lots, information systems, sidewalks, bus shelters, etc.) throughout the CAMPO region

The recommendations listed below are categorized in two ways: those applicable to the entire CAMPO region and by municipality.

3.1 Service and Capital Concepts

Enhancements to transit service and capital facilities serve as the basis for the recommendations in the TDP. The following listing describes the types of transit services and capital facilities that were determined to be appropriate for the CAMPO region.

1. Transit Service by Route Type
   A. Local routes
      a. CAT radial and crosstown service primarily operating on major thoroughfares with few deviations.
      b. Ideally anchored on both ends by major transit locations.
      c. Located along major residential and employment corridors.
      d. Primarily located in areas where the transit-



Local Bus

supportive density (combination of population and employment) exceeds 7500 persons per square mile.

B. Commuter routes
    a. CAT and TTA express service primarily operating on highways and offering non-stop service between major activity centers (Downtown Raleigh, Research Triangle Park (RTP), NCSU, etc.).

Commuter Bus

C. Neighborhood circulator routes
    a. CTran and CAT service primarily operating in smaller municipalities
    b. Routes can deviate off major thoroughfares.
    c. Includes "activity center specials" operating in concentrated areas such as downtown using distinctive buses.
D. Weekend routes
    a. Provision of local, commuter, and neighborhood circulator services given ridership targets are met.
    b. Saturday or Sunday levels of service provided on all major holidays.
E. Paratransit service
    a. Wake Coordinated Transportation Service in non-urban areas for the general public, operating under the TRACS brand.
    b. ADA paratransit service for disabled individuals unable to access regular, fixed-route transit service.

2. Capital facilities
A. Transit Centers
    a. Location with three or more transit routes.
    b. May or may not include automobile parking facilities.
    c. Off-street facility with bus bays and boarding platforms, operator layover facilities (such as restrooms that may or may not include public access), and passenger amenities such as real-time bus arrival/departure times and bus shelters.
    d. Includes overhead shelter over platforms and bus loading areas.


Neighborhood Transit Center

B. Transfer Points
    a. Similar to Transit Centers, but at a lower scale.
    b. May be off-street location, or a series of shelters and pullout bays located on-street.
    c. Does not include as many passenger amenities or operator restrooms.

C. Park-And-Ride lots
    a. Purpose-built location but can be adjacent to shared land-uses.
    b. Includes automobile parking and drop-off facilities for kiss-and-ride and taxi services.
    c. Passenger amenities similar to those found at transit centers such as bus benches/shelters, dynamic signage/passenger information systems, etc.


Park & Ride Lot

D. Premium Transit Corridors
    a. Corridors designed for local service.
    b. Sidewalk coverage located along the corridor.
    c. Bus benches/shelters at all stops.

E. Commuter Corridors
    a. Bus on Shoulder operation (where shoulders exist)
    b. Signal prioritization on corridors with traffic signals

F. Streetside Amenities
    a. Benches/shelters at heavily used stops
    b. Additional sidewalks
    c. Special downtown shelters; bulb-outs; transit streets
    d. New bus stop signs


CBD Shelter

G. Support Facilities
    a. Buses
        i. Different buses for different service types
    b. Maintenance Facility capacity
        i. One maintenance bay for every 10-15 buses
        ii. Maximum facility size of 200-250 buses
    c. Replacements and refurbishment of facilities
        i. 10-year cycle
    d. ITS items
        i. Real time bus displays
        ii. Internet/smart phone applications
        iii. Mobile data terminals, automatic passenger counters

3.2 Service and Capital Design Guidelines

This section describes the general guidelines used to design the recommended bus service network and to decide where the different service types and capital facilities should be provided.

1. Transit service
    - A. Local routes
        - a. Decrease headways on all local routes to no more than 30-minutes during weekday peak-periods and 60-minutes during all other times.
        - b. Increase span-of-service on all local routes to at least 14 hours during weekdays.
        - c. Targeted performance is 25 passengers/hour.
    - B. Commuter routes
        - a. Decrease headways on commuter routes to no more than 15-minutes during weekday peak-periods while offering midday service on a case-by-case basis on at least one major service per corridor; secondary lots along a corridor are targeted for at least a 30-minute service.
        - b. Increase span-of-service on all commuter routes to at least 6 hours during weekdays.
        - c. Targeted performance is 18 passengers/hour.
    - C. Neighborhood circulator routes
        - a. Decrease headways on all circulator routes to at most 30-minutes during weekday peak-periods and 60-minutes during all other times.
        - b. Decrease headways on all "activity center special" (such as the R-Line) routes to no more than 10-minutes in both directions.
        - c. Increase span-of-service on all circulators to at least 14 hours during weekdays.
        - d. Targeted performance is 12 passengers/hour.
    - D. Weekend routes
        - a. Decrease headways on all weekend routes to no more than 60-minutes.
        - b. Increase span-of-service on all weekend routes to at least 12 hours.
        - c. Local weekend routes
            - i. Targeted performance is 20 passengers/hour Saturday and 15 passengers/hour Sunday.
            - ii. Existing Saturday service maintained if passengers/hour exceeds 15; Existing Sunday service maintained if passengers/hour exceeds 10.
        - d. Commuter weekend routes
            - i. Targeted performance is 15 passengers/hour Saturday and 12 passengers/hour Sunday.
            - ii. Existing Saturday service maintained if passengers/hour exceeds 10; Existing Sunday service maintained if passengers/hour exceeds 8.

e. Neighborhood circulator routes
    i. Targeted performance is 10 passengers/hour Saturday and 8 passengers/hour Sunday.
    ii. Existing service maintained due to projected route changes.

E. Paratransit services
    a. Expansion of Wake Coordinated Transportation Service's TRACS non-urban service at a rate of 5% annually.
    b. Expansion of ADA service as legally required to accompany expansion of fixed-route bus service into new areas.

2. Capital facilities
    A. Transit centers
        a. Provide operator layover facilities such as benches, vending machines, and restrooms.
        b. Provide passenger amenities such as signage, lighting, benches, shelters, and sidewalks.
        c. Space approximately 15 to 30 minutes apart (roughly 3 to 6 miles).
        d. Locate approximately 5 to 10 miles from Downtown Raleigh or RTP.
    B. Park-and-Ride lots
        a. Provision of similar operator and passenger amenities as found at transit centers.
        b. Provide parking and drop-off facilities for kiss-and-ride and taxi services.
        c. Space approximately 15 to 30 minutes apart (roughly 3 to 6 miles).
        d. Locate approximately 7 to 10 miles from Downtown Raleigh or RTP.
        e. Conceptual size of 600 spaces is sufficient to support a 15-minute service headway.
        f. Smaller lots appropriate for secondary locations along a corridor.
    C. Premium Transit Corridors
        a. Service headways no more than 15-minutes during weekday peak periods and 30-minutes during all other times.
        b. Span-of-service of at least 14 hours.
        c. Service offered seven days a week.

3.3 Recommended Bus Service Network

Exhibit 3-1 is a conceptual representation of how the overall services fit together. It shows the types of service connections that will be provided among the major transit locations and all of the Wake County municipalities. Note that for simplicity's sake, not all destinations have been shown. As illustrated, the Raleigh downtown continues to be an overall focal point for transit services, but substantial increases in crosstown services are provided, with many additional focal points established around the county.

Exhibit 3-2 summarizes the incremental service enhancements for each system. In 2040, the incremental annual hours of service over the current levels are 457,000 bus hours at an incremental cost of $40 million. An additional 156 peak buses will be in service.

Exhibits 3-3 to 3-5 provide a listing of transit service enhancements that are recommended to be in place by 2040. The exhibit shows the incremental changes to existing routes. Existing routes shown with negative numbers are recommended for service adjustments ranging from minor cutbacks on unused service hours to more significant reroutings associated with the implementation of new routes. New local routes have been given a "placeholder" designation based upon the Military Alphabet and new commuter routes have been assigned a color. At the time of implementation, a route name and number consistent with the overall system would be adopted. Annual costs for routes include costs to expand the Americans with Disability Act (ADA) service area where required.

Exhibit 3-6 provides a listing of recommended capital facilities associated with the Capital Area Transit Development Plan. Costs are further discussed in a later section. Services and capital facilities shown in red in these exhibits are those that are "rail-related". Examples include a park & ride lot that will initially be served by buses, but that will transition to a rail park & ride lot when either the commuter rail or light rail is implemented.

More details about each individual route are provided in a separate Route Profiles document. This document provides individual route descriptions, maps, and performance metrics. It will be used as part of the Long Range Transportation Plan process at CAMPO.

Exhibit 3-1
Long Range Service Concept

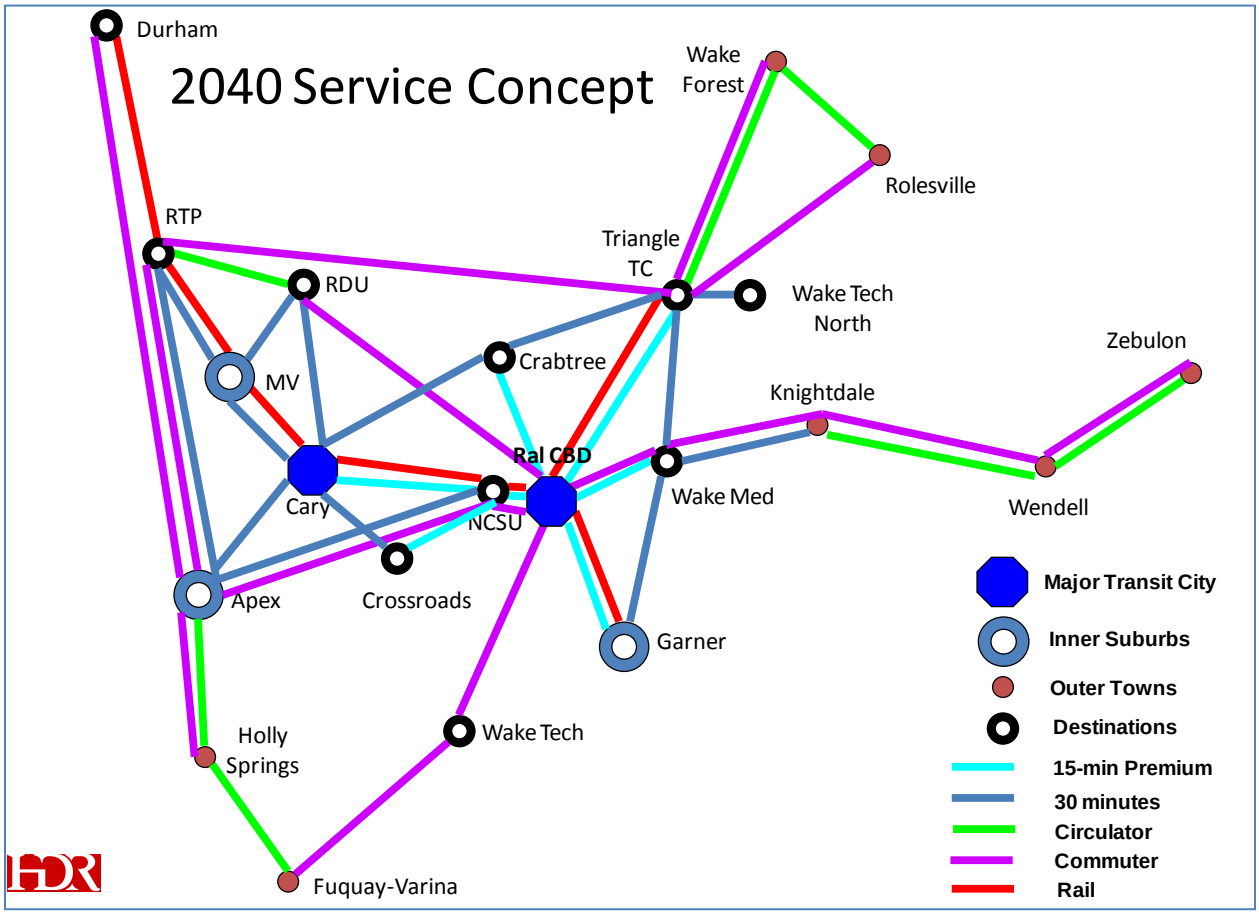


Exhibit 3-2
Summary Recommended Transit Service Enhancements

2040 Annual Transit Service Enhancements Summary (Increment)			
Operator	**Peak buses**	**Annual revenue hours**	**Annual cost (000's)**
CAT	87	322,000	$ 29,000
CTran	34	99,000	$ 7,000
TTA	35	36,000	$ 3,500
County DR	-	-	$ 500
TOTAL	156	457, 000	$ 40,000

Annual cost includes ADA costs incurred by each operator.
Total annual cost does not include marketing costs or farebox revenue.

Exhibit 3-3
CAT Recommended Transit Service Enhancements (Increment)

Name	Type	One-way mileage	Peak buses	Peak freq (min)	Base freq (min)	Annual rev hours	Annual cost (000's)
1 - Capital	Local	9.4	7	15	15	28,500	$2,459
2 - Falls of Neuse	Local	11.9	8	15	30	17,200	$1,486
3 - Glascock	Local	7.8	3	30	60	2,900	$247
4 - Rex Hospital	Local	6.8	2	30	60	(5,400)	($464)
5 - Biltmore Hills	Local	5.8	6	15	30	14,900	$1,519
6 - Crabtree	Local	15.6	6	30	60	7,400	$640
7 - S. Saunders	Local	17.1	13	15	30	38,700	$3,950
8 - Northcliff	Local	10.3	7	15	30	15,500	$1,336
10 - Longview	Local	4.4	2	30	60	(300)	($25)
11 - Avent Ferry	Local	8.7	6	15	30	11,800	$1,018
12 - Method	Local	4.9	2	30	60	(4,000)	($343)
13 - Chavis Heights	Local	1.4	1	30	30	(2,100)	($179)
15 - Wake Med	Local	6.0	5	15	15	13,800	$1,194
16 - Oberlin	Local	9.0	7	15	60	16,800	$1,449
18 - Worthdale	Local	10.8	4	30	60	8,900	$772
19 - Apollo Heights	Local	5.5	2	30	60	(1,200)	($103)
21 - Caraleigh	Local	5.8	2	30	60	2,800	$244
22 - State St	Local	4.6	2	30	60	(400)	($30)
7C - Carolina Pines/ Rush	Local	10.7	4	30	60	5,900	$510
23C - Millbrook	Local	7.9	3	30	60	1,400	$120
40E - Wake Tech	Commuter	10.2	5	15	60	4,200	$362
40E - Wake Tech - FV	Commuter	17.2	2	60	0	2,600	$226
R-Line	Circulator	1.9	4	7.5	7.5	10,100	$872
Wake Forest-Wakefield	Circulator	15.7	4	30	60	5,400	$465
Alpha: Umstead Circ	Circulator	10.0	3	30	60	7,300	$625
Bravo: Brier Creek Circ	Circulator	10.2	3	30	60	7,300	$741
Charlie: Creedmr/Ed Mill	Local	12.4	5	30	60	11,600	$1,001
Delta: RDU-RTP Connect.	Circulator	6.9	2	30	60	5,000	$511
Echo: Raleigh Blvd	Local	10.6	4	30	60	10,200	$876
Foxtrot: Durnt/Stricklnd.	Local	12.2	5	30	60	11,600	$1,185
Golf: New Hope	Circulator	9.5	3	30	60	7,300	$625
Hotel: I-440 NE Xtown	Local	10.2	4	30	60	9,600	$828
India: Atlantic Ave	Circulator	12.1	4	30	60	8,700	$750
Juliet: Spring Forest	Local	10.2	4	30	60	8,700	$750
Kilo: Knightdale	Circulator	13.0	4	30	60	8,800	$894
Lima: Wendell/ Zebulon	Flex	11.0	4	30	60	8,800	$755
Mike: Garner Rd	Local	12.2	5	30	60	11,600	$1,185
Novembr: Garnr-WakMd	Local	11.9	4	30	60	8,800	$894
Oscar: Hillsboro-Chat.	Local	9.2	7	15	30	19,200	$1,656
Whisky: R-Line Two	Special	1.8	5	7.5	7.5	25,600	$2,208
Yankee: WF/ Rolesville	Circulator	8.0	2	30	60	5,000	$511

*Annual hours and annual cost calculated as additions to existing service levels.
More detailed information available in separate Route Profile report.

Exhibit 3-4
CTran Recommended Transit Service Enhancements (Increment)

Name	Type	One-way mileage	Peak buses	Peak headway (min)	Base headway (min)	Annual revenue hours	Annual cost (000's)
1 - Maynard Road	Local	8.3	2	30	60	1500	$88
2 - Maynard Road	Local	8.3	2	30	60	1500	$88
3 - Harrison Ave	Local	8.36	2	30	60	3100	$229
4 - High House Road	Local	6.91	2	30	60	0	$6
5 - Kildaire Farm Road	Local	10.34	3	30	60	6400	$479
6 - Buck Jones Road	Local	9.84	3	30	60	3400	$211
Papa: Lake Pine	Circulator	10.9	4	30	60	8,700	$508
Quebec: Louis Stephens	Local	17.6	7	30	60	16,000	$932
Romeo: Apex-SAS	Circulator	15.4	5	30	60	11,600	$678
Sierra: Morrisville-Carpenter	Circulator	12.8	5	30	60	10,200	$593
Tango: NC 54 Chapel Hill	Local	10.8	4	30	60	13,400	$785
Uniform: Tryon Rd	Local	16.0	6	30	60	14,500	$847
Victor: Fuquay-Varina & Holly Springs	Flex	14.4	5	30	60	11,300	$657

*Annual hours and annual cost calculated as additions to existing service levels.
More detailed information available in separate Route Profile report.

Exhibit 3-5
TTA Recommended Transit Service Enhancements (Increment)

Name	Type	One-way mileage	Peak buses	Peak headway (min)	Base headway (min)	Annual revenue hours	Annual cost (000's)
100 – RTC-RDU-Raleigh	Commuter	20	7	15	60	6,900	$687
311 – RTP-Apex-Cary	Commuter	10.59	2	30	0	(3,000)	($300)
311 –Holly Springs	Commuter	24.17	6	30	0	5,500	$551
CRX - Chapel Hill-Raleigh	Commuter	31.88	5	30	120	2,800	$280
KRX - Knightdale-Raleigh	Commuter	9.42	2	30	0	500	$47
WRX - Wake Forest-Ral.	Commuter	4.97	1	30	0	(3,900)	($392)
WRX – Raleigh-Rolesville	Commuter	7.56	2	30	0	1,700	$165
Red: I-540 to RTP	Commuter	12.6	3	30	0	2,800	$275
Red: TTC to RTP	Commuter	20.2	5	30	0	4,400	$441
Blue: Creedmoor-6 Forks	Commuter	12.0	6	15	0	5,500	$551
Gold: Wendell Falls	Commuter	13.7	2	30	0	2,800	$275
Green: Regency	Commuter	11.3	5	30	0	2,200	$220
Green: Holly Springs	Commuter	20.7	5	30	0	4,400	$441
Orange: RTP LRT Conn.	Commuter	15.2	7	15	30	15,000	$1,496
Purple: Apex-Durham	Commuter	20.4	10	15	0	8,800	$881
Yellow: Five County	Commuter	25.1	6	30	0	5,500	$551

*Annual hours and annual cost calculated as additions to existing service levels.
More detailed information available in separate Route Profile report.

Exhibit 3-6
Recommended Capital Facility Enhancements

Transit Centers	# Bays	TOTAL	Horizon
Apex	8	$ 5,120,000	2020
Crossroads	7	$ 4,480,000	2020
NCSU w/rail	8	$ 5,120,000	2020
Wake Med	8	$ 5,120,000	2015
TOTAL		**$ 19,840,000**	

Transfer Points	# Bays	TOTAL	Horizon
Avent Ferry & Gorman	4	$ 880,000	2015
Brier Creek	4	$ 880,000	2020
Cameron Village	6	$ 1,320,000	2020
Duke Medical	4	$ 880,000	2020
Forum/Colonnade	4	$ 880,000	2030
Morrisville w/rail (McCrimmon)	6	$ 1,320,000	2020
New Bern Walmart	4	$ 880,000	2015
North Hills	4	$ 880,000	2030
Pleasant Valley	4	$ 880,000	2030
RDU	6	$ 1,320,000	2030
Rex	6	$ 1,320,000	2030
Southgate Shopping Center	6	$ 1,320,000	2020
Wake Med North	6	$ 1,320,000	2030
Wilmington & Pecan (SE Raleigh)	4	$ 880,000	2015
TOTAL		**$ 14,960,000**	

Park-and-Ride Lots	# Spaces	TOTAL	Horizon
Beaver Creek	1040	$ 7,280,000	2020
Creedmoor/540	1040	$ 7,280,000	2030
District Dr (West Raleigh)	1420	$ 9,940,000	2015
Garner (White Oak)	400	$ 2,800,000	2015
Knightdale	400	$ 2,800,000	2015
Wendell Falls	400	$ 2,800,000	2020
Regency	400	$ 2,800,000	2015
Wake Tech - Main	500	$ 3,500,000	2015
Wakefield	600	$ 4,200,000	2020
TOTAL		**$ 43,400,000**	

Joint P&R Lot/Transit Center	# Spaces	TOTAL	Horizon
Cary CBD w/rail (Cary)	940	$ 22,980,000	2015
RTP w/rail (N or S RTP)	600	$ 7,400,000	2020
Triangle Town Center w/rail	940	$ 11,700,000	2015
TOTAL		**$ 42,080,000**	

Exhibit 3-6, cont.

Recommended Capital Facility Enhancements

Small Town Facilities	# Lots	TOTAL	Horizon
Clayton (Clayton)	1	$ 790,000	2015
Fuquay-Varina	1	$ 790,000	2015
Garner Downtown	1	$ 790,000	2015
Holly Springs	1	$ 790,000	2015
Rolesville	1	$ 790,000	2030
Wake Forest	1	$ 790,000	2015
Wendell	1	$ 790,000	2015
Zebulon	1	$ 790,000	2015
Zebulon - Five County	1	$ 790,000	2030
TOTAL		**$ 7,110,000**	

Park-and-Pool Lots	# Lots	TOTAL	Horizon
50/98	1	$ 250,000	2030
TOTAL		**$ 250,000**	

Premium Transit Corridors	# Miles	TOTAL	Horizon
Avent Ferry	6.1	$ 3,220,000	2020
Capital	8.7	$ 4,600,000	2015
Chatham (LRT)	7.3	$ 3,870,000	2030
Crabtree	7.7	$ 4,090,000	2030
Falls of Neuse	10.2	$ 5,400,000	2020
New Bern	4.6	$ 2,430,000	2015
Rock Quarry	6.2	$ 3,290,000	2030
Saunders	5.2	$ 2,770,000	2020
Six Forks	6.3	$ 3,330,000	2030
TOTAL		**$ 33,000,000**	

Commuting Corridors		TOTAL	Horizon
I-40 West		$ 100,000	2015
I-40 East		$ 70,000	2015
US 1 North - Capital		$ 80,000	2015
US 401 South		$ 90,000	2015
US 64 East		$ 70,000	2015
US 1 South		$ 90,000	2015
Creedmoor/Glenwood		$ 80,000	2030
TOTAL		**$ 580,000**	

Exhibit 3-6, cont.
Recommended Capital Facility Enhancements

Supporting Capital		TOTAL	Horizon
Buses			
Service expansion		$ 20,280,000	
New services		$ 103,580,000	
Paratransit		$ 18,530,000	
Maintenance Facility			
West Maintenance Facility		$ 34,200,000	
Streetside			
Sidewalks		$ 30,600,000	
Bus Stops - Sign only		$ 360,000	
Bus Stops - Benches		$ 540,000	
Bus Stops - Shelters		$ 2,880,000	
Other Capital			
Raleigh Union Station		$ 13,800,000	2030
Moore Square Renovation		$ 3,500,000	2015
Crabtree Renovation		$ 250,000	2015
CBD Street Improvements		$ 18,000,000	2030
Renovation & Modernization		$ 13,270,000	
Soft Costs			
Engineering, Design, Construction Management		$ 83,580,000	
TOTAL		**$ 343,370,000**	

The recommended transit system is described in the following sections. For clarity's sake, the recommendations are shown on four different maps. **Exhibit 3-7** shows the overall bus system recommendations. This map shows the recommendations for local bus services assumed to be operated by CAT as green lines; the local bus services assumed to be operated by C-Tran as blue lines, and commuter bus services as red lines. Highlighted in yellow are the local bus corridors designated as "Premium Transit Corridors." These corridors will have the highest frequency local bus service and will have pedestrian amenities, including sidewalks, shelters, and benches, located along their length. Not shown on Exhibit 3-4 are the planned rail corridors.

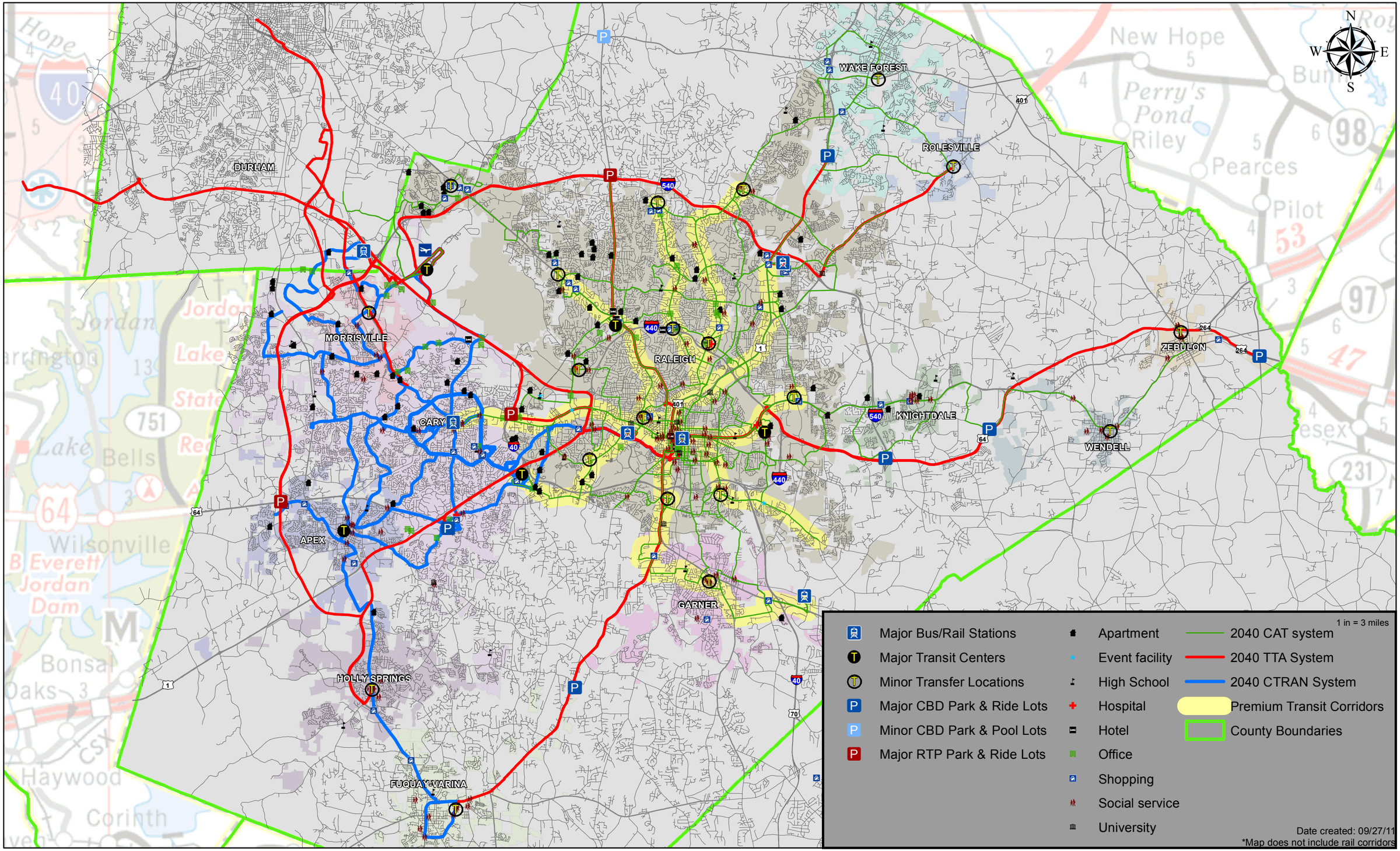
Exhibit 3-8 shows the commuter transit system, both bus and rail. The commuter bus network is designed to serve the peak work trip, especially for riders traveling longer distances. This service operates primarily as a point-to-point service, with few intermediate stops between the origin park & ride lot and the major employment destination. Commuter bus routes in the northeast are designed to act as high-speed feeder bus routes into the rail system.

Exhibit 3-9 shows the local bus network centered on the City of Raleigh. These routes are a combination of radial services to downtown Raleigh; crosstown services directly connecting outlying locations; and

circulator routes in the outlying communities. Also shown are the network of park & ride lots and transit centers that will be served by these routes.

Exhibit 3-10 shows the local bus network centered on the Town of Cary. This network is assumed to be operated by the existing C-Tran service, but the network covers not just the Town of Cary but the entire western side of Wake County.

The exhibits are shown on the following pages. After the exhibits, the subsequent sections provide more details by municipality on what services are being recommended. Depending upon the municipality, maps of the recommended routes could be on a combination of the commuter bus network and either the CAT or C-Tran networks.



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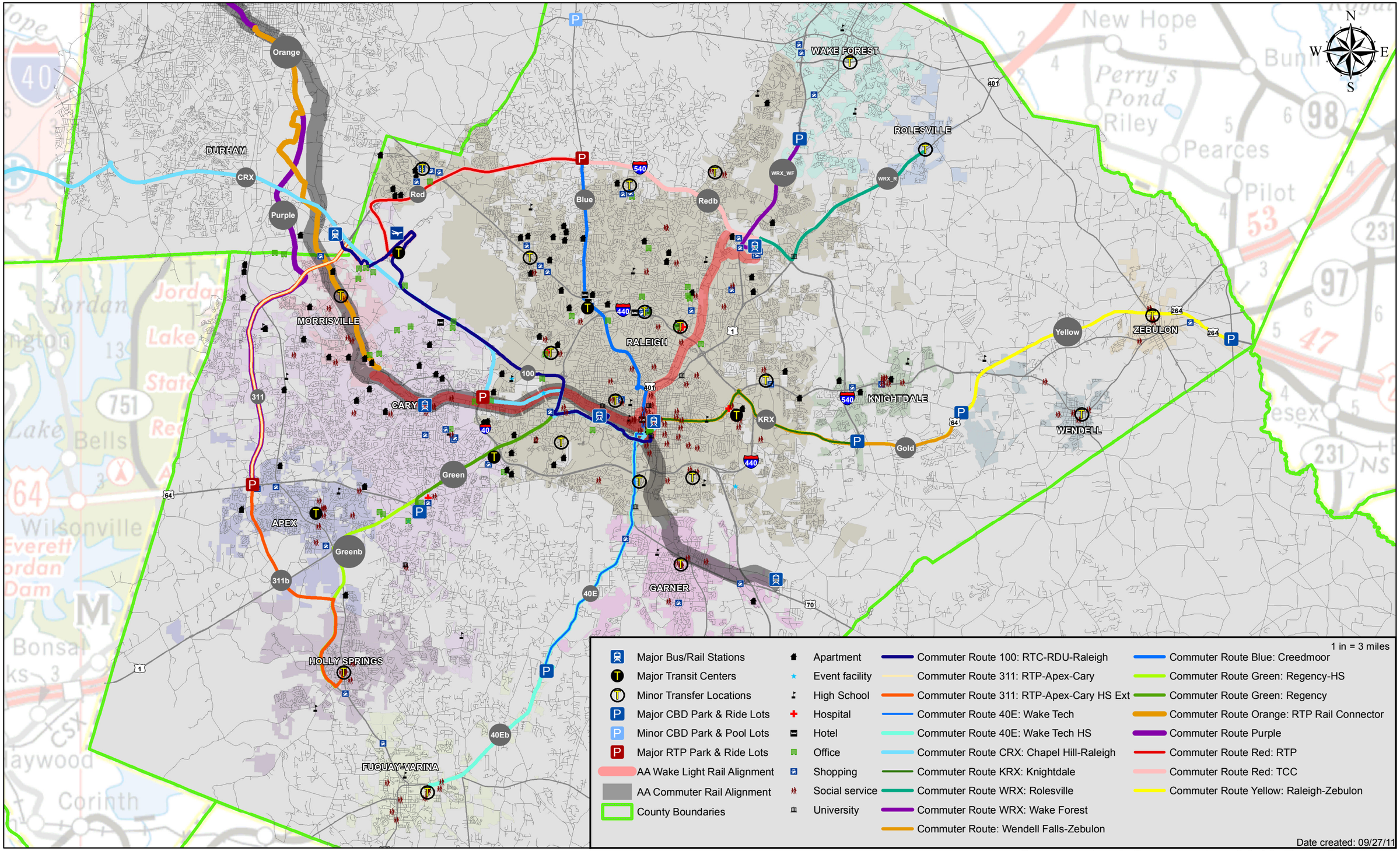
Conceptual 2040 Bus System

Exhibit 3-7



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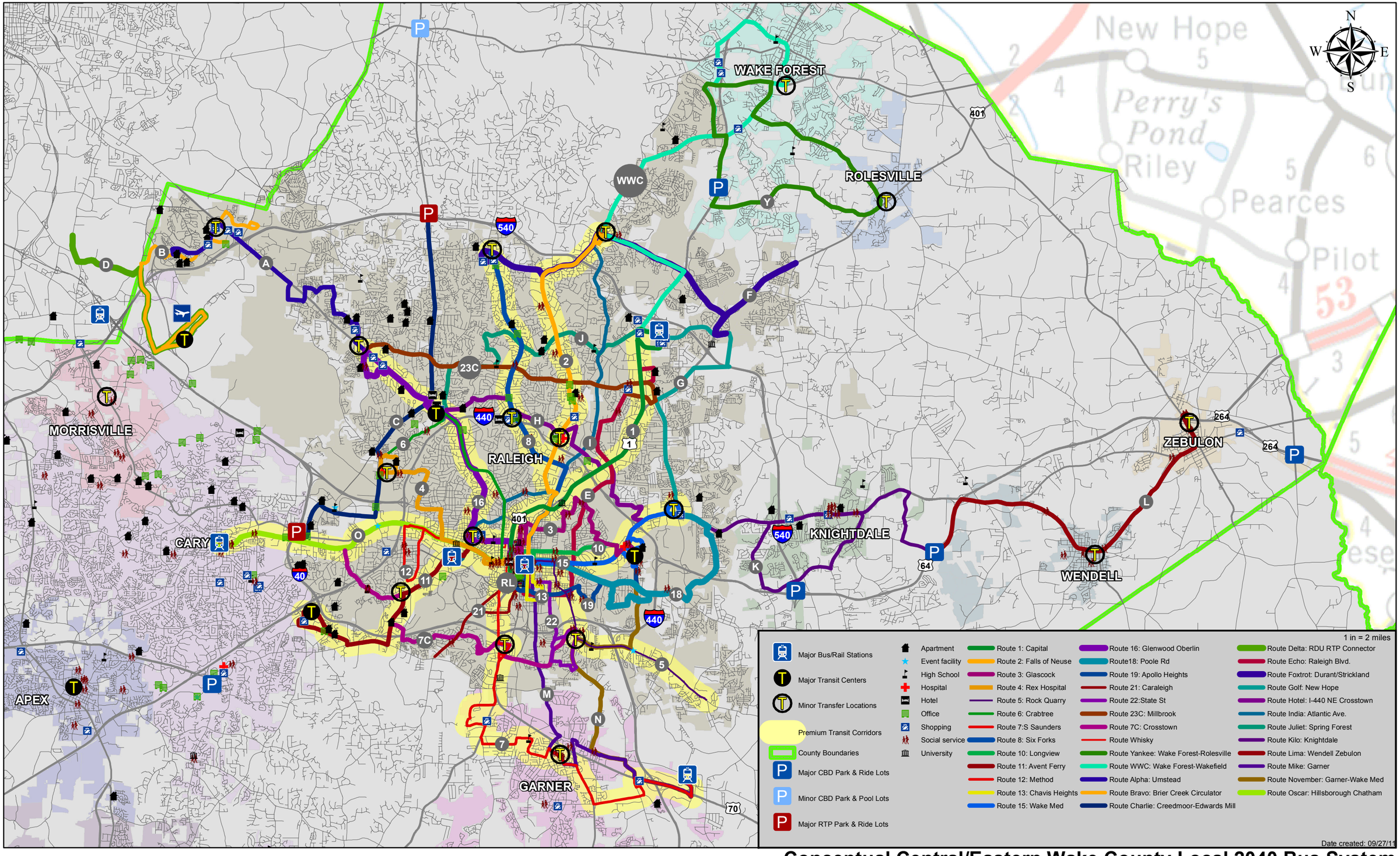
Conceptual Commuter 2040 Bus System

Exhibit 3-8



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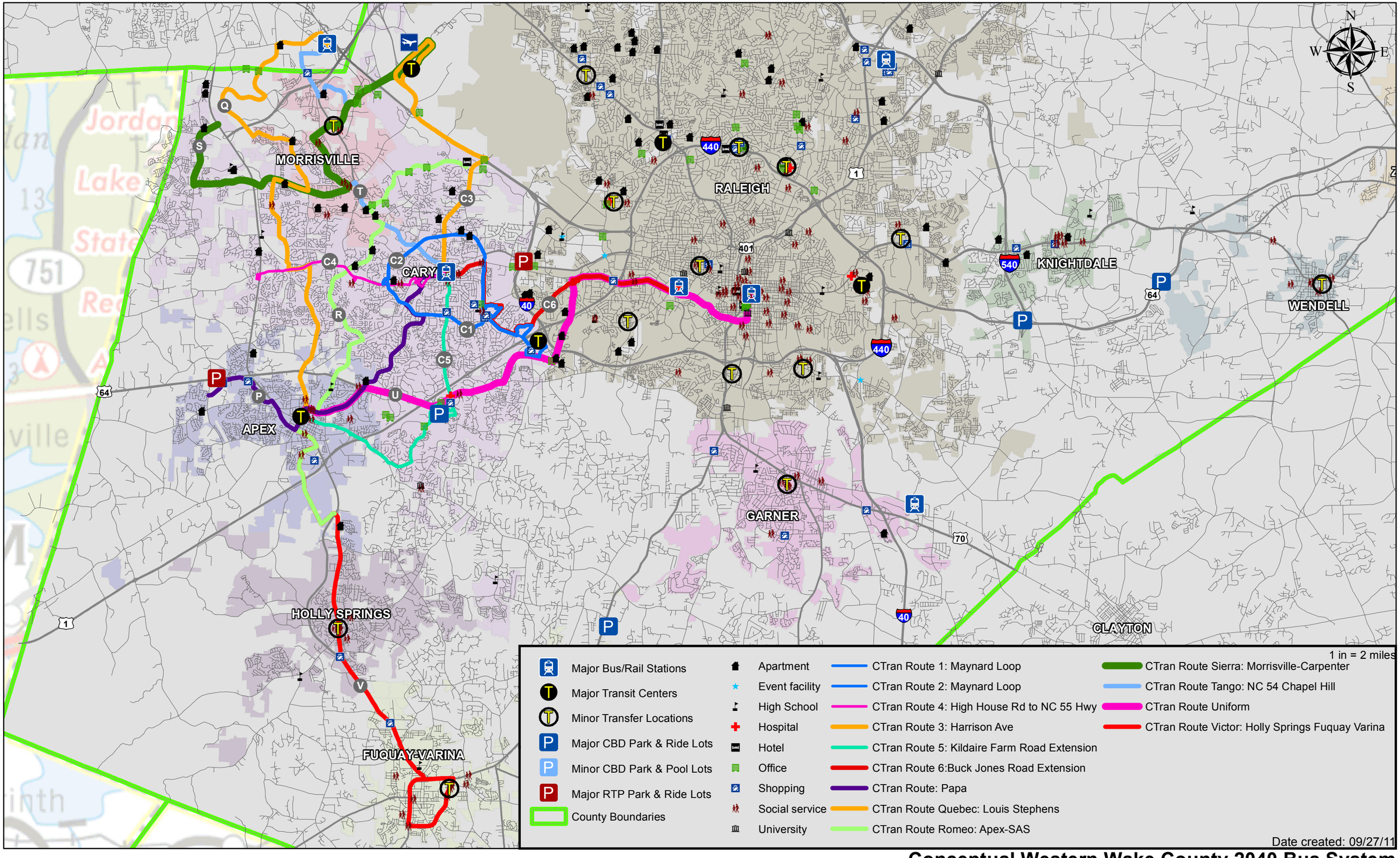
Conceptual Central/Eastern Wake County Local 2040 Bus System

Exhibit 3-9



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Conceptual Western Wake County 2040 Bus System

Exhibit 3-10

3.4 Recommendations by Municipality

The following list provides the breakdown of services and capital items for each of the municipalities within Wake County. In addition to these improvements, the non-urbanized areas of the county will be served by the Wake Coordinated Transportation Service's TRACS general public program. This program is assumed to grow at a rate of 5% per year. Over the 28 years covered by this plan (to 2040), TRACS grows by nearly 400%.

Also not specifically noted in the list below is the federal requirement to increase the Americans with Disability Act (ADA) paratransit service. This service grows in parallel with the expansion of regular transit service into new areas. This expansion occurs outside of the corporate limits of Raleigh and Cary since all of their territory is already covered by ADA paratransit service.

3.4.1 Raleigh/Cary

1. Transit service
    A. Local routes
        a. Service enhancements
            i. Decrease headways on all local routes to no more than 30-minutes during weekday peak-periods and 60-minutes during all other times.
            ii. Increase span-of-service on all local routes to at least 14 hours during weekdays.
        b. New routes/extensions
            i. Route Charlie - Creedmoor/Edwards Mill
            ii. Route Echo - Raleigh Blvd.
            iii. Route Foxtrot - Durant/Strickland
            iv. Route Hotel - I440 NE Crosstown
            v. Route Juliet - Spring Forest
            vi. Route Oscar - Hillsborough/Chatham
            vii. Route Tango – NC 54 Chapel Hill
            viii. Extend CAT Route 2 – Falls of Neuse to the Wake Med North transfer point
            ix. Extend CAT Route 3 – Glascock to the Wake Med transit center
            x. CAT Route 4 – Rex Hospital terminates at Rex Hospital and replaced by crosstown route on Creedmoor
            xi. Extend CAT Route 5 – Rock Quarry along the proposed Rock Quarry premium transit corridor
            xii. Reroute CAT Route 6 – Crabtree to the Rex transfer point

xiii. Extend CAT Route 8 – Six Forks to the Forum/Colonnade transfer point taking over the 8C - Sawmill
xiv. Extend CAT Route 10 – Longview to the Wake Med transit center
xv. Extend CAT Route 11 – Avent Ferry to the Crossroads transit center
xvi. Extend CAT Route 15 – Wake Med to the New Bern Walmart transfer point taking over a portion of Route 15C
xvii. Reroute CAT Route 16 – Oberlin to the Pleasant Valley transfer point
xviii. Extend CAT Route 18 – Worthdale to the New Bern Walmart transfer point
xix. Extend CAT Route 21 – Caraleigh on Lake Wheeler Rd. to Tryon Rd.
xx. Extend CAT Route 22 – State St. to the Southgate Shopping Center transfer point
xxi. Extend CAT Route 7C – Carolina Pines/Rush to the proposed Jones Franklin light rail station
xxii. Reroute CAT Route 23C – Millbrook to Pleasant Valley transfer point
xxiii. Extend CTran Route 3 to RDU Airport
xxiv. Extend CTran Route 6 to the NCSU bus/rail station

B. Commuter routes
   a. Service enhancements
      i. Decrease headways on the principal commuter routes on each corridor to no more than 15-minutes during weekday peak-periods while offering midday service on a case-by-case basis. Offer 30-minute headways on secondary commuter services.
      ii. Increase span-of-service on all commuter routes to at least 6 hours during weekdays.
   b. New routes/extensions
      i. Route Red - I540 N to RTP
      ii. Route Red TTC - I540 N to RTP/TTC
      iii. Route Blue - Creedmoor/Six Forks Park-and-Ride
      iv. Route Green - Regency Park-and-Ride
      v. Route Green (Holly Springs) - Regency Park-and-Ride/Holly Springs
      vi. Route Orange - RTP Rail Connector
C. Neighborhood circulator routes
   a. Service enhancements
      i. Combine most “connector” routes with their downtown radial counterpart.
      ii. Decrease headways on all circulator routes to at most 30-minutes during weekday peak-periods and 60-minutes during all other times.
      iii. Decrease headways on the R-Line to no more than 10-minutes in both directions.

b. New routes/extensions:
    i. Route Alpha - Umstead
    ii. Route Bravo - Brier Creek
    iii. Route Delta - RDU/RTP Connector
    iv. Route Golf - New Hope
    v. Route India - Atlantic Ave.
    vi. Route Sierra – Morrisville/Carpenter
    vii. Route Whisky – Downtown Raleigh
    viii. CAT R-line divide into two routes

2. Capital facilities
    A. Transit centers
        a. Crossroads
        b. Cary CBD
        c. Moore Square
        d. NCSU
        e. RTP
        f. Triangle Town Center
        g. Wake Med

Cary Depot

    B. Transfer points
        a. Avent Ferry and Gorman
        b. Brier Creek
        c. Cameron Village
        d. Duke Medical
        e. Forum/Colonnade
        f. Morrisville
        g. New Bern Walmart
        h. North Hills
        i. Pleasant Valley
        j. RDU Airport
        k. Rex Hospital
        l. Southgate Shopping Center
        m. Wake Med North
        n. Wilmington and Pecan (SE Raleigh)
    C. Park-and-Ride lots
        a. Creedmoor/540
        b. West Raleigh
        c. Regency
        d. Wake Tech – Main Campus
    D. Park-and-Pool lots
        a. 50/98

E. Premium Transit Corridors
    a. Avent Ferry
    b. Capital
    c. Chatham
    d. Crabtree
    e. Falls of Neuse
    f. New Bern
    g. Rock Quarry
    h. Six Forks

Premium "Quickline" Shelter

3.4.2 Morrisville

1. Transit service
    A. Local routes
        a. New routes/extensions
            i. Route Quebec - Louis Stephens
            ii. Route Tango – NC 54 from Cary to RTP
    B. Commuter routes
        a. Service enhancements
            i. Decrease headways on major commuter routes to no more than 15-minutes during weekday peak-periods while offering midday service on a case-by-case basis. Offer 30-minute headways on secondary commuter services.
            ii. Increase span-of-service on all commuter routes to at least 6 hours during weekdays.
        b. New routes/extensions
            i. Route Orange - RTP Rail Connector
    C. Neighborhood circulator routes
        a. New routes/extensions
            i. Route Romeo - Apex/SAS
            ii. Route Sierra – Morrisville/Carpenter to RDU
2. Capital facilities
    A. Transfer points
        a. McCrimmon Parkway

3.4.3 Apex/Holly Springs/Fuquay-Varina

1. Transit service
    A. Local routes
        a. New routes/extensions

i. Route Quebec - Louis Stephens
ii. Route Uniform - Tryon Road
iii. Route Victor - Fuquay-Varina/Holly Springs
iv. Extend CTran Route 5 to the Apex transit center

B. Commuter routes
   a. Service enhancements
      i. Decrease headways on major commuter routes to no more than 15-minutes during weekday peak-periods while offering midday service on a case-by-case basis. Offer 30-minute headways on secondary commuter services.
      ii. Increase span-of-service on all commuter routes to at least 6 hours during weekdays.
   b. New routes/extensions
      i. Route Green (Holly Springs) - Regency Park-and-Ride/Holly Springs
      ii. Route Purple - Apex/Durham
      iii. Extend TTA Route 311 from new Beaver Creek P&R to Holly Springs
      iv. Extend CAT Route 40E from Wake Tech to Fuquay-Varina
C. Neighborhood circulator routes
   a. New routes/extensions
      i. Route Papa - Lake Pine
      ii. Route Romeo - Apex/SAS

2. Capital facilities
   B. Transit centers
      a. Apex
   C. Transfer points
      a. Fuquay-Varina
      b. Holly Springs
   D. Park-and-Ride lots
      a. Beaver Creek

3.4.4 Garner/Clayton

[Note: Service into Clayton will be dependent upon the Town or Johnston County contributing financially to the operating and capital costs.]

1. Transit service
   A. Local routes
      a. Service enhancements
         i. Decrease headways on all local routes to no more than 30-minutes during weekday peak-periods and 60-minutes during all other times.

ii. Increase span-of-service on all local routes to at least 14 hours during weekdays.

b. New routes/extensions

i. Route Mike – Garner

ii. Route November - Garner/Wake Med

iii. Extend CAT Route 7 – South Saunders to the Garner bus/rail station along the proposed South Saunders premium transit corridor

2. Capital facilities

A. Transfer points

a. Clayton

b. Garner (Downtown)

B. Park-and-Ride lots

a. Garner (White Oak)

b. Clayton

C. Premium Transit Corridors

a. Saunders

3.4.5 Knightdale/Wendell/Zebulon

1. Transit service

A. Local routes

a. Service enhancements

i. Decrease headways on all local routes to no more than 30-minutes during weekday peak-periods and 60-minutes during all other times.

ii. Increase span-of-service on all local routes to at least 14 hours during weekdays.

b. New routes/extensions

i. Route Lima - Wendell/Zebulon

B. Commuter routes

a. Service enhancements

i. Decrease headways on major commuter routes to no more than 15-minutes during weekday peak-periods while offering midday service on a case-by-case basis. Offer 30-minute headways on secondary commuter services.

ii. Increase span-of-service on all commuter routes to at least 6 hours during weekdays.

b. New routes/extensions

i. Route Yellow - Raleigh/Five County

C. Neighborhood circulator routes

a. Service enhancements

i. Decrease headways on all circulator routes to at most 30-minutes during weekday peak-periods and 60-minutes during all other times.

b. New routes/extensions

i. Route Kilo – Knightdale

2. Capital facilities

A. Transfer points

a. Wendell

b. Zebulon

c. Zebulon – Five County

B. Park-and-Ride lots

a. Knightdale

b. Wendell Falls

Small P&R Lot

3.4.6 Wake Forest/Rolesville

1. Transit service

A. Commuter routes

a. Service enhancements

i. Decrease headways on major commuter routes to no more than 15-minutes during weekday peak-periods; midday service on a case-by-case basis. 30-minute headways on secondary commuter routes.

ii. Increase span-of-service on all commuter routes to at least 6 hours during weekdays.

b. New routes/extensions

i. Terminate WRX at Triangle Town Center LRT station

ii. New WRX – branch to Rolesville

B. Neighborhood circulator routes

a. Service enhancements

i. Decrease headways on all circulator routes to at most 30-minutes during weekday peak-periods and 60-minutes during all other times.

b. New routes/extensions

i. Route Yankee – Wake Forest/Rolesville

ii. Extend CAT Wake Forest-Wakefield circulator to Triangle Town Center

2. Capital facilities

A. Transfer points

a. Rolesville

b. Wake Forest

B. Park-and-Ride lots

a. Wakefield

4 Financial Summary

The TDP does not include the preparation of a full financial plan. This activity is being undertaken by TTA as part of their Alternatives Analysis process and will include calculations of bus and rail costs as well as estimates of funding sources. The TDP provides inputs into the TTA plan related to the bus program within Wake County.

The developed financial calculations provide an opportunity to link new service and facility recommendations with implementation costs associated with the TDP. The financial plan estimates both capital and operating costs in order to derive annualized costs. These annualized capital and operating costs are outlined across a phased financial plan over three planning horizon years: 2015, 2020, and 2030 coinciding with the planning horizons that will be used for the forthcoming update to CAMPO's Long Range Transportation Plan. Costs have been projected out to 2040 for use in the LRTP update.

The cost calculations assume that commuter rail service is implemented by 2020 and that light rail service is implemented before the 2030 planning horizon.

The financial calculation includes:

- Capital Costs
- Operating Costs

All costs are expressed in current (2011) year dollars (no allowance for inflation).

4.1 Capital Costs

Costs for the TDP were estimated for capital items by determining the unit cost for each type of improvement and multiplying by the number of units. Estimated costs for transit capital items, such as buses, transit centers, and streetscape improvements, were determined based on similar past costs from CAT and TTA as well as from projects across the United States. Capital cost estimates include fixed capital items along with estimated expenses for rolling stock such as spare vehicles. Finally, additional costs were included to account for a maintenance facility expansion to support an expanded bus fleet as well as corridor-related retrofits intended to support transit service improvements.

4.2 Operating Costs

Operating costs were estimated by determining the annual increase in hours required to bring existing routes up to the recommended service standard and for the additional revenue hours required for the new routes. A cost-per-hour amount was applied to the additional service hours to determine annual costs, based on an annualization factor of 250 weekday service days, plus 57 Saturdays and 58 Sundays to determine total annual costs. The cost-per-hour was based upon the 2010 cost-per-revenue-hour for each system as reported in the National Transit Database. TTA costs were used to estimate the costs of the commuter bus service; CAT costs were used to estimate the costs of the Raleigh-centered service; C-Tran costs were used to estimate the costs for the western Wake County services, and TRACS costs were used to estimate the expansion of the demand-response rural services.

4.3 Potential Funding Sources

For use as a reasonableness test, funding sources were estimated on a gross assumption basis. Capital costs were assumed to be funded by a combination of 50% by the Federal Government, 25% by the State of North Carolina, and the remaining 25% being funded locally. For major capital expenses, such as those that go through the federal New Starts process, these funding ratios reflect the historical trends. Funding for some capital elements, notably buses, could be higher, with federal money covering up to 80% of the cost and state funding covering 10% of the cost. Offsetting these higher ratios is the general uncertainty over the future federal program. The major federal transportation funding program, SAFETEA-LU, has expired and is being renewed on an annual basis. Current discussions on the successor legislation envision a dramatically lower funding amount. For simplicity's sake, the funding sources were set at the 50% federal, 25% state level for all capital items.

Federal and State funds are not available for operating costs, with limited exceptions for the capitalized costs of maintenance. This funding allowance is all used by the existing services, so no new Federal or State funds were assumed for operations. All operating costs were assumed to be paid by local sources, less 11% of the operating costs that are paid for by fares, based upon the average cost recovery of the CAMPO region's transit providers.

"Local" funding as depicted in the following section can come from a variety of sources. Currently, local money consists of annual appropriations by the municipalities out of general fund revenues. This funding source is assumed to continue to pay for the current level of service, with increases to reflect inflation. Costs for existing services are not included in any of the tables in this document. The incremental cost of the new capital and service can also be paid for out of the general fund, but the major local source is anticipated to be the adoption of a half-cent sales tax dedicated to transit. This sales tax will require a vote of the residents in each county in order to be implemented. Other funding sources will be fees on the vehicle registration charge, and for Triangle Transit, a fee on rental cars.

Other potential sources could be public-private partnerships, tax increment financing, and other mechanisms.

Additional funding sources beyond the half-cent sales tax are likely to be required depending upon the assumptions incorporated into the final financial plan developed by Triangle Transit. Funding requirements will be heavily dependent upon the final rail plan, the assumed growth in the economy, the projected inflation rate, and any changes to the presumed federal and state shares.

Services implemented within any given municipality as described in this document may require a financial contribution from the served municipality. These decisions will be made as part of the interlocal agreements being crafted between Wake County and the individual cities/towns.

4.4 Total Costs

Exhibit 4-1 shows the total costs for the 28-year period from 2012 to 2040:

Exhibit 4-1
Total Incremental TDP Costs through 2040

	TOTAL	Non-Local Share	Local Share
Capital Costs	$825,050,000	$618,790,000	$206,260,000
Operating Costs	$1,091,500,000	$120,000,000	$971,400,000
Total	$1,916,550,000	$738,790,000	$1,177,660,000

All costs in 2011 dollars

Non-local is a combination of Federal and State sources; Local share can come from several sources.

Total incremental capital expenditures for Wake County bus program, including advanced rail facilities, is $825 million. Total incremental bus operating cost is $1.1 billion. Roughly 40% of the combined costs are presumed to come from non-local sources, including fare revenues. While these costs rightly seem large, when considered on an annual basis, the total incremental cost averages to $68 million, with a local share of $42 million. By way of comparison, a roadway costs on average between$1.5 million and $2.0 million per lane mile. The $42 million local share would be similar to building a 5-7 mile four lane road each year.

The cost estimating spreadsheet prepared as part of this study provides detailed estimates of the cost by service and capital project and estimates of the year-by-year expenditures.

4.5 Job Creation Effect

One of the many benefits associated with investments made in public transportation is the potential for job creation. Based on APTA's 2009 methodology, assessing the jobs impact of all national spending on

public transportation results in 29% being captured by capital spending and 71% captured by operations spending of jobs per billion dollars of spending. The following table outlines a breakdown of these jobs, distinguishing categories of direct jobs (public transportation manufacturing/construction and operations jobs), indirect jobs (jobs at suppliers of parts and services), and induced jobs (jobs supported by workers re-spending their wages).

Exhibit 4-2
Estimated Job Creation

	2015 – Base	2020	2030
Capital			
Direct Jobs	2,093	3,196	5,587
Indirect Jobs	2,009	3,069	5,365
Induced Jobs	1,967	3,005	5,253
TOTAL	**6,069**	**9,269**	**16,205**
Operating			
Direct Jobs	635	785	913
Indirect Jobs	88	109	126
Induced Jobs	508	628	730
TOTAL	**1,230**	**1,522**	**1,769**