Capital Area
Bus Transit Development Plan

cat

2012

CAPITAL AREA TRANSIT

SHORT RANGE TRANSIT PLAN

FINAL REPORT

November 2012

Prepared for
City of Raleigh/Capital Area Transit

Prepared by
HDR Engineering, Inc. of the Carolinas

HDR

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1 Background & Introduction

The City of Raleigh/Capital Area Transit (CAT) *2012 Short Range Transit Plan* presents recommendations to implement the initial phases of the long-range transit service and capital improvements developed for Wake County.

In September 2010, the Capital Area Metropolitan Planning Organization (CAMPO), and the City of Raleigh/CAT, engaged HDR Engineering, Inc. of the Carolinas (HDR) and its subconsultants to prepare the *2040 Capital Area Bus Transit Development Plan* for service in the CAMPO jurisdiction as a long-range complement to separate rail studies being undertaken by Triangle Transit. Separately, the City of Raleigh/CAT included the development of more detailed implementation plans for local bus service within Raleigh. This report outlines short-range findings and recommendations.

1.1 Study Overview

This study involved the preparation of a short range bus transit plan for the city of Raleigh in anticipation of significant population and employment growth. The *Raleigh 2030 Comprehensive Plan* projects that the city population will grow from 404,000 in 2010 to almost 600,000 by 2030, almost a 50 percent increase. The entire capital area jurisdiction is projected to grow in population from 880,500 in 2005 to 1,952,000 in 2035, a 122 percent increase. How an additional 200,000 Raleigh residents and over 1 million new Wake County residents will continue to be able to travel efficiently is a major concern and challenge.

The *2012 CAT Short Range Transit Plan* calls for the development of an enhanced bus system that complements an expansion of bus service throughout the Triangle and the introduction of a potential long-range rail transit system. Enhancing the existing bus service system will allow the city 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. It complements the Raleigh Five Strategic Themes of Customer Service, Neighborhood Quality, Capital Projects, Environmental Initiatives, and Growth. 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 planning horizon used for the *2012 CAT Short Range Transit Plan* is a three- to five-year horizon. Essentially, it represents the bus transit changes that are recommended to occur in Raleigh prior to the introduction of commuter rail service in the region. The horizon timeline is flexible, reflecting the current uncertainty over the available funding for transit. While numerous improvements can be made within the existing resources being spent on transit, the full implementation of these changes will require additional sources of funding. One potential source, but not the only one, is a half-cent sales tax

dedicated to transit; a source recently approved in Durham County and currently under consideration for Wake County. Orange County approved a similar tax in the November 2012 referendum.

1.1.1 Relationship to Rail Studies

Triangle Transit (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 within each county. Each county must conduct its own referendum; Durham County voters approved the sales tax in 2011, and Wake County voters may be asked to vote on a similar tax later in 2012.

The *2012 CAT Short Range Transit Plan* is based upon the assumption that additional funding to expand service is available, through the sales tax or some other source, but the planned rail improvements have not yet been implemented. Essentially the *2012 CAT Short Range Transit Plan* details the immediate bus service changes that need to be in place to support an expanded transit program.

1.1.2 Associated Studies

As part of the long-range transit planning, two Technical Memoranda were prepared and are included in the **Appendix**. Technical Memorandum #1 presents the results of a rider survey conducted on the CAT, CTran, Triangle Transit, and Wolfline system. Highlights for the CAT system are provided in Section 2.4 of this *2012 CAT Short Range Transit Plan*. Technical Memorandum #2 presents the results of the boarding & alighting counts on the CAT and CTran systems for a weekday and a Saturday. The CAT highlights are given in Section 2.3.

1.1.3 Components of the CAT Short Range Transit Plan

The *2012 CAT Short Range Transit Plan* 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.

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

The main components of the transit development plan include:

- An examination of existing routes and plans
- Considerations of existing and future demographics, 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 plan

1.1.4 A "Living Document"

The *2012 CAT Short Range Transit Plan* is subject to some changes. While the initial phases, which have more limitations to modify since no increase in funding levels are assumed, the changes proposed for later years may be modified as they move to the implementation phase. Population and employment projections may not materialize as anticipated, or funding may not be available when expected, so the plans may need to be adjusted. Transit demand may also increase faster than projected. Current forecasting foresees the return of $4.00 per gallon gasoline in 2012, with some forecasts calling for $5.00 per gallon gasoline. Should these higher prices come about, transit demand is likely to be much higher than anticipated, which could require a more aggressive expansion than is called for in this *2012 CAT Short Range Transit Plan*.

1.2 Study Area

The study area for the *2012 CAT Short Range Transit Plan* is the city limits of Raleigh. **Exhibit 1-1** shows the CAT service (in orange) in relation to the other services provided within the entire CAMPO region. Also shown are the existing bus services provided by C-Tran (within Cary), TTA (throughout the Triangle), and Wolfline (at NC State).

1.3 Study Team

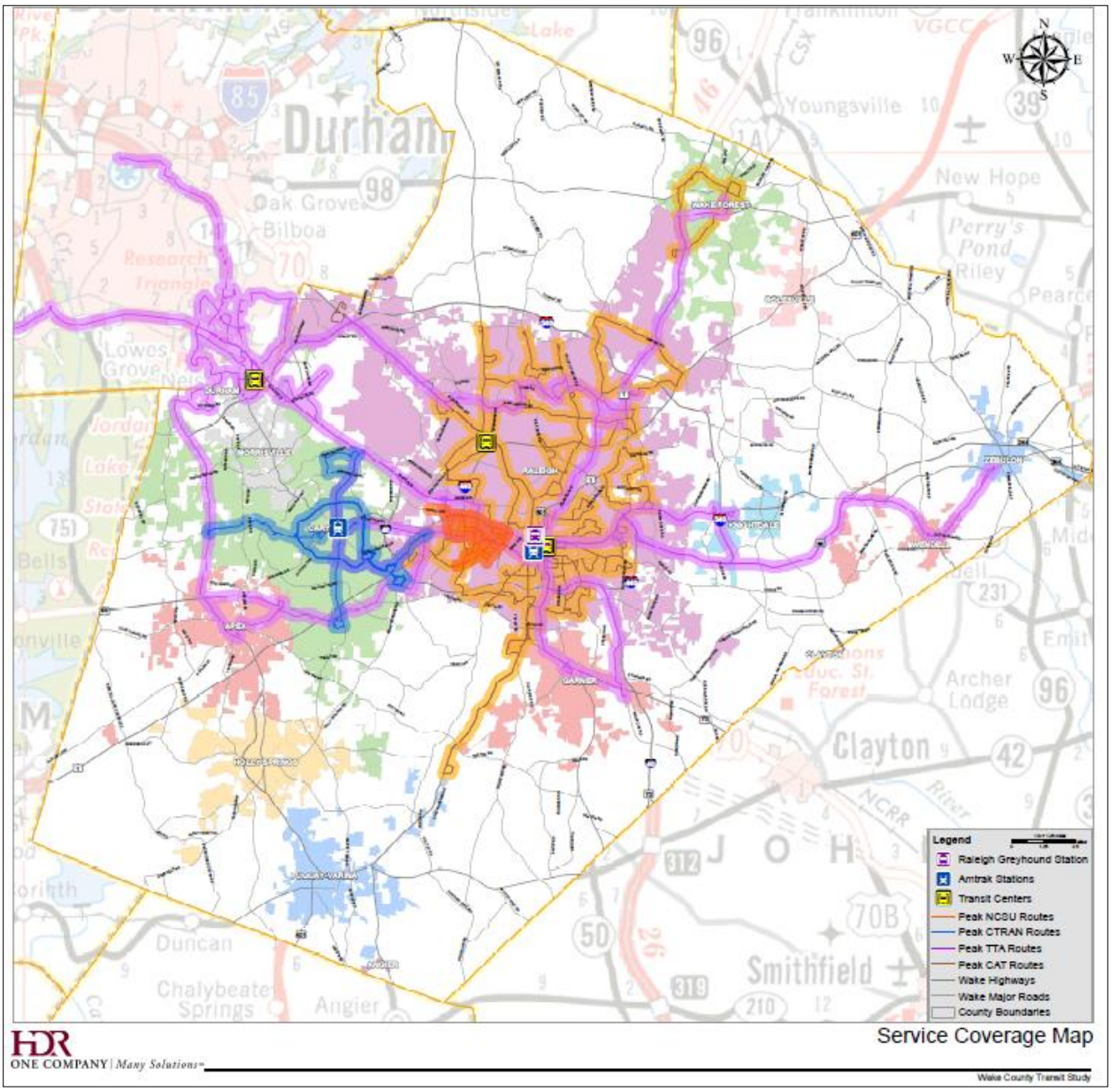
To ensure the goals and recommendations of the *2012 CAT Short Range Transit Plan* reflect the interests and considerations of all persons in Raleigh, considerable effort was made to incorporate the input of public officials, representatives of key civic organizations and public agencies, and the general public. An assembled project team consisting of a study steering committee, local transit and transportation partners, the Raleigh Transit Authority Board, and HDR consultants guided and monitored study progress. Additional public input will be solicited prior to the implementation of each phase of the adopted plan.

1.3.1 Core Study Steering Committee

The core study steering committee consisted of CAT staff and the consultant team

David Eatman	City of Raleigh/CAT – PM	Michael Ousdahl	HDR
Carmalee Scarpitti	City of Raleigh/CAT	Mike Surasky	HDR
Aaron Hair	City of Raleigh/CAT	Jessica Tisdale	HDR
Robert Bush	HDR Project Manager	Brett Wallace	HDR
Marcus Arnold	HDR	Kevin Hall	Planning Communities
Claire Brinkley	HDR	Andy Mundew	AJM Consulting

Exhibit 1-1
Existing Wake County Transit Service Coverage



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 provides a summary of this analysis that was conducted for the *2040 Capital Area Bus Transit Development Plan* and 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. For a more detailed discussion, the reader is referred to the long range plan.

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:

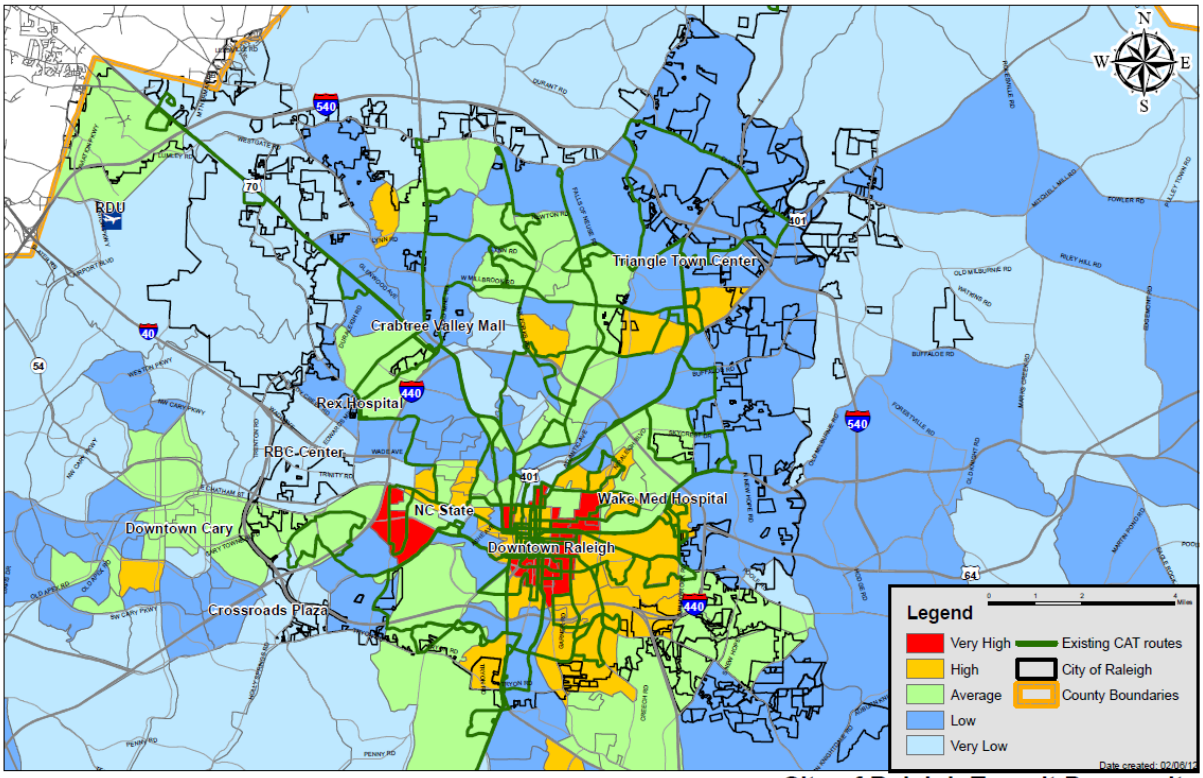
- Population density
- Percentage of households without cars
- Percentage of persons with mobility limitations
- Percentage of persons with work disabilities
- Percentage of persons who were not White, non-Hispanic
- Percentage of recent (< 10 years) immigrants
- Percentage of low-income (<$20,000) households
- 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 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 Raleigh 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).

Exhibit 2-1
Ridership Propensity



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.

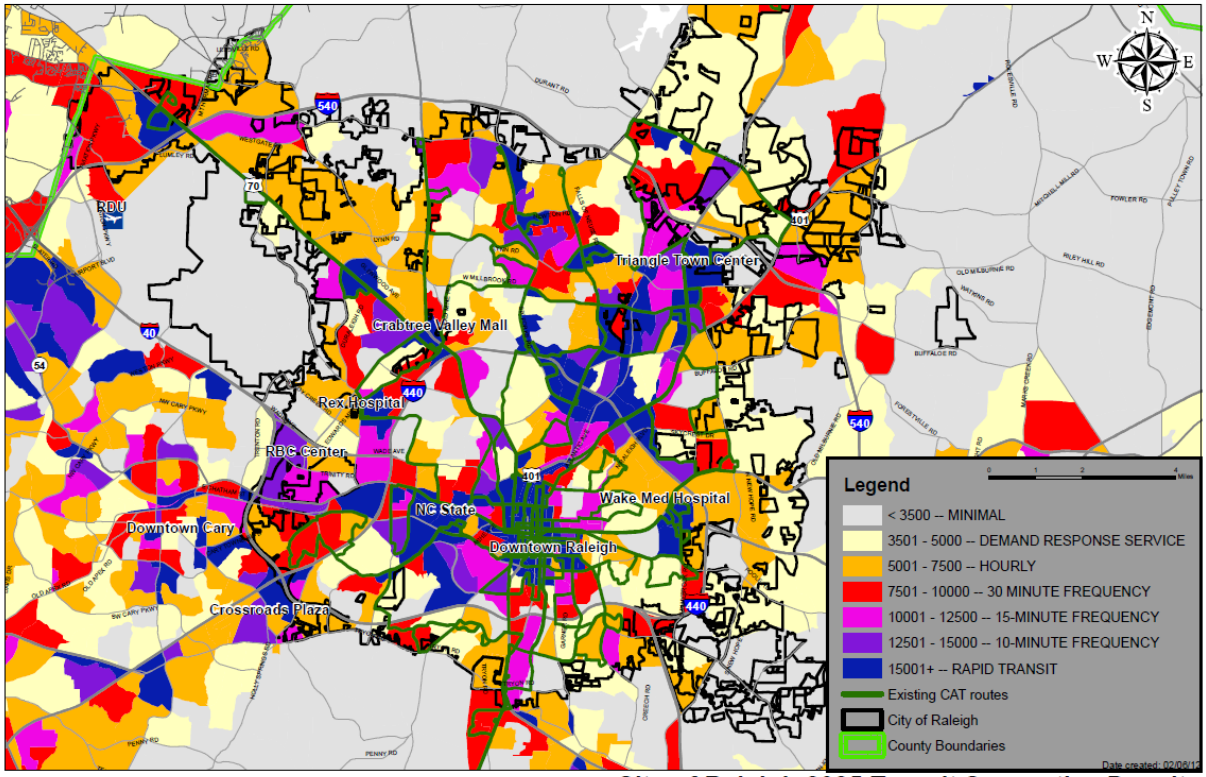
2.2 Transit Supportive Density

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.

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 Raleigh in 2025. 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, and 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). These locations are indicated by the blue shading on the map.

Exhibit 2-2
2025 Transit Supportive Density



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City of Raleigh 2025 Transit Supportive Density

Wake County Transit Study

2.3 Passenger Boarding and Alighting Counts

To better understand existing transit ridership trends, a complete boarding and alighting count was conducted for CAT using on-board counter personnel or "checkers". The boarding and alighting count was conducted for all existing CAT routes in September 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. More detail can be found in a separate Technical Memorandum.

2.3.1 CAT 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 2-3** 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 2-3
Weekday CAT Ridership

Route	Route	Ons	Offs	Total	Rank
1	Capital	1994	2015	4009	2
2	Falls of Neuse	1078	1070	2148	5
3	Glascock	306	304	610	22
4	Rex Hospital	1087	1094	2181	4
5	Biltmore Hills	639	629	1268	10
6	Crabtree	755	743	1498	8
7	South Saunders	1211	1204	2415	3
7C	Carolina Pines	388	388	776	18
8	Northclift	521	522	1043	13
8C	Sawmill Connector	180	180	360	25
10	Longview	468	447	915	16
11	Avent Ferry	1061	1070	2131	6
11C	Buck Jones Connector	304	304	608	23
12	Method	939	937	1876	7
13	Chavis Heights Loop	327	333	660	21
15	Wake Med	2208	2222	4430	1
15C	Trawick Connector	709	710	1419	9
16	Oberlin	610	612	1222	11
18	Worthdale	607	607	1214	12
19	Apollo Heights	507	507	1014	14
21	Caraleigh	475	469	944	15
22	State Street	434	427	861	17
23C	Millbrook Connector	304	304	608	23
24C	North Crosstown	364	364	728	20
25C	Triangle Town Center	371	371	742	19
26C	Early East	8	7	15	38
27	Southeast	25	25	50	36
28	Southwest	14	14	28	37
29	North Night Connector	45	45	90	34
30	Northeast	46	46	92	33

Route	Route	Ons	Offs	Total	Rank
32	Sanderford Road	151	145	296	26
33	Glenwood-Creedmoor	30	30	60	35
35	Poole Road	96	97	193	28
36	Garner Station	130	137	267	27
37	North Hills	54	63	117	31
38	Blue Ridge	87	91	178	29
39	Cameron Village	73	73	146	30
70	Brier Creek Express	51	51	102	32
SYSTEMWIDE		**18,657**	**18,657**	**37,314**	

Source: 2010 CAT Boarding and Alighting Count

2.3.2 Estimated Individual Riders

Traditionally, the transit industry has counted passenger boardings as "ridership." A boarding occurs every time a rider gets on a bus, and is the easiest and most accurate count of riders. Boardings are also known as "unlinked" trips. For riders that transfer between buses to complete a one-way trip, that rider would count as two boardings (one on each bus route, but this would be classified as one "linked" or one one-way trip. If the rider made the trip in the morning and returned in the afternoon, that individual rider would be counted as four boardings or two linked trips.

From the rider survey data, an estimate can be made of the number of individuals that use CAT service. **Exhibit 2-4** shows this calculation for a typical day. The unlinked trips are divided by the number of transfers to convert to linked trips. Individuals are estimated by dividing the linked trips by two, under the assumption that everyone makes a round trip on transit. This probably underestimates the number of individuals since some will not take transit in both the morning and afternoon, but others may make more than one trip during the day, such as to take transit to lunch. Without specific data, these effects are assumed to cancel one another out. The results show that one-way (linked) trips are about two-thirds of the boardings (unlinked trips), and individual riders are about one-third of the daily boardings.

Exhibit 2-4
Estimated Daily Individuals
(individuals riding on any single day)

Transfers	Boardings	One-Way Trips (Boardings/Transfers)	Individuals (One-way trips/2
0	5,829	5,829	2,915
1	7,412	3,706	1,853
2	1,912	637	319
Total	**15,153**	**10,172**	**5,086**
		67%	**34%**

Source: 2010 CAT Rider Survey; note missing values are not shown.

The other calculation that needs to be made to estimate individuals that use transit is to adjust for riders who do not ride every day. Some people will only take transit a few times a week or month. Since on any given day, these individuals will be different, the number of individual riders must be increased to reflect that there are many more individuals who ride only one day per week than are picked up on a single day survey. **Exhibit 2-5** shows this adjustment. Note that this table's totals are slightly different from the tables in Exhibit 2-4 since they have been adjusted to account for missing data. As shown, an estimated 13, 156 individuals use CAT services every month.

Exhibit 2-5
Estimated Monthly Individuals
(individuals riding anytime during one month)

Rider Frequency	Boardings	Daily Individuals (Boardings *0.34)	Adj Factor	Monthly Individuals
6 to 7 days a week	7,177	2,409	1.085	2,614
5 days a week	4,740	1,591	1.4	2,227
3 to 4 days a week	2,472	830	2.04	1,693
1 to 2 days a week	1,526	512	5.25	2,688
Once or twice a month	473	159	14	2,221
Less than once a month	182	61	28	1,713
Total	**16,569**	**5,562**		**13,156**

Source: 2010 CAT Rider Survey. Adjustment factors from the American Public Transportation Association

2.3.3 Major Activity Locations

From the stop level ridership, 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 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 not using transit 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 2-4** 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. Note that this table only reflects CAT riders; Triangle Transit riders and Wolfline riders are in addition to these ridership levels.

Exhibit 2-6
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

2.3.4 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 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 Rider On-board Surveys

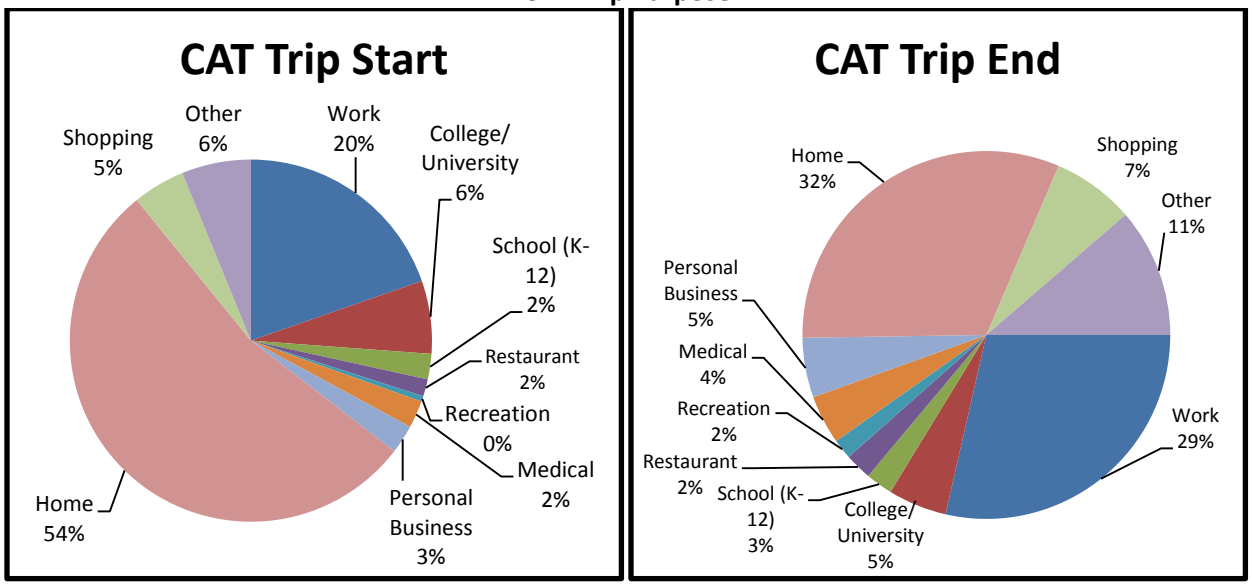
In order to gain a better understanding of current transit users within the region, an on-board ridership survey was administered in October 2010. Survey forms were available in English and Spanish versions. The survey asked questions regarding riders' trip characteristics, ridership habits, demographic information, and recommendations for improvements. The rider surveys are described in detail in a separate Technical Memorandum prepared as part of the overall study. Highlights are given below.

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.

2.4.1 CAT Trip Characteristics

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 2-7** shows the results.

Exhibit 2-7
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.

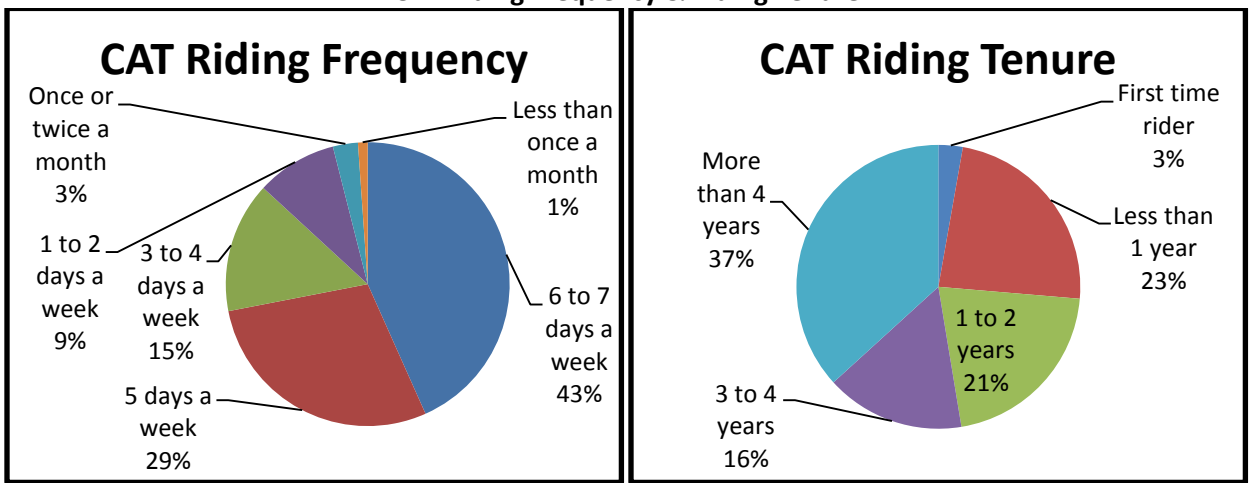
When excluding "home" as a trip purpose, CAT had a plurality of trips for work at 45%. CAT also showed a large percentage of college/university related trips at 10%. Another significant trip purpose was for shopping on CAT at around 10% of the trips. These findings convey the benefits of having a transit system in place by providing mobility for residents to engage in productive activities that benefit the overall economy of the Triangle.

2.4.2 CAT Rider System Use

Riders were asked how frequently they use CAT's bus service. As illustrated in **Exhibit 2-8**, 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 2-8
CAT Riding Frequency & Riding Tenure



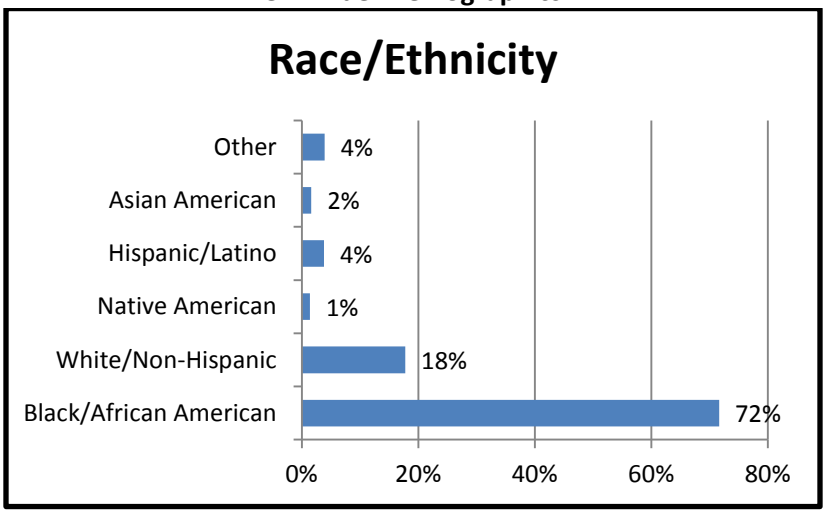
Source: 2010 Rider Survey

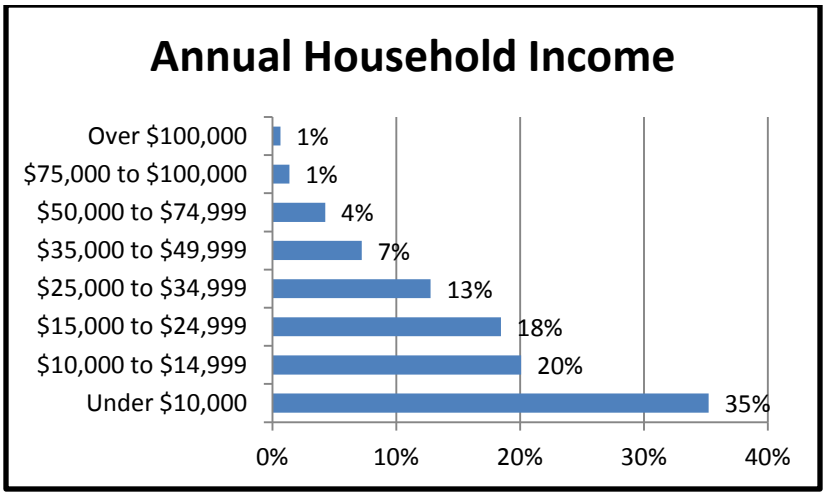
2.4.3 CAT Rider Demographics

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 2-9**.

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 2-9
CAT Rider Demographics



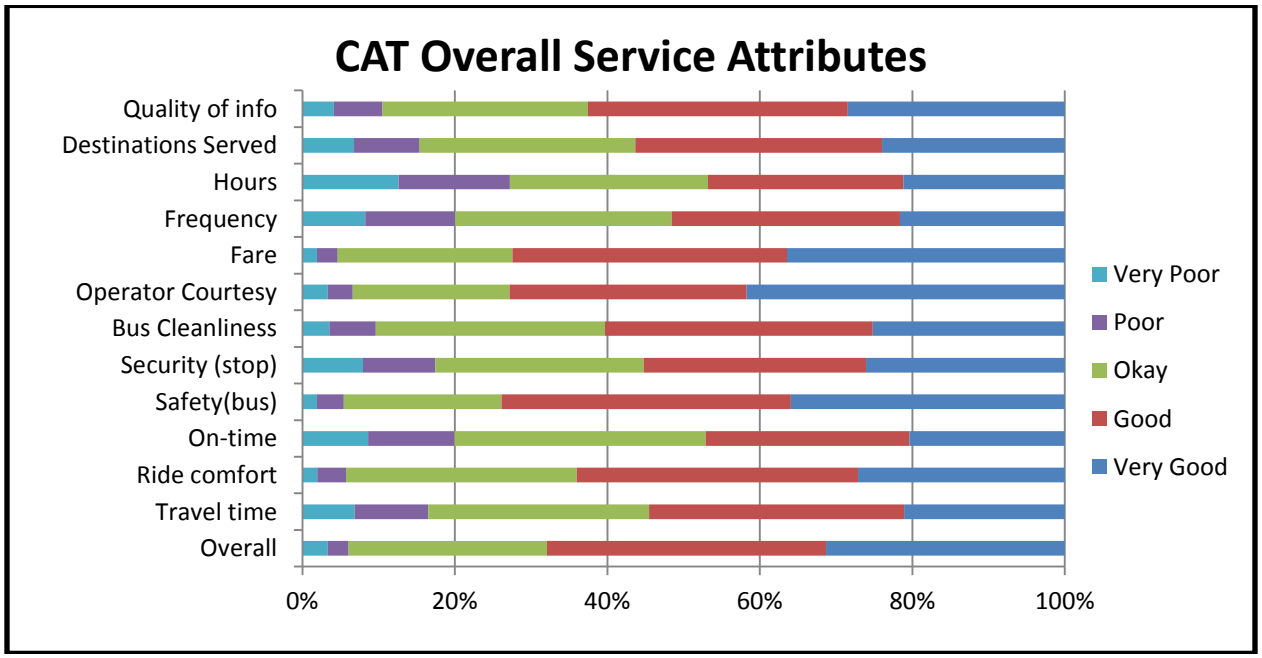


Source: 2010 Rider Survey

2.4.4 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 2-10**. 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 2-10
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

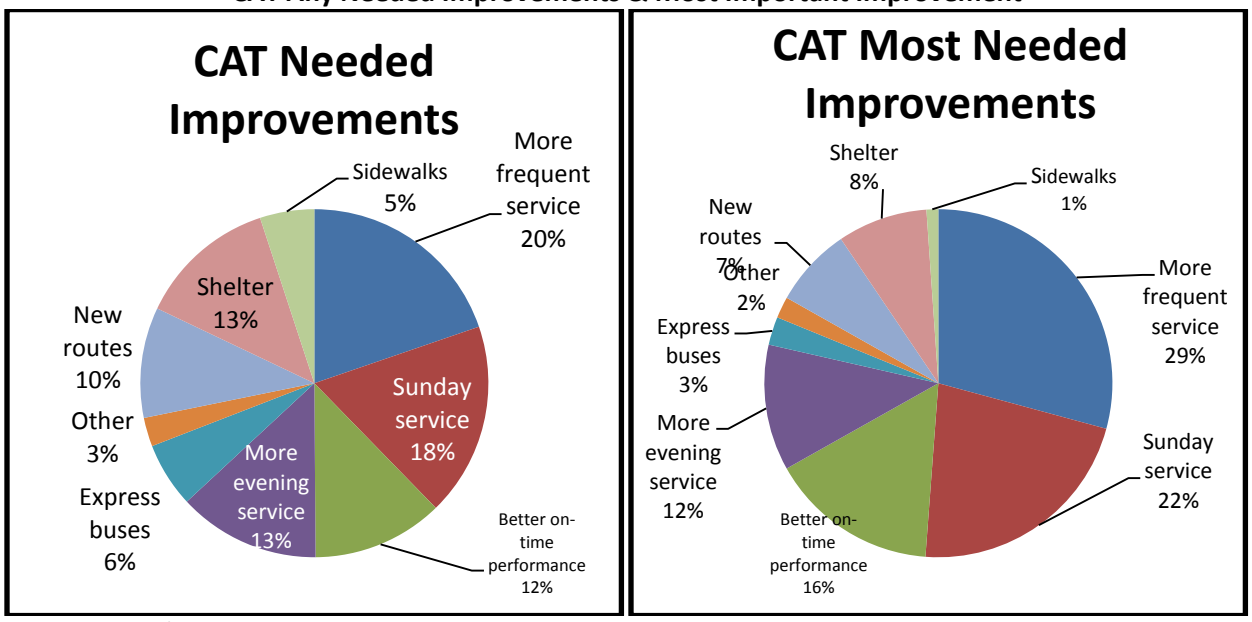
The lowest scoring attributes, all with a composite score below 3.5 are:

- 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 2-11.**

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 2-11
CAT Any Needed Improvements & Most Important Improvement



Source: 2010 Rider Survey

2.4.5 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. The major reason for using the bus for CAT was because "The bus is my only option," selected by 59% of the riders. These riders are those typically considered as "transit dependent" but just as significant is that 41% could be considered as choice riders. 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; nearly 9% in fact use the bus to save money on their commuting costs.

A second question provides further insight into the impact of bus service. When asked how they would travel if no bus service was available, 38% would shift to a shared-ride mode, either riding with a friend or a taxi. Another 21% would shift to a non-motorized mode, either walking or bicycling, with 17% choosing to drive to work. Significantly, 24% of CAT riders would lose their mobility and would not make the trip.

2.5 Public Involvement

The general public was given a number of opportunities to provide input on desired service improvements as part of the planning outreach for the overall *2012 CAT Short Range Transit Plan*. These opportunities included:

- Joint workshops with Triangle Transit as part of their Alternatives Analysis meetings in September 2010 and March 2011;
- Stakeholder meetings at the Raleigh Urban Design Center in December 2010 and at Biltmore Hills Community Center in February 2011;
- Presentations to the Raleigh Transit Authority Board in December 2010, and March, May, and September 2011;
- Public meetings in June 2011 at the Walnut Creek Wetlands Center, Raleigh Urban Design Center, Triangle Town Center, and McKimmon Center, and
- Meetings with CAT bus operators in October 2010 and June 2011.
- Public meetings in April and May 2012 at the Wilmoore Café/Moore Square, Green Road Community Center, and the CAT Operating Facility on Poole Road. Additionally, an online comment form was available on the CAT website.

A separate memorandum provides details about specific comments. The general themes that emerged from all meetings 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 (shelters, benches)
- Extend service hours – weekends, later hours, holidays

2.5.1 Raleigh Transit Authority Action

A public hearing by the Raleigh Transit Authority highlighting the plan and designed to receive comments was conducted on August 9, 2012. Staff also visited a number of CAC's and distributed materials at existing gatherings.

At the September 13, 2012 Raleigh Transit Authority meeting, the 2012 CAT Short Range Transit Plan was approved (this document). The final set of changes and implementation schedule will follow the recommendations of this document, but may have minor modifications based upon public input and final implementation details.

Refer to the Transit Plan website,

http://www.raleighnc.gov/services/content/PWksTransit/Articles/ShortRangeTransitPlan.html,

for more details as they are developed.

3 Mobility Recommendations

In developing the recommendations for improved local bus service in Raleigh and throughout Wake County, several objectives were identified. The service changes should develop a comprehensive bus network within Wake County that:

- Enhances existing transit corridors
- Builds upon existing success
- Links population and employment centers with direct services
- Directs transit services to areas with projected growth
- Defines service levels that correspond with projected ridership
- Creates a framework of transit options that may be deployed quickly

Guidelines used in the development of the individual route proposals were to:

- Simplify routes for new riders
- Consolidate off-hour routes into peak routes
- Reduce large one-way loops
- Provide minimum basic service frequency and span of service; more as demand warrants
- Initiate or increase weekend and holiday services where warranted
- Identify major corridors for emphasis
- Adequately equip the fleet with new buses, including spares
- Construct capital improvements to support the expanded system, both on-street and off-street
- Complement the Triangle Transit rail system by connecting with it and not duplicating it

3.1 Service and Capital Concepts

Enhancements to transit service and capital facilities serve as the basis for the recommendations in the *2012 CAT Short Range Transit Plan*. The following listing describes the types of transit services and capital facilities that were determined to be appropriate for Raleigh.

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.

Local Bus

c. Located along major residential and employment corridors.
d. Primarily located in areas where the transit-supportive density (combination of population and employment) exceeds 7500 persons per square mile.

Commuter Bus

B. Commuter routes
   a. Express service provided by Triangle Transit primarily operating on highways focused on downtown, NC State, and Wake Med (the locations that charge for parking)
   b. These routes have higher fares and use over-the-road coaches
   c. As a Triangle Transit service, these routes were not developed further in the *2012 CAT Short Range Transit Plan*, but were included in the long-range *2040 Capital Area Bus Transit Development Plan*

C. Neighborhood circulator routes
   a. Routes can deviate off major thoroughfares.
   b. Includes "activity center specials" operating in concentrated areas such as downtown using distinctive buses, e.g. the R-Line

D. Weekend/holiday routes
   a. Provision of local 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. ADA paratransit service for disabled individuals unable to access regular, fixed-route transit service.
   b. Costs included where ADA service boundaries increase


Neighborhood Transit Center

2. Capital facilities

A. Transit Centers
   a. Location with three or more 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.

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

D. 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

E. Support Facilities
   a. Buses
      i. Different buses for different service types
      ii. Spare buses included
      iii. Sufficient maintenance capacity exists at the new CAT maintenance facility on Poole Road
   b. 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 (the time interval between buses) 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. 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.

C. 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. Neighborhood circulator routes
i. Targeted performance is 10 passengers/hour Saturday and 8 passengers/hour Sunday.

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, information displays, 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.
B. 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.

3.2.1 Premium Transit Corridors

A key recommendation is the identification and establishment of "Premium Transit Corridors." These local bus corridors are those that have the most ridership, greatest potential for growth, and that need the highest frequency and highest level of passenger amenities. The nine corridors identified for "premium" designation are:

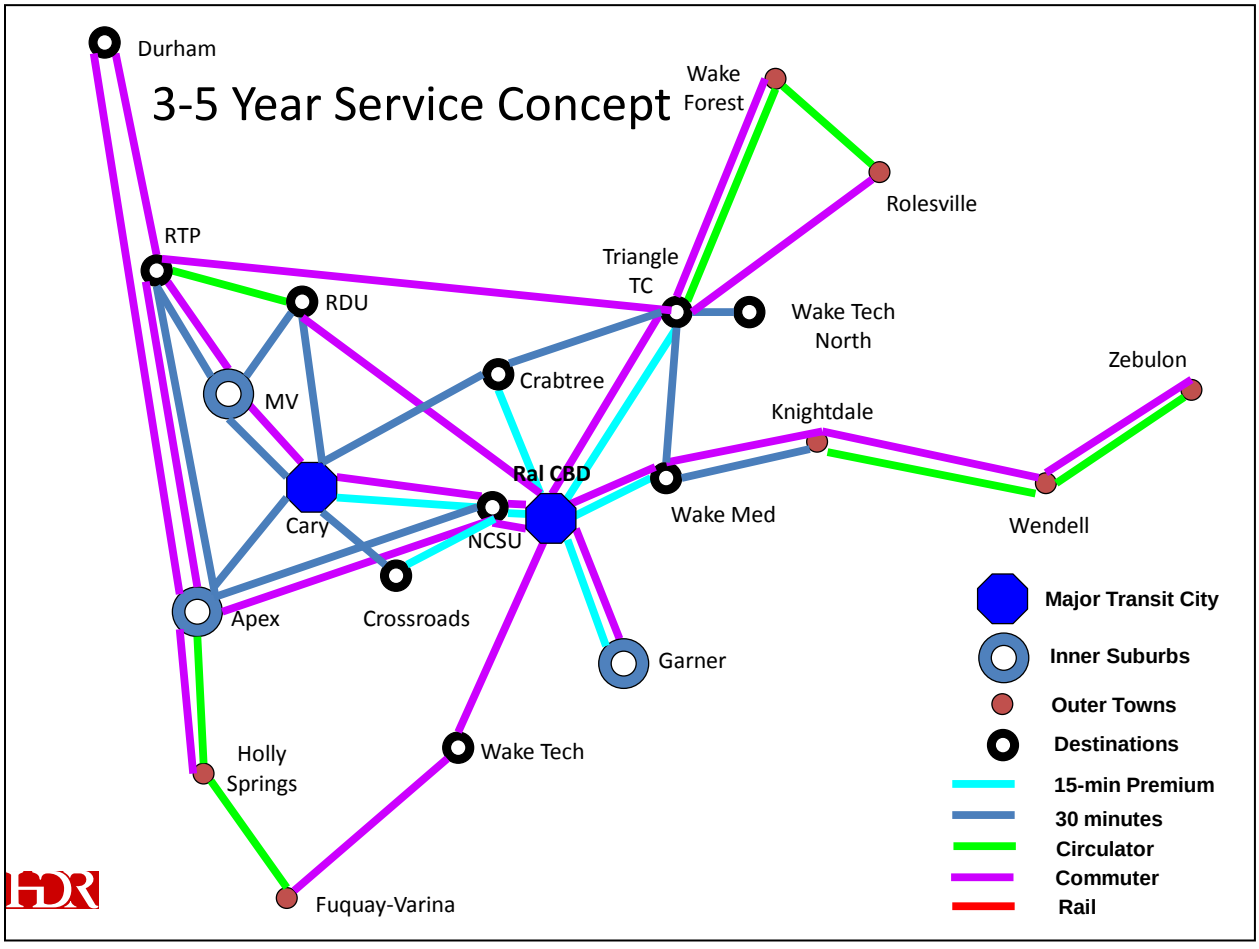
- Capital Boulevard
- New Bern Avenue
- Rock Quarry Road
- South Saunders Street
- Avent Ferry Road
- Hillsborough Street
- Glenwood Avenue/Oberlin Road
- Six Forks Road
- Falls of Neuse Road

These corridors will have a combination of frequent, all day, seven-day-a-week service and improved pedestrian amenities. Service will be offered at least every 15 minutes during weekday peaks and at least every 30 minutes during off peaks and weekends. They will provide a high level of service to all quadrants of the City, and will clearly identify to existing and new riders where to go if high quality transit service is desired.

3.2.2 Overall Wake County Service Concept

Exhibit 3-1 is a conceptual representation of how the overall services fit together for the entire county. It shows the types of service connections that will be provided among the major transit locations and all of the Wake County municipalities and how CAT's local services fit in with the overall concept. Note that for simplicity's sake, not all destinations or premium corridors 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 3-1
Wake County Short Range Service Concept



The following sections describe how the CAT changes will be phased in over the next three to five years.

3.3 Recommended Approach to Short Term Changes

The approach used in determining the short term priorities for CAT were based upon several overall themes:

- In the first year (FY 2013), do as much as possible within existing funding
- Establish the long-term route network
- Reinvest savings from poorly used services into areas of greatest need
- In 2014 and beyond, add service and facilities by premium transit corridor
- Incrementally implement long-term service network

Expenses beyond the initial year, which can be done within the existing funding levels, will require additional funding. As such, the timing of these changes is subject to adjustment to stay within available resources. The changes presented have been determined to be within the overall guidelines of the *2040 Capital Area Bus Transit Development Plan*. Should adjustments be required, the overall themes above should be used to determine the revised phasing.

3.3.1 Limitations of this Plan

The recommendations in this plan have been developed based upon the best information available at the time, and on input received from the affected areas. Circumstances can change, and as the recommendations move through the implementation process, further refinement is to be expected, especially for changes beyond FY 2013 (July 2012 – June 2013). As the results of the service changes in the first year are known, the plans for the later years should reflect lessons learned.

The service changes below have not been fully developed. After public input is received, the routes may need to be refined and then schedules need to be determined. The schedule development should be based upon the most current and complete information that's available so that running times are realistic. Excessive layover times, especially at intermediate timepoints, should be eliminated, and overly aggressive schedules should be avoided. Timepoints should be set approximately 10 minutes apart to give a guide to riders on when to expect their bus, but not be overly prescriptive on the time at individual locations.

Suggested On-Time LOS Standard
For CAT, a reasonable target is LOS "C", or 85% of the trips arriving no more than 5 minutes late at a timepoint, or leaving a timepoint early. See Technical Memorandum #2 in the Appendix for more details.

With the adoption of the new TransLoc bus tracking system[4], real-time travel information is available. This data should allow for the preparation of accurate running times for all routes and eliminate much of the guesswork that has historically been required to develop schedules.

3.3.2 Ridership Levels

Ridership estimates for the service changes have not been specifically prepared. As one element of the overall Wake County transit planning effort, the CAT short range plan is rolled into the countywide plan. Triangle Transit will be incorporating the revised CAT route structure into subsequent Triangle Regional Model travel demand runs. These subsequent runs will develop ridership estimates for each route.

Routes were designed with desired performance levels in mind (see sidebar). These levels are similar to the performance of the current CAT routes and similar routes throughout the country.

The elasticity approach provides a general indication of what level of ridership increase could be expected with the proposed service changes. Elasticity measures the change in one variable against the change in another variable. For example, if the service elasticity is 0.5, for every 10% increase in service hours, ridership could be expected to increase by 5%. Service elasticity in some studies range from +0.6 to +1.02, with an average between +0.76 and +0.78[5]. Smaller urban areas, and areas with lower beginning service levels had the greatest elasticity, where larger cities or cities that already had a good amount of service had lower elasticities.

Targeted Ridership Levels

While a specific ridership estimate (projection) was not developed, the services were designed to achieve a targeted ridership performance level. For regular local routes, which are most service operated by CAT, the targeted passengers per revenue hour (p/h) is

- 25 p/h for weekdays,
- 20 p/h for Saturdays, and
- 15 p/h for Sundays.

For connector-type services, a lower, realistic target is:

- 12 p/h weekdays,
- 10 p/h Saturday, and
- 8 p/h Sundays.

These targets were based upon a combination of the existing performance levels of CAT and other systems large and small. They are deemed to be realistic and achievable.

Raleigh, comparatively, has a low level of transit service, especially in terms of the frequency of service. Most routes operate at best every 30 minutes during peak times, and hourly during the middle of the day. Doubling service, as is proposed for many routes, would cut the headway times in half, from every 30 minutes to every 15 minutes or from every 60 minutes to every 30 minutes. From a rider's perspective, this is a dramatic improvement in service, and ridership levels respond accordingly.

[4] See http://triangle.transloc.com/ for real-time bus information on all systems in the Triangle.
[5] See for example,Pratt, Richard, et al. *TCRP Report 95: Traveler Response to Transportation System Changes; Chapter 10: Bus Routing & Coverage*. Washington, DC: Transportation Research Board, 2004.

Overall, the *2012 CAT Short Range Transit Plan* calls for a 77% increase in the hours of annual service provided between 2012 and the end of 2016. Based upon the elasticity factors, ridership could be expected to have a similar increase, from about 5.2 million annual riders to 9.2 million. Ridership levels may increase even more because the first year of the transit plan reallocates hours from unproductive routes and times to areas where ridership levels are highest. Overall hours of service do not increase, but the headways on key routes are cut in half.

3.4 FY 2013 Service Changes

During the first year of the *2012 CAT Short Range Transit Plan*, numerous changes are recommended for implementation. These changes collectively will simplify the system by adding service on holidays; eliminating the practice of having a separate nighttime and weekend system; simplifying the route structure by streamlining the routes; and begin implementing high frequency service on the premium transit corridors.

These changes are extensive and will affect every route in the system, primarily due to the changes in the nighttime service and the addition of more holiday service. As such, the changes may need to be phased in over the year. CAT typically makes one set of schedule changes in any given year at the time of the changeover in the operator work assignments (the operator pick). This operator pick customarily occurs in January, and phasing the changes will require additional operator picks. Based upon public comments and the detailed evaluation of the changes in work assignments by the service contractor, adjustments to the phasing plan outlined below may occur.

The division of the changes into two phases is a suggestion as a way to minimize the burden on staff and the riders. The first phase is those changes needed to adjust schedules, while Phase II requires some route changes. They could all be done at once, or the changes could be done in three phases, with the first phase consisting only of the holiday changes. Since the 4th of July occurs immediately after the start of CAT's fiscal year, the holiday changes are recommended to be in Phase I. The other changes could be delayed until later in the year, but the longer they are delayed, the longer before riders see any benefits.

3.4.1 Phase I Changes

Changes during this initial phase are all scheduling changes. The few "routing" changes are to adjust selected trips on individual routes but are not adjustments to how the route operates during weekday daytime. There are no capital changes during this phase nor are any changes required to the bus fleet.

3.4.1.1 *Holiday Schedule Changes*

Exhibit 3-2 shows the services offered by CAT and the other transit providers in the Triangle on the major holidays. Wolfline service is not shown; their schedule is entirely based upon the schedule of the university. As indicated, DATA in Durham provides a robust amount of holiday service; Christmas Day is

the only day they do not provide bus service. Triangle Transit offers different service levels from the other providers reflecting that theirs is more of a commuter market while the other providers are used for a greater variety of purposes. Note that Columbus Day, Veteran's Day, and President's Day are not shown. All providers operate a weekday schedule on those days.

Exhibit 3-2
Holiday Schedules

Holiday	CAT	C-Tran	DATA	Chapel Hill	Triangle Transit
4th of July	None	None	Sunday	None	None
Labor Day	None	None	Sunday	None	None
Thanksgiving Day	None	None	Sunday	None	None
Thanksgiving Friday	Friday	Friday	Friday	Friday	Saturday
Christmas Eve	Weekday	None	Weekday	Weekday	None
Christmas Day	None	None	None	None	None
New Years Eve	Weekday	Weekday	Weekday	Weekday	Weekday
New Years Day	None	None	Sunday	None	None
MLK Day	None	None	Sunday	Monday	Saturday
Good Friday	Friday	None	Friday	Friday	Saturday
Memorial Day	Saturday	None	Sunday	None	None

For simplicity's sake, both for the transit provider and rider, holiday schedules are usually either a Saturday or a Sunday schedule. This means that a route would operate the same service on the holiday as it operates on either the Saturday or Sunday. If a route does not operate on Saturday or Sunday, then no service would be provided on that holiday. For the "movable day" holidays, those that occur on a specific date (4th of July, Christmas Eve, Christmas Day, New Years Eve, New Years Day), the "holiday" level of service is provided on the observed weekday of the holiday, generally the Friday before if the holiday is on a Saturday, or the Monday after if the holiday is on a Sunday.

The ridership levels from DATA provide a very good indicator of how much service is should be provided by CAT for each of the holidays. Ridership levels on each system for all holidays over the past two years were compared with the average weekday, Saturday, and Sunday ridership levels to identify how much service is warranted. Overall, the average Saturday had 66 percent of the ridership level on an average weekday, and Sunday had 24 percent of the average weekday ridership. Saturday service levels are therefore recommended for days that have about 50-75 percent of an average weekday ridership, and Sunday service is recommended for days with ridership between about 10-50 percent of the average weekday. Days with ridership above 75 percent of the average weekday are recommended for a regular weekday schedule and days with less than 10 percent of the average weekday are recommended for no service. These parameters set a high standard of providing service and are reflective of most larger systems around the country.

Exhibit 3-3 shows the recommended service levels for CAT compared with the current service offered. Ideally, the other local systems in the Triangle will also adopt these service levels so that the individual rider will have a consistent service level no matter where they live.

Exhibit 3-3
Recommended Holiday Schedules

Holiday	Recommended Service Level	Current CAT Service
4th of July	Sunday	None
Labor Day	Sunday	None
Thanksgiving Day	None	None
Thanksgiving Friday	Saturday	Friday
Christmas Eve	Saturday	Weekday
Christmas Day	None	None
New Years Eve	Saturday	Weekday
New Years Day	Sunday	None
MLK Day	Saturday	None
Good Friday	Friday	Friday
Memorial Day	Sunday	Saturday

The result is the operation of four "Saturday" holidays and four "Sunday" holidays. For the movable day "Saturday" holidays, if the actual holiday is on a Sunday, then a Sunday level of service would be provided, with a Saturday level of service provided on the following Monday when most people are off work. Five days receive an "upgrade" in service – 4th of July, Labor Day, New Years Day, and MLK Day. Four days receive a lesser amount of service – Thanksgiving Friday, Christmas Eve, New Years Eve, and Memorial Day. The lower amount of service is in line with actual ridership levels on these days. This balancing of supply and demand allows for more days of service at no net cost to CAT.

No service is recommended for Thanksgiving Day. This recommendation is made as a way to control costs and to ease into the provision of holiday service. DATA's ridership on Thanksgiving Day was the lowest of all its holidays at about 20 percent of the average weekday. Still, they were carrying in excess of 3,000 daily boardings on that day. CAT should consider adding Thanksgiving Day service as soon as funding allows.

No service is recommended for Christmas Day in keeping with the current practice of DATA. Most large cities, though, offer a Sunday level of service on Christmas Day since some people do still have to work on that day or will travel to visit family and friends. It is recommended that CAT implement the holiday schedules as outlined above and if ridership materializes as expected and if funding is available, Sunday service be added on Christmas Day in later years.

Weekday service has been assumed for Veteran's Day and for Good Friday. Both of these days are near the cut off point where Saturday service might be a better fit. Additional data should be gathered for these days and the service levels reevaluated at a later date to see if a change is warranted.

3.4.1.2 *Nighttime and Fringe Trip Schedule Adjustments*

A detailed analysis was conducted on the ridership for the off-hours routes and on the first and last trips of the day for all routes. This analysis was done to identify times and locations where service was being provided but not being used or where existing ridership was high indicating a need for more service.

A major objective of the analysis was to merge the off-hour routes into the regular daytime routes. The current route structure is an outgrowth of changes made to the system several years ago when the former demand-responsive service zones were converted into fixed route services. At that time, the origins and destinations of the demand-response riders were essentially connected up. For zones that operated off-hours, the resulting routes were not the same as the daytime routes. To signal to the rider that the off-hour service was different, a different route name and number was applied to the off-hour service.

This approach worked well initially, but as ridership has changed in the ensuing years, the use of off-hour routes now creates more confusion than clarification. It has become a hindrance, especially for new riders who were not familiar with the old service. Therefore, the designation of different routes, names, and numbers during early morning, evenings, and weekends are recommended for discontinuation.

Instead of having separate routes, the span of service on the daytime routes are recommended to be expanded based upon ridership levels. For trips where boardings were greater than five riders, the daytime route is recommended to be extended to cover that trip. For example, ridership on the 39 Cameron Village was more than five riders on each trip from 7 PM to 10 PM. As a result, the span of service on the 16 Oberlin is recommended to be extended until 10 PM to cover for these trips. On the 30 Northeast Evening route, the last trip at 10 PM only had three boardings, but the trips from 7 PM to 9 PM each had more than five boardings. The 3 Glascock is therefore recommended to have its span of service increased until 9 PM to cover for the trips that are used on the 30 Northeast Evening. The 10 PM trip is discontinued.

When an off-hours route duplicated more than one daytime route, the location of the ridership was examined to determine where the riders were actually on board. The resulting recommendations keep ridership at the time and location where service is being used and only discontinues it where fewer than about five riders would lose service.

Exhibit 3-4 shows the early morning network and **Exhibit 3-5** shows the evening service network that will be in place after the separate off-hour routes are merged into the daytime routes.

The decrease in early morning service coverage is misleading – the areas losing service all have very low ridership levels – generally less than 5 persons per route per direction. So even though the coverage area is shrinking, few riders lose service. The savings in this reduction have been reapplied elsewhere in the system, notably some routes have actually gained earlier service based upon the passenger loads on their current first trip.

As shown on the evening map, a few areas with very low ridership will lose service – Glenwood Avenue to Brier Creek, with a limited number of trips on the 70e Brier Creek; Edwards Mill Road, Blue Ridge Road, and Creedmoor Road on the 4 Rex Hospital; Six Forks Road, Spring Forest Road, Millbrook Road, and Hardimont Road on the 2 Falls of Neuse and 29C North Night. Service is added on Lassiter Mill and Northclift on the 8 Northclift and continuous service on Falls of Neuse.

Marked up dispatch sheets were prepared as part of this detailed examination of the schedules. These mark ups were submitted and reviewed by CAT officials and the staff of the CAT contractor.

Exhibit 3-4
Early Morning Route Changes

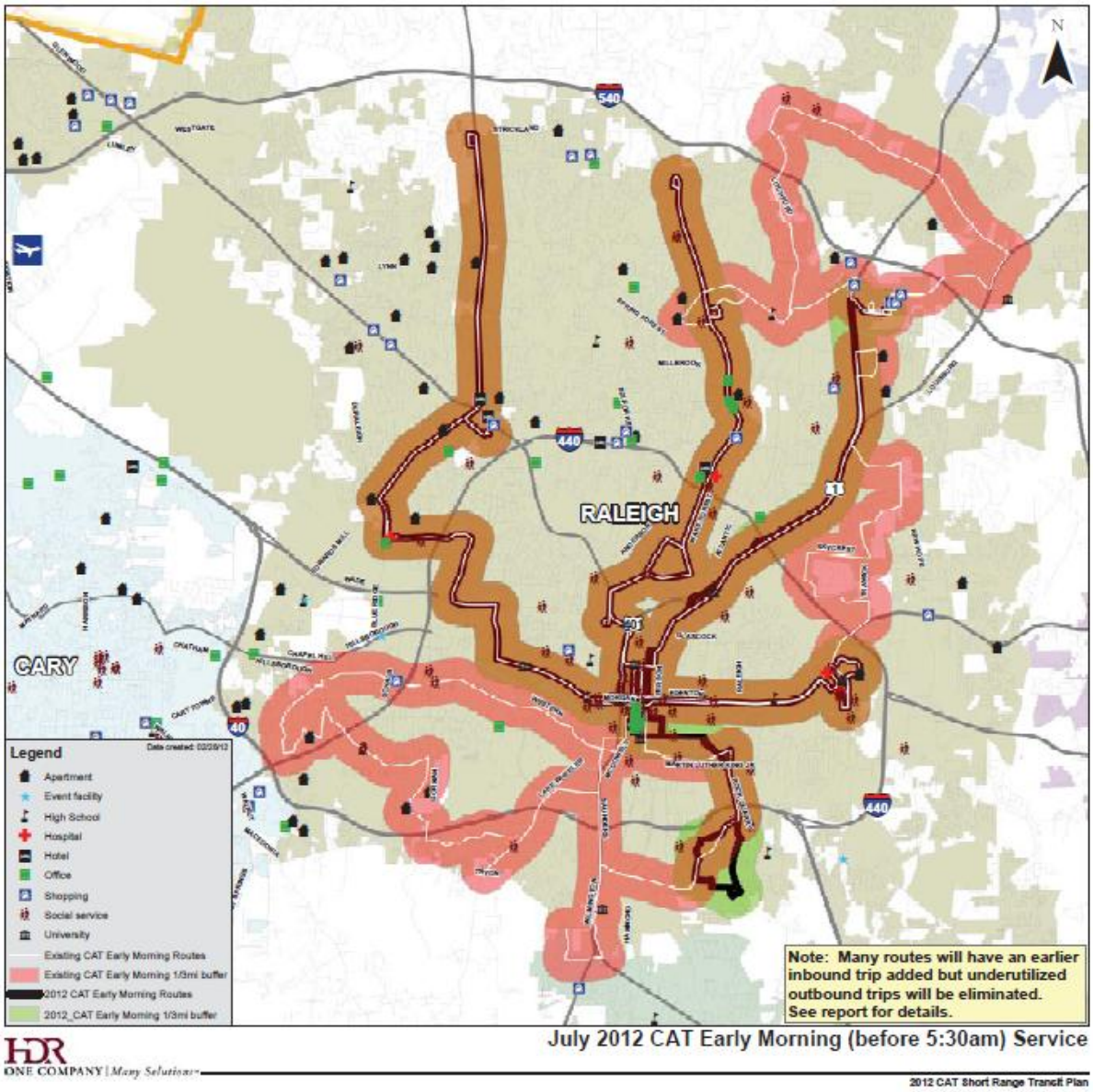
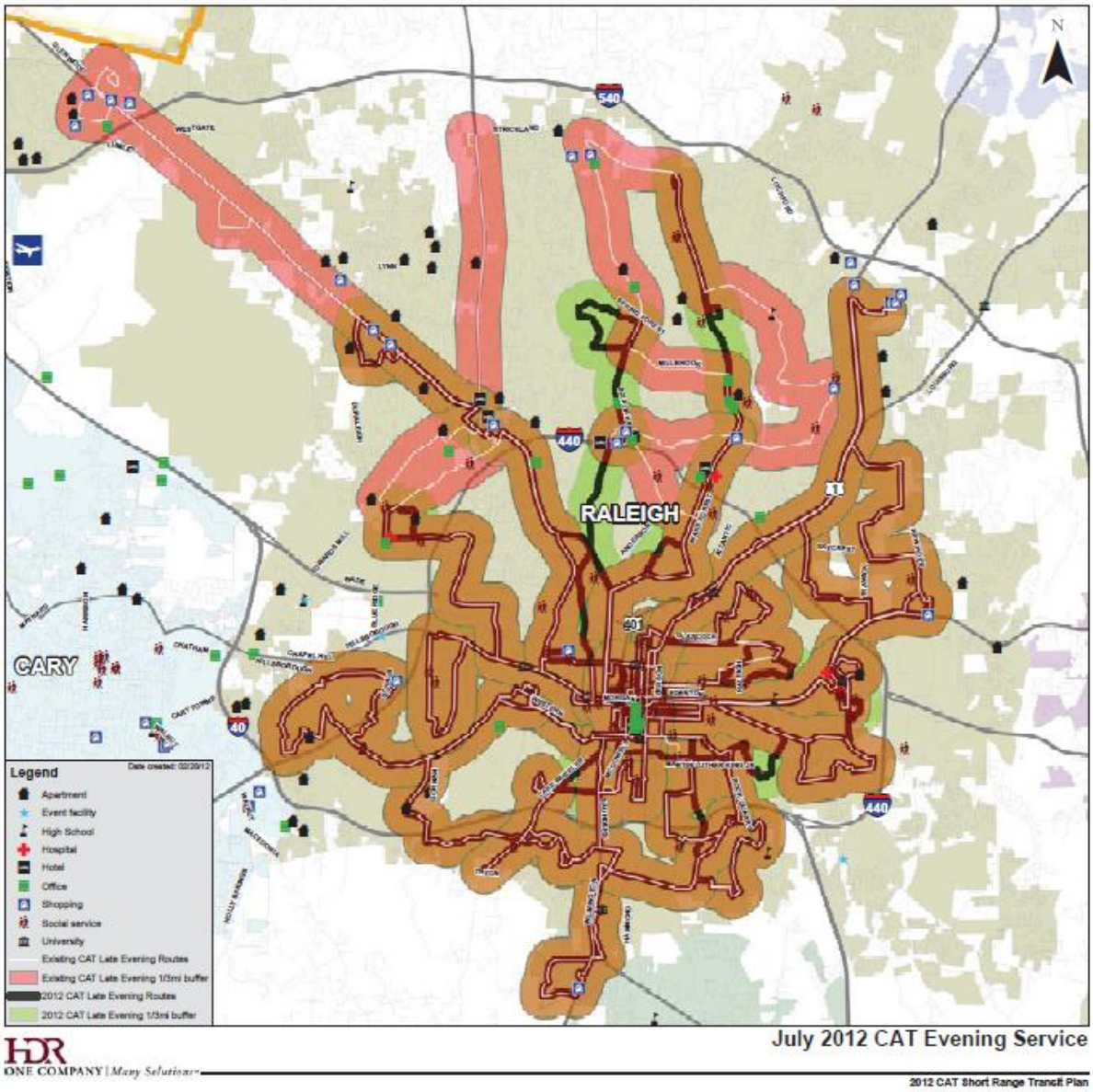


Exhibit 3-5
Evening Route Changes



All routes, both daytime and off hours, weekdays and weekends, were examined to see if the span of service needed to be increased or decreased. Ridership on the first few trips and the last few trips of the day were examined in detail. The guideline for making a decision on changing the span was that if a trip had more than 20 boardings, an earlier or later trip was warranted; if a trip had five or fewer boardings, the trip was discontinued; for trips with between five and 20 boardings, the span of service was left unchanged.

In no case were trips recommended to be eliminated after 6 AM or before 6 PM. Service during these hours was considered to be the minimum amount required. Regardless of ridership levels, the first trip of the day would be no later than around 6 AM and the last trip of the day would not be before about 6 PM.

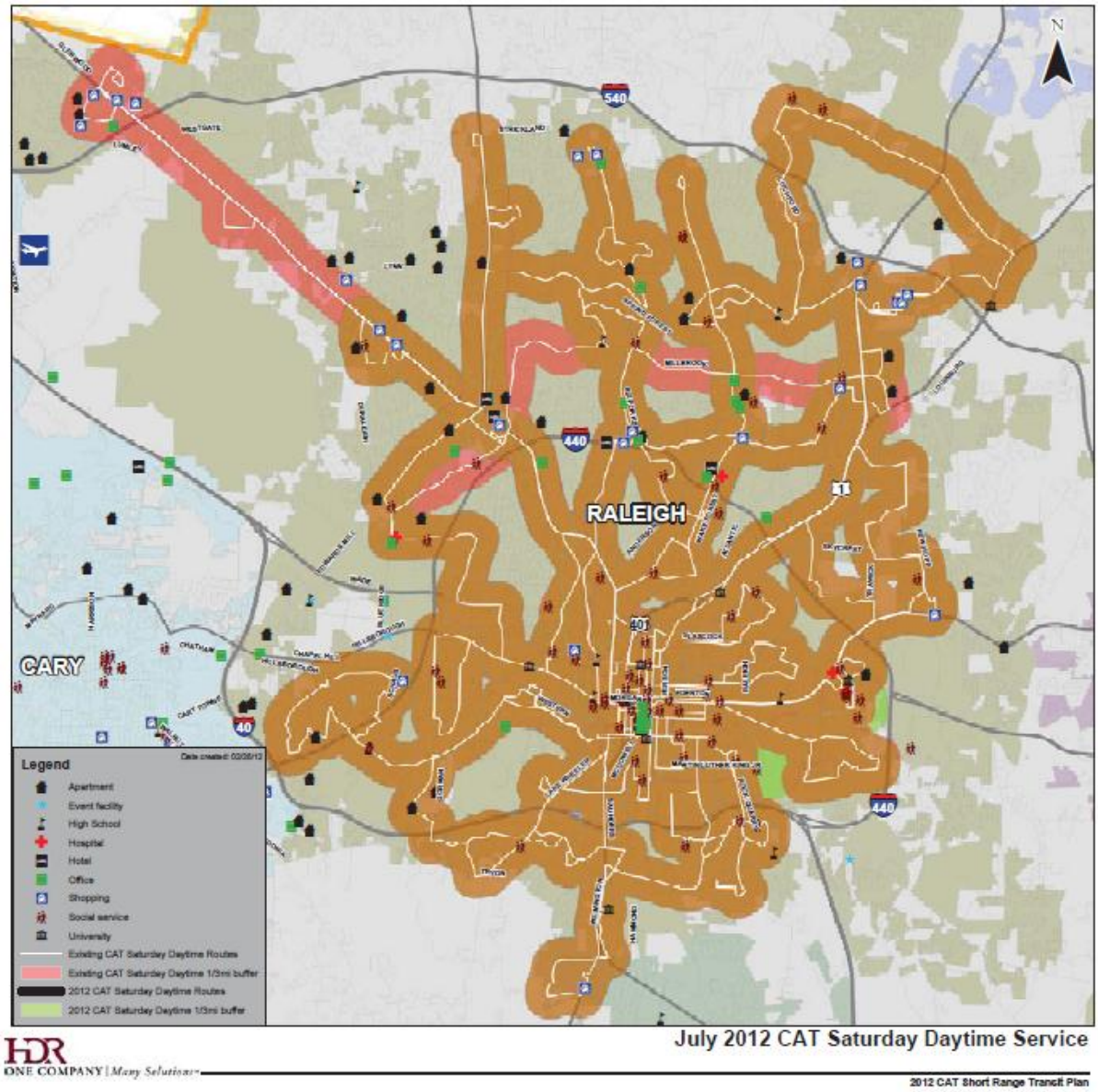
As a result of this finely tuned approach, all off-hour routes can be merged into their daytime counterparts and service spans can be adjusted on all routes to match demand with no increase in costs. The resulting system should have a much greater productivity because service is being removed from areas where it is very poorly used and redirected into areas with a clear pent up demand.

3.4.1.3 *Saturday Service Adjustments*

Due to low ridership, the 16 Oberlin route on Saturday is recommended to terminate at Crabtree. There were few riders on Blue Ridge Road, and the 4 Rex Hospital continues to provide a connection between Crabtree and Rex Hospital.

Two routes are proposed to have their Saturday service discontinued due to low ridership – 23C Millbrook, with 167 boardings all day, and 70e Brier Creek, with 69 boardings all day. Saturday service is not a minimum service requirement, and both of these routes have poor performance. Additional changes are planned for these routes in later years, and Saturday service will be reevaluated at that time. **Exhibit 3-6** shows the resulting Saturday route network.

Exhibit 3-6
Saturday Route Changes



3.4.1.4 *Frequency Adjustments for Overloads*

The fine tuning of the hours of service as outlined above result in some savings for the CAT system. These savings are recommended to be reinvested into the two most heavily used routes – 1 Capital and 15 Wake Med. Both of these routes have overloads on some trips, and both are slated to be premium transit corridors as highlighted in the *2040 Capital Area Bus Transit Development Plan*. The savings allow some of the increase service that is warranted on these two routes to be implemented at no cost.

The changes that can be implemented on the 1 Capital are:

- Decrease the 1 Capital peak headway to 15 minutes, giving the route a 15 minute peak, 30 minute midday headway
- Decrease 1 Capital Saturday to a 30 minute headway, giving it a 30 minute headway all day Saturday. This is accomplished by moving the tripper buses to operate a half hour later.

On the 15 Wake Med, the savings allow:

- Decreasing the 15 Wake Med Saturday to a 30 minute headway

With these adjustments, the 1 Capital and 15 Wake Med become the two routes that offer a 15-minute headway during weekday peaks and 30-minute headway weekday midday, plus a 30-minute headway on Saturdays.

As additional funding becomes available, the 15 Wake Med will have weekday midday service increased, but the savings from this first phase was not sufficient to cover this expense.

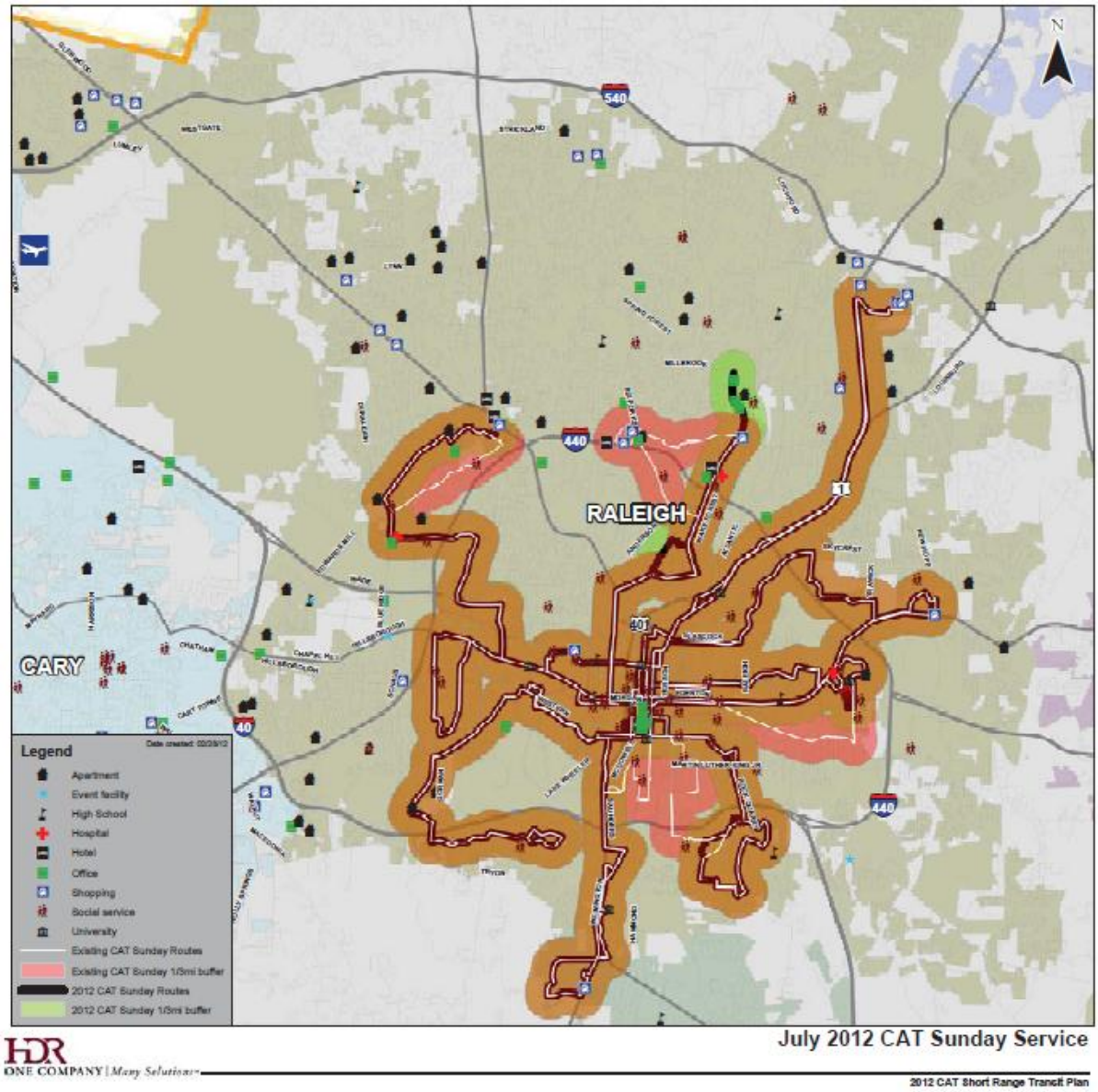
3.4.1.5 *New Sunday Service*

With the redesign of the service network to merge the off-hour routes into the weekday daytime routes, changes are warranted to the Sunday services. Most Sunday routes are similar variations of the off-hour routes, and to provide a simpler to understand system, several regular weekday routes are recommended to receive hourly Sunday service. The new services are:

- 2 Falls of Neuse – extend along weekday route to Millbrook (removes Sunday service from North Hills and extends it to Millbrook)
- 4 Rex Hospital – operate weekday route to Crabtree (removes Sunday service from Blue Ridge Road)
- 5 Biltmore Hills – weekday routing (removes Sunday service from portions of 13 Chavis Heights and 22 State Street)
- 7 S. Saunders – weekday routing (removes Sunday service from portions of 21 Caraleigh)
- 15 Wake Med – weekday routing (removes Sunday service from Poole Road and portions of Sunnybrook Drive)

Note that because of cost constraints, one "off-hour" route is maintained – the 31 New Hope Commons. This route will only operate on Sundays until sufficient funds are available to replace it with regular weekday routes. **Exhibit 3-7** shows the resulting Sunday service network.

Exhibit 3-7
Sunday Route Changes



3.4.1.6 *Summary of Phase I Recommendations*

Exhibit 3-8 presents a summary of the recommendations for each route.

Exhibit 3-8
Summary of Phase I Service Changes

Route	Change
1 - Capital	Add earlier weekday trip; decrease peak headway to 15 minutes. SATURDAY decrease peak headway to 30 minutes
2 - Falls of Neuse	Add earlier OB trip; extend evening service until 10 PM. SATURDAY extend evening service until 10 PM. SUNDAY add service to Millbrook from 8 AM to 7 PM.
3 - Glascock	Extend evening service until 9 PM. SATURDAY delete first trip; add evening service until 9 PM; change loop to always operate counterclockwise;
4 - Rex Hospital	Delete first IB trip; add evening service until 11 PM between Rex and downtown. SATURDAY delete service on Creedmoor before 9 AM; add evening service between Crabtree and downtown until 11 PM. SUNDAY operate same hours as 38.
5 - Biltmore Hills	Add earlier trip; extend evening service until 11 PM. SATURDAY extend evening service until 11 PM. SUNDAY add service from 8 AM to 7 PM.
6 - Crabtree	Delete first OB trip and add earlier IB trip; extend service until 8 PM. SATURDAY extend evening service until 9 PM.
7 - S. Saunders	Extend evening service until 10 PM. SATURDAY delete first trip; extend evening service until 10 PM. SUNDAY add service from 8 AM until 7 PM.
8 - Northclift	Delete first OB trip; extend evening service until 8 PM. SATURDAY delete first trip and extend evening service until 7 PM.
10 - Longview	Add evening service until 9 PM. SATURDAY delete first trip; add evening service until 9 PM.
11 - Avent Ferry	Delete first OB trip and add earlier IB trip; extend evening service until 11 PM. SATURDAY delete first OB trip; add later evening service.
12 - Method	Delete first OB trip and add earlier IB trip;
13 - Chavis Heights	NO CHANGE
15 - Wake Med	Reduce early morning OB trips; extend 30 minute headways until 9 PM. SATURDAY decrease headways to 30 minutes. SUNDAY add service from 8 AM to 7 PM.
16 - Oberlin	Delete first trip; extend evening service until 10 PM. SATURDAY delete service to Rex; add later IB trip.
18 - Worthdale	Extend evening service until 11 PM. SATURDAY add service from 6 AM to 11 PM.
19 - Apollo Heights	Extend evening service until 8 PM.
21 - Caraleigh	Extend evening service until 9 PM.
22 - State St	Extend evening service until 10 PM.
CONNECTORS	
7C - Carolina Pines/Rush	SATURDAY delete first and last trips.
8C - Sawmill	SATURDAY delete first and last trips.
11C - Buck Jones	Delete last IB trip. SATURDAY delete first and last trips.
15C - Trawick	Delete last IB trip.
23C - Millbrook	SATURDAY delete service.
24C - North Crosstown	Delete last trip. SATURDAY delete first trips.
25C - Triangle Town Center	Delete first trip. SATURDAY delete first trip.

Route	Change
EXPRESSES	
55E - Poole Rd Express	Redesignate as limited stop trips on 18; check trip times with new deadheading.
70E - Brier Creek	Add 9 AM and 6 PM trips; delete last two trips. SATURDAY delete service.
EARLY/LATE SERVICES	
26C - Early East	DELETE
27 - Southeast	DELETE
28 - Southwest	DELETE
29C - North Night	DELETE
30 - Northeast	DELETE
31 - New Hope Commons	Keep on Sundays
32 - Sanderford Road	DELETE
33C - Glenwood-Creedmoor	DELETE
34 Wake Med Poole Rd	DELETE
35 - Poole Road	DELETE
36 - Garner Station	DELETE
37 - North Hills	DELETE
38 - Blue Ridge	DELETE
39 - Cameron Village	DELETE

Exhibit 3-9 summarizes the revenue hour changes for the Phase I service adjustments. The net effect is the equivalent of adding 13 minutes of service on each weekday, a negligible amount.

Exhibit 3-9
Net Change in Revenue Hours

Category	Revenue Hours	Weekday Equivalent
Weekday Hour changes	-4:34	-4:34
Saturday changes	-31:03	-7:04
Sunday changes	0:00	0:00
Holiday changes	-1:22	-1:22
1 Capital to 15 peak	+11:10	+11:10
15 Wake Med to 30 Saturday	+9:00	+2:03
NET CHANGE		+0:13

At CAT's $86 cost per hour, these changes will cost less than $5,000 annually.

3.4.2 Phase II Changes

In Phase II, the focus is on addressing the overloads on the 15 Wake Med during the midday period. The need is to take the headway down to 15 minutes from 30 minutes, which requires doubling the number of buses and hours during the midday. The resulting schedule will be a 15-minute service during weekdays daylight hours.

3.4.2.1 *Route Changes*

To implement this change at no cost, the 13 Chavis Heights is recommended to be replaced by a modification of the 22 State Street. It would be rerouted along Blount, Cabarrus, and Chavis Way, and MLK Blvd. outbound instead of along Lenoir. And inbound the route would be along MLK Blvd, Chavis Way, and Lenoir. The 13 Chavis Heights, while serving a key public housing project, is within one-quarter mile of the 19 Worthdale, 21 Caraleigh, and 22 State Street. While some riders may have to wait at a new stop, any additional walking distance is short, and is minimized with this rerouting.

The total weekday hourly savings from discontinuing the 13 Chavis Heights is 9:41, with an additional 2:28 weekday equivalent savings from discontinuing Saturday service, for a total weekday equivalent of 12:09. The increase in hours on the 15 Wake Med is 11 hours weekday, resulting in a net savings of about 1 hour weekdays. There are no costs to modifying the 22 State Street to cover a portion of the 13 Chavis Heights. At CAT's cost of $86 per hour, the net savings is about $22,000 annually.

At the same time this change is made, CAT should examine the potential of extending the 15 Wake Med to Walmart on New Bern. This extension may require some changes around the apartments by Wake Med, and adjusting the 19 Apollo Heights, but CAT has had to make several adjustments lately due to changes in the roadway configuration in the area. If the time required to go through the apartments can be reduced, there may be sufficient time to go to Walmart and return.

No capital changes are required in Phase II.

Maps of these individual route changes, and all route changes, are provided in the **Appendix**.

3.4.2.2 *Premium Corridor Service Levels*

At the end of the FY 2013 changes, two of the premium corridors will have their service levels raised to premium status –

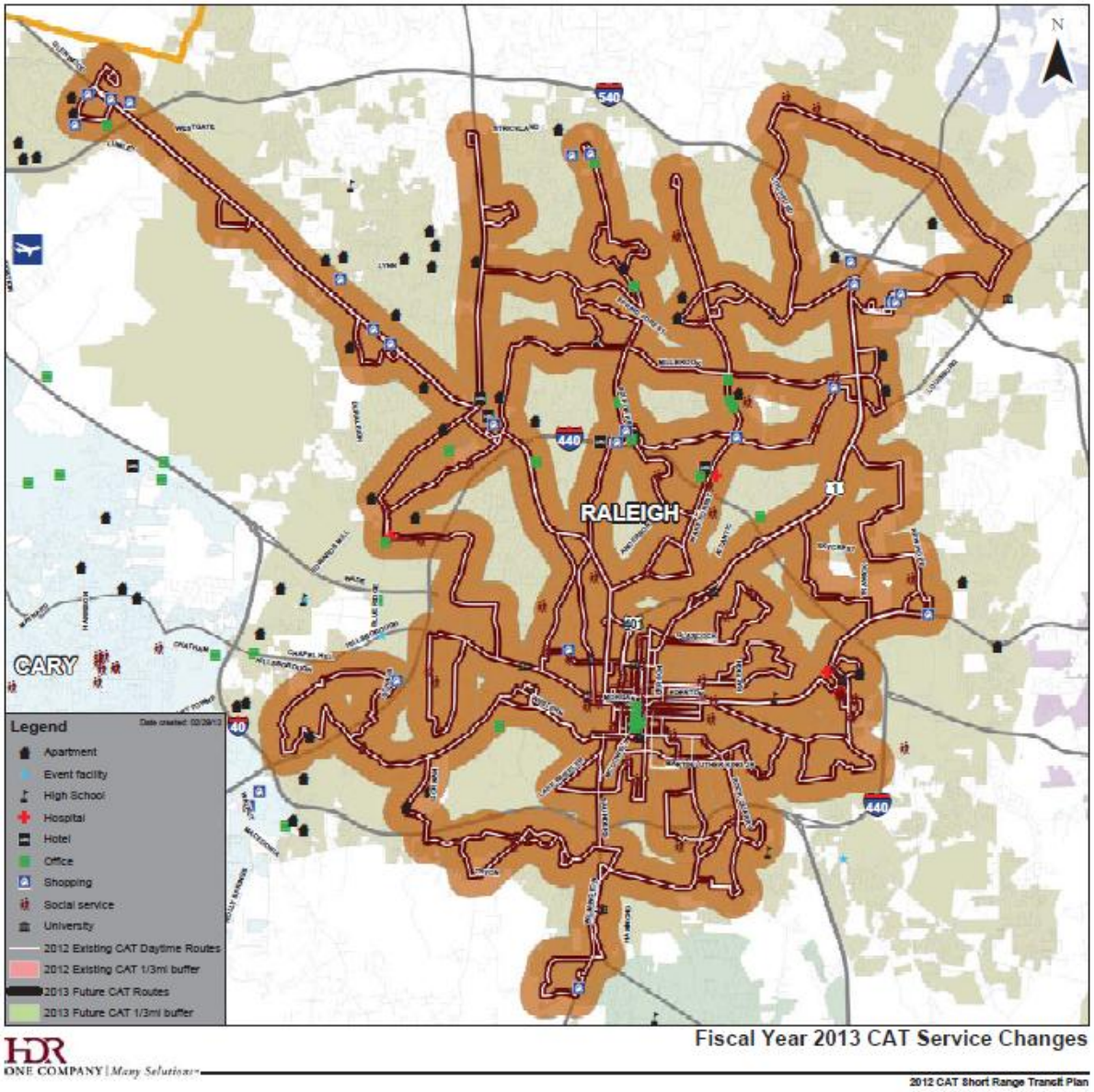
- Capital Boulevard will have service every 15 minutes peak and 30 minutes midday; Saturday service will operate every 30 minutes. Sunday service will remain at every 60 minutes and will be upgraded in later years.
- New Bern Avenue will have service every 15 minutes peak and better than premium status in midday with 15 minute service. Saturday service will be upgraded to every 30 minutes. Sunday

service will remain at every 60 minutes and will be upgraded in later years. Later years will also see the extension of premium service further out New Bern to the Walmart.

3.4.3 Summary

Exhibit 3-10 shows the systemwide changes in the route coverage for FY 2013 compared to the existing daytime service. Even though the 13 Chavis Heights was discontinued, service coverage, shown by the one-third-mile buffers around the routes did not change.

Exhibit 3-10
FY 2013 Systemwide Service Coverage Changes



3.5 FY 2014 Service and Capital Changes

The focuses of the FY 2014 service changes are to complete the route network restructuring and to continue implementing the program of premium transit corridors. No phasing is anticipated for these changes; instead they would all be implemented at the time of the regular operator pick in January 2014. While almost 20 routes will be affected, a sizable percentage of the route network, the burden on staff and riders is not too high. Waiting until January 2014 provides sufficient time for the new funding to be in place and to acquire the additional vehicles that will be required for operation. Individual route maps are provided in the Appendix.

3.5.1 Unsettled Funding

Changes in 2014 will require additional funding to be implemented. This funding could come from an increase in Raleigh general funds, state, federal, or private funds, or some other source. State and federal funding increases are possible, but are highly uncertain. Under current federal legislation, Raleigh could expect to see an increase in the "formula" funds in proportion to the rapid increase in population that has occurred from 2000. A significant caveat is that the current federal debate is unsettled, with some proposals calling for keeping funding levels constant and others calling for a dramatic reduction in federal funding support for transit.

A more likely scenario for increased transit funding is the passage of the local sales tax dedicated to transit. This potential calls for a voter referendum on increasing the sales tax by one-half a percent (a nickel on every $10 purchase). The referendum would need to be passed by Wake County as a whole, not just Raleigh, and would fund transit improvements throughout the county. As this plan is being written, Wake County Commissioners are considering whether to call for this election in November 2012. Should they do so, and should the referendum pass, additional funds for transit would become available about three months after the referendum, and could be used for the FY 2014 service changes described below.

Regardless of the funding source, the changes depicted below will not occur unless additional funds are provided to transit.

3.5.2 Service Changes

3.5.2.1 *New Bern Avenue Area Improvements*

During FY 2014, the improvements along New Bern Avenue to the 15 Wake Med are recommended to continue. The 15 Wake Med route will be extended to the New Bern Walmart, eliminating the need for riders to transfer to the 15C Trawick Connector at Wake Med Hospital. To provide for a quicker trip along the corridor, the deviations around the Wake Med Hospital will be reduced. The 15 Wake Med will continue to go into the hospital complex but will exit along Swinburne, Fallstaff, and Sunnybrook

back to New Bern Avenue. This change eliminates travel to Kidd Road and the operation through the housing complex on Calumet. Instead, the 19 Apollo Heights will serve this area.

The 15 Wake Med will also have its Sunday service increased from a 60-minute headway to a 30-minute headway.

The 19 Apollo Heights is recommended for two reroutings. Around Wake Med, the route will be extended to take over the Calumet service from the 15 Wake Med. Without this change, the 15 Wake Med would have a time consuming detour off its main route. Instead, the 19 Apollo Heights can serve the area at its end-of-line. Secondly, the route will change in downtown to shorten it to operate inbound along Wilmington instead of McDowell. This provides increase service to Shaw University. The 19 Apollo Heights gains Sunday service

The 15C Trawick Connector is recommended for replacement by the extension of the 15 Wake Med and by the implementation of two new routes – the New Hope Crosstown and the Northeast Crosstown. The New Hope Crosstown will provide a direct connection among the New Bern Walmart, Wake Tech North Campus, and Triangle Town Center. It will originate at the New Bern Walmart, travel north on New Hope Road, eats on Louisburg Road/US 401 to the Wake Tech North Campus, and west on Fox Road to Triangle Town Center. Service will be provided every 30 minutes peak, 60 minutes midday, and 60 minutes on Saturday.

The Northeast Crosstown will provide a significant increase in mobility in the northeast area of Raleigh. It will directly connect Wake Med, Highwoods, Duke Raleigh Hospital, North Hills, and Crabtree Valley Mall. Riders traveling in this area will no longer need to travel downtown to complete their trip. From Wake Med, the route will travel principally along New Bern Avenue, Lake Woodard, Brentwood, Highwoods, Wolfpack, Bush, St. Albans, and Northbrook. Service will be provided every 30 minutes peak, 60 minutes midday, and 60 minutes on both Saturday and Sunday. Given the number of medical facilities and major shopping locations served by this route, it is being implemented with Sunday service.

With the changes outlined above, the New Bern Premium Corridor has its route improvements fully implemented. Additional growth in service will be dependent upon growth in ridership.

3.5.2.2 *South Saunders Area Improvements*

The 7 South Saunders is recommended for two improvements. First, the schedule is recommended to be brought up to the premium corridor standards. Secondly, if the Town of Garner is supportive, the 7 South Saunders should be extended through downtown Garner to the White Oak Shopping Center. This extension, though, should not be the financial requirement of the City of Raleigh. Either the Town of Garner should pay the incremental cost, or if the Wake County dedicated sales tax is in place, the sales tax could fund the incremental cost.

For the schedule changes, the route is recommended to have its peak headway reduced to every 15 minutes from every 30 minutes; keep the midday headway unchanged at every 30 minutes, and double the service on Saturday to every 30 minutes.

Should the route extension be implemented, this extension would operate from the current terminus at the Walmart to White Oak Shopping Center via Government Road, Foxwood Drive, Aversboro Road, Timber Drive, and White Oak Road. US 70 would provide a faster and more direct route, but this is a fast moving highway and is unsuitable for local bus service.

3.5.2.3 *Six Forks Road Improvements*

The Six Forks Road corridor will have its service reorganized to provide a single route along the length of the corridor. This change involves merging the 8 Northclift with the 8C Sawmill Connector. With this change, riders from downtown will have a one-seat ride all the way out to Six Forks Station. Implementing this change will require some changes to the existing routes. From downtown, the new Six Forks route will follow the current 8 Northclift route to Millbrook. From that point it travels north on Six Forks to the current end-of-the-line of the 8C Sawmill at Strickland. This streamlined routing provides faster and more direct travel, but does remove service from several streets with low ridership. Losing service on the 8 Northclift portion are the turnaround portion on Northclift and Dixon. On the 8C Sawmill portion, the deviations along Newton Road and Longstreet and along Lynn Road are eliminated. Most of the abandoned portions remain within a short walk of bus service, generally about one-quarter mile or 5 minutes. Sunday service every hour will be added along the length of the new route.

To maintain service to the Greyhound terminal, the 2 Falls of Neuse will be rerouted to cover the portion eliminated by the change to the 8 Northclift. From Capital Boulevard, the 2 Falls of Neuse will exit at Peace Street, travel west one block to West Street, and head south to Jones Street where it will pass in front of Greyhound en route to its current routing along Salisbury. Outbound, the 2 Falls of Neuse will follow its current route along Wilmington to west on Lane Street, south on Harrington Street, stopping opposite Greyhound. From there the bus goes west on Jones, north on West Street to Peace and returns to its current route along Capital Boulevard.

3.5.2.4 *Glenwood Avenue/Oberlin Road Improvements*

Changes to this corridor are designed to provide the major route along the portions of the road used by most riders. From ridership counts, this is Oberlin Road from downtown to Glenwood Village, and Glenwood Avenue from Glenwood Village to Pleasant Valley. Therefore, one route will be established along this path, which necessitates changes to both the 6 Crabtree and 16 Oberlin.

The 6 Crabtree will follow its current route between the mall and downtown, but at the mall the route will take over the Blue Ridge Road portion of the 16 Oberlin. This extension should be closely monitored; current ridership is low and may warrant discontinuation at a later time.

The 16 Oberlin receives two changes. One change is to take over the Pleasant Valley portion of the 6 Crabtree. This change puts the heaviest ridership portions on one route. As ridership levels continue to grow, the 16 Oberlin will have its frequency increased to that of the premium transit corridors. The second route change is to change the routing to downtown. Instead of using St. Mary's, the route will continue along Peace Street and follow the same routing as the current 12 Method. With this change to the 16 Oberlin, the 12 Method will be relocated as described in the next section.

Along with the changes to the routes, the schedules of the 6 Crabtree and 16 Oberlin will be adjusted to stagger their service between downtown and Crabtree Valley Mall. Both routes will continue to offer 30-minute service peaks and 60-minute service midday, but they will alternate so that service between the mall and downtown will be provided every 15 minutes peak and 30 minutes midday. For example, the 6 Crabtree may leave downtown at 7:00, the 16 Oberlin at 7:15, the 6 Crabtree at 7:30, and the 16 Oberlin at 7:45. Running times are similar, and the result will be a doubling of the service between the mall and downtown at no cost.

Finally, the 16 Oberlin will gain Sunday service every hour.

3.5.2.5 *Hillsborough Street Improvements*

As noted above, the routing of the 16 Oberlin will be changed to follow the 12 Method route into downtown. With that change, the 12 Method can be relocated to Hillsborough Street from downtown. It would follow the same routing as the 4 Rex Hospital between downtown and NC State. Along with this change, the schedules of the 4 Rex Hospital and 12 Method would be adjusted so that they operate at staggered times, similar to the alternating schedule described above for the 6 Crabtree and 16 Oberlin. The result will be service every 15 minutes peak and 30 minutes midday between downtown and NC State along Hillsborough Street. This change will, however, eliminate bus service between NC State and Cameron Village, but this distance is less than a 5 minute walk.

3.5.2.6 *Avent Ferry Road Improvements*

Two scheduling only changes are proposed for this corridor. First, the 11C Buck Jones Connector is recommended to have its headway decreased to the policy level of every 30 minutes during peaks from the current hourly service. This change will double the frequency of service during peak times. Secondly, the schedules of the 11 Avent Ferry and 11C Buck Jones Connector should be staggered along Avent Ferry from NC State to the Avent Ferry Shopping Center at Avent Ferry & Gorman. The result on this stretch of roadway will be a 15-minute frequency peak and 30-minute frequency midday for the concentration of students commuting to NC State.

3.5.2.7 *Miscellaneous Schedule Improvements*

Besides the scheduling changes described above, other routes will have their service improved to the minimum levels. The following routes will have their peak headways decreased to every 30 minutes from their current hourly service: 25C Triangle Town Center Connector; and 40e Wake Tech Express. As an option, the 25C could institute bi-directional service around the loop for the same cost. Both options should be reviewed with the riders during the implementation planning. The 40e Wake Tech Express is recommended to have its stopping area extend to Hoke Street on the south side of downtown. By adding stops at Hoke and at MLK Boulevard, where traffic signals are located, minimum delay will be incurred by riders destined further out, but the accessibility of this neighborhood will be greatly improved.

The 70e Brier Creek Express will have midday service added on an hourly basis. This route will receive further changes in FY 2015, and adding midday service now will help build ridership for the new route.

3.5.2.8 *Premium Corridor Service Levels*

By the end of FY 2014, the Premium Corridor concept will be more fully developed. The corridor service is anticipated to include the following. The check mark shows the two corridors that meet or mostly meet the premium service levels of 15 minutes peak, and 30 minutes midday, Saturday, and Sunday. The Hillsborough corridor falls short because only a portion of the corridor has the full service levels.

- Capital Boulevard – service provided seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 60 minutes.

- New Bern Avenue – service provided seven days per week with peak headways at 15 minutes, midday headways at 15 minutes, Saturday headways at 30 minutes, and Sunday headways at 30 minutes. Service levels are extended out to the New Bern Walmart. The corridor also gets capital improvements to the streetside elements and a new transfer location (see capital projects section).
- Rock Quarry Road – service provided seven days per week with peak headways at 30 minutes, midday headways at 60 minutes, Saturday headways at 60 minutes, and Sunday headways at 60 minutes.

- South Saunders street – service provided seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 60 minutes.
- Avent Ferry Road – service provided seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 60 minutes. These service levels are on the portion of the corridor between NC State and Avent

Ferry & Gorman and are achieved though staggered schedules on the 11 Avent Ferry and 11C Buck Jones Connector. The portion of the corridor into downtown has half this service level.

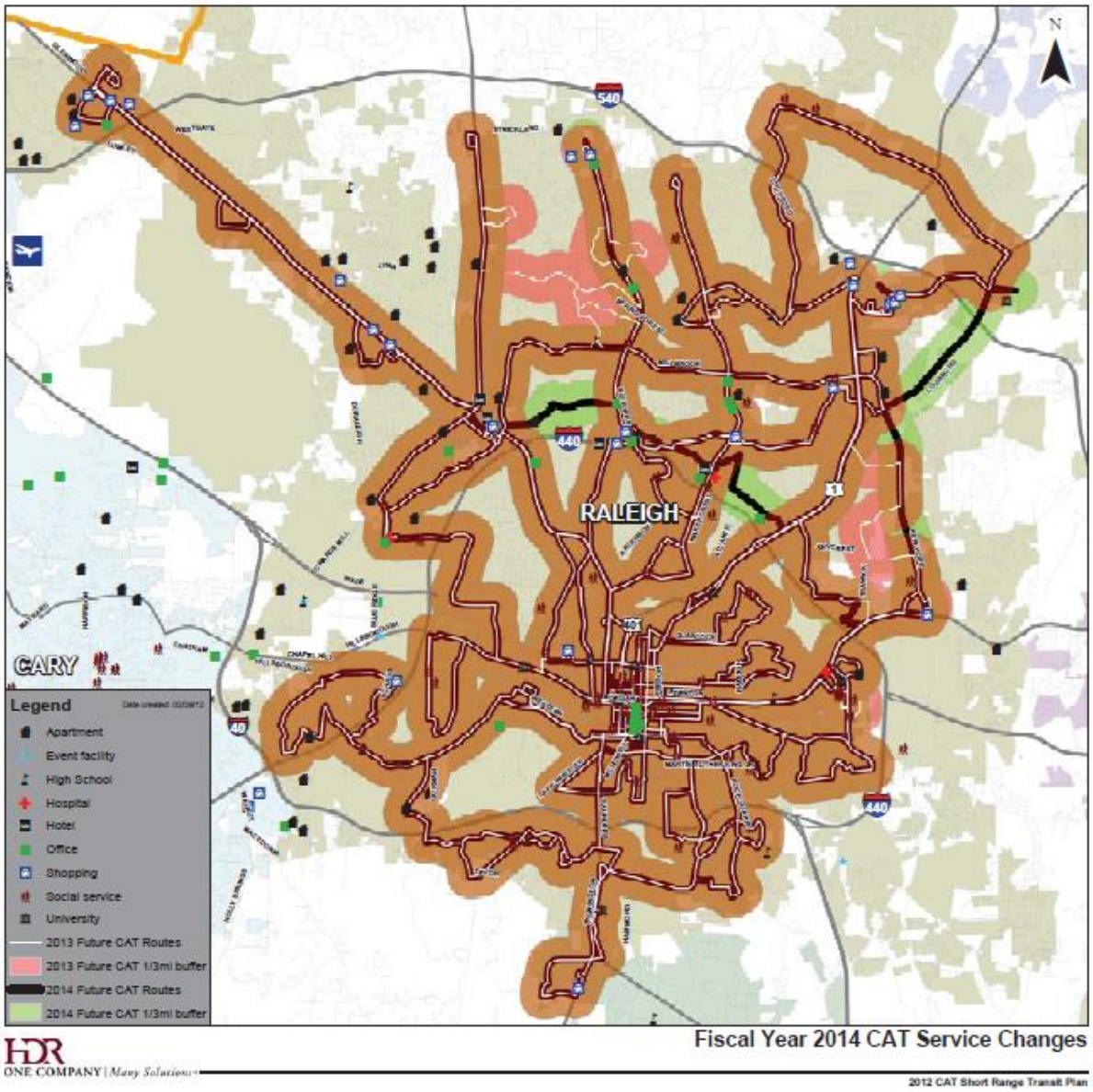
- Hillsborough street – service provided seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 30 minutes. These service levels are on the portion of the corridor between downtown and Dixie Trail and are achieved though staggered schedules on the 4 Rex Hospital and 12 Method.

- Glenwood Avenue/Oberlin Road – service provided between downtown and Crabtree Valley Mall seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 60 minutes. These service levels are only between downtown and the mall and are achieved though staggered schedules on the 6 Crabtree and 16 Oberlin. Since the routes follow different paths between the two ends, the high frequency is only on between the two main destinations.
- Six Forks Road – service provided seven days per week with peak headways at 30 minutes, midday headways at 60 minutes, Saturday headways at 60 minutes, and Sunday headways at 60 minutes, but only on the outer portion of the route. Continuous service along the corridor is not yet in place.
- Falls of Neuse Road – service provided seven days per week with peak headways at 30 minutes, midday headways at 60 minutes, Saturday headways at 60 minutes, and Sunday headways at 60 minutes.

3.5.3 Summary

Exhibit 3-11 shows the systemwide changes in the route coverage for FY 2014 compared to the FY 2013 service coverage. The increases in service coverage are due to the new New Hope Crosstown and the new Northeast Crosstown. The underutilized areas losing service are portions of the 15C Trawick Connector and the 8C Sawmill Connector. Further refinement of these plans with the affected areas may be required closer to implementation.

Exhibit 3-11
FY 2014 Systemwide Service Coverage Changes



3.5.4 Capital Improvements

To support the service changes, several new or improved capital facilities are recommended. In addition, more buses will need to be purchased to provide the expanded services.

3.5.4.1 *Moore Square Renovation*

Moore Square was built in 1988 as the central focal point for CAT services. It is located in the ground floor of the Moore Square Parking Deck, across Blount Street from Moore Square Park. The facility has space for 16 buses at one time, and includes a small customer service booth and separate small restroom facilities for men and women. Some of the bus bays are covered by the parking deck and others just have shelters with benches. As noted in Section 2.3.2, Moore Square has over 10,600 boardings+alightings daily, more than 25 percent of the total daily activity on CAT. This usage is even greater if the R-Line and Triangle Transit riders are included.

In the 24 years since the facility was constructed, no significant renovations or upgrades have occurred beyond the recent removal of some fountains. The current facility has several shortcomings that need to be addressed to prepare it for the next 24 years.

The most critical need is to expand the capacity of the facility for both buses and patrons. The number of bus loading spaces is inadequate for the expansion in CAT service and with the increases in Triangle Transit's commuter services. The passenger waiting platforms are too small for waiting passengers, resulting in an uncomfortably crowded feeling. The customer information area is inadequately sized, as are the restrooms, and amenities for bus operators are inconveniently located upstairs in one of the storefronts on Wilmington.

CAT is undergoing the environmental clearance process to improve the facility and a design contract is anticipated to be let sometime in 2012. The actual construction is anticipated to be in FY 2014, although if sufficient funding is identified, the construction could be accelerated to FY 2013. The upgrades will considerably freshen up the facility, increase capacity, and provide improved amenities for both riders and employees.

3.5.4.2 *New Bern Walmart Transfer Location*

With the changes outlined above, and additional changes in later years, the Walmart on New Bern will become a focal point for transit services on the eastern edge of Raleigh. The capital project in FY 2013 is to establish a "mini-Transit Center" somewhere within close proximity to the Walmart and nearby retail centers. This facility will not be a large transit center with overhead shelters, but is envisioned to be a series of passenger shelters, benches, and information displays arrayed in a fashion to provide easy transferring among routes. Layover facilities for buses will be provided, but no operator or general public restrooms.

3.5.4.3 *New Bern Avenue Premium Corridor Amenities*

In FY 2014, the first of the premium transit corridors is schedule to receive a comprehensive upgrade of the streetside amenities. New Bern Avenue has been selected as the first corridor since it has the greatest ridership of any of the nine corridors.


Premium "Quickline" Shelter

The program of projects for the corridor has not been determined, but is anticipated to include:

- Sidewalks along the length of the corridor on both sides of the street
- Sidewalk connections off the corridor to significant destinations, such as Enloe High School
- Enhanced amenities at stops, including larger shelters, benches, and real-time information displays
- Minor capital improvements to facilitate bus operations, such as signal timing, queue-jumper lanes at intersections, and other low-cost items

The final program of projects will be determined based upon the conditions at the time and feedback from riders, operators, property owners, and city staff.

3.5.4.4 *Miscellaneous Capital Improvements*

The *2040 Capital Area Bus Transit Development Plan* called for a regular program of making streetside improvements along all bus routes. These improvements will not be to the level of the premium transit corridors, but would include additional sidewalks, shelters, and benches throughout the service area.

3.6 FY 2015 Service and Capital Changes

During FY 2015, the focus shifts to the second busiest corridor in the CAT system – Capital Boulevard. The majority of the changes are designed to complete the service network adjustments along the corridor by increasing service frequencies and realigning routes to provide improved crosstown travel.

3.6.1 Service Changes

3.6.1.1 *Capital Boulevard/Triangle Town Center Area Improvements*

The 1 Capital route is almost at premium transit levels, except for Sunday service. During FY 2015, additional Sunday trips will be added so that the route has service every 30 minutes. Additional service may be warranted on weekdays and Saturdays, depending upon demand. At the time of these

improvements, the ridership on the other days should be carefully examined to determine if additional trips are justified.

One routing adjustment may be needed depending upon land development. The City of Raleigh is considering transforming Capital Boulevard as it enters downtown into a more densely developed and walkable area. Should this transformation occur, the 1 Capital should be rerouted to provide continuous travel along Capital Boulevard, rather than exiting at Wake Forest Road to enter downtown.

The 25C Triangle Town Center Connector will be replaced by three new routes – the Atlantic Avenue Crosstown, the Spring Forest Crosstown, and the Durant/Strickland Crosstown. The current 25C Triangle Town Center Connector provides good coverage with the minimum amount of buses and hours possible, but as a one-way loop, travel around the area can be time consuming. These changes break up the loop and provide two-way travel on all streets.

The western side of the 25C Triangle Town Center Connector is taken over by the Atlantic Avenue Crosstown. This is a major new route for Raleigh that provides service to a large area that currently does not have any route and opens up new mobility options by providing another route that does not go downtown. It originates at the Wake Med North Campus and travels south along Litchford Road following the current route of the 25C Triangle Town Center Connector. At the intersection of Litchford and Atlantic Avenue, the route continues south on Atlantic Avenue until Whitaker Mill Road. The route turns west on Whitaker Mill Road, following the same route as the existing 2 Falls of Neuse. The route continues west on Capital/Wade/Daniels/Oberlin and terminates at NC State. The Atlantic Avenue Crosstown provides service every 30 minutes peak and every 60 minutes midday and on Saturday.

Atlantic Avenue does not currently have service, but light-rail transit is being considered for the rail line that runs parallel to Atlantic Avenue. This new route will provide the initial service on the corridor and complement the rail service whenever it is implemented. The service on Wade Avenue will serve the Employment Security Administration (ESC) office, allowing the 8 Northclift/Six Forks route to be rerouted along Six Forks. This route will operate via Wilmington, Wake Forest, and Atlantic to Six Forks. This change removes all service from St. Mary's and Lassiter Mill, but other than the ESC stop and a stop near North Hills Mall, there are few riders.

With the routing of the Atlantic Avenue along Whitaker Mill, the 2 Falls of Neuse can be rerouted to travel along Wake Forest into downtown. This route is also extended along Falls of Neuse Road to connect with the Atlantic Avenue at Wake Med North.

The northern portion of the 25C Triangle Town Center Connector is taken over by the new Durant/Strickland Crosstown. This route provides coverage between the south Rolesville area, Wake Tech North, Wake Med North, and the Six Forks Station Shopping Center. The Durant/Strickland Crosstown provides service every 30 minutes peak and every 60 minutes midday and on Saturday.

The southern portion of the 25C Triangle Town Center Connector is taken over by the new Spring Forest Crosstown and the previously implemented New Hope Crosstown. The Spring Forest Crosstown operates on Spring Forest and Lynn Road from Triangle Town Center to North Hills Drive. At this point it operates along North Hills Drive, Dixon, Millbrook Road, and Lead Mine Road to Crabtree Valley Mall. This route provides new crosstown travel opportunities and directly connects the two biggest malls in Raleigh. Service will be offered every 30 minutes peak and every 60 minutes midday and on Saturday. The implementation of this route will allow Triangle Transit to reorient its 201 North Raleigh route to be an express service operating along I-540.

The 23C Millbrook Crosstown is reoriented to be a continuous crosstown along Millbrook Road. With the introduction of the 54 Spring Forest Crosstown to Crabtree Valley Mall, the 23C Millbrook Crosstown can be rerouted along Millbrook Road to Pleasant Valley. This rerouting provides a direct connection between the Pleasant Valley area and its high ridership to the shopping and employment opportunities at Capital Boulevard. With this rerouting, Saturday service is restored to the 23C Millbrook Crosstown to gauge the interest in weekend travel between these new destinations.

3.6.1.2 *Crabtree Area Improvements*

As noted above, the Crabtree area receives changes during FY 2015, notably the swapping of service between the new 54 Spring Forest Crosstown and the 23C Millbrook Crosstown. Additionally, the 70e Brier Creek Express is replaced by a new circulator/crosstown route, the Umstead Crosstown. This route operates between Pleasant Valley and Brier Creek, and deviates off either side of Glenwood Avenue to get close to the retail and apartment locations. The 70e Brier Creek Express was an experiment to see how best to connect to the Brier Creek area, but it was unsuccessful. A more robust crosstown/circulator may be a better performer. Glenwood Avenue is a transit-unfriendly street, which until just recently had a 55 mph speed limit along portions of the roadway. By implementing a route that wanders around a bit but gets within easy walking distance of more locations, it is hoped that a productive service will result. This new route will need to be closely monitored to see what adjustments may be warranted. Service will be offered every 30 minutes peak and every 60 minutes midday and Saturday.

3.6.1.3 *Premium Corridor Service Levels*

By the end of FY 2015, the Premium Corridor concept will be more fully implemented. The corridor service is anticipated to include the following. The check mark shows the now three corridors that meet or mostly meet the premium service levels of 15 minutes peak, and 30 minutes midday, Saturday, and Sunday.

- Capital Boulevard – service provided seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30

minutes, and Sunday headways at 30 minutes. The corridor also gets capital improvements to the streetside elements and a new transfer center/park & ride lot (see capital projects section).

- New Bern Avenue – service provided seven days per week with peak headways at 15 minutes, midday headways at 15 minutes, Saturday headways at 30 minutes, and Sunday headways at 30 minutes. Service levels are extended out to the New Bern Walmart. The corridor has in place the improvements to the streetside elements.

- Rock Quarry Road – service provided seven days per week with peak headways at 30 minutes, midday headways at 60 minutes, Saturday headways at 60 minutes, and Sunday headways at 60 minutes.
- South Saunders street – service provided seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 60 minutes.

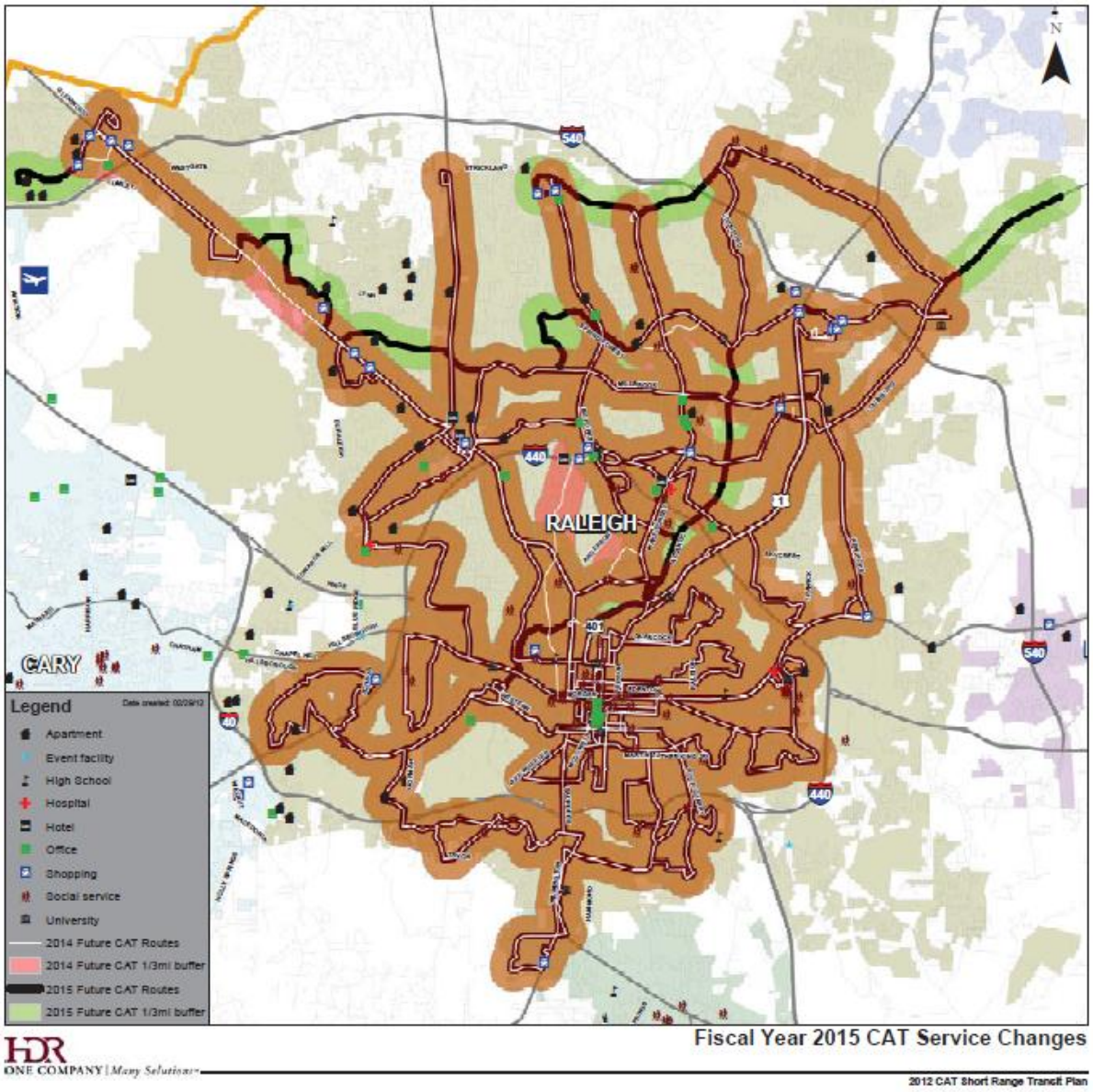
- Avent Ferry Road – service provided seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 60 minutes. These service levels are on the portion of the corridor between NC State and Avent Ferry & Gorman and are achieved though staggered schedules on the 11 Avent Ferry and 11C Buck Jones Connector. The portion of the corridor into downtown has half this service level.
- Hillsborough street – service provided seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 30 minutes. These service levels are on the portion of the corridor between downtown and Dixie Trail and are achieved though staggered schedules on the 4 Rex Hospital and 12 Method.

- Glenwood Avenue/Oberlin Road – service provided between downtown and Crabtree Valley Mall seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 60 minutes. These service levels are only between downtown and the mall and are achieved though staggered schedules on the 6 Crabtree and 16 Oberlin. Since the routes follow different paths between the two ends, the high frequency is only on between the two main destinations. New improvements are made to the Crabtree Valley Mall Transit Center (see capital projects section).
- Six Forks Road – service provided seven days per week with peak headways at 30 minutes, midday headways at 60 minutes, Saturday headways at 60 minutes, and Sunday headways at 60 minutes. Continuous service along the entire corridor is now in place.
- Falls of Neuse Road – service provided seven days per week with peak headways at 30 minutes, midday headways at 60 minutes, Saturday headways at 60 minutes, and Sunday headways at 60 minutes. The route now operates along the full length of the Falls of Neuse premium corridor.

3.6.2 Summary

Exhibit 3-12 shows the systemwide changes in the route coverage for FY 2015 compared to the FY 2014 service coverage. The increases in service coverage are from the new Durant/Strickland Crosstown, Spring Forest Crosstown, and Umstead Crosstown. The underutilized area losing service are along US 70/Glenwood from the 70e Brier Creek, and the relocation of the 8 Northclift from Lassiter Mill.

Exhibit 3-12
FY 2015 Systemwide Service Coverage Changes



3.6.3 Capital Improvements

To support the service changes, several new or improved capital facilities are recommended. In addition, more buses will need to be purchased to provide the expanded services.

3.6.3.1 *Triangle Town Center Park & Ride/Transit Center*

With the changes occurring in FY 2015, the Triangle Town Center becomes a new focal point for CAT service. At the end of FY 2015, the 1 Capital, New Hope Crosstown, Spring Forest Crosstown, Wake Forest Circulator, and TTA's WRX Wake Forest-Raleigh Express all connect at the mall. The *2040 Capital Area Bus Transit Development Plan* identifies this location as a park & ride location for commuter service to both downtown Raleigh and the Research Triangle Park, and TTA's long range plans call for the possible creation of a light rail station in this area.

With all of this activity, an improved transit facility is warranted. During FY 2015, a combination transit center and park & ride lot should be constructed. This facility should have a centralized boarding platform for buses, overhead shelter, operator restrooms, passenger amenities, and real-time information displays. Sufficient parking should be provided to meet anticipated demand for bus services and the potential rail service, conceptually around 600 spaces or more. Additionally, this facility should be located where the future light rail service can easily access it. Ideally, the site will be within easy walking distance to major destinations in the area, such as the mall or the other major retail centers nearby. If riders can get off their bus at the transit center and walk to their destination, usage levels will be much higher. CAT is responsible for the construction of the transit center, and TTA is responsible for the construction of the parking.

3.6.3.2 *Capital Boulevard Premium Transit Corridor Amenities*

In FY 2015, the second of the premium transit corridors is schedule to receive a comprehensive upgrade of the streetside amenities. Capital Boulevard has been selected as the second corridor since it has the second highest ridership of any of the nine corridors.

The program of projects for the corridor has not been determined, but are anticipated to include:

- Sidewalks along the length of the corridor on both sides of the street
- Sidewalk connections off the corridor to significant destinations, such as the multiple retail centers and office areas like Highwoods
- Enhanced amenities at stops, including larger shelters, benches, and real-time information displays
- Minor capital improvements to facilitate bus operations, such as signal timing, queue-jumper lanes at intersections, and other low-cost items

- Additional consideration needs to be given to pedestrian crossings and stop locations. As an extremely busy and often fast moving US highway, safe design for pedestrian crossings are more critical along this corridor than some others. Bus stops should be located to encourage use of the signalized crossings and minimizing the temptation to jaywalk (or run) across traffic.

The final program of projects will be determined based upon the conditions at the time and feedback from riders, operators, property owners, and city staff.

3.6.3.3 *Crabtree Valley Mall Transit Center Upgrades*

Unlike the Moore Square Transit Center that had few upgrades over the years, the Crabtree Valley Mall Transit Center was completely redone in recent years when the new parking deck was constructed in front of Belks. The resulting facility is very attractive and highly convenient to the mall; the mall interior can be reach with a short walk completely under cover. A more ideal location could not have been selected.

A few upgrades are warranted, however. In particular, the addition of an operator restroom, not open to the general public, would be welcomed. The mall restrooms are not nearby, and operators are unable to have a break due to the time they would have to leave their bus unattended.

Additional passenger amenities may also be desirable. One potential would be to work with the mall and see if any creative way to add retail space that is easily accessible from the platform can be found. A convenience store/coffee/donut shop would be a desirable addition.

3.6.3.4 *Miscellaneous Capital Improvements*

The miscellaneous capital improvement program identified in the *2040 Capital Area Bus Transit Development Plan* will continue in FY 2015.

3.7 FY 2016 Service and Capital Changes

The service changes for FY 2016 continue the themes of the previous years – implementing additional service along the premium transit corridors, and implementing new crosstown service to improve mobility throughout the city.

3.7.1 Service Changes

3.7.1.1 *Hillsborough Street Area Improvements*

The *2040 Capital Area Bus Transit Development Plan* identified Hillsborough Street as a premium transit corridor from downtown Raleigh to downtown Cary. This corridor duplicates the potential commuter rail and light rail corridors to some extent, but bus service along this corridor will help build the travel

patterns in advance of the rail and serve as a collector/distributor service for people destined away from a rail station.

The previous years' service changes have partially implemented the premium transit corridor service, but only on the segment between downtown Raleigh and NC State. The portion of the corridor between NC State and downtown Cary does not have local bus service. In FY 2016, this gap is filled with the introduction of the Chatham route. This route will originate in downtown Raleigh and follow Hillsborough Street past the Fairgrounds to Chatham Street and to the downtown Cary Train Station. Service will be offered every 30 minutes during peaks, and hourly midday, Saturday, and Sunday.

A new crosstown route is also implemented along part of this corridor. The Blue Ridge Crosstown will operate between downtown Cary and the Town North Shopping Center on Creedmoor. It will travel Chapel Hill Road, Corporate Center Drive, Trinity Road past the RBC Center, Blue Ridge Road past the NC Art Museum and Rex Hospital, Edwards Mill Road, through the Crabtree Mall Transit Center, and north on Creedmoor to the current end-of-the-line on the 4 Rex Hospital. With the introduction of this route, the 4 Rex Hospital becomes a much shorter route, terminating at Rex Hospital. The Blue Ridge Crosstown will provide service every 30 minutes peak and hourly midday and on Saturdays.

3.7.1.2 *Avent Ferry Area Improvements*

The 11 Avent Ferry will be rerouted from its current service on Lineberry Road to become a connection to Crossroads Plaza in Cary. This extension will be via Gorman Street, Tryon Road, and Dillard Drive. This change provides another connection point between CAT and CTran routes, and will allow NC State students to directly reach Crossroads. It will also provide another opportunity for Cary residents to travel directly to NC State and downtown Raleigh. Along with this change, the 11 Avent Ferry gains the full premium transit schedule of every 15 minutes during peaks and every 30 minutes during midday, Saturday, and Sunday. This increase doubles the amount of service on the 11.

The 11C Buck Jones Connector gets merged with the 7C Carolina Pines/Rush Connector and forms the new South Crosstown. This crosstown originates at Sanderford & Rock Quarry, and follows the 7C Carolina Pines/Rush Connector route to Lake Wheeler Road. From there, the route continues west along Lineberry Road, taking over for the 11 Avent Ferry route, and continues over the 11 Avent Ferry route to Gorman & Avent Ferry. At this point, the route follows the 11C Buck Jones Connector along Athens Drive to Jones Franklin, and travels north on Jones Franklin to terminate at the Plaza West Shopping Center, where it connects with TTA service and the 6 Buck Jones CTran route. Service will be provided every 30 minutes peak, and hourly midday, Saturday, and Sunday.

The South Crosstown provides a continuous service along the south side of Raleigh. While new travel patterns outside of downtown are now possible, a few areas lose service or have their service changed. In the Crosslink area, route changes will need to be coordinated with adjustments to the 5 Biltmore Hills

to ensure that all major stops continue to have service. For residents in the Lineberry area, a transfer to reach NC State will be required. Residents in some of the areas at the end-of-the-line loop on the 11C Buck Jones Connector will lose service, primarily along Ft. Sumpter/Dana Drive and Schaub/Derby areas. Ridership in these areas are low and most stops being abandoned are within a 5-10 minute walk of service on Athens Drive, Jones Franklin Road, Buck Jones Road, or Western Boulevard. This route will provide enhanced transfer opportunities with the new transfer facilities at Pecan & Wilmington and Gorman & Avent Ferry. These facilities are discussed in the capital projects section.

At the time of these changes, the 21 Caraleigh should be adjusted to provide two-way service on South Fayetteville Street, Maywood Avenue, and Lake Wheeler. The route should be extended to Lake Wheeler & Tryon at a minimum. A further extension may be required to find a suitable turnaround for the bus. With these changes, greater mobility is provided for residents of Walnut Terrace, the Farmers' Market, and the apartment complexes at Tryon Road. This change will remove service from the area of the old CAT maintenance facility, but with the additional stops provided earlier on the 40e Wake Tech Express, service will be in close proximity to the few riders remaining in the area.

3.7.1.3 *Rock Quarry Area Improvements*

The 5 Biltmore Hills route along Rock Quarry Road will be adjusted to provide continuous service along a longer stretch of the roadway. At the outer end, the route will be extended southeast to the vicinity of Battle Bridge Road. The limits of the extension will be based upon the amount of development along the corridor in FY 2016.

Operation of the end-of-the-line loop requires further examination. The current operation along Sanderford, Crosslink, and other roadways will not continue on the 5 Biltmore Hills due to the travel time impacts, but these roadways are unlikely to be completely abandoned. One option is to extend the 22 State Street to take over the current end-of-line loop on the 5 Biltmore Hills, but this option would require service to be removed from Peterson, Garner Road, and Newcombe, but the few riders in this area will have service within a 5-10 minute walk. This rerouting may require the introduction of the new Garner Road route or the Garner-Wake Med Crosstown included in the *2040 Capital Area Bus Transit Development Plan*. Further input from the community will be required during the implementation planning.

Approaching downtown, the route will be modified to continue north to New Bern Avenue and then west to downtown following the same route as the 15 Wake Med. The extension to New Bern will provide more accessibility on the east side of downtown and will allow the route to take advantage of the premium transit corridor improvements along New Bern.

Service will be provided every 30 minutes peak and hourly midday, Saturday, and Sunday.

3.7.1.4 *New Bern/Wake Med Area Improvements*

As indicated in the capital section below, the Wake Med Hospital area is scheduled to have a transit center constructed in FY 2016. This transit center will create a major focal point for routes on the eastern side of Raleigh. To maximize the potential connections and benefits to riders, several routes will be adjusted to provide connections.

The 3 Glascock and 10 Longview routes operate on the north side of New Bern Avenue and terminate near Wake Med. Neither of these routes, however, go to Wake Med leaving this entire corner of northeast Raleigh disconnected from destinations in their immediate area. In order to improve the connections, when the new transit center opens, both routes will be extended to terminate at the transit center. The routing will use Milburnie and Peartree for a portion of the extension, but the final routing will need to be determined in close coordination with the area residents and will be dependent upon where the transit center is located. With these changes, the 31 New Hope Commons Sunday only service can be eliminated and Sunday service added to either the 3 Glascock or 10 Longview.

Further out on New Bern Avenue, the 18 Worthdale will be extended to terminate at the New Bern Walmart transfer center. This extension will be via Poole Road, past the CAT operating facility, and north on New Hope Road and Rogers Lane, to west on New Bern Avenue to the Walmart. With this extension, the 15 Wake Med, 18 Worthdale, and 45 New Hope Crosstown will all connect.

3.7.1.5 *R-Line Improvements*

Included in the FY 2016 service program is the addition of a second R-Line route. The current R-Line provides good geographic coverage of the downtown and Glenwood South areas, but requires riders to go around a one-way loop. With the addition of a second R-Line, this out-of-direction travel can be eliminated. The "second" R-Line could be another route, with a redesign of the current service, or could be the operation of a clockwise service to complement the existing counterclockwise operation. This second route will provide a critical connection between Moore Square and the new Union Station being planned to serve Amtrak and the future high speed rail. Funds have been included in the budget to allow for this additional service, but the most appropriate routing will need to be determined in close cooperation with the Downtown Raleigh Association and other interests.

3.7.1.6 *Premium Corridor Service Levels*

By the end of FY 2016, the Premium Corridor concept will be more fully implemented. The corridor service is anticipated to include the following. The check mark shows the now three corridors that meet or mostly meet the premium service levels of 15 minutes peak, and 30 minutes midday, Saturday, and Sunday.

- Capital Boulevard – service provided seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 30 minutes. The corridor streetside improvements are in place.

- New Bern Avenue – service provided seven days per week with peak headways at 15 minutes, midday headways at 15 minutes, Saturday headways at 30 minutes, and Sunday headways at 30 minutes. The corridor streetside improvements are in place.

- Rock Quarry Road – service provided seven days per week with peak headways at 30 minutes, midday headways at 60 minutes, Saturday headways at 60 minutes, and Sunday headways at 60 minutes. The route has been extended along the length of its corridor.
- South Saunders street – service provided seven days per week with service levels brought up to the premium corridor standards of peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 30 minutes.

- Avent Ferry Road – service provided seven days per week with service levels brought up to the premium corridor standards of peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 30 minutes. Service has been extended all the way to Crossroads.

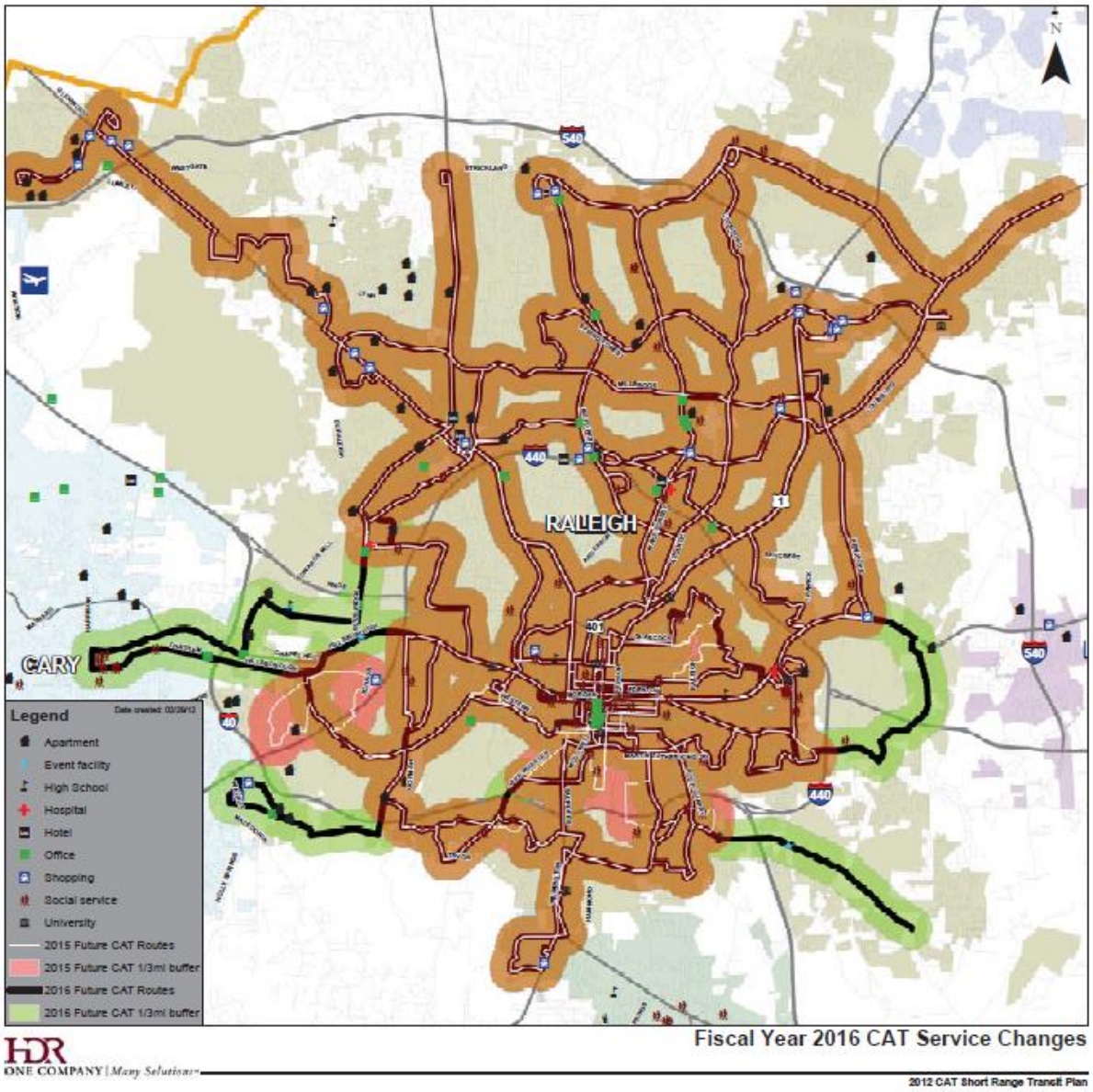
- Hillsborough street – service provided seven days per week. Along the inner portion, peak headways are 15 minutes, midday headways are 30 minutes, Saturday headways are 30 minutes, and Sunday headways are 30 minutes though staggered schedules on the 4 Rex Hospital and 12 Method. Service has been added at half these levels from NC State to downtown Cary.

- Glenwood Avenue/Oberlin Road – service provided between downtown and Crabtree Valley Mall seven days per week with peak headways at 15 minutes, midday headways at 30 minutes, Saturday headways at 30 minutes, and Sunday headways at 60 minutes. These service levels are only between downtown and the mall and are achieved though staggered schedules on the 6 Crabtree and 16 Oberlin. Since the routes follow different paths between the two ends, the high frequency is only on between the two main destinations.
- Six Forks Road – service provided seven days per week with peak headways at 30 minutes, midday headways at 60 minutes, Saturday headways at 60 minutes, and Sunday headways at 60 minutes. Service is now continuous along the entire length of the corridor.
- Falls of Neuse Road – service provided seven days per week with peak headways at 30 minutes, midday headways at 60 minutes, Saturday headways at 60 minutes, and Sunday headways at 60 minutes. Continuous service along the corridor is in place.

3.7.2 Summary

Exhibit 3-13 shows the systemwide changes in the route coverage for FY 2016 compared to the FY 2015 service coverage. The increases in service coverage are from the extension of the 18 Worthdale, 5 Biltmore Hills, 11 Avent Ferry, the new Chatham route, and the new Blue Ridge Crosstown. The underutilized areas losing service coverage are a small portion of the 22 State Street area and a portion of the 11C Buck Jones Connector. This latter loss is not as bad as shown since the CTran Route 6 Buck Jones covers this area.

Exhibit 3-13
FY 2016 Systemwide Service Coverage Changes



3.7.3 Capital Improvements

3.7.3.1 *Wake Med Transit Center*

Wake Med is the second busiest transit center after downtown. The level of activity already in place, the need to provide improved transfer facilities and operator layover space, and the increasing amount of service in the plan all lead to a critical need to provide better transit facilities.

The need for the transit center exists today, but its construction has been delayed until FY 2016 to allow time for funding to become available and to determine the most appropriate location in consultation with Wake Med as they update their campus plan. The transit center should be located off-street, include a central boarding platform, provide shelter for passengers as they wait and board buses, provide passenger amenities, and have an operator restroom. The transit center should be located such that riders have a short and preferably covered access into the hospital's building complex, and other related medical and Wake County facilities in the area.

This transit center will be used by the 3 Glascock, 10 Longview, 15 Wake Med, 19 Apollo Heights, and 50 Northeast Crosstown. The *2040 Capital Area Bus Transit Development Plan* recommends that the Triangle Transit commuter bus service along US 64 also stop at the facility en route to downtown. Wake Med is one of only four locations that charges for parking, and is likely to have demand from work commuters.

3.7.3.2 *Pecan & Wilmington Transit Center*

The Pecan & Wilmington/S. Saunders area is currently a major transfer location for CAT with numerous riders connecting between the 7 S. Saunders and 7C Carolina Pines/Rush Connector. Even though it is only two routes, it is the 7th busiest location in the CAT system, with 450 boardings and 359 alightings. This area is also being considered for a future Commuter Rail station as part of the studies underway by Triangle Transit.

Funding has been included in FY 2016 for construction of a new transit center in this general area that can transition to also being a commuter rail station/park & ride lot. As such, the transit center should be located adjacent to the railroad, but in a location where the 7 S. Saunders and 7C Carolina Pines/Rush Connector routes can easily access. The bus routes and commuter rail service will complement one another, with commuter rail serving the longer distance work commuters and the bus service providing the local area connections.

3.7.3.3 *Gorman & Avent Ferry Transit Center*

The Gorman & Avent Ferry area is another busy location for existing CAT service, with about 200 boardings and alightings each. With the changes to extend the 7C Carolina Pines/Rush Connector and

11 Avent Ferry routes, this location will become even busier. A transit center at this location would serve these two routes, plus the 12 Method, which would be extended, and the Wolfline routes in the area. It could also service as a peripheral park & ride for Wolfline to encourage students not to bring their cars to campus. CAT would be financially responsible for the transit center elements and NC State would be responsible for the provision of the park & ride.

3.7.3.4 *Miscellaneous Capital Improvements*

The miscellaneous capital improvement program identified in the *2040 Capital Area Bus Transit Development Plan* will continue in FY 2016.

3.8 Marketing

A key and often overlooked aspect of any transit program is to market the system to existing and potential users. As with any consumer product or service, usage is first dependent upon letting customers know it exists.

Marketing is not just "advertising." A successful program involves (in order):

- Product
- Place
- Price
- Promotion

This document describes the "product," that is the bus services being made available for use, and the place they are being provided. Price (aka, the fare) is not addressed in this document, but has been addressed in the *2040 Capital Area Bus Transit Development Plan*. The "promotion" consists of everything associated with creating an identity for the bus system and publicizing it to the community.

The best way to distinguish between advertising and marketing is to think of marketing as a pie, inside that pie you have slices of advertising, market research, media planning, public relations, product pricing, distribution, customer support, sales strategy, and community involvement. Advertising only equals one piece of the pie in the strategy. All of these elements must not only work independently but they also must work together towards the bigger goal.[6] Marketing is everything that CAT can do to encourage more people to take the bus.

As a general guideline, a marketing program should amount to 3-8% of the operating budget. For systems that are in a maintenance mode, that is not doing many service changes, but needing to keep the system in the forefront of people's minds, a 3% expenditure is appropriate. For systems that are undertaking a significant change, a level of 5% is better. When a system is undertaking a major

[6] See Lake, Laura. *Marketing vs. Advertising: What's the Difference?* http://marketing.about.com/cs/advertising/a/marketvsad.htm.

rebranding program that involves changing the image of the service and promoting major changes, a level of about 8% is desirable. The financial calculations for the 2012 CAT Short Range Transit Plan have assumed the middle level – 5%. A higher expenditure is more appropriate and is even critical to promote the significant changes associated with the rail program, but these changes are likely to be included as part of the overall regional transit budget. In the meantime, CAT is undertaking some significant enhancements of its own, and a minimum level of 5% of the operating budget is desirable.

4 Financial Summary

The financial calculations for the *2012 CAT Short Range Transit Plan* take into account the cost for capital improvements and estimates of the additional hours of service per year. Costs are preliminary and will need to be refined as the schedules are prepared for each individual route and locations and design for the capital projects are determined. Detailed spreadsheets have been developed showing the cost calculations.

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

4.1 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 251 weekday service days, plus 56 Saturdays and 56 Sundays to determine total annual costs. The cost-per-hour was based upon the 2009 cost-per-revenue-hour for CAT as reported in the National Transit Database. **Exhibit 4-1** shows the annual increment in the operating costs. The FY 2013 incremental savings is estimated to be $17,000; for all practical purposes, this represents no change in the operating costs.

The slow build up to the operating expenses has been deliberate. This buildup allows time for the receipt of additional funding to occur, and allows the impacts of the previous year's changes to be evaluated. The initial year of the program will result in a dramatically different route structure, which should have time to be evaluated before major new changes are introduced. By the end of this short-term plan, CAT will have in place a robust system to support the introduction of rail technologies. Should rail be delayed, the bus network alone will provide substantially more mobility than does the current bus system.

Exhibit 4-1
Incremental Operating Costs

FISCAL YEAR	INCREMENTAL OPERATING COSTS
FY 2013	$0.0 million
FY 2014	$1.4 million
FY 2015	$2.0 million
FY 2016	$8.1 million

4.2 Capital Costs

Costs for the *2012 CAT Short Range Transit Plan* 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 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. **Exhibit 4-2** shows the costs by facility type.

The costs shown for the Triangle Town Center facility are those for just the bus transit center. The *2040 Capital Area Bus Transit Development Plan* also included costs for 940 parking spaces for initial use as commuter bus spaces, transitioning to a rail park & ride facility. These costs are related to the commuter transit network provided by Triangle Transit and have not been included in the CAT expenses. The costs associated with the additional parking are estimated to be around $11.6 million, which includes costs for design and contingency.

Exhibit 4-2
Capital Facility Enhancements

CAPITAL ITEM	UNIT	COST	HORIZON
Transit Centers	# Bays		
New Bern Walmart	4	$ 880,000	2014
Moore Square Renovation		$ 3,500,000	2014
Triangle Town Center w/rail	8	$ 3,200,000	2015
Crabtree Renovation		$ 250,000	2015
Wake Med Transit Center	8	$ 5,120,000	2016
Avent Ferry & Gorman	4	$ 880,000	2016
Wilmington & Pecan (SE Raleigh)	4	$ 880,000	2016
Premium Transit Corridors	# Miles		
New Bern Avenue	4.6	$ 2,430,000	2014
Capital Boulevard	8.7	$ 4,600,000	2015
Buses (includes spares)	Vehicles		
Service expansion	12	$ 5,000,000	2013-16
New services	37	$ 15,100,000	2013-16
Paratransit	4	$ 250,000	2013-16
Streetside			
Sidewalks	40 miles	$ 6,800,000	2013-16
Bus Stops - Sign only	400	$ 80,000	2013-16
Bus Stops - Benches	60	$ 180,000	2013-16
Bus Stops - Shelters	40	$ 640,000	2013-16
Soft Costs			
Engineering, Design, Construction Management		$ 8,820,000	2013-16
Contingency (35%)		$ 20,500,000	
TOTAL		**$ 79,000,000**	

4.3 Potential Funding Sources

As noted earlier, funding for the service expansion beginning in FY 2014 is uncertain. A funding plan has not been prepared for this short term plan. Rather, the funding requirements have been incorporated into the overall Wake County Transit Plan, which includes funding analyses for the Triangle Transit rail program. Since the principal additional funding source is likely to be the countywide dedicated sales tax, the overall transit needs in the county is the appropriate venue to develop the funding plan.

A long term transportation authorization bill to replace SAFETEA-LU is several years overdue, with current funding levels and programs merely being extended on a short term basis. Under the current rules, Raleigh may well see a sizable increase in funding for the formula programs, since this is primarily appropriated on the basis of population. The baseline is adjusted every 10 years following the Census, and with the 46 percent growth in Raleigh's population from 276,000 to 404,000 from 2000 to 2010, additional federal money would occur under the current program. However, there are also funding bills progressing through Congress that would change the rules and dramatically reduce all transit funding.

Greater certainty will be possible following this November's elections, at the federal and state levels. It will also be known whether or not Wake County will hold a sales tax referendum and whether it passes. A firm funding plan can be developed during FY 2013.

Should the countywide sales tax not be implemented or the federal programs be cut back, the costs for the Raleigh-only service expansion in this document will serve as guidance to the Raleigh City Council and Raleigh Transit Authority Board on whether and how much additional funding and service expansion is appropriate for Raleigh to undertake.

4.4 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.

Exhibit 4-3 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 4-3
Estimated Job Creation

Category	Jobs
Capital	
Direct Jobs	648
Indirect Jobs	622
Induced Jobs	609
TOTAL	**1,880**
Operating	
Direct Jobs	322
Indirect Jobs	45
Induced Jobs	258
TOTAL	**625**

An estimated 2500 people would gain employment by the implementation of the 2012 CAT Short Range Transit Plan. This employment level does not include riders who would gain access to jobs and be able to become or remain gainfully employed.

APPENDICES

TECHNICAL MEMORANDUM #1
2010 Capital Area Bus Transit Rider Survey

TECHNICAL MEMORANDUM #2
2010 Capital Area Bus Transit Boarding & Alighting Count

INDIVIDUAL ROUTE MAPS