

3 Evaluation Methodology

3.1 *Analysis Methods*

The Short-Range Transit Plan provides both general and specific recommendations for improvements to all of Triangle Transit's services. General recommendations include changes to Triangle Transit policies and service standards, while specific recommendations consist of improvements to current routes and implementation of new services. The following sections detail the methodology used to create the specific recommendations for both current and new services; the analysis performed therein revealed several opportunities for general recommendations, which are provided in Section 4.

3.1.1 Current Service Analysis Methodology

Staff evaluated three aspects of our services in order to gauge current service performance and opportunities for improvement: the agency's Regional Bus Service Standards, on-time performance, and coordination opportunities with other transit agencies in the region. A detailed route profile of each of Triangle Transit's fixed-route bus services can be found in Appendix B.

Triangle Transit regularly evaluates current service according to the Regional Bus Service Standards, as described in Section 1.6.1. Thus, the first step in evaluating current service for the Short-Range Transit Plan was to look to these Standards. Staff evaluated route-level ridership and financial data from September through December 2007 according to methods outlined in the Service Standards. Staff then prioritized the recommendations for improvements to several low-performing routes based on the amount of resources dedicated to each route. Table 3-1 shows the results of the current service analysis according to the Regional Bus Service Standards.

The second measure of the quality of our current services is on-time performance. The results of an on-board passenger survey conducted in 2006 revealed that on-time performance was the most important aspect of service for Triangle Transit customers. In the summer of 2007, Triangle Transit installed Automatic Passenger Counters (APCs) in several of our buses. The APCs not only count the number of people getting on and off of the bus at each bus stop, but they also allow us to monitor the on-time performance of routes served by the vehicles in which they are installed. Table 3-2 shows the results of our on-time performance analysis.

The third and final aspect of current service evaluation was to identify opportunities for coordination between Triangle Transit and other transit agencies in the region to provide more seamless and efficient transit service throughout the region (see Table 3-3). After identifying the corridors where service overlaps or transfers are expected to take place, we assessed the impacts and effort required to implement each coordination project and prioritized the projects accordingly.

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Table 3-1. Results of current service analysis according to Regional Bus Service Standards

Service Type	Route	Pax Per Revenue Hour			Recovery Ratio			Operating Cost Per Pax			Subsidy Per Pax		
		Aug-Dec 2005	Sep-Dec 2006	Sep-Dec 2007	Aug-Dec 2005	Sep-Dec 2006	Sep-Dec 2007	Aug-Dec 2005	Sep-Dec 2006	Sep-Dec 2007	Aug-Dec 2005	Sep-Dec 2006	Sep-Dec 2007
Regional	102 Raleigh - Garner	5.2	6.9	5.0	8%	13%	6%	15.64	11.81	20.16	14.32	10.28	18.87
	105 Raleigh - RTP via District Dr	10.5	11.2	12.2	16%	19%	15%	7.48	7.35	8.24	6.55	5.99	6.97
	107 Raleigh - RTP via Raleigh Corp Ctr (ELIMINATED)	12.4	11.0	--	19%	18%	--	6.62	7.44	--	5.36	6.08	--
	201 North Raleigh - RTP	8.7	6.4	7.6	13%	10%	9%	9.93	12.77	13.14	8.17	11.47	11.91
	202 North Raleigh - RTP via Leesville Rd (ELIMINATED)	4.1	6.8	--	6%	12%	--	19.78	12.15	--	18.57	10.74	--
	301 Raleigh - Cary - RTP	9.0	9.1	8.7	14%	15%	11%	9.16	9.06	11.58	7.90	7.69	10.32
	302 Raleigh - Cary - Apex - RTP (ELIMINATED)	6.0	--	--	9%	--	--	13.58	--	--	12.31	--	--
	303* Raleigh - Cary mid-day	--	--	5.3	--	--	7%	--	--	18.88	--	--	17.56
	305 Raleigh - Cary - Apex	--	6.8	7.5	--	12%	10%	--	12.10	13.29	--	10.69	12.00
	310 Cary - Apex - RTP via Davis Dr (ELIMINATED)	--	3.4	--	--	6%	--	--	24.30	--	--	22.89	--
	311 Apex - RTP	7.4	7.4	7.9	10%	9%	9%	11.13	11.13	12.69	10.01	10.09	11.52
	402/412 RTP - Durham - Chapel Hill	10.8	11.6	11.8	16%	18%	14%	7.57	7.08	8.47	6.37	5.82	7.25
	403/413 RTP - Chapel Hill - Durham	10.2	11.2	12.0	15%	17%	15%	8.02	7.31	8.36	6.82	6.05	7.14
420 Hillsborough - Chapel Hill	--	--	9.0	--	--	12%	--	--	11.18	--	--	9.82	
Regional Average		9.6	10.0	10.6	14%	16%	13%	\$ 8.57	\$ 8.22	\$ 9.49	\$ 7.35	\$ 6.92	\$ 8.25
Express	500 Chapel Hill - Raleigh	14.9	12.3	11.7	22%	21%	15%	5.50	6.69	8.58	4.27	5.28	7.27
	550 Raleigh - Chapel Hill	9.5	13.7	11.7	14%	20%	14%	8.60	5.99	8.54	7.44	4.81	7.32
	600 Durham - Raleigh	7.1	11.0	14.1	11%	17%	18%	11.61	7.44	7.11	10.37	6.21	5.83
	650 Raleigh - Durham	5.9	4.7	8.0	9%	8%	11%	13.83	17.55	12.50	12.58	16.16	11.17
Express Average		9.4	10.5	11.5	14%	16%	15%	\$ 8.72	\$ 7.84	\$ 8.75	\$ 7.50	\$ 6.56	\$ 7.48
Shuttle	42 North-central RTP	9.6	8.7	8.7	14%	14%	10%	8.56	9.45	11.51	7.33	8.10	10.33
	45 West RTP	4.4	4.5	3.8	6%	8%	4%	18.59	18.14	26.71	17.39	16.95	25.58
	46 East RTP	7.8	7.1	3.4	12%	12%	4%	10.52	11.47	29.60	9.29	10.19	28.32
	48* Northeast RTP	4.4	--	5.6	6%	--	6%	18.70	--	18.05	17.52	--	16.91
	49 South RTP	--	--	13.0	--	--	15%	--	--	7.72	--	--	6.53
	747 RDU Airport	4.3	6.1	5.2	7%	11%	7%	19.21	13.55	19.18	17.90	12.04	17.83
Shuttle Average		5.3	6.1	5.9	8%	10%	7%	\$ 15.42	\$ 13.44	\$ 17.08	\$ 14.18	\$ 12.07	\$ 15.85
Night	470* Durham - Chapel Hill	--	--	4.9	--	--	6%	--	--	20.30	--	--	19.12
	570* Raleigh - Chapel Hill	--	--	3.5	--	--	5%	--	--	28.56	--	--	27.25
	670* Raleigh - Durham	--	--	3.4	--	--	4%	--	--	29.29	--	--	28.01
Night Average		--	--	3.9	--	--	5%	--	--	\$ 25.84	--	--	\$ 24.59
WEEKDAY AVERAGE		9.0	9.6	9.7	13%	15%	12%	\$ 9.13	\$ 8.56	\$ 10.34	\$ 7.90	\$ 7.26	\$ 9.10
Saturday	101 Raleigh - RTP	14.9	15.2	14.5	23%	26%	18%	5.49	5.41	6.81	4.20	3.99	5.58
	412 RTP - Durham - Chapel Hill	11.2	8.3	11.8	18%	15%	15%	7.31	9.92	8.35	6.01	8.43	7.08
	413 RTP - Chapel Hill - Durham	11.2	8.3	11.1	18%	15%	14%	7.31	9.92	8.92	6.01	8.43	7.68
	747 RDU Airport	3.8	3.7	4.2	6%	6%	5%	21.61	22.12	23.77	20.30	20.80	22.51
Saturday Average		10.6	8.7	10.8	17%	15%	14%	\$ 7.74	\$ 9.45	\$ 9.15	\$ 6.45	\$ 7.99	\$ 7.90
SYSTEM AVERAGE		9.3	9.4	9.8	14%	15%	12%	\$ 8.86	\$ 8.70	\$ 10.27	\$ 7.62	\$ 7.38	\$ 9.02

Notes:

Red numbers Low-performing routes (values below 75% of weekday or Saturday average, respectively)

Shaded numbers High-performing routes (values above 125% of weekday or Saturday average, respectively)

* Indicates new service (a route that has been in service for 6 months or less); these routes are not held to same standard as routes in service for more than 6 months.

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Table 3-2. Results of on-time performance analysis

		STATUS			TOTALS
		EARLY	ON TIME	LATE	
ROUTE	48	4%	90%	6%	100%
	49	18%	80%	1%	100%
	105	8%	60%	33%	100%
	201	4%	76%	20%	100%
	301	5%	48%	47%	100%
	303	3%	70%	27%	100%
	402	8%	69%	23%	100%
	403	5%	63%	32%	100%
	412	7%	65%	28%	100%
	413	5%	67%	28%	100%
	470	10%	34%	55%	100%
	500	16%	58%	26%	100%
	550	14%	59%	27%	100%
	570	22%	58%	21%	100%
	600	18%	63%	20%	100%
	650	19%	61%	20%	100%
	670	20%	56%	24%	100%
TOTALS		8%	62%	31%	100%

Saturday

		STATUS			TOTALS
		EARLY	ON TIME	LATE	
ROUTE	101	9%	36%	55%	100%
	412	10%	44%	46%	100%
	413	10%	40%	50%	100%
TOTALS		10%	41%	50%	100%

Notes: ON TIME is defined as between 1 min. early and 5 min. late
 No data available for 102, 305, 311, 420, RTP Shuttles, or Airport Shuttle
 All time points along route measured for on-time performance

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Table 3-3. Results of coordination project analysis

Priority	County	Segment	Other Stakeholders	Type of Coordination	Ease of Implementation	# Affected	Pros	Cons
High	Wake	Hillsborough St	CAT, Wolfline	Coordinating timetables and bus stops	Moderate	High	Improve travel time, reduce confusion	Difficult to coordinate timetables, timed transfers elsewhere
High	Orange/ Durham	15/501/New Hope Commons/Westgate, Duke Hospital, NCCU/Durham Tech	DATA, CHT, Robertson Scholars, Duke Transit	Limit overlap with other systems, timed transfers	Difficult	High	Reduce redundancy, allow resources to be used elsewhere, improve travel time, reduce confusion	May increase need to transfer, reduce service quality, miss major destinations
High	Wake	Walnut St/Buck Jones Rd, Cary Train Station, Wake Medical Center (Tryon Rd), Route 301 corridor (Harrison, Kildaire Farm, SE Maynard, Walnut)	C-Tran, CAT	Limit overlap with other systems, timed transfers, reduce number of stops	Difficult	Mid	Allow passengers to move easily between agencies, improve travel time, reduce confusion	No current transfer point between the three agencies, may affect transfers at other locations, may serve fewer passengers, increase need to transfer
High	Orange	Downtown CH & UNC	CHT, UNC, Robertson Scholars	Evening and weekend timed transfers	Moderate	Mid	Decrease wait time	Difficult to coordinate timetables, timed transfers elsewhere
High	Durham	South Durham (NC 54, Southpoint, Woodcroft)	DATA	Limit overlap with other systems/timed transfers	Difficult	Mid	Reduce redundancy, allow passengers to move easily between agencies	Increase need to transfer
Mid	Wake	Western Blvd	CAT, Wolfline	Coordinating timetables and bus stops	Moderate	Mid	Allow passengers to move easily between agencies	Difficult to coordinate timetables, timed transfers elsewhere
Mid	Wake	Moore Square	CAT	Timed Transfers	Moderate	High	Allow passengers to move easily between agencies	Difficult to know which "pulse" to coordinate with, timed transfer at RTP could be affected
Low	Orange	NC 54 (Raleigh Rd) & Franklin St.	CHT	Limit stops	Easy	Low	Improve travel time slightly	Serve fewer passengers; negligible improvement in travel time
Low	Orange	UNC/UNC Hospitals	CHT, UNC	Limit overlap with CHT	Difficult	High	Improve travel time	Miss major destinations, difficult to coordinate timetables
Low	Orange	Downtown CH & UNC	CHT, UNC, Robertson Scholars	Weekday timed transfers	Difficult	High	Allow passengers to move easily between agencies	Difficult to coordinate timetables, timed transfers elsewhere
Low	Wake	Brier Creek area	CAT, DATA	Timed Transfers, coordinating stops	Moderate	Low	Allow passengers to move easily between agencies	May remove service from Brier Creek

3.1.2 New Corridor Analysis Methodology

In order to evaluate potential new transit services in the Triangle Region, staff first compiled a list of thirty corridors for which transit demand has been demonstrated or perceived. This list comprised corridors from two major regional transit planning initiatives (Triangle Mayors' Bus Expansion Plan and Special Transit Advisory Commission) and corridors suggested by internal and external advisory groups.

The Triangle Mayors' Bus Expansion Plan identified the travel corridors with the highest demand for new or enhanced transit service and quantified the costs associated with these services. Triangle Transit incorporated all of the regional transit corridors (i.e., those extending beyond one locality's boundaries) from the Mayors' Plan in the Short-Range Transit Plan new service evaluation.

The second major transit planning effort from which staff drew potential corridors for evaluation was the Special Transit Advisory Commission (STAC). Several of the STAC analysis corridors overlapped with the Mayors' Plan corridors; staff included the additional corridors in the SRTP new corridor analysis.

Finally, staff took suggestions from an internal staff advisory group and external advisory group of partner agencies for additional corridors to analyze. After compiling the list of corridors from the various sources, staff estimated total daily peak work and university travel demand (person-trips) in each corridor using the Triangle Regional Model travel demand estimates for 2005. Staff adjusted the travel demand figures based on several factors that influence transit ridership, resulting in a transit ridership score for each corridor. Staff then used the total travel demand and transit ridership scores to rank and group the corridors into three tiers. Corridors with fewer than 1,000 person-trips of travel demand fell into in Tier 3 (low-priority projects) because it is unlikely that the demand for travel in these corridors will be high enough to support transit service. Staff ranked and divided the remaining projects into Tiers 1 and 2 (high- and medium-priority projects, respectively) based on their Transit Ridership Scores, taking into consideration the projected costs of operating the service. Table 3-4 shows the results of the new corridor analysis. The remainder of this section provides further detail on the analysis of new corridors.

Transit Ridership Score

The transit ridership score is a combination of the estimated travel demand in a corridor (for all modes of travel: car, bus, walk, etc.) and characteristics of the origin and destination ends of the corridor that influence transit ridership. For each corridor, staff multiplied the travel demand by the sum of the scores for each of the four factors that influence transit ridership, which are defined in the following section. Staff then normalized the results so that they fell within the range of 0 to 100 for simplicity of comparison.

Factors that Influence Transit Ridership

Staff assigned each corridor a score for each of the following four factors to assist in the calculation of the Transit Ridership Score:

Low-Income Household Travel Demand - Percent of travel demand from households without vehicles and low income households. Households with lower incomes tend to have access to

fewer private vehicles and use transit more often than households with higher incomes. Staff assigned one to three points to each corridor for Low-Income Household Travel Demand as follows:

- 1 = 0 to 5% of travel demand from low-income households
- 2 = 5% to 10% of travel demand from low-income households
- 3 = >10% of travel demand from low-income households

Destination Walkability - The term “walkability” refers to the elements of a streetscape that create a sense of comfort (or discomfort) for pedestrians. Some of the things that constitute good walkability include sidewalks on both sides of the street, marked and signalized pedestrian crossings at intersections, low vehicle travel speeds, a grid street pattern, and buildings that front the sidewalk (rather than being set back a distance from the street). Most downtowns in this region (including Chapel Hill, Durham, and Raleigh) are considered “walkable.” Destination walkability is linked to positive transit ridership because almost all transit trips end by walking from the bus stop either to a final destination or another vehicle trip. Staff assigned one to three points to each corridor for Destination Walkability as follows:

- 1 = Poor walkability
- 2 = Average walkability
- 3 = Good walkability

Parking Constraints - The presence of parking constraints at the destination end of a trip influences what mode people use to travel. Parking is “constrained” if the quantity of parking spaces is limited or if parking has a cost. Both of these factors are generally present in areas that are considered to have high parking constraints. Staff assigned points to each corridor for Parking Constraints on a scale of one to six. One point indicates abundant, free parking, while a score of six indicates limited, high-priced parking. Two through five indicate various degrees of parking constraints that lie between these two scenarios. The inherent assumption in giving parking constraints a scale of one to six is that parking pricing and availability will have a larger impact on one’s decision to use transit than the other factors.

Existing Employer Incentives - Transit agencies across the country, including Triangle Transit, have experienced noticeable increases in ridership when large employers or several employers in an area of concentrated employment offer incentives to their employees to take transit. An example of an employer incentive in the Triangle region is the State Government GoPass program, which allows any State Government employee to ride CAT and Triangle Transit buses for free. Staff assigned one to three points to each corridor for Existing Employer Incentives as follows:

- 1 = Incentives available to few or no employees at the destination
- 2 = Incentives available to some employees at the destination
- 3 = Incentives available to many employees at the destination or multiple large employers offer incentives

Ridership Score/\$100,000 Operating Cost

In addition to looking at travel demand and factors that influence transit ridership, staff also estimated the operating costs of these potential services. By dividing the ridership score by operating cost, two similar services can be compared. The service with a higher ridership score per operating cost would be likely to give the region “more bang for the buck.” It is a way to compare the size of the travel market to the cost of providing transit service to that market.

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Table 3-4. Results of new corridor analysis

Project No.	Bus Service Investments	Add'l Vehicles Needed	Annual Operating Cost	2005 Peak Work and University Travel Demand	Transit Ridership Factors				Combined Ridership Factor	Ridership Score	Ridership Score/\$100,000 Operating Cost
					Low-Income Household Travel Demand Scale ¹	Destination Walkability Scale ²	Parking Constraints Scale ³	Existing Employer Incentives Scale ⁴			
		(vehicles)	(\$)	(person-trips)	(1 to 3)	(1 to 3)	(1 to 6)	(1 to 3)	Sum of Scales	(1 to 100)	
Tier One (High Priority Projects)											
1a	Youngsville/Wake Forest to NCSU/Raleigh	3	\$451,680	5881	3	3	4	2	12	100	22
1b	Wake Forest to NCSU/Raleigh	2	\$308,120	5158	3	3	4	2	12	88	29
2a	Zebulon/Wendell/Knightdale to NCSU/Raleigh	2	\$308,120	4328	2	3	4	2	11	67	22
2b	Wendell/Knightdale to NCSU/Raleigh	2	\$299,120	2860	2	3	4	2	11	45	15
2c	Knightdale to NCSU/Raleigh	1	\$149,560	1801	2	3	4	2	11	28	19
3a	Burl./Mebane/Hillsb. to Duke/Durham	2	\$287,120	4792	2	3	3	1	9	61	21
3b	Hillsborough to Duke/Durham	1	\$140,560	1966	2	3	3	1	9	25	18
4	Durham-Person County to Durham/Duke	2	\$305,120	4681	2	3	3	1	9	60	20
5	Clayton/Garner to NCSU/Raleigh	0	\$164,560	2602	3	3	4	2	12	44	27
6	Pittsboro to UNC/Chapel Hill	2	\$273,040	1891	1	3	6	3	13	35	13
7	Holly Springs to NCSU/Raleigh (305 Extension)	1	\$143,560	1806	2	3	4	2	11	28	20
8a	Fuquay-Varina to Wake Tech (Southern Campus) to Raleigh	1	\$237,600	1380	2	3	4	2	11	28	12
8b	Wake Tech (Southern Campus) to Raleigh (all day)	0	\$88,040	N/A	2	3	4	2	11	N/A	N/A
9	Raleigh - RDU Direct (all day)	1	\$361,440	2060	2	3	5	1	11	32	9
Tier Two (Medium Priority Projects)											
10	Durham - Raleigh/NCSU via US 70	1	\$502,680	3830	2	2	3	1	8	43	9
11	Burlington/Graham to UNC/Chapel Hill	2	\$290,120	1315	2	3	6	3	14	26	9
12	Old Greensboro Rd to UNC/Chapel Hill	1	\$146,560	1198	1	3	6	3	13	22	15
13	Cary - RDU Direct (all day)	1	\$524,160	1374	1	3	5	1	10	19	4
14	Durham - RDU Direct (all day)	1	\$361,440	1163	2	3	5	1	11	18	5
15	Chapel Hill - RDU Direct (all day)	2	\$722,880	1278	1	3	5	1	10	18	2
16	Johnston Co (Cleveland) to Raleigh	1	\$146,560	1092	2	3	4	2	11	17	12
17	Butner/Creedmoor to Durham/Duke	1	\$146,560	1355	1	3	3	1	8	15	10
18	540 Express service (Triangle Town Ctr) to RTP	1	\$158,560	2017	1	1	1	2	5	14	9
19	Holly Springs/Apex to Duke/Durham	2	\$284,120	1240	1	3	3	1	8	14	5
Tier Three (Low Priority Projects)											
20	Mt. Carmel Church Rd to UNC/Chapel Hill	1	\$140,560	694	2	3	6	3	14	14	10
21	Rolesville to Raleigh	2	\$522,080	797	2	3	4	2	11	12	2
22	Wake Forest to Durham via Hwy 98	2	\$281,120	746	1	3	3	1	8	8	3
23	Carrboro to Duke/Durham	2	\$281,120	548	3	3	3	1	10	8	3
24	Apex to Chapel Hill Express via NC 55	2	\$281,120	421	1	3	6	3	13	8	3
25	North Raleigh to Chapel Hill Express	1	\$140,560	411	1	3	6	3	13	8	6
26	Extension of 311 to Holly Springs	1	\$143,560	997	1	1	1	2	5	7	5
27	Cary to Chapel Hill Express	2	\$281,120	328	1	3	6	3	13	6	2
28	Carrboro to RTP	2	\$281,120	488	3	1	1	2	7	5	2
29	Pittsboro to Raleigh	3	\$783,120	283	3	3	4	2	12	5	1
30	Creedmoor/Oxford to Raleigh	2	\$522,080	85	3	3	4	2	12	1	0

Notes: Operating cost estimates based on peak service only unless noted (all day).

¹ Low Income Household Travel Demand Scale:

1 = 0-5% of demand from low income households; 2 = 5-10% of demand from low income households; 3 = >10% of demand from low income households

² Destination Walkability Scale:

1 = Poor; 2 = Average; 3 = Good

³ Parking Constraints Scale:

1 = Abundant, free parking; 6 = scarce, priced parking

⁴ Existing Employer Incentives Scale:

1 = Incentives available to few or no employees; 2 = Incentives available to some employees; 3 = Incentives available to many employees/multiple large employers offer incentives

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3.2 Data Collection and Improvements

As discussed in the analysis methods section, Triangle Transit has several sources of data that we can use to evaluate the performance of our services. Because our single most important indicator of performance is based on passenger trips, ridership data is extremely valuable. We collect ridership data for our regional bus service using three separate methods: system-wide manual on-board passenger counts, 'smart' fareboxes installed on the entire fleet, and Automatic Passenger Counters (APCs), which are installed on a portion of our fleet. Each method has a different level of reliability based on different probabilities of sampling and measurement error, and at present the methods are not cross-referenced to check the accuracy of each.

In order to maintain eligibility for Federal funding, Triangle Transit performs manual on-board passenger counts using the sampling method defined by the Urban Mass Transportation Administration (UMTA) for Section 15 reporting. Counters board specific trips on each route according to a sampling calendar (3 trips a day, every other day) and record the number of boardings and alightings at each stop along the route. The agency compiles statistics annually for reporting purposes. Although scientific sampling methods such as the one recommended by UMTA help to control sampling error, it is still a possibility. Measurement error by on-board checkers, on the other hand, is considered minimal in this method (Furth, 2000).

The second type of ridership data that Triangle Transit collects is through our fareboxes. The entire fleet of Triangle Transit buses is equipped with electronic fareboxes, which register passenger boardings by fare category. While sampling error is usually not an issue (because fareboxes collect information on every trip), measurement error can be a serious problem, either because of equipment failure or human error. The electronic fareboxes Triangle Transit uses require some level of operator intervention for a large portion of boardings because of the variety of fare types and passes available to our customers.

Triangle Transit's third source of data is a technology called Automatic Passenger Counters (APCs). Triangle Transit began installing APC units on a sample of our fleet in August 2007. The APCs installed at the front and center doors of our buses detect passenger boardings and alightings using optical imaging tools. Passengers 'trip' infrared beams projected across the steps (or boarding floor in our low-floor vehicles) as they climb/descend the steps to board/alight. Two sensors are placed at each door to determine the direction in which the passenger is moving. Data are collected and stored in units on the vehicle and transmitted to transponders located at the maintenance facility when the buses go out of service and return to base. Measurement error with APCs can be serious due to equipment inaccuracy, malfunction, and failure. Sampling is necessary because only a few buses in Triangle Transit's fleet are equipped with APCs, and thus sampling error is also a possibility. Another limitation of the APC data we currently collect is that APCs are not installed on any of our El Dorado cutaway fleet; thus very little, if any, APC data has been collected on the routes served on most or all trips by El Dorado vehicles.

As previously mentioned, the three types of passenger data collection that Triangle Transit performs are not cross-checked for accuracy. In an attempt to ensure accurate ridership data, staff recommends that each method of passenger counting is individually checked for accuracy, the data outputs are cross-checked for consistency, and any inconsistencies are addressed.

3.3 Advisory Groups and Public Participation

3.3.1 Outreach Strategy

Triangle Transit staff engaged the assistance of two advisory groups, met individually with several of our transit planning partners, and solicited public feedback to guide the Short-Range Transit Plan process and recommendations.

The Internal Advisory Group, made up of representatives from each department within Triangle Transit, met several times to provide feedback to the service planning staff during the SRTP development process.

Staff also assembled a Partners' Advisory Group of regional transit planning stakeholders. Staff invited representatives from Capital Area Transit, Durham Area Transit Authority, Cary Transit, Chapel Hill Transit, RDU Airport Authority, University of North Carolina, North Carolina State University, North Carolina Central University, Duke University, Orange County, Durham County, Wake County, Capital Area Metropolitan Planning Organization (MPO), Durham-Chapel Hill-Carrboro MPO, and NCDOT to participate in the Partners' Advisory Group, which met monthly during the SRTP development process. The partners provided staff with valuable feedback during each stage of the planning process and worked with us to determine the feasibility and timeline for implementation of several coordination projects. In addition to the monthly meetings of the Partners' Advisory Group, Triangle Transit staff met individually with representatives from each of the transit agencies and universities to discuss specific coordination issues.

In order to involve regional leaders in the discussion about Triangle Transit's plans for expansion of services, the General Manager contacted the Mayors and Town Managers of each municipality for which new service was being considered and the County Commissioners from Wake, Durham, and Orange Counties, requesting feedback and offering Triangle Transit staff support for public meetings and presentations to local decision-makers. As a result, staff met with officials from the Town of Garner and jointly with the Towns of Knightdale, Wendell, and Zebulon to discuss potential future transit service and partnerships.

In addition to seeking guidance from internal staff, transit planning partners, and regional leaders, staff sought feedback from the public (riders and non-riders). Staff gathered public input in two phases. The first phase began with the release of the SRTP priorities in April 2008. The SRTP priorities comprised staff-recommended projects but did not include an implementation plan or schedule. Staff launched a website with information about the priorities, held two public information sessions at Triangle Transit's Regional Transit Center, posted information on Triangle Transit buses, sent an announcement to our customer e-mail database, and requested that university and other employer Transportation Demand Management coordinators notify their employees about the SRTP priorities information available on the Web. Staff also produced an informational brochure that was available at several of the on-site events associated with the SmartCommute Challenge promotion between April 15 and May 31, 2008. Staff posted an on-line survey on the agency's website and provided paper surveys at the Regional Transit Center information sessions. The brochure and text of both surveys (on-line and paper) are available in Appendix C.

Using feedback received from our advisory groups and outreach efforts, staff drafted the SRTP recommendations, including the year-by-year implementation plan for all of the priority

projects. The second phase of gathering public feedback followed the release of these recommendations in early June 2008. Staff used a similar public outreach strategy to collect feedback on the draft SRTP, with the addition of a public hearing at the June 2008 Board of Trustees Meeting.

3.3.2 Summary of Public Feedback on Short-Range Transit Plan Priorities

Staff received more than 300 responses to solicitation for public feedback on the Short-Range Transit Plan priorities, with the majority of comments collected via the on-line survey (81%) and at the public information sessions held at Triangle Transit's Regional Transfer Center (13%). Staff received the remaining comments by telephone, through the agency's web-based customer feedback system, and through e-mail. Of the comments received through the on-line and paper surveys, 71% were from current or former bus riders, 3% were from vanpool and paratransit customers, and 16% were from those who have never used Triangle Transit services.

Perceived Quality of Triangle Transit Services

Customers taking the on-line survey were asked to rate their overall perception of the quality of Triangle Transit services. On a scale of 1 to 5, with 1 being poor and 5 being excellent, the average rating for the Triangle Transit services from all customer feedback was 3.6, with 59% of respondents rating our services as 4 or 5. Looking more closely at the quality ratings, the average rating for respondents who have used Triangle Transit services (3.9) was higher than the average rating of non-users (2.8). Refer to Figure 3-1 for details on customer ratings by type of Triangle Transit service used.

Customers who use the Triangle Transit services the most gave the highest quality ratings. Customers who have used Triangle Transit within the last week and use the services 4-6 times per week gave the services an average rating of 4.0. Refer to Table 3-5 and Table 3-6 for quality rating by recentness and frequency of using Triangle Transit Services, respectively.

Triangle Transit Short-Range Transit Plan

Figure 3-1. Perception of Overall Quality of Triangle Transit Services by Service Type

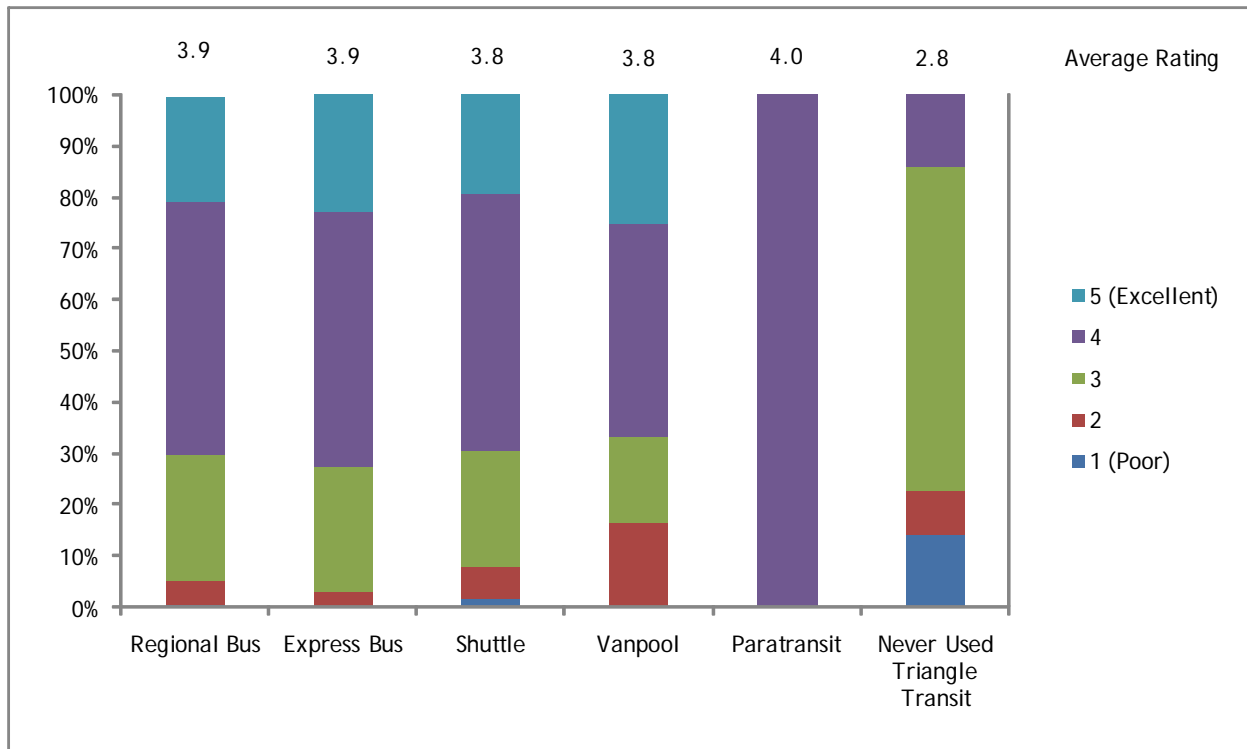


Table 3-5. Perception of Overall Quality of Triangle Transit Services by Recentness of Use

	Last time respondent used Triangle Transit services				Never
	Within the Last Week	Within the Last Month	Within the Last 6 months	Greater than last 6 months	
Average Rating	4.0	3.6	3.5	3.4	2.8
Number of Respondents	129	17	23	22	54

Table 3-6. Perception of Overall Quality of Triangle Transit Service by Frequency of Use

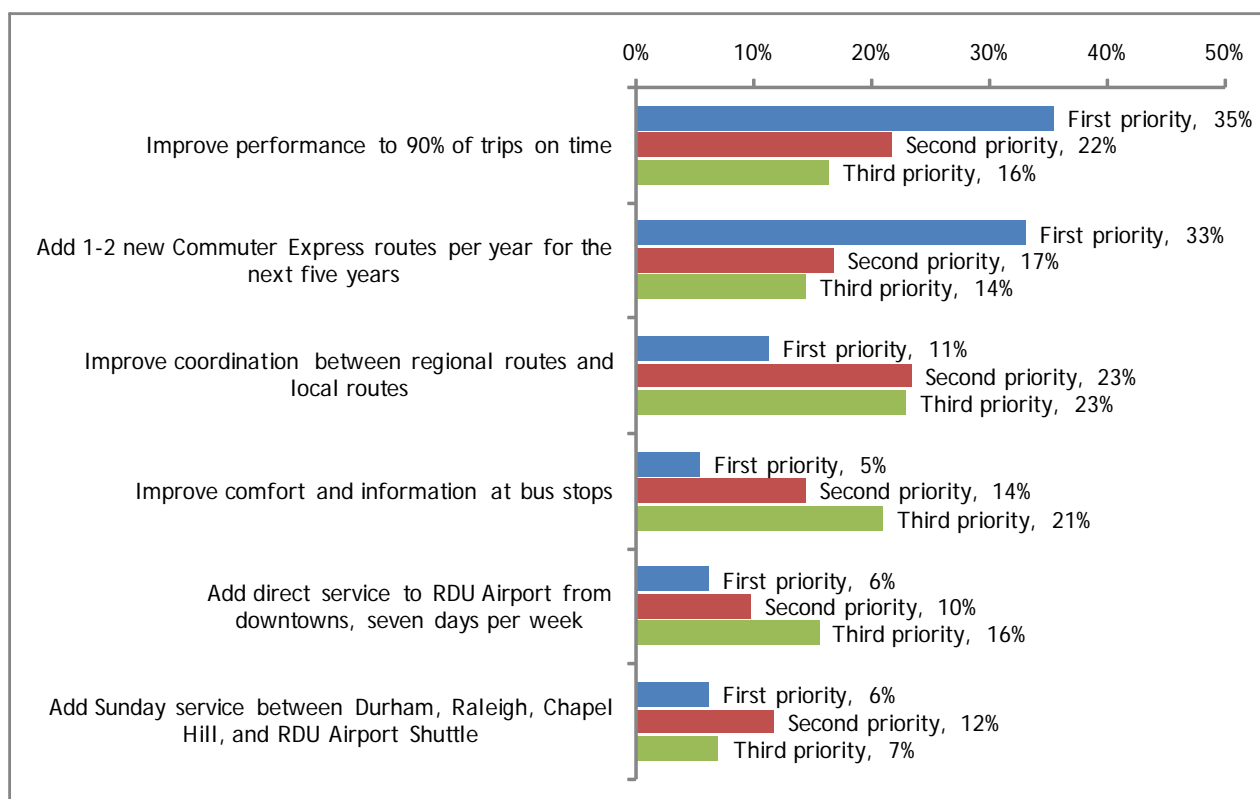
	How often respondent uses Triangle Transit services			
	4 - 6 days per week	1 - 3 days per week	Less than 1 day per week	Never
Average Rating	4.0	3.8	3.5	2.8
Number of Respondents	106	43	43	57

Ranking Transit Improvements

A main objective of conducting the on-line and paper survey as a part of the public outreach for the SRTP priorities was to identify the transit improvements that are most important to the public (both riders and non-riders). To this end, a question on the survey listed transit improvements and asked respondents to rank the improvements from most important to least important. Overwhelmingly, the responses indicated the importance of improving on-time performance, the success of express routes, and the need to better coordinate regional routes with local routes. See Figure 3-2 for the percentage of respondents who selected each transit improvement as their first, second, or third priority.

- **Improving performance to 90% of trips on-time** appeared in the top 2 priorities for customer responses from all modes of transit use, although a higher percentage of customers who use the regional bus and shuttles put on-time performance as their first priority. A greater percentage of respondents who use Triangle Transit services 4-6 times a week selected on-time performance as their first priority (44%) as compared to all respondents combined (35%).
- **Adding 1-2 new Commuter Express routes** per year for the next five years was ranked in the top 2 priorities for responses for each mode of transit and for customers who ride the bus often or never at all, thus supporting Triangle Transit's recommendation to focus on providing more express routes. Interestingly, 54% of non-riders put the express routes as their top priority indicating that express routes could be a way to attract new riders to the system.
- Finally, **improving coordination between regional routes and local routes** was an important second and third priority among respondents.
- While **improving the comfort and information at bus stops** was not often ranked as a first priority, 14% of survey respondents ranked it as a second priority and 23% as a third priority. This priority appears to be more important for riders who use the system less frequently (1-3 times per week) since 12% of these respondents selected this priority as their first priority as opposed to 5% of respondents overall.

Figure 3-2. Ranking of Transit Improvements



Impact of High Priority Changes

The survey also asked customers to rate the impact to transit services if the high priority changes were implemented. Fifty-four percent reported that the high priority changes would make their transit experiences better and 23% said they did not know how their transit experience would be affected. As details of service changes and expansions are released to the public, customers will be better able to judge how their transit experience will be affected.

Respondents who use regional bus and vanpool services reported similar results in this category with the majority of respondents reporting a positive impact (53% and 50%, respectively). Respondents who use Express routes reported the greatest positive impact to their transit service with 73%. Several respondents who use Route 301 indicated that the proposed changes would have a negative impact on transit service for them. Triangle Transit responded to these concerns by revising the SRTP recommendation to reroute the eastern half of Route 301 between Cary and Raleigh. Staff will continue to work with Cary Transit and the City of Raleigh to coordinate transit services between RTP, Cary, and Raleigh such that service along existing corridors will be maintained in the near term, with any changes to Triangle Transit’s routing being predicated by changes to C-Tran and/or CAT service that would enable a seamless transition with as little disruption as possible to current riders.

3.3.3 Summary of Public Feedback on Draft Short-Range Transit Plan

The second phase of public involvement followed the release of the draft SRTP in June 2008. Staff received more than 150 responses to solicitation for public feedback on the draft SRTP. Most people submitting comments used the on-line feedback form available on the SRTP website. The remaining comments came via e-mail, telephone, and at the public hearing held at the June meeting of the Triangle Transit Board of Trustees. Unlike the SRTP Priorities phase of public involvement, in which a survey was employed to gain insight into customer preferences for different types of service improvements, the second phase involved collecting free-response commentary on the draft SRTP document.

The majority of comments indicated support for current service improvements and new service recommendations. Most comments in support of SRTP recommendations expressed the desire to see improvements happen sooner than planned.

The majority of support for current service recommendations involved service to Perimeter Park on Route 301, planned for implementation in FY2011. Several people supported the changes made to the recommendation for the eastern half of Route 301 between Cary and Raleigh. Staff also received comments in support of the recommendations to improve on-time performance, add Sunday and holiday service, and coordinate service in the US15/501 corridor.

Staff received many suggestions to consider new services that are not included in the Short-Range Transit Plan recommendations. Most suggestions involved direct service from residential areas or park-and-ride locations to employment centers. While many of these suggestions appeared in the list of corridors analyzed for the SRTP, the travel demand and/or factors that influence transit ridership present in these corridors were insufficient to result in their inclusion in the SRTP recommendations.

After comments in support of the SRTP recommendations and suggestions for new service, the most common type of comment was requests for additional service on current routes, the majority of which came from patrons of our express services (Routes 500, 550, and 600). In response to these requests, Triangle Transit added a recommendation for FY2009 to enhance passenger capacity on our most popular routes where financially feasible.

Staff also received several requests to improve customer information and amenities, including requests for real-time passenger information, wireless internet on buses, bicycle capacity on buses and at bus stops, and bus stop amenities. Recommendations for improvements to passenger information and amenities are included in the SRTP.

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