

---

**Wake County Fire  
Commission**

**Long Range Business Plan**

**Facility and Staffing Components**

**Study Period FY 2009 - 2015**

---

## TABLE OF CONTENTS

<b>TABLE OF CONTENTS .....</b>	<b>2</b>
<b>EXECUTIVE SUMMARY .....</b>	<b>4</b>
Summary of Recommendations .....	8
Summary of Fire Station Recommendations for FY 2009 – 2015 .....	8
Summary of Staffing Recommendations .....	8
Summary of Conclusions / Observations.....	9
<b>INTRODUCTION .....</b>	<b>12</b>
<b>POPULATION ESTIMATE AND PROJECTED GROWTH BY FIRE DISTRICT 14</b>	
2007 Population Estimate .....	14
Municipal Growth.....	14
Population Projections .....	17
Population Trends 2007 - 2035.....	20
<b>SERVICE DEMAND .....</b>	<b>22</b>
Current Per Capita Service Demand .....	22
Projected 2015 Per Capita Demand .....	22
<b>RESPONSE TIME AND SERVICE LEVEL GOALS.....</b>	<b>24</b>
Response Time.....	24
Fire Commission’s Adopted Service Level Goals.....	25
Population Density.....	26
Response and Turnout Time Analysis .....	29
Summary of Response Time Analysis .....	33
<b>FACILITY RECOMMENDATIONS .....</b>	<b>34</b>
New Fire Stations to Extend Fire Insurance Districts.....	34

New Fire Stations to Meet Service Level Goals .....	35
Maintenance and Repair of Existing Fire Stations .....	37
Service Replacement Evaluation of Current Fire Stations .....	37
Summary of Fire Station Recommendations for FY 2009 - 20 15 .....	39
<b>STAFFING RECOMMENDATIONS.....</b>	<b>40</b>
Staffing Evolution.....	41
Volunteerism.....	43
Impact of 24-Hour Staffing on Response Time .....	44
Staffing Improvement Plan .....	45
Impact of Transition to Predominantly Career System.....	47
Summary of Staffing Recommendations .....	50
<b>TOWN OF WENDELL ANALYSIS .....</b>	<b>51</b>

## EXECUTIVE SUMMARY

Wake County contracts with nineteen, individual organizations to provide fire protection, medical responder and related emergency services in unincorporated areas of Wake County and in the Town of Wendell corporate limits. Fourteen of the nineteen contracting fire departments are private, non-profit organizations, and the remaining five departments are public, municipal fire departments. Wake County funds fire protection and related services with revenues from the fire protection service tax district.

Recognizing the need for a long-term approach to address fire service needs, the Wake County Board of Commissioners approved two fire service consultant studies in 2003. The Waters Consulting Group completed the pay and compensation study, and Tri-Data Corporation completed the Fire/EMS Capital Facility and Equipment Study. The Board of Commissioners adopted the compensation plan prepared by the consultants and recommended by the Fire Commission. The Fire Commission did not support the capital study, and the study was not presented to the Board of Commissioners.

In 2004, the Fire Commission committed to complete a long-range business plan. The intent of the business plan was to address facility, apparatus and staffing needs and provide a collection of financial policies for the fire protection system. The Board of Commissioners approved the first version of the plan in 2005. The initial version of the business plan contained a completed apparatus plan and adopted financial policies; however, the facility and staffing components were not fully developed.

This report completes the facility and staffing components of the business plan. Recommendations in this report address facility and staffing needs of the fire departments through 2015 and lay the foundation for future planning efforts.

Wake County is consistently ranked as one of the best places in the country to live, work, play and raise a family. By 2030, Wake County's population is expected to nearly double to approximately 1.4 million. Wake County is home to several of the country's fastest growing suburbs.

Continuing growth and development in the County and in the County's twelve municipalities presents many challenges to the fire protection system. Growth and population increase demand for fire service and related emergency services.

Population projections predict a population increase in unincorporated areas for approximately the next 20-30 years, then a decrease in unincorporated population as municipalities continue to annex area into their corporate limits. Since 2000, Wake County's twelve municipalities have annexed approximately 63 square miles. This area is substantially equivalent to the combined area of five current fire insurance districts: Durham Highway, Falls, Western Wake, Morrisville and Fairview.

The current population estimate for unincorporated Wake County is 186,654 persons. The projected 2015 population is 275,631 persons.

Using current per capita service demand estimates and future population projections, future demand for service can be projected. Current per capita demand ranges from a low of 34.6 incidents per thousand population (Bay Leaf) to a high of 236.1 incidents per thousand population (Morrisville).

Although the demand for service is predicted to increase in fourteen fire insurance districts, no department other than the Garner Fire Department is forecast to become busier than Garner Fire Department is today. Garner Fire Department's demand service is predicted to increase 17%.

The Fire Commission has adopted service delivery goals for the fire service. The service level goals prescribe response time and staffing targets based on population density category<sup>1</sup>. The current population density category for unincorporated Wake County is rural.

The rural service level goal for Wake County is:

A response time of 9-minutes<sup>2</sup> for the first arriving fire unit with a staffing level of four personnel to structure related incidents.

A response time of 17-minutes for the full first alarm dispatch assignment to structure related incidents with a staffing level of four per unit.

---

<sup>1</sup> The adopted service level goals contain three population density categories. Rural is defined as a population density of 1,000 persons or less per square mile. Suburban is defined as more than 1,000 but less than 2,000 persons per square mile. Urban is defined as 2,000 or more persons per square mile.

<sup>2</sup> The 9-minute response time goal assumes a 7.5-minute travel time and 1.5-minute turnout time. Travel time is the time period beginning when a fire unit leaves the fire station and ending when the unit arrives at the scene of the call. Turnout time is defined as the time period beginning when a fire department receives a call and ending when the fire unit is on the way to the call.

A review of response time data reveals a gradual improvement in overall response time over the last four years. The countywide response time at the 90<sup>th</sup> percentile for the current calendar year is 7.98 minutes.

However, it is important to note that turnout time at all fire stations exceeds the adopted service level goal of 1.5 minutes.

Although response time at the countywide level meets that service level goal, there are three fire stations with a 90<sup>th</sup> percentile travel time that exceeds the service level goal:

- Stony Hill Fire Station #2
- Holly Springs Fire Station #2
- Apex Fire Station #2

Although travel time for these three fire stations exceeds the service level goal, the demand for service in these areas does not justify the cost to build, equip and operate a new fire station.

The primary factor driving new fire station locations through 2015 will be the need to meet the Fire Commission's goal of expanding fire insurance district boundaries to cover the fire protection service tax district. There are two areas of unincorporated Wake County that are not in a rated fire insurance district. Only one of the two areas, an area in Southeastern Wake County, is also in the fire protection service tax district. The Fire Commission has approved a recommendation to construct a fire station in the Raynor Road area to serve the area.

As the system struggles to meet service level goals while facing increased service demand, the pool of available volunteers is decreasing. All fire departments in Wake County now rely on varying levels and numbers of paid staff to provide service.

A review of turnout time and volunteer data shows that fire departments cannot rely on volunteers to be the primary service provider to consistently meet adopted service level goals. To meet the adopted service levels reliable and consistently, the Fire Commission has approved a recommendation from the Staffing Committee to increase staffing in all Wake County fire stations to 4-persons per day on a 24 / 7 basis.

Wake County Fire Commission  
 Long Range Business Plan  
 Facilities and Staffing

TABLE 1 - RECOMMENDED STAFFING IMPROVEMENT PLAN

Department Name	2009		2010		2011		2012		2013		TOTAL # of Positions
	# of Positions	Costs	# of Positions	Costs	# of Positions	Costs	# of Positions	Costs	# of Positions	Costs	
Apex	0	\$ -	6	\$ 50,805.71	6	\$ 55,538.29	0	\$ -	0	\$ -	12
Bay Leaf	8	\$ 428,790.85	8	\$ 427,270.37	10	\$ 528,358.76	0	\$ -	0	\$ -	26
Durham Highway	3	\$ 146,356.63	0	\$ -	0	\$ -	0	\$ -	0	\$ -	3
Eastern Wake	0	\$ -	3	\$ 140,554.87	3	\$ 145,906.73	0	\$ -	0	\$ -	6
Fairview	12	\$ 628,828.87	12	\$ 628,828.87	0	\$ -	0	\$ -	0	\$ -	24
Falls	12	\$ 628,828.87	0	\$ -	0	\$ -	0	\$ -	0	\$ -	12
Fuquay Varina	0	\$ -	8	\$ 279,011.14	0	\$ -	0	\$ -	0	\$ -	8
Gamer	0	\$ -	0	\$ -	6	\$ 129,612.74	0	\$ -	0	\$ -	6
Gamer #4	0	\$ -	12	\$ 282,972.99	0	\$ -	0	\$ -	0	\$ -	12
Holly Springs	0	\$ -	0	\$ -	3	\$ 31,112.79	0	\$ -	0	\$ -	3
Hopkins	6	\$ 331,576.14	0	\$ -	0	\$ -	0	\$ -	0	\$ -	6
Morrisville	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0
Rolesville	6	\$ 271,662.93	0	\$ -	0	\$ -	0	\$ -	0	\$ -	6
Stony Hill	6	\$ 306,778.96	12	\$ 579,041.96	0	\$ -	0	\$ -	0	\$ -	18
Swift Creek	12	\$ 628,828.87	0	\$ -	0	\$ -	0	\$ -	0	\$ -	12
Wake Forest	0	\$ -	12	\$ 134,436.94	12	\$ 120,739.30	0	\$ -	0	\$ -	24
Wake New Hope	8	\$ 441,482.82	8	\$ 441,482.82	0	\$ -	0	\$ -	0	\$ -	16
Wendell	0	\$ -	6	\$ 287,751.09	3	\$ 175,570.96	0	\$ -	0	\$ -	9
Western Wake	12	\$ 596,972.76	0	\$ -	0	\$ -	0	\$ -	0	\$ -	12
Zebulon	3	\$ 70,605.00	0	\$ -	0	\$ -	0	\$ -	0	\$ -	3
<b>Total by Year</b>	<b>88</b>	<b>\$ 4,480,712.71</b>	<b>87</b>	<b>\$ 3,252,156.77</b>	<b>43</b>	<b>\$ 1,186,839.56</b>	<b>0</b>	<b>\$ -</b>	<b>0</b>	<b>\$ -</b>	<b>218</b>

The total cost to implement the Staffing Committee’s plan over a three-year period is \$7,623,347. The fire tax operating model predicts a cumulative tax rate increase of \$.048 per hundred over a three year period to support plan implementation. This tax rate prediction is based on the 2007 fire tax base. The prediction will be adjusted once the 2008 property reevaluation is complete.

The fire service in Wake County is at the threshold of an evolution from a substantially volunteer system supported by career members, to a substantially career system supplemented by volunteers. The transition to a substantially career system will present additional challenges to the fire protection system that are unforeseen today.

The Town of Wendell is included in Wake County’s fire protection service tax district. Population density in the Town meets the suburban population density classification in the Fire Commission’s adopted service level goals. Response time data for the Wendell Fire Department is well below the suburban response time goal. However, a large development is beginning construction in recently annexed area. This new development is beyond the suburban travel time goal from Wendell Fire Station #1. A new fire station will be needed in this area to meet service level goals as the area develops.

## **SUMMARY OF RECOMMENDATIONS**

This report provides a number of recommendations to address staffing and facility needs through 2015.

### *Summary of Fire Station Recommendations for FY 2009 – 2015*

- Construct fire station in southeastern Wake County, Raynor Road area.
- Address ongoing maintenance and repair needs of existing fire stations during the annual operating budget development
- Initiate fire station closure evaluations for Bay Leaf Fire Station #3, Falls Fire Station, Wake New Hope Fire Station #1 and Western Wake Fire Station #1 in FY 2009.

### *Summary of Staffing Recommendations*

- Increase staffing to 4 – persons per station on a 24-hour a day, 7-day a week basis over a 3-year period (FY 09 - FY 11)
- Fire Commission recommend that the Wake County Board of Commissioners appoint a Blue Ribbon committee to study the future of the Wake County fire service.

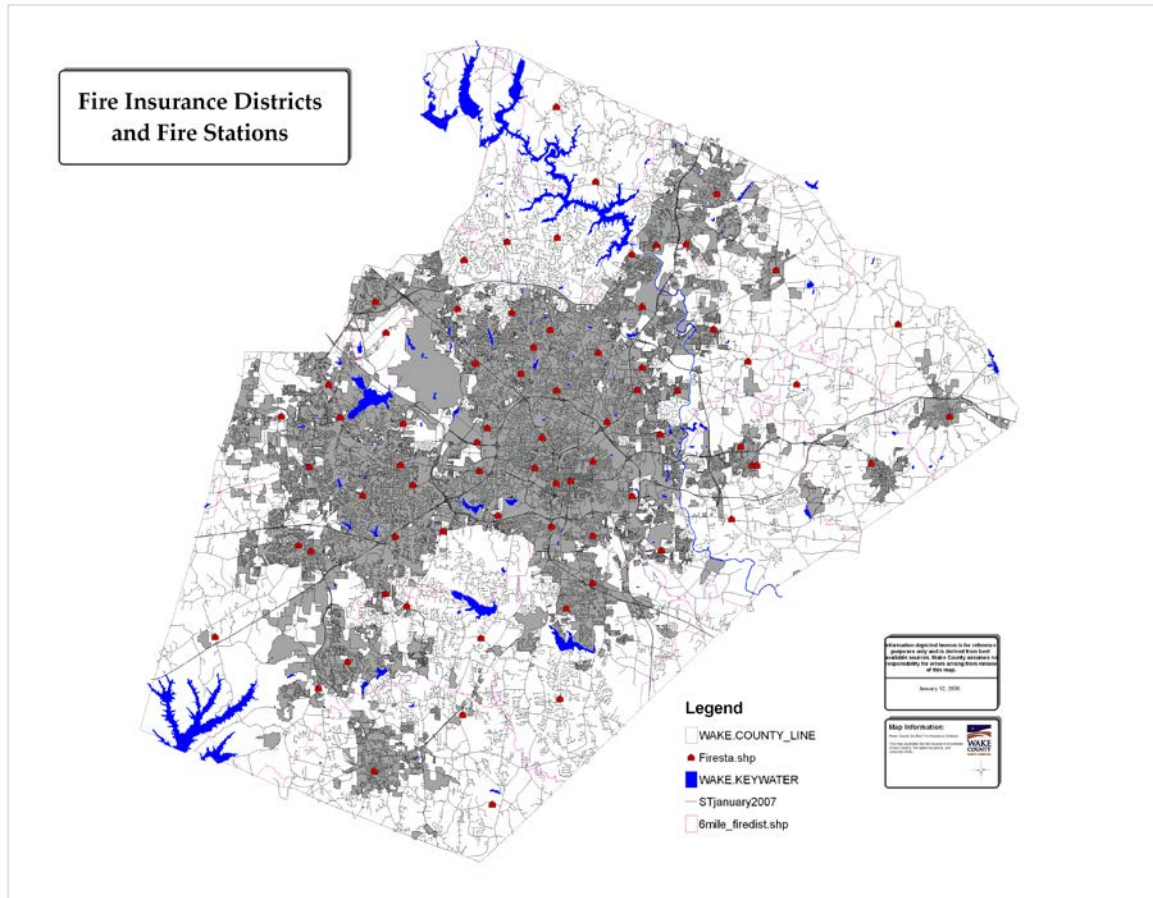


## SUMMARY OF CONCLUSIONS / OBSERVATIONS

- The 2007 population estimate for the fire insurance districts is 186,654 persons.
- The population estimate for areas identified in the long-range land use plan as remaining unincorporated Wake County is approximately 139,314.
- Although the demand for service is predicted to increase in fourteen fire insurance districts, no department other than the Garner Fire Department is projected to become busier than Garner Fire Department is today. Garner Fire Department's demand service is predicted to increase 17%.
- Rural service level goals are used in the analysis for the study period FY 2009 through 2015 since both the current and the estimated 2015 population densities are in the rural classification.
- Eight first due areas had response times in excess of the rural service level goal.
- Three first due areas had travel times in excess of the rural service level goal.
- All stations have turnout times in excess of the service level goal.
- The three first due areas with travel times in excess of the service level goals have a relatively low number of responses.
- Improved station staffing will improve response time over the study period.
- The Fire Commission's highest priority for fire station location is to locate fire stations to extend fire insurance district boundaries to cover areas of the fire protection service tax district not in a rated fire district.
- The Facility Committee has identified the Raynor Road area as the best area to locate a fire station to cover the southeastern portion of Wake County that is not in a rated fire insurance district. This fire station location will be a collaborative effort between the Town of Garner and Wake County. Additionally, the site provides a partnership opportunity with Emergency Medical Services (EMS) for a co-location of fire and EMS resources.

- A new fire station is needed to meet service level goals when distribution is the factor leading to travel time in excess of the service level goal.
- Based on the GIS model, fire station distribution is not the factor leading to travel times in excess of the adopted service level goal in the Stony Hill Fire Station #2, Holly Springs #2 and Apex Fire Station #2 areas. Consequently, no additional fire stations are recommended through 2015 to meet adopted service level goals.
- The Facility Committee recommends applying fire station closure criteria to the remaining four fire stations in FY 2009.
- There are no fire departments in Wake County relying solely on volunteers for service delivery. All contracting fire departments are now combination fire departments, and all fire stations are now staffed with either full-time or part-time staff, or a combination of both.
- Lengthy turnout times associated with volunteer response is evidence that volunteers cannot be relied on to consistently meet turnout time goals for primary response. Due to the continued decline in the number of volunteers and the increasing number of paid fire personnel, there is no evidence that volunteer availability will increase to the level that volunteers can be relied on for primary response in a consistent and reliable manner.
- The addition of 24/7 staffing at Garner Fire Station #2 measurably improved response times in the Garner Station #2 first due area. The Garner Fire Station #2 example demonstrates that improved staffing countywide on a 24 / 7 basis will result in measurable improvements in response times.
- The Fire Commission's top service priority is improved staffing. The Staffing Committee recommends a plan to staff every fire station in Wake County with four career personnel on a 24-hour /7-day a week basis over a three-year.
- At the Fire Commission's November 15, 2007, regular meeting, the Fire Commission adopted the Staffing Committee's recommended staffing plan.
- A new fire station will be needed in the Wendell Falls area to meet response time goals. Land acquisition is recommended prior to 2015. This fire station project will be a partnership between Wake County, Town of Wendell, and EMS.

FIGURE 1 - FIRE DISTRICTS AND FIRE STATION LOCATIONS



## INTRODUCTION

Wake County contracts with nineteen fire departments to provide fire protection and related emergency services in unincorporated areas of Wake County. Fourteen of the contracting fire departments are private, not-for-profit organizations, and five contracting fire departments are municipal fire departments. The nineteen fire departments operate out of thirty-eight fire stations distributed throughout Wake County and various municipalities.

In 1999, the Wake County Board of Commissioners approved the creation of a single service tax district to finance fire protection services in unincorporated areas of Wake County, effective July 1, 1999. The elected officials in the Town of Wendell adopted a resolution authorizing the inclusion of the Town of Wendell corporate limits in the fire tax district.

The Board of Commissioners approved the single fire tax district in 1999 based on a recommendation from a 1994 consultant study. The consultants observed that the system of multiple rural fire tax districts “perpetuates an imbalanced distribution of resources between districts with the low valuations and high tax rates and high valuation districts with lower tax rates.” The purpose of the single fire tax district was to balance resources with needs on a countywide basis.

The creation of the fire protection service tax district increased the need for countywide planning and coordinated service delivery. The urbanization of rural areas and the rapidly increasing growth of Wake County and its twelve municipalities exacerbate the need for a coordinated, countywide approach to planning and service delivery.

In 2003, the Wake County Board of Commissioners approved funding for two countywide consultant studies:

- Fire Compensation Study
- Fire/EMS Capital Facility and Equipment Study

The Fire Commission recommended the Board of Commissioners approve the compensation plan presented by the Waters Consulting Group. The Board of

Commissioners approved the recommendation and approved funding for a three-year implementation. The program began in FY 2003 and was complete in FY 2006.

TriData Corporation of Arlington, Virginia, completed the Fire/EMS Capital Facility and Equipment Study. The consultants analyzed facility and equipment needs for a 15-year study period. The Fire Commission did not recommend the study to the Board of Commissioners.

In FY 2004, the Fire Commission agreed to work on a Long Range Business Plan. The Business Plan addressed apparatus, facilities, staffing and financial policies. The apparatus component of the plan was completed and presented to the Board of Commissioners in 2005. The facility and staffing components were not fully developed.

The Fire Commission has taken responsibility for development of a comprehensive plan incorporating facility and staffing needs and balancing needed revenues with the expenditures. Recommendations in this report are based generally on several guiding principles:

- Compliance with service level goals
- Individual departments collectively are considered the “fire protection system”
- Resources are considered on a countywide basis without regard for jurisdictional boundaries

## POPULATION ESTIMATE AND PROJECTED GROWTH BY FIRE DISTRICT

### *2007 Population Estimate*

The Wake County Planning Department calculated the 2007 population estimate for the nineteen fire districts. As shown in Table 1 below, the 2007 population estimate for the unincorporated areas is 186,654 persons.

*TABLE 2 - 2007 FIRE DISTRICT POPULATION ESTIMATE*

Wake County July 2007 Population Estimates							
Fire District	July 2007 Residential Units	July 2007 Mobile Homes	July 2007 Total Units	July 2007 Total Occupied Units	July 2007 Household Population	2000 Group Quarters Population	July 2007 Population Estimate
Alert (Eastern Wake FD)	5,875	1,378	7,253	6,946	18,615	10	18,625
Bayleaf	7,881	114	7,995	7,803	23,409	0	23,409
Durham Hwy	2,821	34	2,855	2,775	8,186	0	8,186
Falls	701	14	715	687	1,924	0	1,924
Furina (Fuquay FD)	7,264	1,489	8,753	8,202	23,130	124	23,254
Garner	8,235	2,135	10,370	9,572	25,653	32	25,685
Hipex (Apex FD)	1,997	369	2,366	2,342	6,277	59	6,336
Holly Springs	861	155	1,016	922	2,471	0	2,471
Hopkins	1,178	403	1,581	1,437	3,995	0	3,995
Morrisville	466	104	570	533	1,279	0	1,279
Rolesville	2,722	644	3,366	3,157	8,840	0	8,840
Stony Hill	1,877	248	2,125	1,998	5,415	0	5,415
Swift Creek	2,653	182	2,835	2,722	7,513	0	7,513
Ten Ten (Fairview FD)	5,630	1,279	6,909	6,260	16,777	36	16,813
Wake New Hope	2,787	452	3,239	3,071	8,230	162	8,392
Wakelon (Zebulon FD)	1,623	318	1,941	1,801	4,917	0	4,917
Wakette (Wake Forest FD)	1,884	212	2,096	1,991	5,674	0	5,674
Wendell Holmes (Wendell)	2,393	1,015	3,408	3,142	8,766	111	8,877
Western Wake	900	9	909	882	2,179	149	2,328
<b>Total Fire District</b>	<b>59,748</b>	<b>10,554</b>	<b>70,302</b>	<b>66,243</b>	<b>183,250</b>	<b>683</b>	<b>183,933</b>
Dutchville	76	26	102	100	250	0	250
Other Unincorp. Wake	682	267	949	892	2,471	0	2,471

### *Municipal Growth*

Much of the population growth in Wake County is occurring within the twelve municipalities that lie within the County's borders. Wake County is home to several of the nation's fastest growing suburban areas. Forbes magazine recently ranked the 100

suburbs across the nation with the highest growth rates between 2000 and 2006. Forbes defined suburbs as cities, townships and villages that had more than 10,000 people. Several Wake County towns are on the Forbes list:

- Holly Springs is listed at number 18, with a 74 percent increase in population
- Wake Forest is listed at number 20, with a 73.2 percent increase
- Apex is listed at number 63, with a 43.6 percent growth rate.

Population growth in Raleigh, Wake County’s largest municipality, makes the city the 50th largest city in the country.

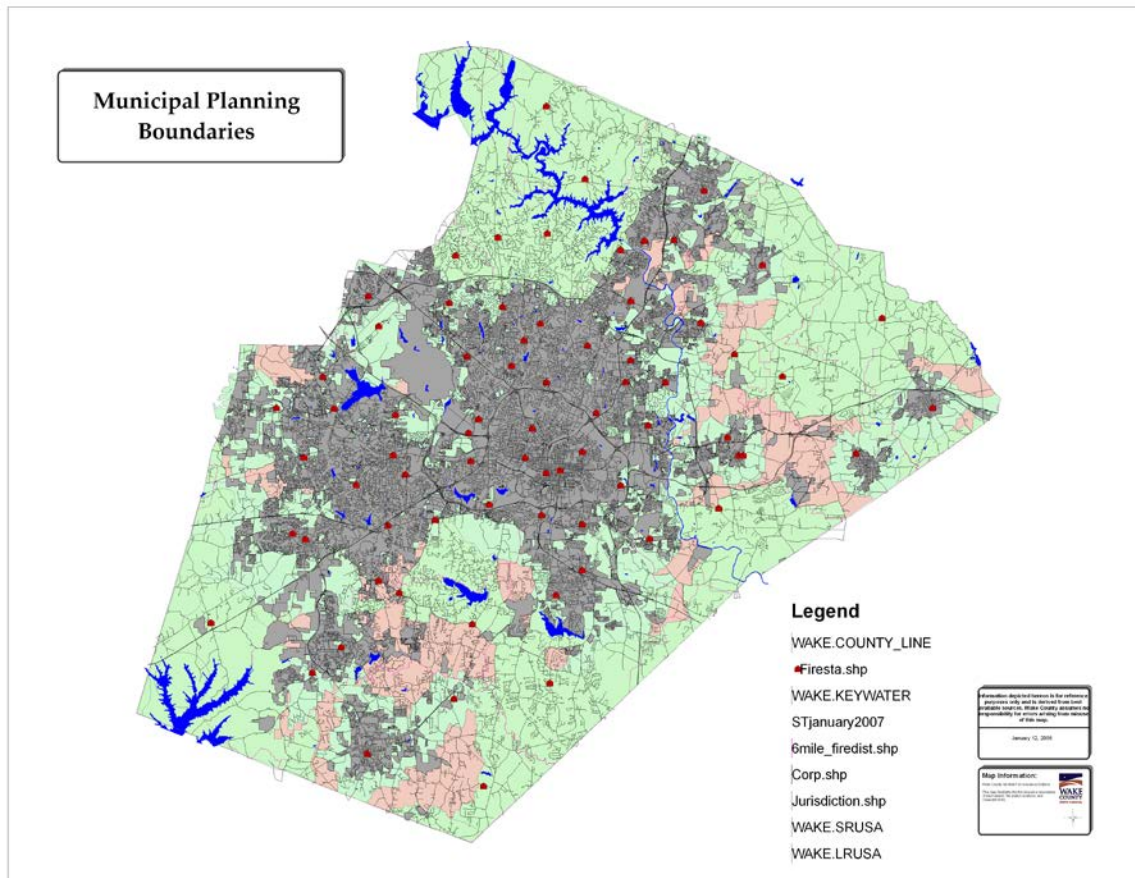
Approximately 673 of Wake County’s 857 square miles are in one or more of the various planning boundaries for the twelve municipalities:

- Corporate limits
- Extraterritorial jurisdiction (ETJ)
- Short range urban service area (SRUSA)
- Long range urban service area (LRUSA)

TABLE 3 - MUNICIPAL PLANNING BOUNDARY AREA

Municipality	Corporate Limits Area in Sq. Miles	Jurisdiction Area in Square Miles	ETJ Area in Square Miles	SRUSA Area in Square Miles	LRUSA Area in Square Miles
ANGIER	0.30	0.30			2.91
APEX	14.57	20.63	6.06	1.55	21.40
CARY	52.20	65.12	12.92	11.04	3.50
CLAYTON	0.05	0.05	0.00		
DURHAM	0.02	0.01	0.00		
FUQUAY-VARINA	10.61	27.29	16.68	28.25	15.25
GARNER	14.32	29.51	15.19	5.71	39.12
HOLLY SPRINGS	14.19	19.86	5.67	3.83	14.55
KNIGHTDALE	5.58	13.91	8.33	10.46	4.08
MORRISVILLE	8.10	9.66	1.57	0.15	
RALEIGH	140.60	181.51	40.91	7.69	21.89
RDU		7.48	7.48		
ROLESVILLE	3.34	9.09	5.75	3.02	6.58
WAKE FOREST	13.78	20.68	6.90	1.30	3.74
WENDELL	4.27	11.06	6.79	9.71	13.76
ZEBULON	4.11	11.73	7.62	3.86	12.50
Non-Urban Area (LRUSA)					173.24
Unresolved (LRUSA)					12.04
<b>Total</b>	286.04	427.90	141.87	86.58	344.58

FIGURE 2 - MUNICIPAL PLANNING BOUNDARIES



Continued municipal growth and annexation of unincorporated area into municipal corporate limits impacts the fire protection service tax district in a number of ways:

- Reduces the fire tax base
- Shifts burden for service delivery from County to the municipality
- Creates pockets or areas of unincorporated area that may be closer to a municipal fire station than a contracted fire department's fire station.



According to annexation information provided by Wake County Geographical Information Services (GIS) Division to the Fire/Rescue Division, Wake County's municipalities have annexed more than 63 square miles of unincorporated area since 2000.

- Annexation has averaged approximately 7.9 square miles per year since 2000.
- Annexations increased from 2005 through 2007 to an average of 10.4 square miles per year
- The 63 square miles annexed since 2000 is substantially equivalent to the combined area of five existing fire insurance districts: Durham Highway, Falls, Western Wake, Morrisville and Fairview Fire Insurance Districts.

TABLE 4 - ANNEXATION BY YEAR

MUNICIPALITY	FISCAL YEAR								
	2000	2001	2002	2003	2004	2005	2006	2007	2008*
Angier								85.07	0
Apex	47.03	202.90	93.471	266.49	372.12	183.13	414.22	1121.45	1.53
Cary	24.45	379.93	810.36	2156.344	726.16	970.07	963.35	573.97	18.1
Clayton								29.33	0
Fuquay-Varina	410.08	181.26	-77.36	224.05	201.35	750.98	110.07	692.72	0
Garner	2.67	69.76	219.19	147.653	136.51	90.78	234.62	97.12	32.65
Holly Springs	89.72	1013.30	934.23	472.828	133.37	472.31	630.82	210.55	1.4
Knightdale	6.23	9.25	188.02	253.82	183.29	498.73	340.56	434.17	135.21
Morrisville		18.66	34.42	32.643	63.51	486.58	62.88	259.04	6.86
Raleigh	1680.68	2111.47	1804.388	924.15	975.17	3090.46	507.7	3155.09	0
Rolesville	30.17	38.83	66.58	217.52	9.76	78.42	110.41	577.42	0
Wake Forest	75.20	761.33	151.27	225.17	1064.96	177.01	343.33	220.25	0
Wendell		55.92	0.45	101.5	40.97	154.01	914.75	262.07	26.18
Zebulon	0.09	1.26	5.75	0	73.05	391.7	149.4	53.73	0
<b>TOTAL ACRES</b>	<b>2366.32</b>	<b>4843.87</b>	<b>4230.769</b>	<b>5022.168</b>	<b>3980.22</b>	<b>7344.18</b>	<b>4782.11</b>	<b>7771.98</b>	<b>221.93</b>
<b>TOTAL SQ. MI.</b>	<b>3.70</b>	<b>7.57</b>	<b>6.61</b>	<b>7.85</b>	<b>6.22</b>	<b>11.48</b>	<b>7.47</b>	<b>12.14</b>	<b>0.35</b>
* Total to Date									

### Population Projections

Using data obtained by the Capital Area Metropolitan Planning Organization (CAMPO), population growth can be forecast by fire district. CAMPO forecasts population growth to develop traffic forecasts and air quality analysis.<sup>3</sup>

<sup>3</sup> The population forecasts are based on parcel level socio-economic data obtained by CAMPO. CAMPO's process of developing and verifying the population forecast data involved coordinated efforts by all the transportation and planning departments in the Triangle region. The dwelling unit forecast for Wake

Based on CAMPO’s data, population in the current fire insurance districts will increase approximately 300% to 745, 854 persons, through 2035.

As shown in Table 5 below, the 10-year period between 2015 and 2025 will experience the largest population increase.

Although the population in the current fire insurance boundaries will increase significantly through 2035, municipal boundaries are expected to expand to accommodate the forecasted rate of growth.

**TABLE 5 - POPULATION PROJECTIONS BY FIRE DISTRICT**

Population Projections by Fire Insurance District				
2010	2015	2025	2035	
30,254.58	47,592.80	83,887.17	107,471.52	ALERT (Eastern Wake FD)
23,797.50	26,745.66	29,715.72	31,229.34	BAY LEAF
9,548.86	11,415.38	14,197.10	15,673.73	DURHAM HIGHWAY
434.24	805.20	1,215.32	1,404.51	DUTCHVILLE
2,629.19	3,017.89	4,223.42	4,637.24	FALLS
27,054.00	35,756.50	53,457.88	63,798.46	FURINA (Fuquay FD)
36,065.28	47,322.80	68,473.72	86,741.83	GARNER SUBURBAN
11,965.87	27,623.87	51,330.80	73,713.17	HIPEX (Apex FD)
4,609.52	7,963.81	14,189.51	16,916.22	HOLLY SPRINGS RURAL
5,783.78	10,840.94	16,774.84	19,557.96	HOPKINS
9,110.84	13,122.66	18,770.46	20,825.98	MORRISVILLE RURAL
15,771.81	29,657.78	46,265.32	51,949.01	ROLESVILLE RURAL
6,646.97	11,386.65	16,722.96	19,296.04	STONY HILL
9,798.41	11,408.22	13,495.67	14,700.69	SWIFT CREEK
20,802.88	23,678.84	28,881.52	32,651.47	TEN-TEN (Fairview FD)
12,855.91	19,475.34	25,815.37	29,157.78	WAKELON (Zebulon FD)
28,319.57	40,395.61	66,122.29	76,557.93	WAKE-NEW HOPE
9,083.59	18,174.03	26,439.00	30,459.76	WAKETTE (Wake Forest FD)
13,451.41	22,760.29	37,413.44	41,930.73	WENDELL-HOLMES (Wendell FD)
3,776.42	4,907.79	6,439.39	7,180.73	WESTERN WAKE
281,760.62	414,052.08	623,830.91	745,854.11	Total

County was derived from the parcel database created during the joint Wake County Public School System (WCPSS)-CAMPO forecasting process. The process was developed jointly by the Operations Research and Education Laboratory (OR/Ed Lab) at NCSU’s Institute for Transportation Research and Education and CAMPO staff. The output from the joint effort used in this report is a parcel level database of future land use including residential density profiles, non-residential profiles, and build-out percentages for 2005, 2010, 2015, 2025, and 2035. Given that CAMPO’s forecast data is available at the parcel level, the forecast data can be aggregated to various geographies. For this report, the forecast data is aggregated by fire insurance district boundaries.

Using various planning boundaries as proxies for future municipal corporate limit boundaries, population in future fire insurance districts can be forecast through 2035. The planning boundaries and their respective proxies are:

- Using current municipal extraterritorial limit boundaries as the proxy for corporate limits in 2015, total population can be estimated for 2015.

<b>Total 2015 Population Estimate</b>			
<b>Estimate</b>	<b>District</b>	<b>Estimate</b>	<b>District</b>
28,834	ALERT (Eastern Wake FD)	3,188	MORRISVILLE RURAL
23,163	BAY LEAF	24,795	ROLESVILLE RURAL
5,471	DURHAM HIGHWAY	11,387	STONY HILL
805	DUTCHVILLE	7,488	SWIFT CREEK
1,310	FALLS	23,201	TEN-TEN (Fairview FD)
24,559	FURINA (Fuquay FD)	11,924	WAKELON (Zebulon FD)
29,945	GARNER SUBURBAN	14,973	WAKE-NEW HOPE
19,274	HIPEX (Apex FD)	9,377	WAKETTE (Wake Forest FD)
6,694	HOLLY SPRINGS RURAL	18,282	WENDELL-HOLMES (Wendell FD)
10,745	HOPKINS	214	WESTERN WAKE

- Using extraterritorial limit and short range urban service area boundaries as the proxy for corporate limit boundaries in 2025, the 2025 population can be estimated by fire insurance district.

<b>Total 2025 Population Estimate</b>			
<b>Estimate</b>	<b>District</b>	<b>Estimate</b>	<b>District</b>
29,344	ALERT (Eastern Wake FD)	2,237	MORRISVILLE RURAL
25,899	BAY LEAF	28,229	ROLESVILLE RURAL
6,218	DURHAM HIGHWAY	16,723	STONY HILL
1,215	DUTCHVILLE	7,245	SWIFT CREEK
1,471	FALLS	13,678	TEN-TEN (Fairview FD)
16,232	FURINA (Fuquay FD)	13,678	WAKELON (Zebulon FD)
34,321	GARNER SUBURBAN	9,527	WAKE-NEW HOPE
27,885	HIPEX (Apex FD)	8,564	WAKETTE (Wake Forest FD)
4,618	HOLLY SPRINGS RURAL	16,955	WENDELL-HOLMES (Wendell FD)
16,775	HOPKINS	0	WESTERN WAKE

- Using extraterritorial limit, short range urban service area and long range urban service area boundaries as a proxy for corporate limit boundaries in 2035, the 2035 population can be estimated by fire insurance district.

Total 2035 Population Estimate			
Estimate	District	Estimate	District
3,629	ALERT (Eastern Wake FD)	0	MORRISVILLE RURAL
27,213	BAY LEAF	13,658	ROLESVILLE RURAL
6,524	DURHAM HIGHWAY	19,296	STONY HILL
1,405	DUTCHVILLE	7,749	SWIFT CREEK
1,430	FALLS	8,037	TEN-TEN (Fairview FD)
4,143	FURINA (Fuquay FD)	4,243	WAKELON (Zebulon FD)
7,566	GARNER SUBURBAN	0	WAKE-NEW HOPE
4,738	HIPEX (Apex FD)	6,544	WAKETTE (Wake Forest FD)
377	HOLLY SPRINGS RURAL	7,983	WENDELL-HOLMES (Wendell FD)
14,779	HOPKINS	0	WESTERN WAKE

***Population Trends 2007 - 2035***

As shown in Table 5, population in the unincorporated areas will increase for approximately the next 20 to 30 years, and then will decrease as municipalities continue to annex unincorporated area into their respective corporate limits.

The population estimate for areas identified in the long-range land use plan as remaining unincorporated Wake County is approximately 139,314.

Wake County’s fire protection system will experience significant challenges as the system evolves to serve this future population efficiently and effectively.

TABLE 6 - POPULATION TREND SUMMARY

	<b>2007</b>	<b>2015</b>	<b>2025</b>	<b>2035</b>
<b>ALERT (Eastern Wake FD)</b>	18,625	28,834	29,344	3,629
<b>BAY LEAF</b>	23,409	23,163	25,899	27,213
<b>DURHAM HIGHWAY</b>	8,186	5,471	6,218	6,524
<b>DUTCHVILLE</b>	250	805	1,215	1,405
<b>FALLS</b>	1,924	1,310	1,471	1,430
<b>FURINA (Fuquay FD)</b>	23,254	24,559	16,232	4,143
<b>GARNER SUBURBAN</b>	25,685	29,945	34,321	7,566
<b>HIPEX (Apex FD)</b>	6,336	19,274	27,885	4,738
<b>HOLLY SPRINGS RURAL</b>	2,471	6,694	4,618	377
<b>HOPKINS</b>	3,995	10,745	16,775	14,779
<b>MORRISVILLE RURAL</b>	1,279	3,188	2,237	0
<b>ROLESVILLE RURAL</b>	8,840	24,795	28,229	13,658
<b>STONY HILL</b>	5,415	11,387	16,723	19,296
<b>SWIFT CREEK</b>	7,513	7,488	7,245	7,749
<b>TEN-TEN (Fairview FD)</b>	16,813	23,201	13,678	8,037
<b>WAKELON (Zebulon FD)</b>	4,917	11,924	13,678	4,243
<b>WAKE-NEW HOPE</b>	8,392	14,973	9,527	0
<b>WAKETTE (Wake Forest FD)</b>	5,674	9,377	8,564	6,544
<b>WENDELL-HOLMES (Wendell FD)</b>	8,877	18,282	16,955	7,983
<b>WESTERN WAKE</b>	2,328	214	0	0
<b>Total</b>	184,183	275,631	280,814	139,314

## SERVICE DEMAND

Demand for service can be expressed on a per capita basis. Using current population projections and incident counts by fire insurance district, the number of incidents per capita can be calculated. The per capita rate can then be multiplied by the forecasted population to estimate future service demands.

### *Current Per Capita Service Demand*

As shown in Table 6, the current per capita demand for service ranges from 34.6 incidents per thousand population to 236.1 incidents per thousand population.

TABLE 7 - PER CAPITA SERVICE DEMAND CALCULATION

	Current Population	FY07 Incidents	Per Capita Rate	Incidents per 1000 Population
Bay Leaf	23,409	810	0.03460208	34.6
Durham Highway	8,186	297	0.03628146	36.3
Ten-Ten (Fairview FD)	16,813	755	0.04490573	44.9
Furina (Fuquay FD)	23,254	1,127	0.04846478	48.5
Swift Creek	7,513	369	0.04911487	49.1
Falls	1,924	97	0.05041580	50.4
Stony Hill	5,415	275	0.05078486	50.8
Rolesville Rural	8,840	578	0.06538462	65.4
Alert (Eastern Wake FD)	18,625	1,221	0.06555705	65.6
Holly Springs Rural	2,471	162	0.06556050	65.6
Wake-New Hope	8,392	564	0.06720686	67.2
Garner Suburban	25,685	1,761	0.06856142	68.6
Hopkins	3,995	327	0.08185232	81.9
Hipex (Apex FD)	6,336	534	0.08428030	84.3
Wakette (Wake Forest FD)	5,674	482	0.08494889	84.9
Wakelon (Zebulon FD)	4,917	440	0.08948546	89.5
Wendell Holmes (Wendell FD)	8,877	823	0.09271150	92.7
Western Wake	2,328	307	0.13187285	131.9
Morrisville Rural	1,279	302	0.23612197	236.1

### *Projected 2015 Per Capita Demand*

Using the 2007 per capita incident rate and the forecasted 2015 population (population not in corporate limits or extraterritorial limits), the service demand for 2015 can be predicted. As shown in Table 7, the greatest increase in service demand is predicted to be in the Hipex Fire Insurance District, while the service demand is predicted to decrease in Durham Highway, Falls, and Western Wake Fire Insurance Districts.

TABLE 8 - FORECASTED 2015 SERVICE DEMAND BY FIRE DISTRICT

	Per Capita Incident	Total 2015 Population Estimate	2015 Demand Estimate	Percentage Change from 2007
<b>Alert (Eastern Wake FD)</b>	0.065557	28,834	1890	55%
<b>Bay Leaf</b>	0.034602	23,163	801	-1%
<b>Durham Highway</b>	0.036281	5,471	199	-33%
<b>Falls</b>	0.050416	1,310	66	-32%
<b>Furina (Fuquay FD)</b>	0.048465	24,559	1190	6%
<b>Garner Suburban</b>	0.068561	29,945	2053	17%
<b>Hipex (Apex FD)</b>	0.08428	19,274	1624	204%
<b>Holly Springs Rural</b>	0.065561	6,694	439	171%
<b>Hopkins</b>	0.081852	10,745	880	169%
<b>Morrisville Rural</b>	0.236122	3,188	753	149%
<b>Rolesville Rural</b>	0.065385	24,795	1621	180%
<b>Stony Hill</b>	0.050785	11,387	578	110%
<b>Swift Creek</b>	0.049115	7,488	368	0%
<b>Ten-Ten (Fairview FD)</b>	0.044906	23,201	1042	38%
<b>Wakelon (Zebulon FD)</b>	0.089485	11,924	1067	142%
<b>Wake-New Hope</b>	0.067207	14,973	1006	78%
<b>Wakette (Wake Forest FD)</b>	0.084949	9,377	797	65%
<b>Wendell Holmes (Wendell FD)</b>	0.092712	18,282	1695	106%
<b>Western Wake</b>	0.131873	214	28	-91%

Although the demand for service is predicted to increase in fourteen fire insurance districts, no department other than the Garner Fire Department is projected to become busier than Garner Fire Department is today. Garner Fire Department's demand for service is predicted to increase 17%.

## RESPONSE TIME AND SERVICE LEVEL GOALS

Wake County’s Fire Commission has adopted prescribed service level, or performance, goals. Service level goals are included in the fire tax district’s adopted long-range business plan approved by the Wake County Board of Commissioners.

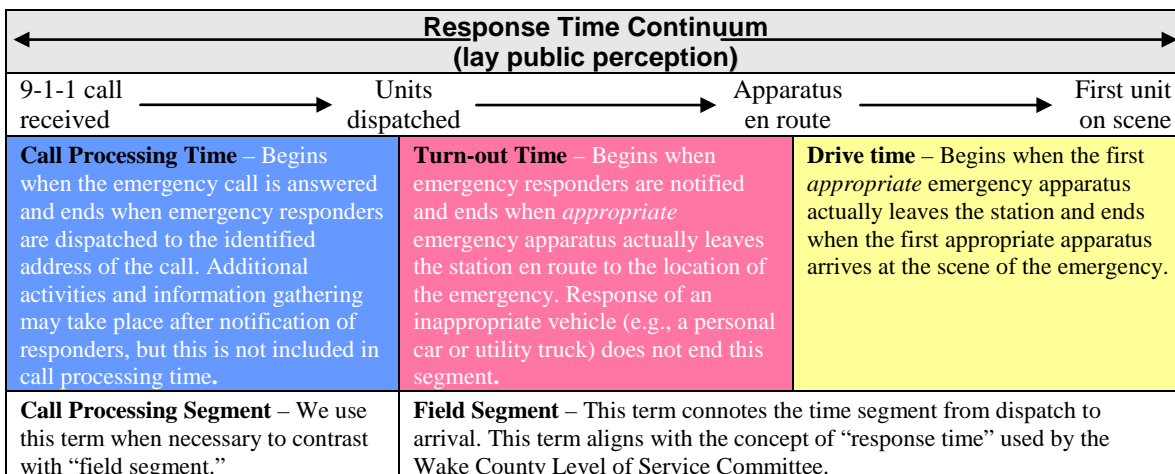
The service level goals provide response time benchmarks and prescribe the minimum staffing for each unit. Response time is the most visible performance indicator from the perspective of the person experiencing an emergency and needing help.

### *Response Time*

Response time generally includes three components: call processing and dispatch time, turnout time, and drive time. There is no single, nationally accepted response time standard, although a number of organizations, notably the National Fire Protection Association (NFPA), have issued their own standards.

The chart below describes the three response time components:

FIGURE 3- RESPONSE TIME COMPONENTS



Source: Tridata Corporation, Wake County Fire/EMS Capital Facility and Equipment Study Final Report, December 2003, Page 31

The three components of response time are part of a nine-step process from fire ignition to fire extinguishment. Rexford Wilson, a fire protection engineer, describes this nine-step process:



FIGURE 4 - WILSON NINE-STEP CONTINUUM

1	2	3	4	5	6	7	8	9
Free Burn	Permitted Burn	Notification	Alarm Processing	Turnout Time	Travel	Setup	Combat	Overhaul

Source: Wilson R, *Nine Steps from Ignition to Extinguishment* (2e), FirePro Institute, Putney, VT (1994), pp. 2-3

Of the nine-steps, fire departments have direct control over turnout time, travel time, setup time, combat time and overhaul time. Travel time is directly impacted by fire station location, and turnout time is directly impacted by firefighters present in the fire station.

*Fire Commission’s Adopted Service Level Goals*

The Fire Commission’s Long Range Business plan includes adopted service level goals. The goals include the response time components of turnout time and travel time. The Board of Commissioners approved the Business Plan and service level goals at its February 22, 2005, meeting.

Since the initial approval of the service level goals, the Fire Commission has revisited and updated the goals. The current service level goals for the fire protection system are:

Incident Type	Minimum Staff at first-unit arrival <sup>(1)(2)</sup>	Minimum Staff for incident <sup>(3)</sup>	Minimum Unit response for incident
Structure	4	16 <sup>(4)</sup>	4 <sup>(5)</sup>
Vehicle	4	4	1
First Responder	2	2	1

(1) Urban = 5 Minutes  
 Suburban = 7 Minutes  
 Rural = 9 Minutes

- (2) Per Staffing Committee recommendation of December 14, 2006 . Because Staffing Committee goal is four firefighters/station, Staffing Committee unanimously voted to set “Service Level Goal” for “Minimum Staff at first-unit arrival” as firefighters arriving on apparatus.
- (3) Urban = 13 minutes  
Suburban = 15 minutes  
Rural = 17 minutes
- (4) Includes Incident Commander. Can be done via mutual/automatic aid. Assumes that staff arrives on fire apparatus. Firefighters arriving via POV with second and subsequent units can be counted if documented.
- (5) Per Staffing Committee recommendation of December 14, 2006. Based on staffing needs for typical minimum reported (residential) structure fire, Staffing Committee unanimously recommended four-unit minimum response.

### *Population Density*

Population density determines the appropriate response time goal for unincorporated Wake County. The adopted service level goals contain response time standards for rural, suburban and urban areas. The density classifications for service level purposes are:

- Rural – area with 1000 or less persons per square mile
- Suburban – area with more than 1000 and 2000 or less per square mile
- Urban – area with more than 2000 persons per square mile

Calculating population density requires a determination of the appropriate geography within which to calculate the number of persons per square mile. Although the use of geographic information system (GIS) software allows a multitude of geographies to be used in an analysis, three common geographies exist:

- Traffic analysis zone<sup>4</sup>

---

<sup>4</sup> Traffic analysis zones (TAZ) are special areas delineated by transportation planners to tabulate traffic related data. A TAZ usually consists of one or more census blocks, block groups or census tracts.

The suitability of TAZ’s as the basis for determining population densities was evaluated. Using TAZ’s as the basis for determining population densities is impractical due to their inconsistent and small sizes. The small size (as small as 3.2 acres) of some TAZ’s may inflate the need for a fire station in some areas.

- Map grid<sup>5</sup>
- Fire insurance district boundaries<sup>6</sup>

Each of the three geographies was evaluated for use as the basis for determining population densities. Fire insurance district boundaries were determined to be the most appropriate boundary to use since the Wake County Board of Commissioners approves the boundaries and the fire departments place a high level of significance on the districts.

Table 9 shows that all fire insurance districts have population densities in the rural classification.

---

<sup>5</sup> The map grid is an overlay grid used in the geographic information system for spatial analysis. There is no scientific basis for the size or distribution of map grids. All of the grids are homogenous and are approximately 3.6 square miles in area. All of the grids completely within unincorporated Wake County have population densities that are in the rural classification.

Using map grids as the basis for determining population density is not practical as there is no relationship between the map grids and any other public safety use.

<sup>6</sup> Fire insurance districts are boundaries approved by the Wake County Board of Commissioners for fire insurance grading purposes. Wake County is divided into nineteen fire insurance districts. Although the statutory purpose of fire insurance districts is for determining property insurance premiums, fire departments highly value their individual district boundaries.

Since the Board of Commissioners approve the fire insurance district boundaries and the boundaries are highly valued by the fire departments, fire insurance districts are the most appropriate geography for determining population densities.

TABLE 9 - POPULATION DENSITY BY FIRE INSURANCE DISTRICT

	Area	Population	Population Density
Alert (Eastern Wake FD)	51	17,416	341
Bay Leaf	36.03	22,429	623
Durham Highway	10	7,915	792
Falls	4.94	1,840	372
Furina (Fuquay FD)	56.68	20,600	363
Garner Suburban	54.69	24,089	440
Hipex (Apex FD)	52.99	5,750	109
Holly Springs Rural	21.17	2,196	104
Hopkins	23.4	3,323	142
Morrisville Rural	15.42	1,323	86
Rolesville Rural	33.68	8,424	250
Stony Hill	34.07	4,407	129
Swift Creek	15.29	7,159	468
Ten-Ten (Fairview FD)	25.52	16,356	641
Wakelon (Zebulon FD)	25.1	4,302	171
Wake-New Hope	19.31	11,030	571
Wakette (Wake Forest FD)	16.47	5,177	314
Wendell Holmes (Wendell FD)	33.43	8,466	253
Western Wake	6.59	2,315	351

As shown in Table 10, the projected 2015 population densities for fire insurance districts are all in the rural classification.

TABLE 10 - PROJECTED 2015 POPULATION DENSITY BY FIRE INSURANCE DISTRICT

	Area	2015 Population Estimate	2015 Population Density
Alert (Eastern Wake FD)	51	28834.45024	565
Bay Leaf	36.03	23163.32004	643
Durham Highway	10	5471.144855	547
Falls	4.94	1309.57714	265
Furina (Fuquay FD)	56.68	24559.02647	433
Garner Suburban	54.69	29945.06357	548
Hipex (Apex FD)	52.99	19274.37655	364
Holly Springs Rural	21.17	6694.482719	316
Hopkins	23.4	10745.48067	459
Morrisville Rural	15.42	3187.878939	207
Rolesville Rural	33.68	24795.38255	736
Stony Hill	34.07	11386.65409	334
Swift Creek	15.29	7488.325281	490
Ten-Ten (Fairview FD)	25.52	23200.85965	909
Wakelon (Zebulon FD)	25.1	11923.632	475
Wake-New Hope	19.31	14973.11613	775
Wakette (Wake Forest FD)	16.47	9377.205334	569
Wendell Holmes (Wendell FD)	33.43	18281.55908	547
Western Wake	6.59	213.9721527	32

Of the three geographies evaluated for use as the geography within which to calculate population densities, two of the geographies (TAZ and map grid) are not practical for the

purpose. Fire insurance districts are an acceptable geography for determining population densities since the districts are approved by the Board of Commissioners and highly valued by the fire departments.

Rural service level goals are used in the analysis for the study period FY 2009 through 2015 since both the current and the estimated 2015 population densities are in the rural classification.

### *Response Time Analysis*

After establishing the appropriate population density and service level goal for the unincorporated area of Wake County, actual performance can be evaluated against the goal. Response time components are analyzed countywide and by first due area<sup>7</sup> to evaluate service level goal compliance.

Computer aided dispatch (CAD) data from January 1, 2004, through August 15, 2007, was reviewed to compare actual data with service level goals. Response, turnout and travel time were calculated at the 90<sup>th</sup> percentile, by first due area.

Wake County's response time goal for rural population densities is 9 minutes. The 9-minute goal assumes:

- a 90<sup>th</sup> percentile turnout time of 1.5 minutes<sup>8</sup>, and
- a 90<sup>th</sup> percentile travel time of 7.5 minutes.

The response time summary table below details countywide response time components from 2004 through 2007:

*TABLE 11 - RESPONSE TIME COMPONENT SUMMARY*

---

<sup>7</sup> First due area is the area surrounding a fire station where units from that fire station respond to emergency incidents. First due areas are determined using geographic information system (GIS) tools to calculate where units from fire stations can arrive quicker than units from a neighboring fire station.

<sup>8</sup> National Fire Protection Association (NFPA) 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments, establishes fire service delivery objectives. Wake County's service level goal for turnout time differs from the NFPA 1710 turnout time delivery objective of 1 minute, 90% of the time.

	2004	2005	2006	2007	Goal
<b>Turnout Time</b>	2.83	2.53	2.25	2.15	1.50
<b>Travel Time</b>	6.70	6.22	6.20	6.25	7.50
<b>Response Time</b>	9.14	8.37	8.05	7.98	9.00

A review of the summary table shows:

- Response time at the 90<sup>th</sup> percentile has improved since 2004.
- In 2004, the countywide 90<sup>th</sup> percentile response time was 9.15 minutes, and 27 first due areas had 90<sup>th</sup> percentile response times in excess of 9 minutes.
  - The countywide performance exceeded the Fire Commission’s adopted service level goal of 9 minutes.
- For calendar year 2007 through August 15, 2007, 8 first due areas had 90<sup>th</sup> percentile response times in excess of 9 minutes, and the countywide 90<sup>th</sup> percentile response time was 7.98 minutes.
  - The countywide performance met the Fire Commission’s adopted service level goal of 9 minutes.

There is no single factor that explains the response time improvement. There are several factors that appear to have contributed to the gradual improvement:

- Turnout time and travel time have gradually improved since 2004.
- Continued implementation and refinement of “quickest unit response”
- Incidents close to fire stations may be increasing at a rate faster than incidents in the fringes of response areas

Although response time performance on a countywide basis meets the response time goal for rural population densities, it is important to observe that turnout time at the 90<sup>th</sup> percentile exceeds the adopted service level goals countywide.

An analysis of response time data at the first due area level reveals eight first due areas with a response time in excess of the rural service level goal. As shown in Table 12, the following first due areas do not meet the response time goal:

- Apex Fire Station #2
- Stony Hill Fire Station #2
- Holly Springs Fire Station #1
- Western Wake Fire Station #2
- Fuquay-Varina Fire Station #3
- Fairview Fire Station #1
- Bay Leaf Fire Station #2
- Stony Hill Fire Station #1

TABLE 12 - CALENDAR YEAR 2007 RESPONSE TIME BY FIRST DUE AREA

First Due Station	Response Time
Apex 2	13.37
Stony Hill 2	11.82
Holly Springs 1	10.93
Western Wake 2	9.74
Fuquay-Varina 3	9.47
Fairview 1	9.23
Bay Leaf 2	9.13
Stony Hill 1	9.09
Garner 2	8.91
Garner 1	8.85
Wake New Hope 1	8.70
Bay Leaf 1	8.69
Hopkins	8.62
Swift Creek	8.51
Morrisville 2	8.40
Fuquay-Varina 2	8.38
Falls	8.33
Morrisville 1	7.97
Rolesville	7.96

First Due Station	Response Time
Fairview 2	7.89
Wake New Hope 2	7.86
Eastern Wake 2	7.85
Morrisville 3	7.83
Durham Highway	7.76
Apex 1	7.70
Wake Forest 1	7.55
Holly Springs 2	7.53
Apex 3	7.52
Wake Forest 2	7.46
Eastern Wake 1	7.27
Western Wake 2	7.17
Wendell 2	7.15
Fuquay-Varina 1	7.02
Zebulon	7.02
Garner 3	6.84
Bay Leaf 3	6.68
Wendell 1	6.39

Although eight first due areas have response times in excess of the response time goal, only three first due areas have travel times in excess of the rural service level goal (assuming 1.5 minute turnout time at the 90<sup>th</sup> percentile). As shown in Table 13, the three first due areas with long travel times are:

- Apex Fire Station #2
- Stony Hill Fire Station #2
- Holly Springs Fire Station #1

TABLE 13 - CALENDAR YEAR 2007 TRAVEL TIME BY FIRST DUE AREA

First Due Station	Travel Time
Apex 2	11.64
Stony Hill 2	10.88
Holly Springs 1	8.88
Fuquay-Varina 3	7.47
Stony Hill1	7.47
Western Wake 2	7.34
Morrisville 2	7.32
Garner1	7.17
Bay Leaf 2	6.96
Hopkins	6.90
Fuquay-Varina 2	6.82
Morrisville 3	6.71
Garner 2	6.70
Morrisville 1	6.59
Fairview 1	6.58
Durham Highway	6.43
Swift Creek	6.42
Falls	6.39

First Due Station	Travel Time
Eastern Wake 2	6.38
Bay Leaf 1	6.35
Wake New Hope 1	6.25
Apex 3	6.22
Apex 1	6.09
Fairview 2	6.08
Western Wake 1	6.07
Fuquay-Varina 1	5.92
Wake Forest 1	5.82
Wake Forest 2	5.78
Eastern Wake 1	5.77
Holly Springs 2	5.75
Wendell 2	5.50
Wake New Hope 2	5.44
Rolesville	5.39
Garner 3	5.26
Zebulon	5.22
Bay Leaf 3	5.07
Wendell 1	5.06

The three first due areas with 90<sup>th</sup> percentile response times above the service level goals have:

- A relatively low number of responses
- A relatively low number of responses in excess of the 9-minute goal.

TABLE 14 - INCIDENT AND LATE INCIDENT COUNT SUMMARY<sup>9</sup>

<sup>9</sup> Incident count for period January 1, 2007 through August 15, 2007.



<b>First Due Area</b>	<b>Total Incidents</b>	<b>Incidents Above Service Level Goal</b>
Stony Hill Station #2	61	18
Holly Springs #2	185	32
Apex Fire Station #2	99	30

*Summary of Response Time Analysis*

- Eight first due areas had response times in excess of the rural service level goal.
- Three first due areas had travel times in excess of the rural service level goal.
- All stations have turnout times in excess of the service level goal.
- The three first due areas with travel times in excess of the service level goals have a relatively low number of responses.
- Improved station staffing will improve response time over the study period.

## FACILITY RECOMMENDATIONS

Facility recommendations address three facility related areas:

- New fire station locations
- Maintenance and repair of existing fire stations
- Closure evaluation of existing fire stations using criteria approved by the Fire Commission in the Long Range Business Plan.

The need for new fire station locations is considered based on two Fire Commission priorities:

- Extend fire insurance district boundaries to cover the fire protection service tax district.
- Service level goal compliance

The Fire Commission's highest priority for fire station location is to locate fire stations to extend fire insurance district boundaries to cover areas of the fire protection service tax district not in a rated fire district.

### *New Fire Stations to Extend Fire Insurance Districts*

Two substantial areas of Wake County are not covered by rated fire insurance district boundaries:

- Area of northern and northwestern Wake County. This area is commonly referred to as the "hook" of Wake County and is not in the fire protection service tax district. Much of this area is in the Dutchville Fire Insurance District and receives primary fire protection from the Creedmoor Fire Department in Granville County.
- Area of southeastern Wake County. This area is in the fire protection service tax district.

Since the area in the northern and northwestern portion of Wake County is not in the fire protection service tax district, a new fire station is not currently recommended. The area of southeastern Wake County that is not in a rated fire insurance district but is in the fire tax district was identified in 2003 as being in need of a fire station.

The Facility Committee has identified the Raynor Road area as the best area to locate a fire station to cover the southeastern portion of Wake County that is not in a rated fire insurance district. This fire station location will be a collaborative effort between the Town of Garner and Wake County. Additionally, the site provides a partnership opportunity with Emergency Medical Services (EMS) for a co-location of fire and EMS resources.

### *New Fire Stations to Meet Service Level Goals*

A second consideration for new fire station locations is compliance with service level goals. The travel time component of the response time goal is directly impacted by fire station location. There are two general factors that lead to travel times exceeding travel time goals:

- **Distribution** – Distribution refers to the location of fire stations in relation to the street network and the district fire units must drive to reach a fire incident. Distribution of fire stations with long distances to the outer edge of the response boundary results in long travel times
- **Other** – There are other factors that may result in long travel times that are unrelated to the distribution of fire stations. These factors include but are not limited to: unstaffed fire stations resulting in a fire unit responding from farther away fire station; units are too busy and unavailable to respond when dispatched; units respond from a location other than the fire station (i.e. unit from a substation dispatched while at the headquarters station).

A new fire station is needed to meet service level goals when distribution is the factor leading to travel time in excess of the service level goal.

A geographic information system (GIS) tool is used to model drive times from existing fire stations and determine whether distribution is the cause when travel time goals are not met in an area. When a majority of incidents occur in an area that the GIS model predicts is within the travel time goal from a fire station, there are factors other than fire station location causing actual travel time to exceed service level goals.

Three first due areas have travel times in excess of the adopted service level goals. However, those three areas have relatively low demand for service. There are no existing standards that provide guidance on when to build, equip, staff and operate a fire station for an area with a response time not in compliance with the adopted service level goal.

The relatively high cost to build and operate a fire station may not be warranted in areas with a low number of incidents above the response time goal.

The three first due areas with travel times in excess of the adopted goal are:

- Apex Fire Station #2
- Stony Hill Fire Station #2
- Holly Springs Fire Station #2

Using GIS to model drive time from each of the three fire stations, the percentage of incidents that occurred within 7.5 minutes of the three fire stations exceeds 90% of the total incidents in each of the three areas and meets the service level goals.

TABLE 15 – TRAVEL TIME COMPARISON

<b>First Due Area</b>	<b>Total Incidents</b>	<b>Incidents Above Travel Time Goal – Based on Model</b>	<b>Incidents Within 7.5 Minute Drive Time Model</b>	<b>Response Time Compliance – Based on GIS Model</b>
Stony Hill Station #2	61	4 <sup>10</sup>	57	93%
Holly Springs Station #2	185	15	170	92%
Apex Fire Station #2	99	7	92	93%

<sup>10</sup> This incident count does not include incidents that were not in the fire protection service tax district. There were an additional 19 incidents that occurred more than 7.5 incidents from Stony Hill Fire Station #2 but were not also in the fire tax district.

Based on the GIS model, fire station distribution is not the factor leading to travel times in excess of the adopted service level goal in the Stony Hill Fire Station #2, Holly Springs #2 and Apex Fire Station #2 areas. Consequently, no additional fire stations are recommended through 2015 to meet adopted service level goals.

### *Maintenance and Repair of Existing Fire Stations*

With the conclusion of the HEERY<sup>11</sup> project, providing for ongoing maintenance and repair of existing fire stations is necessary. This need can be addressed through the annual operating budget process.

### *Service Replacement Evaluation of Current Fire Stations*

The adopted long-range business plan identifies five fire stations as candidates for service replacement evaluation:

- Bay Leaf Fire Station 3
- Falls Fire Station
- Wake New Hope Fire Station 1
- Western Wake Fire Station 1
- Western Wake Fire Station 2

The business plan contains the criteria to be used in the evaluation of whether to close a fire station and replace with fire protection service from either the Cary Fire Department or Raleigh Fire Department. However, the business plan does not provide criteria for screening other fire stations to add to the list for future closure evaluations.

---

<sup>11</sup> The HEERY project consisted of design and engineering professionals conducting a facility assessment of all fire stations and preparing a facility condition report. The Facility Committee categorized each item noted in the report, and the fire tax district's capital improvement plan funded the work in phases based on category.

The Facility Committee recommends that the percentage of first due area that a fire station can respond quickest to be used as the screening criteria.<sup>12</sup>

If units from a neighboring fire station can respond quickest to 50% or more of a fire station’s first due area, then the fire station serving the area should be added to the list for closure evaluation. As shown in Table 16, only the five fire stations identified in the business plan for closure evaluation list meet the screening criteria.

TABLE 16 - PERCENTAGE OF FIRST DUE AREA CLOSEST TO EACH FIRE STATION

Name	% Area Closest to Station	Name	% Area Closest to Station
Bay Leaf #3	2%	Garner #3	90%
Wake-New Hope #1	6%	Apex #3	92%
Western Wake #2	25%	Rolesville	93%
Western Wake #1	29%	Wendell #2	95%
Falls	35%	Bay Leaf #1	96%
Wake-New Hope #2	57%	Fairview #2	98%
Eastern Wake #1	59%	Wendell #1	99%
Durham Highway #1	61%	Apex #2	100%
Garner #1	66%	Stony Hill #2	100%
Eastern Wake #2	66%	Hopkins	100%
Morrisville #2	70%	Stony Hill #1	100%
Fairview #1	70%	Fuquay-Varina #3	100%
Morrisville #3	77%	Holly Springs #2	100%
Holly Springs #1	79%	Fuquay-Varina #2	100%
Swift Creek	80%	Zebulon	100%
Bay Leaf #2	81%	Garner #2	100%
Wake Forest #2	81%	Wake Forest #1	100%
Apex #1	86%	Fuquay-Varina #1	100%
Morrisville #1	87%		

<sup>12</sup> A fire station may not be able to respond quickest to its entire first due area due to annexation of unincorporated area, expansion of municipal corporate limits and construction of new fire stations.

One closure evaluation is complete. At its meeting on July 19, 2007, the Fire Commission unanimously adopted a recommendation to replace service from Western Wake Fire Station #2 with service from Cary Fire Department.

Although one fire station closure evaluation is complete, the business plan does not provide a schedule for future evaluations. Since the remaining four fire stations involve a negotiation with the City of Raleigh as the possible alternate service provider, the remaining four stations can be evaluated concurrently.

The Facility Committee recommends applying fire station closure criteria to the remaining four fire stations in FY 2009.

### *Summary of Fire Station Recommendations for FY 2009 - 20 15*

- Construct fire station in southeastern Wake County, Raynor Road area.
- Address ongoing maintenance and repair needs of existing fire stations during the annual operating budget development
- Initiate fire station closure evaluations for Bay Leaf Fire Station #3, Falls Fire Station, Wake New Hope Fire Station #1 and Western Wake Fire Station #1 in FY 2009.

## STAFFING RECOMMENDATIONS

Wake County has taken responsibility to provide fire protection service to its citizens. Delivery of fire and related emergency services is critical and time-sensitive; therefore, the delivery system must be capable of providing a reliable, consistent and timely level of service.

The fire protection system in Wake County has traditionally been a predominantly volunteer system. However, all contracting fire departments are challenged to recruit and maintain an adequate number of volunteer members in an environment with increasing workloads and decreasing pool of volunteer candidates.

There are no fire departments in Wake County relying solely on volunteers for service delivery. All contracting fire departments are now combination fire departments<sup>13</sup>, and all fire stations are now staffed with either full-time or part-time staff, or a combination of both.

As fire departments have increased reliance on paid staff, the cost to support fire protection has increased significantly. Fire tax support has increased from approximately \$122,387 in 1960, to approximately \$18,165,478 in 2007.

TABLE 17 - HISTORICAL FIRE FUNDING<sup>14</sup>

Fiscal Year	Appropriation (Current Year \$)	Appropriation (in 2000 \$)	Percent Increase by Decade (in 2000 \$)
1960	16,800	122,387	
1970	34,632	159,242	30.114%
1980	95,083	202,679	27.277%
1990	111,576	146,331	-27.802%
2000	7,485,421	7,485,421	5015.400%
2008	18,165,478	16,627,135	122.127%

<sup>13</sup> Combination fire departments are fire departments with volunteer members and paid staff. The paid staff may be either full-time or part-time.

<sup>14</sup> Source: Wake County Budget and Management Services Department. Historical funding is fire tax funding only. Total does not include non-fire tax revenue sources such as departmental fund raising revenues, contributions, etc.



### *Staffing Evolution*

Staffing patterns of the various fire departments reflect the staffing challenge, and departments have evolved to rely more heavily on career staff. The evolution was subtle with the early signs being a predominant reliance on part-time and/or full-time staff during the weekdays supplemented by volunteers. Subsequent signs of the continuing evolution are the introduction of duty crew staffing<sup>15</sup>, 24-hour career personnel, career fire chiefs and other career supervisory personnel.

The evolution to increased reliance on career staff is an indicator that Wake County outgrew the all-volunteer fire service in the early to mid 1990's. As shown in Table 17, this evolution began during the time period with the largest increase in fire tax funding to support fire protection.

Table 18 shows the current staffing patterns by station. All fire stations are staffed with varying levels of part-time and/or full-time personnel. Twenty-six fire stations are staffed with personnel on a 24-hour / 7-day a week basis, and eleven fire stations are staffed during weekday, working hours.

---

<sup>15</sup> Duty crew staffing is an arrangement where volunteers are assigned to stay at a fire station during a specified time period. Volunteers staffing duty crews are often compensated. Two fire departments with the longest history of duty crew usage report difficulty in sustaining consistent duty crew staffing.

Wake County Fire Commission  
 Long Range Business Plan  
 Facilities and Staffing

TABLE 18: STATION STAFFING (DOES NOT INCLUDE SECRETARIAL OR ADMIN. ASSISTANT STAFFING)

Department	Station #	24-Hour/7 Day Personnel		Weekday-Only Personnel		Weekend-Only Personnel		Nighttime Personnel	Chief Officer	Notes
		# Per Shift	Total Complement	# Per Shift	Length of Shift	# Per Shift	Length of Shift			
Apex	1	2	6	3	8am-5pm				Career Chief	Weekday personnel includes 1 part-time employee, 1 Fire Marshal, 1 Fire Inspector
	2	2	6	1	8am-5pm					
	3	5	15	2	8am-5pm			2		Nighttime personnel is 2 person duty crew on weeknights.
Bay Leaf	1			4	9am-3pm				Career Chief	Dept. has 10 full-timers and 2 FTE by part-timers that rotate among all three stations.
	2			4	6am-3pm	3	Duty crews work 12-hour shifts to cover	3		Station 1 weekday crew shifts to Sta 2 at 3PM; vol duty crews week nights and Sat. and Sun.
	3			4	7am-4pm					Dept. has 10 full-timers and 2 FTE by part-timers that rotate among all three stations.
Durham Highway	1	3	9	2	12 hours			3	Volunteer Chief	Weekday-only personnel are part-time. Nighttime personnel are vol. Duty crew working 6pm - 6am.
Eastern Wake	1	3	9						Career Chief	Volunteer members fill in for career staff when career staff off.
	2	3	9							
Fairview	1			3	12 hours				Career Chief	Weekday personnel are part-time
	2			3	12 hours					Weekday personnel are part-time
Falls				3	7am-5pm	3	7:00pm - 7:00am	3	Volunteer Chief	Weekend only personnel and nighttime personnel are night volunteer duty crews. Duty crews are usually 3 or 4 personnel. Weekday only personnel are part-time.
Fuquay-Varina	1	4	12	5					Career Chief	Battalion chief is included in 4 each 24 hour staff. Weekday only personnel include 2 part-time, 1 Assistant Chief, 2 Safety Officers.
	2	3	9	0				1		Nighttime duty crew is 6 pm - 6 am.
	3	3	9	0				1		Nighttime duty crew is 6 pm - 6 am.
Garner	1	4	12						Career Chief	3 each 24 hour staff on engine, 1 each 24 hour staff on aerial.
	2	3	9							
	3	4	12							District Chief plus 3 man company per shift
Holly Springs	1	4	12	2	8:00am-5:00pm				Career Chief	Weekday is two Assistant Chiefs.
	2	2	6	1	8:00am-5:00pm					Weekday is part-time
Hopkins		2	6	1	7am-3pm				Career Chief	Weekday is 1 full time.
Morrisville	1	5	15	2	8am-5pm				Career Chief	Weekday only is 2 fire inspectors
	2	4	12							
	3	4	12							
Rolesville		2	6						Volunteer Chief	
Swift Creek				4					Part-Time Chief	Weekday personnel are part-time (2 @ 6:30am-5:00pm plus 2 @ 8:00am-5:00pm)
Stony Hill	1			4	7am-6pm	3	6:00pm - 6:00am	3	Volunteer Chief	Weekend only and nighttime are volunteers. Duty crew staffing on weekends and nighttime may be 2. 1-full time and 3 part-time weekday.
	2	2	6							
Wake Forest	1	5	15						Career Chief	
	2	4	12							
Wake-New Hope	1	2	6						Volunteer Chief	
	2			3	7am-6pm					2 full-time and 1 part-time on weekdays.
Wendell	1	3	9	1	8am-5pm				Career Chief	Weekday is 1 full time.
	2	2	6							
Western Wake	1			3	7am-6pm	3	6am-6pm	3	Volunteer Chief	1 of 3 each day is full-time employee; the other 2 are part-time. Nighttime personnel are duty crew. Weekend-only personnel are part-time personnel.
	2			3	7am-5pm					All part-time.
Zebulon		3	9	1	8hrs/day				Career Chief	Weekday only is full time.

## Volunteerism

The pool of available volunteers is decreasing countywide. Wake County is not unique as the fire service nationally is faced with similar trends.

A survey of contracting fire departments in 2004 showed that although several departments had good numbers of volunteer members on their rosters, many of the volunteers were not significantly active<sup>16</sup>. Table 19 compares the number of volunteer members on the various rosters with the number of active volunteers.

TABLE 19: NUMBER OF ACTIVE VOLUNTEERS

<i>Fire Department</i>	<i>Number of Volunteers</i>	<i>Active Daytime Volunteers*</i>	<i>Active Nighttime Volunteers**</i>
Apex	50	7	24
Bay Leaf	62	8	62
Durham Hwy	45	NR	NR
Eastern Wake	35	10	18
Fairview	40	4	15
Falls	35	2	17
Fuquay-Varina	43	0	1***
Garner	24	4	4
Holly Springs Public Safety	12	3	4
Hopkins	24	5	20
Knightdale Public Safety	29	9	20
Morrisville	12	4	12
Rolesville	32	5	9
Stony Hill	31	2	29
Swift Creek	37	19	20
Wake Forest	37	2	8
Wake-New Hope	43	1	26
Wendell	23	NR	NR
Western Wake Fire/Rescue	30	4	17
Zebulon	26	0	12
<b>TOTAL</b>	<b>648</b>	<b>89</b>	<b>318</b>

\* Volunteers that respond at least 20 percent of incidents from 6:00am to 6:00pm.

\*\* Volunteers that respond at least 20 percent of incidents from 6:00pm to 6:00am.

\*\*\* Fuquay-Varina Fire Department utilizes volunteer duty crews during the nighttime hours.

NR = Not Reported

<sup>16</sup> For survey purposes, a volunteer was considered “active” if the volunteer responded to at least 20% of incidents.

The problem of inadequate number of volunteers is most apparent during weekday, working hours. As shown in Table 18, the number of active volunteers during the daytime ranges from 0 (Fuquay-Varina FD) to 19 (Swift Creek FD).

Several fire departments are also experiencing difficulty in effective volunteer response during evenings and weekend hours. Table 18 shows the number of active volunteers during nighttime hours ranges from 1 (Fuquay-Varina FD) to 62 (Bay Leaf FD)

The active volunteer survey was completed in 2004. Since the number of total volunteers has decreased since 2004, it is assumed that the number of “active” volunteers has also decreased.

A turnout time analysis reveals turnout times are the longest and most inconsistent during periods volunteers are relied on to provide service.

Lengthy turnout times associated with volunteer response is evidence that volunteers cannot be relied on to consistently meet turnout time goals for primary response. Due to the continued decline in the number of volunteers and the increasing number of paid fire personnel, there is no evidence that volunteer availability will increase to the level that volunteers can be relied on for primary response in a consistent and reliable manner.

Given the high cost of supporting a total career firefighting force, reliance on volunteers to support career staff must continue. Volunteers can still play a vital role in fire service delivery. As the staffing patterns of fire departments evolve, it is important to continue efforts to recruit and retain volunteers.

### *Impact of 24-Hour Staffing on Response Time*

Performance data for Garner Fire Station #2 provides a valuable case study of the positive impact of staffing on response time. The FY 2006 fire tax budget funded 24-hour career staff at Garner Fire Station #2. A review of turnout time for Garner Fire Station #2 in Table 20 shows a decrease of approximately 3.9 minutes from 2005 to 2006.

*TABLE 20 - 90TH PERCENTILE TURNOUT TIMES - GARNER FIRE STATION #2*

	Total	2004	2005	2006	2007
FDGF2	4.71	6.18	6.28	2.38	2.40

As shown in Table 21, the decreased turnout time resulted in an approximate 3 minute response time improvement for the Garner Fire Station #2 first due area.

TABLE 21 - 90TH PERCENTILE RESPONSE TIMES - GARNER FIRE STATION #2

	Total	2004	2005	2006	2007
FDGF2	10.73	13.85	11.59	8.54	8.91

The addition of 24/7 staffing at Garner Fire Station #2 measurably improved response times in the Garner Station #2 first due area. The Garner Fire Station #2 example demonstrates that improved staffing countywide on a 24 / 7 basis will result in measurable improvements in response times.

### *Staffing Improvement Plan*

Several factors contribute to the fire departments' inability to meet staffing and response time goals in the adopted service level goals:

- Decreasing pool of active and available volunteers
- Lengthy turnout times
- Increased demand for fire protection and related emergency services

To meet the staffing and service demand challenges of tomorrow, the strategy for adequate fire service staffing should be:

- Introduce more career employees into the system in a planned, systematic manner to handle emergency calls with adequate response times and staffing levels
- Anticipate and prepare for future challenges created by the transition to increased reliance on career staff
- Continue efforts to recruit and retain volunteers

Wake County Fire Commission  
 Long Range Business Plan  
 Facilities and Staffing

The Fire Commission’s top service priority is improved staffing. The Staffing Committee recommends a plan to staff every fire station in Wake County with four career personnel on a 24-hour /7-day a week basis over a three-year.

TABLE 22 - STAFFING COMMITTEE'S RECOMMENDED PLAN

Department Name	2009		2010		2011		2012		2013		TOTAL # of Positions
	# of Positions	Costs	# of Positions	Costs	# of Positions	Costs	# of Positions	Costs	# of Positions	Costs	
Apex	0	\$ -	6	\$ 50,805.71	6	\$ 55,538.29	0	\$ -	0	\$ -	12
Bay Leaf	8	\$ 428,790.85	8	\$ 427,270.37	10	\$ 528,358.76	0	\$ -	0	\$ -	26
Durham Highway	3	\$ 146,356.63	0	\$ -	0	\$ -	0	\$ -	0	\$ -	3
Eastern Wake	0	\$ -	3	\$ 140,554.87	3	\$ 145,906.73	0	\$ -	0	\$ -	6
Fairview	12	\$ 628,828.87	12	\$ 628,828.87	0	\$ -	0	\$ -	0	\$ -	24
Falls	12	\$ 628,828.87	0	\$ -	0	\$ -	0	\$ -	0	\$ -	12
Fuquay Varina	0	\$ -	8	\$ 279,011.14	0	\$ -	0	\$ -	0	\$ -	8
Garner	0	\$ -	0	\$ -	6	\$ 129,612.74	0	\$ -	0	\$ -	6
Garner #4	0	\$ -	12	\$ 282,972.99	0	\$ -	0	\$ -	0	\$ -	12
Holly Springs	0	\$ -	0	\$ -	3	\$ 31,112.79	0	\$ -	0	\$ -	3
Hopkins	6	\$ 331,576.14	0	\$ -	0	\$ -	0	\$ -	0	\$ -	6
Morrisville	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0
Rolesville	6	\$ 271,662.93	0	\$ -	0	\$ -	0	\$ -	0	\$ -	6
Stony Hill	6	\$ 306,778.96	12	\$ 579,041.96	0	\$ -	0	\$ -	0	\$ -	18
Swift Creek	12	\$ 628,828.87	0	\$ -	0	\$ -	0	\$ -	0	\$ -	12
Wake Forest	0	\$ -	12	\$ 134,436.94	12	\$ 120,739.30	0	\$ -	0	\$ -	24
Wake New Hope	8	\$ 441,482.82	8	\$ 441,482.82	0	\$ -	0	\$ -	0	\$ -	16
Wendell	0	\$ -	6	\$ 287,751.09	3	\$ 175,570.96	0	\$ -	0	\$ -	9
Western Wake	12	\$ 596,972.76	0	\$ -	0	\$ -	0	\$ -	0	\$ -	12
Zebulon	3	\$ 70,605.00	0	\$ -	0	\$ -	0	\$ -	0	\$ -	3
<b>Total by Year</b>	<b>88</b>	<b>\$ 4,480,712.71</b>	<b>87</b>	<b>\$ 3,252,156.77</b>	<b>43</b>	<b>\$ 1,186,839.56</b>	<b>0</b>	<b>\$ -</b>	<b>0</b>	<b>\$ -</b>	<b>218</b>

The Staffing Committee’s recommended plan is intended to:

- Phase in career staff over a three-year period
- Allow each fire department to meet service level goals in the first year
- Maintain current staffing levels during plan implementation

The Staffing Committee evaluated many alternative implementation plans during development of its recommendation<sup>17</sup>. The total cost to implement the Staffing Committee’s plan over a three-year period is \$7,658,223.

The Staffing Committee also considered a five-year implementation period. However, total cost difference between the two plans was negligible<sup>18</sup>, and the five-year plan was determined to be too long due to the critical staffing needs<sup>19</sup>.

<sup>17</sup> The Staffing Committee considered a plan to phase in personnel based on a prioritization system that allocates points to stations based on several factors – incident count, total unit responses, and current staffing. The Staffing Committee also considered a plan to phase in personnel with each fire station getting to a staffing level of three personnel in the first year. The Budget Committee asked the Staffing Committee to evaluate this 3-personnel first year approach.

The three-year cost to implement the Staffing Committee’s plan is included in an operating model to predict the tax rate needed to support the plan.

TABLE 23 - FIRE TAX OPERATING MODEL WITH STAFFING PLAN COSTS

	FY 2008 Adopted	FY 2009	FY 2010	FY 2011
<b>Staffing Proposal</b>				
New Expansion Funds (that year only)	-	4,269,459	3,252,157	1,186,840
Recurring Merit/Benefit Increases			170,778	307,696
Cumulative Expansion Funds	-	4,269,459	7,692,394	9,186,929
Total Operating Expenditures		23,250,993	27,569,130	30,001,830
Projected Revenue per Penny	-	1,878,551	1,951,938	2,028,260
<b>Tax Rate Needed to Support</b>	<b>10.00</b>	<b>12.38</b>	<b>14.12</b>	<b>14.79</b>
<b>Tax Increase Needed that year</b>		<b>2.38</b>	<b>1.75</b>	<b>0.67</b>
		24%	14%	5%

As predicted in the operating model, a cumulative tax rate increase of \$.048 per hundred over a three year period will be needed to support plan implementation. Note that the \$.1479 per hundred fire tax rate at the end of five years is less than the statutory fire tax district maximum<sup>20</sup> of \$.15 per hundred.

At the Fire Commission’s November 15, 2007, regular meeting, the Fire Commission adopted the Staffing Committee’s recommended staffing plan.

*Impact of Transition to Predominantly Career System*

The transition to increasing reliance on career staff in the fire protection system supplemented by volunteers will improve response times. However, the transition will present Wake County and the fire service with a number of challenges and difficult decisions.

<sup>18</sup> At the end of five years, the cost difference between the three-year plan and the five-year plan was approximately 5% higher for the three-year implementation. The cost difference was attributed to the difference in the annual pay increases.

<sup>19</sup> The collective judgment of Staffing Committee members was that five years was too long to allow fire stations to continue with inadequate staffing given the current long turnout times at all fire stations.

<sup>20</sup> The resolution approved by the Board of Commissioners creating the fire protection service tax district limits the fire tax rate to \$.10 per hundred. However, the statutory tax rate limitation based on the procedure for creating the tax district is \$.15 per hundred.

The transition to a predominantly career system will improve response times systemwide. However, the transition will create additional issues that the fire service leadership must anticipate and prepare for. Simply adding additional career staff without considering and planning for these issues will negatively impact the fire protection system. Many of the inconsistent conditions and situations that currently exist in the fire service and are not apparent, will become highlighted as the number of career staff substantially increases. These issues, conditions and situations include but are not limited to:

- Friction between career members and volunteers.
  - As the number of career members increases in the complex combination system, there is a possibility of increased tension between the career members and the volunteers. The introduction of additional career staff may accelerate the decline in volunteerism.
- Varying and inconsistent recruitment and selection processes.
  - Each fire department is responsible for its own recruitment and selection. The processes and criteria vary from department to department.
- Varying and inconsistent continuing education requirements for career staff.
  - As the reliance on career staff increases, the need for continuing education will increase. Continuing education requirements and programs vary from department to department.
- Limited candidate pool.
  - Fire departments report difficulty in recruiting and selecting applicants for a limited number of new positions. As the number of new positions increase, the competition for qualified applicants will result in a limited pool of qualified applicants countywide.
- Varying organization structures.
  - Although there is a countywide compensation plan guiding compensation decisions in contracting fire departments, there is no consistent organizational structure among the fire departments.
- Limited career ladder and promotional opportunities.



- Since each fire department maintains independent career programs, there is limited opportunity for employees to advance within the organization.
- Inconsistent level of benefits.
  - Since each fire department maintains its own independent career program, the types and levels of benefits provided to employees is inconsistent. Additionally, the cost to offer the benefits is increased as each fire department is shopping the market as a small employer.
- Increased administrative costs and burden to maintain multiple, independent career systems.
  - The administrative costs and burden increase as the number and complexity of independent career systems increases.
- Increased chief officer positions.
  - Since each fire department is an independent organization, each fire department may employ supervisory levels to increase promotional opportunities rather than provide appropriate supervisory levels as needed to maintain adequate spans of control. The number of chief officer positions countywide may be increased.
- Inability to enforce countywide policies/programs
  - As the number of career employees increases, the need for consistency and coordination of a complex combination system will increase. Although there is a process through the Fire Commission to adopt countywide policies and programs, it is the responsibility of each independent organization to implement the policies and programs. There is opportunity for fire departments to adopt practices that are inconsistent with countywide policies and programs.
- Lack of a county fire academy.
  - There is currently no way for a new member of the fire service to attend a fire academy to acquire all of the required certifications. Earlier attempts to implement a county fire academy have failed. As the pool of applicants

possessing the required certifications decreases, the need for a county fire academy increases.

One condition that may interfere with effectively addressing these issues is the “staffing paradox”. The staffing paradox is the contradiction of maintaining the independence of separate fire department organizations while effectively dealing with staffing issues on a countywide basis.

A successful model for community involved planning is the Blue Ribbon Committee on the Future of Wake County. A similar approach can successfully review future fire service needs and recommend appropriate strategies to meet those needs.

Given the importance of fire protection to the community, the Fire Commission should recommend the Board of Commissioners appoint a Blue Ribbon Committee. The Blue Ribbon Committee can consist of community leaders, fire service and Fire Commission leaders and County staff. The role of the Blue Ribbon Committee will be to review the current and future fire protection needs and identify and recommend strategies for meeting those needs.

### *Summary of Staffing Recommendations*

- Increase staffing to 4 – persons per station on a 24-hour a day, 7-day a week basis over a 3-year period
- Fire Commission recommend that the Wake County Board of Commissioners appoint a Blue Ribbon committee to study the future of the Wake County fire service.

## TOWN OF WENDELL ANALYSIS

Town of Wendell corporate limits are in Wake County’s fire protection service tax district. Residents in the Town of Wendell pay Wake County’s fire tax, and Wake County contracts with the Wendell Holmes Fire Department, Inc. to provide service in the Town.

The current population in the Town of Wendell is 5,325.

*TABLE 24 WENDELL POPULATION ESTIMATE*

Town	July 2007 Residential Units	July 2007 Mobile Homes	July 2007 Total Units	July 2007 Total Occupied Units	July 2007 Household Population	2000 Group Quarters Population	July 2007 Population Estimate
Wendell	2,221	17	2,238	2,103	5,258	67	5,325

Approximately 34.53 square miles are in the Town of Wendell’s various planning jurisdictions.

*TABLE 25 - TOWN OF WENDELL PLANNING BOUNDARY AREA*

Municipality	Corporate Limits Area in Sq. Miles	Jurisdiction Area in Square Miles	ETJ Area in Square Miles	SRUSA Area in Square Miles	LRUSA Area in Square Miles
<b>WENDELL</b>	4.27	11.06	6.79	9.71	13.76

The population inside the Town of Wendell corporate limits is forecast to increase 545% to 34,357 in 2035.

*TABLE 26 - TOWN OF WENDELL POPULATION PROJECTIONS*

Population Projection	2007	2015	2025	2035
Town of Wendell	5,325	11,915	22,428	34,357

In FY07, 600 incidents occurred in the Town of Wendell corporate limits. Based on the current population and incident count, the population density in the Town of Wendell is

.112677 per capita, or 112.68 incidents per thousand population. Based on the per capita service demand, the projected service demand for 2015 is 1,343 incidents.

The population density for the Town of Wendell is 1,247 persons per square mile. This area is in the suburban population density classification.

A review of computer aided dispatch data shows that the 90<sup>th</sup> percentile response time for the Town of Wendell is below the suburban response time goal and is only .10 of one minute above the urban response time goal. The 90<sup>th</sup> percentile travel time is well below the suburban travel time goal and substantially meets the urban travel time goal. As shown in Table 27, the turnout time at the 90<sup>th</sup> percentile is above the adopted service level goal of 1.5 minutes.

TABLE 27- TOWN OF WENDELL RESPONSE TIME COMPONENTS

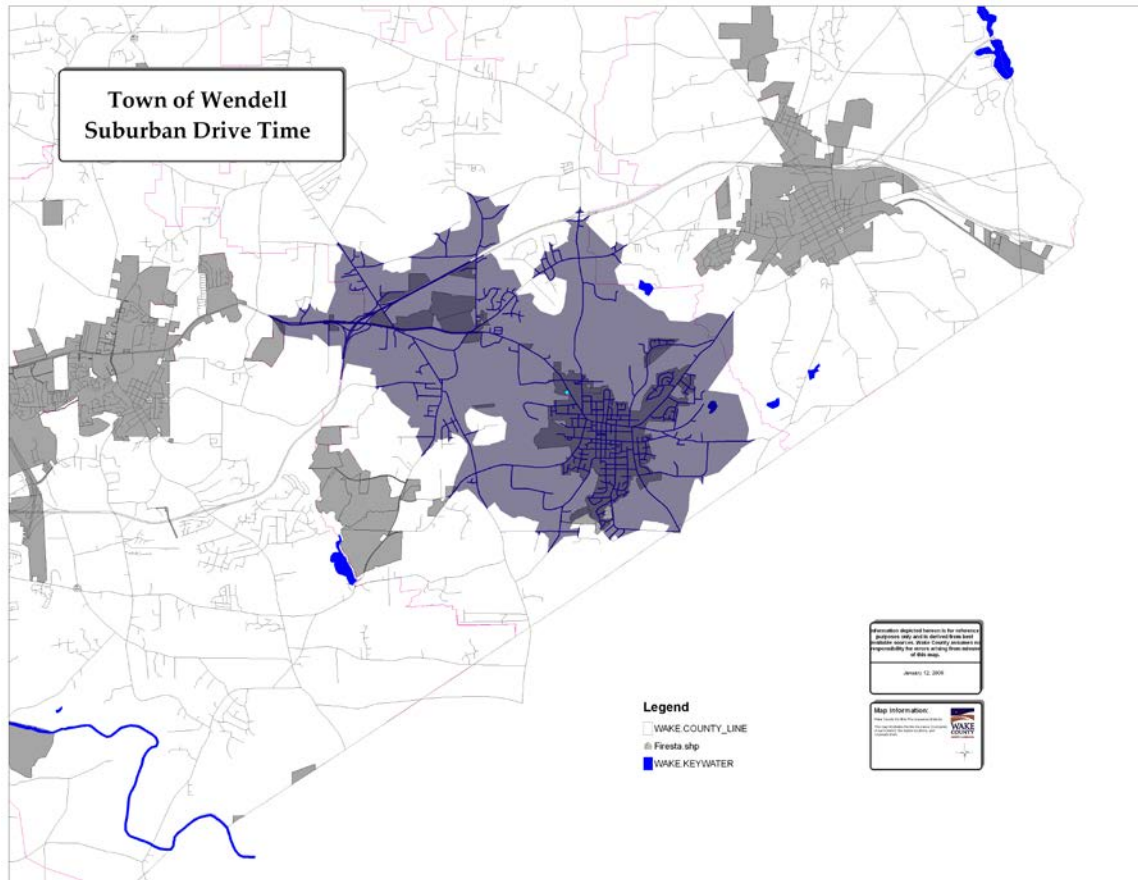
	2004	2005	2006	2007
Turnout Time	2.15	1.64	1.66	1.78
Travel Time	4.22	3.45	3.53	3.54
Response Time	6.00	4.77	4.88	5.10

A decrease in turnout time will result in an improved response time at the 90<sup>th</sup> percentile.

A significant new development, Wendell Falls, recently began construction in newly annexed Town area. As shown in the map below, the new area is a satellite area southeast of the town. The new development is beyond the suburban travel time goal from Wendell Fire Station #1.

A new fire station will be needed in the Wendell Falls area to meet response time goals. Land acquisition is recommended prior to 2015. This fire station project will be a partnership between Wake County, Town of Wendell, and EMS.

FIGURE 5 - TOWN OF WENDELL DRIVE TIME ANALYSIS



*APPENDIX A - WAKE COUNTY AREA RECOGNITIONS AND ACCOLADES*

**2007 Accolades**

#7 Business Boomtown (Raleigh-Cary, NC)  
*Inc.*, May 2007  
Top 10 Metro Areas for Job Growth  
*Business 2.0*, May 2007  
#3 City for African Americans to Live (Raleigh, NC)  
*Black Enterprise Magazine*, 2007  
#4 Hottest Job Market for Young Adults (Raleigh, NC)  
*Bizjournals*, April 2007  
#1 Best Place for Business and Careers (Raleigh, NC)  
*Forbes*, April 2007  
#8 Fastest Growing Metro in the Nation (Raleigh, NC)  
US Census Bureau, April 2007  
#5 Best Place to Find a Mate (Raleigh, NC)  
*Men's Health*, March 2007  
#1 Best US City for Jobs (Raleigh-Cary, NC)  
*Forbes.com*, February 2007  
Top 50 Hottest Cities for Expanding and Relocating Companies (Raleigh-Cary, NC)  
*Expansion Management*, February 2007  
Top Ten Tech Town (Raleigh-Durham, NC)  
*Wired Magazine*, January 2007  
#1 School District in the Nation for Certified Teachers (Wake County)  
National Board of Certified Teachers, January 2007  
Gold Rating (Wake County Schools)  
*Expansion Management's Education Quotient*, January 2007

**2006 Accolades**

#1 Best City for Women Entrepreneurs (Raleigh-Cary, NC)  
*AllBusiness.com*, November 2006  
#8 Safest City (Cary, NC)  
*Morgan Quitno Press*, October 2006  
#9 Health Ranking (Raleigh-Durham, NC)  
#13 Overall Quality of Life (Raleigh-Durham, NC)  
#15 Climate Ranking (Raleigh-Durham, NC)  
*Business Development Outlook*, September/October 2006  
#1 Area Overall (Raleigh-Durham, NC)  
*Tampa Bay Partnership Regional Economic Scorecard*, September 2006  
#6 Area for Relocating Singles (Raleigh-Durham-Chapel Hill, NC)  
*Primacy Relocation*, October 2006

#1 Area for Tech Business (Raleigh-Durham, NC)  
Silicon Valley Leadership Group, September 2006

#3 Best City for Entrepreneurs (Raleigh-Durham-Chapel Hill, NC)  
Entrepreneur.com, August 2006

#10 Fastest Growing MSA (Raleigh-Cary, NC)  
US Census Bureau, July 2000 - July 2005 (Released August 2006)

#3 Top Metro Overall (Raleigh-Cary, NC)  
*Expansion Management* Mayor's Challenge, August 2006

#12 Best Sports City (Raleigh-Durham-Chapel Hill, NC)  
*The Sporting News*, August 2006

#4 Greatest Home Price Appreciation Market (Raleigh-Durham, NC)  
Veros, July 2006

#6 Best City for Singles (Raleigh-Durham, NC)  
Forbes.com, July 2006

5-Star Business Metro for Business Expansion (Raleigh, NC)  
*Expansion Management*, July/August 2006

#13 Fastest Growing Cities (Raleigh, NC)  
US Census Bureau, June 2006

#6 Brainiest Mid-sized Metro (Raleigh, NC)  
Bizjournal, June 2006

5-Star Quality of Life Metro (Raleigh, NC)  
*Expansion Management* "Quality of Life Quotient," May/June 2006

#2 Best Place for Business & Careers (Raleigh, NC)  
*Forbes*, May 2006

#13 Boom Town (Raleigh, NC)  
*Inc. Magazine*, May 2006

Top 10 Projected Home Appreciation Market (Raleigh, NC)  
MSN.com, April 2006

Top 20 Business Schools (Duke University #11, UNC-CH #20)  
*US News and World Report*, 2006

#2 Best Value Public Colleges (North Carolina State University)  
*Princeton Review*, March 2006

#1 Highest Growth County in NC (Wake County, NC)  
US Census Bureau, March 2006

#1 City for Federally Funded Economic Development Incentives (Raleigh, NC)  
Public Policy Forum, March 2006

#10 Best Walking City (Raleigh, NC)  
*Prevention*, March 2006

#16 Hottest City for Business Relocation & Expansion (Raleigh-Cary, NC)  
*Expansion Management*, February 2006

#3 Most Educated City (Raleigh, NC)  
*American Community Survey*, US Census Bureau, 2004 (Released January 2006)

#3 Best US City for Bargains (Raleigh-Durham, NC)  
Hotwire Travel Value Index, January 2006

### **2005 Accolades**

#10 Safest City (Cary, NC)

*Morgan Quitno Press*, November 2005

#7 Richest City (Raleigh, NC)

*Forbes*, November 2005

Top 20 Best Places to Live, Work and Play (Raleigh-Durham-Chapel Hill, NC)

Homebuilder.com, November 2005

#5 Best Inner City for Small Businesses (Raleigh, NC)

Small Business Administration, November 2005

Top Ten Fast Cities/Hubs for Creative Class Talent (Raleigh-Durham, NC)

*Fast Company*, October 2005

#3 Best Large Metro Areas for New Businesses and Entrepreneurs (Raleigh-Durham, NC)

National Policy Research Council, October 2005

#1 Area for Tech Business (Raleigh-Durham, NC)

Silicon Valley Leadership Group, September 2005

Top "Seven Cool Cities" for Young Professionals (Raleigh, NC)

*Kiplinger's Personal Finance*, October 2005

#3 Hottest City for Entrepreneurs (Raleigh-Durham, NC)

*Expansion Management*, August 2005

#12 Top Real Estate Market (Raleigh-Durham, NC)

*Expansion Management*, August 2005

Top Ten Best Budget Weekend City (Raleigh-Durham, NC)

*MSN City Guides*, August 2005

Five-Star Business Opportunity Metro (Raleigh-Cary, NC)

*Expansion Management*, July 2005

#2 Schools that Rock (Raleigh-Durham-Chapel Hill, NC)

*Rolling Stone*, July 2005

#4 Best City for Singles (Raleigh-Durham, NC)

*Forbes*, July 2005

Top 20 Business Opportunity Metro (Raleigh-Cary, NC)

*Expansion Management*, July 2005

#5 Knowledgeable Workforce (Raleigh-Cary, NC)

*Expansion Management*, July 2005

#1 Fastest Growing Life Science Workforce

#5 Overall Life Science Cluster

Milken Institute, June 2005

#17 Healthiest City (Raleigh-Durham-Chapel Hill, NC)

Sperlings Best Places, June 2005

#2 Best Place for Business and Careers, (Raleigh-Durham, NC)

*Forbes*, May 2005



#2 Most Educated City (Raleigh, NC)

*US Census Bureau-American Community Survey, 2003 Survey*  
(Released April 2005)

#2 Best Public Education System  
(Raleigh-Cary, NC)

*Expansion Management, April 2005*

#1 Fastest Growing Life Science Workforce

#5 Overall Life Science Cluster

*Milken Institute, June 2005*

#8 High-Tech City (Raleigh, NC)

*Popular Science, February 2005 Science*

#17 Healthiest City (Raleigh-Durham-Chapel Hill, NC)

*Sperlings Best Places, June 2005 Places*

#17 Best City for Runners (Raleigh, NC)

*Runner's World, June 2005*

#8 Most Wired City (Raleigh-Durham-Chapel Hill, NC)

*Intel Annual Survey, 2005 Survey*

Five Star Knowledge-Worker Metro

#7 Best Educated Workforce

#10 Top Metro for University R&D Spending

#7 Top Metro-Scientists and Engineers Per Capita (Raleigh-Cary, NC)

*Expansion Management, May 2005 Management*

Top Five Most Innovation-Entrepreneurial Regions (Raleigh, NC)

*US Small Business Administration, April 2005*

Top 50 5-Star City for Quality of Life (Raleigh-Cary, NC)

*Expansion Management's Quality of Life Quotient, March 2005*

**2004 Accolades**

#2 Best Place for Business (Raleigh-Durham, NC)

*Forbes, May 2004*

#4 Best City for Entrepreneurs and Small Business

*Gold Guide, May 2004*

#6 Best Public School System (Raleigh - Durham -Chapel Hill MSA)

*Expansion Management's MSA Education Quotient Rankings, April 2004*

#1 City with the Happiest Workers (Raleigh, NC)

*Hudson Employment Index, March 2004*

#3 High Value Labor Market Quotient 2004

*Expansion Management, March 2004*

#4 City That Rocks (Raleigh, NC)

*Esquire, April 2004*

#6 Least Expensive Midsize Metro Area for Businesses (Raleigh, NC)

*KPMG LLP, February 2004*

2004 National Superintendent of the Year (Bill McNeal, Wake County Public Schools)

*American Association of School Administrators, 2004*

#3 Best Education In The Biggest Cities (Wake County Schools)

*Forbes*, February 2004

#1 Hottest Job Market (Raleigh-Durham-Chapel Hill, NC)

*Business 2.0*, March 2004

Hottest Town in the East (Cary, NC)

*Money* magazine, January 2004

#6 Most Fun City

*Cranium*, January 2004

#4 Top State for New Business Sites and Facilities

*Plants, Sites & Parks*, January 2004

#13 Hottest Cities (Raleigh-Durham, NC)

*Expansion Management*, January 2004

**2003 Accolades**

#1 Best Place to Live

*MSN House & Home*, July 2003

#1 Best Place to Live & Work

*Employment Review*, June 2003

#9 Best City for Corporate Headquarters

*Business Facilities*, April 2003

#3 Best Place to Reinvent Your Life

*AARP* magazine, May/June 2003

#4 Top Metro for 2003

*Plants, Sites & Parks*, March 2003

#1 Best City for Education

*Places Rated Almanac*, Millennium Edition

#1 Fastest Growing Local Online Population

*Nielson/Netratings Report*, February 2003

*APPENDIX B – EVOLUTION OF ADOPTED SERVICE LEVEL GOALS*

The Fire Commission’s service level committee recommended the initial version of the response time goals at the committee’s March 5, 2003, meeting:

- 5 minute – urban areas
- 7 minute – suburban areas
- 9 minute – rural areas
- Includes turnout time and travel time.

The service level committee recommended the following staffing levels at its March 5, 2003, meeting:

- Structure fire: Minimum of 4 persons and optimum of 16.
- Vehicle fire: Optimum 4 person staffing.
- First Response: Minimum of 2 persons and optimum of 4.

The service level committee refined its recommended response time goals at its March 10, 2003, meeting:

- 5 minute – urban areas
- 7 minute – suburban areas
- 9 minute – rural areas
- Includes turnout time and travel time.
- Confirmed response time goals are for four members at 90%.
- Response time goals are for all structure related events.
- Goal for first alarm staffing is 15 firefighters to arrive on scene within 8 minutes, 90% of the time.

The committee again revised the response time goal for first alarm staffing to structural related events to 15 firefighters on scene within an additional 8 minutes after the initial unit response. The first alarm staffing response time goals are:

- 13 minute – urban areas
- 15 minute – suburban areas
- 17 minute – rural areas

At its January 18<sup>th</sup>, 2007, meeting, the Fire Commission approved several refinements to the service level goals.

The current service level goals for the fire protection system are:

<b>Incident Type</b>	<b>Minimum Staff at first-unit arrival <sup>(1)(2)</sup></b>	<b>Minimum Staff for incident <sup>(3)</sup></b>	<b>Minimum Unit response for incident</b>
Structure	4	16 <sup>(4)</sup>	<b>4<sup>(5)</sup></b>
Vehicle	4	4	<b>1</b>
First Responder	2	2	<b>1</b>

- (1) Urban = 5 Minutes  
 Suburban = 7 Minutes  
 Rural = 9 Minutes

- (6) Per Staffing Committee recommendation of December 14, 2006 . Because Staffing Committee goal is four firefighters/station, Staffing Committee unanimously voted to set “Service Level Goal” for “Minimum Staff at first-unit arrival” as firefighters arriving on apparatus.

- (7) Urban = 13 minutes  
 Suburban = 15 minutes  
 Rural = 17 minutes

- (8) Includes Incident Commander. Can be done via mutual/automatic aid. Assumes that staff arrives on fire apparatus. Firefighters arriving via POV with second and subsequent units can be counted if documented.

- (9) Per Staffing Committee recommendation of December 14, 2006. Based on staffing needs for typical minimum reported (residential) structure fire, Staffing Committee unanimously recommended four-unit minimum response.

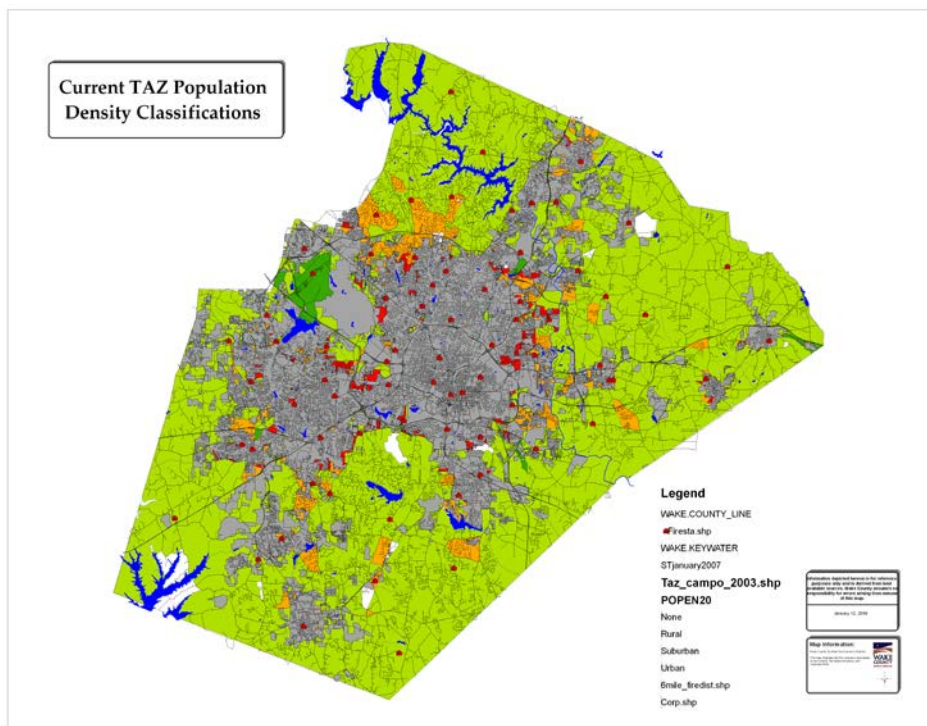
*APPENDIX C - TRAFFIC ANALYSIS ZONES*

The area of Wake County's TAZ's range from 3.2 acres to 5647.3 acres (approximately 8.8 square miles). The distribution of population densities in TAZ's with their center in unincorporated Wake County are:

- Rural Classification – 410 TAZ's
- Suburban Classification – 40 TAZ's
- Urban Classification – 12 TAZ's

Only two urban TAZ's are completely in unincorporated Wake County. Both TAZ's are in the Western Wake Fire Insurance District in the peninsula area. Only eleven of the forty suburban TAZ's are completely in unincorporated Wake County.

*FIGURE 6 - CURRENT POPULATION DENSITY BY TAZ*



APPENDIX D - MAP GRID POPULATION DENSITIES

FIGURE 7 - CURRENT POPULATION DENSITY BY GRID

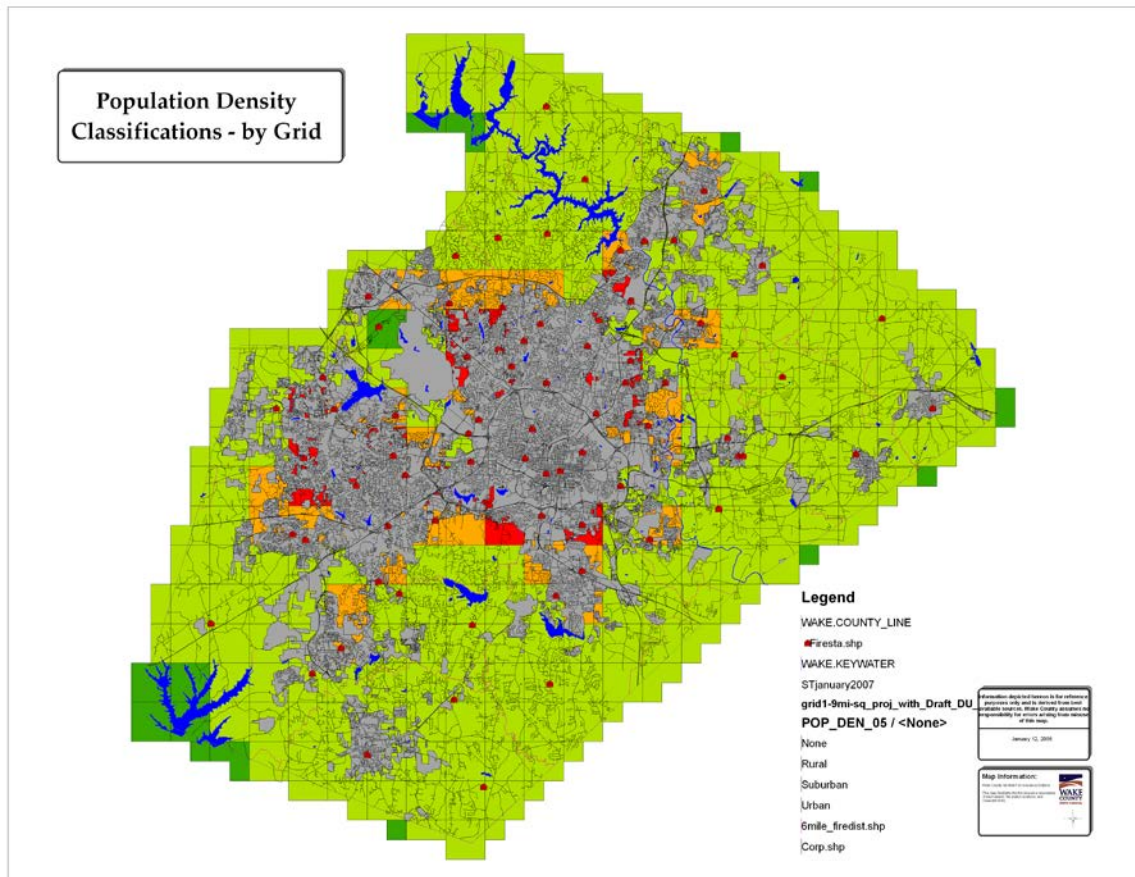
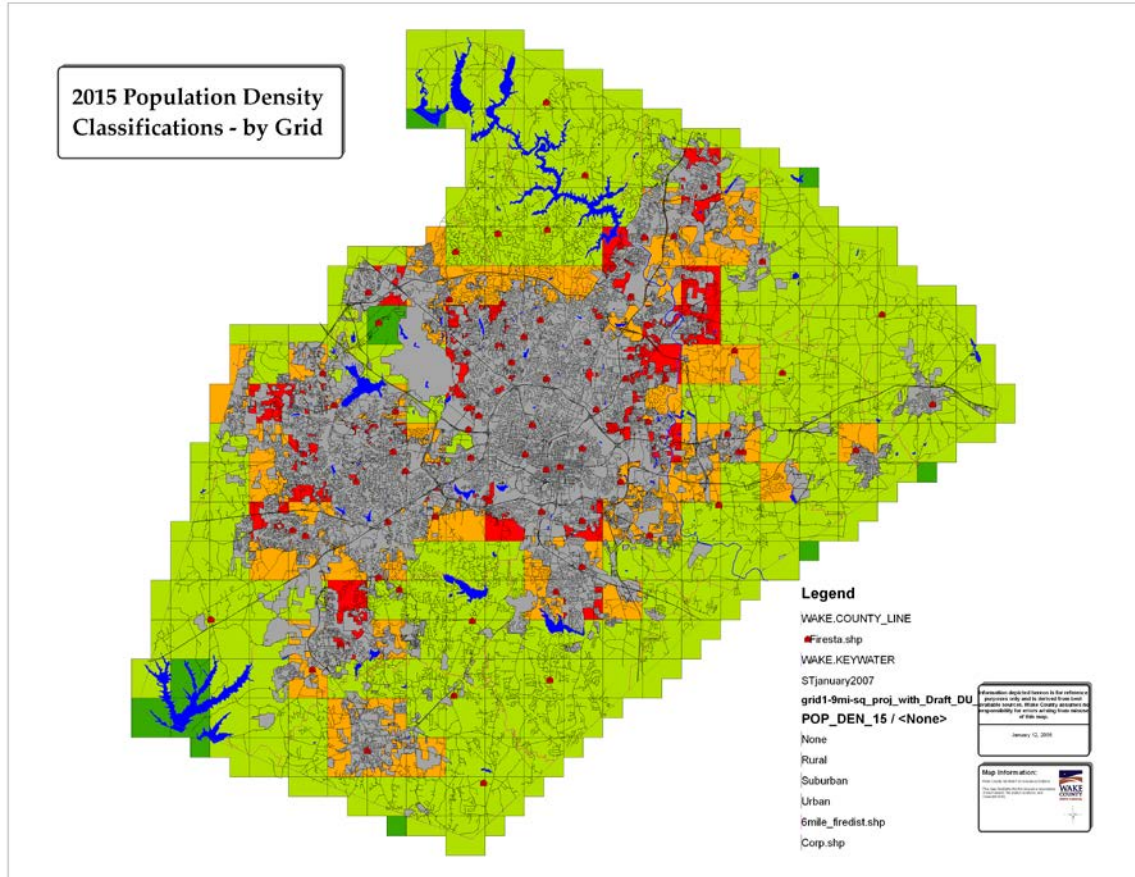


FIGURE 8 - PROJECTED 2015 POPULATION DENSITY BY GRID



APPENDIX E - 90TH PERCENTILE RESPONSE TIME BY FIRST DUE

	Total	2004	2005	2006	2007
Total	8.40	9.14	8.37	8.05	7.98
Apex 1	7.89	50.95	29.20	7.85	7.70
Apex 2	13.86	10.28	61.87	16.45	13.37
Apex 3	8.22	60.07	46.03	8.94	7.52
Bay Leaf 1	9.42	10.04	9.41	8.95	8.69
Bay Leaf 2	9.71	10.52	8.66	9.80	9.13
Bay Leaf 3	8.37	9.49	7.75	7.00	6.68
Durham Highway	7.53	9.02	7.03	6.90	7.76
Eastern Wake 1	7.79	8.00	7.93	7.77	7.27
Eastern Wake 2	8.41	9.57	8.30	8.00	7.85
Fairview 1	8.65	8.66	8.32	9.15	9.23
Fairview 2	8.76	9.83	8.35	8.77	7.89
Falls	9.34	9.67	9.93	8.79	8.33
Fuquay-Varina 1	7.10	7.02	7.15	7.22	7.02
Fuquay-Varina 2	8.84	9.11	8.96	8.62	8.38
Fuquay-Varina 3	10.25	11.06	10.77	9.68	9.47
Garner 1	9.30	10.08	9.02	8.97	8.85
Garner 2	10.73	13.85	11.59	8.54	8.91
Garner 3	7.02	7.61	6.83	6.85	6.84
Hopkins	8.57	9.08	8.51	8.44	8.62
Holly Springs 1	9.17	8.95	8.45	8.75	10.93
Holly Springs 2	8.01	8.35	8.37	7.61	7.53
Morrisville 1	7.83	7.85	9.04	6.82	7.97
Morrisville 2	9.02	12.22	9.53	8.38	8.40
Morrisville 3	8.22	17.12	8.84	7.98	7.83
Wake New Hope 1	9.47	10.81	8.97	8.72	8.70
Wake New Hope 2	8.86	10.08	8.76	8.82	7.86
Rolesville	8.65	9.18	8.88	7.91	7.96
Swift Creek	8.81	9.40	8.92	8.47	8.51
Stony Hill 1	9.99	11.13	10.16	9.02	9.09
Stony Hill 2	15.68	15.13	18.10	14.73	11.82
Wendell 1	6.84	7.92	6.55	6.32	6.39
Wendell 2	7.79	8.45	7.98	7.27	7.15
Wake Forest 1	7.54	7.44	7.53	7.73	7.55
Wake Forest 2	8.17	9.44	7.70	7.96	7.46
Western Wake 1	9.30	10.38	9.90	9.33	7.17
Western Wake 2	10.01	10.96	10.38	9.05	9.74
Zebulon	7.12	7.78	6.83	6.75	7.02



APPENDIX F – 90<sup>TH</sup> PERCENTILE TRAVEL TIME BY FIRST DUE

	Total	2004	2005	2006	2007
Total	6.33	6.70	6.22	6.20	6.25
Apex 1	6.17	12.55	39.78	6.23	6.09
Apex 2	12.43	8.78	61.62	11.93	11.64
Apex 3	6.65	51.67	22.28	7.11	6.22
Bay Leaf 1	6.23	6.19	6.36	6.17	6.35
Bay Leaf 2	6.80	6.67	6.42	6.86	6.96
Bay Leaf 3	6.75	9.51	6.63	5.15	5.07
Durham Highway	6.02	6.67	5.72	5.52	6.43
Eastern Wake 1	6.19	6.72	6.20	5.98	5.77
Eastern Wake 2	6.52	6.97	6.57	6.32	6.38
Fairview 1	6.19	6.53	5.77	6.26	6.58
Fairview 2	6.55	7.28	6.02	6.55	6.08
Falls	6.60	6.76	7.47	6.73	6.39
Fuquay-Varina 1	5.67	5.58	5.62	5.71	5.92
Fuquay-Varina 2	7.05	7.62	6.77	7.03	6.82
Fuquay-Varina 3	7.90	8.68	8.33	7.71	7.47
Garner 1	7.25	7.76	6.98	7.23	7.17
Garner 2	6.91	7.91	6.55	6.64	6.70
Garner 3	5.37	5.55	5.34	5.27	5.26
Hopkins	6.65	6.35	6.47	6.72	6.90
Holly Springs 1	7.46	7.19	6.73	7.34	8.88
Holly Springs 2	6.18	6.31	6.27	5.97	5.75
Morrisville 1	6.28	6.97	6.71	5.58	6.59
Morrisville 2	7.67	9.55	8.30	6.80	7.32
Morrisville 3	6.77	8.87	7.32	6.40	6.71
Wake New Hope 1	6.36	7.70	6.37	5.24	6.25
Wake New Hope 2	6.03	6.31	6.30	6.10	5.44
Rolesville	5.80	5.97	5.81	5.77	5.39
Swift Creek	6.32	6.49	6.40	6.02	6.42
Stony Hill 1	7.68	8.58	7.98	7.10	7.47
Stony Hill 2	12.65	12.58	14.87	12.11	10.88
Wendell 1	5.27	6.04	5.13	4.97	5.06
Wendell 2	5.92	6.74	5.83	5.69	5.50
Wake Forest 1	5.67	5.57	5.29	5.83	5.82
Wake Forest 2	6.22	7.02	5.78	6.25	5.78
Western Wake 1	7.72	9.18	7.63	7.70	6.07
Western Wake 2	8.06	8.88	8.50	8.34	7.34
Zebulon	5.36	6.15	5.00	4.90	5.22

APPENDIX G - 90TH PERCENTILE TURNOUT TIME BY FIRST DUE

	Total	2004	2005	2006	2007
Total	2.43	2.83	2.53	2.25	2.15
Apex 1	2.07	5.63	38.10	2.41	2.02
Apex 2	2.34	1.92	3.25	4.05	2.12
Apex 3	2.33	8.40	3.65	2.32	2.18
Bay Leaf 1	4.99	5.74	4.52	4.50	3.58
Bay Leaf 2	3.96	5.28	3.86	2.39	2.75
Bay Leaf 3	2.62	5.19	2.99	2.40	1.93
Durham Highway	1.87	2.37	1.62	1.84	2.07
Eastern Wake 1	2.15	2.28	2.15	2.00	1.98
Eastern Wake 2	2.03	2.33	2.02	1.85	1.90
Fairview 1	3.91	3.64	4.12	4.62	3.17
Fairview 2	3.03	3.23	3.53	3.27	2.35
Falls	3.15	3.15	3.13	3.37	2.96
Fuquay-Varina 1	1.93	1.91	2.12	1.80	1.84
Fuquay-Varina 2	2.08	2.20	2.22	1.92	2.07
Fuquay-Varina 3	2.05	2.20	2.08	1.87	1.94
Garner 1	2.30	2.55	2.25	2.13	2.13
Garner 2	4.71	6.18	6.28	2.38	2.40
Garner 3	2.10	2.44	2.10	1.89	2.00
Hopkins	2.24	2.57	2.82	1.91	1.89
Holly Springs 1	2.23	2.51	2.07	2.09	2.33
Holly Springs 2	2.42	2.58	2.52	2.40	2.23
Morrisville 1	1.79	0.95	2.07	1.55	1.65
Morrisville 2	1.83	6.30	1.95	1.67	1.90
Morrisville 3	1.85	8.57	2.04	1.61	1.82
Wake New Hope 1	5.17	5.91	5.63	4.69	3.53
Wake New Hope 2	3.85	4.29	3.84	3.55	3.61
Rolesville	3.76	4.16	4.33	3.07	2.67
Swift Creek	3.68	3.65	4.05	3.57	3.61
Stony Hill 1	2.47	3.37	2.37	2.08	2.25
Stony Hill 2	3.98	3.90	4.43	4.02	4.28
Wendell 1	1.88	2.16	1.77	1.72	1.78
Wendell 2	1.95	2.28	1.72	1.71	1.82
Wake Forest 1	2.44	2.57	2.54	2.42	1.87
Wake Forest 2	2.70	3.61	2.79	2.12	1.85
Western Wake 1	2.07	2.25	2.40	1.97	1.97
Western Wake 2	2.07	2.45	2.28	2.77	1.57
Zebulon	2.37	2.21	2.28	2.43	2.52

