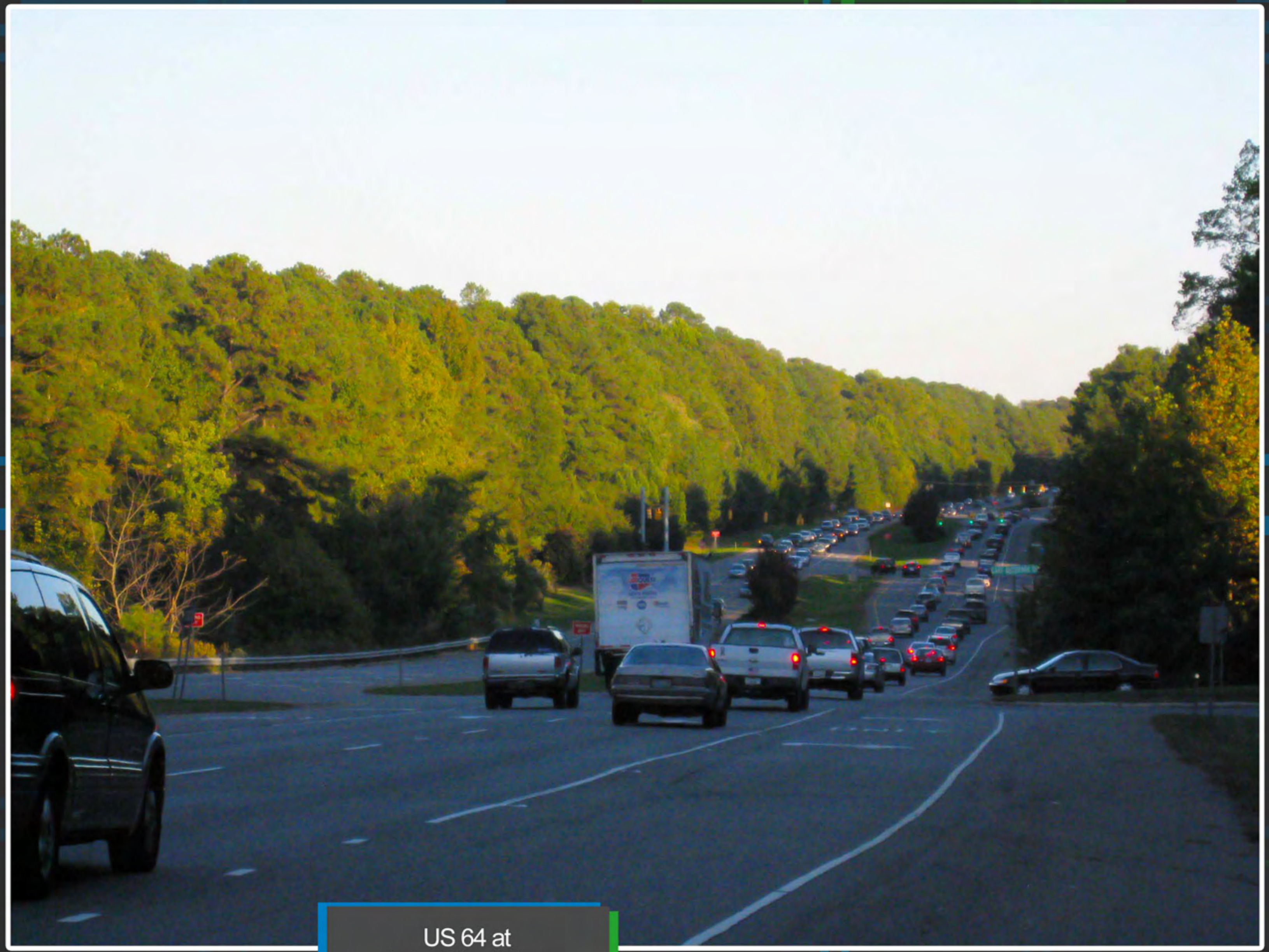
Chapter 2: Existing and Anticipated Conditions



US 64 at
Lake Pine Drive
(October 2009)

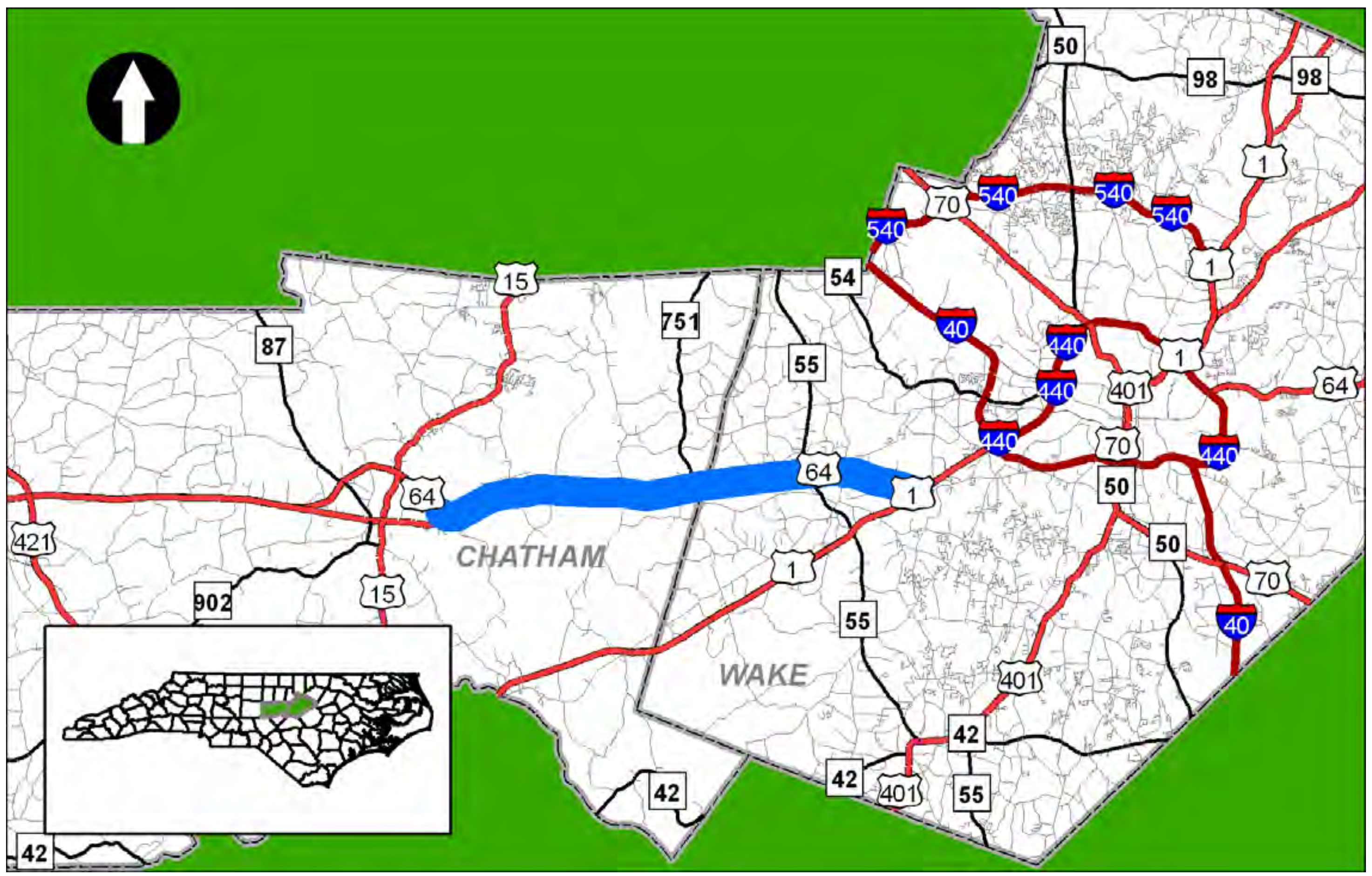
CHAPTER 2. EXISTING AND ANTICIPATED CONDITIONS

This chapter includes an evaluation of the existing conditions along the corridor and an analysis of what the corridor will look like in the future if no major improvements are made to US 64.

2.1 STUDY AREA DESCRIPTION

The US 64 corridor study area begins at the US 64 Business/US 64 Bypass Interchange, east of Pittsboro (Chatham County) and extends east to the US 1/US 64 interchange in Cary (Wake County). The study area is approximately 19 miles in length, which includes two miles across Jordan Lake. The study area includes approximately 1500 feet on each side of existing US 64. The study area also includes a segment of US 1 at the east end of the corridor for potential modifications to the US 1/US 64 interchange. The study area for the corridor is shown in Figure 2.1. The corridor includes ten miles in Chatham County and nine miles in Wake County and passes through the towns of Apex and Cary.

Figure 2.1: Study Area



2.2 POPULATION AND DEVELOPMENT

The Triangle area is one of the fastest growing areas in the nation and has been identified on numerous "Best Places" lists. According to the US Census Bureau in March 2009, Raleigh-Cary was the fastest growing metropolitan area in the nation. In 2009 alone, according to the Greater Raleigh Chamber of Commerce, the Triangle area received over 35 accolades including the following:

- #1 City with Best Economic Potential (*fDi Magazine)*
- #1 City where Americans are Relocating (Forbes.com)
- #1 Best Place for Business and Careers (Forbes.com)
- #1 Top City for Small Business (*Bizjournals)*
- #1 America's Smartest Cities (The Daily Beast)
- #3 Best Places to Launch a Small Business (CNNMoney.com)
- #5 Metro for Best Quality of Life (*Business Facilities*)
- #6 Healthiest Housing Market (Builderonline.com)
- #8 Best Big City for Jobs (Forbes.com)
- #10 Best City (*Kiplinger's)*
- #10 High-tech Centers in the U.S. (*American City Business Journals)*

Based on the strong growth in the past and the continued strong outlook for growth in the future, the Triangle region is poised for a substantial amount of growth in the coming years.

2.2.1 CURRENT POPULATION AND TRENDS

The current population and growth trends for the past 20 years are discussed in this section and summarized in Table 2.1. Chatham County had a slightly higher growth rate than the state and a slower growth than Wake County from 1980 to 1990 and 1990 to 2000. The Town of Pittsboro had a higher growth than both the state and Chatham County during these decades. According to North Carolina State Demographics, the Town of Pittsboro had a projected average increase of 1.5% per year from 2000 to 2008.

The Town of Apex has had a substantial amount of growth in the last two decades compared to Wake County and North Carolina. As shown in Table 2.1, Apex had an estimated 306.8% increase in population from 1990 to 2000. According to the Town of Apex Development Report (Town of Apex, October 2008), population increased in Apex 72% from 2000 to 2008, with an average growth rate of 6.4% per year. The estimated average number of residents added per day in 2008 was 2.97.

According to the Town of Cary's Population Report (Town of Cary, July 2007), the Town has had an annual growth rate averaging 7.6% from 1980 to 2000, and has grown an average of 4.2% per year from 2000 to 2007. Like the Town of Apex, the Town of Cary has had a substantial amount of growth in the last two decades compared to Wake County and the state. As shown in Table 2.1, Cary had an estimated 117.5% increase in population from 1990 to 2000.

Table 2.1: Population Trends

	1980	1990	2000	% Change	
				1980-1990	1990-2000
North Carolina	5,880,095	6,632,448	8,049,313	12.8	21.4
Wake County	301,429	426,301	627,846	41.4	47.3
Chatham County	33,415	38,759	49,326	16.0	27.3
Apex	2,847	4,968	20,212	74.5	306.8
Cary	21,763	43,457	94,536	99.7	117.5
Pittsboro	1,332	1,621	2,226	21.7	37.3

Source: http://data.osbm.state.nc.us/pls/linc/dyn_linc_main.show

2.2.2 Population Projections

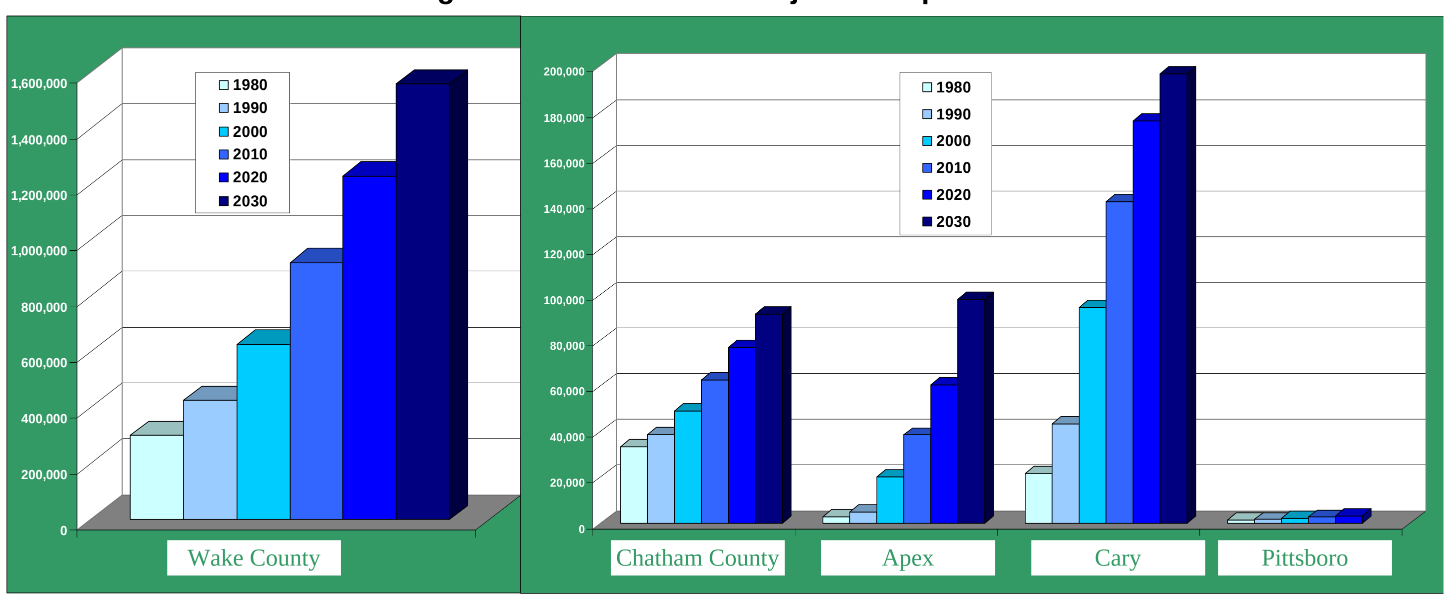
According to the North Carolina Department of Commerce's Economic Development Intelligence System, Chatham County is expected to have an annual growth rate of 2.6% from 2008 to 2013, with an estimated 2013 population of 69,498. This is comparable to its growth rate from 1990 to 2000. As shown in Table 2.2 and Figure 2.2, population estimates show an estimated increase of 27.5% from 2000 to 2010, 22.5% from 2010 to 2020, and 18.8% increase from 2020 to 2030. All estimates for Chatham County are slightly higher than growth rates for the state.

Table 2.2: Population Projections

Area	Population				Growth % Change		
	2000	2010	2020	2030	2000-2010	2010-2020	2020-2030
North Carolina	8,046,813	9,502,904	10,966,956	12,465,478	18.1	15.4	13.7
Wake County	627,846	920,298	1,230,382	1,560,026	51.4	33.7	26.8
Chatham County	49,326	62,887	77,008	91,491	27.5	22.5	18.8
Town of Apex	20,212	38,659	60,614	98,091	91.3	56.8	61.8
Town of Cary	94,536	140,871	176,072	196,806	49.0	25.0	11.8
Town of Pittsboro	2,226	2,678	3,120	n/a	20.3	16.5	n/a

Source: CAMPO, Population summary.; Log Into North Carolina (LINC) Census Lookup. Available: http://linc.state.nc.us/.; North Carolina State Demographics. Available : http://osbm.state.nc.us.; Town of Apex, Development Report, October 8, 2008.; Town of Pittsboro, Land Use Plan, June 27, 2002.; U.S. Census Bureau, 2000 U.S. Census.

Figure 2.2: Current and Projected Population



The Town of Pittsboro's Land Use Plan estimates an increase in growth of 20.3% from 2000 to 2010 and an increase of 16.5% from 2010 to 2020. These estimates are comparable to the state and lower than the estimates for Chatham County.

Wake County has a projected increase in growth of 51.4% from 2000 to 2010, an increase of 33.7% from 2010 to 2020 and an increase of 26.8% from 2020 to 2030. These estimates are substantially higher (nearly double) than the percent increase for the state and the estimates for Chatham County.

According to the Town of Apex Development Report, it is estimated that the Town's population will be approximately 48,408 in 2015. As shown in Table 2.2 and Figure 2.2, the projected population for the Town of Apex in 2010 is 38,659, a 91.3% increase from 2000. It is also projected that the town will have a 56.8% increase from 2010 to 2020 and a 61.8% increase from 2020 to 2030. These projections are substantially higher than Wake County and the state.

The Town of Cary has a projected increase in growth of 49.0% from 2000 to 2010, an increase of 25.0% from 2010 to 2020 and an increase of 11.8% from 2020 to 2030. These estimates are higher than the percent increase for the state between 2000 and 2020 but lower than the percent increase between 2020 and 2030.

A summary of the growth along the US 64 corridor is shown in Figure 2.3 for Population and Figure 2.4 for Employment. Each dot in Figure 2.3 denotes 100 people and is shown for 2005 and 2035, while each dot in Figure 2.4 denotes 50 jobs and is shown for 2005 and 2035. The information is based on the population and employment projections developed by CAMPO in support of their 2009 Long Range Transportation Plan. The data was developed in 2008 and may not include several large developments that have been approved recently. The graphics show large growth in western Wake County with the growth in Chatham County being somewhat limited by the watershed restrictions for Jordan Lake.

As can be seen from Table 2.2 and Figure 2.2, Figure 2.3, and Figure 2.4; the US 64 corridor and the surrounding areas are projected to have strong growth in the future.

Figure 2.3: 2005 and 2035 Population Data

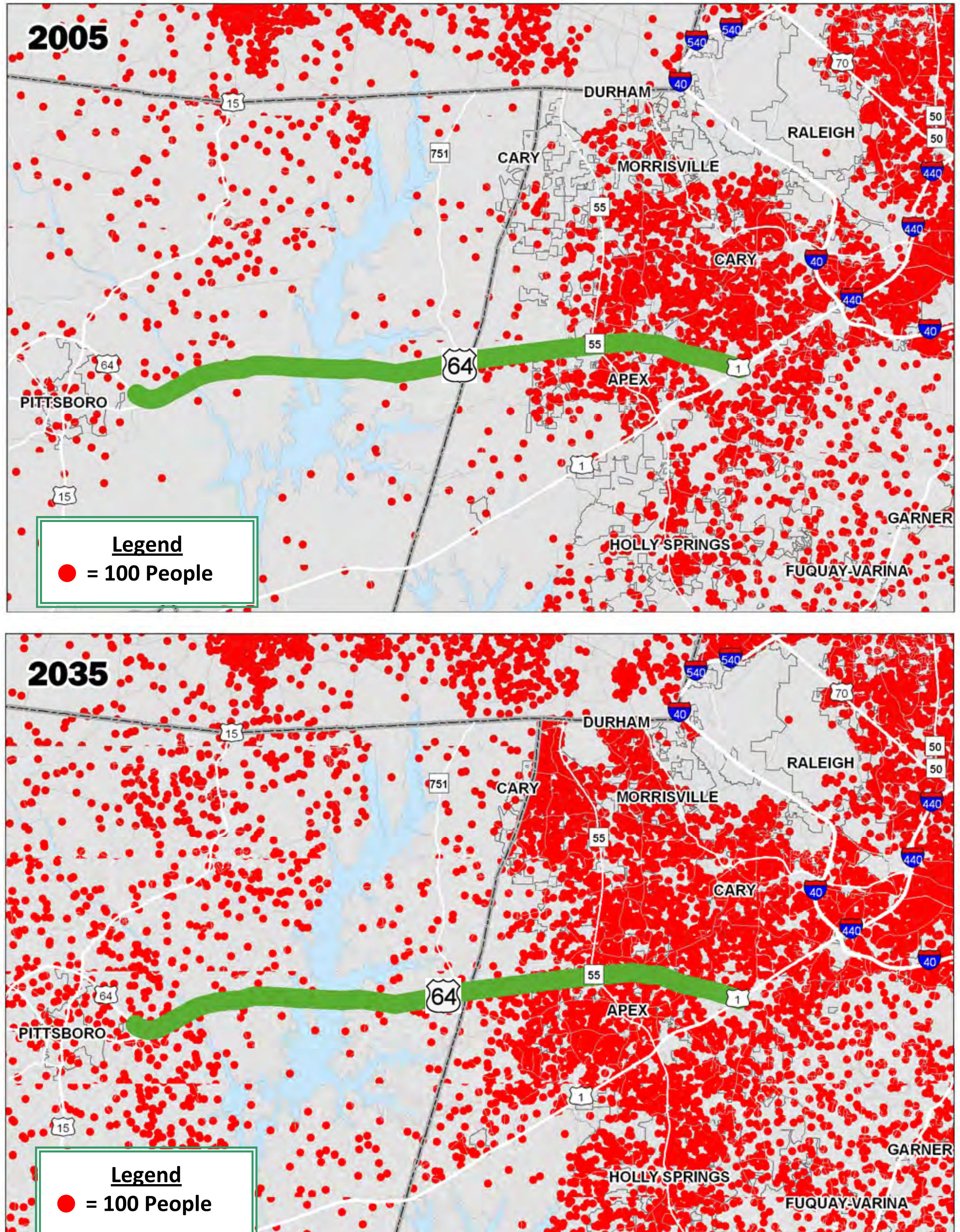
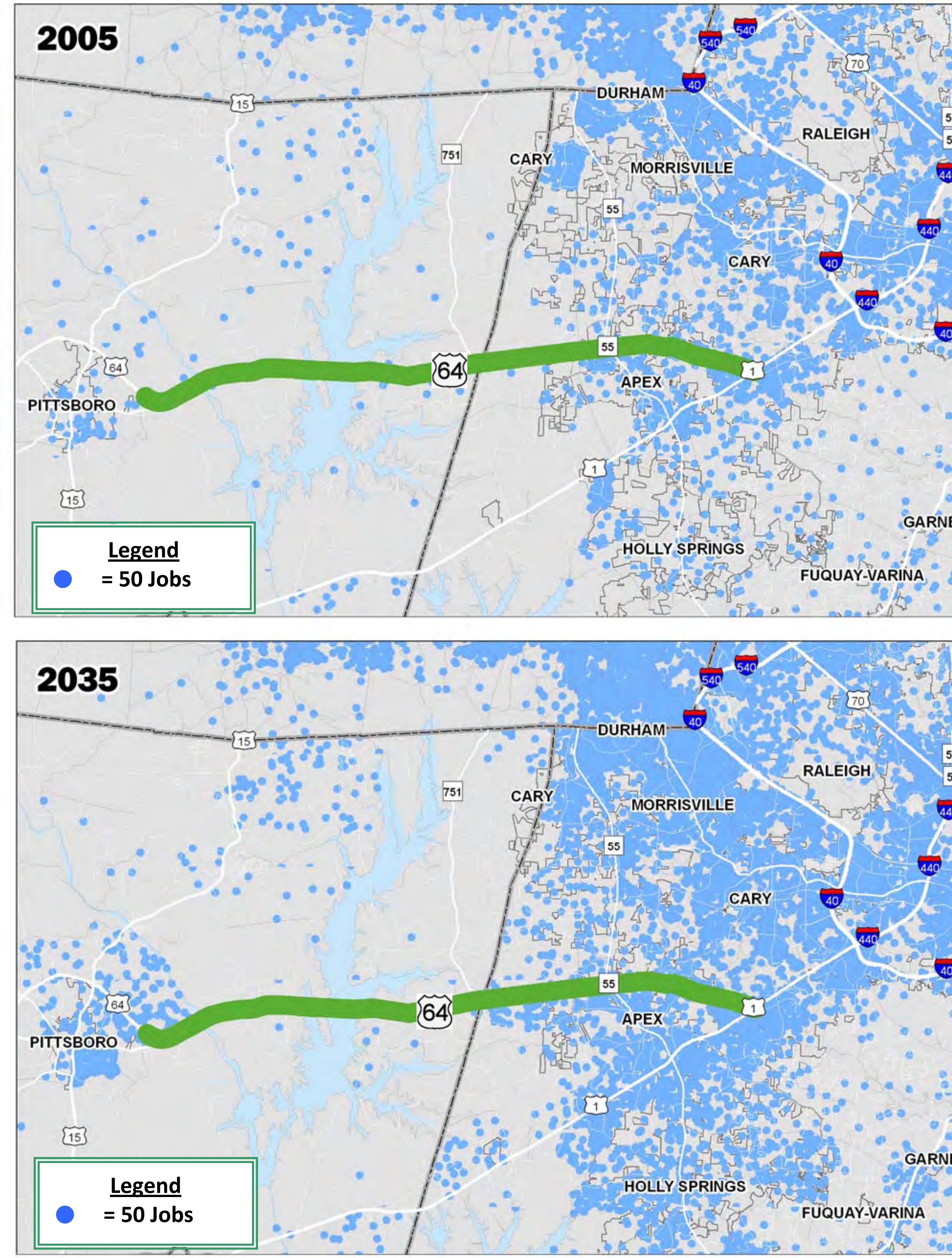


Figure 2.4: 2005 and 2035 Employment Data



2.3 EXISTING AND FUTURE NO-BUILD TRAFFIC FORECAST

This section includes determining the existing traffic volumes along the corridor and determining what the likely future volumes along the corridor will be in the future. The determination of the existing and future traffic volumes is an important step in evaluating how the corridor is currently operating and how it will operate in the future. The detailed evaluations of the traffic capacity along the corridor are included in Section 2.4.

2.3.1 DATA COLLECTION SUMMARY

In order to determine the existing traffic volumes, traffic counts were collected in September and October 2007 along the US 64 corridor at intersections, on the roadway between intersections, and on ramps. Intersection counts were collected for at least 16 hours at a total of 26 locations along the corridor and included the collection of turning volumes and the percentage of trucks. Tube counts, collected by laying a pneumatic tube across the roadway, were taken at 22 locations along the corridor for a minimum of 48 hours each and included the traffic volume and percentage of trucks at each location. As standard procedure, the data collected was then converted to the Average Annual Daily Traffic (AADT) by accounting for factors such as the time of year and day of week that the data was collected. A summary of the 2007 AADT for each of the major roadways along the corridor is shown in Figure 2.5.

2.3.2 TRAVEL DEMAND MODEL AND FUTURE TRAFFIC VOLUME PROJECTIONS

The most common tool used for projecting future traffic volumes for large and complex planning studies is travel demand models. For projects located within the Triangle Region, the Triangle Regional Travel Demand Model (Triangle TDM) is utilized. The Triangle TDM is developed and maintained by the Triangle Regional Model Service Bureau at NC State University's Institute for Transportation Research and Education (ITRE).

The Triangle TDM was utilized to determine the traffic volumes along US 64 in 2007 and the projected traffic volumes along US 64 in 2035 assuming no major improvements will be made to the US 64 corridor. The 2035 scenario where no major improvements are made to the US 64 corridor is known as the Future No-Build Scenario and allows for a basis of comparison for any alternatives developed. The No-Build scenario assumes that all planned and programmed projects outside of this study, such as NC 540 and I-40 widening, will be built but that the improvements being evaluated in this study will not be built. The No-Build traffic volumes and associated capacity analysis will show what the corridor will look like in 2035 if the recommendations of this study are not constructed. In Chapter 3, the effect of the potential solutions for the corridor on projected traffic volumes are compared to the No-Build traffic projections in order to determine whether the solutions meet the goals for the corridor.

The results of the Triangle TDM reveal several trends for the corridor when 2007 traffic volumes are compared to the 2035 No-Build projections:

- US 64 between US 1 and NC 55 showed a relatively low rate of growth in volume with an increase of approximately 1% per year between 2007 and 2035.
- The traffic volumes along US 64 from NC 55 to NC 540 increased from 1% per year at NC 55 to approximately 3% per year as you approach NC 540 for the period between 2007 and 2035.
- The traffic volumes along US 64 from Kelly Road to Farrington Road increased by approximately 3% per year for the period between 2007 and 2035.
- The traffic volumes along US 64 from Farrington Road to the US 64 Business interchange increased by approximately 4% per year for the period between 2007 and 2035.

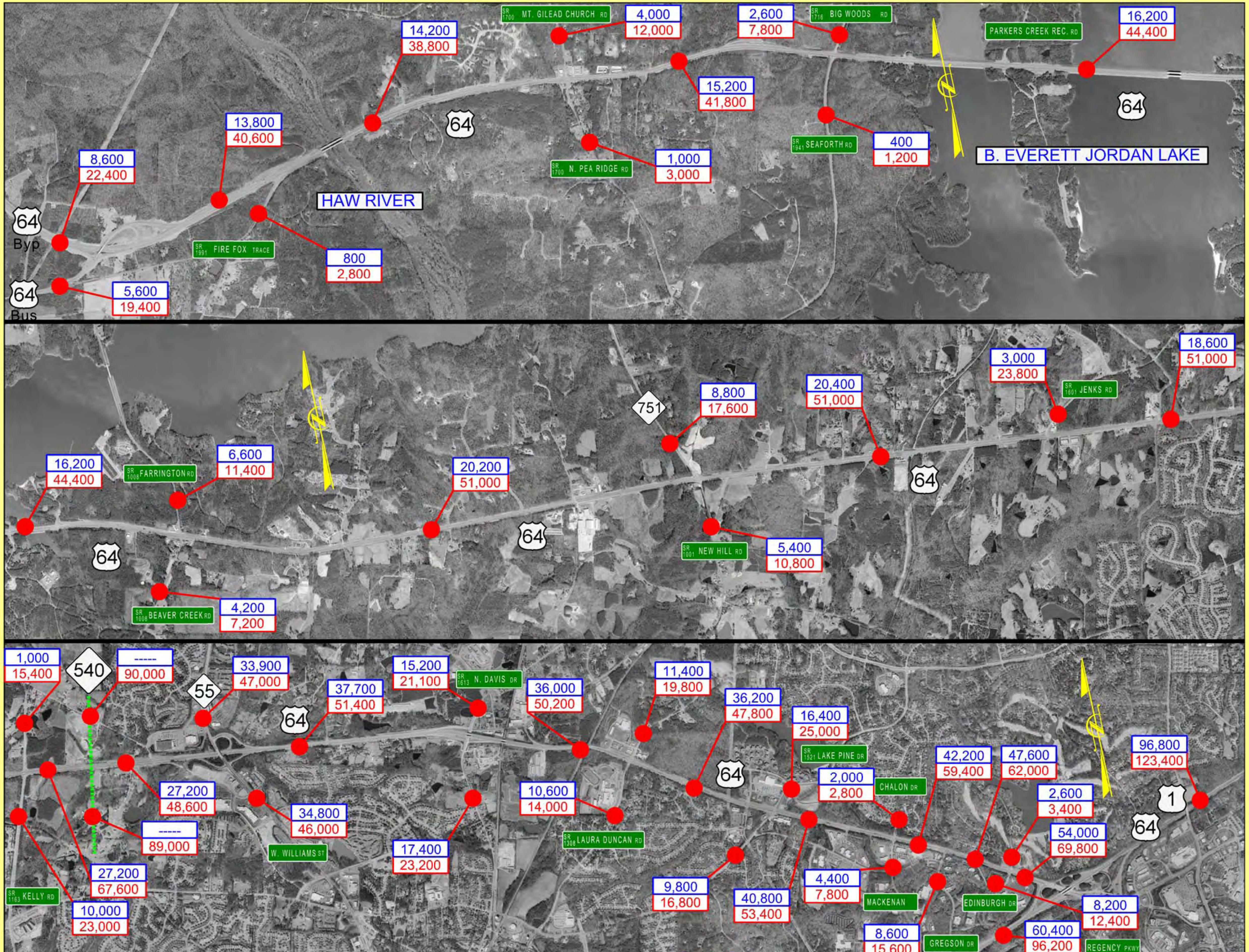
A summary of the 2035 No-Build AADT for the major roadways along the corridor is shown in Figure 2.5.

2.3.3 SUMMARY OF EXISTING AND FUTURE NO-BUILD TRAFFIC VOLUMES

Based on the traffic volume shown on Figure 2.5, the following observations can be made about the US 64 corridor:

- The traffic volume on US 64 west of the Haw River nearly triples between 2007 and 2035.
- The traffic volume on US 64 across Jordan Lake nearly triples between 2007 and 2035 to a volume of 44,400 vehicles per day.
- The traffic volume on US 64 continues to increase the further east you travel on US 64, until you reach the NC 540 (Triangle Expressway) interchange, where it reaches a daily volume of 67,600 vehicles per day. In 2035 the volume between Kelly Road and NC 540 is projected to increase by 40,400 vehicles per day beyond the existing volume of 27,200 vehicles per day.
- The NC 540 (Triangle Expressway) Toll Road is projected to have volumes of 89,000 vehicles per day south of US 64 and 90,000 vehicles per day north of US 64 by 2035. The NC 540 (Triangle Expressway) will provide relief to the NC 55 corridor and the US 64 corridor, east of NC 540.
- The portion of US 64 between NC 540 and NC 55 will nearly double between 2007 and 2035 as a result of the increased traffic to and from NC 540 and the intense retail development along this portion of the corridor.
- The traffic volumes on NC 55 in the vicinity of US 64 are projected to increase at a moderate level of about 40% from 2007 to 2035 with a 2035 volume of 47,000 vehicles per day north of US 64.
- The traffic volumes on US 64 between NC 55 and Davis Drive are projected to increase by 36% from a volume of 37,700 vehicles per day in 2007 to 51,400 vehicles per day in 2035.
- The traffic volumes on US 64 between Laura Duncan Road and US 1 are projected to increase by a moderate level of about 30% between 2007 and 2035. The 2035 volumes along US 64 for this section of roadway increase gradually the further east you travel with a projected traffic volume of 69,800 vehicles per day as you approach the US 1 interchange. The volumes for this section of US 64, and the corresponding moderate increase in traffic volumes, are a direct result of the construction of the NC 540 (Triangle Expressway). According to the Triangle TDM, NC 540 (Triangle Expressway) carries a majority of the statewide and regional trips that do not originate or terminate along US 64 between NC 540 and US 1. An evaluation by CAMPO of the portion of the corridor through Cary and Apex showed that 90% of the trips along this stretch of US 64 had an origin and/or a destination within 15 miles of this segment of US 64, meaning that a majority of the traffic on this portion of US 64 is locally generated.
- The traffic volume on US 1 south of US 64 is projected to increase by nearly 60% between 2007 and 2035, while the increase on US 1 north of US 64 is projected to be slightly less than 30%. The larger increase south of US 64 on US 1 shows that statewide and regional traffic is being diverted onto the NC 540 (Triangle Expressway). The traffic volume on US 1 north of US 64 is projected to be 123,400 in 2035.

Figure 2.5: 2007 Existing and 2035 No-Build Daily Traffic Volumes



LEGEND

2007 Existing Daily Traffic Volumes

2035 No-Build Daily Traffic Volumes

2007

2035

2007 Existing and 2035 No-Build

Daily Traffic Volumes

US 64 Corridor Study
Wake & Chatham Counties

2.4 EXISTING AND FUTURE NO-BUILD TRAFFIC CAPACITY ANALYSIS

This section includes the analysis of the traffic operations for the existing conditions and the future no-build scenario. The traffic volumes utilized in the analysis are based on the traffic forecasts included in Section 2.3.2.

2.4.1 ANALYSIS METHODOLOGY

The methodology used to determine the traffic operations for the US 64 corridor are based on the procedures defined in the *Highway Capacity Manual* (HCM) published by the Transportation Research Board. According to the Federal Highway Administration's publication *Traffic Analysis Toolbox:*

> HCM is the most widely used and accepted analysis technique in the United States. The HCM procedures are good for analyzing the performance of isolated facilities with moderate congestion problems. These procedures are quick and reliable for predicting whether or not a facility will be operating above or below capacity, and they have been tested through significant field-validated efforts.

The HCM includes procedures to define the operational qualities of roadways based on the concept of capacity and Level of Service (LOS) and is based on the peak one hour period of the day. The LOS is defined with letter designations from A to F as shown in Table 2.3. LOS A represents the best operating conditions along a road or at an intersection, while LOS F represents the worst conditions.

Table 2.3: Level of Service Definitions

Level of Service	Signalized Intersections	Unsignalized Intersections
A	Very low delay (<10.0 seconds per vehicle). Most vehicles do not have to stop at all.	Very low delay (<10.0 seconds per vehicle). Most vehicles do not have wait at the stop sign.
B	10.0-20.0 second delay. Good progression and short cycle length.	10.0-15.0 second delay. Good available gaps and short wait time.
C	20.1 to 35.0 second delay. Fair progression and/or longer cycles. The number of vehicles stopping is significant.	15.1 to 25.0 second delay. Less frequent gaps and the number of vehicles waiting to turn increases.
D	35.1 to 55.0 second delay. Many vehicles stop. Individual cycle failures are noticeable.	25.1 to 35.0 second delay. Gaps are becoming much less frequent and queuing along the roadway becomes more substantial.
E	55.1 to 80.0 second delay. Individual cycle failures are frequent.	35.1 to 50.0 second delay. Very few gaps exist and the wait time to make turn increases the length of traffic queuing at intersection
F	Delay in excess of 80.0 seconds. Considered unacceptable to most drivers.	Delay in excess of 50.0 seconds. Very few or no gaps. Considered unacceptable to most drivers.

Source: Transportation Research Board, 2000.

The LOS that is considered acceptable is based on guidance provided by the American Association of State Highway and Transportation Officials (AASHTO) in the *Policy on Geometric Design of Highways and Streets*. The AASHTO guidance for Urban and Suburban Arterials, as US 64 is classified, calls for LOS C as the appropriate LOS, but also states that in heavily developed sections of metropolitan areas, conditions may make the use of LOS D appropriate; however, this level should be used sparingly and LOS C should be sought. For this study, LOS D was considered to be the minimum acceptable LOS and the goal was to achieve LOS C or better.

2.4.2 EXISTING AND FUTURE NO-BUILD LEVEL OF SERVICE

The LOS for the major intersections along the corridor was evaluated based on the 2007 existing traffic volumes and the projected 2035 traffic volumes along US 64 without any major upgrades to the corridor. A summary of the LOS for each intersection is included in Table 2.4 and shown on Figure 2.6.

Table 2.4: 2007 Existing and 2035 No-Build Scenario Level of Service Analysis

Signalized Intersections	2007 Existing AM/PM Peak Hour LOS	2035 No-Build AM/PM Peak Hour LOS
US 64 at Mt. Gilead Church Road/N. Pea Ridge Road	B/B	E/D
US 64 at Big Woods Road/Seaforth Road	N/A[1]	D/D[5]
US 64 at Farrington Road	C/D	F/F
US 64 at NC 751/New Hill Road	C/C	F/F
US 64 at Jenks Road	N/A[1]	D/F[5]
US 64 at Kelly Road	C/B	N/A[2]
US 64 at Green Level Church Road	B/C	N/A[3]
US 64 at Laura Duncan Road	E/E	F/F
US 64 at Lake Pine Drive	F/E	F/F
US 64 at Mackenan Drive/Chalon Drive	C/C	F/F
US 64 at Gregson Drive	C/B	F/F
US 64 at Edinburgh Drive	E/D	F/F
US 64 at US 1 Southbound Ramps	C/D	F/F
Unsignalized Intersections	**2007 Existing AM/PM Peak Hour LOS[4]**	**2035 No-Build AM/PM Peak Hour LOS[4]**
US 64 at Firefox Trace	D/D (0/0)	F/F (6/7)
US 64 at Big Woods Road/Seaforth Road	F/F (2/4)	N/A[5]
US 64 at Jenks Road	F/F (2/2)	N/A[5]
US 64 at Kellyridge Road	F/F (1/1)	F/F (3/3)
US 64 at Knollwood Drive	F/F (2/2)	F/F (3/2)
US 64 at Shepherds Vineyard Drive	F/F (6/6)	F/F (7/7)
US 64 at Autopark Boulevard	F/F (2/2)	F/F (3/2)

Notes: 1 – Existing Unsignalized Intersection
2 – Upgraded to an interchange as part of NC 540 (Triangle Expressway) project
3 – Signalized intersection removed as part of NC 540 (Triangle Expressway) project
4 – LOS shown for unsignalized intersections is for the worst movement at the intersection and the number in parenthesis is the number of movements operating at LOS E or F.
5 – Intersection assumed to be signalized by 2035

The analysis indicates that 3 of the 11 signalized intersections and 6 of the 7 unsignalized intersections (with a total of 17 individual movements) are currently operating at an unacceptable LOS E or F. If no improvements are made to the corridor, 10 of 11 intersections and all 5 unsignalized intersections (with a total of 22 individual movements) will be operating at LOS E or F in 2035.

Figure 2.6: 2007 Existing and 2035 No-Build Level of Service Summary

LEGEND

2007 — 2007 Existing Level of Service (AM/PM)

2035 — 2035 No-Build Level of Service (AM/PM)

Signalized Intersection

Unsignalized Intersection

2007 Existing and 2035 No-Build

Level of Service

US 64 Corridor Study
Wake & Chatham Counties

An additional measure that is used to show the traffic operations along a corridor is through the use of travel time. Table 2.5 shows the approximate travel time for the 19-mile US 64 corridor from the US 64 Bypass west of Pittsboro to the US 1 interchange in Cary for each direction of US 64 in the AM and PM peak periods.

Table 2.5: 2007 Existing and 2035 No-Build Scenario Travel Time Summary

Roadway	2007 Existing AM/PM Travel Time	2035 No-Build AM/PM Travel Time
US 64 Eastbound	29 minutes/26 minutes	54 minutes/40 minutes
US 64 Westbound	27 minutes/27 minutes	39 minutes/51 minutes

As shown in Table 2.5, the travel time along the corridor is substantially higher in 2035 with an average speed as low as 21 miles per hour for the US 64 eastbound traffic during the AM Peak period and shows that significant delays to traffic will occur unless measures are taken to address the congestion along the corridor.

2.5 TRAFFIC SAFETY ANALYSIS

This section presents a summary of the traffic safety analysis for the US 64 corridor.

2.5.1 SEGMENT ANALYSIS

As part of the traffic safety analysis, the accident rates on roadway segments in the study area were compared to statewide average accident rates for similar roadway types. The purpose of the study is to determine if the accident rates on the roadway segments in the study area exceed statewide averages.

The segments analyzed along US 64 included a total of 522 crashes, of which 3 resulted in fatalities and 3 involved pedestrians during the analysis period from August 2004 through July 2007. The segments analyzed along US 1/US 64 and US 1 included a total of 246 crashes, of which 1 resulted in a fatality. The simple comparison of the roadway crash rate versus the statewide average crash rate identifies nearly one half of all locations as having a potential highway safety concern. A more appropriate method is the critical crash rate method. The critical crash rate is a statistically derived number, which is greater than the average crash rate, that can be used to identify locations where crash occurrence is higher than expected for a given facility type. Safety measures could be considered for locations identified in this manner. For planning purposes the confidence level used to calculate the critical crash rate is 95% for rural areas and 99.95% for urban areas. The critical crash rate is beneficial as it accounts for differing traffic volumes and varying segment lengths. If a segment has an actual crash rate higher than the critical rate, the location may have a potential highway safety deficiency and should receive additional analysis. Table 2.6 and Figure 2.7 show each segment along the corridor that was analyzed and whether it exceeds the statewide average crash rate and the critical crash rate for a similar roadway type and configuration.

Table 2.6: Crash Rate Segment Analysis

Roadway	Segment Limits	Crash Rate[1]	Statewide Average	Critical Rate	Crash Rate Exceeded
US 64	US 64 Business to Big Woods Road/Seaforth Road	57.3	96.84	119.40	None
US 64	Big Woods Road/Seaforth Road to Farrington Road/Beaver Creek Road	68.79	96.84	118.38	None
US 64	Farrington Road/Beaver Creek Road to NC 751/New Hill Road	99.01	96.84	119.68	Statewide Average
US 64	NC 751/New Hill Road to Kelly Road	117.6	250.45	318.80	None
US 64	Kelly Road to NC 55	141.01	250.45	340.24	None
US 64	NC 55 to Davis Drive/Salem Street	55.52	250.45	322.22	None
US 64	Davis Drive/Salem Street to Lake Pine Drive	240.13	250.45	318.78	None
US 64	Lake Pine Drive to US 1/US 64/Tryon Road	255.46	250.45	313.38	Statewide Average
US 1/ US 64	Cary Parkway to US 64/Tryon Road	223.16	142.59	188.41	Statewide Average and Critical Rate
US 1	US 64/Tryon Road to Ten-Ten Road	74.37	142.59	181.69	None

1 – Crash rate is in crashes per 100 million vehicle mile traveled from August 2004 through July 2007.

Only one segment analyzed resulted in the crash rate exceeding both the statewide average crash rate for similar facilities and the critical crash rate. This segment is not within the limits of the study; however was included in the analysis due to the proximity to the study and because the US 64 corridor shares a common alignment with US 1 east of the project.

The one segment was along US 1/US 64 from the Cary Parkway interchange to the US 64/Tryon Road interchange. The segment had a total of 169 crashes including 107 rear end collisions due to a vehicle being stopped or slowed down (63%), and 23 crashes involving sideswipes between vehicles traveling in the same direction (14%). It should also be noted that the period of analysis includes a majority of the timeframe when the segment was under construction and may not be representative of normal conditions.

2.5.2 INTERSECTION ANALYSIS

In addition to the analysis of roadway segments, the crash evaluation included the analysis of individual intersections and interchanges along the US 64 corridor. A total of 19 intersections and 3 interchanges were analyzed. Unlike for roadway segments, individual intersections and interchanges do not have statewide averages to compare against to determine the magnitude of the crash rate. In order to make a relative comparison between locations it was determined that using a "normal distribution" would be the most appropriate.

A normal distribution is a statistical method used to represent a data set where most of the values in the set are fairly close to the average and there are relatively few values that are much lower or higher than the average. That is to say, when most of the intersections studied have crash rates fairly close to the average crash rate of all intersections studied. When using a normal distribution to represent the behavior of a data set, a value called the "standard deviation" is used to describe how tightly all of the values in the data set are clustered around the average. The lower the standard deviation, the closer the data set is clustered around the average. This type of analysis would show that accident rates within 1 standard deviation of the average would be considered normal (this would capture approximately 68% of all intersections), while those between 1 and 2 standard deviations (capturing 95% of all intersections) would be considered above normal and anything beyond 2 standard deviations would be considered substantially above normal. Table 2.7 shows each intersection and Table 2.8 shows each interchange along the corridor, their crash rate and where the rate falls according to the normal distribution.

Figure 2.7: Traffic Safety Analysis - Segment Analysis Summary

LEGEND

- Crash Rate Below Statewide Average
- Crash Rate Exceeds Statewide Average But Below Critical Rate
- Crash Rate Exceeds Statewide Average and Critical Rate

Traffic Safety Analysis

Segment Analysis Summary

US 64 Corridor Study
Wake & Chatham Counties

Table 2.7: Crash Rate Intersection Analysis

Intersection	Total Crashes	Fatal Crashes	Crash Rate[2]	Frequency Level
Tryon Road and US 1 NB Ramp/Regency Parkway	25	0	57.80	Normal
US 64 and Edinburgh Drive	20	0	38.86	Normal
US 64 and Gregson Drive	24	0	58.45	Normal
US 64 and Mackenan Drive/Chalon Drive	9	0	21.92	Normal
US 64 and Autopark Boulevard	4	0	11.24	Normal
US 64 and Lake Pine Drive	35	0	79.91	Normal
US 64 and Shepherds Vineyard Drive	28	0	78.68	Normal
US 64 and Knollwood Drive	2	1	5.89	Normal
US 64 and Laura Duncan Road	41	0	99.58	Above Normal
US 64 and Fern Valley Road	0	0	0.00	Below Normal
US 64 and Green Level Church Road	28	0	55.36	Normal
US 64 and Kelly Road	34	0	109.72	Above Normal
US 64 and Kellyridge Road	0	0	0.00	Below Normal
US 64 and Jenks Road	8	0	28.99	Normal
US 64 and NC 751/New Hill Road	41	0	167.16	Substantially Above Normal
US 64 and Farrington Road/Beaver Creek Road	13	0	55.47	Normal
US 64 and Big Woods Road/Seaforth Road	6	0	28.99	Normal
US 64 and Mt. Gilead Church Road/North Pea Ridge Road	4	0	23.57	Normal
US 64 and Foxfire Trace	0	0	0.00	Below Normal
Average			48.50	
Standard Deviation			44.13	

2 – Crash rate is in crashes per 100 million vehicles entering the intersection from July 2004 through August 2007

Table 2.8: Crash Rate Interchange Analysis

Interchange	Total Crashes	Fatal Crashes	Crash Rate[2]	Frequency Level
US 1/US 64 Interchange	274	0	292.66	Above Normal
US 64 and Davis Drive Interchange	46	0	97.7	Normal
US 64 and NC 55 Interchange	88	0	140.99	Normal
Average			177.12	
Standard Deviation			102.38	

2 – Crash rate is in crashes per 100 million vehicles entering the intersection from July 2004 through August 2007

As shown in Table 2.7, two intersections are above normal and one intersection is substantially above normal. Table 2.8 shows that one interchange has an above normal frequency level. Table 2.9 shows the types of crashes for each intersection or interchange.

Table 2.9: Above Normal Crash Rate Analysis

Intersection/ Interchange	Object	Angle	Pedestrian	Head On	Left-turn	Ran-off Road	Rear End	Right-turn	Sideswipe	Other
US 64 and Laura Duncan Road	0	5	1	0	0	1	23	0	6	0
US 64 and Kelly Road	2	0	0	0	2	0	29	0	0	1
US 64 and NC 751/New Hill Road	0	3	0	1	19	0	11	3	3	1
US 1/US 64 Interchange	17	1	0	0	2	17	199	3	27	8