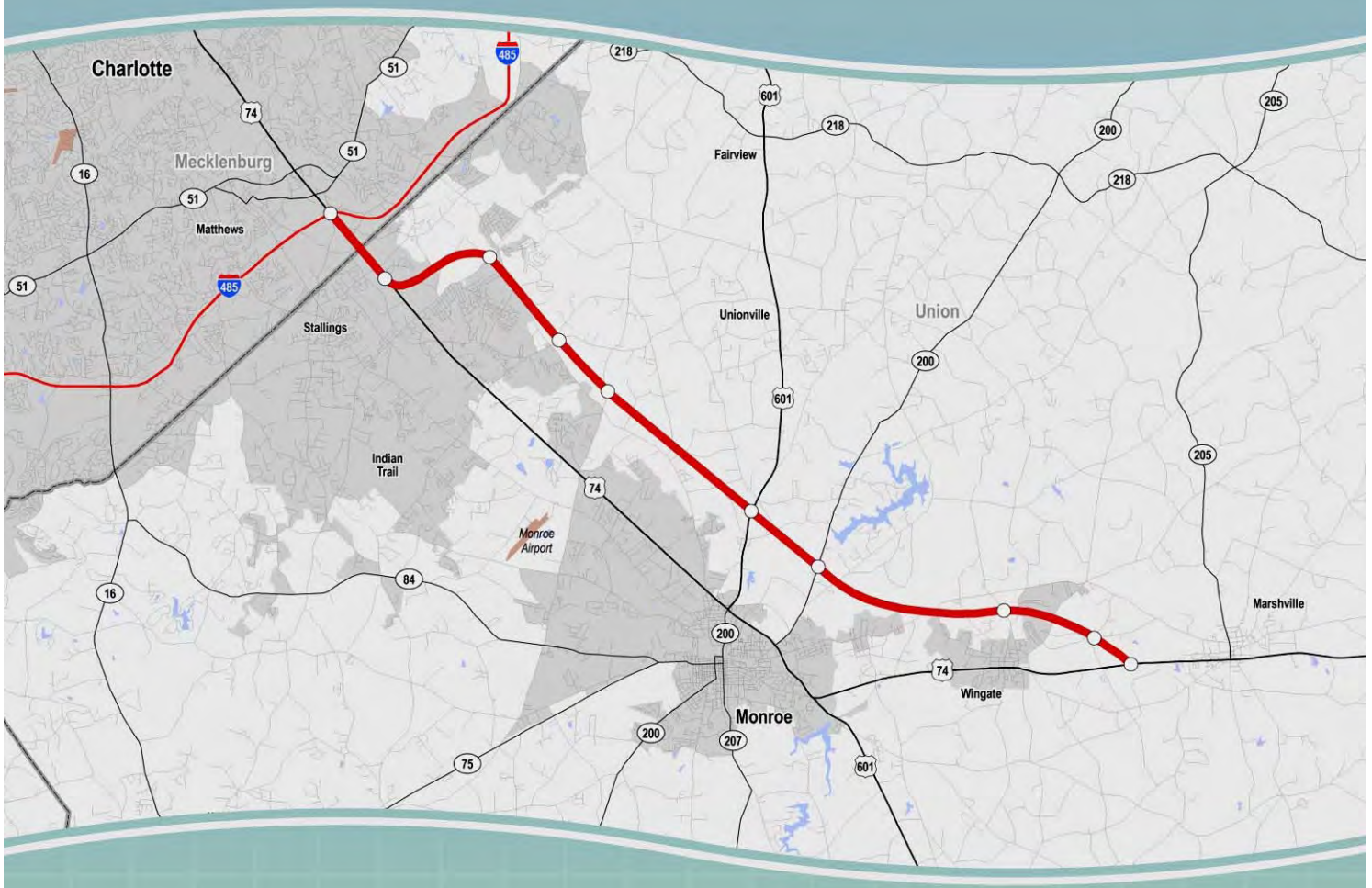
Technical Memorandum

Proposed Monroe Connector/Bypass Comprehensive Traffic and Revenue Study

Report of Independent Economist



NORTH CAROLINA
Turnpike Authority

Report of Independent Economist

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Technical Memorandum

Proposed Monroe Connector/Bypass Comprehensive Traffic and Revenue Study

Initial Report of Independent Economist

Prepared For

NORTH CAROLINA Turnpike Authority

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Evaluation of the Socio-economic Estimates Underlying the Study of the Feasibility of the Proposed Monroe Connector/Bypass

Report to North Carolina Turnpike Authority

Prepared by the Kenan Institute of Private Enterprise
University of North Carolina at Chapel Hill

for

Wilbur Smith Associates

28 September 2009

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Abstract

The Charlotte Region has consistently been among the nation's most rapidly growing metropolitan areas. Much of the population and employment growth has been concentrated in Mecklenburg County, which contains the City of Charlotte. Over the past decade or so, residential growth has begun flowing over county lines, especially into Union County, exacerbating traffic congestion and intensifying the need for a rapid means of long distance travel and commuting.

Aside from long-term growth trends, the Charlotte Region has undergone a recent boom which, like the rest of the country, has been undergoing a correction which has had dramatic effect on employment and population. The economic correction is expected to have a permanent effect on the U.S. economy and thus on the Charlotte Region. Nevertheless, the region is expected to continue to grow, albeit at a somewhat slower pace than in recent years.

Union County can be expected to continue to attract a growing share of residential development. The county offers a competitive residential option bolstered by quality schools and attractive prices. The Connector/Bypass is likely to accelerate population growth in the county and the county government is adding water and wastewater infrastructure capacity to the Connector/Bypass Corridor in anticipation of rapid growth.

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Introduction

The North Carolina Turnpike Authority is considering the construction of a limited access tolled facility in the Charlotte metropolitan region that would reach approximately nine miles from U.S. 74 near exit 51 of the I-485 ring road in Matthews southeast to rejoin U.S. 74 between Wingate and Marshville. The proposed Connector/Bypass would serve two functions. First, it would connect a popular, rapidly-growing suburban residential area to employment concentrations in center-city ("Uptown") Charlotte, along the I-485 beltline in the University Research Park and Ballantyne, and other areas. Second, it would serve as a conduit for long distance traffic between Charlotte and areas towards the coast. That long distance traffic is primarily comprised of trucks going to and coming from the Port of Wilmington and recreational beach traffic to and from the Wilmington and Myrtle Beach resort areas. Both local and long distance traffic is hampered by insufficient roadway capacity and the resulting congestion along U.S. 74 between Matthews and Monroe in Union County. In order to accelerate the construction of the long-proposed Monroe Connector/Bypass, the North Carolina Turnpike Authority has suggested that the possibility of financing the road through a bond issue backed by tolls be considered. Map 1 shows the recommended route of the Connector/Bypass.

(Map 1 about here)

Wilbur Smith Associates has been asked to assess the feasibility of toll-backed financing for the Monroe Connector/Bypass described in the previous paragraph. Their analysis is based on 1) the Regional Travel Demand Model developed and maintained by the Mecklenburg-Union Metropolitan Planning Organization (MUMPO), 2) expert knowledge about travel behavior accumulated over several decades of analysis, 3) supplemental studies of trip origins and destinations and of traveler willingness-to-pay tolls, and 4) small area socio-economic estimates prepared by the Metropolitan Planning Organizations (MPOs). As they constitute critical inputs into the modeling process, the Kenan Institute of Private Enterprise at the University of North Carolina's Kenan-Flagler Business School has been asked to independently review the socio-economic estimates prepared under the leadership of MUMPO.

The Kenan Institute has reviewed the socio-economic estimates that were used in Wilbur Smith Associates' preliminary study of the proposed Connector/Bypass.[1] On the basis of independent analysis including the quantitative analysis of diverse

[1] "Proposed Monroe Connector Preliminary Traffic and Revenue Study, final Report," Wilbur Smith Associates for North Carolina Turnpike Authority. 11 October 2006.

sources of data and extensive interviews with knowledgeable informants, the Kenan Institute has adjusted the MPO estimates to reflect current long-term growth prospects for the region and revised small area growth expectations for Union County.

Critical questions for this report

We reviewed the employment and population growth prospects for North Carolina's Charlotte Metropolitan Region with special attention devoted to the proposed Monroe Connector/Bypass Corridor. This region consists most broadly of the 16-county Charlotte-Gastonia-Salisbury Combined Statistical Area. In the report, we focus on the overall region and, for substantive and practical reasons, on progressively smaller areas: the six-county Charlotte-Gastonia-Concord Metropolitan Statistical Area, a four-county core region (Cabarrus, Gaston, Mecklenburg, and Union Counties), and on Union County until we reach the Connector/Bypass Corridor itself. [2]

The Connector/Bypass Corridor is built up from Traffic Analysis Zones (TAZs) along the Connector/Bypass route, reaching from Matthews in southeastern Mecklenburg County through Stallings, Indian Trail, Henby Bridge, Lake Peak, Unionville, Monroe, Wingate, and Marshville in Union County.[3] The Connector/Bypass corridor also abuts or includes small portions Fairview, Weddington, and Wesley Chapel in Union County. The Connector/Bypass Corridor is a major commuter shed in the Charlotte Metropolitan Region. The Connector/Bypass has the potential to accelerate growth in this area by reducing travel time. Map 2 shows Union County municipalities and the study corridor along the proposed Connector/Bypass route.

(Map 2 about here)

Long distance traffic would either continue along U.S. 74 towards major destinations in Wilmington or turn off the Connector/Bypass at U.S. 611 to travel towards the Myrtle Beach area. The Connector/Bypass will become an important component of two North Carolina Strategic Highways Corridors: Corridor 23 which connects Charlotte and Florence SC via U.S. 74 and U.S. 601 and Corridor 24 which links Charlotte and Wilmington via U.S. 74. (The NC Department of Transportation numbers the corridors from west to east.)

Because one of the primary functions of the proposed Connector/Bypass is to connect a center of generally high-wage employment to one of several possible areas of residence, the three central questions for this report are:

[2] The Regional Travel Demand model covers an area intermediate in scope between the Combined Statistical Area and the Metropolitan Statistical Area. It includes Cabarrus, Gaston, Lincoln, Mecklenburg, Rowan, Stanly, Union, York (SC) Counties as well as parts of Cleveland, Iredell, and Lancaster (SC) Counties. The MPO region-wide projections include an area that approximates the CSA.

[3] The Corridor is an analyst's construct approximating the area where travel behavior is most likely to be influenced by the new roadway. We use it to orient our efforts and as a discussion aid. The formal traffic analysis is built on the full Traffic Demand Model region.

1) How many people will work in the core Mecklenburg County employment areas and elsewhere over the next several decades – specifically in 2010, 2015, 2020, 2025, 2030, and 2035?
2) How many people will live in the central Union County communities that may be served by the proposed expressway?
3) Because income affects the value of time and thus willingness-to-pay, what are the income levels of those working in the core Mecklenburg employment areas and commuting to central Union County?

These questions are addressed mainly in detailed datasets. We provide a general overview of the region, its recent past and future, and of our methodologies in this report while providing on overview of our adjustments and the reasoning and evidence behind them.

Because long distance commuting is common in the Charlotte Region, we consider the potential growth of all major employment centers in the region. Because Union County is only one of the residential options available to those working in the core Mecklenburg County area, we also consider the potential growth of alternative residential areas. Finally, because the number of jobs and residences in any of these areas depends upon the total in the region, we consider the growth prospects of the region as a whole.

Because the other primary function of the proposed Connector/Bypass is to facilitate long distance travel between Charlotte and selected regions, we also address two additional questions:

4) What socio-economic developments in the Charlotte Metropolitan Region and elsewhere will affect long distance freight traffic in the Connector/Bypass Corridor?

5) What socio-economic developments in the Charlotte Metropolitan Region and elsewhere will affect long distance recreational traffic in the Connector/Bypass Corridor?

These last two questions are addressed mainly, albeit incompletely, in the report narrative because they largely fall outside the Charlotte Region Travel Demand Model. Moreover, while the North Carolina Department of Transportation does maintain a dataset of traffic counts, there is apparently no statewide transportation model. The Federal Highway Administration does maintain a nationwide inter-regional transportation model but the Connector/Bypass Corridor is not a major component of that model.

Methodology

We employed two basic methodologies in preparing this report. First, we developed a set of projections for the region, beginning with national economic and population projections and an overall projection for the region and model-driven methods of employment and population allocation within the region. As a basis for these projections, we reviewed recent employment and population trends. We discuss

the prospects for the future and model employment and population at critical time periods.

The assumptions underlying the projection are supported by a review of the literature on the "competitiveness" of the region and of the trends in the key industries that form the region's economic base. We also interviewed several area experts to check our beliefs and to increase our faith in our assumptions and predictions.

Second, we reviewed a set of small area allocations of county growth totals developed under the coordination of the Mecklenburg-Union Metropolitan Planning Organization (MUMPO) in cooperation other regional planning organizations (Cabarrus-Rowan MPO, Gaston Urban Area MPO, and Rock Hill-Fort Mill MPO with the assistance of Lake Norman RPO, Rocky River RPO, and other organizations) and the constituent counties and municipalities. Because of their immediate relevance to the proposed Connector/Bypass, we concentrate on the small area projections for Union County and the Connector/Bypass Corridor, in particular.

MUMPO's small area projections were based on a formal model and then modified through a process of consultation among a panel with expert knowledge of development trends and factors in Mecklenburg and Union Counties, respectively. The result should be a set of projections which incorporates both systematic and contextual knowledge. Nevertheless, we found that key aspects of Union County's small area projections are now discounted by knowledgeable planners.

Part of our review of the MPO projections entailed an evaluation of the basic assumptions upon which the projections have been made. Another component of our review consisted of a set of interviews with planners and developers assessing the contingencies that could affect the projections.

Our basic assessment of the MPO socio-economic projections is twofold. First, although the region-wide projections were prepared with an unusual degree of competency and care, they may have been over-adapted to new information during the boom years which followed. Now, the region-wide projections need to be adjusted to reflect the large, unforeseen national and global economic correction. Second, despite the formal model underlying them, the allocations of growth among small areas (TAZs) may have been unduly influenced by the give and take of collaborative discussion. The projected Union County growth needs to be reallocated among the small areas to reflect the operative systematic development factors.

The following sections of the report describe the trends that supported the MPO projections, specific aspects of the national recent economic crisis necessitating adjustment, and outline resumed, but somewhat diminished, regional growth. The process by which the MPO forecasts were generated and how information was used to adjust the projections is also provided. Before concluding, the report discusses some information relevant to forecasting extra-regional traffic.

Past Trends in Charlotte Metropolitan Region Development

The Charlotte Metropolitan Region (here defined by the Bureau of the Census as the Charlotte-Gastonia-Concord, NC-SC Metropolitan Statistical Area) consists of six counties, Mecklenburg County NC, four adjacent counties: Cabarrus County NC to the northeast, Gaston County NC to the west, Union County NC to the southeast, and York County SC to the southwest, and one additional county, Anson County NC, to the east of Union County. The larger region of the Charlotte-Gastonia-Salisbury, NC-SC Combined Statistical Area consists of the Metropolitan Statistical Area plus seven additional micropolitan areas: the Albemarle NC Micropolitan Statistical Area (Stanly County) to the east of Mecklenburg County, the Chester SC Micropolitan Statistical Area (Chester County) to the south of York County, the Lancaster SC Micropolitan Statistical Area (Lancaster County) to the south of Mecklenburg and Union Counties, the Lincolnton NC Micropolitan Statistical Area (Lincoln County) to the northwest of Mecklenburg County, the Salisbury NC Micropolitan Statistical Area (Rowan County) to the northeast of Mecklenburg County and north of Cabarrus County, the Shelby NC Micropolitan Statistical Area (Cleveland County) to the west, and the Statesville-Mooresville NC Micropolitan Statistical Area (Iredell County) immediately to the north of Mecklenburg County.

The Charlotte Metropolitan Region covers 3,148 square miles or 6,590 square miles as the Metropolitan Statistical Areas or Combined Statistical Area, respectively, at the southwestern end of the urban Piedmont Crescent that arcs through North Carolina. The area has a mild four-season climate and a rolling topography. Map 3 provides an overview of the Charlotte Metropolitan Region.

(Map 3 about here)

The City of Charlotte in Mecklenburg County is the largest and most economically dynamic portion of the larger region. The Charlotte Region maintains a central orientation that is unusual in contemporary metropolitan geography. The revival of Charlotte's "Uptown" has strengthened the centrality of the city even as its employment core has been complemented by the University Park complex near the intersection of I-85 and I-485 and other smaller employment concentrations. The proposed Monroe Connector/Bypass will strengthen that centrality by improving access to a large, popular residential area and by improving long distance transportation to growing coastal areas .

The region has a diverse economy which is still transitioning from old to new. Charlotte is perhaps best well-known for its status as a retail banking headquarters city and was, for a time, the second-largest home of deposits nationwide. The acquisition of Wachovia by Wells-Fargo will do little to change that status as Wells Fargo has decided to maintain Charlotte as an East Coast coordination center for retail banking. Besides the Bank of America and Wells-Fargo, TIAA-CREF has a major facility in Charlotte, as do Wells Fargo Mortgage and BB&T.

Charlotte also acts as a regional service and distribution center for much of the Piedmont and, indeed, the Southeast. With its central location at the intersection of I-85 and I-77 and a busy hub airport, it is sometimes seen as a less-expensive, less-congested, and more livable alternative to Atlanta. Accordingly, both business

services (centered in Uptown, University Park, and the several smaller office parks) and distribution and warehousing (often along I-77, especially near Charlotte-Douglas Airport) are well-represented in regional employment.

The Charlotte Region is also home to both old and new manufacturing centers. Charlotte maintains the largest manufacturing center in the Carolinas. The remnants of the textile industry still serve as declining sources of employment. At the same time, advanced manufacturing in several sectors has taken root in the region with defense and high technology being well-represented. Much of the manufacturing employment is located in small dispersed concentrations around the region, including Monroe.

With an increase in population of 100,103, Charlotte added, by far, more population than any other North Carolina municipality between 2000 and 2005. (We focus on 2005 to correspond with the MPO data baseline year.) Mecklenburg added more population over the same period than any other North Carolina county except Wake. As Charlotte and Mecklenburg County are increasingly densely settled, population growth spilled over into other municipalities and counties. Union County's population expanded by 29 percent – from 123,772 to 160,048 – during that period, making Union County, the location of the Connector/Bypass Corridor, possibly the most-rapidly growing of North Carolina's 100 counties.

The region's population growth is reflected in the expansion of selected municipalities. Concord (in Cabarrus County), Indian Trail (Union County), Huntersville (north Mecklenburg County), Monroe (Union County), and Stallings (Union County) each added at least 5,000 between 2000 and 2005. Cornelius (north Mecklenburg County), Mooresville (Iredell County), , Gastonia (Gaston County), Matthews (Mecklenburg County), Kannapolis (Cabarrus County), and Mint Hill (Mecklenburg County) each added at least 3,000 during the same period.

Stallings, Marvin, Indian Trail, Wesley Chapel, Mineral Springs, Wingate, Unionville, Lake Park, Waxhaw, Weddington, Monroe, Hemby Bridge, Marshville, all in Union County, added population at at least twice the state's growth rate between 2000 and 2005. The same can be said for nearby Mint Hill and Matthews in Mecklenburg County, Pineville along the I-485 beltline, and Cornelius and Huntersville in the northern portion of the county. Mooresville in Iredell County also was a prominent growth pole. Most of these municipalities grew at a more rapid rate than Charlotte which also doubled the state's 7.9 percent growth over the period. Regional population growth is quite dispersed although there is a notable concentration of growth in Union County municipalities.

Many of these municipalities are concentrated in the Monroe Connector/Bypass corridor stretching southeast from the intersection of U.S. 74 and the I-485 beltline in Matthews. Most of the municipalities are products of Charlotte's suburban extension into Union County. Although there is a regional hospital and health complex in Monroe as well as a growing industrial area surrounding Monroe Airport, Union County's growth so far has been mainly fueled by employment growth in the City of Charlotte. Accordingly, residential land use is heavily represented while employment and retail opportunities are comparatively lacking.

The County is sometimes marketed as "South Charlotte" and, especially the area along NC 16 to the west, is often seen as an extension of the attractive residential area to the south of Uptown which reaches all the way to the Mecklenburg County line and beyond into Union County. The Union County school system is seen as an attractor for those who do not send their children to private schools. Many believe the Union County system provides a better education than that offered by Mecklenburg, which is an extremely large system educating over 137,000 students. Union County has been one of the fastest-growing counties in the state and the area from the Connector/Bypass Corridor to the west has been one of the region's most important residential growth regions.

With that brief overview as background, we more systematically discuss the historical trends in regional population, housing, and employment. We also examine the impact of these trends on land use and commuting patterns. Finally, we place Charlotte Region population and employment trends in a broader context, relativizing the rate of growth and its drivers.

Population

As of 30 June 2005, an estimated 2,124,260 people called the Charlotte Metropolitan Region (Charlotte-Gastonia-Salisbury, NC-SC Combined Statistical Area) home. That number is more than sixty percent larger was in 1980 (1,299.880), twenty five years ago. Table 1 shows population trend data for the U.S., North Carolina, its two major metropolitan areas, and selected components of the Charlotte region. North Carolina's share of the national population has been growing steadily for several decades from 2.59 percent of the national population in 1980 to 2.93 percent in 2005.

(Table 1 about here)

North Carolina's major population growth centers anchor opposite ends of the state's Piedmont I-40/I-85 growth crescent. The greater Charlotte metropolitan area (Charlotte-Gastonia-Salisbury CSA) is the larger of the two. In 1980, the Charlotte Region accounted for 22.05 percent of the state's population. By 2005, its share had increased to 24.48 percent. The Charlotte Region has been responsible for an increasing share of the population of a growing state.

The region's core has been growing more rapidly than the region as a whole. The Charlotte-Gastonia-Concord MSA accounted for 66.10 percent of the region's population in 1980. By 2005, it accounted for 71.66 percent. Within the MSA, Mecklenburg's share of the larger region's population increased steadily from 31.25 percent in 1980 to 37.77 in 2005. Union County's share of the regional population increased from 5.45 percent to 7.57 percent over the same time period. With an average annual growth rate of 3.28 percent between 1980 and 2005, Union County's population growth rate is two-thirds higher than that of the entire region. Figure 1 shows the trend in state population shares for the two metropolitan areas and selected Charlotte Region counties.

(Figure 1 about here)

Mecklenburg County has captured almost half of the region's population growth recently (rising from one-third three decades ago). Union County's share of regional population growth has risen from approximately ten percent three decades ago to nearly 15 percent in recent years as the suburban frontier has moved progressively outward. As noted above, the municipalities along the Connector/Bypass Corridor have been among the most rapidly growing in the state.

Housing

The growth in population necessitated housing construction. An annual average of over 16,957 residential building permits were issued annually for the two decades through 2005 (20,013 annually for the decade 1996-2005) in the Charlotte Region (here defined as the six-county MSA). Figure 2 shows a boom in housing between slumps in new construction in the early 1990s and early this decade before the recent strong decline. The slump continues until the present.

(Figure 2 about here)

As seen in Figure 2, housing additions closely followed population growth with Mecklenburg and Union playing prominent roles. The proportion of housing added in Mecklenburg exceeds its population size due to its attraction to smaller households. Roughly 30 percent of that county's new housing stock has been in multi-family dwellings in recent years. In contrast, nearly all of Union County's housing stock has been single-family houses.

Figure 3 shows the allocation of building since 1950 among the major regions of Union County. These regions are made up of the present boundaries of municipalities and the remaining unincorporated areas. Anticipating the discussion of a later section, growth in all areas levels off around 2006 after a rapid rise. Note the prevalence of growth in unincorporated areas. Many of these may be subsequently annexed by a municipality. Despite widespread steady growth, earlier this decade, Indian Trail, which is now the most populous municipality in Union County, shot past the City of Monroe in size. Stallings also became prominent in the early part of the decade.

(Figure 3 about here)

Figure 4 repeats the analysis for the five zones of the Connector/Bypass Corridor beginning in Mecklenburg County and working progressively southeast. (See Map 2 for the zones.) As mentioned above, as Charlotte has grown, residential development has pushed progressively further outward. Over the past decade, residential growth in Zone 1, which straddles the Mecklenburg-Union County line, has skyrocketed, nearly doubling the housing stock in that area to approximately 15,000 homes. Zone 2, inside Union County grew even more rapidly. The housing stock has grown steadily, but not as rapidly, in Zone 3 which also includes the western reaches of the City of Monroe. Zone 4, which includes central Monroe, and Zone 5, which is the area beyond Monroe, have not grown quite as quickly.

Residential growth in the outlying zones of the Connector/Bypass Corridor is likely to accelerate as the suburban frontier continues to advance and the road is constructed.

(Figure 4 about here)

We used information contained in parcel files obtained from Mecklenburg and Union Counties to calculate the residential density of newly constructed homes. Figure 5 tracks the changes in dwellings per acre from 1950 for the Connector/Bypass Corridor. Residential density was calculated from the deeded acreage for each housing unit and categorized to attenuate the effects of extreme outliers. As the suburban frontier has advanced outward, lot size has decreased. Residential density of recent new housing in the first three Connector/Bypass Corridor zones is now approximately 6 dwellings per acre. In the more distant zones, density has yet to increase. As noted above, in Union County, virtually all recent housing has been in the form of single-family dwellings. In general, Union County densities are lower than in Mecklenburg County.

(Figure 5 about here)

In line with regional and national trends, dwelling size has been on a gradual upward trajectory. The new housing in the close-in zones may be somewhat larger than in the other zones as fill-in development serves a more upscale market by compensating for the smaller lot size. Differences among regional areas are relatively small with the exception of the unincorporated portions of Union County and the Union County municipalities to the west of the Connector/Bypass Corridor (not shown). Those areas seem to attract a disproportionate share of large homes. Figure 6 charts the average size of dwelling by the year in which it was built for the Corridor.

(Figure 6 about here)

In general, housing closer in is valued more highly than housing further out – but the differential is less than what might be expected. Figure 7 graphs average contemporary tax valuations for homes according to the year they were built. The small areas and limited number of homes built in particular years lead to marked spikes in value especially in earlier years. Comparisons are complicated because the two counties use different valuation metrics. Nevertheless, consistent with the previous figures, the housing in the Connector/Bypass Corridor is less expensive, but more dense, and plentiful than in other areas of Union County.

(Figure 7 about here)

The appeal of the further reaches of the Connector/Bypass Corridor appears to be not price *per se* but "house for the money." The preceding analysis has discussed history but the past trends provide clues to future growth. As Charlotte's growth resumes and the suburban frontier advances, residential building in the Corridor is likely to be increasingly rapid with a gradual increase in density.

Employment

In 2005, an estimated 1,275,910 people worked in the Charlotte Region. Table 2 complements Table 1 by showing the trends in employment. As shown, in 2005 there was an increase of 563,000 over the number employed in 1980. North Carolina's share of national employment has increased over the last several decades from 2.68 percent in 1980 to 2.96 percent in 2005 – a somewhat more modest expansion than the population increase. In 1980, the Charlotte Region accounted for 23.28 percent of the state's employment. By 2005, its share had increased to 24.77 percent. The Charlotte Region has been responsible for an increasing share of the employment of a growing state. Regional informants suggested that the region's economic competitiveness has attracted employment and consequently driven the population changes outlined above.

(Table 2 about here)

Charlotte Region employment has fared relatively well over time and through the last recession cycle. The region's employment was flat (but barely declined) in the 2001 recession and quickly recovered. Until recently, the region has been recession-resilient.

With respect to employment too, Mecklenburg County has been growing more rapidly than the region as a whole. Most of that growth has been within Charlotte's city limits. In 1980, Mecklenburg County organizations employed 291,910. By 2005, the number had increased almost two-and-a-quarter-fold to 648,470. Mecklenburg County employment increased at an annual rate of 3.19 percent between 1980 and 2005 and of 2.63 percent between 1990 and 2005. Its share of regional employment rose from 40.97 percent to 50.82 percent. Figure 8 follows regional employment shares.

(Figure 8 about here)

A roster of the Charlotte Region's largest employers reflects its diverse economy. Banking is, of course, well represented, as is distribution, and manufacturing. The 14th-largest firm is a textile manufacturer. The list of firms also reflects the impact of population-serving employment. (Government and public education establishments have been removed from the list.) Table 3 lists the 95 firms reporting at least 1,000 employees.

(Table 3 about here)

Map 4, created from MUMPO data, shows the regional distribution of employment by TAZ. Uptown is partially obscured by the TAZ boundary lines. Other important employment concentrations, including University Park, the airport area, and areas in southwest Mecklenburg can be seen.

(Map 4 about here)

Land use

Population growth and employment increase imply the need for land. Like many metropolitan areas, the Charlotte Region has been expanding geographically faster than it has been adding population and jobs. Charlotte Region development has been fairly dispersed. Map 5 shows the physical development of the core portion of the region at selected periods of time. The maps were developed by a research effort at the University of North Carolina at Charlotte's Urban Institute. Like many metropolitan areas, expansion has extended outward rapidly. As can be seen in the series of maps, Union County and the Connector/Bypass Corridor have been key regions of development.

(Map 5 about here)

The Urban Institute's research traces whether land is developed or not over time. They did not record the nature of the land use. We supplement their longitudinal analysis with a snapshot of contemporary land use in Mecklenburg and Union Counties. Because redevelopment is slower and more costly than greenfield construction, future development is likely to fill in selected undeveloped parcels or be near the suburban frontier.

Using the parcel files for Mecklenburg and Union Counties, we made a first assessment of land use in those two counties, the Connector/Bypass Corridor, and selected other areas of the two counties. We categorized a parcel as "developable" if there was no use recorded for the piece of property or residential density was less than one dwelling per five acres and, somewhat arbitrarily, "prime developable" if such a parcel was 25 acres or more in area. A portion of that land may, in fact, be unsuitable for development because of unmeasured factors. With that caveat in mind, Table 4 summarizes the distribution of land uses in the two counties.

(Table 4 about here)

Almost two-thirds of the land in the two-county area is still eligible for development. The proportion of developable land differs between the two counties but not by much. The difference is larger with respect to the prime developable land; Union County has twice as much as Mecklenburg. More immediately, the amount and proportion of developable land increases with distance from Uptown Charlotte. Moreover, the majority of the developable land in Zone 1, which straddles the county line, is in small lots, suggesting a need for more expensive infill development. Map 6 displays the land use categories for parcels in Union County.

(Map 6 about here)

The Connector/Bypass Corridor has significant land reserves available for residential and commercial development in the form of vacant land, rural residences with a significant amount of under-utilized land, and, to a lesser extent, farmland. Over half of Corridor land remains to be developed. Most of that land is in large parcels. That availability does not imply that any particular parcel will or should be developed but it does suggest that land is available, should a demand arise through an increasing population.

Commuting patterns

Those are the major outlines of the geography, population, and employment in the Charlotte Metropolitan Region. The region is held together by automobile travel. Almost all those economically active (93.8 percent according to the 2000 Census) make their journey-to-work by automobile; almost 80 percent of those employed ride alone. Many of those traveling to work cross county lines. Map 7 summarizes regional county-to-county journeys to work as of the time of the 2000 Census.

(Map 7 about here)

Because it is the geography that most closely approximates the Connector/Bypass Corridor for which data are available, Union County is examined more closely. Of the 61,217 people living in Union County and working outside their homes, 53.3 percent worked in Union County. A proportion almost as large, 40.7 percent (24,892) commuted to Mecklenburg County. Union County added almost 10,000 commuters to Mecklenburg County (up from 14,949 according to 1990 Census counts) during the 1990s. With the growth trends over the first part of this decade, the number has been increased.

The years since the last Census have included additional residents accelerating the need for additional roadway capacity. Unfortunately, relief from improved public transportation does not seem imminent. While Charlotte has a large and successful public transportation system that has attracted national attention, the system has no plans to extend major capacity to the Connector/Bypass Corridor. For the residents of the Corridor, improved roads are the most likely solution to their transportation needs.

The Charlotte Region growth in context

Charlotte's growth can perhaps be best understood in the context of its peers. It is, however, unclear which regions may be in its peer group. As noted above, Charlotte has a diverse economy with at least three largely independent drivers. It is: a banking industry headquarters center with its related support services, a regional goods and service distribution center serving the Southeast's Piedmont region and, to a lesser extent, the entire Southeast, and a center of old and new economy manufacturing. As such, its economy and population growth have depended upon the historical strength in banking and the fortunes of two banks in particular, the overall growth of the U.S. Southeast, and upon an environment that has continued to be conducive to manufacturing, respectively.

Two peer groups were chosen using 1950 as a baseline. That year roughly marks the beginning of the geography of post-World War Two automobile and truck-based growth patterns. To be sure, those patterns have a prior history of several decades and, as can be seen in the growth patterns, subsequent factors have had their effects but 1950 is a serviceable point of departure.

The first peer group is the largest 50 metropolitan regions in 1950 (using contemporary definitions of Combined Statistical Areas). Ranked twenty-third, Charlotte is in the middle of this group. Figure 9 shows the subsequent growth

trajectories of this group. Charlotte's trajectory is highlighted. The figure indicates that although it was by no means the most rapidly-growing metropolitan region, Charlotte has raised its ranking among this group.

(Figure 9 about here)

That assessment is corroborated by the graph of regional population growth rates for the same group of regions charted in Figure 10. Charlotte's regional growth is in the "middle of the pack." The regional growth rate begins at a respectable, but moderate, rate and apparently accelerates as those of other large metropolitan regions begin to diminish over the most recent decades.

(Figure 10 about here)

A second peer group, the 25 most rapidly growing metropolitan regions since 1950, provides further evidence. Figure 11 tracks the population of these areas since 1950. Again, with its consistent growth, Charlotte is one of America's more dynamic growth poles but not among the peak performing regions.

(Figure 11 about here)

The Charlotte Region can be somewhat crudely characterized as being "towards the bottom of the top" both in size and in growth. The region's growth might be stronger if it more closely approximated a greenfield site, as some of the Western metropolitan regions such as Las Vegas do, but, as discussed above, Charlotte has a heavy representation of old economy manufacturing, such as textiles, which has been a source of employment decline for decades.

Because the region's economic competitiveness was thought to be an important source of its growth, the sources of Charlotte's competitiveness were explored with a series of shift-share analyses that decompose employment growth into the sum of national growth trends, industry-specific growth differentials, and regional competitive factors. A region can grow more quickly than average because it has a favorable industry mix, disproportionate regional strengths, or a combination of the two. Three sets of peer groups were used as the baseline for comparisons: all metropolitan areas, metropolitan areas in the Southeast, and mid-sized and smaller metropolitan areas in the Southeast. The results of the analyses are shown in Table 5.

(Table 5 about here)

Available data allows analysis across two peak-to-peak business cycles. According to the National Bureau of Economic Research's business cycle committee, the U.S. economy peaked in the third quarter of 1990 and again in the first quarter of 2001 and the fourth quarter of 2007. Although different metropolitan economies may be affected somewhat differently across the business cycle, comparing comparable positions in the business cycle avoids confusing artifacts of cyclical growth and decline with secular trends.

The first point to re-emphasize in the table is that Charlotte's economy is relatively diverse. Although Charlotte is known for banking, financial activities

account for only ten percent of total employment. That is higher than the national metropolitan average but far less than might be expected given Charlotte's prominence in the sector. In line with the Piedmont's reputation, Charlotte also has an over-representation of manufacturing employment. Education and health are comparatively under-represented.

The second point to notice is that Charlotte's sectoral mix is not especially favorable to growth. Based on national and industry growth trends alone, Charlotte's employment growth would have been lower than it was. During the first business cycle, 1990-2001, Charlotte Region employment increased by 153,117 (29.65 percent). Had Charlotte's employment been determined solely by national and sectoral trends, the increase would have been only 85,395 – 55.77 percent of what it actually was. In the second business cycle examined, 2001-2007, regional employment increased 74,328 (11.10 percent). Without Charlotte's competitive effects factored in, the employment increase would have been 33,304 – 44.81 percent of the actual increase. While the shift-share analysis cannot identify the favorable factors, the Charlotte Region obviously offers significant location benefits. Regional informants sometimes noted the cost advantage of the Charlotte Region compared to business location alternatives.

The third point to notice is that, compared to the set of all metropolitan regions, Charlotte is competitive. Its economy has performed well in a shrinking (in terms of employment) industry – financial services – because it has been the site of bank consolidation. A key question now, addressed below, is what will happen now that the region is no longer a primary employment beneficiary of the sector's mergers and acquisitions. Several industry insiders and outside observers have suggested that, in the future, banking will grow more modestly than it recently has.

Charlotte's employment in professional services has grown but, during the second business cycle examined, it has not grown as quickly as might be expected. The region has shown a negative competitive advantage in that area. Due to the slowdown in growth during the second business cycle, construction also showed negative competitive effects. The negative competitive effects for manufacturing, due to the continuing decline of legacy sub-sectors, continued throughout the entire period.

Although the region's economy has performed well, as the peer group shifts to the Southeast and then to mid-sized and smaller metropolitan areas in the Southeast, Charlotte's relative strengths appear to diminish. The regional shift effect contributes 67,722 jobs during the first business cycle and 41,024 during the second when all metropolitan areas are used as the baseline for comparison. The regional differential changes to 8,914 and 46,304, respectively, when metropolitan areas in the Southeast are used as a baseline for comparison and 26,745 and 4,646, respectively, when mid-sized and smaller southeaster metropolitan areas are used as the baseline. This suggests that Charlotte's growth is largely an outcome of larger forces that favor the mid-sized metropolitan areas of the Southeast as a group, rather than factors specific to the region. Once several of the long-time economic trouble spots of the South are excluded, Charlotte's apparent competitive differential may decline further. None of this analysis detracts from Charlotte's economic performance. Rather, it places that performance in the context of the entire region.

Summary

The preceding analysis reveals a region showing solid, but not spectacular, growth. As noted (but not demonstrated) the Charlotte Region may have undergone a cyclical boom over the past several years and portions of that boom may have been mistaken for the workings of a long-term secular trend. We now examine selected aspects of the economic crisis and their effects on the Charlotte Region and the Monroe Connector/Bypass Corridor.

The present crisis in the Charlotte Region

Following a long period of sustained, perhaps recently overheated, economic and population growth, the Charlotte Region economy has been rocked by a series of setbacks. Most notably, employment in the Charlotte MSA dropped dramatically from its peak of 813,267 to 746,753 between April 2008 and March 2009. That loss of 66,514 jobs amounted to an 8.2 percent decline in employment. The unemployment rate in the Charlotte MSA now exceeds 12 percent. That drop in employment is partly a product of a national, indeed, global economic readjustment. The national adjustment has not been quite as dramatic as that in the Charlotte Region, however. National employment decreased from a temporary peak of 139 million jobs in November 2007 to a subsequent low of 132 million in March 2009. Compared to the changes in the Charlotte Region, that is a more modest decrease of approximately 5 percent. Figure 12 compares the dramatic readjustment in Charlotte Region employment with national employment trends.

(Figure 12 about here)

While Charlotte Region employment may have reached a temporary peak in April 2008, some signs of an economic slowdown were apparent for a time beforehand. First, as noted above, professional services were growing at a less than expected rate. In fact, after a rapid increase in employment at the end of the 1990s and early 2000s, employment in the sector declined precipitously and was slow in recovering. Second, employment in the financial sector peaked in 2006 and had been slowly decreasing. Third, employment in the information sector shot up in 2005 and then declined to the level of a decade earlier. These three signs indicated a need for attention to the white collar sectors. Figure 13 charts Charlotte Region employment from 1990 through 2007. On the whole and in several sectors, however, employment continued on an upward trajectory until the precipitous drop.

(Figure 13 about here)

The effects of the impending economic slowdown began to be felt in the growth areas of the Charlotte Region, including Union County, before employment declined. Residential building began slowing down in 2006. The slowdown has impacted the entire region but, as seen in Figure 14, Union County was especially hard hit. Union County was the second-most popular county for new residences after the much more populous Mecklenburg County in 2006 but building declined more rapidly in Union County than in any other area of the region.

(Figure 14 about here)

Several difficult-to-untangle factors led to the precipitous drop in Union County building. First, as charted in Figure 15, applications for permits for residential subdivisions dropped off, partly as the result of a moratorium on such permits between Aug 15, 2005 and Oct 3, 2006 while the county reconsidered infrastructure provisions rules. Second, in some areas of the county, permits were issued up to and perhaps beyond the capacity of existing water and sewerage systems. Water and sewer capacity are discussed in detail below. Third, there was some evidence suggesting over-building. Finally, the slowdown and then decline in center city employment growth led to a softening real estate market.

(Figure 15 about here)

The number of attending and anticipated school students is one indicator of the slowing growth of the county's population. After several years of revising anticipated enrollments upwards, enrollment growth has slowed significantly. Actual Union County school enrollments have not met the expectations from the prior year for the past two years. As seen in Figure 16, projected enrollments have been revised downward during the last two years. Perhaps over-reacting to the present slump, enrollments are now expected to be relatively flat for the next five years or more.

(Figure 16 about here)

Union County housing prices have held relatively steady but sales volumes have decreased markedly from their peak in the summer of 2006. Median housing prices have averaged $189,616 for the first six months of 2009. That is approximately a 10 percent drop compared to the corresponding period one year ago. June is usually the peak month for residential closings in Union County. In June 2009, the sales of 194 residential units were completed. That compares with 261 one year earlier and with 400 and 467 for 2007 and 2006, respectively, more than twice the volume than at present. Figure 17 shows data on residential sales in Union County from January 2005 through June 2009.

(Figure 17 about here)

Dramatic downward employment change has been reflected in building, school enrollments, and real estate sales. Each of those indicators suggests that prognoses for the future need to be carefully reevaluated. There is no guarantee that earlier growth trends will resume but, as discussed below, there is a solid basis for guarded optimism.

The future: Resumed, but more modest growth

The key question for planners is not, "How bad can it get in Charlotte," but rather "How will Charlotte emerge from the present crisis?" That is, of course, undetermined but several of the most important uncertainties are beginning to be reduced. First, banking will likely continue to be a significant employer. Despite the merger of Wachovia with Wells Fargo, Charlotte will likely continue to be a major

center of retail banking. Wells Fargo has announced a desire to maintain much of Wachovia's employment as an east coast "hub." The Bank of America will also maintain a continuing presence. Employment growth in the sector is likely to be significantly slower than it has been in the past however. Charlotte will no longer benefit from continued mergers and consolidation. Technological change and overseas outsourcing will also diminish future employment growth. In addition, local observers maintain that the best-paid banking employment in corporate finance and other esoteric fields will leave the region and indeed may have already done so. The latter development is having, and will continue to have, major repercussions for the high-end real estate markets and have follow-on effects that are not fully modeled.

Ken Lewis, chairman and CEO of the Bank of America, has predicted that banking "will be a smaller industry, with fewer workers overall and claiming a smaller portion of national income and gross national product."[4] The Bureau of Labor Statistics projected a four percent national employment increase in banking over the 2006-2016 period, compared to 11 percent increase in overall national employment.[5] That assessment might be revised downward in the light of industry developments since 2006. The shift in occupational distribution within the industry is somewhat more favorable to Charlotte. The management, business, and financial occupations which comprise approximately one-fourth of the industry's employment are expected to grow more quickly. As a hub or headquarters city, Charlotte will benefit disproportionately from that growth.

Housing the headquarters of a major electricity provider and a major market in its own right, the Charlotte Region may benefit by the push towards green energy. The possible expansion may have repercussions for manufacturing as well as office functions.

Manufacturing will likely continue its on-going overall employment decline albeit at a slightly slower pace. The Bureau of Labor Statistics projects manufacturing employment decline to decelerate over the 2006-2016 period to the point that it accounts for 7.6 percent of national employment. Advanced manufacturing subsectors will likely take diverse employment trajectories with some declining sharply while others, still small, expand rapidly. As a favored relocation destination, Charlotte's manufacturing employment outlook is somewhat rosier than average.

The Bureau of Labor Statistics projects that national employment in logistics and distribution will grow by 14.8 percent between 2006 and 2016, compared to 11 percent for overall national employment. Although they comprise a small proportion of industry employment, management, business, and financial occupations along with sales and related occupations are expected to grow more quickly than the industry average. According to past residential trends, the more highly educated employees in this sector are likely to choose Union county, and thus the Connector/Bypass Corridor, as a place to live.

[4] http://www.americanbanker.com/article.html?id=20081205BFMCTJ6M

[5] Eric B. Figueroa and Rose A. Woods, (2007) "Industry Output and Employment Projections to 2016," Monthly Labor Review, November, pp. 53-85.

As discussed above, the Charlotte Region has thrived by being a competitive, cost-effective location for mature industries. The region has benefitted from a steady stream of business relocations and new establishments even during the ongoing economic downturn. While employment may decline in some industries, such as manufacturing, output is expected to increase. That means regional income growth will outpace basic employment growth and that fewer workers in these critical industries may support an increased number of employees in support sectors.

The regional projection process

The MPO socio-economic estimates and forecasts were generated in several steps. The first step entailed obtaining current estimates of population and employment. The second step was to generate long term "control" totals for the nation, region, counties, and major sub-county areas. The final step generated small area (Transportation Analysis Zone, TAZ) estimates of households, population, and employment. The initial estimates have been updated several times in the light of new information. Another update is scheduled for November 2009. The next major MPO revision of the socioeconomic estimates will likely not occur until after the 2010 Census results are tallied.

Although MUMPO was accountable for and oversaw the entire estimation process, responsibility for completing the estimates and forecasts was split. The initial estimates were compiled by several consultants. The macro-forecasts were completed by Thomas R. Hammer, an independent consultant, in a largely stand alone process while the small area forecasts for Mecklenburg and Union Counties were compiled by Paul Smith and a team of colleagues at UNC Charlotte with the aid of expert panels in both counties.

The macro forecasts applied to a 15-county (plus a portion of one more county) approximation of the Transportation Demand Model geographic area. The small area forecasts applied only to the MUMPO modeling area (then Mecklenburg County and a portion of Union County). Different small area forecasting procedures were used in the other planning regions of the model area.

Bureau of Census statistics were the basis for the then-current estimates of 2002 population and the Bureau of Labor Statistics for 2001 employment. Supplemental employment information was obtained by purchasing 2002 Dun and Bradstreet and InfoUSA data for the entire model area. These data were subsequently verified and corrected by a team at UNC Charlotte's Urban Institute who telephoned each establishment with 50 or more employees. The InfoUSA data were used for smaller establishments.

Region-wide and large area projections

The macro forecasts followed a top-down estimation procedure that had been previously successfully applied in several other regions.[6] The model works downward from sector-specific nation-wide employment projections to estimate region-wide totals and individual county (15 plus a portion of another) and district (42 sub-county and four whole county) subtotals. The districts were used to guide the small area growth allocations discussed below as closely as possible. Our discussion concentrates on region-wide totals and county subtotals.

The expected extent of the urban area at the end of the planning horizon, then 2030, was selected as the target region. Population change was assumed to be substantially employment led. This assumption is well-validated in the Charlotte context. Critical portions of the procedure (the sub-regional county and district allocation models) were calibrated on the experience of 227 counties in 29 separate Eastern U.S. metropolitan areas which were chosen for their comparability to the Charlotte region. (Each metropolitan area in the calibration sample had three or more counties and a population of 1 to 5 million – a selection procedure which placed the Charlotte region in the middle of the range.)

The forecasting process rests on an extension of the Bureau of Labor Statistics' ten-year nation-wide projections of employment, tempered by the Census Bureau's projection of population by age and sex to control for the available labor supply. The process creates national profiles of industry-specific employment for 42 (exhaustive) industry groups tracked by national statistical agencies.

The national projections were used to create region-wide projections by first separating employment in to "economic base" (regional export) and "population-serving" sectors. Region-wide basic employment was then modeled as a fraction of national employment in each of the basic sectors. The evolution of the regional capture rate was then modeled on available data reaching back to 1969 (when the Bureau of Economic Analysis started publishing detailed regional accounts) to predict the fraction of national employment that will be found in the region at critical points in the planning period.

Having projected basic employment, population-serving employment was then estimated on the basis of past relationships between the different categories of employment. Region-wide population is forecast on the basis of the trend of past relationships between basic and population-serving employment. Migration made up for the possible labor shortfalls and overflows.

The region-wide employment and population totals were allocated among counties and districts with the aid of 35 equations – three for demographic variables (upper, middle, and low-income households), 32 for employment by sector (simplified from the 42 used in national forecasts) – which were calibrated by empirically examining values in 1990 and 2000 in the 227 counties. The values for the variables were predicted in blocks according to their degree of independence from

[6] Thomas R. Hammer, Demographic and Economic Forecasts for the Charlotte Region, December 8, 2003. Preliminary reports were issued on August 2000 and December 23, 2002.

population distribution within a region with the estimated values helping to predict the values in subsequent blocks. Industrial activity variables were predicted first followed by producer services, households, and, finally, population-following employment, such as consumer services and retail.

The predictions were applied recursively to three 11-year intervals with the values for years ending in 0 or 5 interpolated using third-degree polynomials. Predictors were limited to readily available Census-based variables but many systematic unobserved influences on growth were thought to be incorporated in observable past growth trends. The predictive equations were applied to each county and to sub-county districts when counties could be divided into multiple areas with at least 50 square miles and a population of 25,000 or more. For sub-county districts, the same models were used as for the county allocation models. Detailed sub-county information based on the Census and InfoUSA data made the sub-county modeling possible.

Mecklenburg County was already relatively densely developed. Recent growth had been at the north, east, and south (but not west) fringes of the urbanized area. Four factors were found to recur in predicting development: recent population gain, recent employment gain, development density (as a measure of the space available for further development), and share of upper-income households. Corrections were made to a northward bias in the forecasts. Map 8 charts the areas predicted to have the highest development potential. Key areas of Union County were included among these. Figure 18 schematizes the forecasting process.

(Map 8 and Figure 18 about here)

Small area growth allocation

Small area projections were made on the basis of a model, the predictions of which were validated and often adjusted by panels of experts.[7] The small area projections used the data generated by the large area projections and allocated the district values among smaller areas and ultimately TAZs. Doing so entailed using additional types of data and modeling techniques. The degree to which the small area allocations were model driven is unclear from the documentation but, after examining the data in detail, it appears that a significant amount of professional judgment was involved.

The small area modeling process used Mecklenburg and Union County tax records to categorize individual parcels into five residential categories (based on density) and eight employment categories using land use and building code descriptions in the files. In Mecklenburg County, 9,143 parcels could not be classified; 6,440 of those located along major thoroughfares were classified via a windshield survey. The uses of the remaining parcels were imputed. In Union County, a similar procedure was followed. In the portion of the county then included

[7] Paul Smith, Mecklenburg-Union Metropolitan Planning Organization Population Projections and Employment Allocations 2000-2030, Center for Applied GIS, UNC Charlotte, December 31, 2004.

in MUMPO's planning region, 8,258 parcels were classified via a windshield survey. The parcel data helped link the socio-economic data, as discussed above, to land use.

In addition to the parcel data and the socio-economic data, the small area projection process entailed the collection of data on school locations and enrollments in order to pinpoint education-related employment and data on the registration of commercial vehicles. The latter was used to help locate employment facilities.

Small area population projections were made based on existing baseline data, district area control totals and the influence of a set of land development factors chosen and ranked by the expert panels selected for Mecklenburg and Union Counties. The procedure used followed procedures prescribed by Metrolina Regional Land Use Technical Advisor (RLUTA). Aggregate land development factors were modeled for each of the set of 500' x 500' grid cells superimposed upon the MUMPO portion of Union County and for each of the set of 250' x 250' grid cells superimposed upon Mecklenburg County. Composite scores grid cell scores were averaged for each TAZ to calculate TAZ attractiveness scores. Development densities per TAZ were used to derive the number of households in each TAZ and converted into residential acres consumed per TAZ. Historical household size was used to generate TAZ population at the critical time periods. Existing development and available land acted as brakes on further growth. The modeled predictions were subject to feedback from the expert panels. Table 6 provides an overview of the land development factors used in allocating residential growth to small areas.

(Table 6 about here)

After the macro forecasting was completed, the employment data was collapsed into eight employment categories: 1) a broad category containing Manufacturing, Industrial, Warehousing, Telecommunications, Utilities, 2) Retail, 3) Highway Retail, 4) Low Traffic Service, 5) High Traffic Service, 6) Office and Government, 7) Banking, and 8) Education. Each of these employment sectors was assigned a percentage value tapping the degree to which it was population chasing. Population chasing employment was allocated to TAZs in the same proportion as population distribution. In those cases when there was insufficient space in a particular TAZ for the forecasted employment growth, the additional employment was allocated to a neighboring TAZ. Non-population chasing employment was allocated among TAZs by a consensus discussion of the expert panels of available land and evolving location patterns. The Mecklenburg County figures were adjusted on the recommendation of the Planning Commission.

Analysis of the information driving the predictions

We performed three checks on the socio-economic projections compiled by MUMPO. First, we compared the MPO estimates with those generated by other organizations. Second, we examined the MPO estimates in the light of subsequent macroeconomic events affecting the entire nation through quantitative analysis of available data and interviews with knowledgeable informants. Third, we conducted a regional scan consisting of direct observation, geographic analysis, and interviews. As stated at the beginning of this report, the results of this checking procedure

indicate that the MPO forecasts are, with some deviation, generally consistent with those of other organizations incorporating less region-specific knowledge. They also suggest a need to adjust the MPO projections to conform to the current long-term national growth outlook. In addition, the regional scan strongly suggests a need to reallocate the adjusted regional growth within Union County.

Comparison among county-level forecasts

A comparison of projections from three additional sources shows that different forecasting organizations generate similar results. Woods and Poole and Global Insight provide county-level bases of comparison for the MUMPO socio-economic forecasts. Both private firms update their forecasts for each U.S. county every year. The basic methodologies are similar. Both organizations perform cohort-component projections. All need to rely on the same sources of information. The main differences would be the assumptions about the changes in the basic demographic rates of fertility, mortality, and migration. The Global Insight model differs from that of Woods and Poole in that the population projections follow the predictions of a regional macroeconomic model. The state government uses the Global Insight forecasts in its budgeting process. The North Carolina State Data Center also generates population projections.[8]

We compared the recently performed projections of regional and county households, population, and employment for a four-county central zone of the Charlotte area, Mecklenburg County, and Union County. Employment projections differ more widely than household and population forecasts because each method defines employment slightly differently – at the extremes from full-time-equivalents to each person-establishment link no matter how few hours worked. A four-county region is used because Global Insight data was not available for South Carolina. Table 7 provides a summary of the household, population, and employment forecasts for the four-county area and the central Mecklenburg and Union Counties.

(Table 7 about here)

The population projections are put side by side in Figure 19. The State Data Center projections reach to 2029. The projections were extended from 2029 to 2035 by assuming a constant county-specific rate of population growth rate equivalent to the average growth rate over the 2019-2029 period. The four projections shown are broadly similar. Global Insight projects the highest population in 2035. The MPO projection is close and Woods and Poole projects the lowest number. The Global Insight projection is almost 14 percent higher for the four-county core area than the Woods and Poole expectation. Woods and Poole also projects fewer people in Mecklenburg, the region's dominant core county, and in Union County than the other sources. Woods and Poole, however, projects the highest proportional concentration of population in Mecklenburg County. The State Data Center projections correspond closely to those of Global Insight with the exception that the SDC expects Mecklenburg County to be less dominant than any of the other organizations.

[8] State employment projections, produced in cooperation with the Bureau of Labor Statistics, forecast only ten years beyond the base year and only for the entire state. They were not used in the comparative analysis.

(Figure 19 about here)

We also compared the employment projections produced by Woods and Poole and Global Insight with those produced by the MPO process. Figure 20 tracks the employment projections of each organization for the same geographic units as the population projections. Here the Woods and Poole projections are higher than the Global Insight projections. The two firms use different definitions of employment so that the projections are not strictly comparable. The MPO, however, projects greater relative employment dispersion out of Mecklenburg County than either of the two firms.

(Figure 20 about here)

Unfortunately, because each organization used different sectoral classifications, we are not able to separate out and compare the projections for "economic base" employment from that, such as retail and consumer services, that follows population. Figure 21 shows Global Insight's projected employment trajectories of selected broad NAICS-based sectors. Business and professional services is expected to become the largest single sector within about a decade, replacing transportation, trade, and utilities. (Unfortunately, that combined category includes disparate sectors.) As noted above, the Charlotte Region has not been especially competitive in business services. Even before the present crisis and the restructuring of the banking industry, the growth in financial sector employment was expected to be modest. Despite an optimistic outlook for advanced manufacturing, manufacturing employment will likely continue to slowly decline.

(Figure 21 about here)

The available top-down projections of population and employment for the next several decades largely coincide. To the extent they can be compared, the independent projections agree in all but detail. The consensus among the projections is continued strong regional growth fueled by high-end employment and migration. Conversations with macro-economists suggest that the region faces short-term obstacles but that the long-term prospects are solid.

A revised national economic outlook

The large area projections performed by Thomas Hammer and summarized above appear to be thoughtfully and carefully constructed. Much has occurred since his task was completed in 2003. First, the Charlotte Region experienced quite a boom fueled by a positive impact in bank consolidation and a favorable macroeconomic climate. As a result employment increased more rapidly than expected in the region and population expanded rapidly, particularly in Union County which became the most rapidly growing county in North Carolina for several years. The rapid growth placed strains on infrastructure capacity and perhaps led to overbuilding. It is possible that in revising the socio-economic projections upward, as seen in the comparisons of Mecklenburg County in Figures 22 and 23, a cyclical increase in economic activity may have been mistaken for an upwardly moving trend.

(Figure 22 and Figure 23 about here)

Second, this boom has since ended. Growth has been flat, perhaps even negative, as discussed above. Certainly, in the case of employment, there has been a dramatic drop in regional jobs, as seen above in Figure 12. The danger for projecting socio-economic values is that both boom and bust cycles are incompletely separated from long-term trends.

Third, there has been a large-scale national "correction" resulting in what is said to be the worst recession in over 50 years. Long-term national growth expectations have been revised significantly downward. Figure 24 lines up several Congressional Budget Office projections of national GDP. As in the cases illustrated, CBO projections typically fall between those of the White House and the Blue Chip consensus (which is the average of about 50 forecasts by private-sector economists). The CBO projections assume a rather rapid recovery with no "lost decade." At this point, guardedly optimistic prognoses appear to be warranted.

(Figure 24 about here)

The March 2009 CBO projections assume a relatively rapid economic recovery before the national economy is restored to a steady real growth rate of approximately 2.2 percent annually. (See Figure 25.) The estimate of long-term real economic growth is now approximately three-tenths of a percentage point lower than it was in January 2005 and almost a point lower than it was in January 2001.

(Figure 25 about here)

Recent analysis suggests that even with no long-term decline in productivity, the effects of the national correction will result in a long-term setback to growth. As growth resumes, GDP is expected to be approximately 91.3 percent as high as it would have been at the same time in the absence of the national crisis. In other words, the crisis is expected to lower national GDP 8.7 percent in perpetuity.

Regional scan of small area growth allocation

In order to evaluate the small area estimates and forecasts generated by the MPOs, we conducted a regional scan which consisted of direct observation of building and built-up areas and interviews with regional planners and developers, some of whom wished to remain anonymous. The regional planners interviewed were knowledgeable about growth trends in their and the neighboring localities. However, even when they had direct or indirect input into the MPO small area forecasting process, critical details in the process could not be recalled and the reasoning behind specific projections could not be reconstructed.

It was difficult to find someone willing to claim "ownership" of the projection process. Key personnel have sometimes moved on and could not be interviewed. In contrast to the situation in the Triangle Region where municipal planners were closely involved in the MPO projection process, municipal personnel sometimes seemed unaware of the MPO projections. In some of those cases, municipal personnel had

developed their own projections. In most cases, however, the municipalities did not have the technical capability to develop projections.

Union County small area projections were given close scrutiny because most of the Connector/Bypass Corridor and almost all the Corridor's projected growth are in that county. Discussions with regional planners revealed that, in the course of several revisions, a few biases may have entered into the Union County small area projection process described above.

In particular, the current MPO projections forecast rapid residential growth in the southwestern quadrant of Union County. The forecasted population growth is shown in Map 9. Note especially the "line of growth" to the south of NC 73 between the county's western border with Lancaster County, SC and the area just south of Monroe.

(Map 9 about here)

Interviewed region-wide and Union County planners did not know the basis for the growth expectations in the southwest quadrant. As discussed further below, there is still sufficient developable land in closer in portions of the county. There is little infrastructure capacity in that portion of the county and no active plans to provide it. The southwestern quadrant of the county is not particularly accessible. The western end of the county, near Waxhaw, is accessible via U.S. 521 (a four-lane highway) running through Lancaster County's panhandle and there are plans to widen NC 16 from the Mecklenburg County line to Waxhaw but that area of the county would still not be the most accessible. Moreover, the development that has occurred has been on relatively large lots and recent sentiment has been to strengthen growth controls.

The municipalities in the eastern and western portions of Union County, that is, on either side of the Corridor have shown increasing resolve in limiting residential development. While that stance may subside over time as land value increases, there is little pressure for it to do so quickly. The relevant municipalities provide few services which would become more cost effective with growth and they have reputations as being oriented towards preserving a rural atmosphere by limiting residential development. Map 6 above illustrates an approximation of the developable land in Union County. There is ample land still available in close-in areas.

As a partial check on the MPO growth projections in the county, we examined the outcome of another projection process. The Urban Institute at UNC Charlotte has projected the evolution of current land use trends in Charlotte Region forward. The results are presented in Map 10. Their model does not examine small area population or employment (although the model is constrained by county totals of both). The model takes accessibility and past patterns of land development into account but does not incorporate political factors. Their simulations of future development in Union County predict a more even pattern of development and considerably more infill development than the MPO projections.

(Map 10 about here)

Union County Water and Wastewater Usage and Capacity

The availability of water and wastewater capacity has emerged as a major consideration with the potential to affect the magnitude, timing, and geographic allocation of Union County population and employment growth. In recognition of the issue, Union County commissioned an update of its water and sewer capacity plans in 2005. These plans have been subsequently revised. The capacity issues are complicated by the number of organizations and contingencies involved. Because of their possible constraining influence on Connector/Bypass Corridor growth, we examined the issues in detail. Our basic assessment is that, discounting the uncertainties in implementing capital improvement plans, infrastructure capacity additions will support growth in the Connector/Bypass Corridor.

Responsibility for water and wastewater infrastructure in Union County is split between the county itself, the City of Monroe, and the Town of Marshville. The county out-sources portions of its responsibilities to Monroe, the Charlotte Metropolitan Utility Department (CMUD), and Anson County while participating in a joint-venture water supply with Lancaster County, SC. The City of Monroe will soon purchase water from Union County and is planning on participating in a future joint venture to add water capacity. Marshville maintains its own water distribution and wastewater collection networks but purchases water from Anson County and sends wastewater to the City of Monroe through an agreement with the County.

Water and wastewater processing capacity is already acting as a constraining factor on Union County residential and business growth. Additional capacity is being actively pursued and the first additions should become available within two years. Real estate developers who have been granted water and sewer permits will be encouraged to “use it or lose it” in order to more efficiently utilize existing capacity.

Union County is divided into two main water basins centered on the Catawba River which runs just to the west in Lancaster County, SC and the Yadkin Pee-Dee River which runs through Anson County to the east, respectively. Four sub-watershed areas, mandated by the state to protect drinking water supplies, are in the Yadkin Pee-Dee watershed in and near the City of Monroe. Map 11 shows the location of the basins and watersheds.

(Map 11 about here)

Collectively, Union County can now supply up to an estimated total of 31 million gallons of water per day. Map 12 charts the major water supply areas of Union County. The grey area in the center of the map is served by the City of Monroe. As noted above, Marshville also has its own service area. The “west” water supply area reaches far over the water basin divide, necessitating an Inter-Basin Transfer (IBT) agreement which allows up to 6.5 million gallons per day to be drained on the east side of the divide. The IBT agreement may be revised to allow more transfer in the medium term but will likely be reduced in recognition of downstream water needs over the long term.

(Map 12 about here)

The primary source of water for the county is the Catawba Water Treatment Plant serving the "west" water supply area. The plant which has been operated by the Lancaster County Water and Sewer District in Lancaster County SC since 1991 as a cross-state joint venture between Union and Lancaster Counties. In 2004, the capacity of the facility was expanded from 18 million gallons per day to 36 million gallons per day. By contract, Union County can draw up to 18 million gallons per day from the plant. By informal agreement somewhat more can be drawn from the plant because Lancaster County does not use its full share. Union County itself operates no water treatment plants at this time.

The second-largest source of water in the county is owned by and operated for the benefit of the residents of the City of Monroe. Approximately 11 million gallons per day can be taken from three reservoirs owned by the City of Monroe: Lake Monroe, Lake Twitty, and Lake Lee. The three lakes are in the protected watershed areas illustrated in Map 11 and are in the Yadkin Pee-Dee Basin.

Anson County serves as the source of the remaining supply. Under an agreement with Anson County, 1.9 million gallons per day can be drawn from the Yadkin Pee-Dee River to serve the Wingate-Marshville area. However, only approximately half that volume can be physically drawn at this time. Marshville's water is bought directly from Anson County and is transported through 8" and 6" water mains which are separate from the system serving elsewhere in Union County. The town has contracted for 1 million gallons per day of capacity but is only using approximately 300,000 gallons per day. The Pilgrim's Pride plant near Marshville is served directly by Union County.

The average day demand for water in Union County is approximately 18 million gallons per day, divided into 8.3, 9.0, and .3 million gallons per day by the County, Monroe, and Marshville, respectively. Peak demand can be higher, effectively placing the county near or at capacity, particularly in the western portion of the county. Accordingly, irrigation restrictions are put in place during the spring and summer months to ensure that water users have consistent water supplies during peak water usage months.

Given the anticipated increase in demand, three projects to enlarge water supply capacity are in various stages of development. Most immediately, the pipeline serving the U.S. 74 East area from Anson County will be upgraded to pump 6.0-7.0 million gallons per day. A contract is imminent and work is expected to be completed within two years. The County anticipates renegotiating the legal capacity of the pipeline to 6.0 million gallons per day concurrent with the completion of the physical upgrades. Anson County's 16 million gallons per day capacity plant at Blewett Falls Lake has ample excess supply to serve the revised limit.

Second, an expansion of the Catawba Water Treatment Plant, now in the design phase, is being considered and tentatively slated for completion by 2014. The expansion will add 9 million gallons per day of capacity to the western region of Union County. County planners hope to begin construction on the plant expansion within a year which would mean that the additional capacity would be available within five years. Those two improvements could increase water supply capacity from 31 to 45 million gallons per day.

Third, a new Northern Source water treatment plant, drawing from the Pee-Dee Yadkin River Basin, has been proposed for the northeastern portion of Union County. The plant will be a joint venture but neither the partners nor the total capacity have been determined. The City of Monroe and Mecklenburg County are likely to partner with Union and Anson Counties in the construction of the plant which could provide 35 million gallons per day of water to Union County at final build out. Construction is estimated to take eight years with a go-ahead hopefully coming by late summer 2010. Initial capacity should be available by 2018.

There are no plans to significantly increase water supply to the southern half of Union County. Lancaster County SC has proposed building a 16" water main line to a 750,000 gallon tank to be built near the state line south southeast of Waxhaw. Completion time is uncertain. If built, that pipeline could be available to serve southern Union County water needs. Union County planners have had no interaction with Lancaster County personnel over that pipeline, however.

The City of Monroe is not expected to expand its water treatment capacity but will begin purchasing 1.99 million gallons per day from Union County in 2014. A representative of the Town of Marshville believes present infrastructure could serve the contractual capacity should the need arise. Table 8 summarizes the forecasted water supply capacity and water demand in Union County across systems.

(Table 8 about here)

Union County is heavily dependent upon wastewater treatment facilities because the soil has poor percolation properties. Union County residents can access a total of 18.9 million gallons per day of wastewater treatment capacity. The Monroe Wastewater Treatment Facility, owned by the City of Monroe, is the largest treatment plant in the county. It services the city and the U.S. 74 East region of Wingate and Marshville in an agreement to provide 2.65 million gallons per day of capacity. (A portion of Marshville's sewerage is treated by Anson County.) The Monroe facility has a capacity of 10.4 million gallons per day.

The County operates two major wastewater treatment plants: Twelve Mile Creek (6.0 million gallons per day capacity) and Crooked Creek (1.9 million gallons per day capacity), both in western Union County. In addition, the county maintains three small package treatment plants which serve individual subdivisions or small clusters of facilities. One additional inactive wastewater treatment plant is owned by the county but no longer used because it cannot meet raised quality standards.

In addition, the County, through a contractual agreement with the Charlotte Metropolitan Utility Department, provides 1.0 million gallons per day of purchased capacity at Charlotte's McAlpine Creek Wastewater Treatment plant. An additional 2.0 million gallons per day is reserved at that facility for future use.

Average daily demand on wastewater treatment facilities is approximately 12 million gallons per day. Sewer capacity in the western part of the county has been allocated to maximize the state regulated capacity. New projects cannot be permitted for sewer capacity in this area until additional capacity is available. The capacity

cushion in the Twelve Mile and Crooked Creek plants is in fact more than fully claimed by approved projects, leaving most of the available capacity in Monroe and the area to the east served by the city's facility. Consequently, as mentioned above, the County is also attempting to regain control over permitted capacity that will not be used quickly.

Finally, the County has also discussed development of a new wastewater treatment plant in the eastern portion of the County, providing more opportunity for development in eastern areas. The City of Monroe has no plans to expand its wastewater facilities. Existing and planned capacity and demand are summarized in Table 9. Table 10 summarizes available information about existing county wastewater facilities.

(Table 9 and 10 about here)

A portion of the Goose Creek drainage sub-basin has been determined to be ecologically sensitive in order to preserve important wildlife. (See Map 13.) Restrictions have been placed on allowable surface runoff resulting in development restrictions near streams. The restrictions imply a density of approximately .25 dwelling units per acre over 8,400 acres of vacant land.

(Map 13 about here)

Despite the constraints on development posed by the short supply of water and wastewater infrastructure, the County is moving forward to aggressively expand capacity to meet potential demand, with portions of the far reaches of the Corridor receiving additional service first. County planners anticipate that future growth will concentrate in the Corridor and are making infrastructure investments accordingly. The Goose Creek sub-basin restrictions may also steer some additional residential development towards the Connector/Bypass Corridor.

Adjustments to the MPO projections

On the basis of the comparisons among forecasts, the information from recent national forecasts, and the regional scan examining small area development factors and patterns, two adjustments were made to the MUMPO socio-economic estimates. The first was to make region-wide adjustments consonant with the national growth expectations. The second was to reallocate the anticipated growth in Union County in line with development factors and constraints.

Taking the three main macro-economic events discussed above into account, we adjusted the current MPO forecasts by taking the ratio of two CBO forecasts (January 2005 and March 2009) for particular years to represent the effect of new information on national growth expectations. The January 2005 CBO forecast was used to approximate the expectations as of the time the latest (current) MPO projections were made. The March 2009 CBO forecast was used to approximate current expectations. Figure 24 above compares several CBO projections.

That adjustment was applied to the MPO estimates of future employment, population, and households. That is, the MPO estimates for 2005 were assumed to be accurate and all subsequent estimates were revised downward by multiplying the MPO estimates by an adjustment factor. The exact adjustment factor differs slightly during the projected period of readjustment. Given the significant loss of regional employment, reports of out-migration, and unsold housing stock, the adjustment is reasonable.

We note that the MPO process adjusted Thomas Hammer's growth estimates by allocating less projected growth to Mecklenburg and, especially, Union Counties than he had estimated. The remaining growth was allocated to the surrounding counties not covered by MUMPO. The reallocation was part of a consensus discussion about future growth trends. The MPO adjustment of several years ago provides an extra cushion for the growth decline experienced in Union County recently.

Employment-led migration is the major factor driving population growth in the Charlotte Region and supporting its expanding economy. As national growth slows, immigration into the U.S., which now comprises approximately 44 percent of national population growth will likely slow with a consequent effect on Charlotte's growth. The Charlotte region has been a major destination for recent immigrants and has the largest concentration of Hispanics in North Carolina.[9] Indications are that immigration has slowed and return migration has accelerated as the U.S. economy has sputtered. Fertility may also decline in response to the economic slowdown.

In making the adjustments, we experimented with a number of options for recalculating a regional capture rate (proportion of national population and employment in the region). Options included using sector-specific employment projections and housing cost differentials. In the end, we opted for assuming that current capture rate trends would continue in a manner roughly consistent with that assumed by the MPO process. Thus, large area forecasts were all adjusted by a similar proportion. We decided to maintain the allocation of growth among counties estimated by the MPO process.

The MPO allocation of population and employment growth among small areas (TAZs) was largely accepted outside Union County. In accordance with the discussion in a previous section, adjustments were made to the Union County MPO small area projections. County growth was reallocated away from the line of high growth in the southwest quadrant of the county, discussed above, to the Connector/Bypass Corridor. That adjustment was in line with discussions with regional and county planners about growth expectations and water and sewer infrastructure provision plans. A portion of the expansion in several high growth TAZs in the northeastern quadrant of the county was also reallocated towards the Corridor.

[9] John D. Kasarda and James H. Johnson, Jr. (2006) *The Economic Impact of the Hispanic Population on the State Of North Carolina*. Kenan Institute for the North Carolina Bankers Association, January.

Projected growth was increased in the Corridor, especially in the area beyond Monroe which will be well-served by the Connector/Bypass. Water and sewer infrastructure will be improved in that area most quickly. Moreover, the two municipalities in the area, Wingate and Marshville, have expressed an eagerness to attract additional residents and employment.

The resulting, Kenan Institute-adjusted, projections are summarized in Figures 26 and 27 and Table 11. Map 2 above identifies the zones used in the summary analysis. The table and figures include the original MPO projections along with the corrected figures. A careful examination shows the impact of the region-wide and small area adjustments. The region-wide adjustment decreased the projected households, population, and employment. The small area adjustments partially counteracted that reduction for the Corridor by reallocating small area growth.

(Figures 26 and 27 and Table 11 about here)

It should be emphasized again that the growth summarized in the analysis rests on three key infrastructure prerequisites: additional water supply, added wastewater processing capacity, and the Connector/Bypass. Although the construction prospects for each are promising, and in some cases, underway, should any of the three improvements not be materialized, growth will likely move elsewhere. Given the existing rush hour congestion on U.S. 74 and limitations on other commuting routes, if the Connector/Bypass not be built, much of the projected residential development will likely largely shift to another county.

Long distance transportation needs

In addition to local commuters and regional traffic, the U.S. 74 corridor handles a significant volume of extra-regional traffic. The beaches near Wilmington and Myrtle Beach are significant attractors for passenger traffic. The port in Wilmington is a significant generator of truck traffic, some of which may come to Charlotte along the U.S. 74 corridor. At the same time, Charlotte is a major distribution center which also serves coastal areas and the less densely populated region in between. Traffic counts may provide the best available indicator of the volume of traffic but provide little indication of the origin and destination of that traffic or of the travel drivers.

This significant amount of traffic largely falls outside the Regional Travel Demand Model. Unfortunately, no good source of data for the drivers of long distance travel through the U.S. 74 corridor exists. Accordingly, there are only partial models of corridor freight traffic and none for passenger traffic. We summarize the information we found below. Our aim is not to forecast traffic but to provide information that might be used in that process.

Long distance passenger traffic

The Department of Transportation provides traffic counts for important sections of North Carolina highways. So far, only annual estimates are provided but

the Wilmington area will begin a program of seasonal counts in order to begin assessing the magnitude of tourist traffic. Those data will not be available for at least a year.

We view beach traffic as a function of the population of the Charlotte Region and the supply of accommodations in the resort areas. The costs of travel have an indirect effect by helping to determine the long-run supply of accommodations. Traffic counts provide indications of the volume of traffic but not its origin. Models of Charlotte-based traffic would need to be adjusted in order to take the travelers who are using Charlotte as a point on a through route into account.

Crash data, compiled by the North Carolina State Highway Patrol for the period 2004-2008 provides some indication of the magnitude of non-local traffic and the seasonality of through traffic via information on the origin of the involved vehicles. Approximately 12 percent of the recorded crashes along U.S. 74 between I-485 and NC 205 at Marshville involve out-of-state vehicles, suggesting that a similar percentage of traffic along the Monroe corridor is extra-regional. This is the segment of U.S. 74 that is also most likely to carry commuter and other regional traffic in addition to long distance travelers. A portion of the North Carolina vehicles would also be from outside the Charlotte Region but we have no finer-grained information than state of vehicle registration.

Fifty-five percent of the out-of-state vehicles were registered in South Carolina, suggesting that U.S. 74 provides important access to the core Charlotte area for South Carolina residents. Almost 14 percent of the vehicles registered out-of-state originated in locations where a routing through Charlotte suggests that the drivers may have been travelling to or from beach resorts.

We found some evidence of seasonality in the crash data with accidents peaking in November and December. With the data we have available, it is difficult to separate the effects of road conditions from increased tourist traffic. These results are not reported.

Long distance truck traffic

The Monroe Connector/Bypass will serve long distance truckers in addition to local commuters, other regional traffic, and long distance passengers. The Federal Highway Administration's nation-wide Freight Analysis Framework-2 (FAF2) is one of the few sources of projections of long distance freight flows. FHWA informants caution that FAF2 is an imperfect, but nonetheless valuable, tool. Informants at the North Carolina Department of Transportation confirmed that they state did not maintain a state-wide traffic or freight model. The MPOs have interests in freight movements but have not yet developed workable models.

FAF2 is built up from 2002 baseline data which is projected forward using Global Insight's proprietary models. The Global Insight models are based largely on various government data sources including input-output tables compiled by the Bureau of Economic Analysis. Estimates of traffic and truck traffic along the U.S. 74 corridor are summarized in Table 12. Estimated traffic along regional highways is

shown in Maps 14 and 15. Our interest here is not to verify the projected counts but rather to outline the socio-economic factors that drive those traffic counts.

(Table 12 and Maps 14 and 15 about here)

Freight flows depend upon the total level of economic production (and consumption), the geographic distribution of production, and the geographic distribution of consumption with the function of freight traffic being to move products from their place of production to (or near) their place of consumption. Because intermediate products comprise a large proportion of total shipments, input-output relationships are key to linking origins and destinations. Because an increasing proportion of U.S. consumption originates overseas (and a smaller but growing proportion of U.S. production is consumed overseas), trends in global production and world trade are central to understanding domestic freight shipments.

Freight flows, including those along the U.S. 74 corridor, are subject to revision as new information pertaining to national and regional economies becomes available. As discussed elsewhere in this report, the national economy has suffered a severe setback which is likely to reduce the economic activity in any one year by approximately 9 percent indefinitely. Ceteris paribus, our expectation is that the predicted freight flows would be decreased by a similar magnitude.

FAFs models on the geographic location of production and consumption likely extend current trends. National current account (imports v. exports) trends have been judged unsustainable by several economists. All other things being held equal, that would likely shift production to domestic sites, reducing port-related traffic for a given level of national economic activity. We expect current trends in the competitiveness of the Charlotte Region and the beach areas as locations for production and consumption to continue.

Possible developments affecting trucking in the U.S.74 Corridor: the North Carolina International Terminal and Legacy Park

The North Carolina State Ports Authority has proposed developing a new ocean container port south of Wilmington, near Southport. If built, the North Carolina International Terminal (NCIT) could have a significant impact on truck traffic along U.S. 74 and the Monroe Connector/Bypass. The most relevant information about the NCIT is summarized in the *Pro Forma Business Plan for North Carolina State Ports Authority*, 15 March 2008.[10] The document is in the process of being updated but the new results will not be released for another several months. The updated version is likely to forecast slower growth than initially predicted and therefore recommend more finely stepped development phases than initially planned.

[10] Pro Forma Business Plan for North Carolina State Ports Authority, 15 March 2008 (http://spa.ncports.com/web/ncports.nsf/4a87ff3bf2c03cc38525646f0072ffa9/6d28af86ed9d134585257419005017ca/$FILE/NCIT%20Pro%20Forma.pdf). A companion document lists planning assumptions (http://spa.ncports.com/web/ncports.nsf/4a87ff3bf2c03cc38525646f0072ffa9/6d28af86ed9d134585257419005017ca/$FILE/NCIT%20Planning%20Assumptions.pdf).

The main driver behind the Ports Authority proposal is the rapid increase in trans-Pacific container traffic which has overwhelmed West Coast port capacity. Much of what arrives on the West Coast is bound for the Midwest. Therefore, the expectation is that, as the Panama Canal widening is completed in 2014 or 2015, a portion of the post-Panamax vessels will bypass West Coast ports for a direct voyage to the east. As it turns out, none of the major East Coast ports enjoys a significant time advantage over the others for Panama Canal traffic so that port processing efficiency, the size of the local market, and land transport connections to other markets may determine the distribution of traffic among East Coast ports.

The first phase of NCIT, handling one million twenty-foot equivalent units (TEUs) annually, could be operational by 2017 or 2018. At full build out eight to ten years later, the port could handle four million TEUs annually. The North Carolina Department of Transportation has begun a highway needs reconnaissance study that will likely be complete within two years. The U.S. Corps of Engineers has begun a study of the costs of dredging a channel to the port. The initial study is scheduled to be completed by May 2010 and would need to be followed by another two to three year study to satisfy the mandates of an Environmental Impact Assessment before construction could begin.

The port's primary orientation would likely not be Charlotte but the "deep hinterland" markets in the Midwest which are 500 or more miles inland. Accordingly, a planning goal is to move half of all containers inland via CSX' rail line to Charlotte and beyond, with the other half travelling by truck. At full capacity the intended 50/50 modal split would result in approximately 10,000 rail movements annually and 900,000 port-related truck movements. Some of those truck movements would travel via I-40 to the I-95 corridor and possibly further north. Nevertheless, the port would likely generate a significant amount of truck traffic along the U.S. 74 intrastate highway.

Trucking firms have expressed doubts about the efficacy of intermodal shipments over short differences, such as that between NCIT and the Charlotte Region. All Charlotte-bound containers might end up being shipped by truck. Truck shipments would entail just one inter-modal transfer: from ship to road.

Alternatively, if sufficient increases in efficiency are made in inter-modal transfers to make a rail link for Charlotte-bound containers cost-effective, truck traffic on the Monroe Connector/Bypass might still increase if CSX agrees to participate in the Legacy Park "freight village" proposed for Marshville. In that case, Charlotte-bound ocean containers could be loaded onto a rail shuttle service stopping at Legacy Park outside Marshville where they would be transferred to trucks for final delivery in the Charlotte Region or elsewhere in the Piedmont Crescent.

Legacy Park is a proposed 5,000-acre industrial and commercial park located to the east of Marshville. The southern boundary of the proposed park runs along U.S. 74 and is adjacent to the CSX rail line to Wilmington. The first phase of the project, if implemented, would include a rail-road intermodal facility on about 250 acres and tracts of between 150 and 250 acres served by rail. Smaller tracts as well as light industrial and flex space are also planned. Figure 28 provides schematic overviews.

At present, the park has attracted the attention of regional planners but has no tenants and no funding commitments have been made.

(Figure 28 about here)

State transportation planners have confirmed that CSX is considering a new inter-modal yard in the Charlotte Region because the capacity of its existing facilities is becoming increasingly strained. They have not yet expressed a desire to locate a facility in Union County. It is likely that a facility near Marshville would have to offer significant cost advantages to counter-balance its inconvenient location away from the main industrial concentrations of Charlotte and the broader North and South Carolina Piedmont.

Before becoming a reality, NCIT still needs to surmount a significant number of hurdles. Among these are decreased growth in container traffic, possible construction cost increases, and the need to coordinate many interdependent investments. Any one of these issues could scuttle NCIT.

First, according to the study cited above, East Coast ports will likely have sufficient capacity to handle projected demand until 2022 or 2025. Several factors point towards slower growth in container traffic than has been forecasted in recent years. These include 1) a general slowdown in economic growth which may last significantly longer than the ongoing crisis, 2) pressures to revalue the Chinese reminbi (yuan) because of the continuing trade surplus, 3) upward pressures on Chinese labor costs in the fast-growing coastal areas which are approaching regional capacity (tapping larger pools of inland labor will require heavy infrastructure investments and institutional reforms), and 4) increasing fuel costs which will likely push producers closer to markets. The last three factors favor Latin American, especially Mexican locations over Asian locations. Should such locations increase in competitiveness with respect to Asian sources, imports that might otherwise be arriving in the U.S. by sea might be shipped via truck or an inland rail network. These considerations have already raised concerns about the efficacy of the Panama Canal expansion.

Second, initial cost estimates, in the study cited above, total $2.5 billion in order to make the port fully operational. If costs rise significantly, the NCIT may no longer be cost-effective. The “pro forma” assumed that dredging costs would be something over $500 million. Based on recent Corps of Engineers’ experience, several commentators have suggested that they could top $2 billion alone and that cost would make the project’s overall benefit-cost ratio unfavorable. The project’s future could rest on the outcome of the Corps of Engineers’ study that is just beginning.

Third, NCIT has no established competitive advantage. Creating one will require a series of linked public and private investments including over $181 million for roadway improvements (given foreseeable conditions this might need to be a tollway) and over $127 million in railway improvements. At least $731 million in public investment across multiple levels of government will be needed. The coordination problems are not trivial. All levels of government face limited budgets and competing needs. CSX, a critical partner, has expressed a willingness to talk but

has not yet committed to the project. Although the Ports Authority remains committed, NCIT lost a key champion with Governor Easley's retirement from office.

In any event, NCIT may be in the weakest competitive position of any East Coast port. It will be the "last in." Other ports enjoy significant established user bases. Several of these ports have significant capacity enhancement programs in place. Norfolk's rail-based "Heartland Express," which is nearing completion, may have a significant advantage over other ports in meeting Midwest demand. Existing analysis suggests that NCIT would offer marginal competitive advantage beyond the limited markets of North Carolina metropolitan areas. On the other hand, should the Ports Authority satisfy cost constraints and succeed in coordinating the full range of needed coastal and inland investments, NCIT has the potential to restructure East Coast shipping patterns.

Conclusion

The prospects for population and employment growth in the Charlotte Region are strong. The Charlotte Region is a growing region within a growing state. The Region competes successfully with metropolitan areas nationally for employment in growing sectors and has a quality of life that earns it many accolades. Independently prepared forecasts all suggest that regional growth, based on a diverse economy and sustained in-migration, can be expected to continue.

The core area of Charlotte (Uptown) is the region's prime location for highly salaried employment. The core area provides attractive office locations, a central location in the region that is reinforced by transportation routes, and easy access to an airport that offers excellent connections to many important metropolitan areas. These features help increase the attractiveness of the region to contemporary firms. The I-485 loop provides access to supplemental employment centers including University Park in the northeast and Ballantyne in the southwest along with the I-77 airport/industrial area. Even with a possible maturing of private sector employment, especially that in banking, the core Charlotte area will likely continue to grow as a center for well-paid employment.

A caveat with respect to that last sentence needs to be emphasized. Informants told us that the very high-end of the income distribution would likely be thinner in Charlotte in the coming years. While Charlotte will likely remain a center for retail banking operations, the highest skill work in corporate finance has already departed for New York. We have not made adjustments to the estimated mean income because the current estimates stem from a period which preceded much of the banking boom in Charlotte and because this recent development does not have a direct impact on the Monroe Connector/Bypass Corridor.

Mecklenburg County has absorbed much of the residential growth and the accompanying support employment in retail, hospitality, and retail. This can be expected to continue. Mecklenburg County still has ample developable land. Over the past decade or so, residential growth has accelerated in Union County which is often marketed as "Charlotte South" in reference to the upscale residential districts just across the county border. The strong orientation of growth towards the Uptown

Charlotte suggests that the completion of a rapid access road through the corridor will likely accelerate growth within the corridor itself.

The proposed Monroe Connector/Bypass will likely act as a channel for residential growth. Past trends suggest that residential density of new housing within the corridor will increase gradually over time and that residential development will continue to focus on the moderately high end of the housing market. Interviews suggest that some of the development in the corridor occurred in anticipation of the highway's completion. Growth rates may accelerate once the economy recovers and concrete steps towards construction are taken.

Forecast reliability

Socio-economic forecasting is an inexact process. The available evidence across projection efforts indicates that "forecast errors are generally larger for small places [such as TAZs] than for large places; are generally larger for places that have very high [such as Union County] or negative growth rates than they are for places that have moderate, positive growth rates; generally increase with the length of the projection horizon [which stretched to 25 years in this case]; and vary from one launch year to another."[11] The evidence suggests that the accuracy of forecasts does not necessarily improve by using more complex models.

These errors can be substantial. Typical mean algebraic percentage errors (a commonly used measure of forecast accuracy) are approximately 30 percent for 25-year county-level projections and 36 percent for 30-year projections. For Census tracts, a unit of geography roughly equivalent to TAZs, the average errors may be 45 percent and 54 percent for 25-year and 30-year projections, respectively.[12] Therefore, any projection of the Charlotte Region needs to be bracketed with a wide confidence interval, particularly on the up-side for small local areas, such as TAZs. The growth projections for specific areas in the Monroe Connector/Bypass Corridor can be both positively and negatively affected by the actions of individual land owners and developers as well as the timing of utility provision and perturbations in regional economic growth rates.

[11] Stanley K. Smith, Jeff Tayman, and David A. Swanson, *State and Local Population Projections: Methodology and Analysis*, Plenum Publishers (2001), p. 292.
[12] Smith, Tayman, and Swanson, p. 340.

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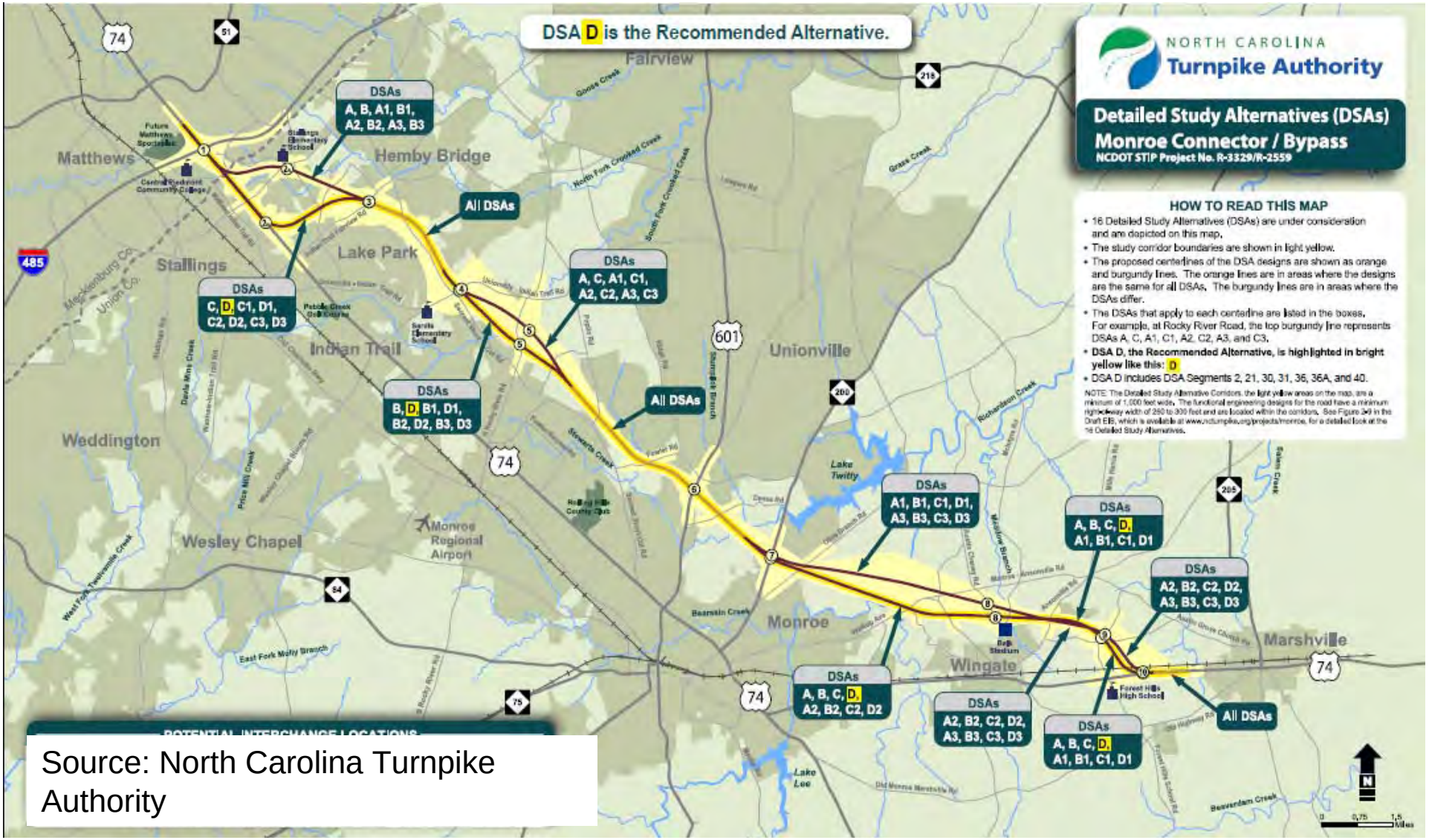
Map 1

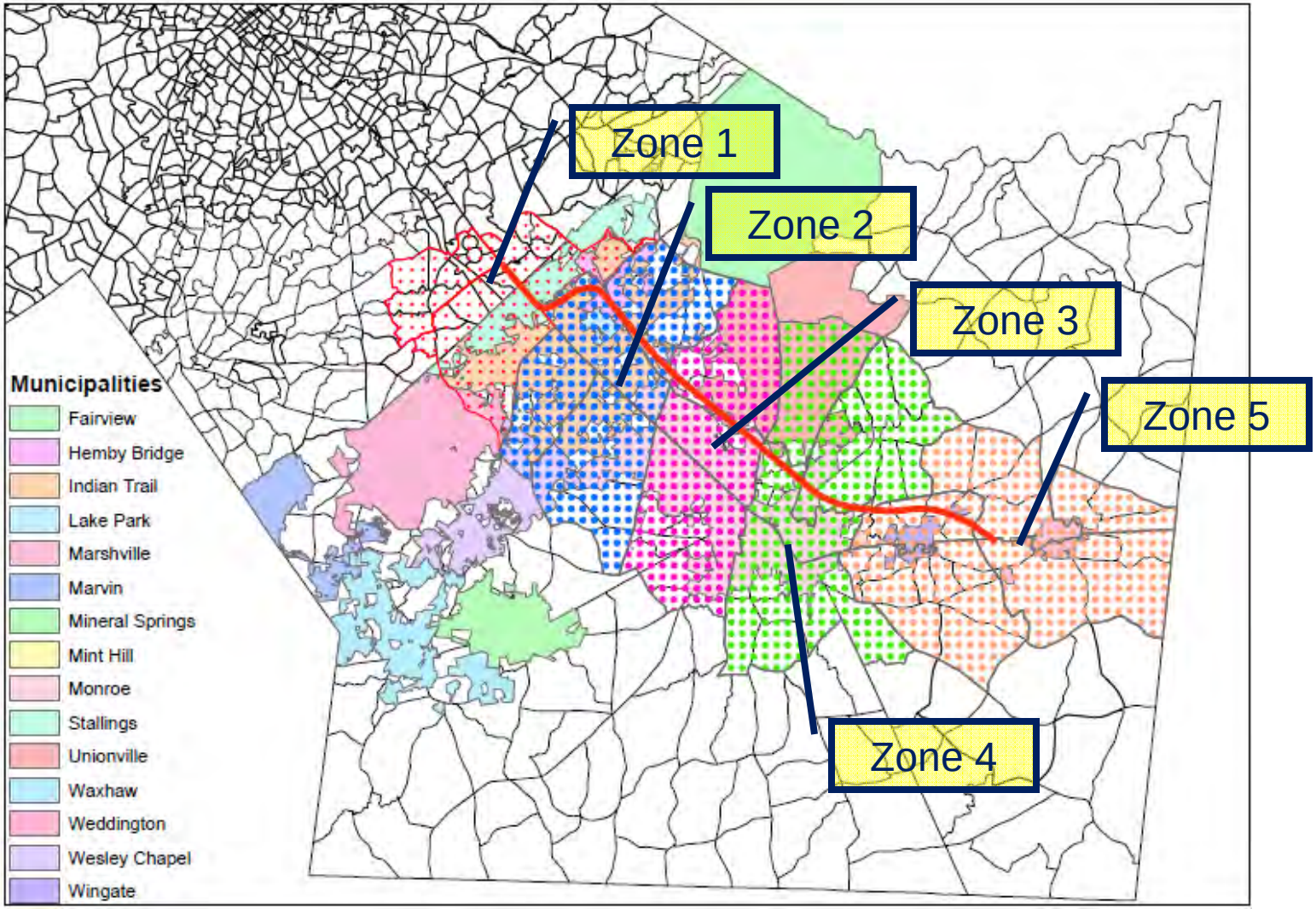
Monroe Connector/Bypass Route



Source: North Carolina Turnpike Authority

Map 2

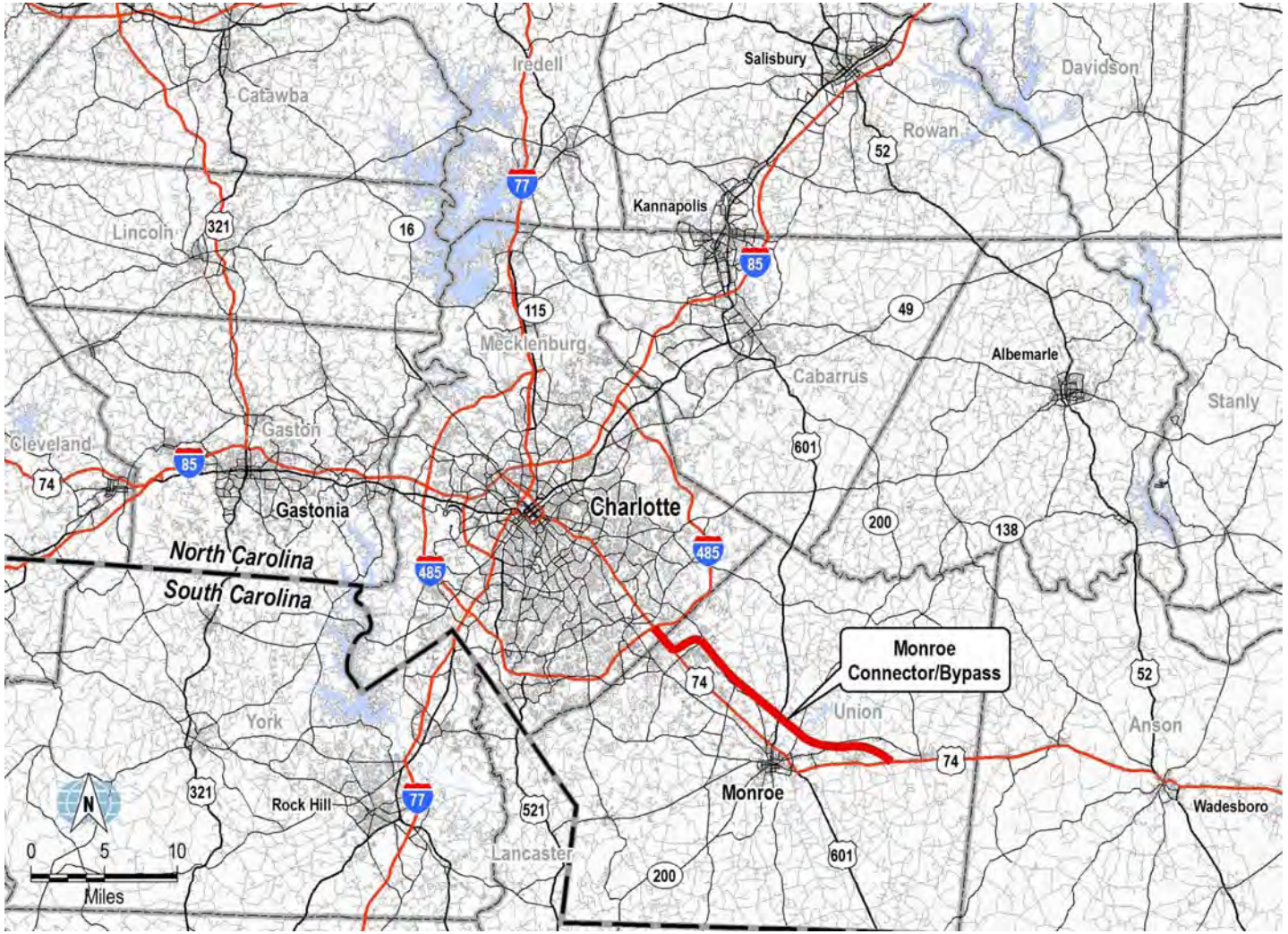
Monroe Connector/Bypass Corridor, Municipalities, and Corridor Zones



Source: Kenan Institute analysis of MUMPO and Union County data

Map 3

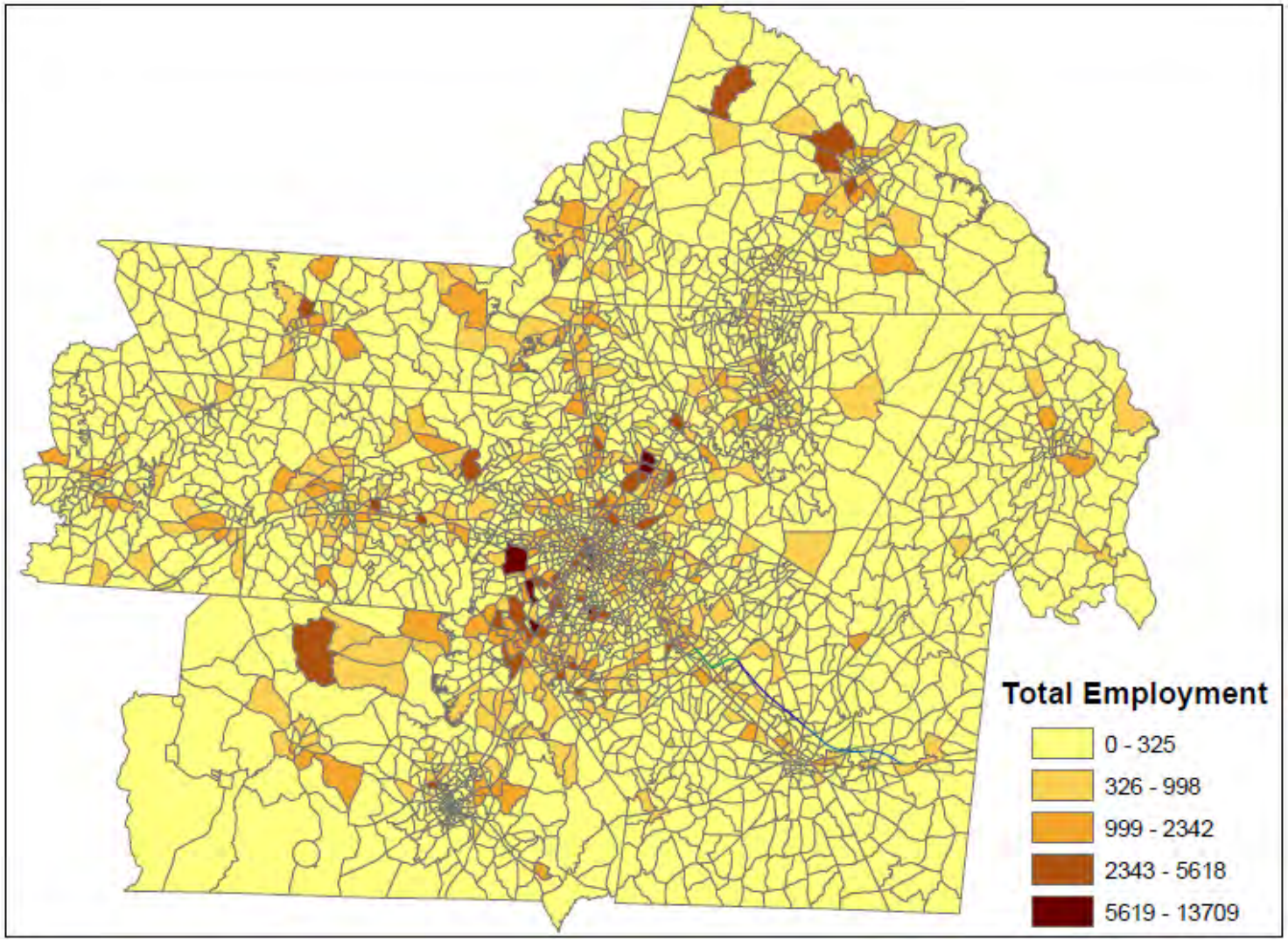
Overview of Charlotte Region



Source: Wilbur Smith Associates

Map 4

Regional Employment Concentrations

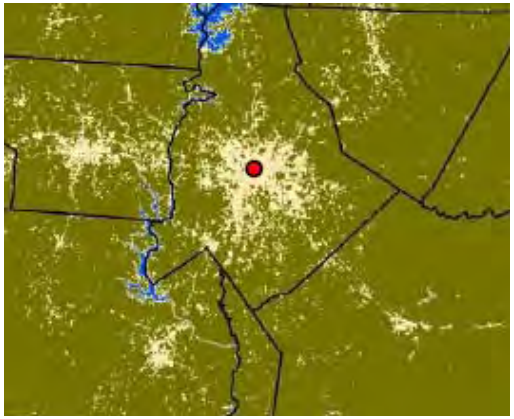


Source: Kenan Institute analysis of MUMPO data

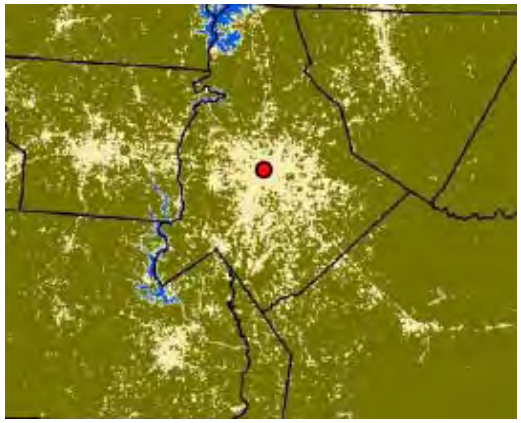
Map 5

Regional Land Consumption over Time

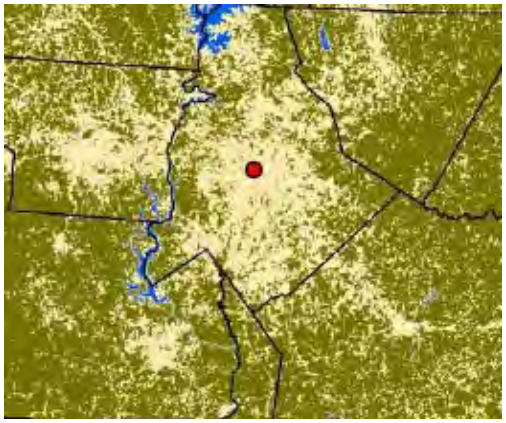
1976



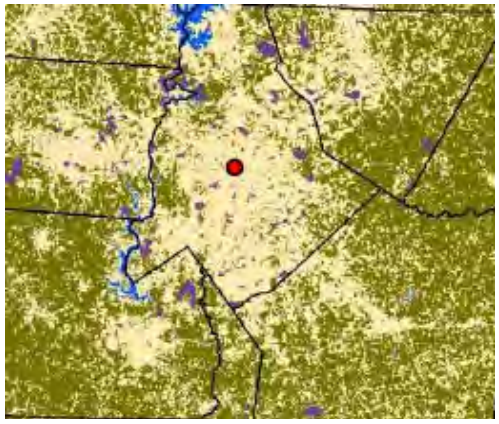
1986



1996



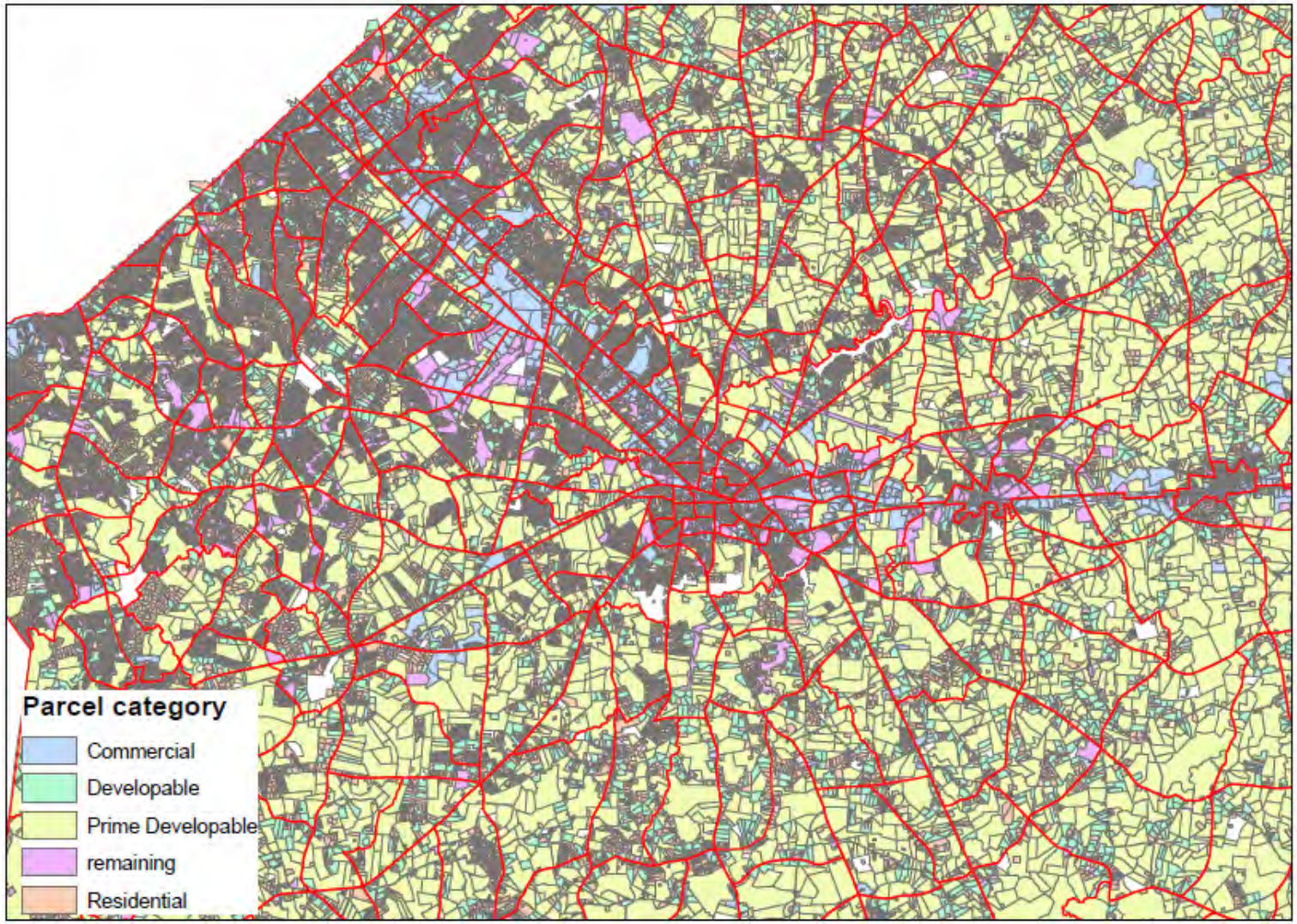
2006



Source: RENCI at University of North Carolina, Charlotte

Map 6

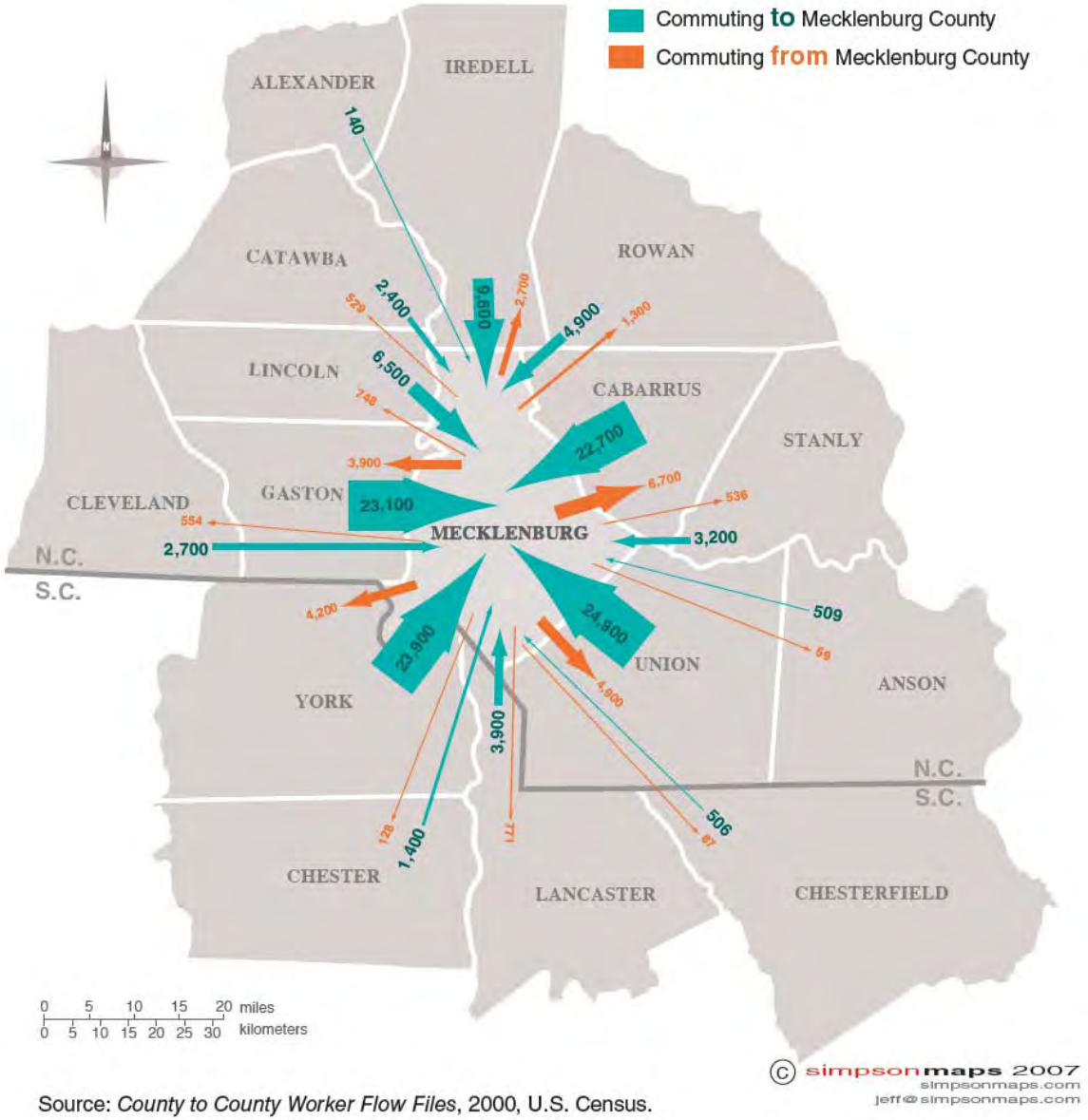
Land Use in Union County



Source: Kenan Institute analysis of MUMPO and Union County data

Map 7

Charlotte / Mecklenburg Commuting Patterns, 2000



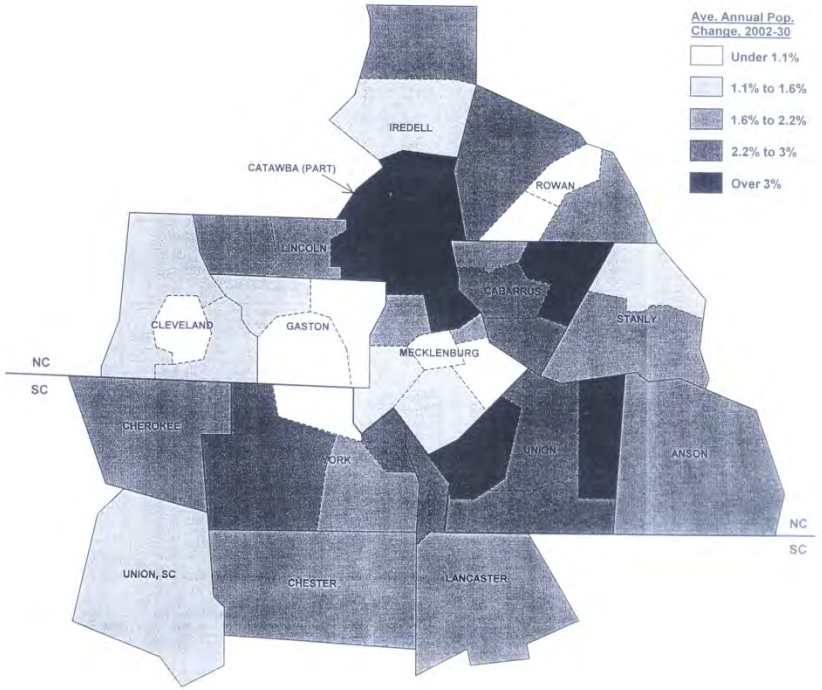
Source: *County to County Worker Flow Files*, 2000, U.S. Census.

Courtesy of Charlotte Chamber of Commerce

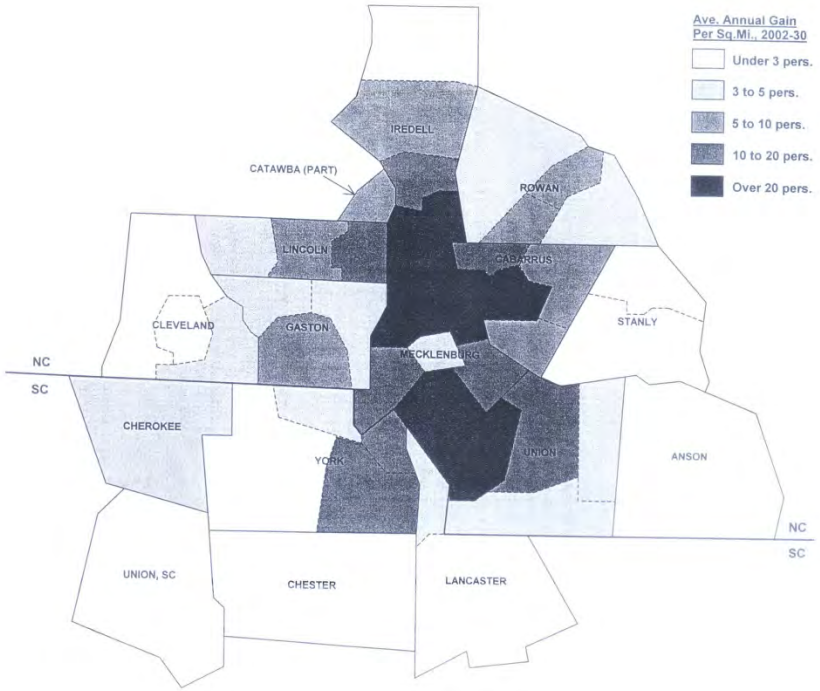
Map 8

MPO Projected District Population Change, 2002-2030

Average Annual Population Growth



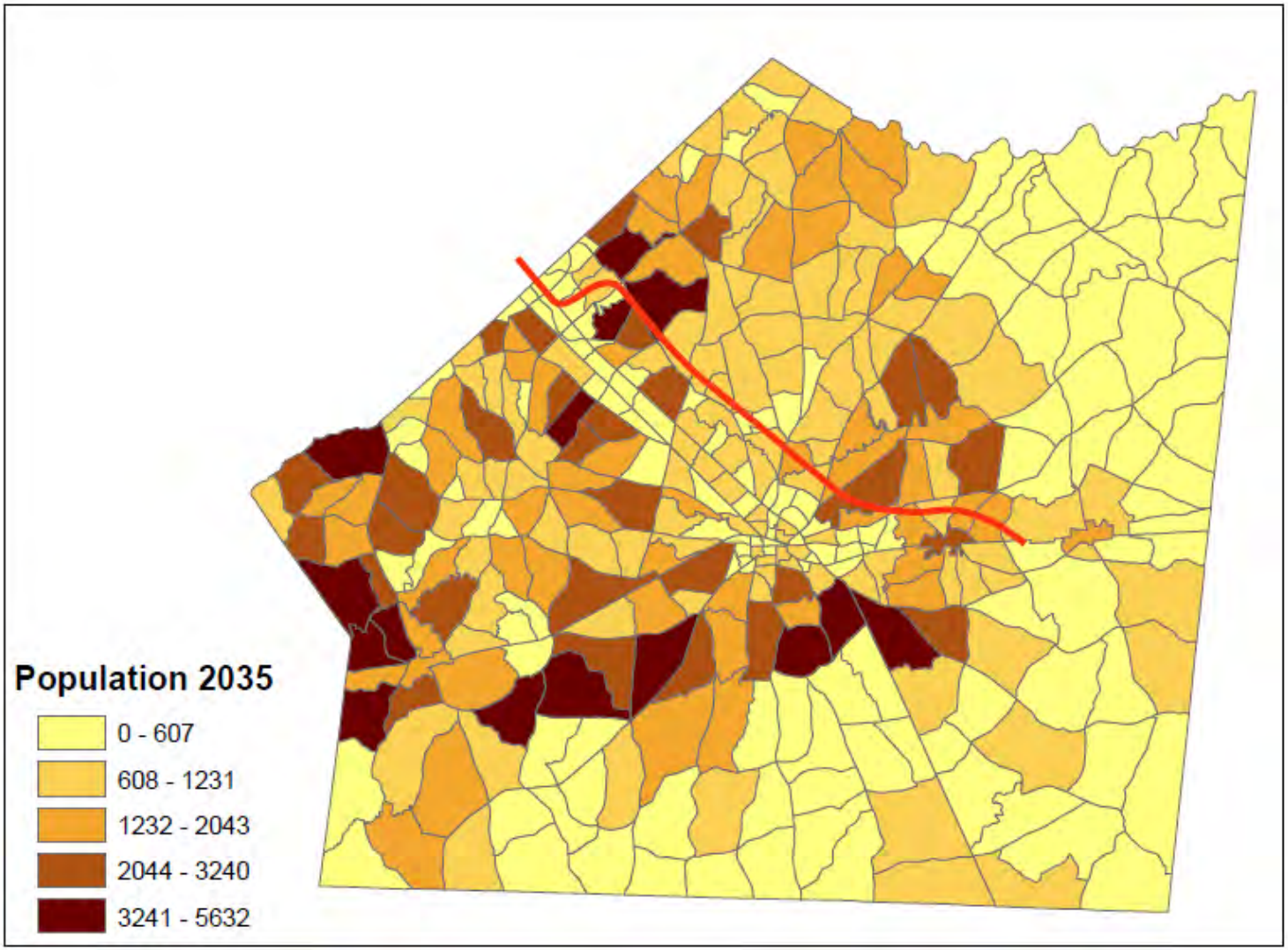
Average Annual Density Increase



Source: Hammer, Demographic and Economic Forecasts for the Charlotte Region, 2003

Map 9

MPO Small Area Population Projection for Union County

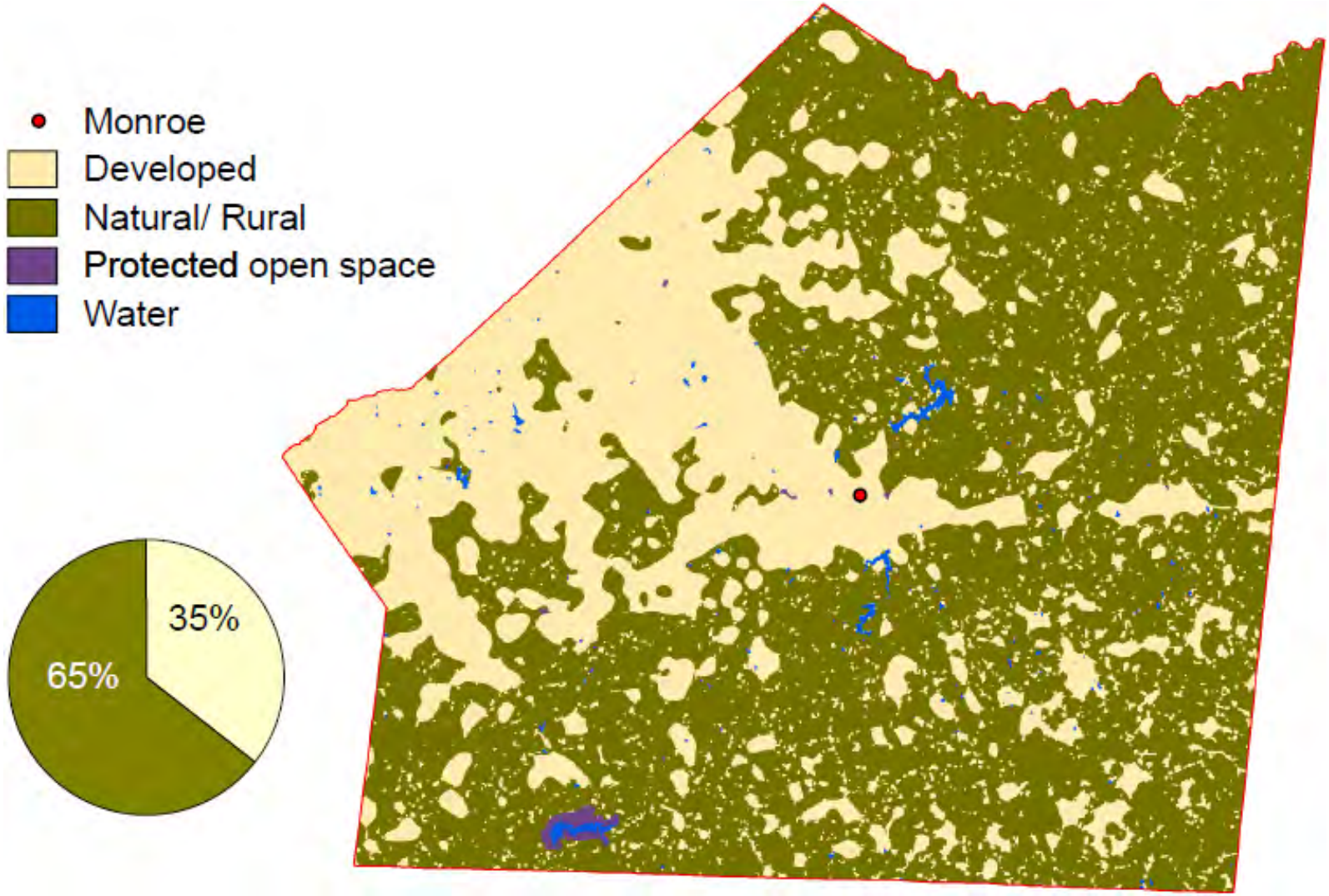


Source: Kenan Institute analysis of MUMPO data

Map 10

Union County Land Consumption Projections

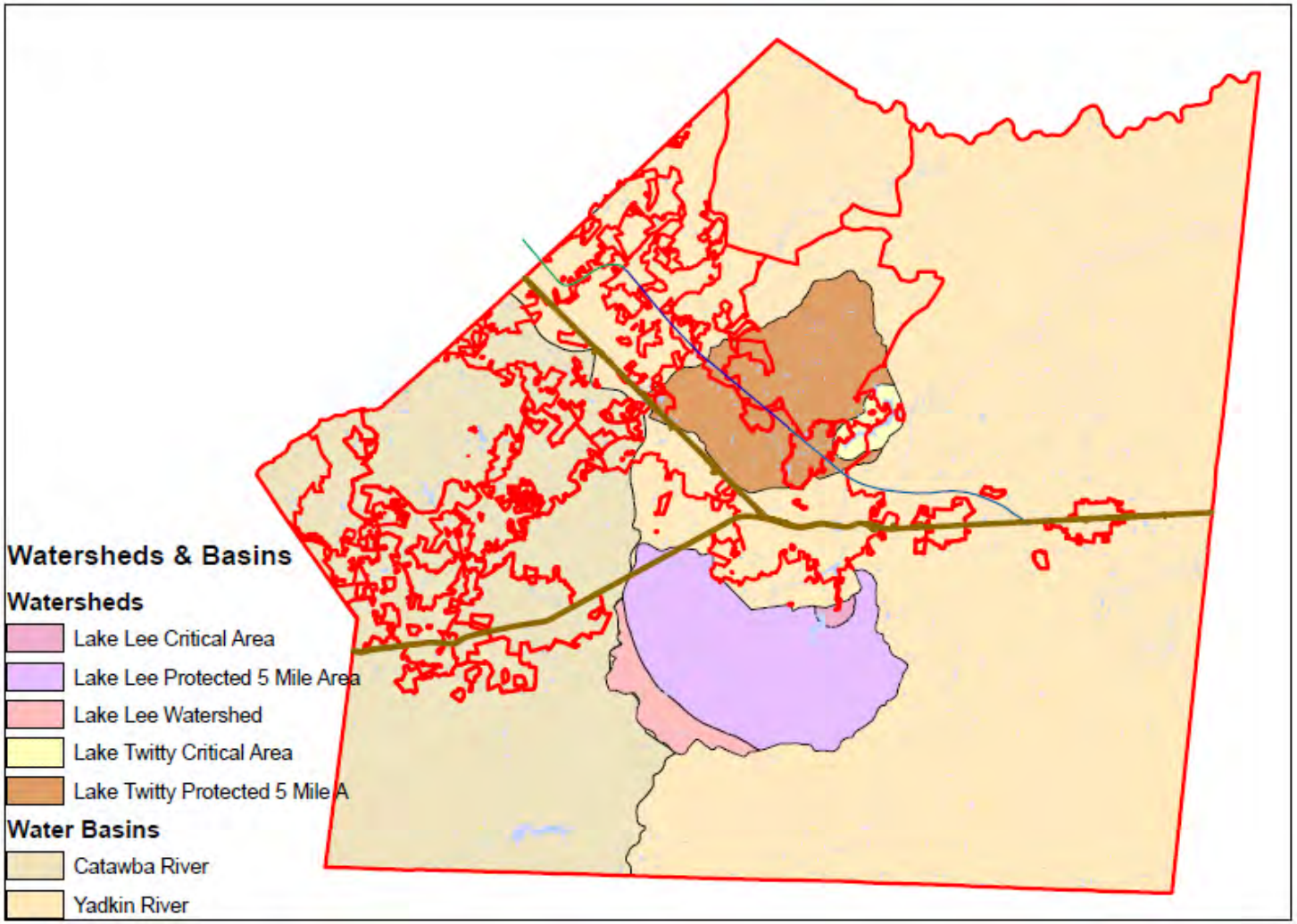
(predicted 2030)



Source: RENCI at University of North Carolina, Charlotte

Map 11

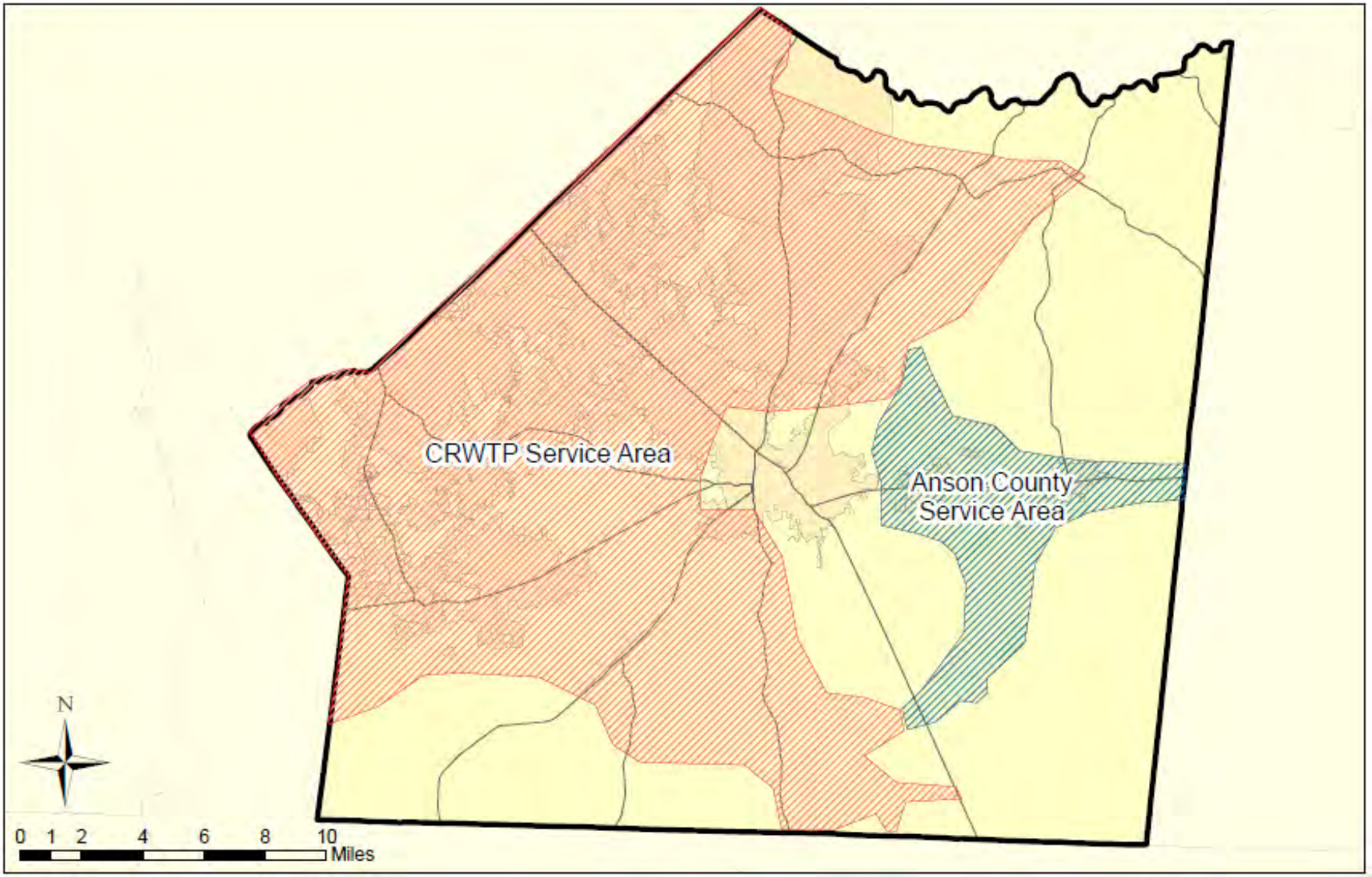
Union County Watersheds and Water Basins



Source: Kenan Institute analysis of Union County data

Map 12

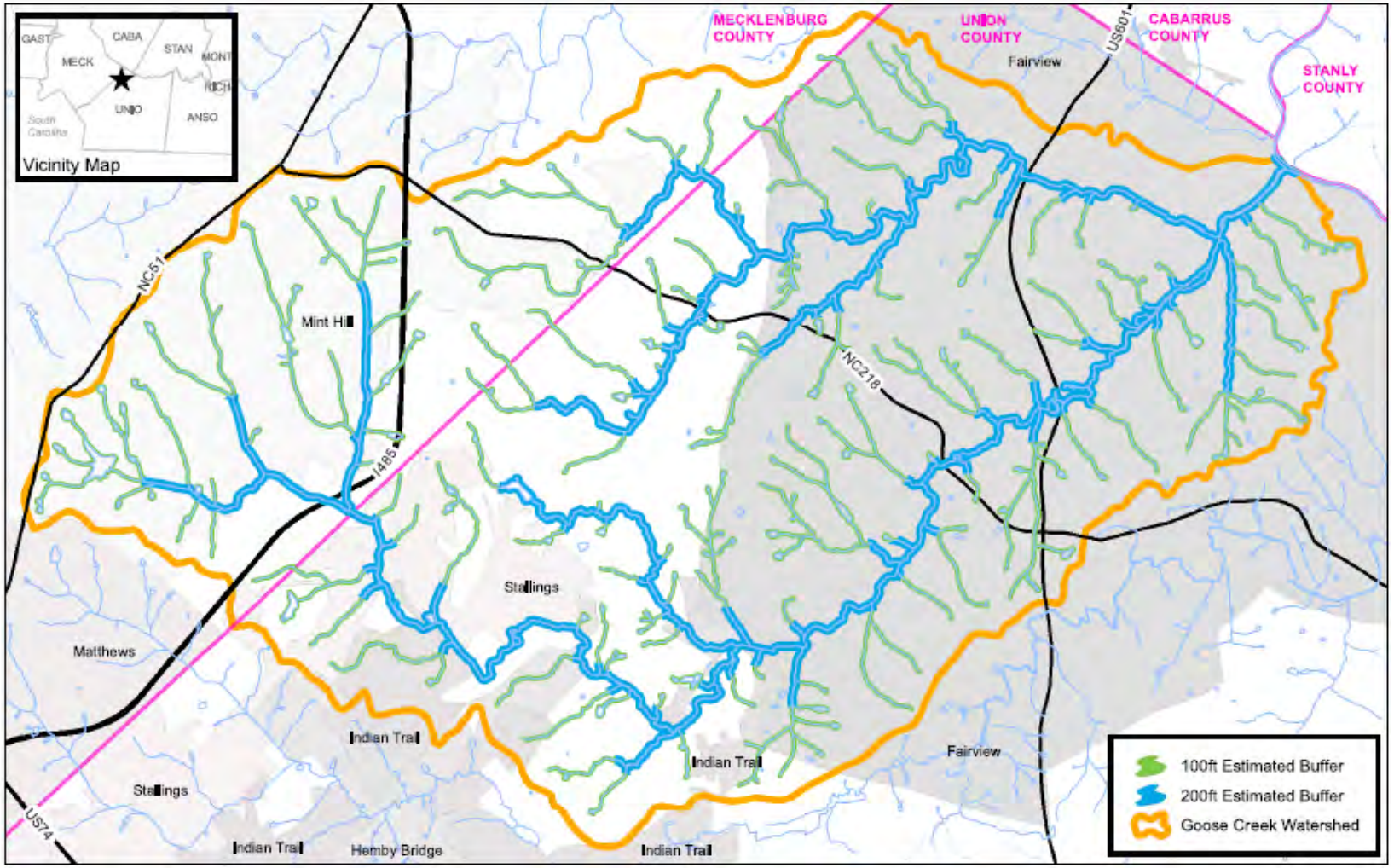
Union County Water Service Areas



Source: Union County Department of Public Works,
http://www.co.union.nc.us/Portals/0/PublicInformation/News/2009/07-09/2.pdf

Map 13

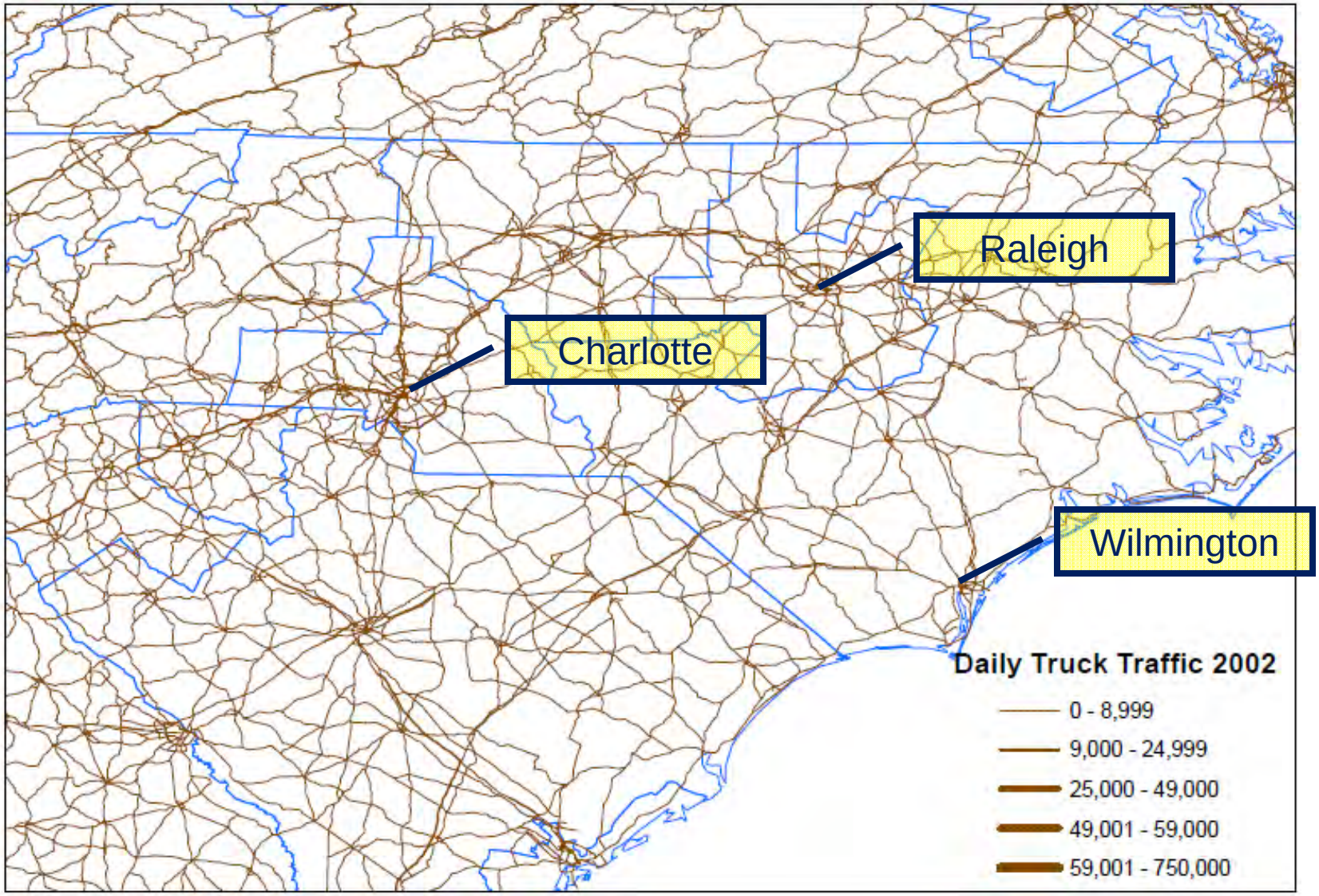
Goose Creek Watershed Buffers



Source: North Carolina Department of Water Quality, http://h2o.enr.state.nc.us/csu/documents/goosecreek_proposed_MAP3_BUFFERS_2feb09_website.pdf

Map 14

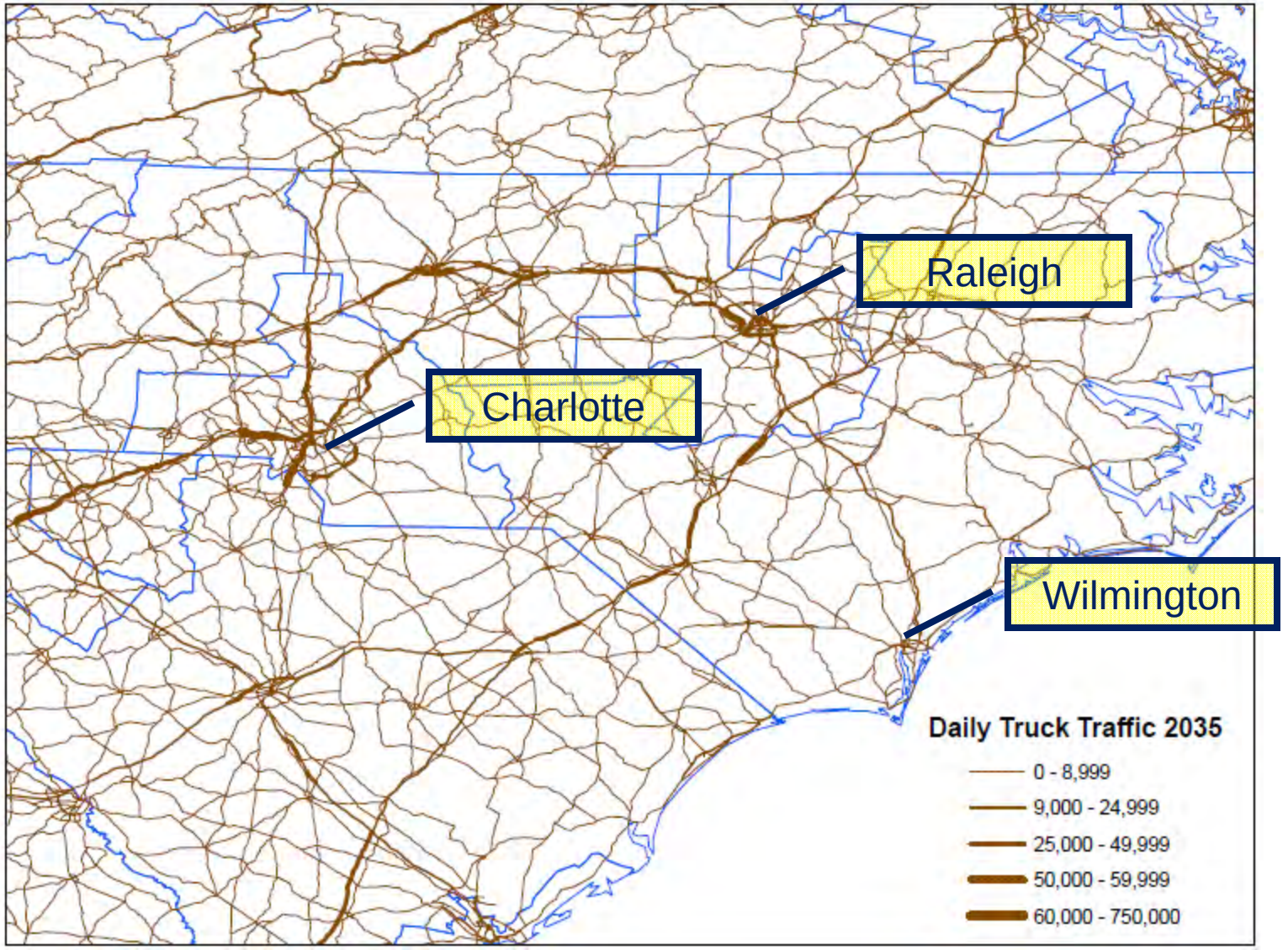
Regional Truck Traffic, 2002



Source: Kenan Institute analysis of Freight Analysis Framework 2 data

Map 15

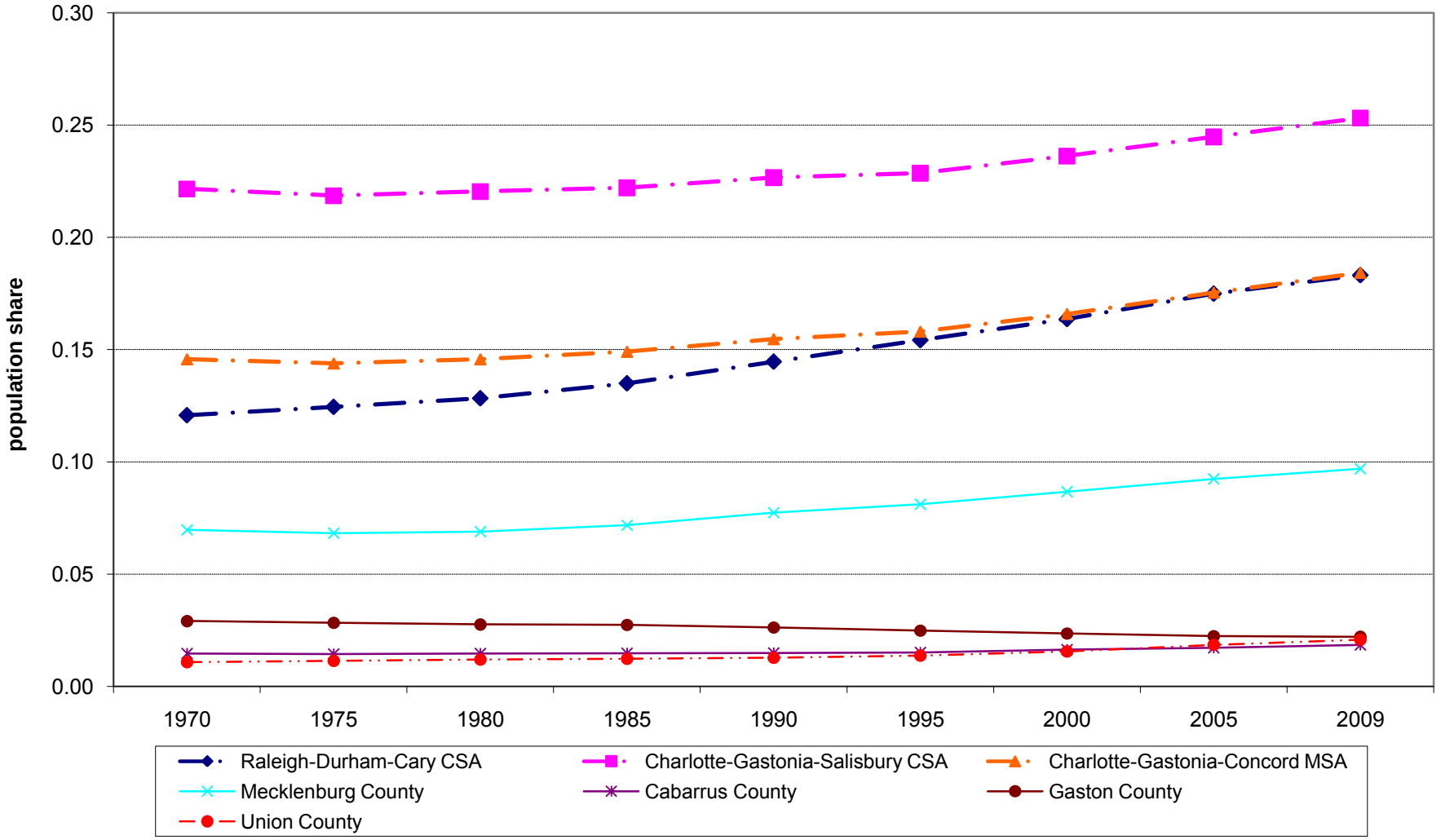
Regional Truck Traffic, 2035



Source: Kenan Institute analysis of Freight Analysis Framework 2 data

Figure 1

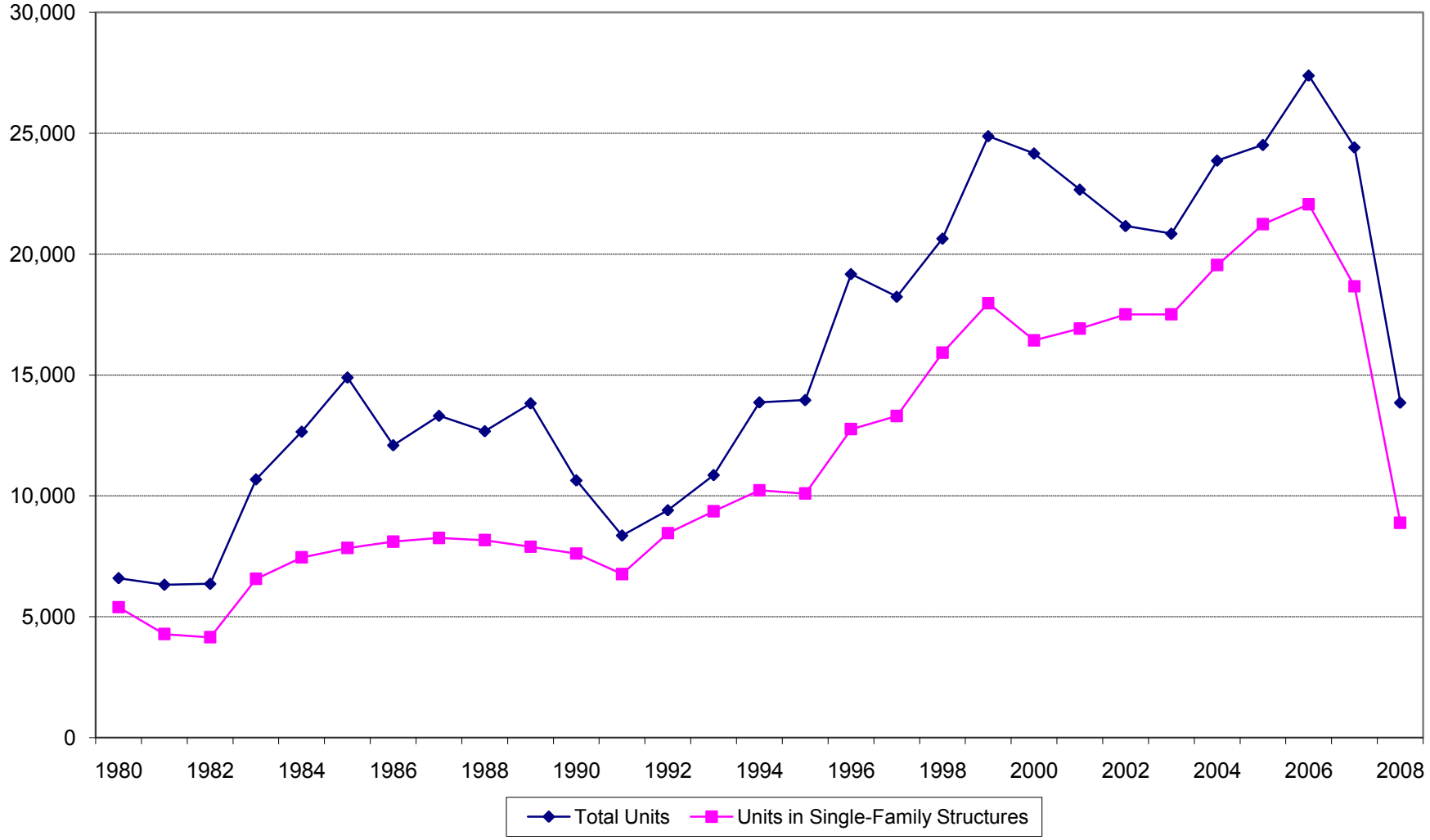
Selected Regional Shares of North Carolina Population



Source: Kenan Institute of Woods and Poole compilation of Census data

Figure 2

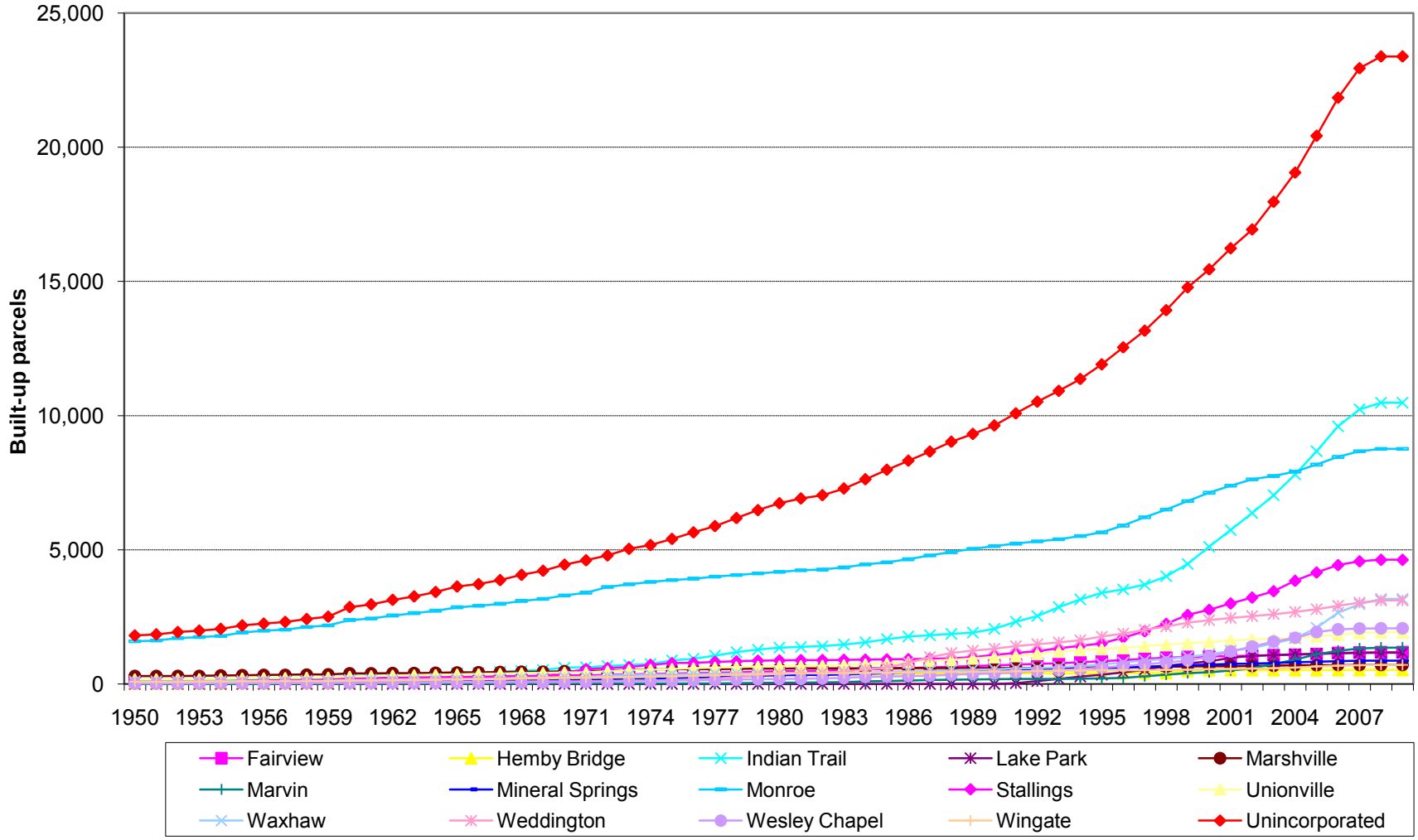
Housing Permits in Six-County Charlotte Region



Source: Kenan Institute analysis of HUD data

Figure 3

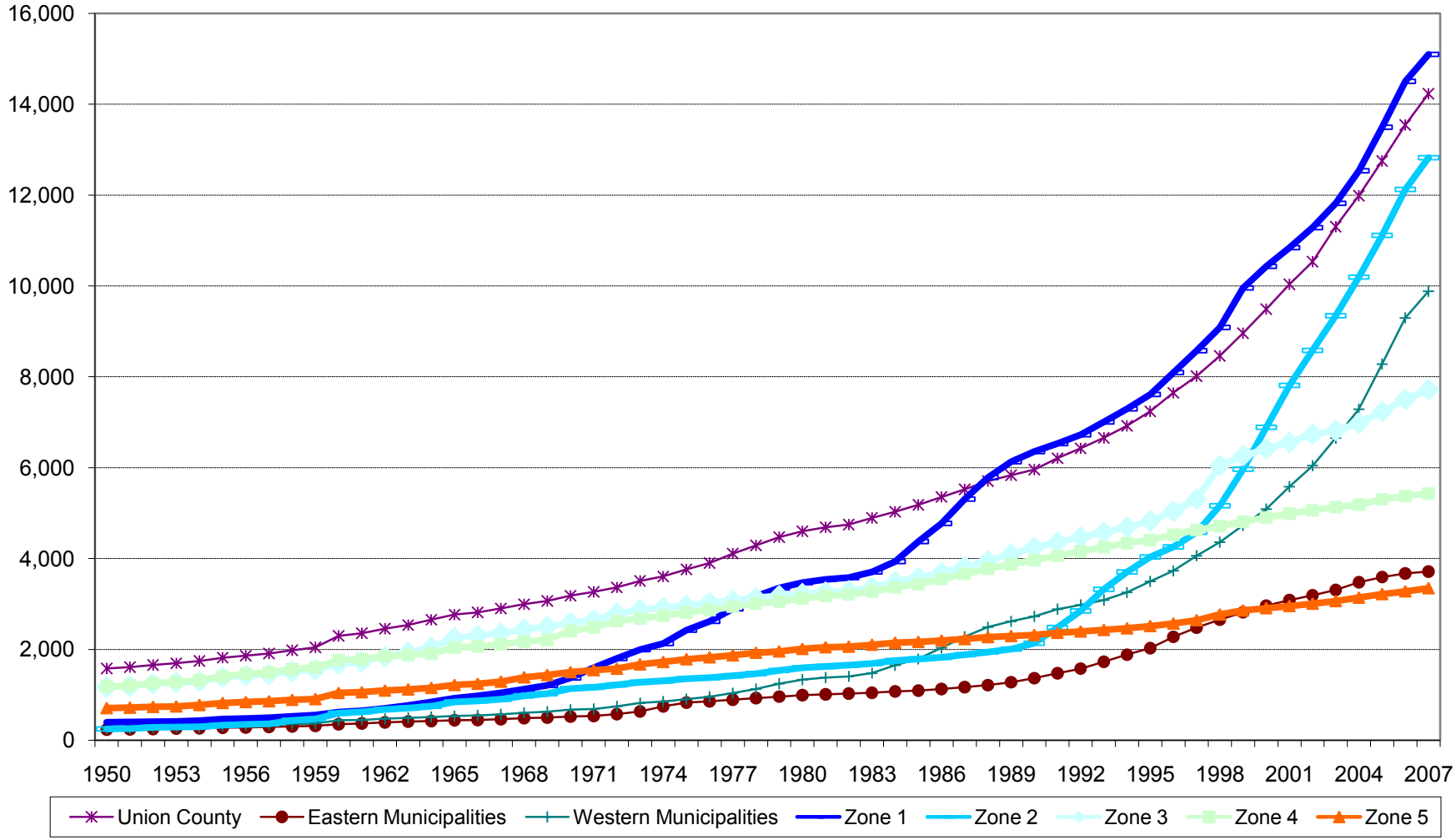
Residential Development in Union County by Municipality



Source: Kenan Institute analysis of Union County data

Figure 4

Dwellings in Mecklenburg and Union Counties

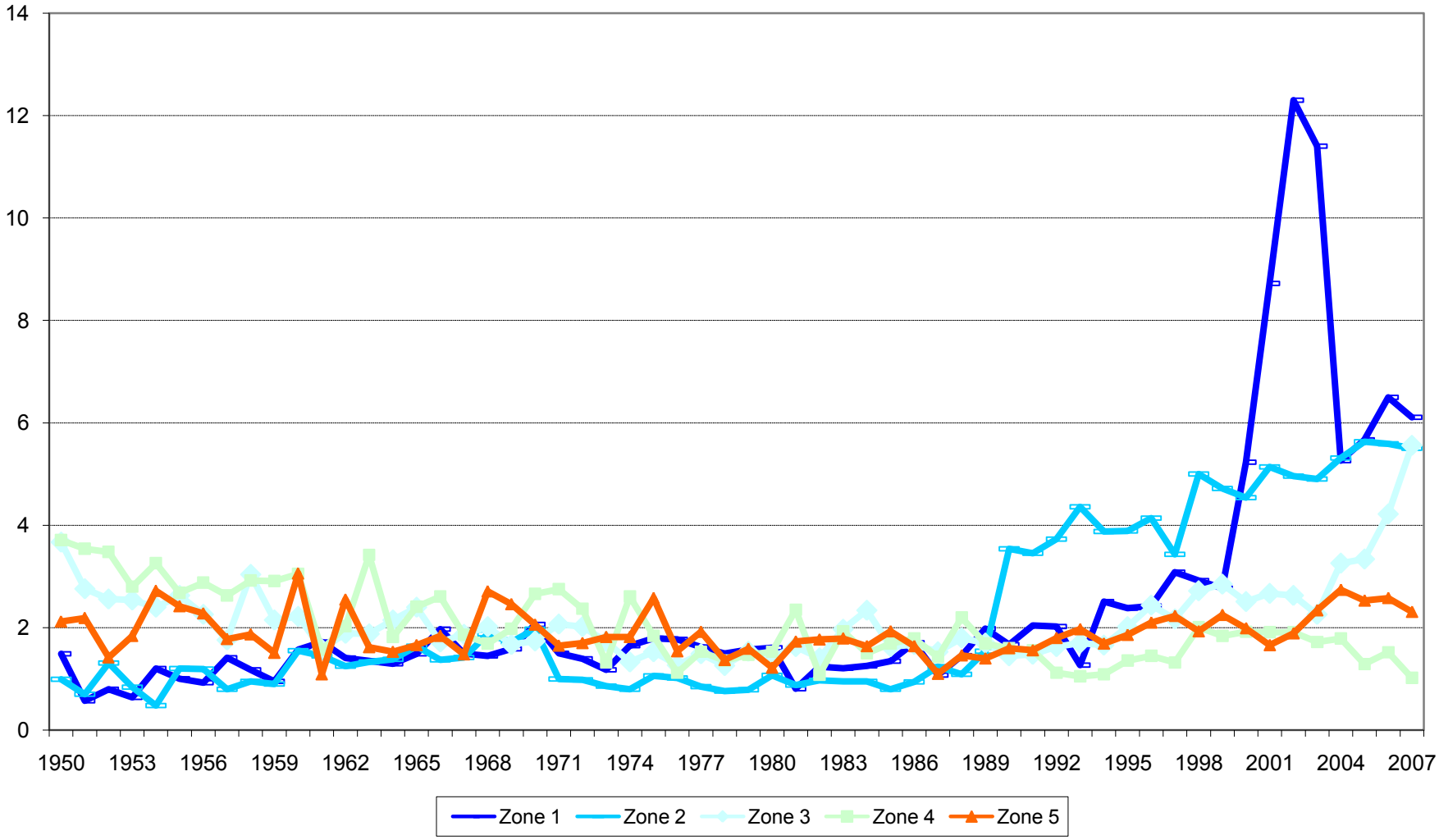


Source: Kenan Institute analysis of Mecklenburg and Union County data

Note: See Map 2 for definitions of Zones

Figure 5

Dwellings per Acre in Corridor Zones

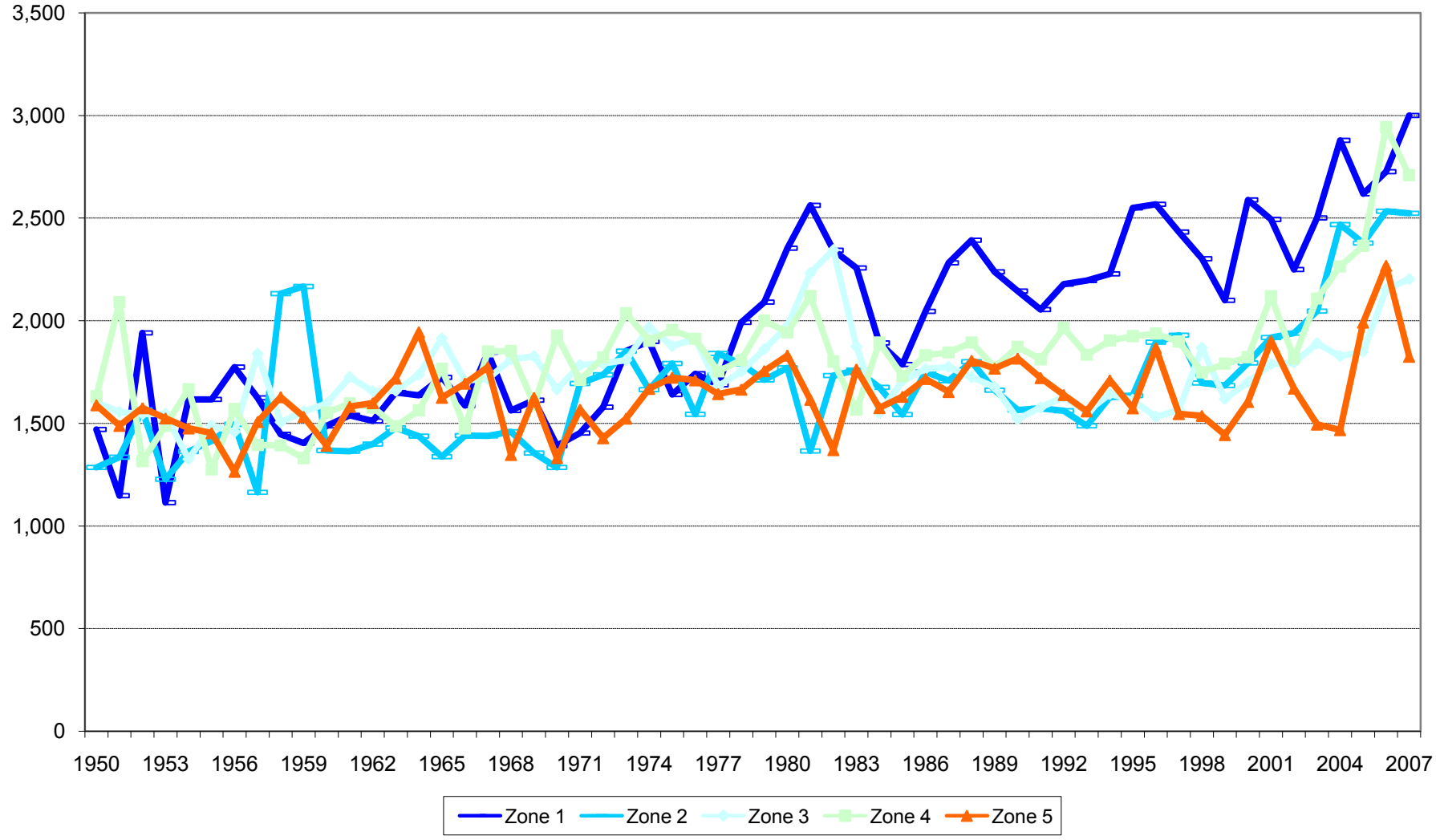


Source: Kenan Institute analysis of Mecklenburg and Union County data

Note: See Map 2 for definitions of Zones

Figure 6

Dwelling Size in Corridor Zones

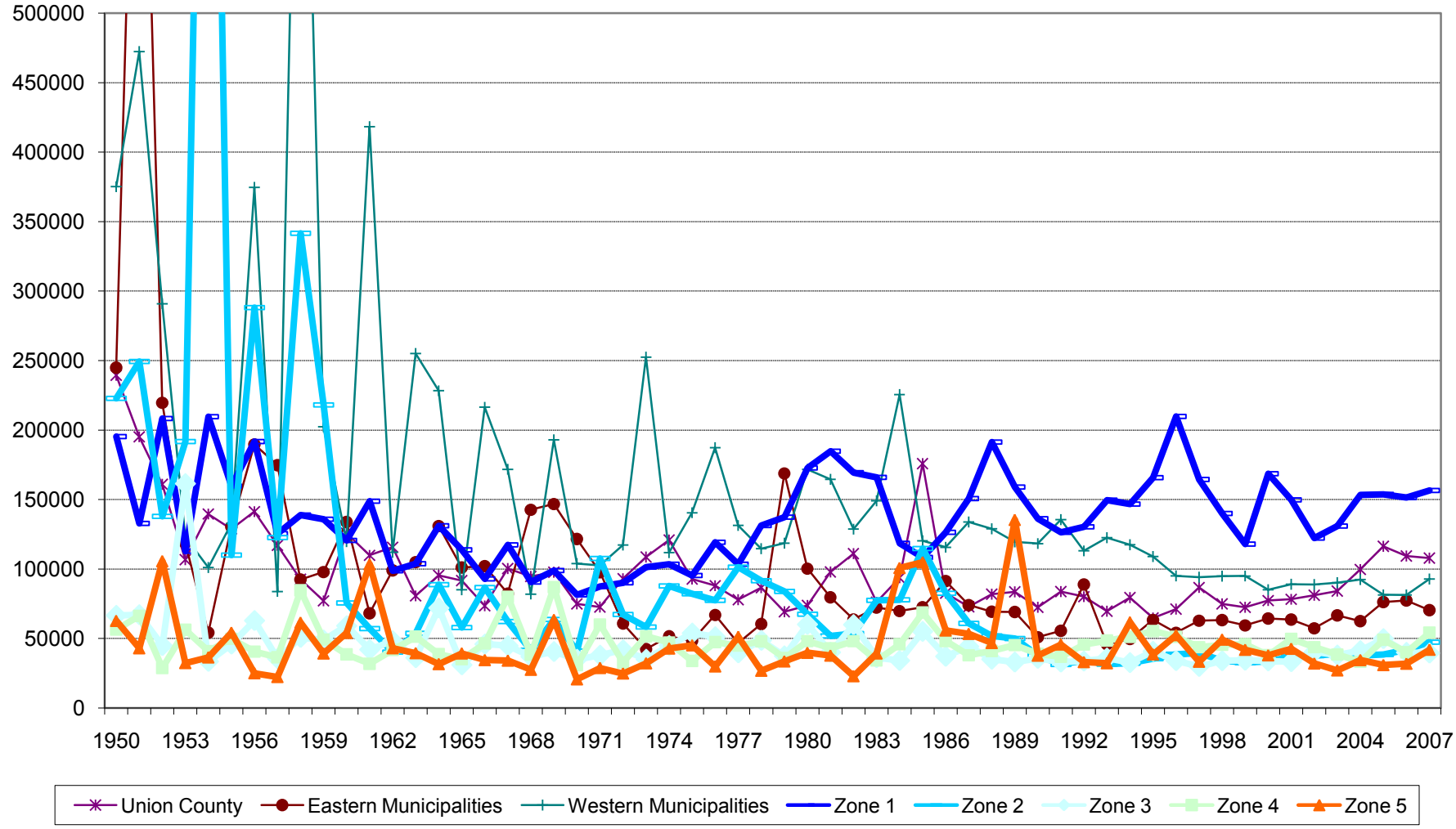


Source: Kenan Institute analysis of Mecklenburg and Union County data

Note: See Map 2 for definitions of Zones

Figure 7

Value of Housing in Mecklenburg and Union Counties

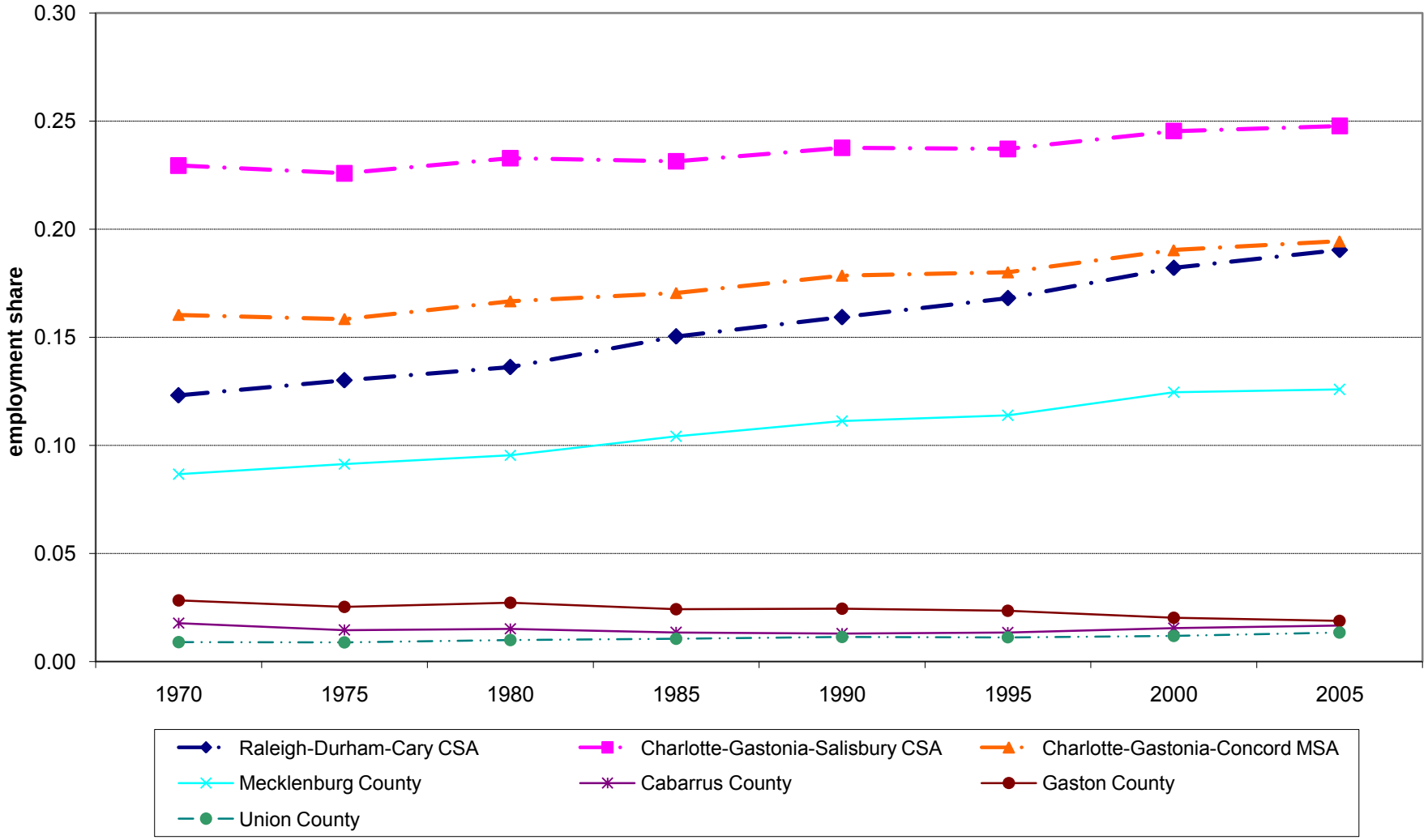


Source: Kenan Institute analysis of Mecklenburg and Union County data

Note: See Map 2 for definitions of Zones

Figure 8

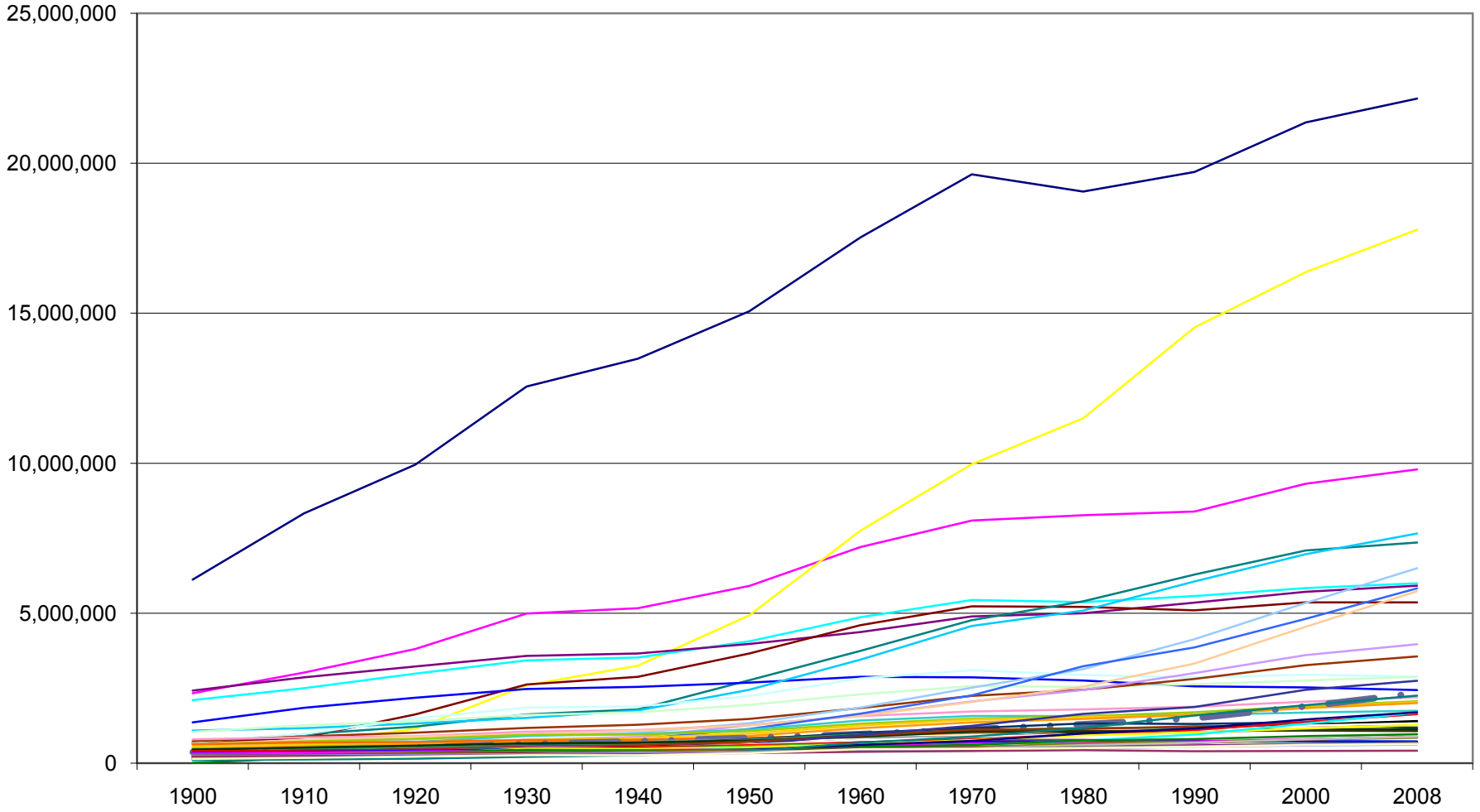
Selected Regional Shares of North Carolina Employment



Source: Kenan Institute analysis of Woods and Poole compilation of Census data

Figure 9

Population of the Largest 50 1950 Metropolitan Regions, 1900-2000

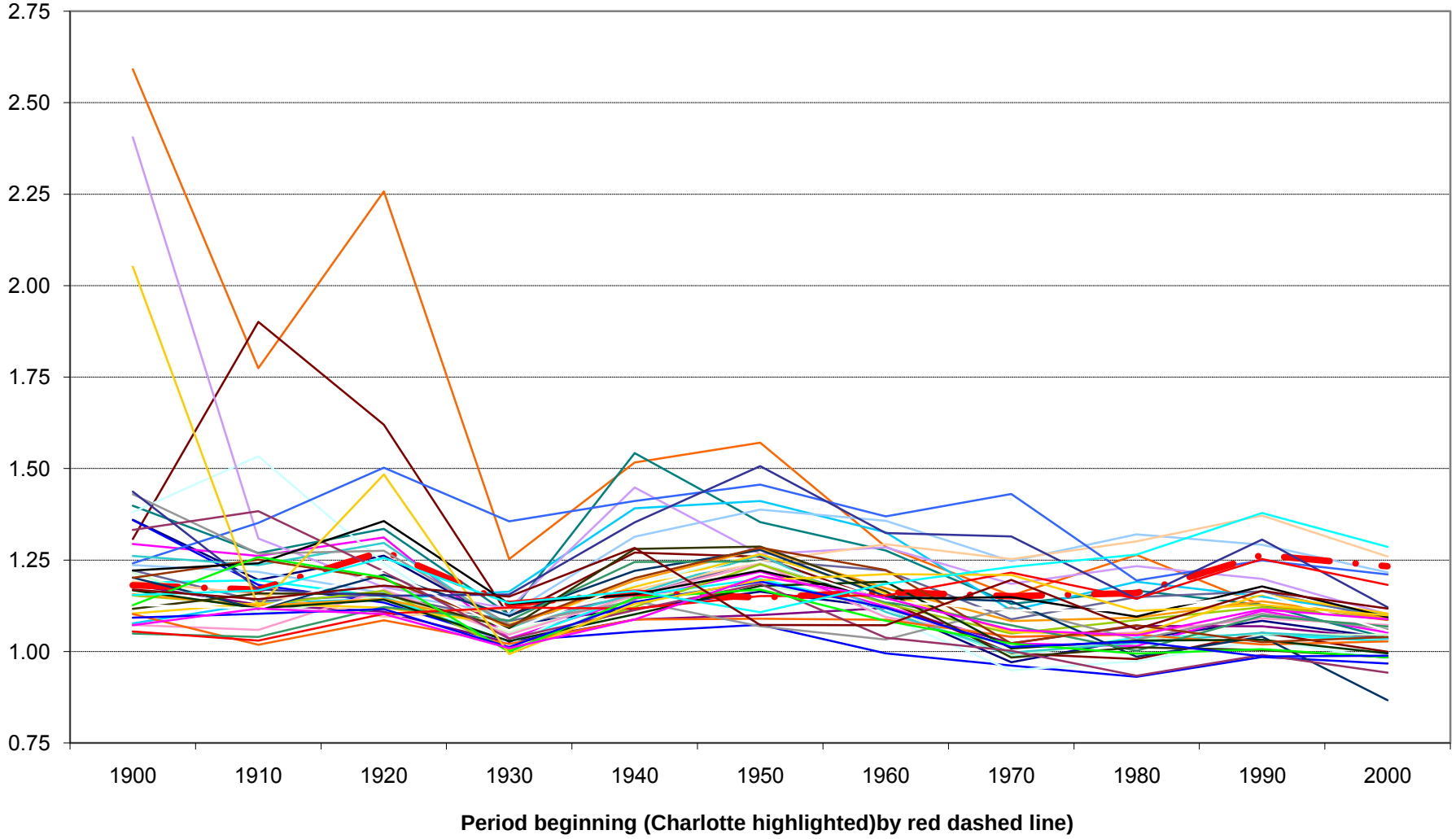


(Charlotte highlighted by red dashed line)

Source: Kenan Institute analysis of Census data

Figure 10

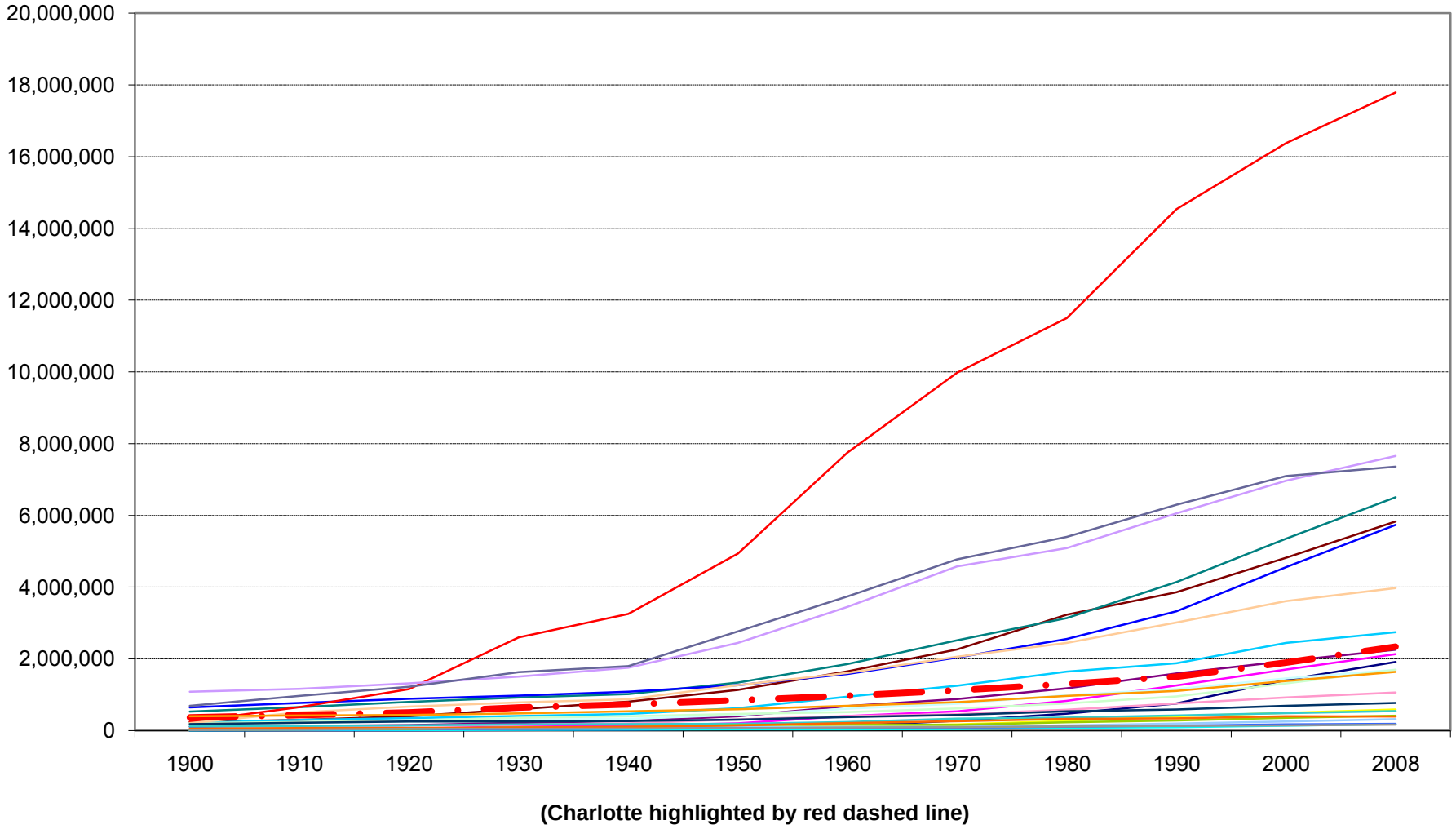
Population Growth among the Largest 50 1950 Metropolitan Regions, 1900-2000



Source: Kenan Institute analysis of Census data

Figure 11

25 Most Rapidly Growing Metropolitan Regions, 1950-2008

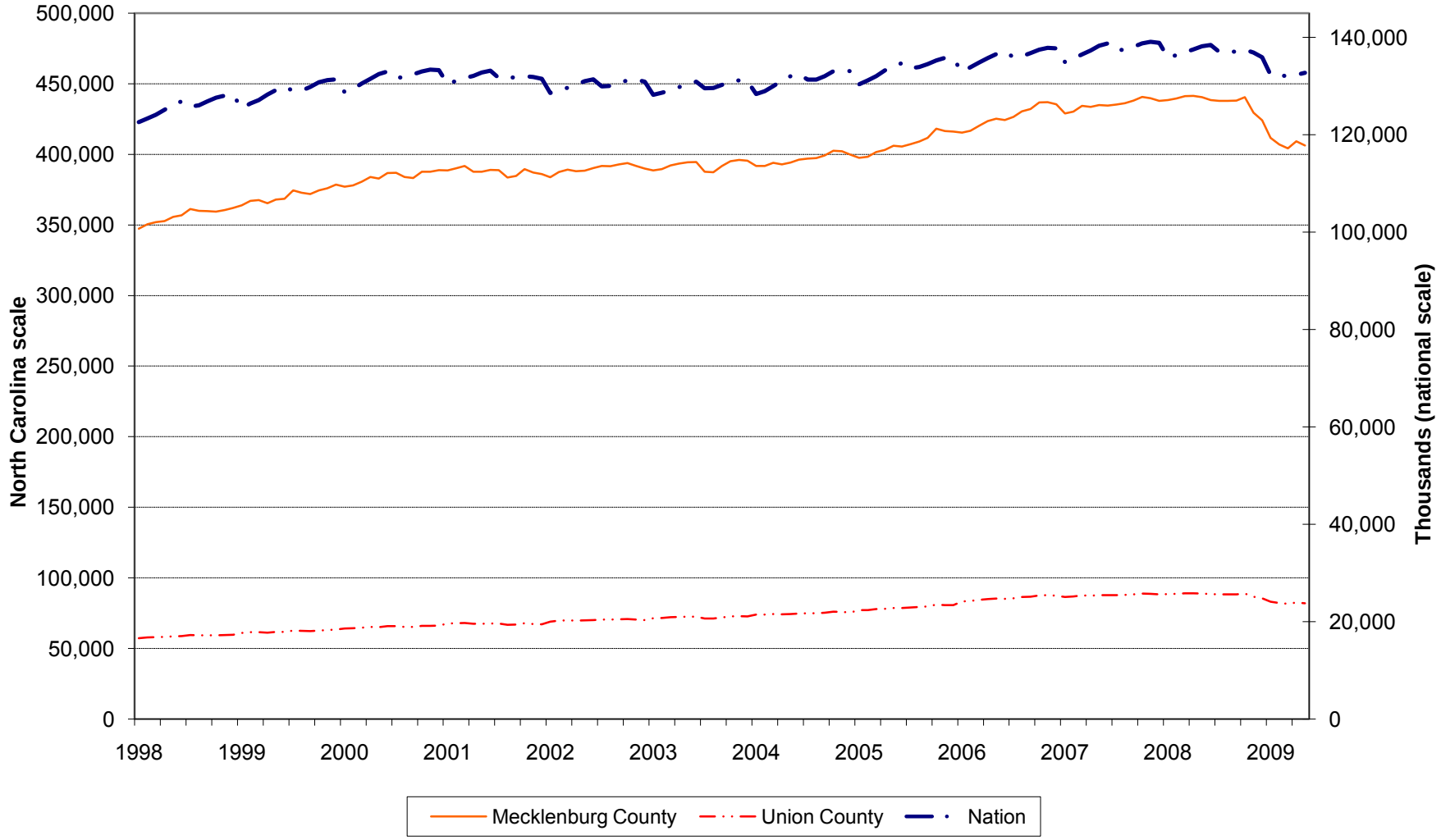


(Charlotte highlighted by red dashed line)

Source: Kenan Institute analysis of Census data

Figure 12

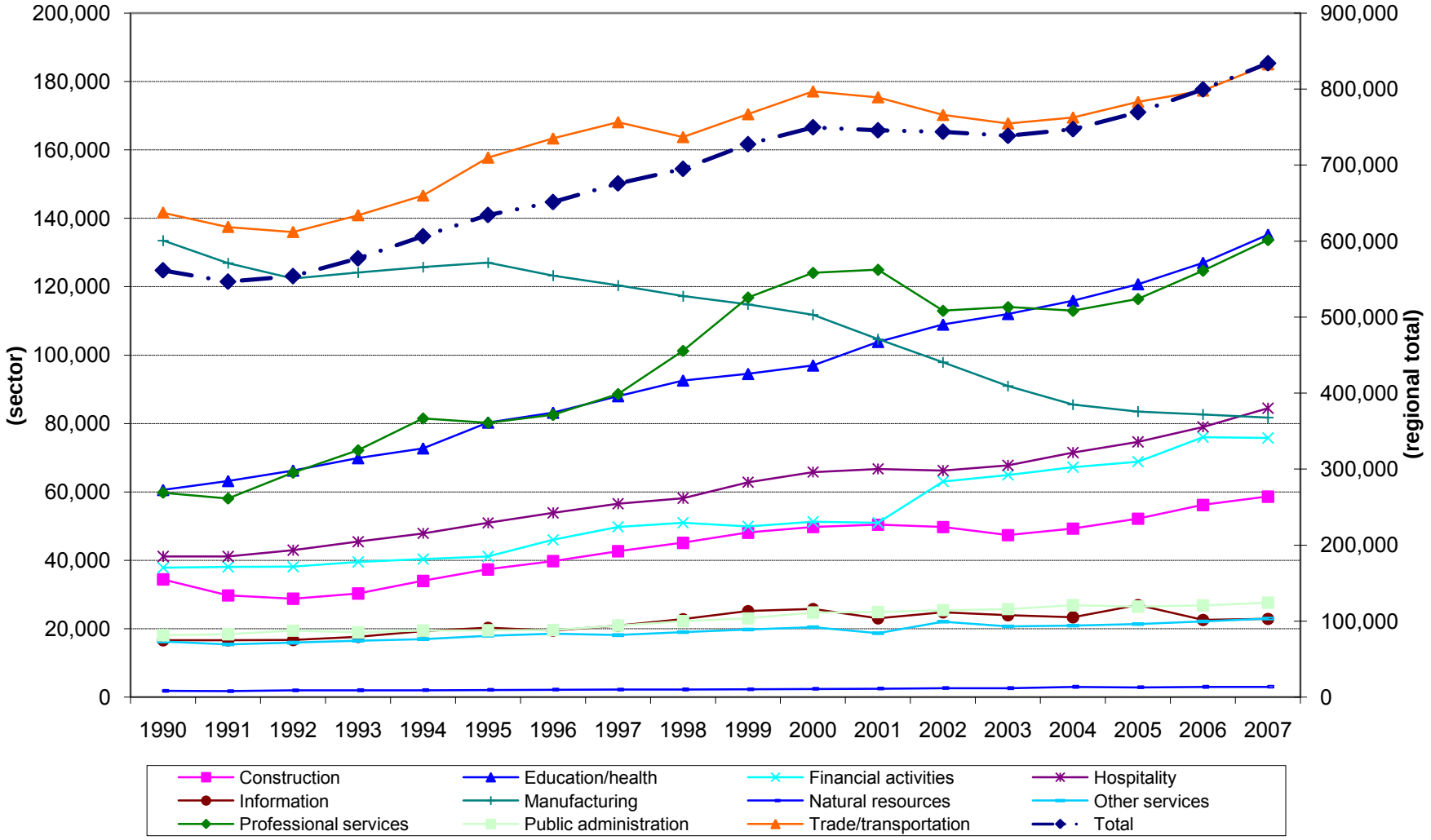
Non-Farm Employment in Selected Areas



Source: Kenan Institute analysis of Bureau of Labor Statistics data

Figure 13

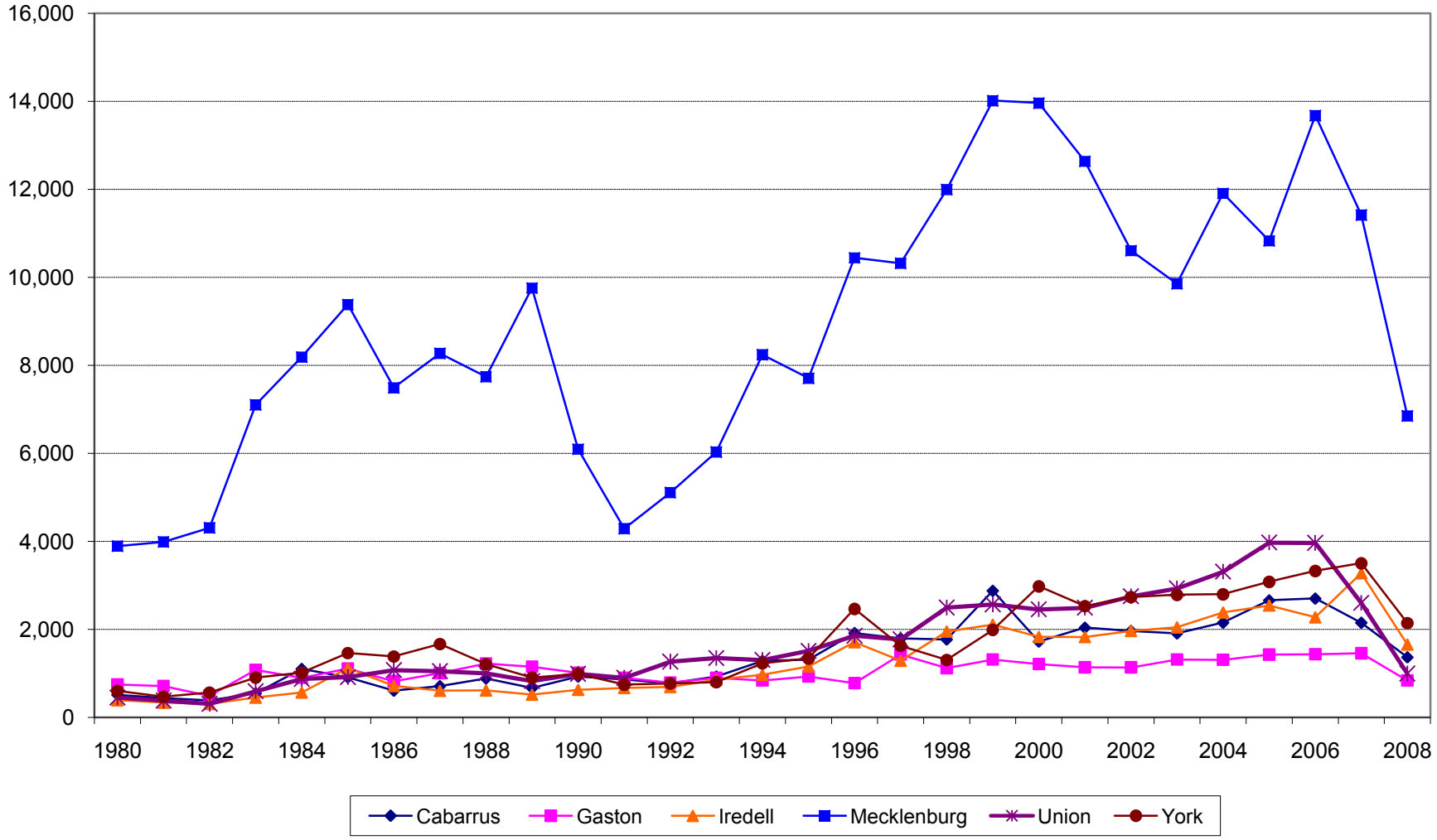
Charlotte Region Employment by Sector, 1990-2007



Source: Kenan Institute analysis of Bureau of Labor Statistics data

Figure 14

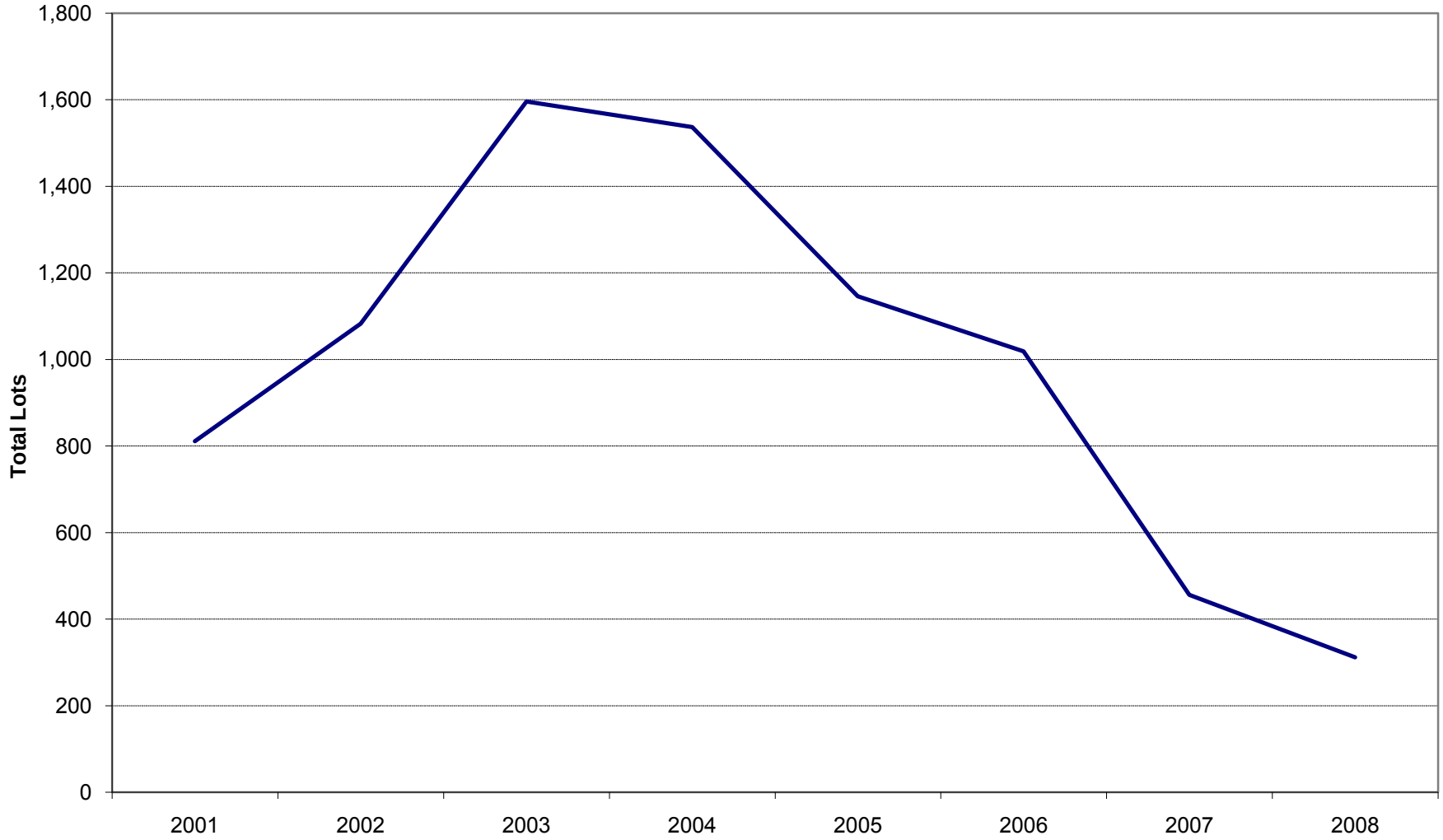
Housing Permits in Charlotte Region by County



Source: Kenan Institute analysis of HUD data

Figure 15

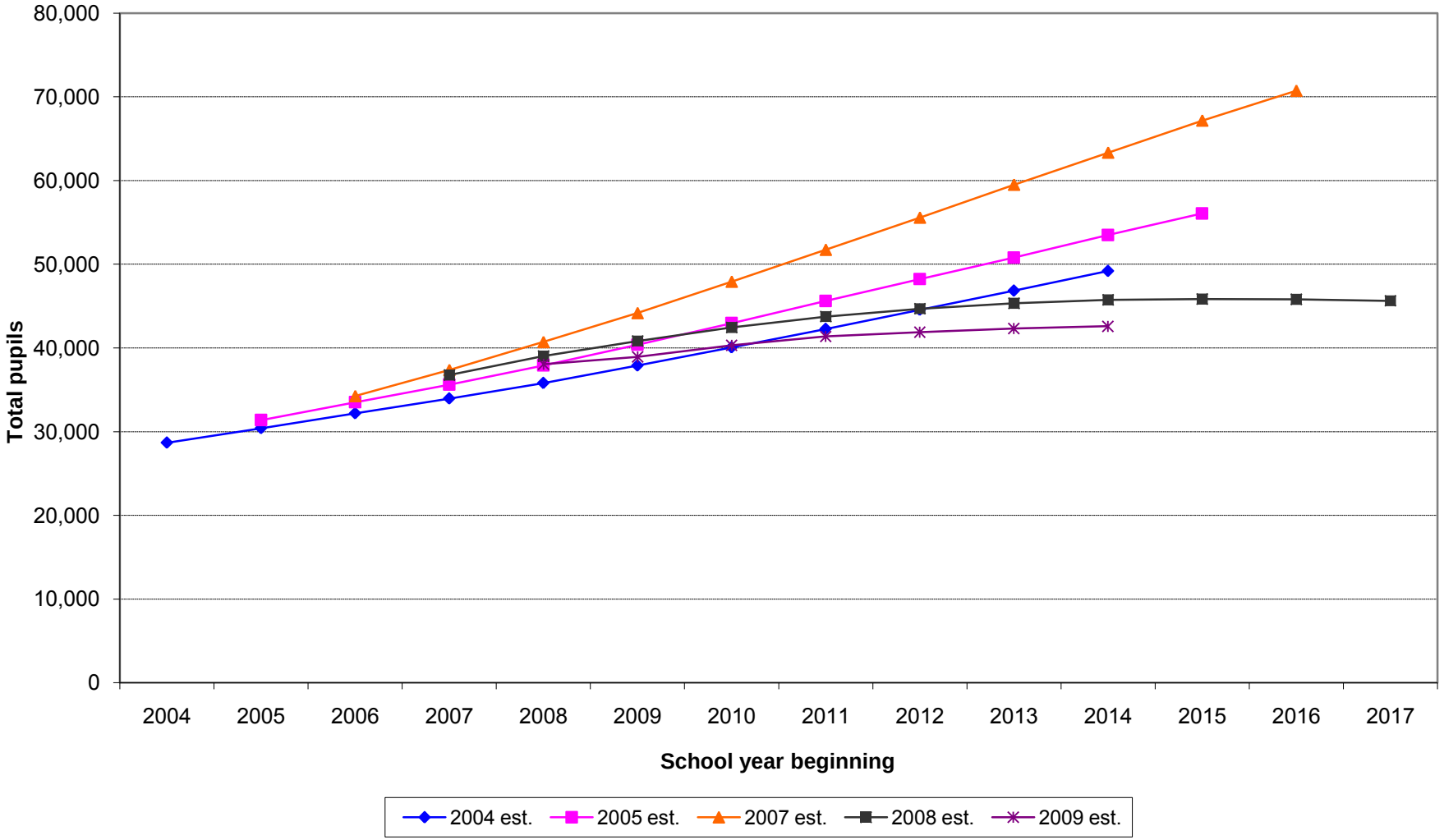
Union County Subdivision Approvals



Source: Kenan Institute analysis of Union County data

Figure 16

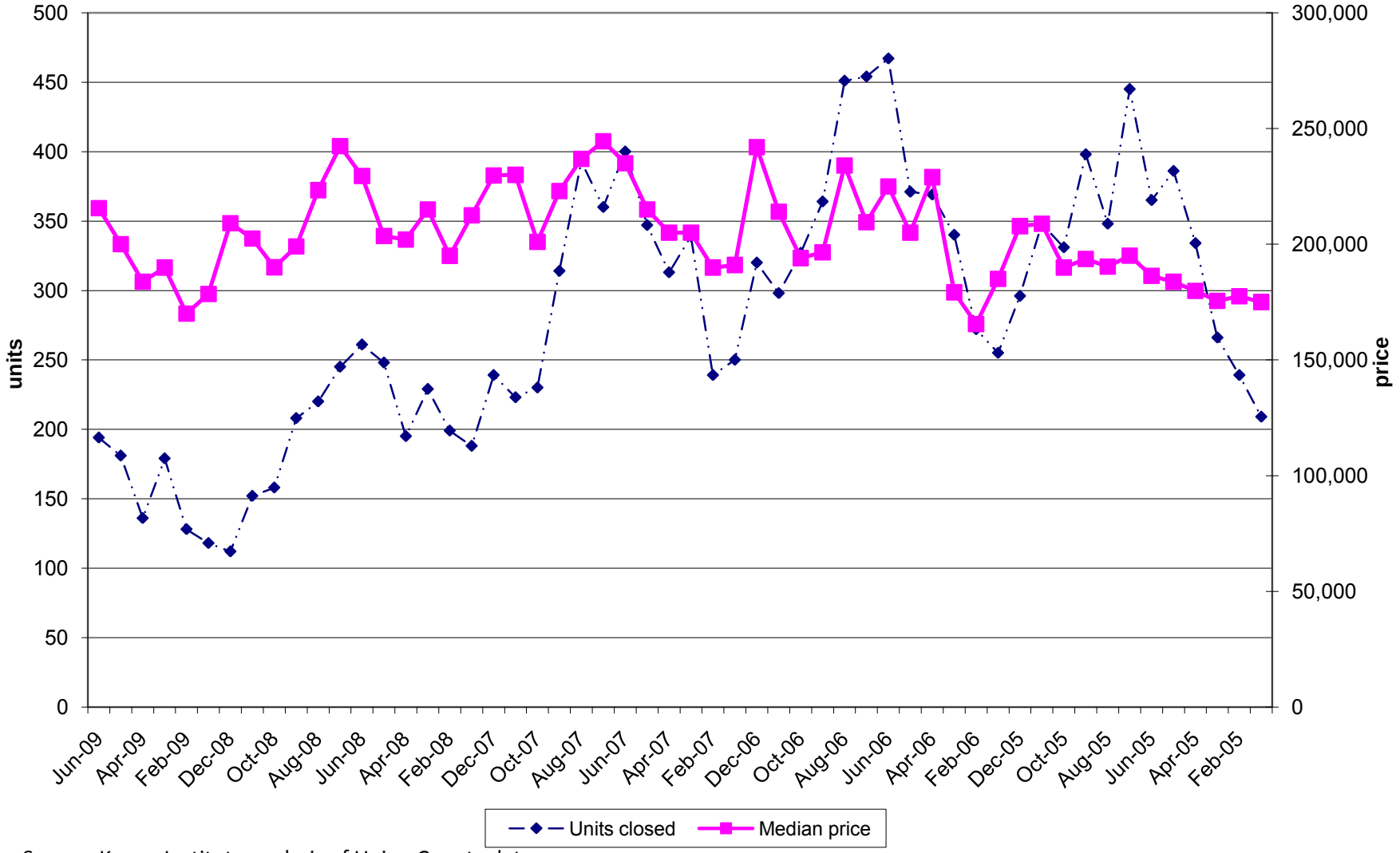
Trends in Union County Pupil Forecasts



Source: Kenan Institute analysis of Union County School District data

Figure 17

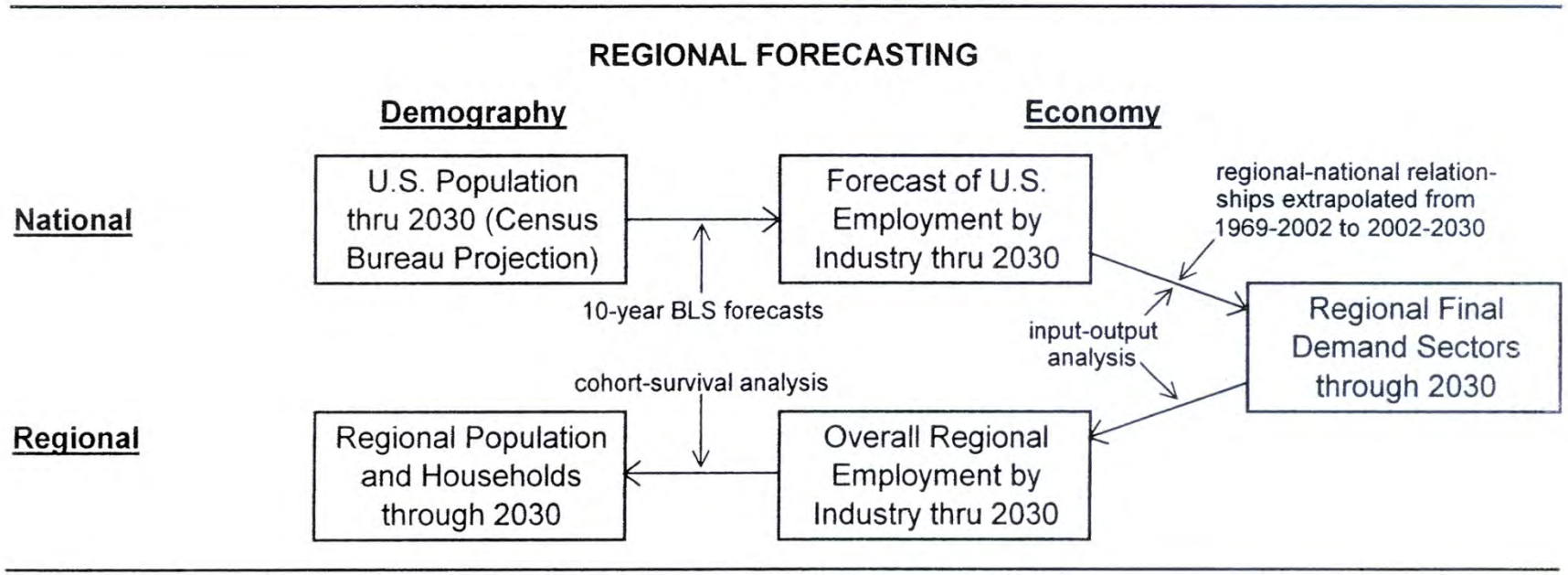
Union County Residential Real Estate Closings, 2005-2009



Source: Kenan Institute analysis of Union County data

Figure 18

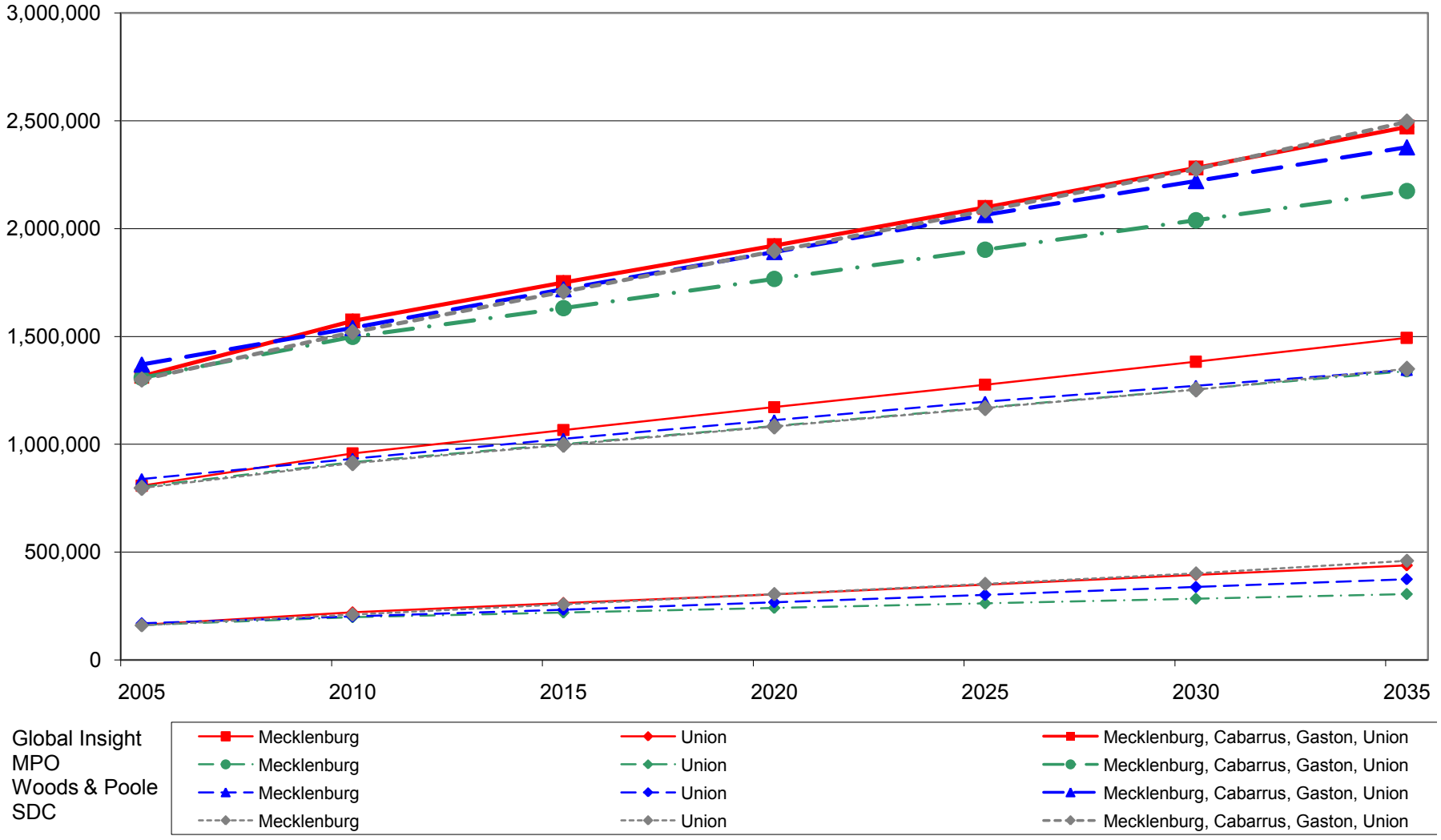
Overview of Regional Projection Process



Source: Hammer, Demographic and Economic Forecasts for the Charlotte Region, 2003

Figure 19

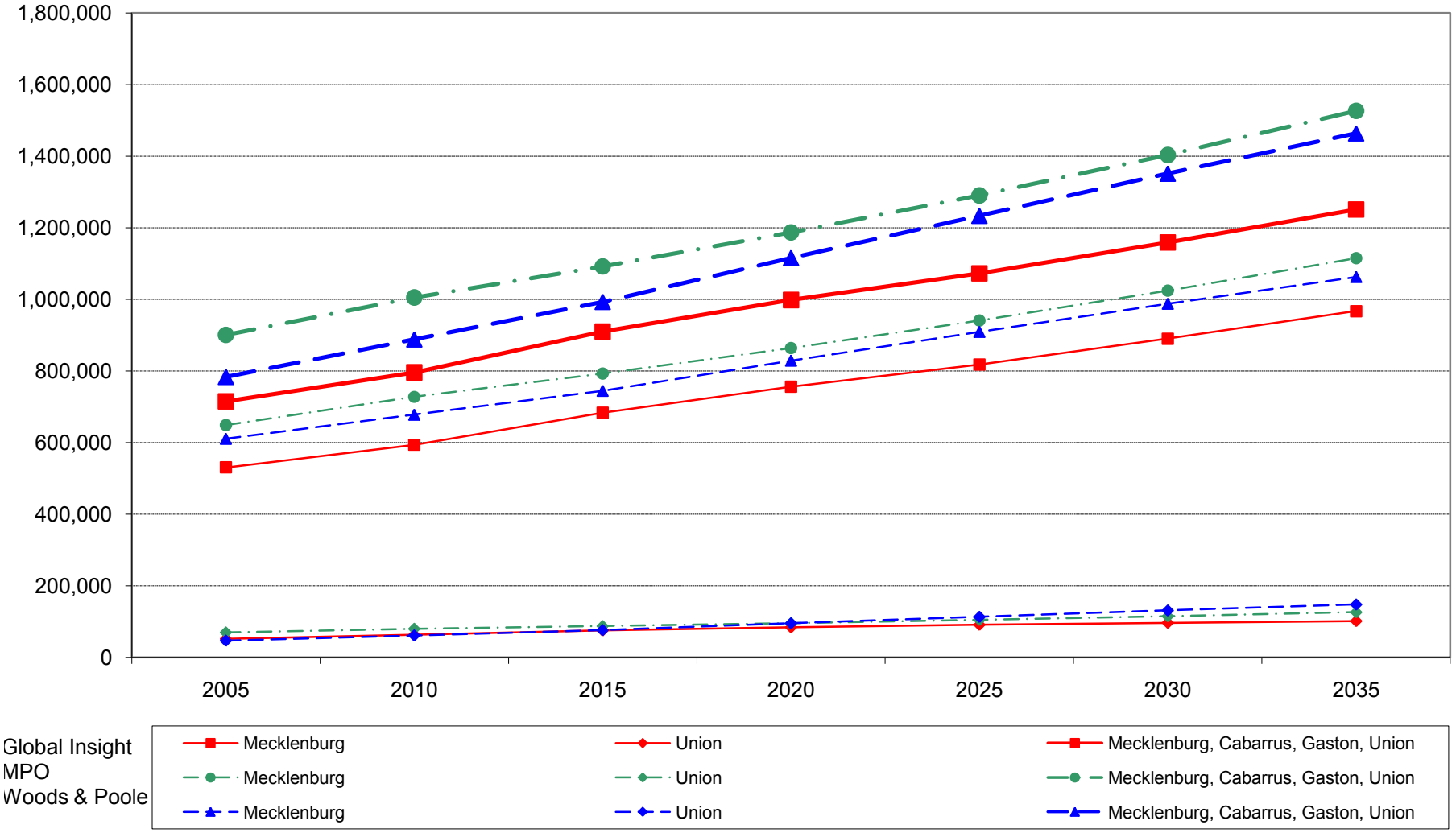
Comparison of Population Projections



Source: Kenan Institute analysis of data compiled from multiple sources

Figure 20

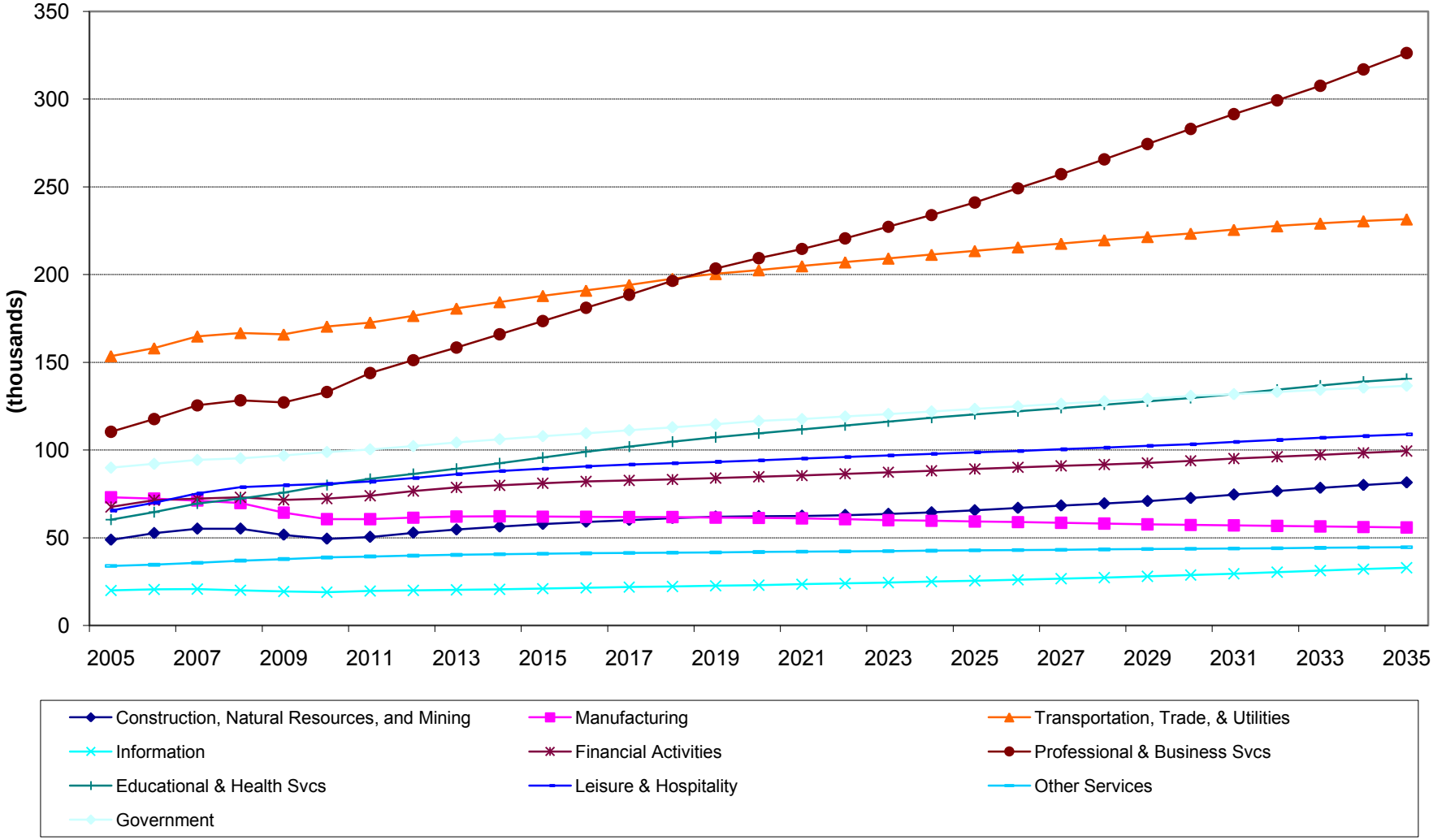
Comparison of Employment Projections



Source: Kenan Institute analysis of data compiled from multiple sources

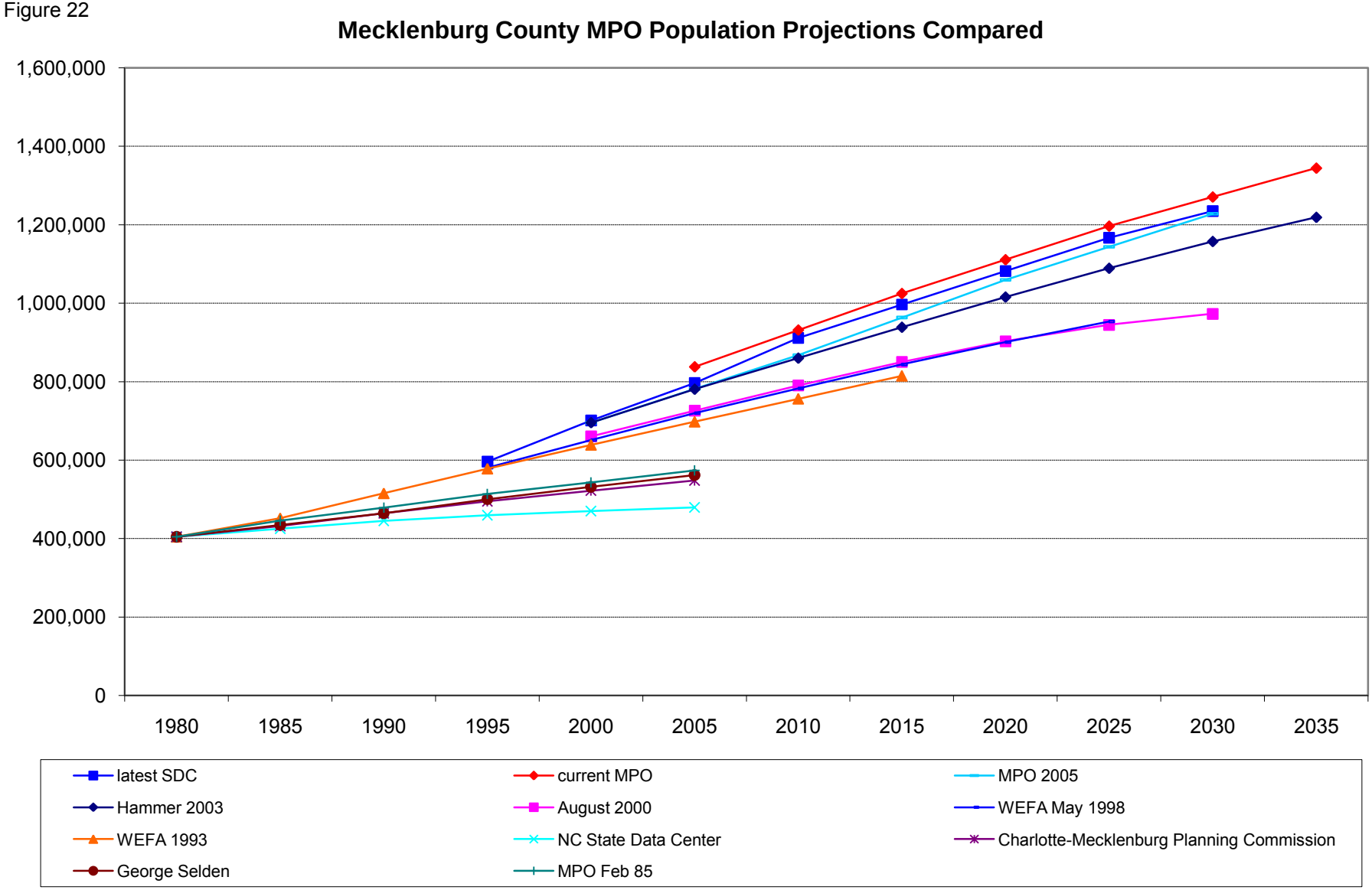
Figure 21

Projected Four-County Employment, Super Sectors



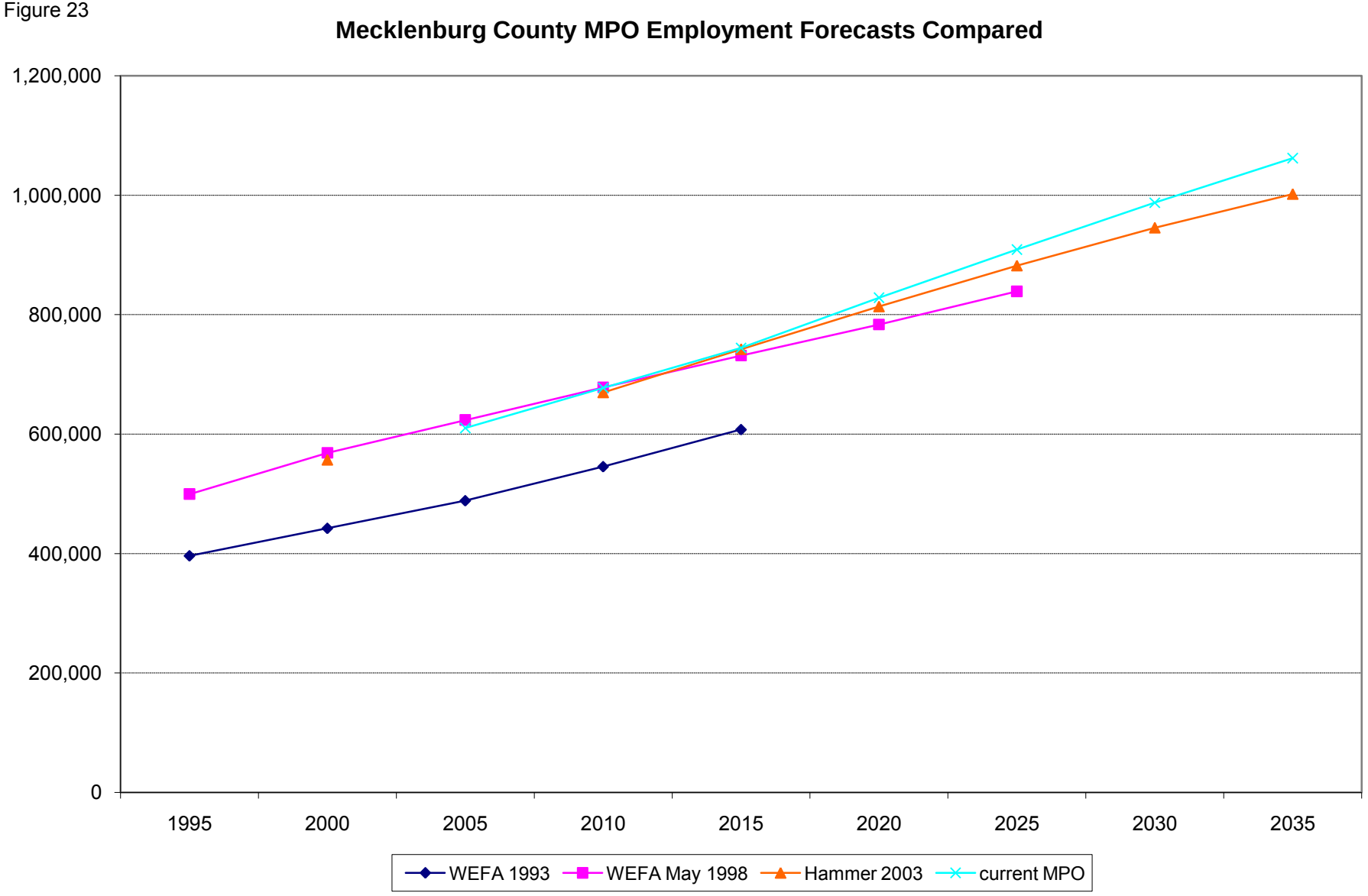
Source: Kenan Institute analysis of Global Insight data

Figure 22



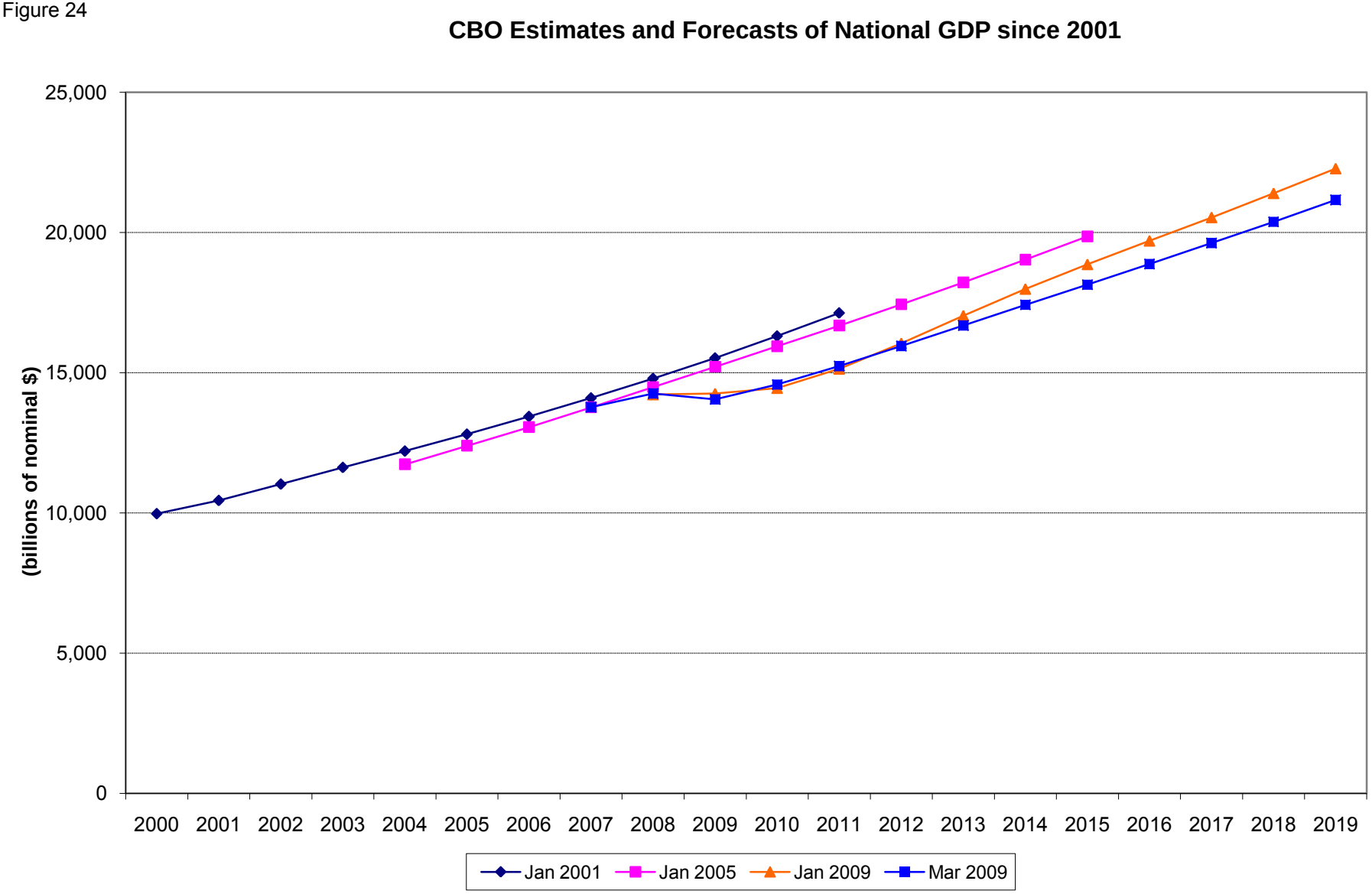
Source: Kenan Institute analysis of data compiled from multiple sources

Figure 23



Source: Kenan Institute analysis of compiled MPO data

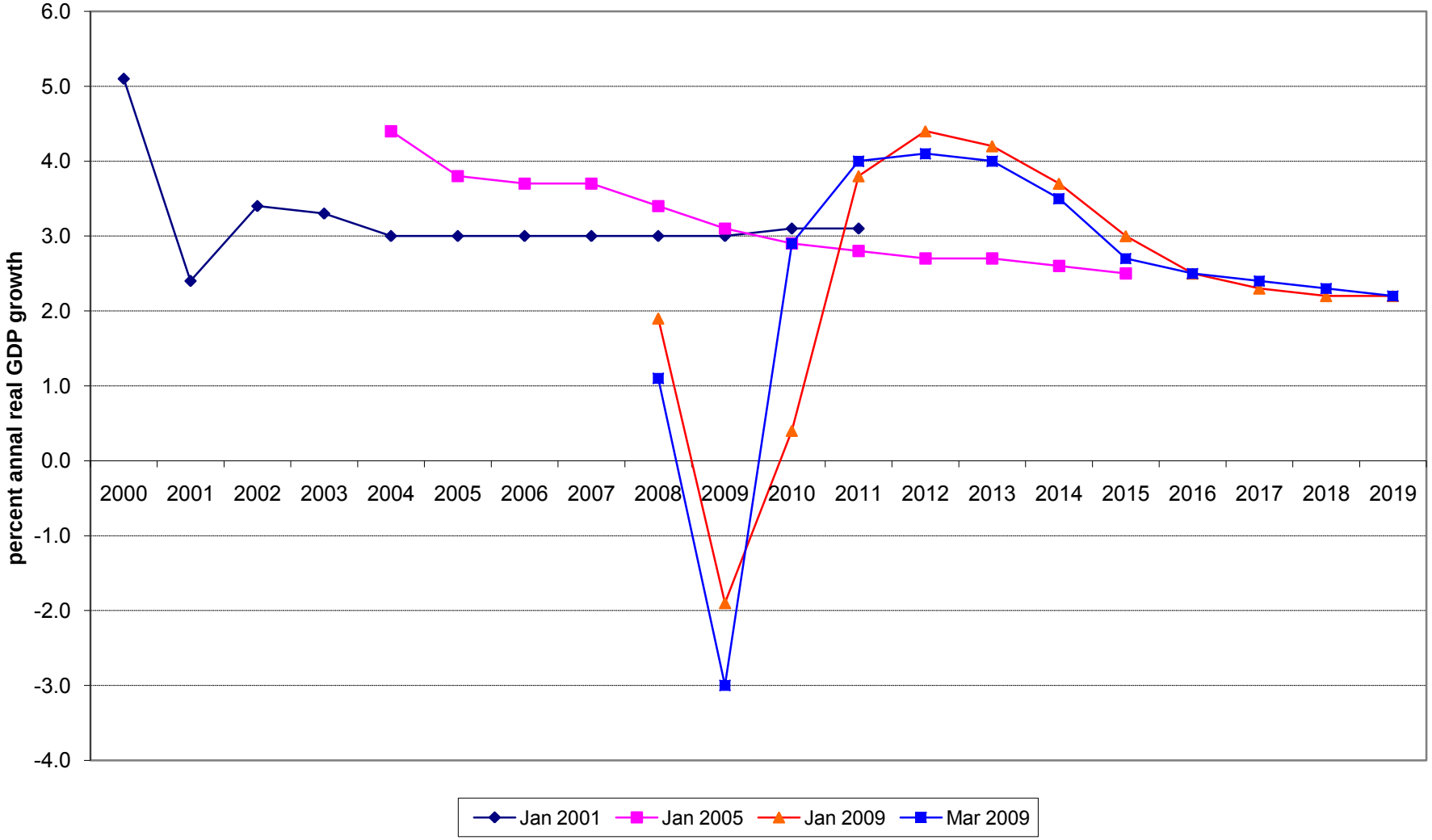
Figure 24



Source: Kenan Institute analysis of compiled CBO data

Figure 25

CBO Estimates and Forecasts of Real GDP Growth Rates

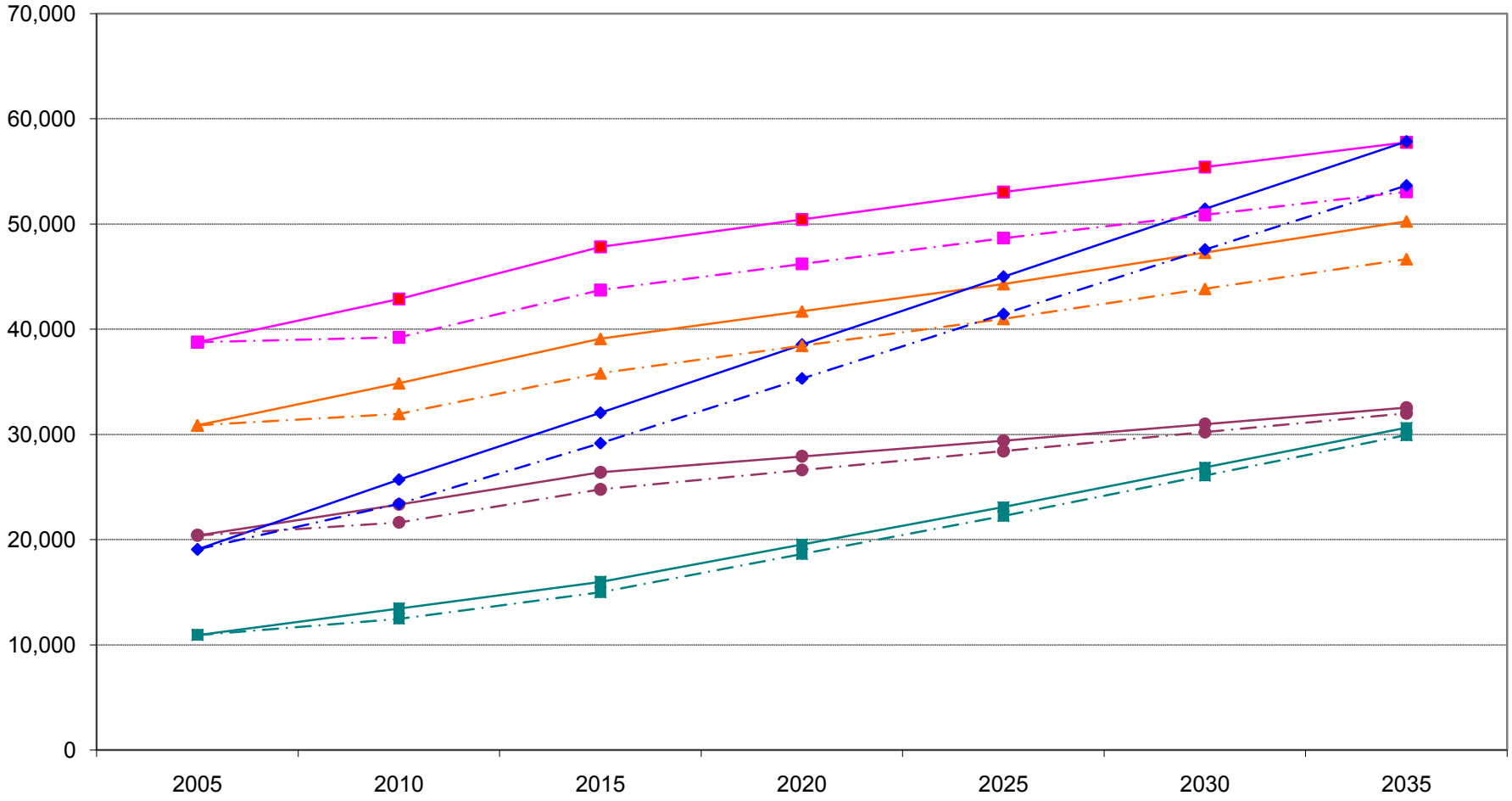


Source: Kenan Institute analysis of compiled CBO data

Figure 26

Comparison of Corridor Zone Population Estimates

30 July 2009



Solid: Original;MPO
Broken: Kenan revised

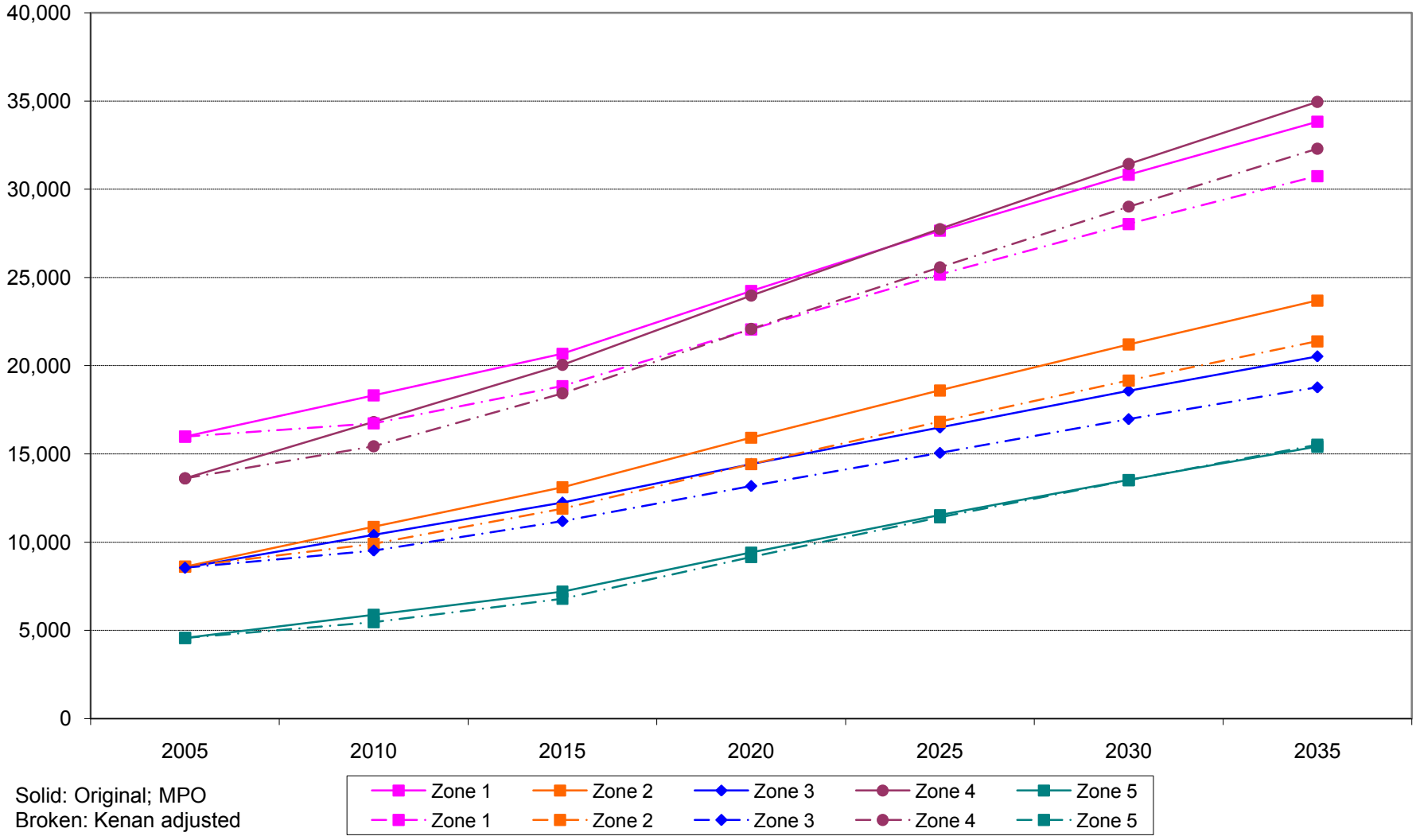
Source: Kenan Institute analysis of MPO data

Note: See Map 2 for definitions of Zones

Figure 27

Comparison of Corridor Zone Employment Estimates

30 July 2009



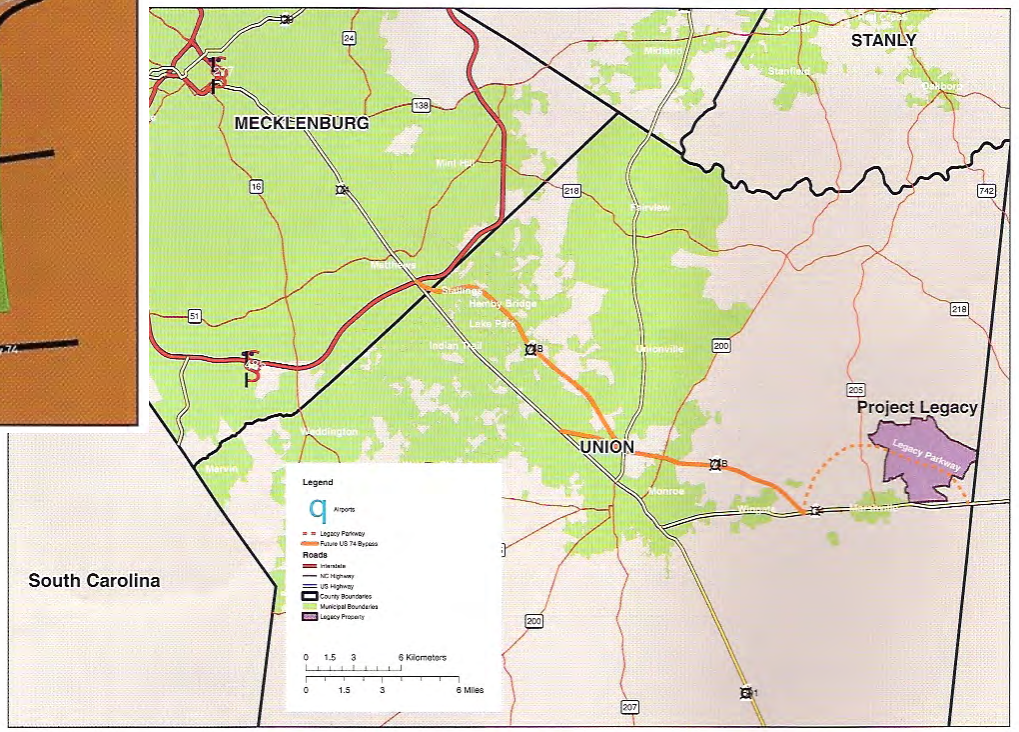
Solid: Original; MPO
Broken: Kenan adjusted

Source: Kenan Institute analysis of MPO data

Note: See Map 2 for definitions of Zones

Figure 28

Proposed Legacy Park



Source: Union County Partnership for Progress http://www.unioncpp.com/pdfs/LegacyBusinessParkBrochure.pdf

Table 1: Historical Population Trends of Selected Areas

Total Population (thousands)

	1970	1975	1980	1985	1990	1995	2000	2005
United States	203,982.31	215,465.21	227,225.62	237,924.75	249,622.81	266,278.39	282,194.31	295,895.90
Southeast Region	44,054.11	48,773.73	52,874.78	56,199.13	59,516.12	64,601.94	69,495.90	74,009.25
North Carolina	5,106.70	5,535.44	5,896.17	6,254.00	6,664.02	7,344.67	8,079.78	8,679.09
Raleigh-Durham-Cary CSA	616.66	688.98	756.57	844.12	963.81	1,132.86	1,322.26	1,518.41
Charlotte-Gastonia-Salisbury CSA	1,131.49	1,210.03	1,299.88	1,389.08	1,510.47	1,679.19	1,908.84	2,124.26
Charlotte-Gastonia-Concord MSA	744.26	796.51	859.26	932.35	1,030.95	1,160.70	1,340.23	1,522.19
Mecklenburg County	355.72	377.50	406.20	448.88	515.61	596.04	700.79	802.40
Union County	55.09	62.98	70.79	76.71	84.77	100.60	125.53	160.88

Population Shares

Share of United States

United States	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Southeast Region	0.2160	0.2264	0.2327	0.2362	0.2384	0.2426	0.2463	0.2501
North Carolina	0.0250	0.0257	0.0259	0.0263	0.0267	0.0276	0.0286	0.0293
Raleigh-Durham-Cary CSA	0.0030	0.0032	0.0033	0.0035	0.0039	0.0043	0.0047	0.0051
Charlotte-Gastonia-Salisbury CSA	0.0055	0.0056	0.0057	0.0058	0.0061	0.0063	0.0068	0.0072
Charlotte-Gastonia-Concord MSA	0.0036	0.0037	0.0038	0.0039	0.0041	0.0044	0.0047	0.0051
Mecklenburg County	0.0017	0.0018	0.0018	0.0019	0.0021	0.0022	0.0025	0.0027
Union County	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004	0.0004	0.0005

Share of North Carolina

North Carolina	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Raleigh-Durham-Cary CSA	0.1208	0.1245	0.1283	0.1350	0.1446	0.1542	0.1637	0.1750
Charlotte-Gastonia-Salisbury CSA	0.2216	0.2186	0.2205	0.2221	0.2267	0.2286	0.2362	0.2448
Charlotte-Gastonia-Concord MSA	0.1457	0.1439	0.1457	0.1491	0.1547	0.1580	0.1659	0.1754
Mecklenburg County	0.0697	0.0682	0.0689	0.0718	0.0774	0.0812	0.0867	0.0925
Union County	0.0108	0.0114	0.0120	0.0123	0.0127	0.0137	0.0155	0.0185

Share of Charlotte CSA

Charlotte-Gastonia-Salisbury CSA	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Charlotte-Gastonia-Concord MSA	0.6578	0.6583	0.6610	0.6712	0.6825	0.6912	0.7021	0.7166
Mecklenburg County	0.3144	0.3120	0.3125	0.3231	0.3414	0.3550	0.3671	0.3777
Union County	0.0487	0.0520	0.0545	0.0552	0.0561	0.0599	0.0658	0.0757

Source: Woods and Poole from Census data

Table 2: Historical Employment Trends of Selected Areas

Total Employment (thousands)

	1970	1975	1980	1985	1990	1995	2000	2005
United States	91,281.59	98,906.57	114,231.29	124,509.76	139,380.79	148,982.80	166,758.67	174,176.36
Southeast Region	19,254.16	21,642.23	25,378.31	28,242.71	32,067.62	35,492.78	39,981.13	42,683.39
North Carolina	2,468.51	2,647.47	3,059.88	3,409.93	3,928.10	4,380.50	4,924.91	5,150.34
Raleigh-Durham-Cary CSA	303.95	344.48	416.82	512.87	625.71	736.46	896.85	980.59
Charlotte-Gastonia-Salisbury CSA	566.34	597.87	712.47	789.06	933.35	1,038.65	1,208.48	1,275.91
Charlotte-Gastonia-Concord MSA	395.83	419.39	509.92	581.33	701.36	788.83	937.32	1,001.31
Mecklenburg County	214.02	241.78	291.91	355.36	436.99	499.07	613.61	648.47
Union County	22.12	23.44	30.51	36.00	44.57	49.04	58.59	69.22

Employment Shares

Share of United States

United States	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Southeast Region	0.2109	0.2188	0.2222	0.2268	0.2301	0.2382	0.2398	0.2451
North Carolina	0.0270	0.0268	0.0268	0.0274	0.0282	0.0294	0.0295	0.0296
Raleigh-Durham-Cary CSA	0.0033	0.0035	0.0036	0.0041	0.0045	0.0049	0.0054	0.0056
Charlotte-Gastonia-Salisbury CSA	0.0062	0.0060	0.0062	0.0063	0.0067	0.0070	0.0072	0.0073
Charlotte-Gastonia-Concord MSA	0.0043	0.0042	0.0045	0.0047	0.0050	0.0053	0.0056	0.0057
Mecklenburg County	0.0023	0.0024	0.0026	0.0029	0.0031	0.0033	0.0037	0.0037
Union County	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0004	0.0004

Share of North Carolina

North Carolina	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Raleigh-Durham-Cary CSA	0.1231	0.1301	0.1362	0.1504	0.1593	0.1681	0.1821	0.1904
Charlotte-Gastonia-Salisbury CSA	0.2294	0.2258	0.2328	0.2314	0.2376	0.2371	0.2454	0.2477
Charlotte-Gastonia-Concord MSA	0.1604	0.1584	0.1666	0.1705	0.1785	0.1801	0.1903	0.1944
Mecklenburg County	0.0867	0.0913	0.0954	0.1042	0.1112	0.1139	0.1246	0.1259
Union County	0.0090	0.0089	0.0100	0.0106	0.0113	0.0112	0.0119	0.0134

Share of Charlotte CSA

Charlotte-Gastonia-Salisbury CSA	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Charlotte-Gastonia-Concord MSA	0.6989	0.7015	0.7157	0.7367	0.7514	0.7595	0.7756	0.7848
Mecklenburg County	0.3779	0.4044	0.4097	0.4504	0.4682	0.4805	0.5078	0.5082
Union County	0.0391	0.0392	0.0428	0.0456	0.0478	0.0472	0.0485	0.0543

Source: Woods and Poole from Census data

Table 3: Major Employers in the Charlotte Metropolitan Region

	Company	EmplNo		Company	EmplNo
1	Carolinas Healthcare System*	26,283	49	Invista	1,600
2	Wells Fargo/Wachovia Corp	20,000	50	Microsoft Corp	1,600
3	Bank Of America*	13,960	51	Ross Stores Inc	1,600
4	Wal-Mart Stores Inc	13,192	52	Ina Usa Corp	1,575
5	Presbyterian Regional Healthcare Corp*	9,000	53	Burger King Corp	1,540
6	Delhaize America Inc/Food Lion Llc	8,658	54	Best Western	1,500
7	Duke Energy Corp*	7,757	55	Carolina Restaurant Group Inc*	1,500
8	US Airways	5,955	56	Chick-Fil-A	1,500
9	Lowe's Companies Inc*	5,900	57	Home Depot Inc	1,500
10	US Postal Service	5,400	58	Piedmont Medical Center*	1,500
11	Adecco	5,000	59	Rite Aid Corp	1,500
12	Harris Teeter Inc*	4,700	60	Intercontinental Hotels Group	1,450
13	Freightliner Corp LLC	4,540	61	Lance Inc*	1,450
14	Parkdale Mills Inc	3,600	62	Brinker International	1,440
15	Compass Group*	3,518	63	Allen Tate Co Inc*	1,400
16	At&T North Carolina	3,290	64	Shaw Energy	1,400
17	Caromont Health Inc	3,230	65	Affinia Group Inc	1,389
18	Corestaff Services	2,900	66	Pizza Hut Inc	1,380
19	Belk Inc*	2,700	67	Ingersoll-Rand Co	1,350
20	Tiaa-Cref	2,650	68	Yum Brands Inc	1,320
21	Philip Morris Usa	2,600	69	RSI Home Products Inc	1,300
22	Labor Ready Inc	2,545	70	Sherrill Furniture Co	1,300
23	Bi-Lo Llc	2,538	71	Hendrick Automotive Group*	1,277
24	CVS Caremark Corp	2,500	72	Starbucks Coffee Co	1,260
25	United Parcel Service	2,500	73	Frye Regional Medical Center	1,247
26	Marriott International	2,475	74	Conbraco Industries Inc	1,212
27	Hickory Springs Manufacturing Co	2,410	75	American & Efird Inc	1,200
28	Target Stores	2,400	76	Charlotte Pipe & Foundry Co*	1,200
29	Family Dollar Stores Inc*	2,373	77	Tyson Foods Inc, Fresh Retail Div	1,200
30	JC Penney Corp Inc	2,300	78	Vanguard Group Inc, The	1,200
31	Hilton	2,175	79	Shurtape Technologies, LLC	1,150
32	Carowinds	2,110	80	Catawba Valley Medical Center*	1,100
33	Commscope Inc	2,100	81	Ati Allvac	1,090
34	Time Warner Cable	2,100	82	Charlotte Observer, The	1,077
35	IBM Corp	2,000	83	Weyerhaeuser Co	1,061
36	Windstream Communications	2,000	84	Gap Inc	1,050
37	Ymca Of Greater Charlotte*	2,000	85	Applebee's International Inc	1,020
38	Century Furniture Industries	1,980	86	Allstate Insurance Co	1,000
39	Pharr Yarns Inc	1,980	87	American Red Cross	1,000
40	Wells Fargo Mortgage	1,899	88	Comporium Group	1,000
41	BB&T	1,865	89	Convergus Corp	1,000
42	Bojangles' Restaurants Inc	1,800	90	Hewitt Associates	1,000
43	Subway	1,800	91	Kelly Services Inc	1,000
44	Rowan Regional Medical Center*	1,729	92	Maersk Companies	1,000
45	Iredell Memorial Hospital Inc*	1,650	93	Mcgee Brothers Co Inc	1,000
46	Wg (Bill) Hefner Veterans Affairs Medical Center	1,626	94	Show Pros Entertainment Services Of Charlotte Inc*	1,000
47	Mcdonald's Corp	1,625	95	Sprint	1,000
48	Alex Lee Inc	1,620			

Charlotte's Largest Employers is based on a survey conducted in June 2008 by the Charlotte Chamber of Commerce and Central Piedmont Community College. One hundred and eight firms employ 500 or more people with Mecklenburg County. Of there firms, 45 are headquartered in Charlotte-Mecklenburg and are indicated by an asterisk.

http://www.charlottechamber.com/index.php?src=gendocs&ref=LargestEmployers&category=Business_Profile&submenu=CommProfile

Table 4: Land Use in Mecklenburg and Union Counties

	Residential	Commercial	Developable	Prime Developable	Remaining	Total	Developed	All developable
City of Charlotte	25,650	27,509	26,125	14,766	6,952	101,002	53,159	40,891
Northern Mecklenburg County Municipalities	6,249	2,463	8,632	7,161	1,068	25,572	8,711	15,792
Southern Mecklenburg County Municipalities	4,725	2,236	4,885	5,575	578	17,998	6,960	10,460
Unincorporated areas of Mecklenburg County	12,059	4,036	24,155	35,708	1,943	77,902	16,095	59,863
Eastern Union County Municipalities	6,862	1,199	3,168	14,389	469	26,087	8,061	17,557
Western Union County Municipalities	14,127	719	1,784	10,650	2,203	29,482	14,846	12,434
Unincorporated areas of Union County	41,426	2,582	24,959	153,714	4,110	226,791	44,008	178,673
Corridor Zone 1	6,342	1,672	2,128	2,079	852	13,072	8,013	4,207
Corridor Zone 2	9,115	4,614	2,332	8,382	3,472	27,915	13,729	10,714
Corridor Zone 3	7,085	2,321	2,121	9,557	1,025	22,110	9,406	11,678
Corridor Zone 4	8,036	2,174	2,251	17,744	2,077	32,281	10,209	19,995
Corridor Zone 5	5,464	2,277	3,139	24,483	1,697	37,060	7,740	27,622
Corridor Total	36,041	13,057	11,971	62,245	9,123	132,436	49,098	74,216
Mecklenburg County	50,446	36,821	65,238	64,231	10,845	227,581	87,267	129,469
Union County	96,692	16,980	40,442	239,976	15,602	409,690	113,671	280,418
Two-county total	147,138	53,800	105,679	304,207	26,446	637,270	200,938	409,886

	Residential	Commercial	Developable	Prime Developable	Remaining	Total	Developed	All developable
City of Charlotte	25.40%	27.24%	25.87%	14.62%	6.88%	100.00%	52.63%	40.49%
Northern Mecklenburg County Municipalities	24.44%	9.63%	33.75%	28.00%	4.18%	100.00%	34.07%	61.76%
Southern Mecklenburg County Municipalities	26.25%	12.42%	27.14%	30.97%	3.21%	100.00%	38.67%	58.11%
Unincorporated areas of Mecklenburg County	15.48%	5.18%	31.01%	45.84%	2.49%	100.00%	20.66%	76.84%
Eastern Union County Municipalities	26.30%	4.60%	12.14%	55.16%	1.80%	100.00%	30.90%	67.30%
Western Union County Municipalities	47.92%	2.44%	6.05%	36.12%	7.47%	100.00%	50.36%	42.17%
Unincorporated areas of Union County	18.27%	1.14%	11.01%	67.78%	1.81%	100.00%	19.40%	78.78%
Corridor Zone 1	48.51%	12.79%	16.28%	15.91%	6.52%	100.00%	61.30%	32.18%
Corridor Zone 2	32.65%	16.53%	8.36%	30.03%	12.44%	100.00%	49.18%	38.38%
Corridor Zone 3	32.05%	10.50%	9.59%	43.23%	4.64%	100.00%	42.54%	52.82%
Corridor Zone 4	24.89%	6.73%	6.97%	54.97%	6.43%	100.00%	31.63%	61.94%
Corridor Zone 5	14.74%	6.14%	8.47%	66.06%	4.58%	100.00%	20.89%	74.53%
Corridor Total	27.21%	9.86%	9.04%	47.00%	6.89%	100.00%	37.07%	56.04%
Mecklenburg County	22.17%	16.18%	28.67%	28.22%	4.77%	100.00%	38.35%	56.89%
Union County	23.60%	4.14%	9.87%	58.57%	3.81%	100.00%	27.75%	68.45%
Two-county total	23.09%	8.44%	16.58%	47.74%	4.15%	100.00%	31.53%	64.32%

Source: Kenan Institute analysis of Mecklenburg and Union county parcel data

Table 5: Shift-Share Analysis of Charlotte Region Employment

Panel A: Baseline Analysis (All Metropolitan Areas)

Period 1: 1990 third quarter to 2001 first quarter; All MSAs as baseline

Industry	Charlotte (MSA) Employment 1990 Q3	Charlotte (MSA) Employment 2001 Q1	Total MSA Employment 1990 Q3	Total MSA Employment 2001 Q1	Charlotte (MSA) Employment Change	National Growth Share	Industry Mix Effect	Regional Shift Effect	Percent of Regional Shift
Natural resources	1,786	2,345	1,175,788	914,807	559	349	(745)	955	1.4%
Construction	35,030	49,211	3,814,378	4,387,453	14,181	6,837	(1,574)	8,918	13.2%
Manufacturing	133,854	109,207	12,489,283	11,884,635	(24,647)	26,124	(32,604)	(18,167)	-26.8%
Trade/transportation	137,588	170,492	19,181,065	21,726,623	32,904	26,852	(8,593)	14,644	21.6%
Information	16,568	25,096	2,005,535	2,443,580	8,528	3,233	385	4,909	7.2%
Financial activities	38,004	50,438	5,766,290	6,608,090	12,434	7,417	(1,869)	6,886	10.2%
Professional services	61,279	126,705	9,026,145	14,138,520	65,426	11,960	22,749	30,718	45.4%
Education/health	33,447	51,759	8,765,410	12,240,960	18,312	6,528	6,734	5,050	7.5%
Hospitality	42,708	63,964	7,884,380	9,460,268	21,256	8,335	201	12,720	18.8%
Other services	16,203	20,367	2,618,300	3,115,303	4,164	3,162	(87)	1,088	1.6%
All	516,467	669,584	72,726,574	86,920,239	153,117	100,796	-15,402	67,722	1

Period 2: 2001 first quarter to 2007 fourth quarter; All MSAs as baseline

Industry	Charlotte (MSA) Employment 2001 Q1	Charlotte (MSA) Employment 2007 Q4	Total MSA Employment 2001 Q1	Total MSA Employment 2007 Q4	Charlotte (MSA) Employment Change	National Growth Share	Industry Mix Effect	Regional Shift Effect	Percent of Regional Shift
Natural resources	2,345	2,848	914,807	1,094,395	503	154	306	43	0.1%
Construction	49,211	58,390	4,387,453	5,411,284	9,179	3,242	8,241	(2,305)	-3.4%
Manufacturing	109,207	81,177	11,884,635	9,238,891	(28,030)	7,195	(31,506)	(3,718)	-5.5%
Trade/transportation	170,492	183,987	21,726,623	22,869,439	13,495	11,233	(2,265)	4,527	6.7%
Information	25,096	22,224	2,443,580	2,002,646	(2,872)	1,653	(6,182)	1,656	2.4%
Financial activities	50,438	75,872	6,608,090	6,864,313	25,434	3,323	(1,367)	23,478	34.7%
Professional services	126,705	135,283	14,138,520	15,985,466	8,578	8,348	8,204	(7,974)	-11.8%
Education/health	51,759	76,283	12,240,960	14,898,160	24,524	3,410	7,826	13,288	19.6%
Hospitality	63,964	84,404	9,460,268	10,942,891	20,440	4,214	5,810	10,415	15.4%
Other services	20,367	23,444	3,115,303	3,339,337	3,077	1,342	123	1,612	2.4%
All	669,584	743,912	86,920,239	92,646,822	74,328	44,114	-10,810	41,024	1

Panel B: Summary Charlotte Region Competitive Effects with Selected Baselines

	First period	Second period
All MSAs	67,722	41,024
Southern MSAs	8,914	46,304
Mid-sized Southern MSAs	26,745	4,646

Source: Kenan Institute analysis of Bureau of Labor Statistics data

Table 6: Land Development Factors Used in Mecklenburg and Union County Small Area Residential Growth Forecasts

Positive
- Existing and planned water service
- Existing and planned sewer service
- Available land
- Population growth 1990-2000
- Residential building permit activity since 2000
- Transit stations, station areas
- Proximity to employment centers (5,000 or more employees located within .5 miles of each other)
- Travel time to core employment areas
- Waterfront within .5 miles
- Planned transportation improvements

Negative
- Undesirable land uses (industrial)
- Congestion
- Sewer treatment facilities

Absolute Avoidance
- Protected open space
- Floodways
- Surface Water Improvement and Management (SWIM) buffers
- Airport

Note: relative weights not reported.

Source: Smith, Mecklenburg-Union Metropolitan Planning Organization Population Projections and Employment Allocations 2000-2030, Center for Applied GIS, UNC Charlotte, 2004

Table 7: Comparisons of Charlotte Region County-level Projections

	Global Insight estimates			Woods & Poole estimates			MPO County control totals			NC State Data Center		
Population	Mecklenburg	Union	Mecklenburg, Cabarrus, Gaston, Union (total)	Mecklenburg	Union	Mecklenburg, Cabarrus, Gaston, Union (total)	Mecklenburg	Union	Mecklenburg, Cabarrus, Gaston, Union (total)	Mecklenburg	Union	Mecklenburg, Cabarrus, Gaston, Union (total)
2005	806,834	161,765	1,314,553	802,400	160,876	1,307,329	837,844	168,728	1,369,427	796,529	159,726	1,298,879
2010	956,823	219,690	1,570,976	916,747	197,554	1,497,063	931,591	200,290	1,539,304	911,252	210,069	1,518,920
2015	1,065,308	263,298	1,749,656	1,000,055	218,988	1,630,535	1,024,722	231,986	1,718,936	996,414	257,378	1,706,871
2020	1,171,442	303,978	1,920,865	1,084,264	240,490	1,765,570	1,110,893	266,617	1,891,585	1,081,577	304,688	1,894,854
2025	1,275,768	349,186	2,097,412	1,168,900	261,995	1,901,371	1,196,462	301,053	2,063,312	1,166,740	351,996	2,082,842
2030	1,382,406	393,407	2,280,808	1,253,544	283,433	2,037,236	1,270,724	337,317	2,220,724	1,253,198	400,683	2,274,700
2035	1,492,923	437,911	2,470,736	1,338,177	304,813	2,173,121	1,344,366	373,403	2,377,207	1,348,998	459,565	2,494,864

Households	Mecklenburg	Union	Mecklenburg, Cabarrus, Gaston, Union (total)	Mecklenburg	Union	Mecklenburg, Cabarrus, Gaston, Union (total)	Mecklenburg	Union	Mecklenburg, Cabarrus, Gaston, Union (total)
2005	317,065	56,755	507,873	320,678	57,382	512,746	350,032	59,090	549,138
2010	367,676	75,711	593,520	372,567	71,700	597,064	376,536	70,282	604,353
2015	411,491	92,151	665,899	412,042	80,624	659,600	402,878	81,418	663,411
2020	454,123	108,146	735,918	449,878	89,217	719,610	437,498	93,786	730,813
2025	490,244	124,813	799,492	486,526	97,534	777,746	471,583	105,974	797,385
2030	528,012	140,618	865,433	520,959	105,429	832,499	501,534	118,886	857,923
2035	566,513	155,507	930,886	553,294	112,919	884,042	530,879	131,624	917,577

Employment	Mecklenburg	Union	Mecklenburg, Cabarrus, Gaston, Union (total)	Mecklenburg	Union	Mecklenburg, Cabarrus, Gaston, Union (total)	Mecklenburg	Union	Mecklenburg, Cabarrus, Gaston, Union (total)
2005	530,215	51,347	714,674	648,470	69,219	900,288	610,386	46,375	783,239
2010	593,404	62,766	795,454	727,289	79,473	1,004,844	677,675	60,991	888,087
2015	683,069	74,938	909,552	792,592	86,926	1,091,639	744,435	75,796	992,835
2020	756,025	83,727	997,770	863,510	95,207	1,186,411	828,620	94,969	1,115,734
2025	817,687	90,802	1,072,008	940,486	104,409	1,289,879	909,005	113,056	1,233,416
2030	889,909	96,408	1,158,841	1,024,008	114,629	1,402,817	987,521	130,877	1,351,339
2035	967,004	101,254	1,250,625	1,114,586	125,966	1,526,054	1,062,193	147,578	1,463,844

Table 8: Union County Water Capacity and Demand

Union County Water Capacity	2005	2010	2015	2020	2025
Catawba Water Treatment Plant	36.00	36.00	36.00	36.00	36.00
Union County share	18.00	18.00	27.00	32.00	39.00
City of Monroe share (included in Union share)			1.99	1.99	1.99
City of Monroe Water Supply	11.00	11.00	11.00	11.00	11.00
Anson County for Union County	1.00	1.90	6.00	6.00	6.00
Anson County for Marshville	1.00	1.00	1.00	1.00	1.00
Northern Source				8.00	21.00
Total Treatment Capacity Installed	31.00	31.90	45.00	58.00	78.00

Union County Water Demand	2005	2010	2015	2020	2025
Union County Demand (mgd)	8.30	12.69	23.33	25.93	33.02
City of Monroe Water Demand	9.00	10.43	12.10	14.02	16.26
Marshville (from Anson County)	0.30	0.35	0.40	0.47	0.54
Total Demand	17.60	23.47	35.83	40.42	49.82

Source: Documents and interviews with Marshville, Monroe, and Union County officials

Table 9: Union County Wastewater Capacity and Demand

Union County Wastewater Average Daily Flow Projections						
	2005	2007	2010	2015	2020	2025
Twelve Mile WWTF	2.15	2.93	5.36	7.16	7.77	7.85
Monroe WWTF	6.64	7.04	7.71	9.80	11.38	13.30
City of Monroe Share	4.93	5.33	6.00	7.30	8.88	10.80
Union County Share	1.71	1.71	1.71	2.50	2.50	2.50
Marshville Share	0.10	0.10	0.10	1.10	2.10	3.10
Anson County (for Marshville)	0.19	0.19	0.19	0.19	0.19	0.19
Crooked Creek WWTF	1.13	1.19	0.96	0.94	0.84	0.84
Olde Sycamore WWTF	0.04	0.04	0.04	0.04	0.04	0.04
Tallwood Estates WWTF	0.03	0.03	0.20	0.20	0.20	0.20
Grassy Branch WWTF	0.02	0.02	0.02	0.02	0.02	0.02
North Union County WWTF				2.54	4.71	6.27
CMUD	0.50	0.50	1.10	1.69	1.69	1.69
Total Demand	10.70	11.94	15.58	22.58	26.84	30.40

Union County Wastewater Averege Daily Capacity						
	2005	2007	2010	2015	2020	2025
Twelve Mile WWTF	2.50	6.00	6.00	9.00	9.00	9.00
Monroe WWTF	10.40	10.40	10.40	10.40	10.40	10.40
Union County Share	2.65	2.65	2.65	2.65	2.65	2.65
Marshville Share	0.20	0.20	0.20	0.20	0.20	0.20
Anson County (for Marshville)	0.38	0.38	0.38	0.38	0.38	0.38
Crooked Creek WWTF	1.90	1.90	1.90	1.90	1.90	1.90
Olde Sycamore WWTF	0.15	0.15	0.15	0.15	0.15	0.15
Tallwood Estates WWTF	0.05	0.05	0.05	0.05	0.05	0.05
Grassy Branch WWTF	0.05	0.05	0.05	0.05	0.05	0.05
North Union County WWTF				5.00	6.00	9.00
CMUD	3.00	3.00	3.00	3.00	3.00	3.00
Total Capacity	15.43	18.93	18.93	26.93	27.93	30.93

Source: Documents and interviews with Marshville, Monroe, and Union County officials

Table 10: Union County Wastewater Treatment Facilities

Twelve Mile Creek Water Reclamation Facility, located at 8299 Kensington Drive, was permitted to discharge up to 3.0 MGD of treated wastewater through up until September 2007. Following a substantial expansion of capacity, it has been permitted to discharge 6.0 MGD since. Twelve Mile Creek serves Waxhaw as well as portions of Indian Trail, Stallings and Weddington. Twelve Mile effluent is discharged into Twelve Mile Creek, which is part of the Catawba River Basin. Since January 2008, Twelve Mile has distributed bulk "reclaimed" water to authorized users in order to reduce demand upon the potable water supply.

Crooked Creek Water Reclamation Facility, located at 4015 Sardis Church Road, is permitted to discharge up to 1.9 MGD of treated wastewater. Crooked Creek serves the Indian Trail, Lake Park and Stallings areas. Crooked Creek effluent is pumped over 17,000 feet to discharge into the North Fork Crooked Creek which lies in the Yadkin Pee Dee River Basin. Since January 2008, the Crooked Creek facility has also distributed bulk "reclaimed" water to authorized users in order to reduce demand upon the potable water supply.

Olde Sycamore Water Reclamation Facility, located off Highway 218 and Rock Hill Church Road, is permitted to discharge up to .150 MGD of treated wastewater. It serves the Olde Sycamore Golf Community. Olde Sycamore effluent is pumped from a storage pond onto the Olde Sycamore Golf Course for irrigation.

Tallwood Estates Wastewater Treatment Plant, located within and serving the Tallwood Subdivision off Brief Road, is permitted to discharge up to .05 MGD of treated wastewater. Tallwood effluent is discharged to Clear Creek, which lies in the Yadkin Pee Dee River Basin.

Grassy Branch Wastewater Treatment Plant, located at 1629 Old Fish Road, is permitted to discharge up to .05 MGD of treated wastewater. Grassy Branch serves the Unionville Elementary, Piedmont Middle and Piedmont High Schools as well as the Loxdale and Smithfield Subdivisions. Grassy Branch effluent is discharged to Crooked Creek which lies in the Yadkin Pee Dee River Basin.

Hunley Creek Wastewater Treatment Plant, located at 6913 Stevens Mill Road, was permitted to discharge up to .231 MGD of treated wastewater until discharge permit limits changed. The facility which served the subdivisions of Shanamara, Hunley Creek, Willowbrook, and Stevens Mill, discharged into Goose Creek, which lies in the Yadkin Pee Dee River Basin, until May 2006.

Source: Union County Department of Public Works documents

Table 11: Summary Comparison of MPO Socio-economic Estimates with Kenan Institute Revised Estimates

	Region	Total Corridor	Corridor Zone 1	Corridor Zone 2	Corridor Zone 3	Corridor Zone 4	Corridor Zone 5
# TAZs	2,934	210	48	37	42	53	30

Current MPO data

Households							
	Region	Total Corridor	Corridor Zone 1	Corridor Zone 2	Corridor Zone 3	Corridor Zone 4	Corridor Zone 5
2005	786,871	42,595	14,118	11,017	7,617	6,164	3,679
2010	865,401	49,393	15,179	12,418	8,696	8,530	4,570
2015	949,954	56,454	16,508	13,819	9,771	10,898	5,458
2020	1,045,707	62,479	17,482	14,738	10,300	13,227	6,732
2025	1,140,211	68,407	18,431	15,647	10,811	15,526	7,992
2030	1,231,516	74,497	19,307	16,676	11,369	17,827	9,318
2035	1,321,587	80,488	20,162	17,691	11,907	20,102	10,626

Population							
	Region	Total Corridor	Corridor Zone 1	Corridor Zone 2	Corridor Zone 3	Corridor Zone 4	Corridor Zone 5
2005	1,993,662	120,054	38,774	30,859	20,404	19,084	10,933
2010	2,216,216	140,267	42,886	34,865	23,333	25,712	13,471
2015	2,463,714	161,371	47,825	39,085	26,403	32,060	15,998
2020	2,709,021	178,152	50,443	41,699	27,913	38,545	19,552
2025	2,952,842	194,812	53,037	44,291	29,400	44,997	23,087
2030	3,189,018	211,973	55,413	47,280	30,980	51,435	26,865
2035	3,423,784	229,028	57,765	50,254	32,541	57,842	30,626

Employment							
	Region	Total Corridor	Corridor Zone 1	Corridor Zone 2	Corridor Zone 3	Corridor Zone 4	Corridor Zone 5
2005	1,005,946	51,306	15,981	8,601	8,543	13,615	4,566
2010	1,142,362	62,270	18,319	10,862	10,399	16,812	5,878
2015	1,296,818	73,259	20,679	13,105	12,236	20,046	7,193
2020	1,452,023	87,951	24,230	15,914	14,424	23,976	9,407
2025	1,599,213	101,999	27,650	18,591	16,489	27,745	11,524
2030	1,746,550	115,538	30,821	21,201	18,568	31,430	13,518
2035	1,886,721	128,395	33,824	23,690	20,522	34,950	15,409

Source: Kenan Institute analysis of MUMPO data

Note: See Map2 for definitions of Zones

Table 11: Summary Comparison of MPO Socio-economic Estimates with Kenan Institute Revised Estimates

Kenan Institute adjusted MPO data

	Households Region	Total Corridor	Corridor Zone 1	Corridor Zone 2	Corridor Zone 3	Corridor Zone 4	Corridor Zone 5
2005	786,871	42,595	14,118	11,017	7,617	6,164	3,679
2010	791,304	45,346	13,891	11,388	8,060	7,764	4,243
2015	867,527	51,968	15,096	12,667	9,168	9,897	5,140
2020	954,935	57,974	16,021	13,589	9,814	12,099	6,451
2025	1,041,241	63,869	16,919	14,492	10,433	14,273	7,752
2030	1,124,600	69,843	17,730	15,474	11,074	16,455	9,110
2035	1,206,857	75,740	18,531	16,444	11,697	18,614	10,454

	Population Region	Total Corridor	Corridor Zone 1	Corridor Zone 2	Corridor Zone 3	Corridor Zone 4	Corridor Zone 5
2005	1,993,662	120,054	38,774	30,859	20,404	19,084	10,933
2010	2,026,471	128,732	39,244	31,954	21,633	23,421	12,480
2015	2,249,865	148,486	43,721	35,809	24,783	29,173	15,000
2020	2,473,882	165,207	46,210	38,423	26,622	35,322	18,630
2025	2,696,523	181,775	48,661	40,991	28,421	41,454	22,248
2030	2,912,200	198,613	50,871	43,842	30,225	47,580	26,095
2035	3,126,583	215,340	53,059	46,668	32,014	53,669	29,930

	Employment Region	Total Corridor	Corridor Zone 1	Corridor Zone 2	Corridor Zone 3	Corridor Zone 4	Corridor Zone 5
2005	1,005,946	51,306	15,981	8,601	8,543	13,615	4,566
2010	1,044,592	57,046	16,736	9,904	9,516	15,434	5,456
2015	1,184,258	67,138	18,845	11,886	11,181	18,432	6,794
2020	1,326,019	80,881	22,060	14,413	13,177	22,080	9,151
2025	1,460,391	94,009	25,164	16,817	15,053	25,571	11,404
2030	1,594,963	106,690	28,031	19,156	16,971	29,015	13,517
2035	1,722,954	118,718	30,744	21,381	18,771	32,299	15,523

Source: Kenan Institute analysis of MUMPO data

Note: See Map2 for definitions of Zones

Table 11: Summary Comparison of MPO Socio-economic Estimates with Kenan Institute Revised Estimates

Absulute adjustment (MPO - adjusted)

	Households Region	Total Corridor	Corridor Zone 1	Corridor Zone 2	Corridor Zone 3	Corridor Zone 4	Corridor Zone 5
2005	0	0	0	0	0	0	0
2010	74,097	4,047	1,288	1,030	636	766	327
2015	82,427	4,486	1,412	1,152	603	1,001	318
2020	90,772	4,505	1,461	1,149	486	1,128	281
2025	98,970	4,538	1,512	1,155	378	1,253	240
2030	106,916	4,654	1,577	1,202	295	1,372	208
2035	114,730	4,748	1,631	1,247	210	1,488	172

	Population Region	Total Corridor	Corridor Zone 1	Corridor Zone 2	Corridor Zone 3	Corridor Zone 4	Corridor Zone 5
2005	0	0	0	0	0	0	0
2010	189,745	11,535	3,642	2,911	1,700	2,291	991
2015	213,849	12,885	4,104	3,276	1,620	2,887	998
2020	235,139	12,945	4,233	3,276	1,291	3,223	922
2025	256,319	13,037	4,376	3,300	979	3,543	839
2030	276,818	13,360	4,542	3,438	755	3,855	770
2035	297,201	13,688	4,706	3,586	527	4,173	696

	Employment Region	Total Corridor	Corridor Zone 1	Corridor Zone 2	Corridor Zone 3	Corridor Zone 4	Corridor Zone 5
2005	0	0	0	0	0	0	0
2010	97,770	5,224	1,583	958	883	1,378	422
2015	112,560	6,121	1,834	1,219	1,055	1,614	399
2020	126,004	7,070	2,170	1,501	1,247	1,896	256
2025	138,822	7,990	2,486	1,774	1,436	2,174	120
2030	151,587	8,848	2,790	2,045	1,597	2,415	1
2035	163,767	9,677	3,080	2,309	1,751	2,651	-114

Source: Kenan Institute analysis of MUMPO data

Note: See Map2 for definitions of Zones

Table 11: Summary Comparison of MPO Socio-economic Estimates with Kenan Institute Revised Estimates

Proportional adjustment (adjusted / MPO)

Households	Region	Total Corridor	Corridor Zone 1	Corridor Zone 2	Corridor Zone 3	Corridor Zone 4	Corridor Zone 5
2005	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2010	0.9144	0.9181	0.9151	0.9171	0.9269	0.9102	0.9284
2015	0.9132	0.9205	0.9145	0.9166	0.9383	0.9081	0.9417
2020	0.9132	0.9279	0.9164	0.9220	0.9528	0.9147	0.9583
2025	0.9132	0.9337	0.9180	0.9262	0.9650	0.9193	0.9700
2030	0.9132	0.9375	0.9183	0.9279	0.9741	0.9230	0.9777
2035	0.9132	0.9410	0.9191	0.9295	0.9824	0.9260	0.9838

Population	Region	Total Corridor	Corridor Zone 1	Corridor Zone 2	Corridor Zone 3	Corridor Zone 4	Corridor Zone 5
2005	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2010	0.9144	0.9178	0.9151	0.9165	0.9271	0.9109	0.9264
2015	0.9132	0.9202	0.9142	0.9162	0.9386	0.9100	0.9376
2020	0.9132	0.9273	0.9161	0.9214	0.9537	0.9164	0.9528
2025	0.9132	0.9331	0.9175	0.9255	0.9667	0.9213	0.9637
2030	0.9132	0.9370	0.9180	0.9273	0.9756	0.9251	0.9713
2035	0.9132	0.9402	0.9185	0.9286	0.9838	0.9279	0.9773

Employment	Region	Total Corridor	Corridor Zone 1	Corridor Zone 2	Corridor Zone 3	Corridor Zone 4	Corridor Zone 5
2005	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2010	0.9144	0.9161	0.9136	0.9118	0.9151	0.9180	0.9282
2015	0.9132	0.9164	0.9113	0.9070	0.9138	0.9195	0.9445
2020	0.9132	0.9196	0.9104	0.9057	0.9135	0.9209	0.9728
2025	0.9132	0.9217	0.9101	0.9046	0.9129	0.9216	0.9896
2030	0.9132	0.9234	0.9095	0.9035	0.9140	0.9232	0.9999
2035	0.9132	0.9246	0.9089	0.9025	0.9147	0.9241	1.0074

Source: Kenan Institute analysis of MUMPO data

Note: See Map2 for definitions of Zones

Table 12: FHWA Estimates of Traffic for U.S. 611 and U.S. 74

	U.S. 611 North of Monroe	U.S. 611 South of Monroe	U.S. 74 West of Monroe	U.S. 74 East of Monroe
	64999	63595	65001	62223
Length of arc (miles).	7.35	11.31	2.74	3.82
Contains the designated primary sign route for the arc.	U601	U601	U74	U74
Contains the local street name for the arc.				Monroe Bypass
Describes the rural/urban classification of the arc.	Rural	Rural	Large urbanized area (population 200,000 or more)	Large urbanized area (population 200,000 or more)
Identifies the assigned functional class of each arc.	Rural minor arterial	Rural principal arterial - Other	Urban principal arterial - Other	Rural principal arterial - Other
Special subnetwork for the National Highway System.			Non-Interstate STRAHNET	Non-Interstate STRAHNET
Information about the FAF 2.2 link.	Not on NHS Other FAF 2.2 routes	Not on NHS National Network (NN) route	National Network (NN) route	National Network (NN) route
2002 estimates				
HPMS annual average daily traffic for year 2002	7,800	11,000	49,000	29,000
Year 2002 truck volume based on HPMS average truck percentage	635	1,577	6,895	2,339
FAF 2.2 truck flow based on freight demand model and FAF 2.2 O-D database	238	554	2,157	955
Local truck traffic that is not part of FAF 2.2 flow	397	1,023	4,738	1,384
Estimated capacity using HCM 2000 methodology	2,371	2,153	6,246	3,213
Service flow volume/hour	936.00	1430.00	1715.00	2073.50
2002 volume to capacity ratio	0.395	0.664	0.275	0.645
2002 congested speed miles/hour	39.50	39.17	42.84	42.79
2002 link delays in hour	0.026	0.072	0.000	0.000
2035 forecasts				
Annual average HPMS daily traffic. Estimated using the HPMS traffic growth factor	18,871	16,309	101,091	48,083
Year 2035 truck volume based on HPMS average truck percentage and traffic growth	1,522	2,327	14,267	3,965
FAF 2.2 truck flow based on freight demand model and FAF 2.2 O-D database	345	1,026	3,453	1,646
Local truck traffic that is not part of FAF 2.2 flow	1,177	1,301	10,814	2,319
Estimated capacity using HCM 2000 methodology	2,565	2,180	6,245	3,389
Service flow volume/hour	2264.52	2120.17	3538.18	3437.93
2035 volume to capacity ratio	0.883	0.972	0.567	1.015
2035 congested speed miles/hour	27.53	30.73	42.82	38.24
2035 link delays in hour	0.112	0.152	0.000	0.011
2035 / 2002 AADT	2.4194	1.4826	2.0631	1.6580
2036 / 2002 AADTT	2.3969	1.4756	2.0692	1.6952
2037 / 2002 long distance AADTT	1.4496	1.8520	1.6008	1.7236
2038 / 2002 local AADTT	2.9647	1.2717	2.2824	1.6756

Source: U.S. Department of Transportation, FHWA, FAF2 Highway Link and Truck Data and Documentation: 2002 and 2035

Technical Memorandum

Proposed Monroe Connector/Bypass Comprehensive Traffic and Revenue Study

Updated Report of Independent Economist

Prepared For

NORTH CAROLINA Turnpike Authority

Prepared By

Kenan Institute of Private Enterprise
University of North Carolina at Chapel Hill

ENGINEERS PLANNERS ECONOMISTS
WilburSmith ASSOCIATES

March 1, 2010

Evaluation of the Socio-economic Estimates Underlying the Study of the Feasibility of the Proposed Monroe Connector/Bypass – Supplemental work

Kenan Institute of Private Enterprise

1 March 2010

The Kenan Institute of Private Enterprise completed an evaluation of the socio-economic forecasts for the Proposed Monroe Connector/Bypass in September 2009. The estimates, produced under the leadership of the Mecklenburg Union Metropolitan Planning Organization (MUMPO) are an important input to the Traffic and Revenue Study for the proposed Connector/Bypass. Our audit of the MUMPO socio-economic data, corroborated by interviews and data analysis, found a rigorous procedure for generating large area (county and sub-county) estimates but an insufficiently documented procedure for allocating residential and employment growth among small areas (Traffic Analysis Zones). In addition, the original MPO projections appeared to have been modified in reaction to the region's rapid growth over much of the last decade without adequate consideration of the long-term sustainability of the short-term acceleration of growth.

On the basis of extensive discussions with knowledgeable local and state informants and on the basis of analysis of many sources of systematic data, we recommended a significant downward revision in the overall MUMPO population and employment growth expectations and a reallocation of expectations for residential growth within Union County towards the turnpike corridor. The former adjustment is roughly consonant with the original, pre-boom MPO projections and in line with expectations for national economic growth but somewhat less strongly downward than some knowledgeable informants had recommended. The latter adjustment was more subjective, based largely on the consensus of interviewees that residential growth prospects in the southwestern quadrant of the county had been over-stated in the MPO estimates and on the infrastructure provision program of Union County which is centered on the Connector/Bypass Corridor. Further information about the MPO estimation process and about our adjustments is available in "Evaluation of the Socio-economic Estimates Underlying the Study of the Feasibility of the Proposed Monroe Connector/Bypass," dated 28 September 2009.

Wilbur Smith Associates recently requested supplemental work on the Kenan Institute analysis. A delay between the completion of our data collection and progress on the Connector/Bypass project raised the possibility that, while the Charlotte region has suffered a serious setback which could affect regional growth and travel patterns, recent information could change assessments of the state of the economy and its likely course over the next several years. Accordingly, we considered developments over the several months since our initial analysis was completed by scanning the regional news media for reports of recent developments, re-interviewing select informants, and gathering the most recent available quantitative data.

The situation in the Charlotte region remains decidedly bleak. A partially completed high-rise condominium development, reportedly untouched for many months, with the mechanicals and interior walls installed but without the external skin, served as a grim backdrop for one of our interviews. Several large Uptown office buildings have been completed over the past several months but they were reportedly largely empty.

Nevertheless, not all indications are negative. We have revised our estimates for 2010 Union County population upward to 186,819, which is approximately two percent more than the previous figure. The same proportional adjustment should apply to household counts. We have decided not to adjust the Union County employment figures and not to adjust the Mecklenburg figures. Unfortunately, the data, method, and time available do not allow us to allocate the increased estimated population within the county. The newly available information does not suggest that later year estimates need to be modified.

Our decision was based largely on the strength of two indicators in combination.

- Charlotte region job announcements are positive. Over the past several months, companies have announced plans to add 2,100 new jobs to the region.[1] None of these jobs have yet materialized and many of them likely never will. Nevertheless, the volume of announcements compares favorably with the recent past and with some other key metropolitan areas.
- More immediately, Union County School enrollments, while slowing quickly, did not slow as quickly as we had expected last summer.[2] Figure 1 shows the slowing, yet continuing, growth trend.

Most indicators and analyses suggest a continuing economic slump with the likelihood of slow recovery. Employment trends through December 2009 are shown for the State, Mecklenburg County, and Union County in Figure 2. Declines in Mecklenburg and Union Counties have not been as steep as in the State as a whole (right scale) but they have been substantial. Visually, it almost appears as if the pre-2005 employment growth trend has been re-established in Mecklenburg County after a several-year boom. The last data point certainly should not be over-interpreted in any case but, unfortunately, trends at the end of 2009 were not in a positive direction.

Traffic estimates for Uptown Charlotte have been generally flat for the last several years. Lynx Line ridership has fallen substantially from its peak. These have been interpreted as indicators of a weak employment situation (not shown).

[1] http://www.wsoctv.com/news/22040850/detail.html

[2] Even most elementary school districts in Union County are relatively large and the districts are periodically redrawn to match capacity and demand. We have not yet been able to definitively state the degree to which enrollment increases imply new in-migration.

Figure 3 charts the trend in Mecklenburg and Union County residential building permits over the last three decades. Less than 600 building permits were issued in Union County in 2009. That was less than 60 percent of the total for 2008, less than one fourth of the number issued in 2007, and less than one seventh of the number issued in 2006. We do, however, note a slight uptick in permits issued at the end of last year, as seen in Figure 4, in both counties and our informants related an increase of inquiries on the part of builders and developers in Union County. Again, this latest data point should not be over-interpreted. No significant action has been seen. Data for the U.S. 74 corridor in Mecklenburg County also suggests some, but significantly slowed, building activity (not shown).

Recent trends in Union County residential real estate sales can be seen in Figure 5. These include both new and existing homes. Completing last year's data suggests an ongoing slowdown in Union County home sales despite recent government incentives. Sales at the beginning of 2010 are slower than they were a year earlier.

In order to place our estimates in the context of the multitude of available population projections, we review portions of the discussion in our full report, cited above, adding new commentary. Our mandate was to review and possibly adjust the socio-economic estimates prepared by MUMPO. The decennial Census is the most accurate source of population and housing information. The most recent data were gathered almost ten years ago. The 2010 data, to be collected this month and next, will not be available in its most basic form for another year. Given the unexpectedly rapid growth earlier in the decade and subsequent employment decline in the Charlotte region, any population estimates run the risk of significant error.

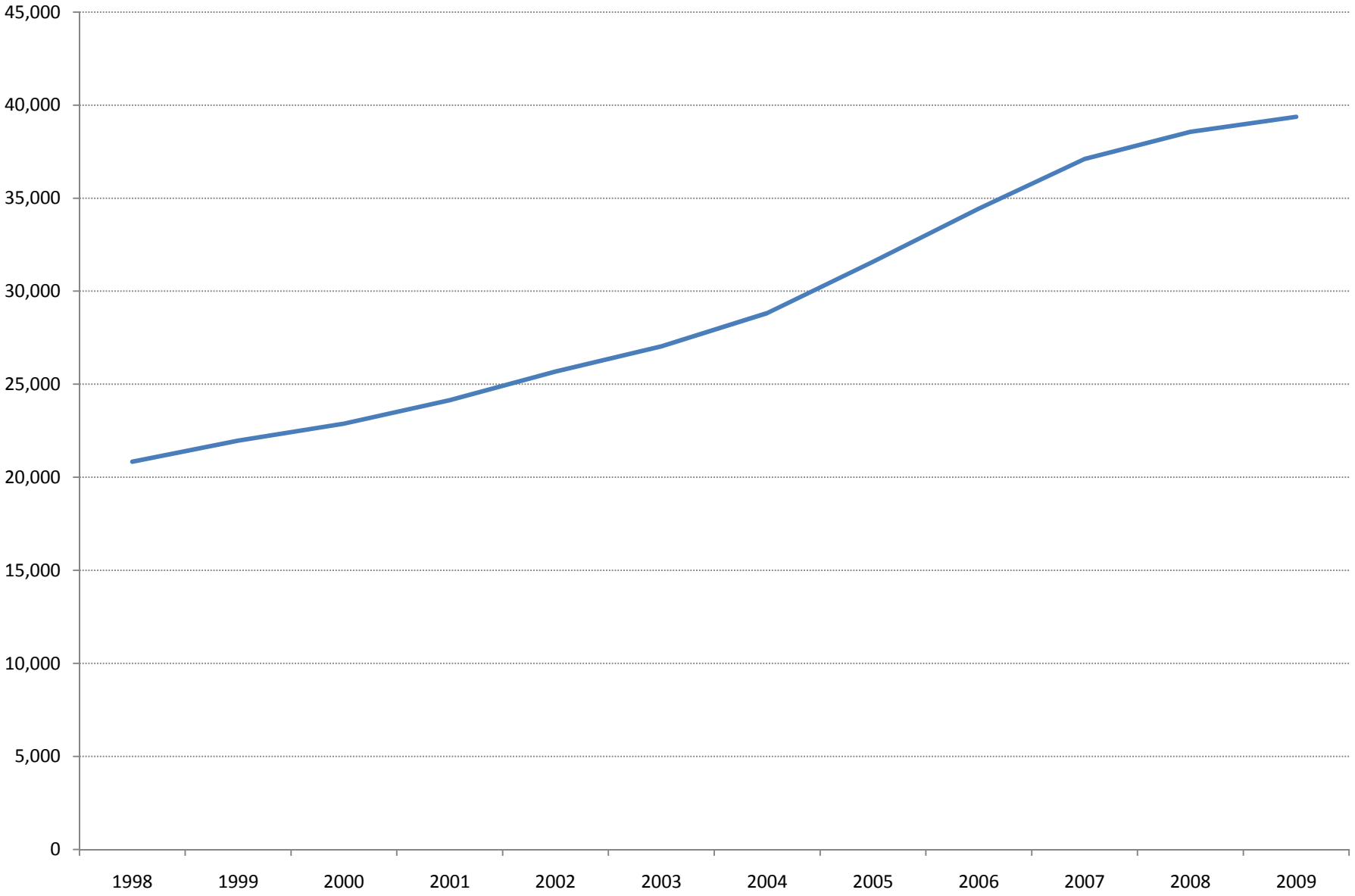
Recognizing that no projection is completely accurate (error bounds are discussed in the full report), our judgment is that Thomas Hammer, the consultant hired by MUMPO to estimate county and sub-county population and employment for selected years, has the most credible methodology of any known population and employment projection. His estimation process relies on Census data, the quantified detailed experiences of similar metropolitan regions, and extensive feedback from knowledgeable regional (Charlotte area) informants. We feel that his estimates, modified with the best available information about developments subsequent to his work, form the best possible basis for NCTA decision-making.

Commercially available population estimates are also of generally high quality but we find they are less able to capture the degree of cross-county suburbanization – the factor which has been the primary driver for Union County population growth. Moreover, many projection methods are unable to adequately capture recession-driven declines in in-migration. Local informants have assured us that such downturns are real – as indicated by the decrease in employment and rapidly slowing growth in the school population. Our assessment is that all available recent population estimates have likely over-reacted to the mid-decade acceleration in regional employment and have not yet incorporated adequate corrections. The 2010 Census data will provide a new solid basis for further projections.

Our assessment of the outlook for the Charlotte Region and Union County remains positive. The region and, more recently, Union County offers advantages that have attracted employment and residents. The recent boom may have passed, but the Charlotte region has been a growth center for at least a century and we see no reason that it will not continue to be – albeit possibly at a pace more consistent with the last several decades, rather than a few select recent years.

Figure 1

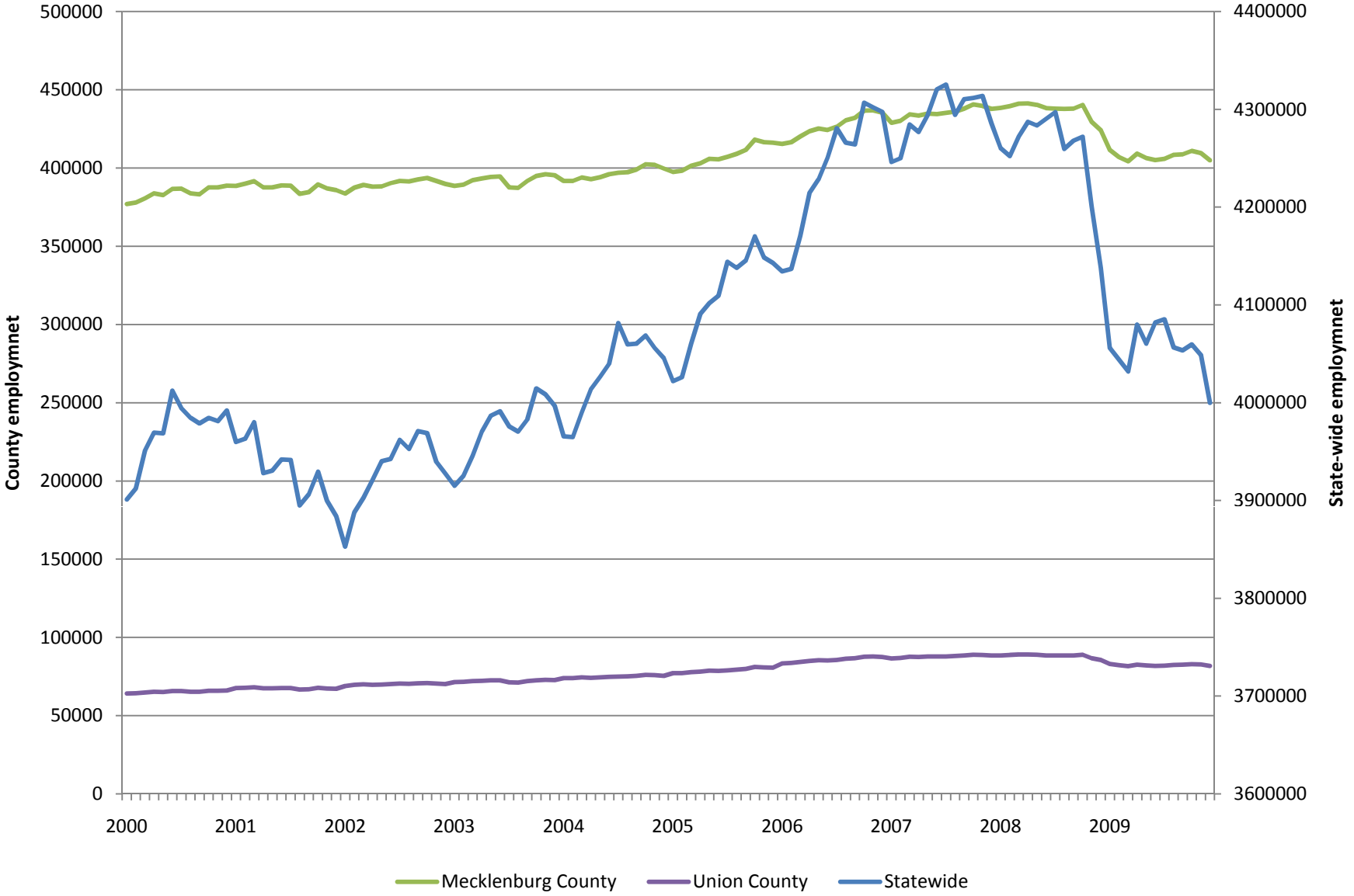
Union County Public Schools Enrollment, 1998-2009



Source: Union County Schools

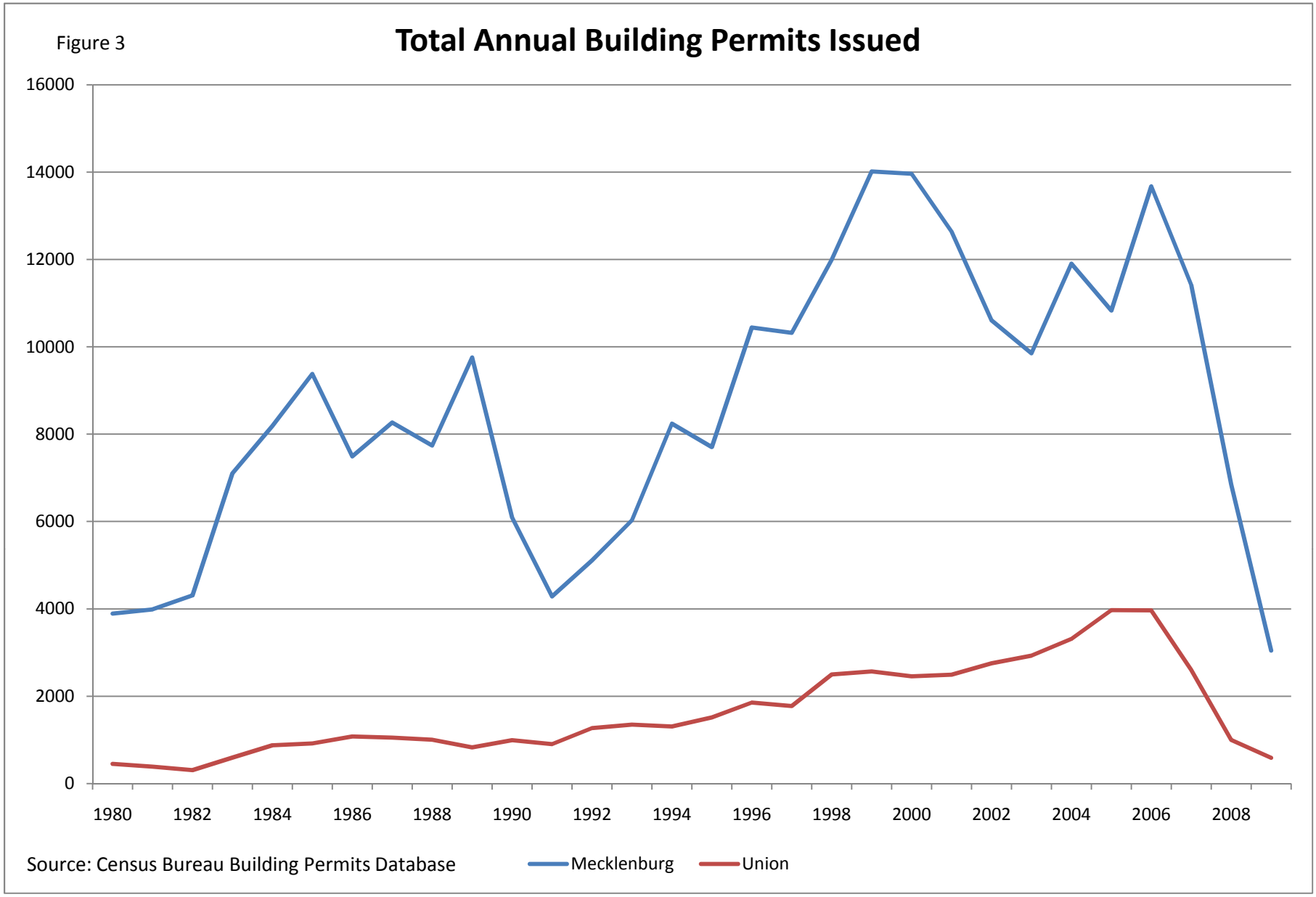
Figure 2

Recent employment trends



Source: N.C. Employment Security Commission

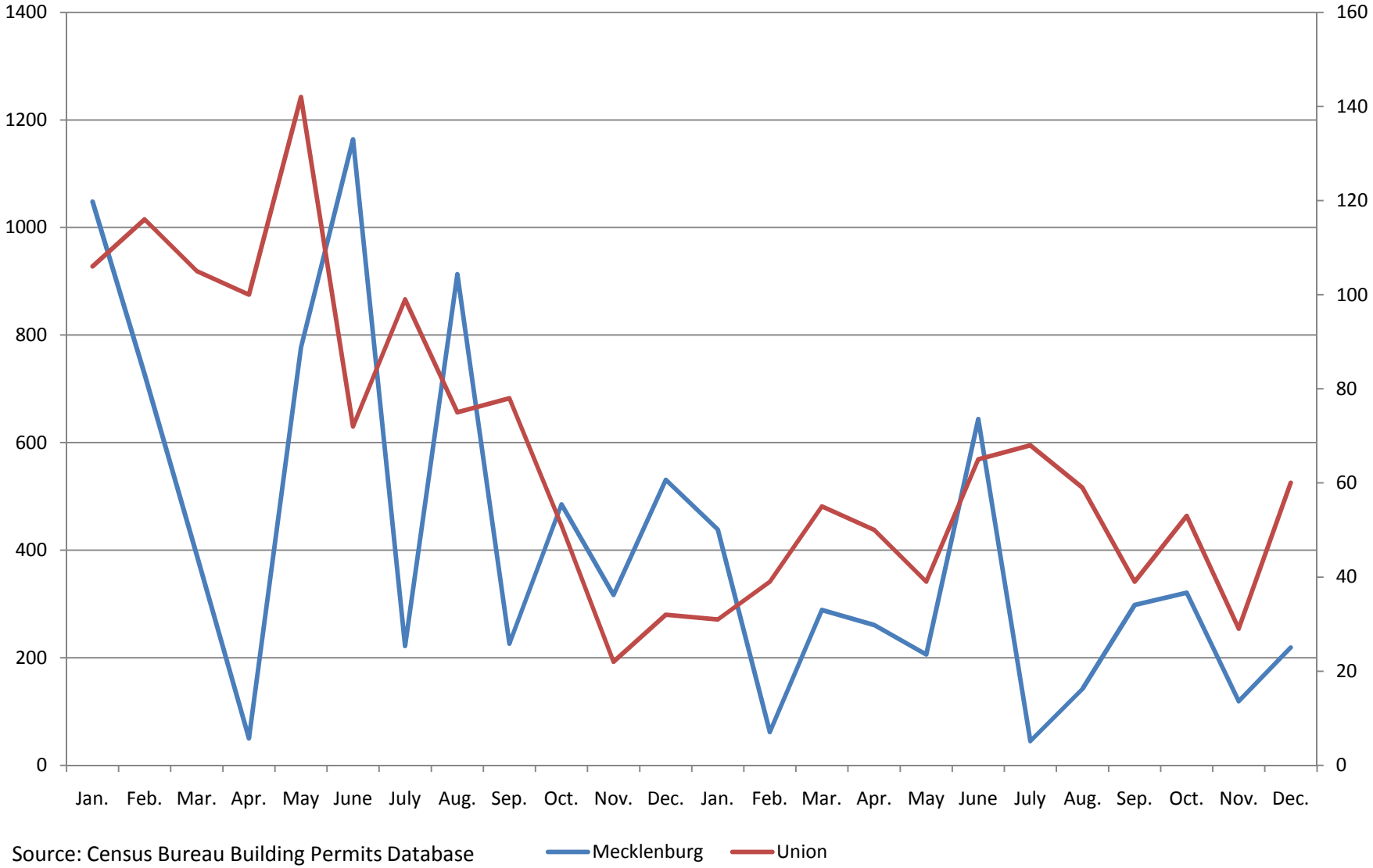
Figure 3



Source: Census Bureau Building Permits Database

Figure 4

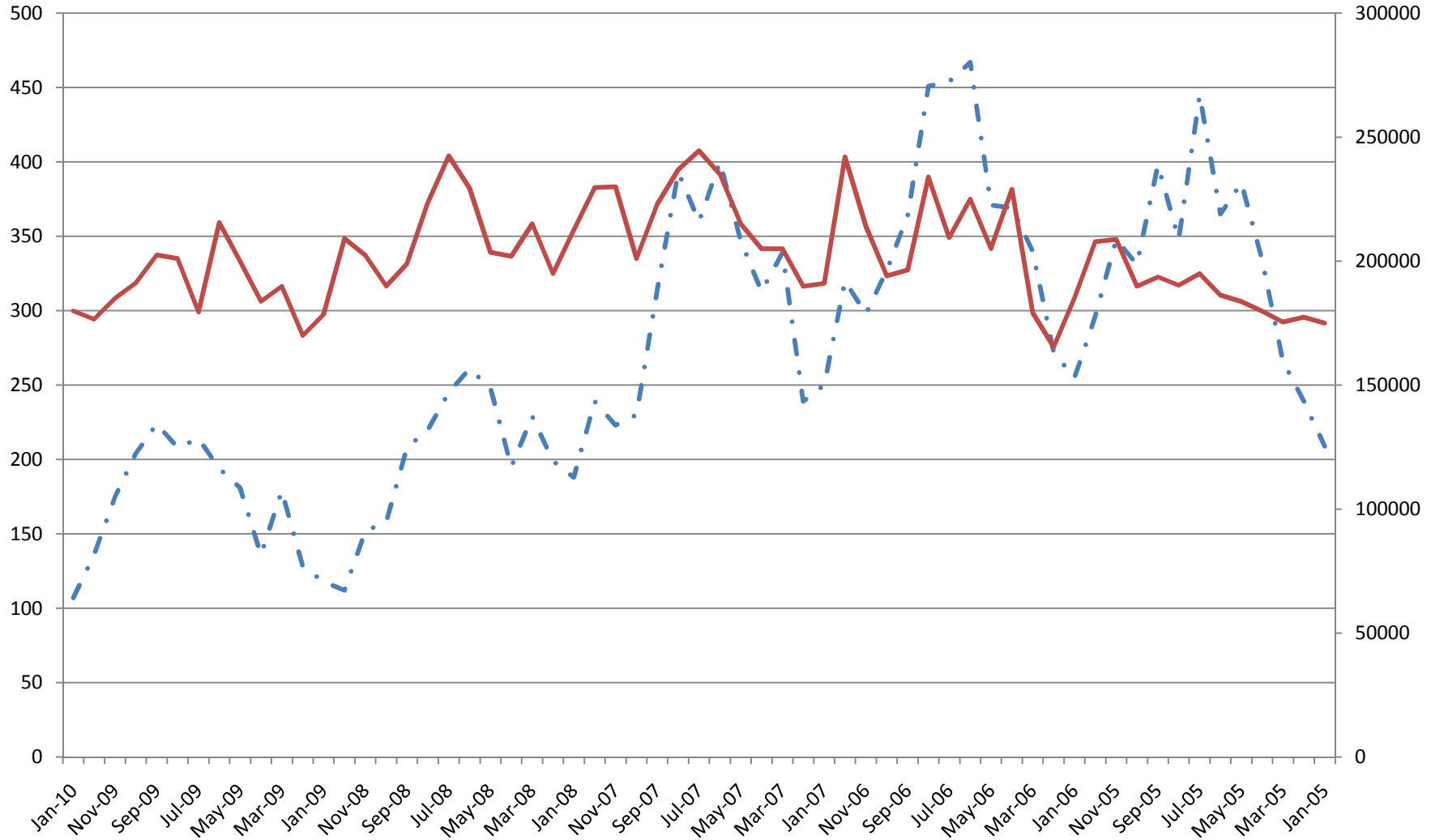
Total Residential Building Permits, Jan 2008-Dec 2009



Source: Census Bureau Building Permits Database

Figure 5

Union County Residential Real Estate Closings, January 2005-January 2010



Source: Charlotte Region Realtors' Association