Comparison of Neighborhoods in the Fastest Growing Suburb in America

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October, 2019

1. Introduction

   1.1.   Background

   Apex, North Carolina was listed as the best place to live in America by Money magazine in 2015. In 2018, it was identified as the fastest growing suburb in America. The town motto is 'The Peak of Good Living'.

   Apex is located in the same county (Wake County) as the state capital of Raleigh and near the Research Triangle Park, home of 50,000 tech jobs. It was founded as a railroad water stop for steam trains in 1873. By 1973 it had grown to 2,200 people. It began to grow rapidly in the 1990's. The town has grown 54% since 2010 to 57,000 people and has 11,000 housing units under construction or planned. Houses are often sold the same day the For Sale sign goes up and bidding wars are not uncommon. New construction is frequently sold before the foundation is laid and a 10-12 month wait between contract to purchase and move-in are common stories.

   Wake County as a whole grows by an average of 62 people per day, 22 by natural increase (births vs. deaths) and a net of 40 of those being by move-in from other areas (188 move in every day and 148 move out).

   In Apex, there is a net natural increase (births vs. deaths) of 8 per week and a net of 20 new residents by move in per week. Assuming a family size of 4-5, new move in residents would require 4-5 new homes per week. This may be a conservative estimate since Wake County as a whole has an average household size of 2.73. (Figures from wakegov.com)

   1.2.   Problem

   Given the hot residential market, potential new residents need to make fast decisions about housing. Since they are often making a job related move from another state, they are unfamiliar with the area and need comparative information to find the best location for them. When that information is not available, many choose to pay market driven high rent for a year while they familiarize themselves with the area. The alternative is to risk making a bad decision.

   The location of Apex in relation to the Research Triangle Park and Raleigh lends itself to another problem caused by travel patterns. Going to work is a northward journey along major arteries. Even current residents could easily miss changes to the south of their normal territories.

1.3. Interest

Neighborhood comparative information should be of interest to potential new residents from other areas as well as local residents contemplating a move. Given the rapid growth of Apex, it is difficult even for a long time resident to keep pace with opportunities.

2. Data Sources

The primary data source will be www.foursquare.com using the Foursquare API. To use it, however, a current list of existing and new neighborhoods was developed. Realtor, town, and Google Maps were used. These are supplemented with maps from the Town of Apex showing permits granted and currently under construction or approved for construction and current and projected city boundaries.

Combined, the resources will provide information on venues near neighborhoods and views of access routes. Due to the rapid growth, the view is effectively a point in time, but also gives a point from which future growth can be anticipated.

The intent is to provide a current comparison of resources near neighborhoods extracted from foursquare. Beside that, planned road, rail, park, and other changes presented from government planning maps were examined to aid in analyzing the results.

3. Methodology

A few decisions had to be made to determine how to use Four Square to examine Apex, NC. Decisions have been made based on 12 years observing Apex' expansion, vis-a-vis domain knowledge.

Doing a straight comparison of venues and resources near neighborhoods does not fit Apex. It is not an established city, rather it is rapidly growing and the character of many areas evolves by the calendar quarter. In this climate of fast growth, residential development precedes most business development. Therefore, more central and older residential areas have many more nearby venues. This is not exclusive, since vacant centrally located land has been and is being filled in. For instance, a tract of land in the city center was next to the government offices and was farm land a decade ago. Now there are 1,100 houses and townhouses on it. That same tract shows a need to adjust foursquare results to current reality: foursquare lists a farm and a venue for a neighboring development when there is no longer any farm in the search radius.

A division has been made for consideration of developments that have more and less than 7 nearby venues. The 7 most frequent venues was extracted from Four Square for each neighborhood. These were manually reviewed for each neighborhood and matched with the location of the neighborhoods. A division of neighborhoods at 7 venues provided the best separation of established from fringe, newly built neighborhoods. No attempt was made to further categorize venues from the categories provided by Four Square.

Due to the efficient road infrastructure, a radius of 1500 meters (1.5 km) from neighborhood centers was chosen. Larger distances failed to delineate neighborhoods and smaller ones artificially left out venues such as shopping centers that provide a quick hop to convenient

shopping. Although there are many sidewalks, greenway trails, and bicycle paths, vehicles are the normal means of transportation. Walking is primarily a leisure or exercise activity.

After extracting nearby venues from Four Square and separating neighborhoods into more or less than 7 nearby venues, unsupervised machine learning using k-means was used to find clusters of neighborhoods. Different values of 'k' were used to explore their effect on cluster labeling for both groups. Selecting the best value of 'k' was via domain knowledge rather than the bent elbow method. While domain knowledge is not always available, in this case it is and provides the ability to fluidly adjust the code and analysis as the city growth progresses. It also inserts the dynamic of understanding the 'personality' of Apex that cold numbers omit.

Ultimately, the 'k' value of 5 was chosen for the group with 7 or more venues and 4 was chosen for the group with less than 7 venues. Another running of the code in 3, 6, 9, or more months could easily require a different value for one or both groups and would be expected to require a fresh separation of the groups as venues are built up around new neighborhoods and neighborhoods are added. Furthermore, a change in the radius value used (1500 meters) could be appropriate at later times, with a reduction in that distance seeming more likely than an increase as new retail centers are built or expanded in areas more removed from the current centers.

4. Results

   4.a Clusters with more than 7 venues
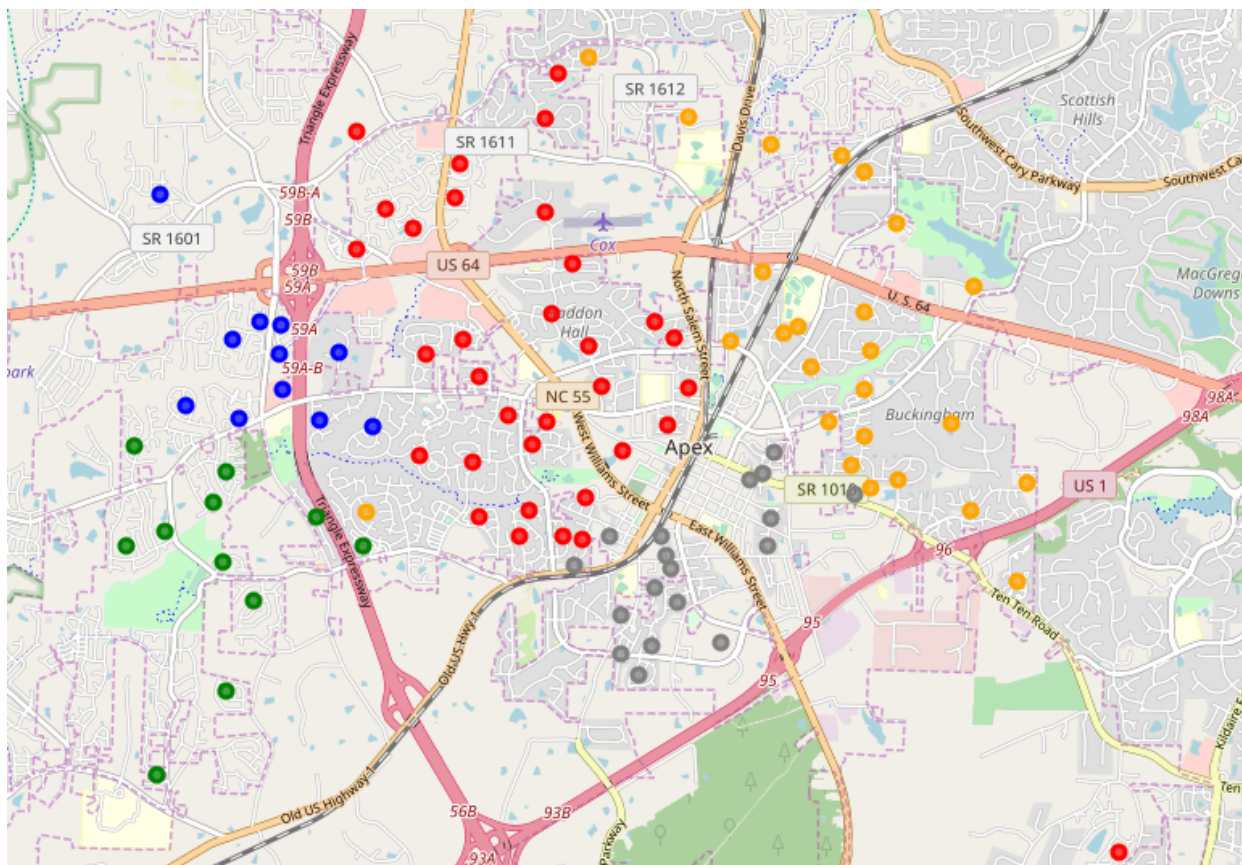
Green - 1st of Two Transition Clusters

While being further from retail centers than the 2nd transition cluster, this one has a heavy focus on parks. Apex is heavily invested in parks, trails, and bicycle paths. Perhaps the dominate path to being on the City Council has been through volunteer work in Parks and Recreation.

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue
12	Bella Casa	Playground	Business Service	Intersection	Construction & Landscaping	Farm	Disc Golf	Tennis Court
20	Bungalow Park at Scotts Mill	Trail	Pool	Auto Workshop	Park	Business Service	Soccer Field	Construction & Landscaping
34	Crocketts Ridge	Playground	Business Service	Farm	Tennis Court	Soccer Field	Disc Golf	Park
46	Greenbrier	Playground	Business Service	Intersection	Shipping Store	Coffee Shop	Soccer Field	Spa
52	Holland Crossings	Playground	Business Service	Tennis Court	Australian Restaurant	Disc Golf	Park	Soccer Field
53	Holland Farm	Playground	Disc Golf	Fish & Chips Shop	Farm	Tennis Court	Soccer Field	Bar
61	Kelly Glen	Playground	Trail	Soccer Field	Tennis Court	Construction & Landscaping	Business Service	Pool
62	Kelly West	Playground	Business Service	Soccer Field	Intersection	Disc Golf	Salon / Barbershop	Shopping Plaza
67	Madison at Evans Creek	Bar	Soccer Field	Park	Disc Golf	Farm	Fish & Chips Shop	Construction & Landscaping
100	Villagio	Playground	Business Service	Disc Golf	Tennis Court	Intersection	Soccer Field	Park
111	Woodridge	Playground	Bar	Intersection	Shipping Store	Soccer Field	Moving Target	Dive Bar

Red - The Central Cluster

The red cluster says much about Apex. Although having over 57,000 residents, it is a suburb city focused on services and quality of life. High paying jobs tend to be the 50,000 tech jobs in the RTP and business headquarters and government jobs in Raleigh. This cluster is the red on the cluster map and edges to the core of Apex, including the historic zone around downtown. 'After work' venues provide shopping and food.

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue
1	Amherst	Pizza Place	Sandwich Place	Mexican Restaurant	Mobile Phone Shop	Bakery	Beer Store	Pub
6	Beaver Creek Apts.	Cosmetics Shop	Pizza Place	Clothing Store	Department Store	Sandwich Place	Spa	Mobile Phone Shop
8	Beckett Crossing	Furniture / Home Store	Pizza Place	Sandwich Place	Salon / Barbershop	Department Store	Cosmetics Shop	Mobile Phone Shop
10	Beechridge Apartments	Pizza Place	Mexican Restaurant	Beer Store	Bar	Pub	Coffee Shop	Sandwich Place
13	Bladestone	Pizza Place	Mexican Restaurant	Supermarket	Beer Store	Pub	Coffee Shop	Sandwich Place
16	Brittany Trace	Pizza Place	Mexican Restaurant	Supermarket	Sandwich Place	Coffee Shop	Smoke Shop	Beer Store
22	Cameron Park	Sandwich Place	Pizza Place	Pool	Mobile Phone Shop	Mexican Restaurant	Supermarket	Pet Store
23	Carriage Downs	Pizza Place	Furniture / Home Store	Sandwich Place	Mobile Phone Shop	Cosmetics Shop	Clothing Store	Supermarket
25	Castlewood	Pizza Place	Coffee Shop	Sandwich Place	Big Box Store	Gym	Italian Restaurant	Women's Store

Blue - 2nd of Two Transition Clusters

The blue cluster is a transition area from core Apex to the newest construction areas. It consists of a mix of 20+ years old neighborhoods and new neighborhoods that fill in formerly open country. While abutting the two largest Apex shopping centers, the venue radius of 1.5 KM does not pull in one of those shopping centers, downtown or the US-64 business district.

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue
0	Abbington	Clothing Store	Furniture / Home Store	Cosmetics Shop	Salon / Barbershop	Mobile Phone Shop	Shopping Plaza	Bed & Breakfast
4	Ashley Downs	Clothing Store	Furniture / Home Store	Cosmetics Shop	Trail	Salon / Barbershop	Mobile Phone Shop	Pool
7	Beazer Homes Peak 502	Furniture / Home Store	Clothing Store	Department Store	Salon / Barbershop	Cosmetics Shop	Coffee Shop	Movie Theater
27	Chapel Ridge	Furniture / Home Store	Cosmetics Shop	Clothing Store	Salon / Barbershop	Department Store	Trail	Coffee Shop
29	Chelsea Run	Clothing Store	Furniture / Home Store	Salon / Barbershop	Department Store	Cosmetics Shop	BBQ Joint	Bed & Breakfast
32	Colonial Village at Beaver Creek	Furniture / Home Store	Bar	Clothing Store	Business Service	Department Store	Salon / Barbershop	Dive Bar
45	Green Plains	Clothing Store	Furniture / Home Store	Salon / Barbershop	Department Store	Cosmetics Shop	BBQ Joint	Bed & Breakfast
54	Homestead Park	Bar	Grocery Store	Business Service	Salon / Barbershop	Dive Bar	Moving Target	Playground
78	Pearson Farms	Furniture / Home Store	Salon / Barbershop	Clothing Store	Department Store	Cosmetics Shop	Mobile Phone Shop	Trail
81	Preserve at White Oak	Gym Pool	Gym	Bar	Dive Bar	Trail	Residential Building (Apartment / Condo)	Alternative Healer
82	Reedy Creek Farms	Furniture / Home Store	Clothing Store	Cosmetics Shop	Salon / Barbershop	Trail	BBQ Joint	Discount Store

Gray - A mix of old and new

The gray cluster takes in the oldest sections of Apex while still including some new development. Vacant land in Apex is being developed rapidly and the new neighborhoods here are fill-ins.
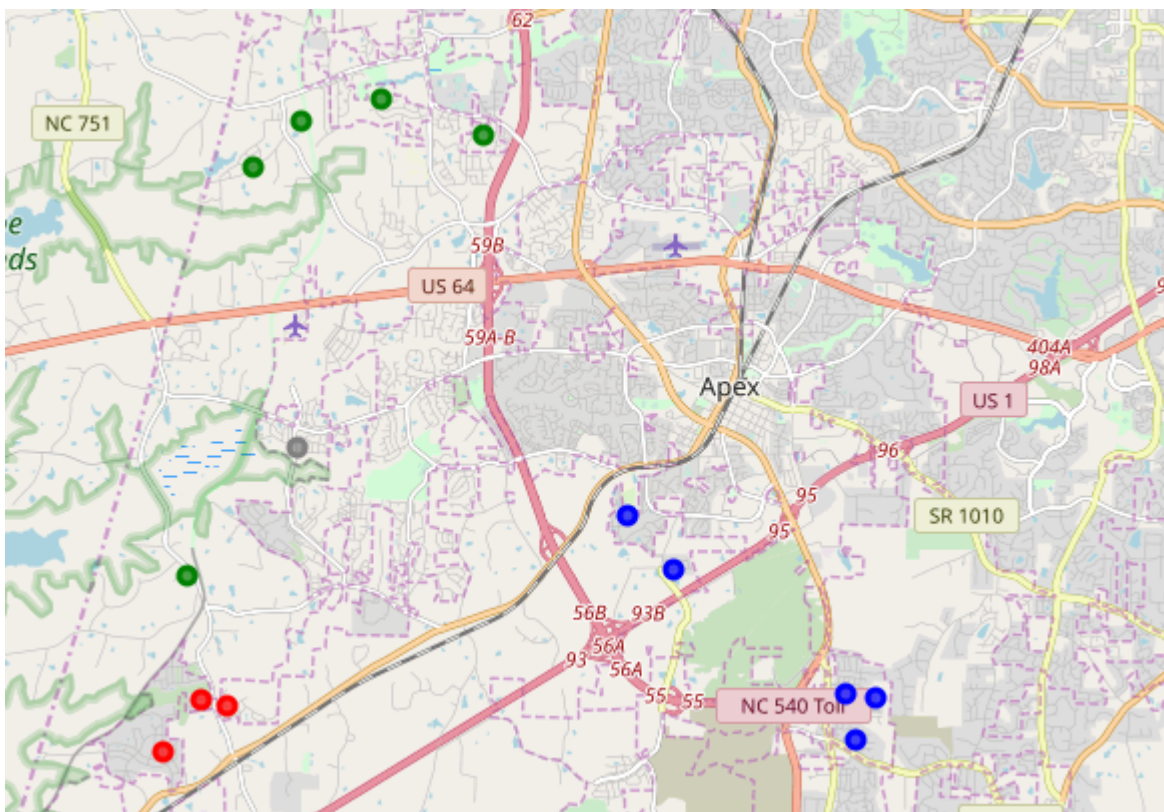
	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue
14	Bradley Park	Convenience Store	Fast Food Restaurant	Pizza Place	Video Store	Hotel	Mexican Restaurant	Market
15	Bradley Terrace	Convenience Store	Pizza Place	Fried Chicken Joint	Dance Studio	Donut Shop	Brewery	Fast Food Restaurant
17	Broadstone Village	Convenience Store	Hotel	Fast Food Restaurant	Video Store	Pizza Place	Mexican Restaurant	Breakfast Spot
26	Center Heights	Pizza Place	Mexican Restaurant	American Restaurant	Bakery	Hotel	Smoke Shop	Historic Site
31	Clairmont	Pizza Place	Mexican Restaurant	Hotel	Gym	American Restaurant	Fast Food Restaurant	Park
35	Damont Hills	Hotel	Pizza Place	Fast Food Restaurant	Convenience Store	Mexican Restaurant	Rental Car Location	American Restaurant
42	Germaine Village	Pizza Place	Mexican Restaurant	Dance Studio	Convenience Store	Hotel	Gym / Fitness Center	Gym
48	Groves	Hotel	ATM	Gym	Pizza Place	Gun Shop	Bakery	Fast Food Restaurant
66	Lexington	Pizza Place	Fast Food Restaurant	Gym	Fried Chicken Joint	Dance Studio	Rental Car Location	Donut Shop

Orange - A Different Sort of Cluster

Multiple venues had the same frequency for this cluster, thus hiding some of its characteristics. It is near 'auto row' consisting of multiple new car dealerships and to the north and south there are 'big box' stores with surrounding retail stores that tend to duplicate each other. At the same time, large shopping centers are not withing the 1.5 KM venue search radius. Domain knowledge is particularly needed to understand this cluster

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue
5	Avalon Peaks Apts.	Convenience Store	ATM	Restaurant	Golf Course	Gas Station	Garden Center	Italian Restaurant
11	Bell Apex	Baseball Field	Fast Food Restaurant	Park	Coffee Shop	Construction & Landscaping	Women's Store	Music Store
18	Brookfield	Pizza Place	Baseball Field	Coffee Shop	Fast Food Restaurant	Discount Store	Pharmacy	Park
19	Buckingham	Gas Station	Mexican Restaurant	Fast Food Restaurant	Restaurant	Pharmacy	Rental Car Location	Construction & Landscaping
21	Camden Lake Pine	Mexican Restaurant	Coffee Shop	Fast Food Restaurant	Salon / Barbershop	Pizza Place	Gas Station	Burger Joint
37	Edgewater	Pizza Place	Fast Food Restaurant	Salon / Barbershop	Sandwich Place	Coffee Shop	Mexican Restaurant	Supermarket
38	Ellington Place	Salon / Barbershop	Pizza Place	Fast Food Restaurant	Supermarket	Coffee Shop	ATM	Convenience Store
39	Empty Nest Way	Park	Pizza Place	Mexican Restaurant	Ice Cream Shop	Coffee Shop	Historic Site	Burger Joint
40	Fair Oaks	Fast Food Restaurant	Pizza Place	Baseball Field	Mexican Restaurant	Gym	Food Court	Pool
51	Heatherwood Townhomes	Mexican Restaurant	Fast Food Restaurant	Gas Station	Salon / Barbershop	Restaurant	Rental Car Location	Pizza Place

4.b   Clusters with less than 7 venues

Green - Turning Country into City

The green cluster pushes development solidly into areas where open land is plentiful. The locations provide easy road access to venues for those who trade a short drive for lower cost,

but don't expect a large lot or much lower cost. Careful selection may yield a house where there is a garden spot.

	Neighborhood	1st Most Common Venue	2nd Most Common Venue
2	Amity Fields	Trail	Farm
9	Beckwith Farms	Trail	Farm
24	Castlebury	Farm	Trail
55	Hunt at Green Level Crossing	Trail	Weight Loss Center
73	New Hope Estates	Trail	Fishing Spot

Red - Farthest Cluster from City Center

A new area getting attention, the members of this cluster are near an intersection community known as New Hill. There is a country store. This could be viewed as an outlier cluster, although that will probably change as Apex continues to expand. The intersection is old US-1 and NC-751. It would not be surprising to have 751 expanded in the next 5 years to a 4-lane north of US-64 and to a 3-lane to the south of that highway. North of US-64 is on the highway projects list, although unfunded at this time.

	Neighborhood	1st Most Common Venue	2nd Most Common Venue
59	Jordan Manors	Residential Building (Apartment / Condo)	Bar
60	Jordan Pointe	Residential Building (Apartment / Condo)	Convenience Store
72	New Hill Estates	Residential Building (Apartment / Condo)	Bar

Blue - Perhaps this should be Three Clusters

Salem Village is a new development. While not really a fill-in community, the forest/farm area it pushes into is being consumed from all sides. Miramonte, Reunion Park Apts., and Sunset Hills are at the termination of NC-540. They have easy toll road access to Raleigh, RTP, and Durham while bordering the less costly town of Holly Springs. Any extension of NC-540 would take out parts of these neighborhoods. An extension is on the planning map. Buy at your own risk. The name Irongate may reference its country feel. The neighborhood is surrounded by woods and fields with large lots that let you not see most neighbors and no quick access to major roads. Its character is more 'small country community' than 'city'.

	Neighborhood	1st Most Common Venue	2nd Most Common Venue
58	Irongate	Food Truck	Brewery
70	Miramonte	Trail	Weight Loss Center
83	Reunion Park Apts	Thai Restaurant	Café
85	Salem Village	Food Truck	Gym / Fitness Center
93	Sunset Hills	Trail	Thai Restaurant

Gray - A cluster of its own

Arcadia West is new. Although it has minimal nearby venues, it is in the direct path of the development push. The venues will come. In the meantime, it is equidistant to shopping and Jordan Lake.

	Neighborhood	1st Most Common Venue	2nd Most Common Venue
3	Arcadia West	Home Service	Farm

5. Discussion

   5.a High Level Map of Apex

The following image shows the city limits of Apex in green. The boundary is complex and, in places, not contiguous. Its fractured state is symptomatic of a rapid growth area. The gray area is the extraterritorial jurisdiction of Apex, within which the town is exercising control over growth. That control would include, among other things, zoning, approval of construction plans, inspections, and even road names.

NC-540 bears the distinction of being the first toll road in North Carolina. It was built to relieve the impact of through traffic from the south through central Apex on NC-55 to the Research Triangle Park, Durham, and Raleigh. To the south of I-40 it is toll road NC-540, a spur, and to the north of I-40 is I-540 forming part of a capital city outer loop into north Raleigh. It is new within the last decade.

US-1 and US-64 join into a heavily traveled 8-lane highway and split again to join the Raleigh inner loop around both west and east Raleigh. US-1 was widened from a 4-lane road within the last decade.

All of those roads are multi-lane and with the exception of NC-55 are divided highways. NC-55 was widened from 2 to 4 lanes 12 years ago and goes to the Research Triangle Park and Durham. NC-751 is a corridor of rapidly developing neighborhoods providing a route to central and west Durham and Duke Medical Center.

The road network enables reasonable commute times from Apex.

Driving Times Within Research Triangle Area

- Cary - 10 minutes
- Chapel Hill - 25 minutes
- Durham - 25 minutes
- Fuquay-Varina - 15 minutes
- Garner - 25 minutes
- Sanford - 25 minutes
- Southern Pines - 35 minutes
- Raleigh - 25 minutes
- Raleigh-Durham Airport - 20 minutes
- Research Triangle Park - 20 minutes
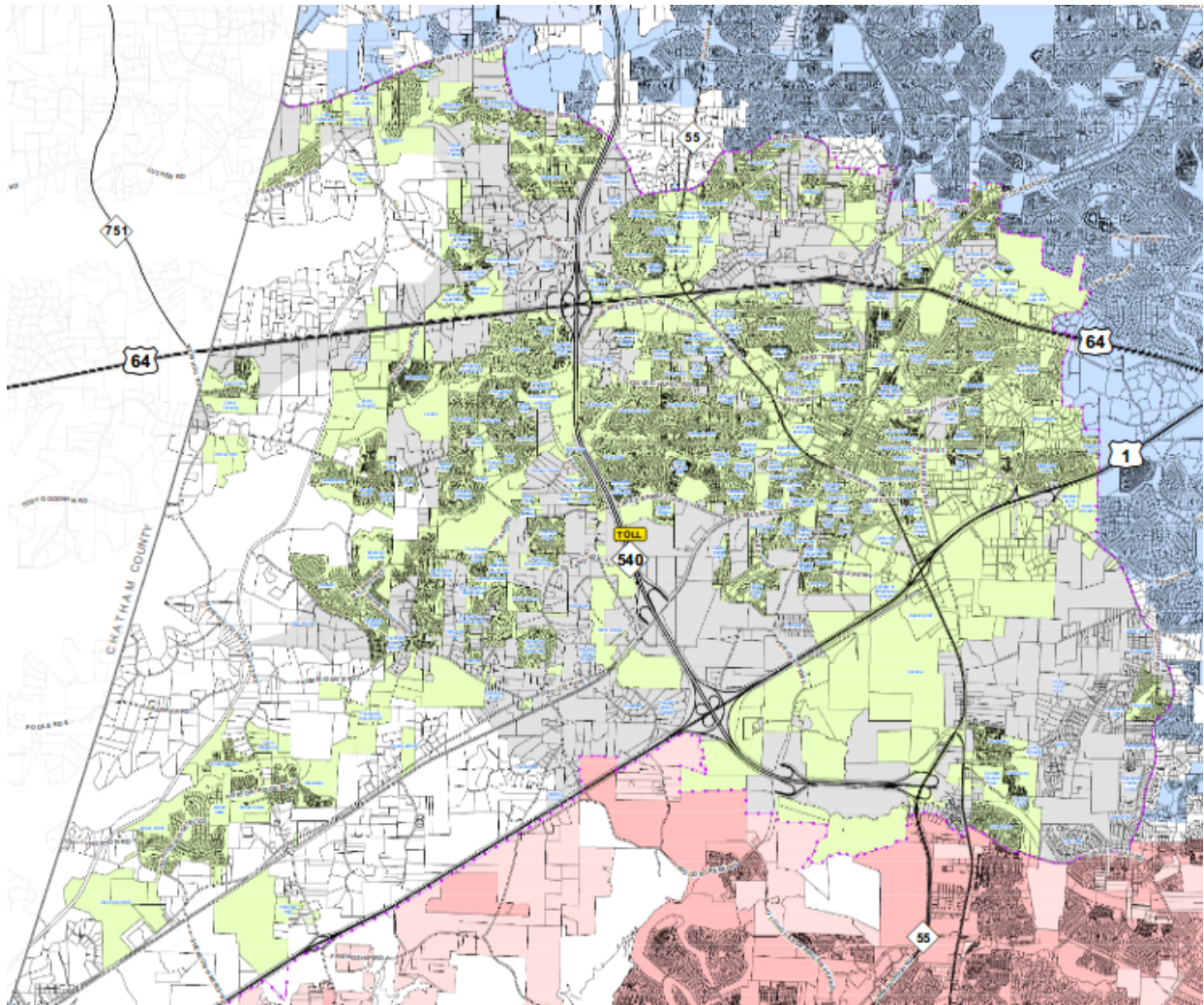
5.b New Construction

In the following image, green shows constructed areas, yellow areas are projects currently under construction, blue areas are approved projects, and red are proposed projects. Areas outlined in black are being rezoned.
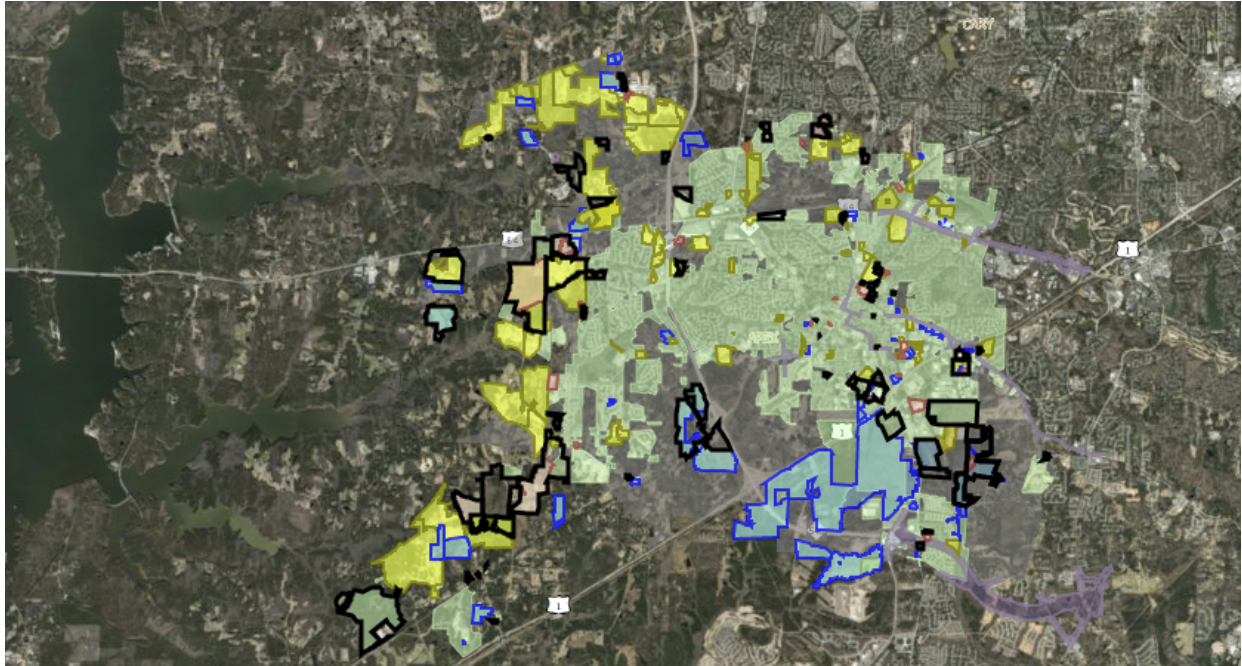

5.c Boundary Limits and Population

Apex is bounded by Cary, NC to the east and is growing into Morrisville to the north and Holly Springs to the south. Jordan Lake, a man-made reservoir, poses a natural expansion barrier to the west.
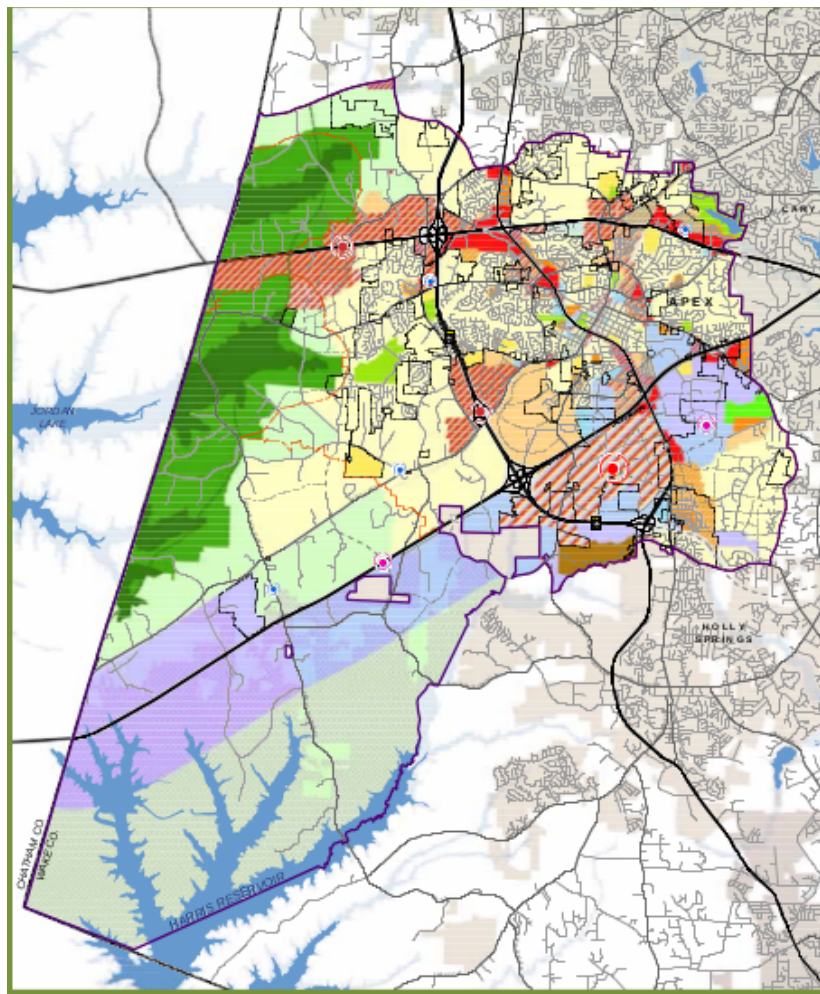
The population of Apex has exploded since 1990 when it had less than 5,000 residents, to 20,000 in 2000, 38,000 in 2010, and now 57,000 in 2019.
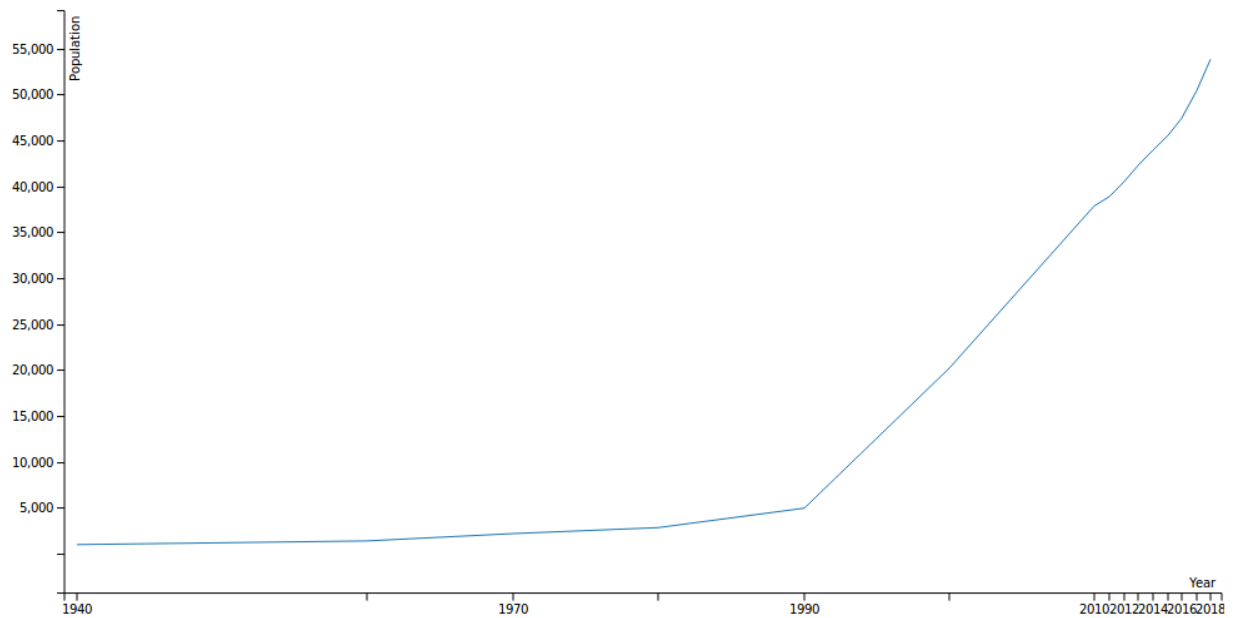
Population projections will potentially turn this suburb city into a city in its own right, large enough to pull major (aka high paying) businesses in locally.

*Estimated figures
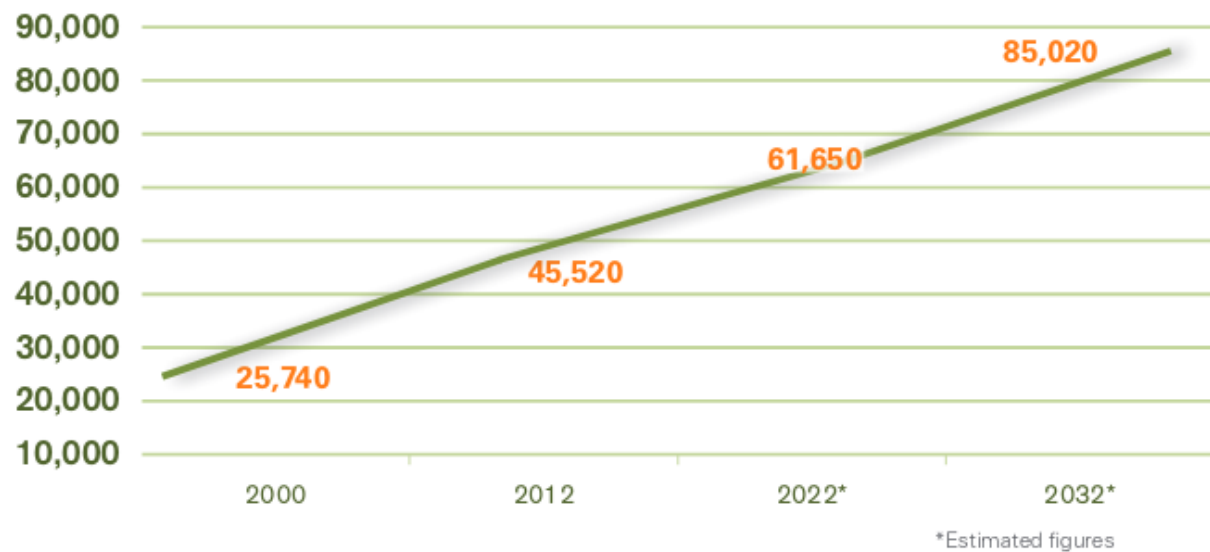
City projections for 2030 include large sections for office and industrial development along the US-1 corridor from Fayetteville to Raleigh.

PEAK PLAN 2030 LAND USE MAP

Future Land Use
- Protected Open Space
- Rural Residential
- Low Density Residential
  Single family homes
- Medium Density Residential
  Single family homes and townhouses
- Medium/High Density Residential
  Single family homes, townhouses and apartments
- High Density Residential
  Townhouses and apartments
- Office Employment
- Commercial Services
- Industrial Employment

- Golf Course
- Park
- School
- Landfill
- Right-of-Way

Context
- Study Area
- Apex ETJ
- Apex Town Limits
- Counties
- Duke Energy Land*
- New Location Roadway

Potential Activity Centers
- NC – Neighborhood Center
- EC – Employment Center
- CC – Community Center
- RC – Regional Center

But it is not alone in its growth. The neighboring suburb cities of Morrisville and Holly Springs are expanding in tandem with Apex, making this a regional experience.

37,803 (2010)

	Apex 37,803
	Holly Springs 24,933
	Morrisville 18,750
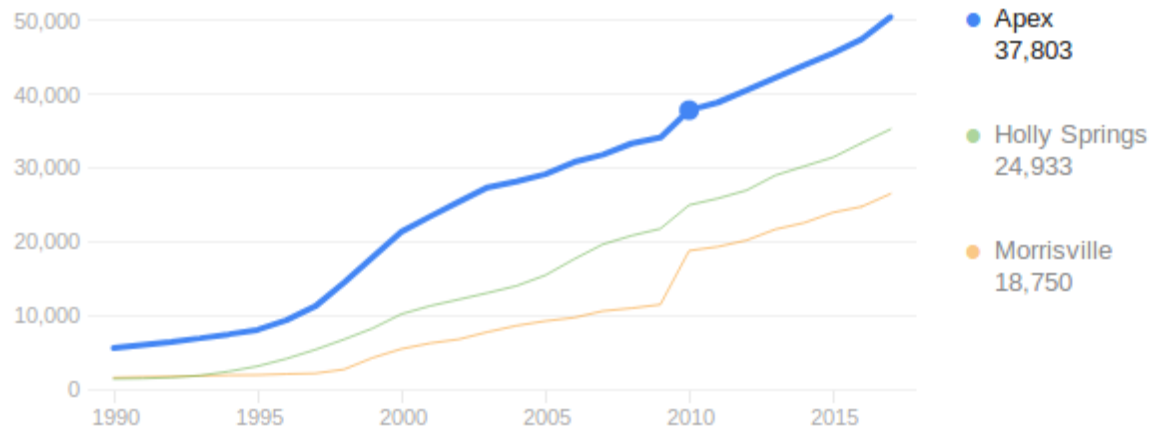
5.d Development Cycle

This study tends to confirm the adage: If you build it, they will come. In this case it is, if you build the infrastructure (Apex runs utilities for water, sewer, electricity, and gas), roads, parks, "Best Place to Live in America" rating (2015), the neighborhoods will come, then venues (businesses) will follow. People need groceries, grocery stores are anchor tenants for shopping centers which then have businesses offering other services. Medical offices (pediatricians, family practitioners, chiropractors, dentists, etc.) open. Three pre-schools and a large private elementary school have opened in the last year. The high school was leveled and rebuilt several time larger.

This development cycle indicated a split in neighborhoods by the number of nearby venues may be beneficial. The split at 7 venues separated core and transition zone neighborhoods from outer, just built, neighborhoods. A second split between the transition zone and core Apex would be inappropriate at Apex' current state. Such a decision would also dictate a reduction in the radius for detecting venues, which in turn would make some neighborhoods appear to be isolated from venues that are easily accessed. Viewing this in reverse, where an expansion of the radius might be appropriate for a particular neighborhood is the following map for the Abbington neighborhood and the venues within 1500 meters of its center.
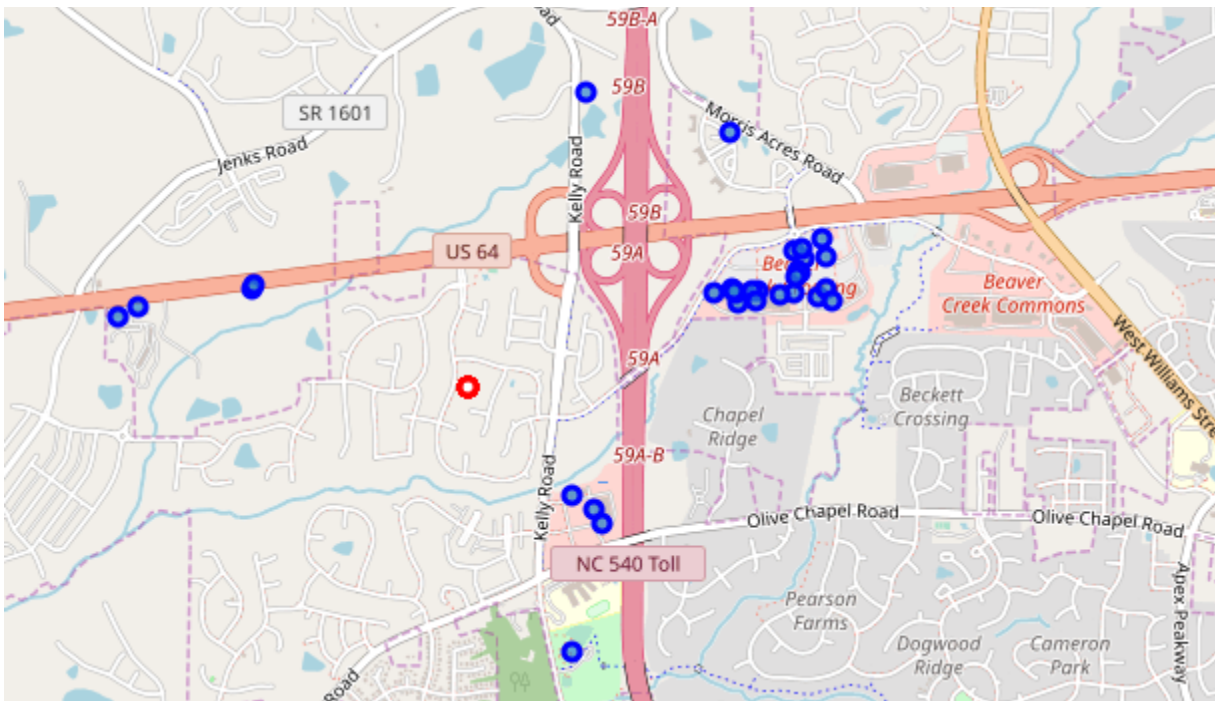
Abbington has a direct road to the shopping center (purpose built for shopping center access at the same time as NC-540 was put in), but 1500 meters misses the theater in that shopping center, Kohls sitting between the centers, and all of Beaver Creek Commons (Target, Lowes Home Improvement, PetSmart, Office Max, and many restaurants and banks) which is easily accessed on the same 'shopping center' road. This is not a major city with the potential for residing where one can walk to many shops. In Apex, the norm is to drive to shop, walk to enjoy trails and parks. It is a suburb, not a metropolis.

5.e Thoughts on Refinement of the Study

No attempt was made to further categorize venues from the categories provided by Four Square. A future refinement could be the recognize, for example, that a Walmart is not a Target, a store in the historic downtown with unique items is not the same as a store with cookie-cutter items in a shopping center, and a Food Lion is not a Publix or Costco.

An exhaustive neighborhood by neighborhood review, defining different radii as appropriate for each, and mapping venues as was done for Abbington, above, may provide further insights.

An Abbington type review could be based on the location of a specific house that is being considered for purchase or location in relation to place of employment even if outside Apex.

Another possibility is, rather than looking at venues per neighborhood, do a review based on distance from selected points such as the city center. This would yield rings by which expansion of the city could be examined.

Additional data would further refine the study. Apex is large enough to be included in U.S. Census estimates between the decade census. Census data is a rich source of demographic and financial information. Maps of such can be overlaid on a city map to provide information on the

character of areas. Extracting information to identify areas with persons at risk (poverty, single parent, etc.) could guide provision of government and charitable services.

Although the crime rate in Apex is very low, crime is not non-existent. Overlaying crime statistics and offender registries would provide further guidance in home selection.

6. Conclusion

Apex is on the fast track from a small railroad town to a 100,000+ city. Residential opportunities vary from the historic district, to established neighborhoods, to close in but still transitioning areas, to the outer edges where farm and forest become developments, but shopping is 5 miles away. Selection of a home requires balancing: a little price advantage with convenience to venues; an older house and a larger lot with a new house in which you could probably reach out your side window and shake your neighbor's hand and have a container garden on your patio. Despite the massive amount of construction, houses are often pre-sold before the foundation is laid. Older homes must compete with new homes with the latest designs, thus making older homes (older = about 20 years, not 50) cheaper per square foot.

7. References

- apexnc.org
- Foursquare API
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- zillow.com
- trianglearearealty.com
- hpw.com
- Google Maps