

Town of Apex

COMPREHENSIVE TRANSPORTATION PLAN

ADOPTED FEBRUARY 5, 2019



ACKNOWLEDGEMENTS

Thank you to the local residents, community leaders, and government staff that participated in the development of this plan through meetings, workshops, comment forms, and plan review. Special thanks to those who participated as Steering Committee members, listed below.

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Amy Sackaroff	Schools / Safe Routes to School
David Cole	Bike Apex Steering Committee
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Chapter 1: Purpose and Process

What is Advance Apex?

Advance Apex: The 2045 Transportation Plan (Advance Apex) identifies transportation needs and recommendations for motorists, bicyclists, pedestrians, transit, and freight. The plan establishes a vision for the transportation network in Apex and identifies a set of projects, policies, and actions that will allow for incremental progress toward that vision. Advance Apex addresses existing issues and concerns in addition to future needs through the year 2045. It was developed through an integrated process that also resulted in an update to the Town's Future Land Use Map. This emphasis on the important link between land use and transportation is intended to ensure the Town's future transportation network is context-sensitive, appropriate for all users, and contributes to a great quality of life.

Why is it important?

Having an adopted plan helps leaders when making transportation decisions that will largely impact the community. With a long-range plan in place, each decision will work toward achieving the goals and objectives established by the community. It also gives stakeholders, like residents and developers, a transparent picture of the future roadway network and what can be expected. Advance Apex provides residents and stakeholders the opportunity to reflect on

WHY NOW?

A lot has changed since the adoption of the Town's Comprehensive Transportation Plan adopted in 2011:

- Opening of Apex Friendship High School, Apex Friendship Middle School, and Scotts Ridge Elementary School
- Completion of major roads including sections of the Apex Peakway and NC 540
- Adoption of both the Parks, Recreation, Greenways and Open Space Master Plan and the Peak Plan 2030
- Adoption of the Wake Transit Plan and passing of a referendum making available new funding for transit
- Tremendous population growth, with almost 10,000 new residents and many new residential and non-residential developments in Apex

While there have been many local changes, the overall transportation landscape has changed too, with the advent of autonomous vehicles, ridesharing applications, and new regional transit projects on the horizon. Advance Apex considers these local, regional, and national changes and provides an opportunity for the public to weigh in on what's important now and for the vision of Apex in 2045.

the goals and objectives established in past planning efforts while arriving at a vision that is representative of where the Town is now and wants to be in the future. The planning period for this plan is set to a horizon year of 2045 – providing near- and long-term guidance.

In addition to guiding future transportation decisions, a long-range transportation plan helps inform local investments in infrastructure and improves the Town's chances of being awarded regional, state, federal, and private funds for transportation improvements. Obtaining funding is a highly competitive process, as Apex must compete against many other municipalities. The plan provides the Town a competitive edge by showing that Apex has identified projects that are of high priority and has demonstrated a clear vision of future needs.

What was the planning process?



Advance Apex was completed through an 18-month planning process. The process began with an exploration of socioeconomic conditions, a review of plans and policies, and an assessment of the current transportation network. A public workshop in Fall 2017 provided feedback on a set of guiding statements, as well as the issues and opportunities that are most important to current residents. The

WHO WAS INVOLVED?

Throughout the Advance Apex process, the project team met frequently with various stakeholders and representatives from the Town. These touchpoints helped ensure that a range of interests were represented in the final plans. These groups included:

- Public and elected officials
- Plan Steering Committee
- Focus groups (Bicycle & Pedestrian, Development, Downtown, Schools, and Transit)
- General community through public outreach events and two online surveys
- Town staff

project team then developed a set of recommendations and policies in close consultation with Town staff, focus groups, and the plan Steering Committee, and brought those recommendations forward for public review at the second public workshop in Summer 2018. Recommendations were vetted with neighboring municipalities and regional planning agencies. The plan will be considered for adoption by the Town Council in February 2019.

How will this plan be used?

Advance Apex will serve as a framework for advancing the Town's transportation and land use vision. It will provide information needed to seek project funding, coordinate with future development, and shape policy and program decisions for the Town. Overall, the plan is a powerful advocacy tool as Town staff seek to communicate local priorities to regional partners, including private developers, the Capital Area Metropolitan Planning Organization (CAMPO), the North Carolina Department of Transportation (NCDOT), and the general public.

This plan is intended to be a living document, which will be updated and maintained as conditions change and the Town grows. Just as Town priorities are different now from five years ago, priorities will likely shift by the year 2024. Therefore, keeping an updated plan and project prioritization list is crucial to advancing projects that shift the needle in the right direction.

Chapter 2: What We Heard

Engagement Philosophy

Public outreach – whether through direct community engagement or by input of stakeholders representing the public interest – is an important part of a successful transportation plan. The two primary goals of engagement for the Advance Apex plan were to inform and engage the public.

Informing the public requires the thoughtful translation of engineering and planning vernacular into common English. The initial step of informing the public is to communicate the purpose of the transportation plan and how it affects them. Once participants understand the value of the plan and its goals and objectives, they can more effectively engage in the planning process.

Engaging the public necessitates empowering community members to speak up, paired with listening to their thoughts and opinions. Those who have the most to gain or lose from investments in the transportation system have valuable perspectives that must be considered when developing project, policy, and program recommendations. The planning process included several avenues of public engagement to improve the likelihood that the feedback obtained was representative of the entire community.

Outreach Opportunities

The Advance Apex process included a variety of opportunities to capture feedback from those who have a stake in the plan's recommendations. A full summary of events and feedback is available in an appendix.

Steering Committee

A Steering Committee was formed to guide the planning process and was consulted regularly throughout plan development. Members represented elected town leaders, community advocacy group members, representatives from other Town committees, the development community, and local business leaders. The committee guided the direction of the plan through direct feedback and assisted in community outreach efforts.

Focus Groups

The project team conducted focus group meetings in Fall 2017 to foster more in-depth conversations on specific topics than are possible during large events. The focus groups represented the following interest areas: downtown, transit, bicycle and pedestrian, development, schools, and Town departments.

Public Workshop

This first public workshop, held in October 2017, helped educate attendees about the Advance Apex process and included interactive stations for participants to provide feedback. Information generated during this event contributed to the initial phase of the planning process, including the creation of guiding statements and understanding of existing conditions.

Online Survey

During the initial stages of the project, an online survey was used to establish a vision for the transportation system and future land use and to identify needs and deficiencies. Over 1,200 individuals participated, and a total of 2,159 comments were logged into the survey and are available under separate cover.



Open House

A drop-in open house held in August 2018 helped to educate attendees about the Advance Apex draft recommendations and allowed participants to provide feedback. Information generated at the event supplemented the feedback from the Steering Committee meetings and was used to craft the final recommendations. Attendees were also encouraged to provide feedback online through publicinput.com.



Communications

In addition to meetings and events, both paper and digital information was distributed to stakeholders throughout the process. The Town maintained a webpage for Advance Apex, keeping it updated with plan documents and information about the process.

The website included a form to sign-up for email communications. Emails were distributed to the contact list prior to the workshop, open house, survey, and public hearing for plan adoption. Information was also posted on social media feeds including Facebook, Twitter, and NextDoor. A one-page paper brochure summarizing Advance Apex was distributed at all events and was made available at several locations in Town Hall.

A full summary of each public outreach event is provided in the Advance Apex appendix.

Outreach Summary

Opportunity	Date	Participants
Public Workshop	Oct. 24, 2017	60
Town Council Updates	Dec. 19, 2017 June 5, 2018	
Online Survey	Sep-Nov 2017	Over 1,200
Focus Groups	Oct. 2017	Approx. 80
<ul style="list-style-type: none"> • Bicycle and Pedestrian • Development • Downtown • Schools • Transit • Staff 	Nov. 2017 Sep. 2018	
Steering Committee Meetings	Sep. 9, 2017 Feb. 13, 2018 June 12, 2018 July 16, 2018 Oct. 9, 2018 Nov. 8, 2018	
Open House	Aug. 2, 2018	119
Online Engagement in conjunction with Open House	Oct. 2018	160
Total		Over 1,600

Key Takeaways

Many members of the Apex community provided input throughout the Advance Apex planning process. While the comments and concerns spanned many different topics, several key themes emerged:



Preserve small-town feel

Apex residents value a high quality of life, and for many that is tied to the small-town charm that originally drew them to the community. While most acknowledge that Apex is likely to change over the next few decades, efforts should be made to preserve the Town's unique qualities.



Integrate transportation investments and land use decisions

Many residents felt that the Town's rapid growth had contributed to traffic congestion and safety issues, as transportation improvements failed to keep pace with development. Transportation decisions should be integrated with the land development process in the future to ensure sustainable growth.



Prioritize active transportation connections

While Apex has great local and regional greenways, with additional greenway projects underway, on-street connections to access these facilities are lacking. In addition, the Town should address many missing sidewalks or unsafe pedestrian crossings.



Address congestion issues on major roadways

Congestion and delay was the public's top identified transportation issue by a wide margin. Many of the Town's major roadways, including Williams Street, Center Street/Ten Ten Road, Salem Street, and other major access points to regional highways, are chokepoints during peak periods.



Focus on safety needs for all modes, particularly around schools

As in all communities, improving travel safety is a major motivation for future transportation improvements. Apex residents felt strongly that areas near community schools should focus on improving pedestrian and bicycling safety as a first priority.



Enhance transit accommodations

While most in Apex travel by personal vehicle, many future opportunities exist to enhance the community's local transit system as well as connections to the regional transit network.

WHAT WE HEARD

What is the most important transportation issue facing Apex?

- **53%** Congestion and delay
- **18%** Disconnection between land use and transportation planning

Select the most important overall challenge facing Apex:

- **#1** Population Growth
- **#2** Traffic Congestion and Safety
- **#3** Loss of Small Town Charm

Planning Themes

In direct response to the public input gathered early in the process, six planning themes were developed to guide the plan's recommendations. These themes represent six interrelated value statements established in accordance with national, state, and regional long range planning goals, and were further refined throughout the process with guidance provided by the project's Steering Committee, Town Council, and the public.

The themes consist of a key phrase (i.e. guiding principle) with supporting description. Planning themes are shown in alphabetical order.

Downtown

Preserve the intrinsic qualities of downtown and enhance the downtown experience by making it easier to travel to and around the Town core; encouraging a variety of uses and opportunities for community interaction; and protecting the historic character valued by residents and visitors.

Integrated Growth

Coordinate transportation investments with land use and development decisions to support travel by multiple modes; efficient land management and protection of natural resources; and opportunities to live, work, shop, and play within mixed-use neighborhoods and developments.

Mobility and Connectivity

Create a balanced transportation system that connects people to destinations with a safe, efficient, progressive, and equitable network that accommodates drivers, pedestrians, bicyclists, and transit users.

Safety

Promote a safe and secure transportation system for all users. Enhance access and safety near schools to ensure age-appropriate options allow choice in how students travel to and from school.

Sense of Place

Plan, design, and construct spaces and infrastructure that enhance the community's existing identity and promote a sense of place for new developments and enhancement projects.

Quality of Life

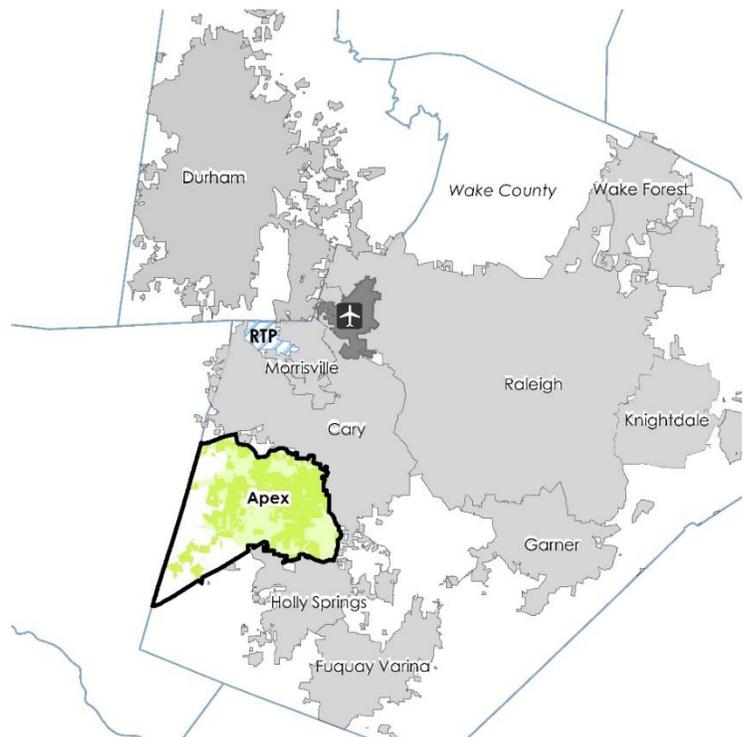
Encourage healthy and active lifestyles and enhance community identification and interaction through well-planned and connected parks, greenspaces, and gathering places, along with multimodal transportation choices for all residents regardless of age or ability.

Chapter 3: Apex Today

The existing conditions section of the plan details relevant trends in the Town's transportation system, demographics, economics, and social context as it exists today. This section uses graphs, charts, and data to inform the reader of the current facts on Apex and the state of the transportation system.

Introduction

The Town of Apex is located in the southwest portion of Wake County, North Carolina and is a popular residential community in proximity to the Research Triangle Park and Raleigh-Durham International Airport. As of February 2018, The Town of Apex has approximately 14,441 acres within its municipal boundaries, with another 9,111 acres of extraterritorial jurisdiction (ETJ). The study area for Advance Apex includes the Town proper as well as the entire ETJ, and several thousand acres of Wake County jurisdiction that is included within the Town's planning boundary. However, some statistics in this report may refer only to the Town, due to data availability.



Apex is a rapidly growing community, situated in one of the fastest growing regions of the country. This brings many challenges as the community seeks to respond to new opportunities and development pressures while maintaining its unique character. The Advance Apex plan provides a forward-looking guide for multimodal transportation investments and an updated land use strategy that fosters the community's vision. This chapter lays the foundation for plan recommendations by providing an understanding of current demographic patterns, development trends, the existing transportation network, and the impact of all of these forces on the Town's overall future growth and development.

Population and Development

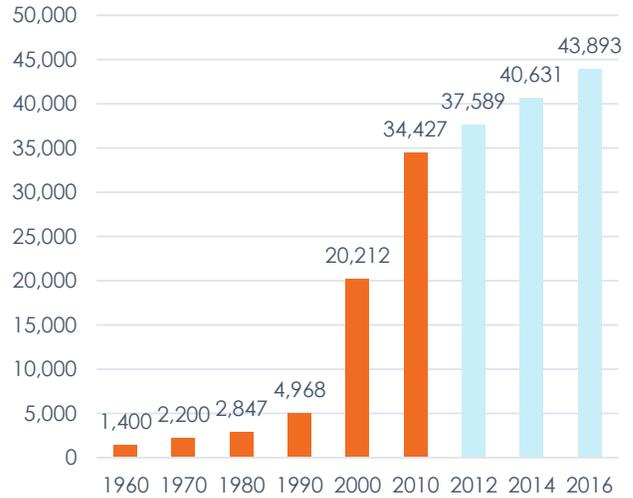
Growth

Apex has experienced explosive growth over the past few decades, with its population increasing from just under 5,000 in 1990 to approximately 20,000 in 2000.¹ This early growth was the result of a major technological boom in the Triangle area, and has continued as the Town earned a reputation as a family-friendly community.

As of September 2018, the current population of Apex is estimated to be 54,874.² On the whole, the Town's growth rate has moderated considerably since the 1990s, though absolute growth is still occurring at a rapid pace. Between 2010 and 2015, the Town grew at a pace commensurate with the regional growth level.

Accurate population projections for the next several decades are difficult to obtain based on uncertainty over continuing growth. The September 2018 Apex Development Report projects a 2030 population of just over 105,000 based on a continuing annual growth rate of 5.82%, which was the average rate between 2014-2018. Projections following Wake County population estimates developed by the North Carolina Office of Budget and Management would likely place the population at a more conservative 65,000-70,000 in 2030. Projections beyond that timeframe would be highly inaccurate at this time.

Apex Population, 1960-2016



Source: U.S. Census Bureau

Population Growth, 2010-2016

Triangle Region	19%
Wake County	16%
Chatham County	14%
Town of Apex	17%

Source: U.S. Census Bureau, 2016 ACS 5-Year

9.37

new residents per day
July 2017-January 2018

Source: Apex Development Report

¹ U.S. Census Bureau

² Apex Development Report

Development Trends

Residential Development

Single-family residential housing dominates the market in Apex, with 4,817 new permits approved over the past five years for 96% of all new building permits over that time period.³ In total, 11,907 residential units are actively under development or approved for construction throughout the Town.⁴

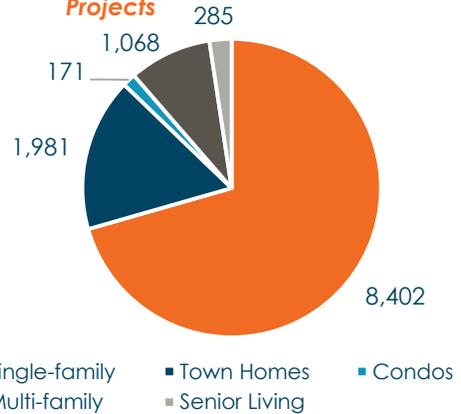
While single-family remains the most popular housing product in Apex, approximately 29% of new developments offer more diverse housing opportunities for a cumulative total of over 3,500 units of townhomes, condos, multi-family, and senior living currently in development.

Though Apex remains a predominately owner-occupied market, the percentage of renters living in the Town of Apex has increased in recent years, following national and regional trends. A shift in the overall development market may be necessary in order to accommodate this overall trend.

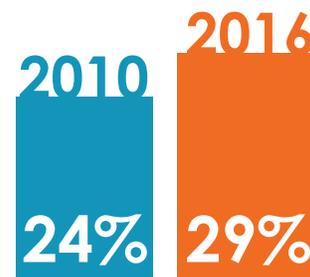
Total Building Permits, 2013-2018

Fiscal Year	Single Family	Multi-family	Non-Residential
2013-14	608	1	36
2014-15	691	0	33
2015-16	665	0	30
2016-17	1,329	3	20
2017-18	1,524	27	63

Total Housing Units, Active Development Projects



Town of Apex Renter Occupancy



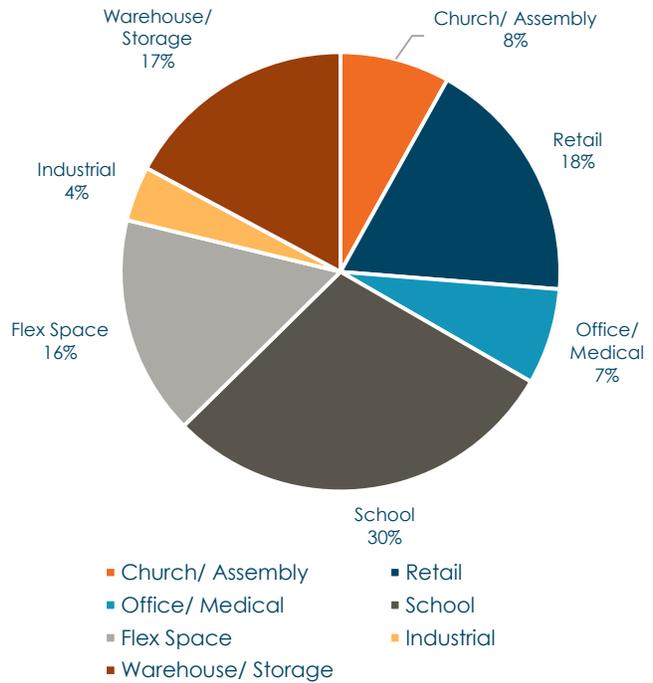
³ Apex Development Report, September 2018

⁴ Apex Development Report, September 2018

Non-Residential Development

As of this analysis, there are 59 approved active non-residential projects throughout the Town. Of the active projects, 54 were approved between 2014 and 2018.⁵ Four projects were approved between the years of 2006 and 2013 and remain in active development status. In total, these projects will add over 2 million square feet of commercial and non-residential space to the Town's existing non-residential inventory.

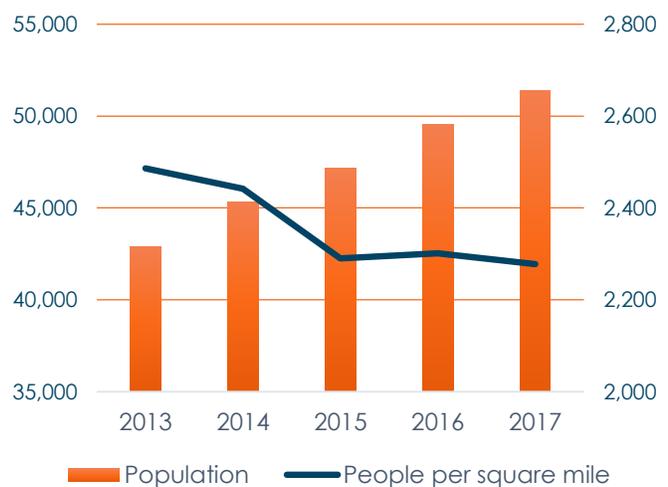
Active Non-Residential Development Projects



RESIDENTIAL DENSITY

Though the population of Apex has increased substantially over the past five years, the population density within the Town limits has slightly decreased. This may be due partially to the annexation of previously rural property, or to the approval of increasingly low-density development. Since 2013, the Town's overall area has increased from 17 square miles to 22 square miles, resulting in a slight decrease in the population density.

Apex Population vs. Density

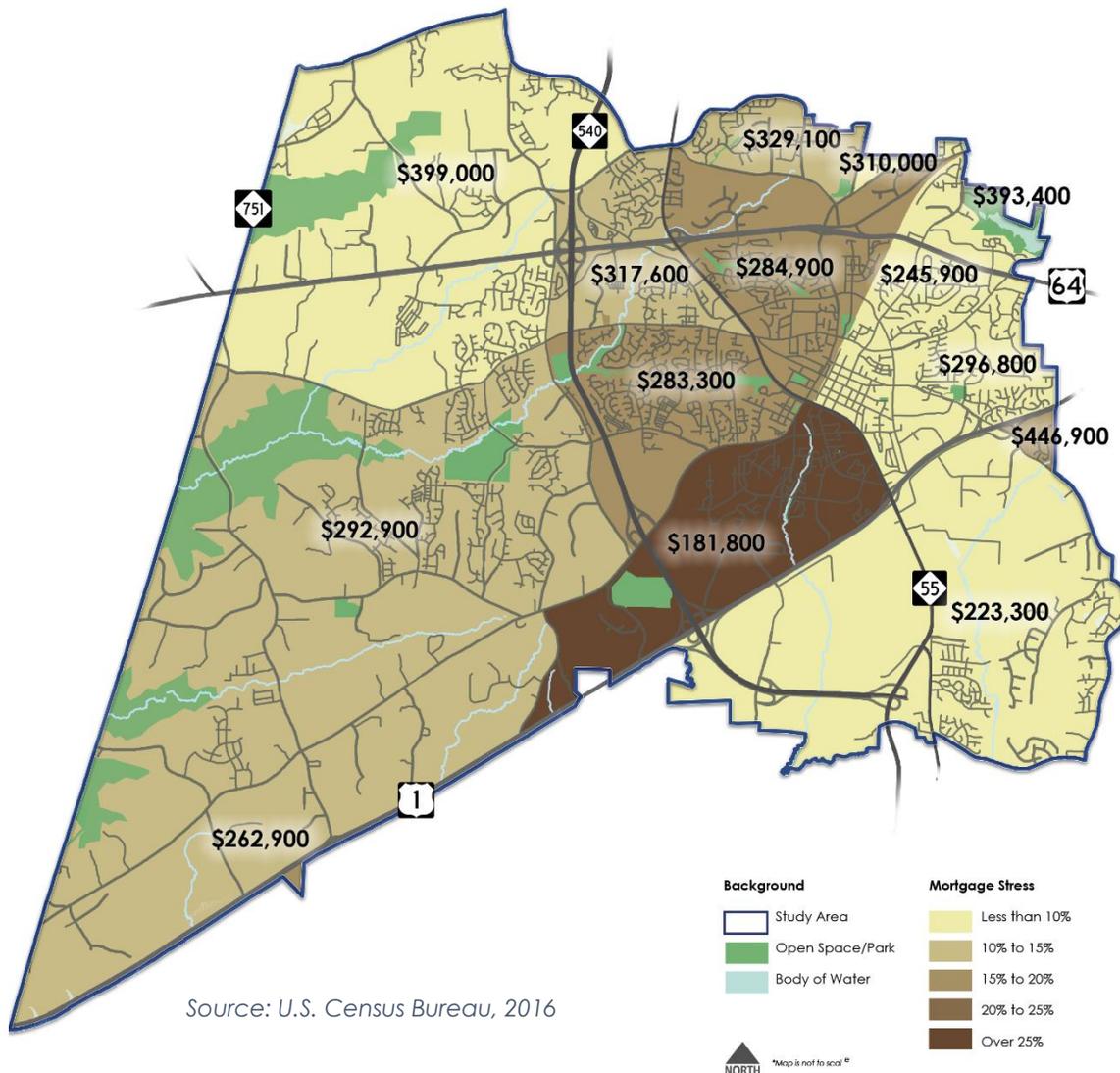


⁵ Apex Development Report, September 2018

Housing Value and Cost

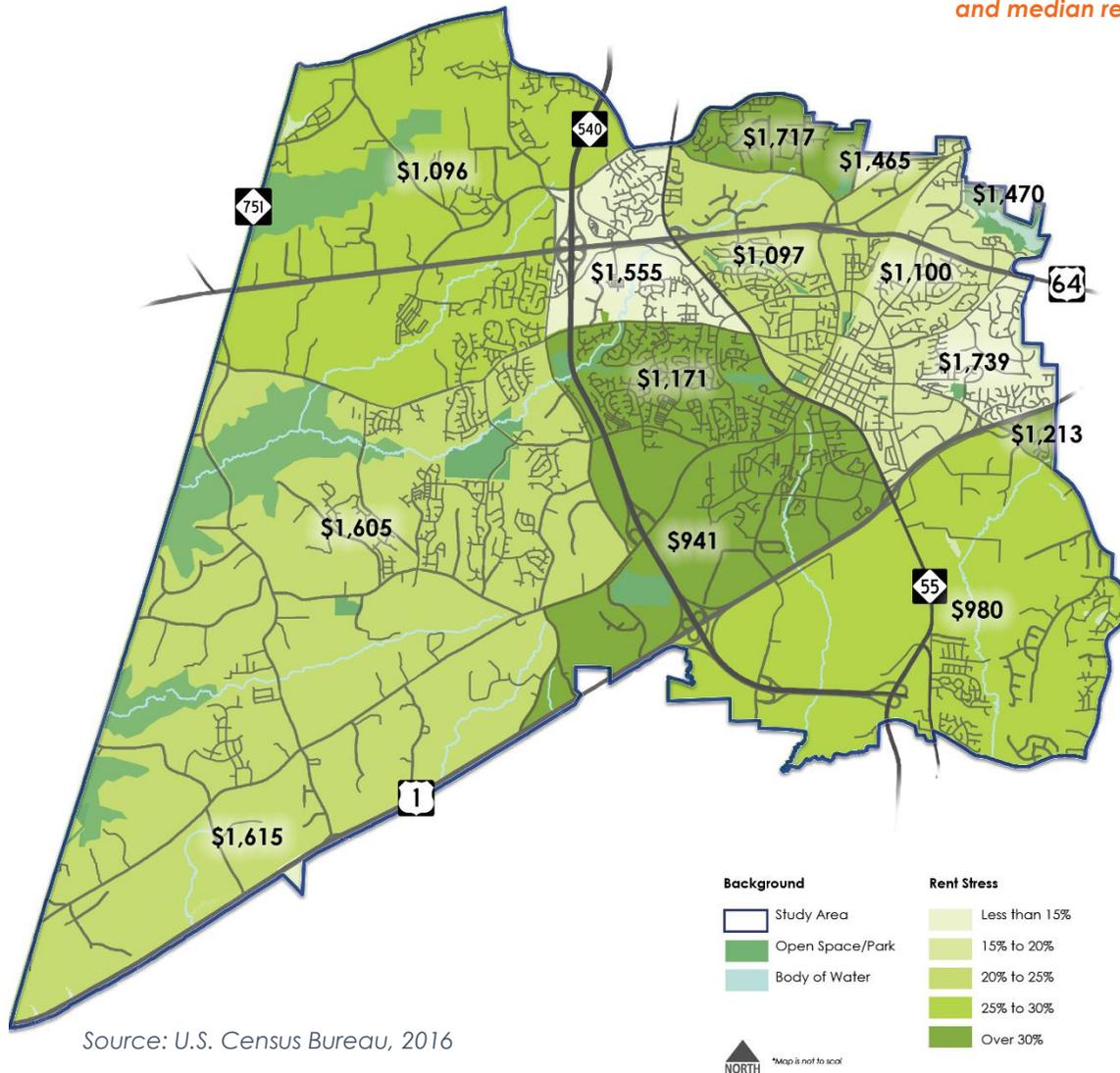
The value of housing investments in Apex has increased in the past several years, with the median home value (shown as labels above census tracts in the map below) rising from \$246,000 in 2010 to \$278,000 in 2016, an increase of 13%. Median rent has increased at a faster rate over that time period, from \$923 to \$1,162, an increase of 26%. Since 2010, the percentage of homeowners who pay more than 35% of their incomes toward housing costs has remained steady (14%), while an increasing percentage of renters have dedicated more than 35% of their income toward housing costs. The percentage of renters considered "housing stressed" is up from 25% in 2010 to 27% in 2016.

Percentage of homeowners who pay more than 35% of their income towards housing and median home values



As shown on the previous page, the highest home values are found in a small wedge between US 1 and Ten Ten Road, with median values approaching \$447,000. However, most of this census tract falls within the Town of Cary, and thus may not be an accurate representation of home values in this small corner of Apex. Within the study area, home values are generally high in the northern areas, where several census tracts have median values over \$300,000. The lowest value, as well as the highest levels of housing stress, are found in the census tract bordered by US 1, Old US 1, Friendship Road, and NC 55. There is no clear geographic pattern to median rent levels within the study area, but it is clear that renters tend to pay more of their income toward housing costs than homeowners across the area.

Percentage of renters who pay more than 35% of their income towards housing and median rent values



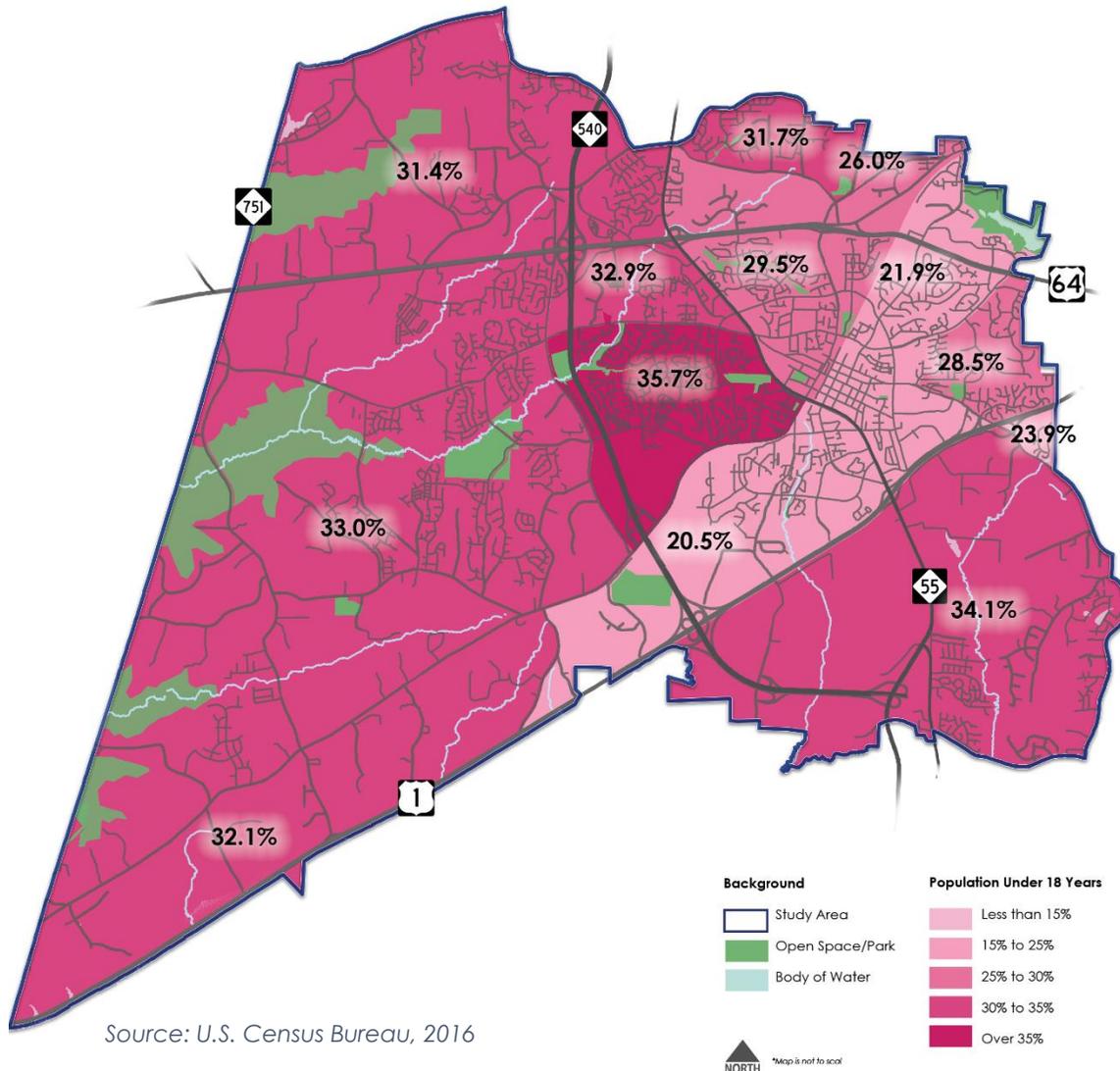
Source: U.S. Census Bureau, 2016

Socioeconomic Characteristics

Age

Reflecting regional and national trends, the Apex community has aged slightly in recent years. The Town's median age has increased from 31.2 in 2010 to 35.9 in 2016, reflecting a slightly increased proportion of the population that is now retirement age or older. Compared to the remainder of Wake County and the Triangle Region as a whole, the Town of Apex has more children and fewer residents of retirement age. This likely reflects the Town's position as a family-friendly community that attracts young families with good schools, parks, and community services. In fact, in some parts of the study area, residents under the age of 18 make up more than one third of the population.

Percentage of population under the age of 18





Young residents often have vastly different transportation needs than other age cohorts. Very young residents are often entirely dependent on parents or older family members for transportation where a reliable transit system or complete bicycle and pedestrian network does not exist. Apex should pay special attention to its walkability, bike facilities, and safety in neighborhoods surrounding schools, parks, and libraries.

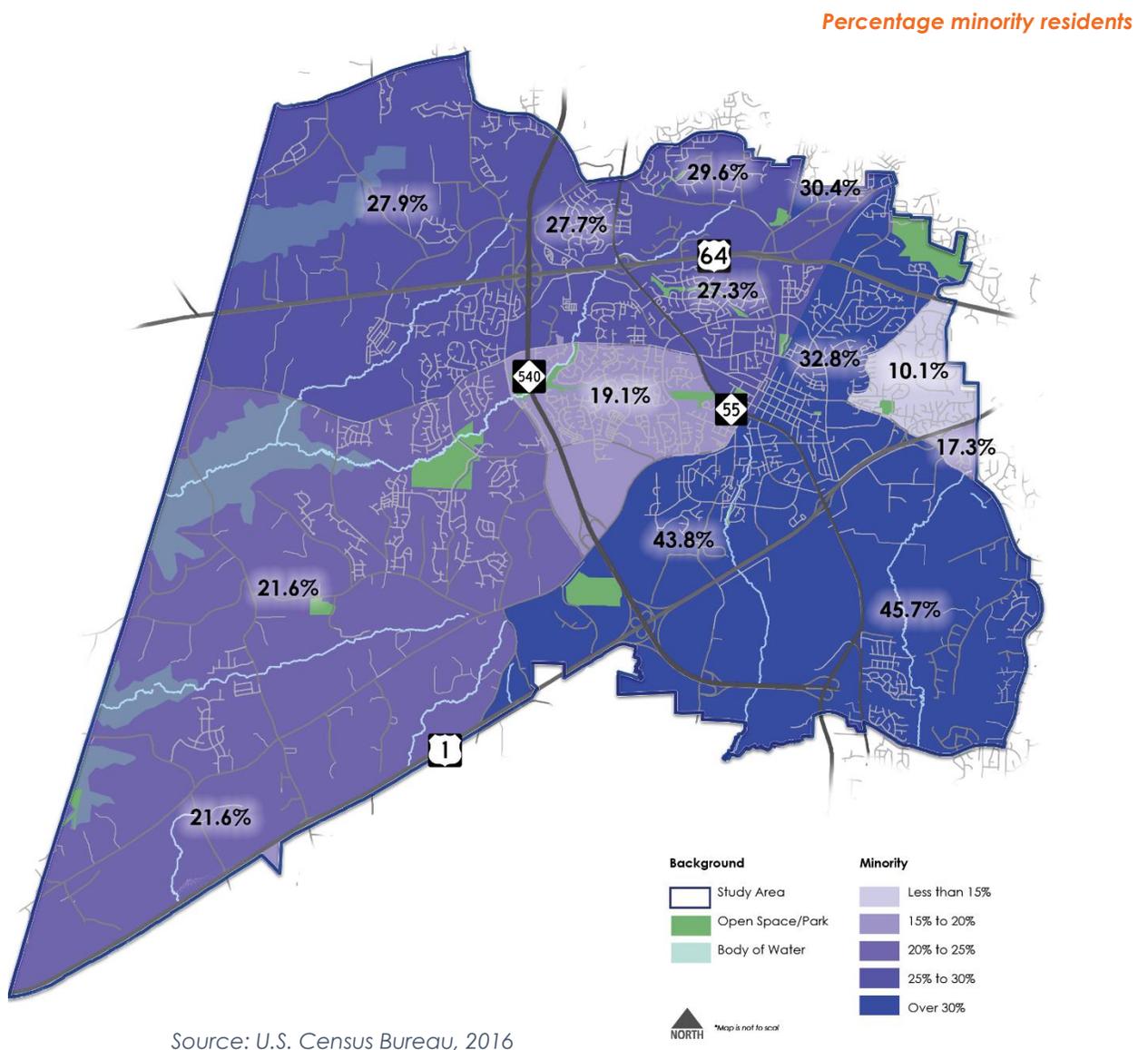
Town of Apex, 2000-2016

	2000	2016
Median Age	31.2	35.9
Under 18	30%	31%
65 and Over	4%	6.9%

Source: U.S. Census Bureau American Community Survey

Diversity

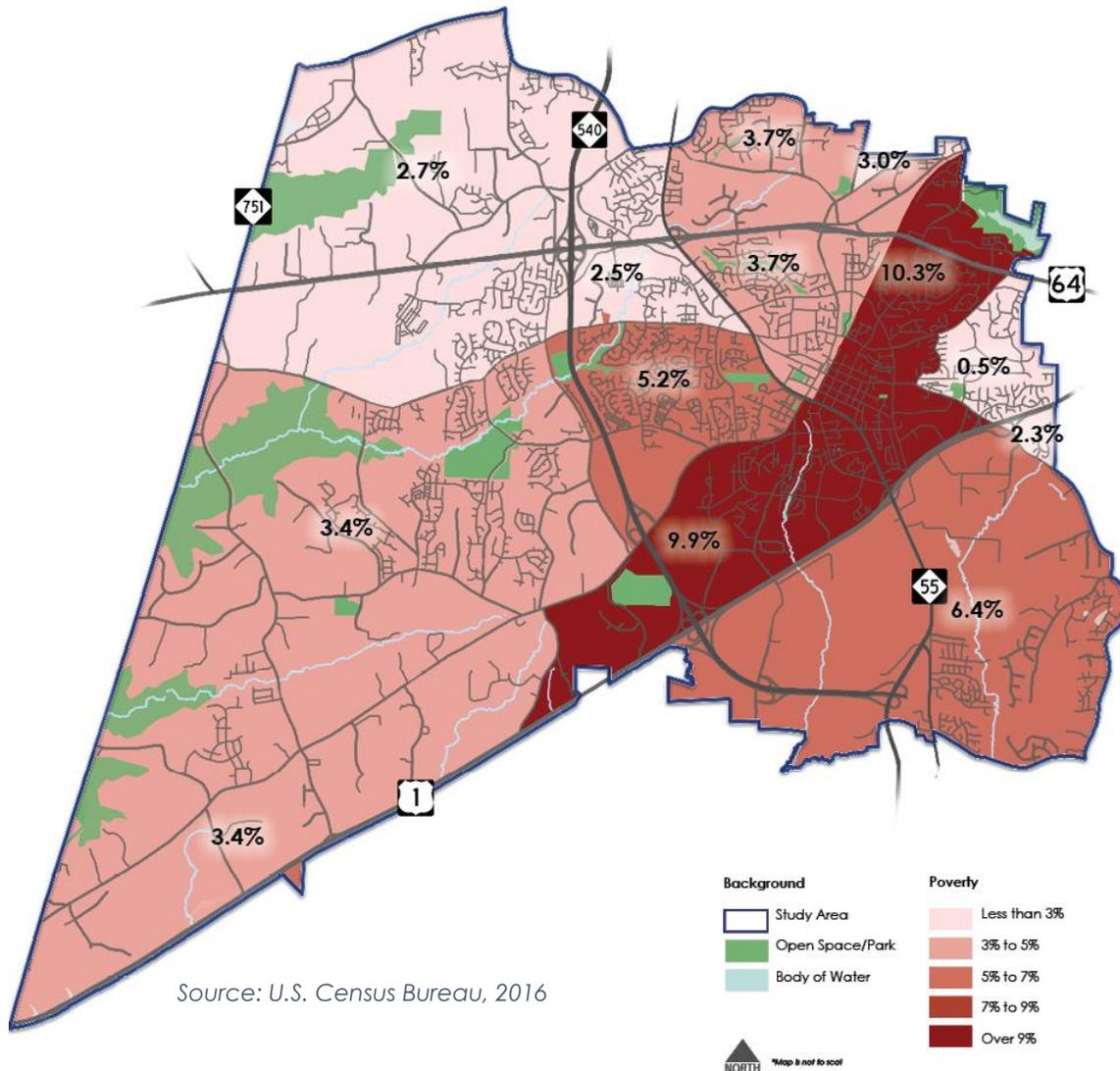
The Town of Apex is relatively less diverse than the remainder of Wake County and the Triangle region as a whole. In 2016, approximately 25% of residents reported themselves as any race or ethnicity other than white, non-Hispanic. This compares to 40% of Wake County residents, and 38% of Triangle residents overall. Diversity in Apex has held relatively steady since 2000. Minority residents are concentrated on the southeast side of the study area, in an area bordered by Friendship Road, S Salem Street, NC 55, US 1, and Ten Ten, Stephenson, and Sunset Lake Roads.



Income and Employment

The Town of Apex is affluent compared to the overall region. Median household income in Apex was \$95,000 in 2016, up from \$83,000 in 2010. This compares to the Triangle region's median income of \$59,000. Apex residents are largely private-sector salary workers, with the largest industry being education, health care and social services, followed by professional, scientific, and management. Poverty in Apex is also relatively low compared to the larger region, although the proportion of the Town's population living under the poverty level has increased since 2010. This moderate increase is likely due to regional and national trends rather than any internal forces. Similarly, unemployment levels

Percentage of population living under the poverty threshold



within Apex have remained low, mirroring a strong regional economy that has continued to grow with the national economic recovery.

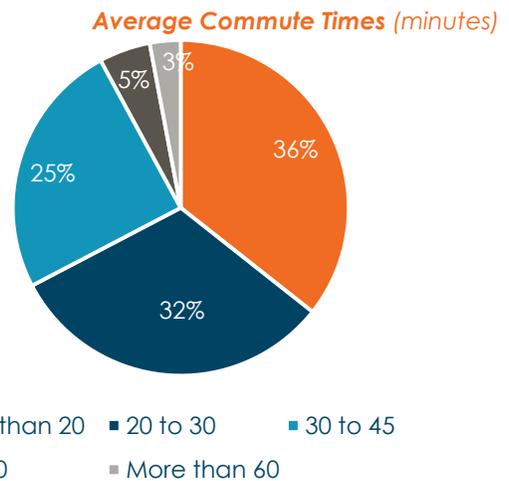
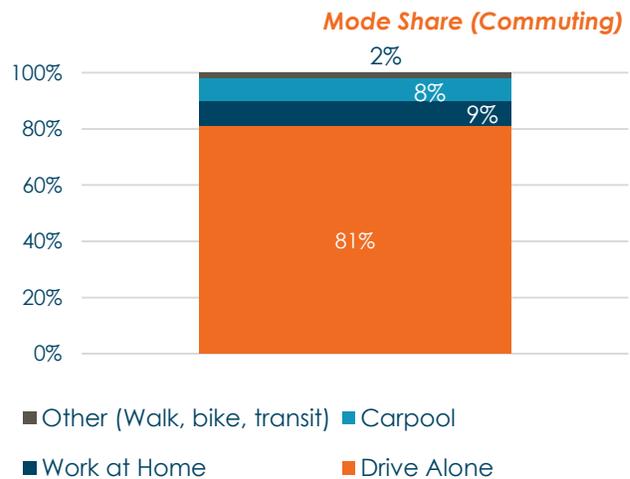
Transportation and Mobility

No Vehicles Available

The vast majority of households in Apex have at least one vehicle available to them for daily transportation, with approximately 70% of households having two or more. Because of this, public transportation, walking, and bicycling are likely to serve as supplemental transportation alternatives rather than necessities for the majority of the community. Therefore, these facilities should be attractive and provide distinct recreational and local mobility benefits to all members of the community in order to attract users. The Apex community has a high proportion of young residents as well as a growing contingency of older residents. Both groups are more likely to rely on transit, biking, walking, as well as assistance from friends and family, to move around the community.

Travel to Work

In 2016, about 82% of Apex residents commuted to work by driving alone, while 8% of residents commuted as part of a carpool. Very few Apex commuters take advantage of alternative options such as walking, biking, or transit, likely reflecting the fact that many Apex residents work outside the local community and that limited transit options exist to serve regional destinations. The only commuting metric that has meaningfully changed in the past several years is the number of residents that work from home, which has almost doubled since 2010.



Average Commute Times

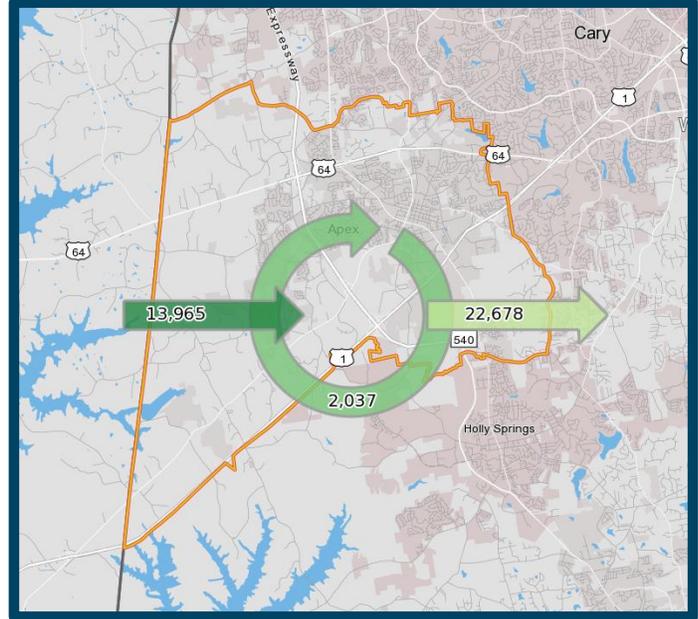
The average commute for workers who live in Apex was 23.8 minutes in 2016, on par with the regional and national averages. Approximately 35% of Apex workers commuted less than 20 minutes to work, likely due to the Town's major roadway connections and proximity to the region's largest employment destinations (namely central Raleigh, Cary, and Research Triangle Park).

Work Locations

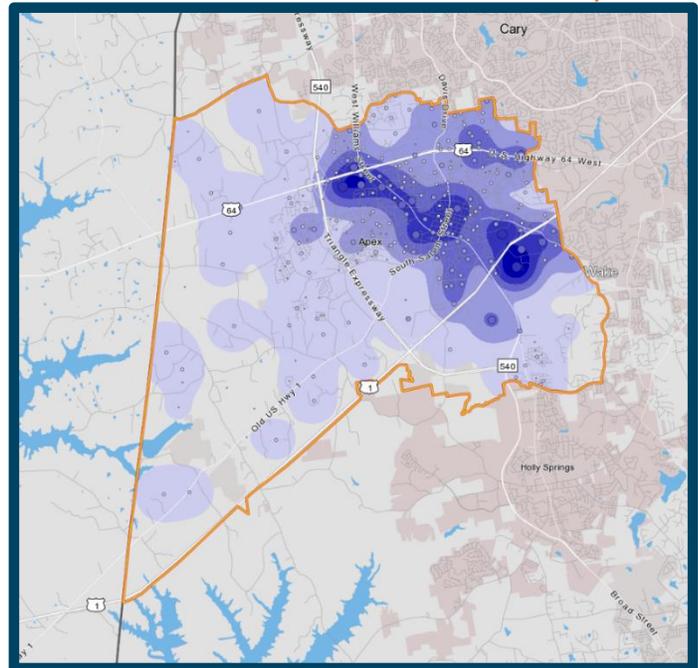
Of the approximately 16,000 jobs hosted within the study area in 2015, 12% were held by residents who also lived within the study area (2,037).⁶ Approximately 14,000 commuters regularly travel into the study area to work, a total of 87% of the study area's jobs. Of residents who live within the study area, 8% are also employed in the area, with 92% commuting outside for work. This makes for a total outflow of approximately 22,600 residents leaving the area every day for employment.

In 2015, the most common work destination for Apex residents was Raleigh, with 24% of Apex commuters traveling there. Cary (18%) and Durham (11%) followed, with Apex the fourth-most popular work location, hosting only 7.5% of residents. Approximately 47% of residents traveled between 10 and 24 miles to work each

Commuter Inflow and Outflow



Job Concentration in Apex, NC



Source (top and bottom images): U.S. Census Bureau ONTHEMAP

⁶ U.S. Census Bureau (OnTheMap)

day, while 11% of residents traveled over 50 miles (most of these workers traveled west to work, away from Triangle destinations).

Jobs within the study area are heavily concentrated in four main areas, all located east of NC 540: along the West Williams Street corridor; in Downtown Apex; in business parks bordering US 1 between NC 55 and Ten Ten Road; and along US 64 east of Salem Street. These locations provide excellent connectivity to the larger surrounding region, as well as proximity to the local workforce. However, this heavy concentration of employment in close proximity may lead to increased congestion on a few select roadways at peak travel periods, as commuters are funneled onto just a few major corridors due to a lack of roadway connectivity. The employment locations are in stark contrast to the residential patterns within the study area, which tend to be much more evenly spread out and concentrated to the west of downtown. This dichotomy creates a vehicle-dependent population, since residents lack jobs and basic services within short distances of their homes.

Shared Ride and Other Technologies

As transportation technology continues to evolve, trends such as ride sharing and the emergence of autonomous vehicles have changed the way cities think about travel and plan for the future.

Ride sharing is a form of transportation that pairs users with nearby drivers through a mobile application. Drivers, usually driving their personal vehicle, then pick up the passenger from a designated location and payment is automatically charged to the consumer's credit card. These highly popular companies have emerged as alternatives to personal vehicles, taxi services, transit, and other more traditional means of travel.

Ride sharing companies Uber and Lyft are operational in Apex, offering rides to destinations throughout the Triangle region. According to the company sites, a ride from downtown Apex to downtown Raleigh could cost a single passenger between \$16 and \$21, depending on a number of factors. The continued rise in popularity of ride sharing applications (Uber counted over 2 billion rides by 2016), provides residents with alternate transportation options, reduces the need for personal vehicles, and increases access to critical service.

Chapter 4: Context-Sensitive Design

Introduction

There is no single solution for improving all streets. Each is unique and should relate to the surrounding context. In the past, streets were designed mostly with cars in mind, which can make active transportation choices difficult, inconvenient, and often dangerous. Context-sensitive, complete-street design supports the idea that streets should be designed for everyone, with appropriate design priorities for pedestrians, bicyclists, motorists, and transit riders determined based on the function of a particular facility and its surrounding area. Context-sensitive design considers not only the functional class of the road, but also the character of the surrounding development, future goals for each corridor, and the existing or future need for different modes of transportation.

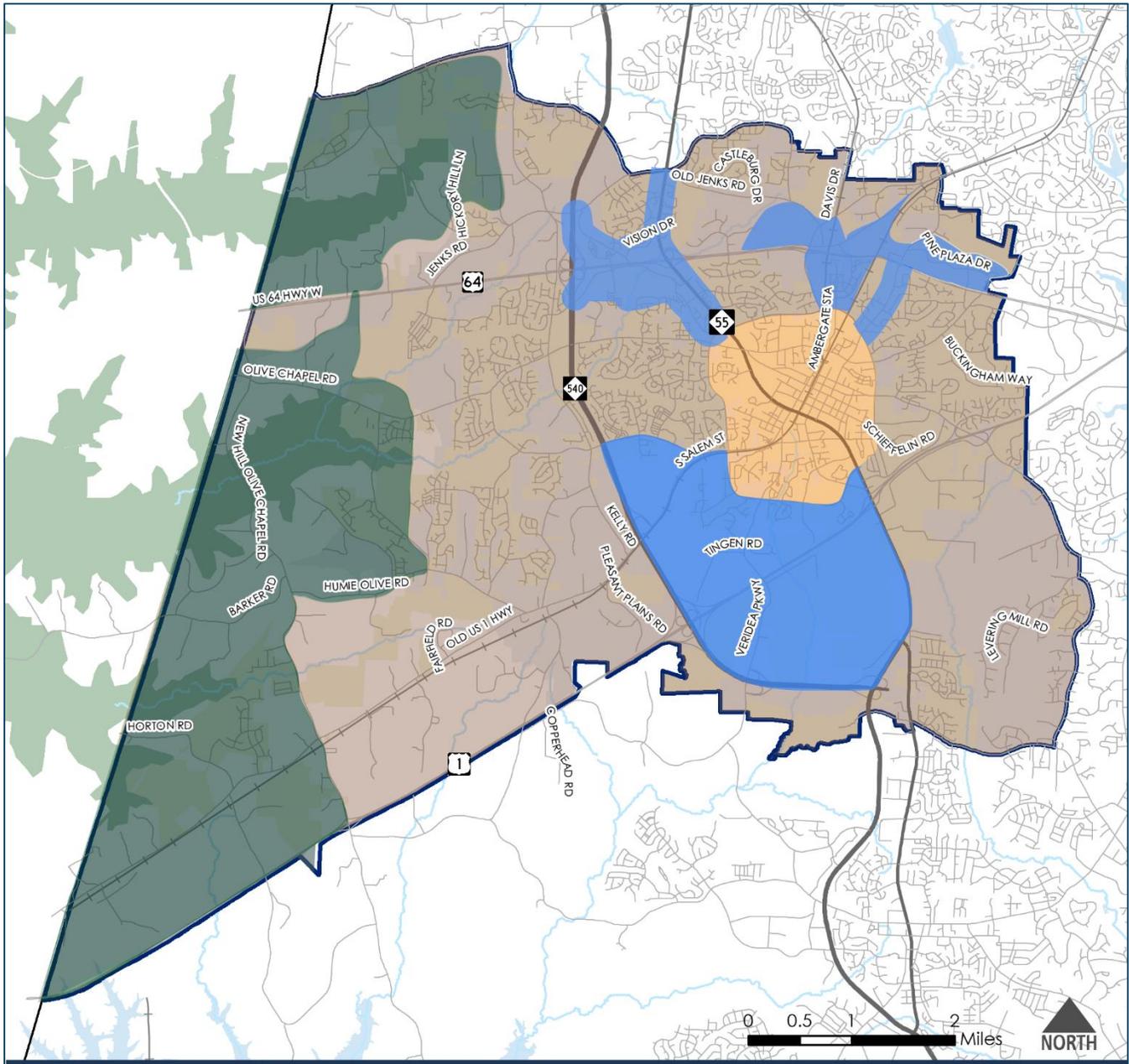
The design of roadways in Apex is guided primarily by typical roadway cross sections organized by functional classification, with a separate set of cross sections for rural areas. By integrating land use and modal priorities with the Transportation Plan, the context-sensitive design process can be applied to determine the most appropriate street cross section to better serve the variety of community priorities, land use contexts, and activity centers along a specific corridor.

Context Areas

Advance Apex introduces four different context types which encompass a variety of land use patterns, modal priorities, and facility design elements: Rural, Suburban, Transit-Oriented Development, and Town Center. The context areas are shown in the map below, followed by a description of each context, including typical characteristics, mode priorities, and street design considerations.

COMPLETE STREETS IN APEX

Apex has long been committed to complete streets. Previous transportation plans, small area plans, and comprehensive plans have established goals that center on a context-sensitive approach to street design. Advance Apex, through its multilayered engagement platform, reaffirmed the Town's commitment to complete streets. Advance Apex integrates a complete streets policy to ensure streets are planned, designed, and operated in a safe, convenient manner, providing mode choices based on the surrounding context for users of all ages and abilities.



Legend

Context Areas

- Town Center
- Rural
- Suburban
- Transit-Oriented Development

Rural

Typical Development Pattern

This context type complements rural living and is characterized by lower densities, open space, and natural views. The development pattern may range from the natural environment with no development to some light development, where residential properties tend to be widely spaced and include single-family homes or urban farms. This context may also include agricultural or forested areas.



Multimodal Considerations

Vehicle	Transit	Bicycle	Pedestrian
<u>High</u> Most travel is by car	<u>Low</u> Transit service is often absent or highly limited	<u>Moderate</u> Bicycle use is mostly recreational	<u>Low</u> Very few pedestrians, except in areas used for outdoor recreation

Street Design Considerations

High Priority	<ul style="list-style-type: none"> Shoulders Street-side swales, and medians with natural landscaping
Moderate Priority	<ul style="list-style-type: none"> Bike facilities such as wide shoulders, bike lanes
Low Priority	<ul style="list-style-type: none"> Sidewalks or side paths Transit accommodations
Not Applicable	<ul style="list-style-type: none"> On-street parking Curb and gutter

Suburban

Typical Development Pattern

This context type typically includes medium-density residential land uses characterized by single-family homes, townhomes, and duplexes. Commercial areas are often located near busy corridors and intersections most easily accessible by car with ample off-street parking.



Multimodal Considerations

Vehicle	Transit	Bicycle	Pedestrian
<u>High</u> Heavy reliance on vehicles; Higher than average volumes expected; Greater need for access management	<u>Low</u> Transit service may be present	<u>Moderate</u> Bicycle activity likely a mix of recreation and utilitarian trips; Use may increase near parks, schools, neighborhoods, and mixed-use activity centers	<u>Moderate</u> Moderate pedestrian activity, particularly near recreation areas, schools, and mixed-use activity centers

Street Design Considerations

High Priority	<ul style="list-style-type: none"> • Vehicle capacity and medians on major facilities • Separation (buffers) for pedestrians and bicyclists • Curb and gutter • Sidewalks within ¼ mile of schools
Moderate Priority	<ul style="list-style-type: none"> • Connected bicycle and pedestrian facilities
Low Priority	<ul style="list-style-type: none"> • On-street parking on minor commercial and residential thoroughfares • Pedestrian streetscape amenities • Enhanced transit accommodations near major stops • Pedestrian-oriented street connectivity
Not Applicable	<ul style="list-style-type: none"> • Shoulders

Transit-Oriented Development

This context type includes areas of residential, economic, entertainment, or community activity centers oriented around a transit corridor, which may include future commuter rail or bus service. The design and scale of the development in this context encourages active transportation, with a comprehensive and interconnected network of walkable streets.



Multimodal Considerations

Vehicle	Transit	Bicycle	Pedestrian
<u>Moderate</u> Area is accessible to vehicles, but travel speeds and volumes are balanced with the needs of all modes	<u>High</u> Development and streets are oriented for convenient access to existing and anticipated transit stops	<u>High</u> Higher than average bicycle activity expected near transit service and mixed-use development	<u>High</u> Higher than average pedestrian activity expected near transit service and mixed-use development

Street Design Considerations

High Priority	<ul style="list-style-type: none"> On-street parking Wider sidewalks and pedestrian-scaled streetscape amenities Bicycle facilities Enhanced transit accommodations Pedestrian-oriented street connectivity and route choice Curb and gutter
Moderate Priority	<ul style="list-style-type: none"> Vehicle capacity
Low Priority	<ul style="list-style-type: none"> Vehicle speed
Not Applicable	<ul style="list-style-type: none"> Shoulders

Town Center

This context type is the most flexible and offers a mix of housing types within proximity to employment, shopping, and community activity. The scale of development, slower traffic speeds and emphasis on pedestrians encourage active transportation. Development often includes small-lot or attached housing types mixed with retail, workplace, civic activities, and walkable mixed-use developments.



Multimodal Considerations

Vehicle	Transit	Bicycle	Pedestrian
<u>Moderate</u> Moderate emphasis on vehicle access, parking and capacity	<u>High</u> Transit service will be present and is vital for future growth	<u>High</u> Closer proximity and mix of destinations near residential areas encourage bicycle activity	<u>High</u> Closer proximity and mix of destinations near residential areas encourage pedestrian activity

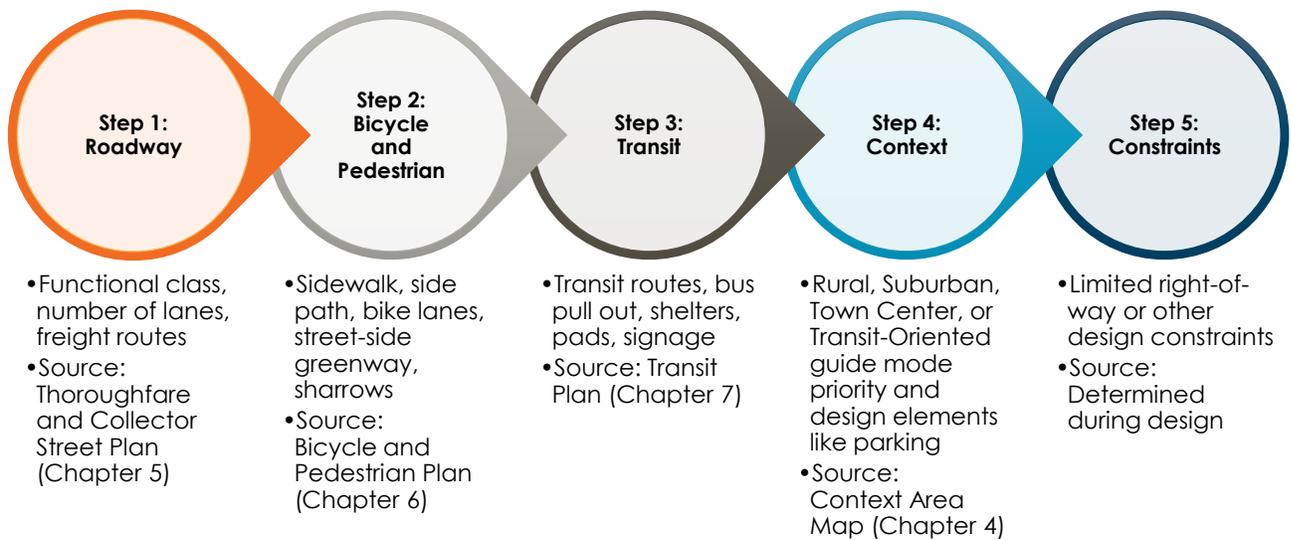
Street Design Considerations

High Priority	<ul style="list-style-type: none"> On-street parking Wider sidewalks and pedestrian-scaled streetscape amenities and roadway crossings Bicycle facilities Enhanced transit accommodations Pedestrian-oriented street connectivity and route choice Curb and gutter
Moderate Priority	<ul style="list-style-type: none"> Vehicle capacity
Low Priority	<ul style="list-style-type: none"> Vehicle speed Shoulders

Cross Sections

Overview

Cross sections guide how much right-of-way will be needed for each roadway type and serve as a starting point for the allocation of space within the right-of-way. The cross sections are flexible, allowing for adjustments based on freight route designation, bicycle and pedestrian facilities, transit needs, context, and constraints. The diagram below depicts the information that is needed to select the appropriate cross section.



Flex Space

Each cross section includes an area identified as "Flex Space". This is the area that can be adjusted to accommodate wide lanes for freight routes, bicycle and pedestrian facilities, transit needs, context elements like parking and street-side seating and constraints. Flex space width may be reduced or reallocated to the roadway to accommodate:

- Wide lanes for designated freight routes
- Side path, wide sidewalk, bike lanes, street-side greenway, or wide shoulder
- Bus stop landing pad, shelter, bench, signage
- On-street parking
- Pedestrian refuge island
- Café seating or wider building frontage
- Environmental constraints such as stream crossings or wetlands

Minimum Design Criteria

In limited circumstances, the cross section right-of-way may be adjusted due to constraints. Examples may include historic resources or important natural environmental features. The following table provides design guidance for the standard and minimum widths of cross-section elements that can be adjusted in constrained situations. The context should guide which design elements should be prioritized to remain at standard.

Context	Town Center		Transit-Oriented Development		Suburban		Rural	
	Standard	Constrained	Standard	Constrained	Standard	Constrained	Standard	Constrained
Median ¹	23'	12'	23'	12'	23'	18'	30'	23'
Center Turn Lane/Island	12'	11'	12'	11'	12'	11'	12'	11'
Side path	10'	8'	10'	8'	10'	8'	10'	8'
Landscaped Verge ²	varies	3'	varies	3'	varies	3'	varies	9'
Shoulder ³	5'	4'	5'	4'	5'	4'	6'	4'
Bike Lanes ⁴	6'	4'	6'	4'	6'	5'	6'	5'
On-Street Parking ⁵	8'	7'	8'	7'	8'	7'	N/A	N/A
Flex Space	varies	0'	varies	0'	varies	0'	varies	0'

1 = Median indicates raised median including curbs for Town Center, Transit-Oriented Development, and Suburban. Median widths in the Town Center and Transit-Oriented Development contexts are narrower to provide a shorter roadway crossing distance for pedestrians. Rural medians will not include curb and will not be raised.

2 = Verge is the area between the back of the curb or street edge and pedestrian facility. The verge width varies based on context and roadway type; however, any verge less than 3' will require hardscaping instead of landscaping.

3 = Shoulder refers to wide paved shoulder.

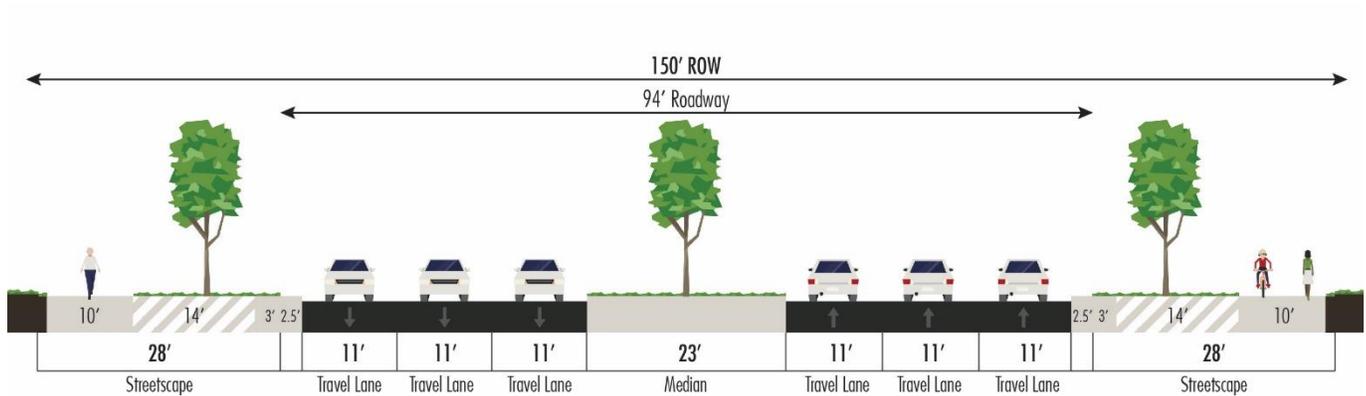
4 = A minimum 4' width can be used in Town Center and Transit-Oriented Development context areas if adjacent to the gutter and without a parking lane.

5 = On-Street Parking accounts for parallel parking. Angle parking would have different widths and requirements.

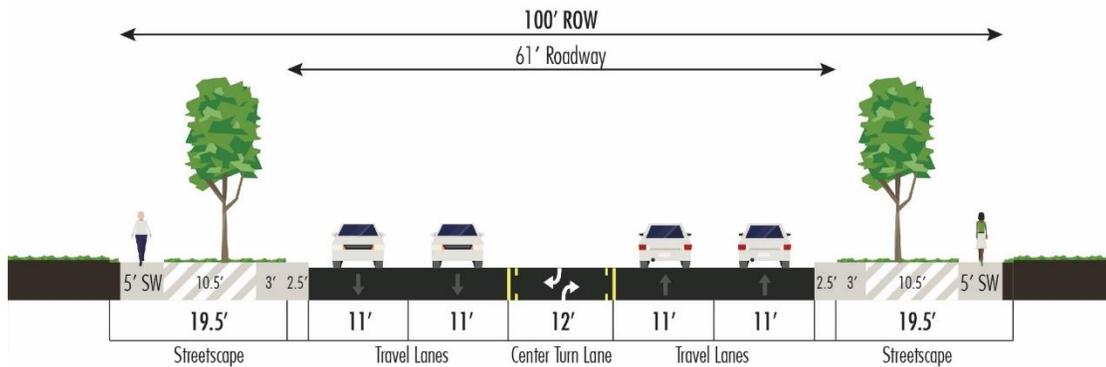
Typical Cross Sections

Typical cross sections for each roadway type are provided in this section. Rural cross sections are provided in a separate section. Each cross-section includes a 1' right-of-way offset from the property line that is included in total right-of-way width. Street trees are subject to plan review and shall be HOA maintained.

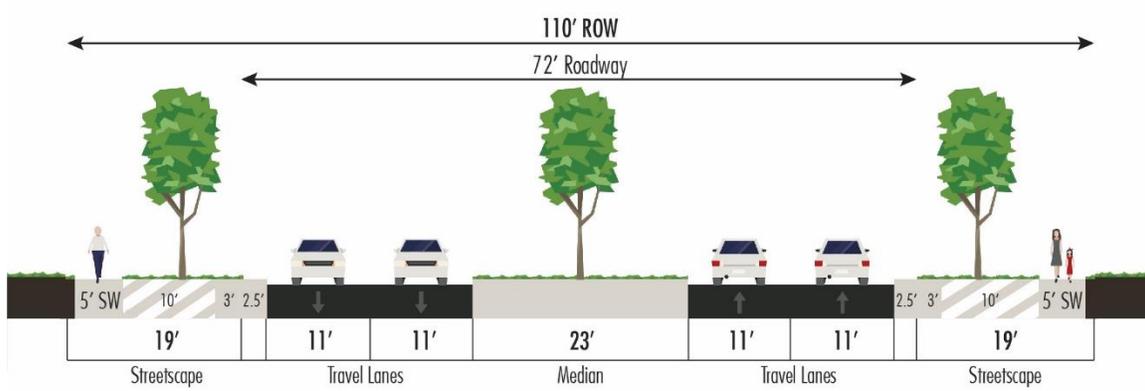
6-Lane Superstreet



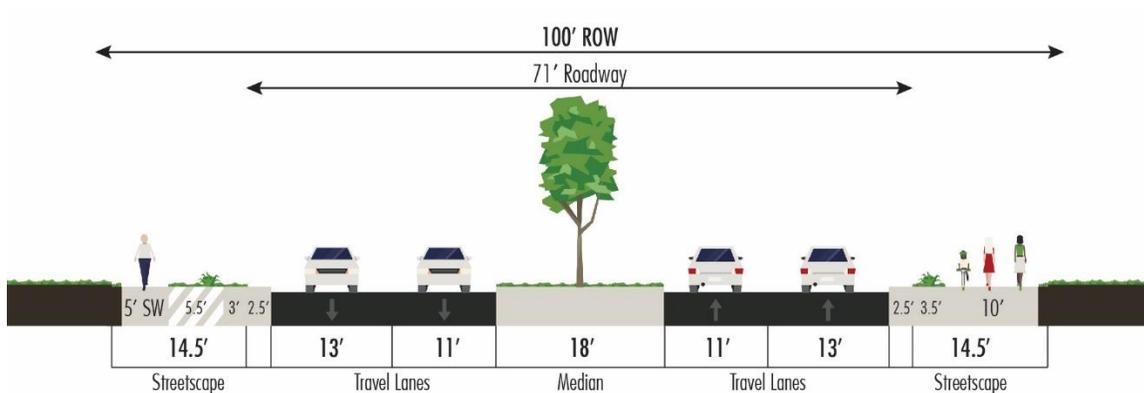
5-Lane Undivided Thoroughfare (100')



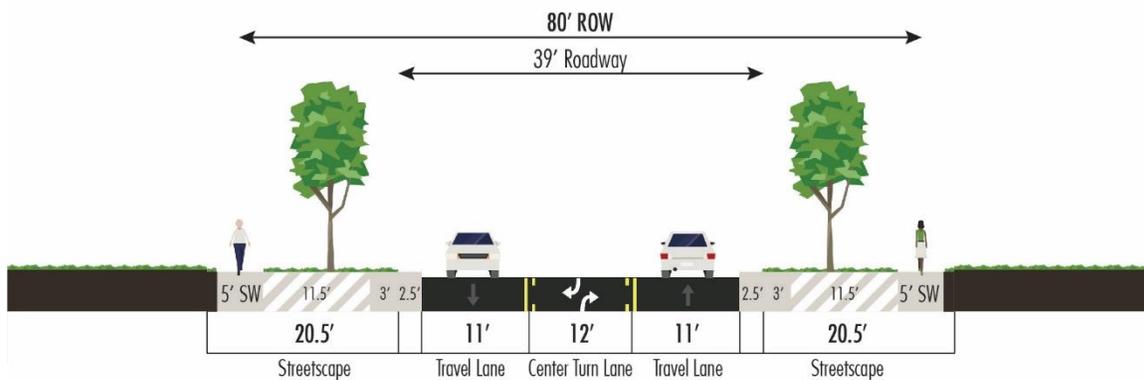
4-Lane Divided Thoroughfare (110')



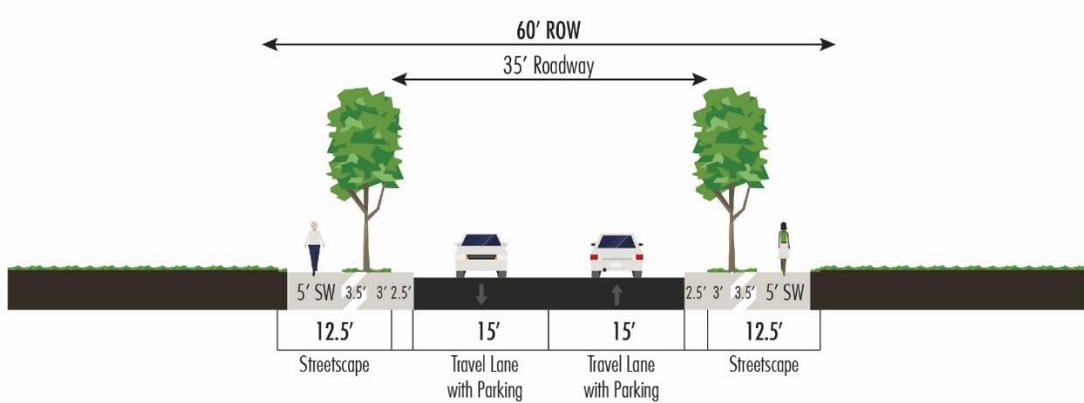
Apex Peakway (100')



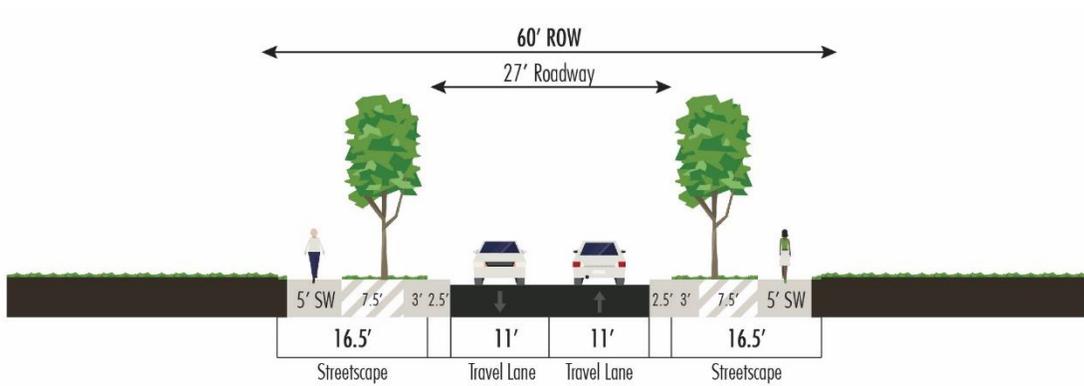
3-Lane Undivided Thoroughfare (80')



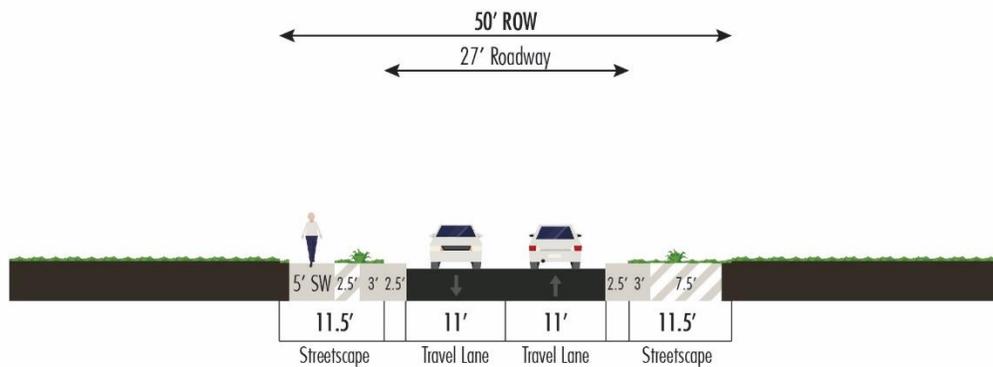
2-Lane Major Collector/2-Lane Thoroughfare/2-Lane Major Residential (60')



2-Lane Minor Collector (60')



2-Lane Minor Residential (50')

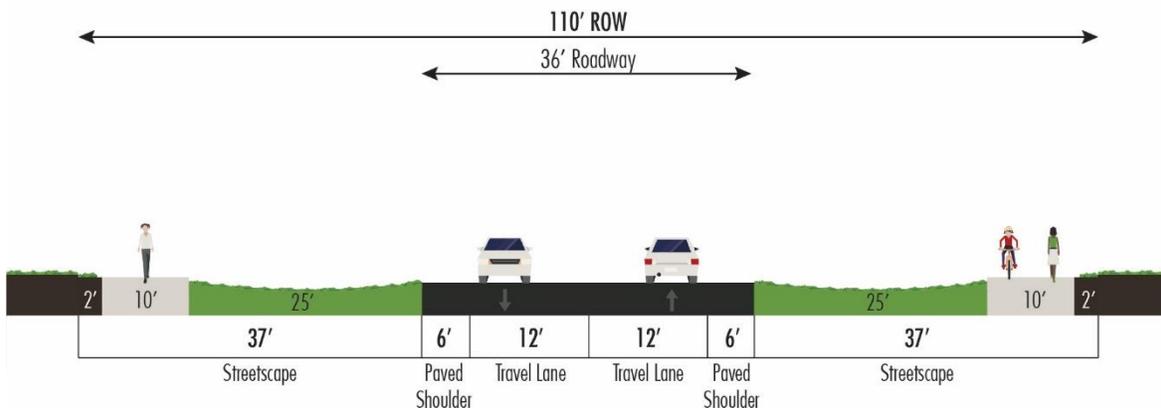


Rural Cross Sections

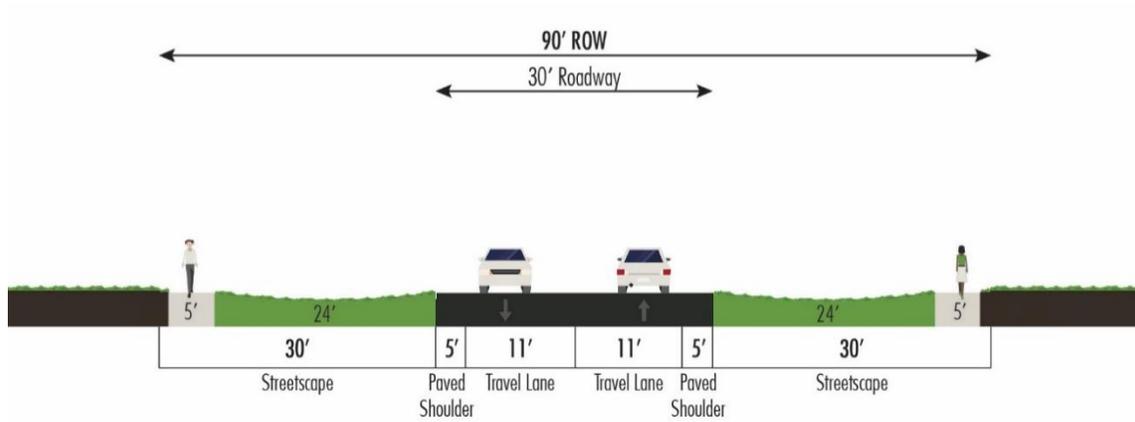
Rural cross sections are addressed slightly differently than cross sections in other contexts. Unique features of rural sections that should be considered include the following:

- Rural cross sections primarily include a shoulder and ditch section rather than curb and gutter. As a result, pedestrian and bicycle facilities outside the travelway are separated by a ditch section. The width of this separation varies based on the drainage needs and ditch characteristics in that area. As a result, the right-of-way needs for this section are also variable.
- Where needed, rural cross sections should include features such as turn lanes to accommodate existing or new development. Signalized intersections should be avoided if not warranted to maintain traffic flow and preserve a rural feel.
- In some cases, such as along New Hill Holleman Road, additional right of way should be reserved to prepare for a future multilane section. This is a proactive approach that offers flexibility for rural roadways in case traffic volumes or desired characteristics of the facilities change over time.

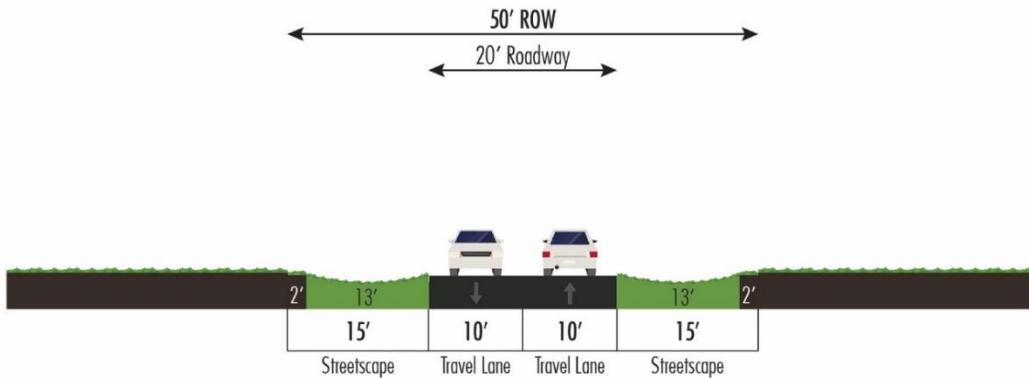
2-Lane Rural Thoroughfare



2-Lane Rural Collector



2-Lane Rural Residential



Street Spacing

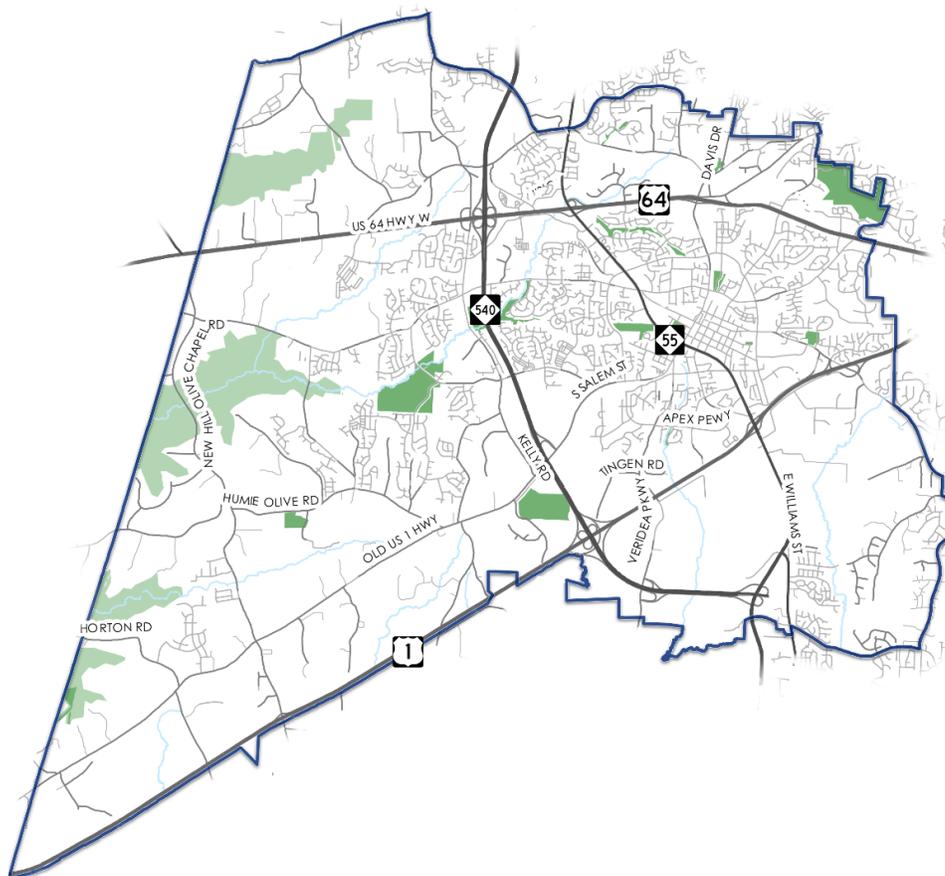
Street spacing is another important component of developing a series of cross sections and contexts that best serves Apex, particularly for collector and residential street sections. NCDOT's Complete Street Guidelines provide recommendations for block length based on land use and were used to inform residential street spacing recommendations. The following street spacing guidelines should be used as new or realigned facilities are being considered.

Cross-Section	Town Center	Transit-Oriented Development	Suburban	Rural
2-lane major collector	750'-1,500'	750'-1,500'	1,500'-3,000'	3,000'-6,000'
2-lane minor collector	750'-1,500'	750'-1,500'	1,500'-3,000'	3,000'-6,000'
Residential	200'-650'	200'-650'	200'-800'	200'-1,000'

Chapter 5: Roadway Element

Introduction

As growth occurs and travel demand continues to increase, roadway improvements are needed to manage traffic congestion and improve safety. Often in Apex, neighborhoods and activity centers rely on just a few transportation corridors to provide essential links between home, school, employment, shopping, social, and recreational destinations. To successfully support a vibrant community, roadway improvements should be planned to strengthen these critical connections between activity centers, provide alternative routing options, and support additional travel modes. In this chapter, the process used to identify existing and future roadway needs is presented, along with resulting recommendations for thoroughfares, collector streets, and intersections. Policy recommendations are also provided to guide the improvement and continued development of the roadway network in Apex.



Process

A challenge in creating a successful transportation system for the Town of Apex is blending local and regional connectivity and access functions with preservation of the Town's unique character.

The recommended roadway improvements for the study area represent the results of a process that considered: previous planning efforts, existing and planned land uses, environmental constraints, safety and congestion data, projected future travel demand, committed projects, and public input.

In addition, each recommendation was vetted against the six planning themes established at the outset of Advance Apex, to ensure it was consistent with the Town's long-term goals.

Public Input

Public input was an integral part of identifying priority projects and roadway improvements. Input from the public workshops and online survey were combined with quantitative data to identify areas of concern and deficiency throughout the network. Overall, the most frequently mentioned corridors and intersections identified as priorities for improvement were:

- Apex Peakway
- Ten Ten Road
- Jessie Drive improvement/extension between NC 55 and Ten Ten Road
- Laura Duncan Road
- Olive Chapel Road
- NC 55
- US 64
- Jenks Road
- Wimberly Road
- NC 540 extension
- Salem Street/Davis Drive from downtown to Cary limits
- Jenks/Richardson Road interchange with US 64
- Olive Chapel Road/Apex Barbecue Road realignment
- Beaver Creek Commons/Kelly Road

PROJECT SOURCES

Recommended projects shown in this chapter came from many sources, including:

- 2011 Town of Apex Comprehensive Transportation Plan
- 2045 Metropolitan Transportation Plan (MTP)
- Safety and traffic data analysis
- Steering Committee



Public input helped tailor the ultimate recommendations by defining the solutions that would be appropriate for the community. Survey questions and workshop exercises that asked about road design and bicycle and pedestrian accommodations helped define the types of recommended projects and roadway cross sections in the final plan.

See the Appendix for a full public outreach summary.

Safety

Crash data provide valuable insight about roadways and intersections where improvements may be needed due to safety concerns. According to NCDOT and Town of Apex data, the Town of Apex recorded 4,462 vehicular, bicycle, and pedestrian crashes between December 2012 and November 2017. Ten of these crashes involved cyclists, and 40 involved pedestrians.

Most of these crashes did not result in any injuries, with only one during this time period resulting in a fatality. That fatality occurred on Apex Barbecue Road in May of 2017 as the result of a vehicle running off the road.

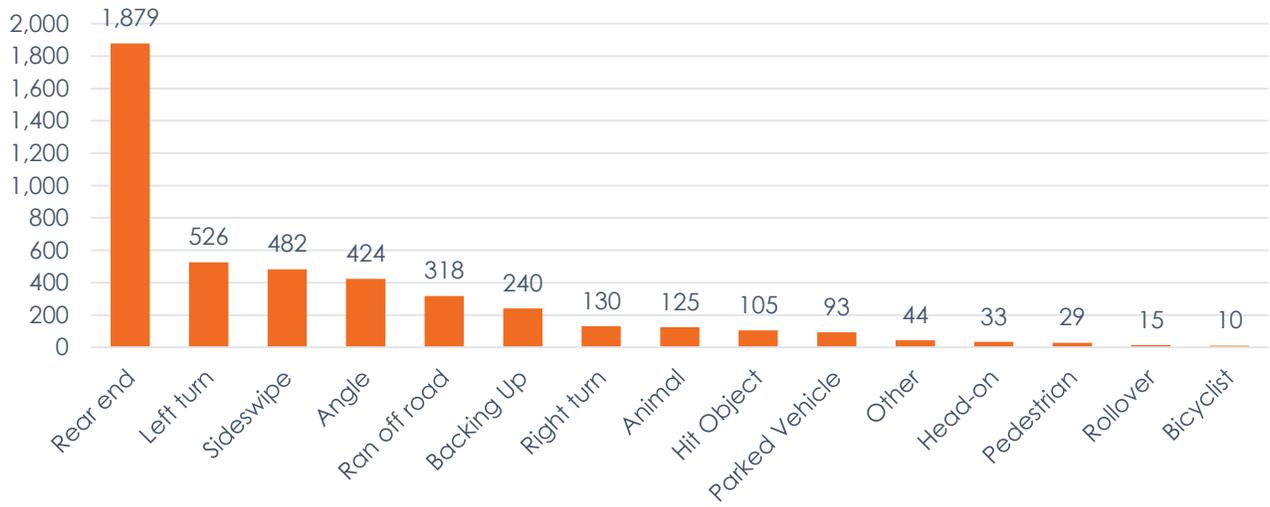
The most common type of crash occurring within the Town limits is a rear-end crash, followed by angle crashes, sideswipes, and crashes during left turns. However, injuries occurred most frequently during rollover incidents and crashes involving pedestrians and bicyclists, though each of these occurrences were relatively rare.

Crashes occur with relative frequency on the study area's most traveled roads, with high crash locations occurring mainly along US 64 and NC 55. Many major intersections along these corridors saw over 50 crashes during the 6-year study period, even while the roads throughout the rest of the study area remained relatively free of collisions. Many of the high frequency crash locations in the study area also occur on roadways that feed into these major corridors. The map on the following page outlines the study area's high frequency crash locations, but does not take into account the severity of the incidents.

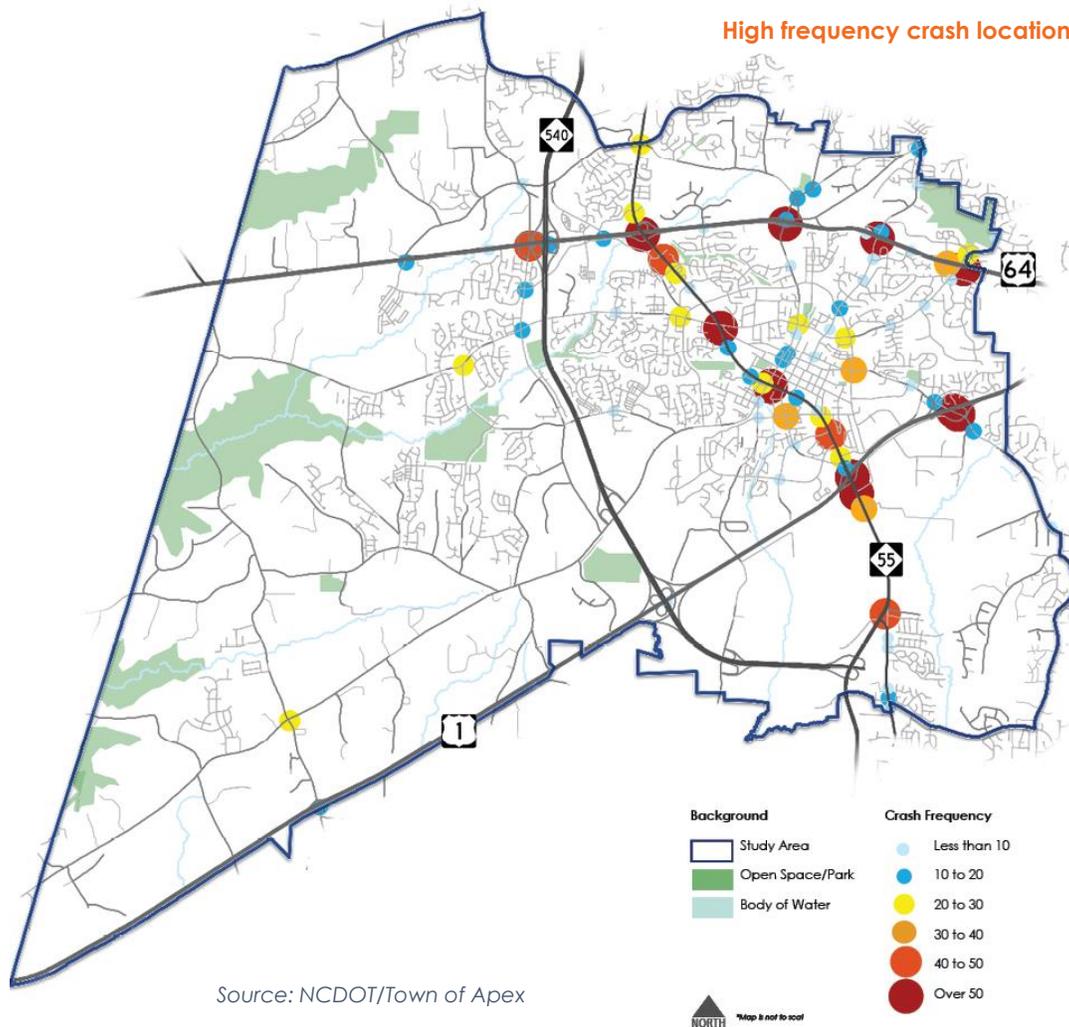
North Carolina's Highway Safety Improvement Program identifies potentially hazardous locations that should be considered for priority safety improvements. As of March 2018, those identified locations in Apex are:

- James Street at South Hughes Street
- NC 55 at Beaver Creek Commons Drive
- NC 540 at NC 55 Bypass
- Lake Pine Drive at MacGregor Pines Drive/Pine Plaza Drive
- Zeno Road at Beaver Creek Commons Drive

Apex vehicle crashes by type, 2012-2017

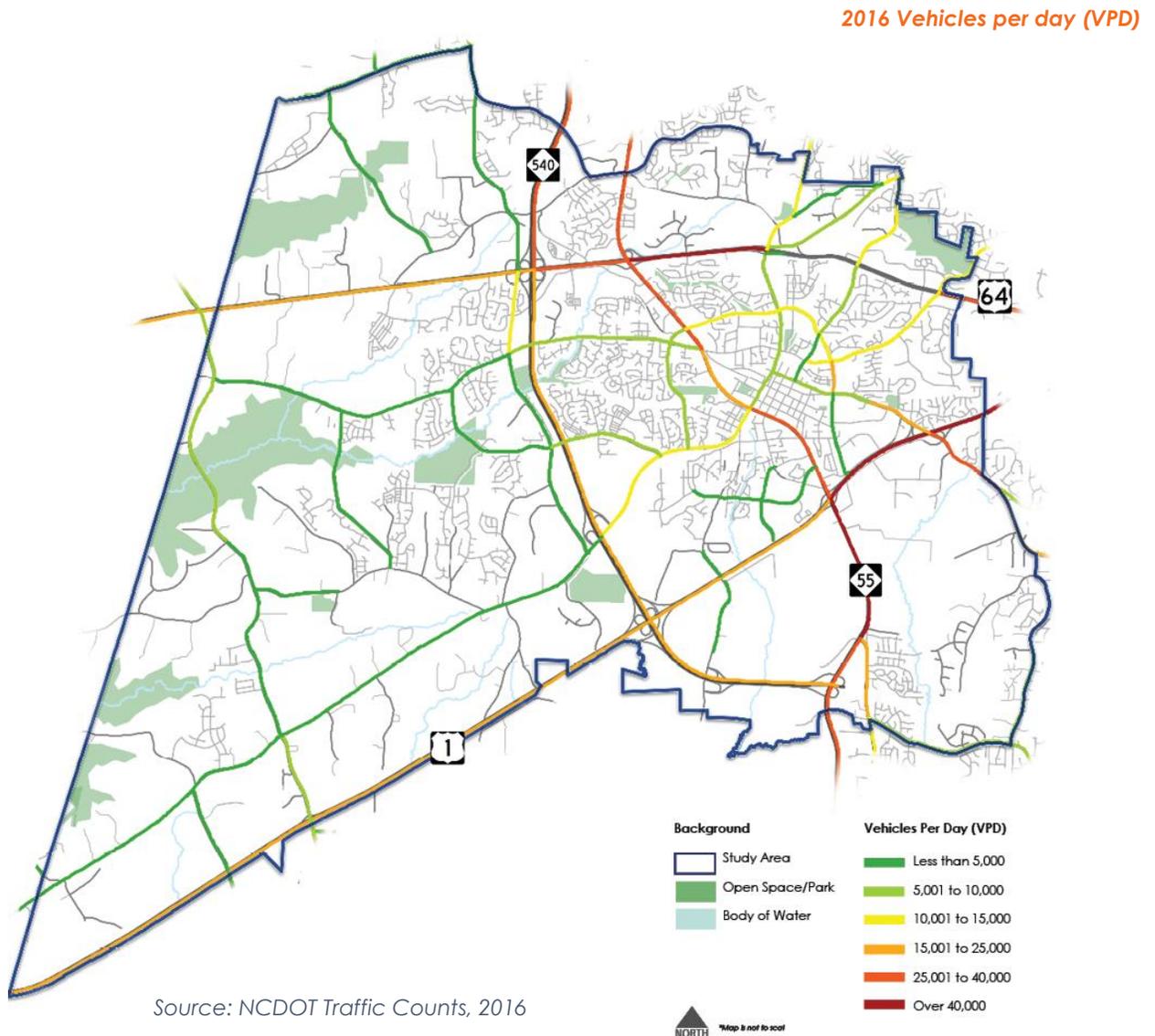


High frequency crash locations, 2012-2017

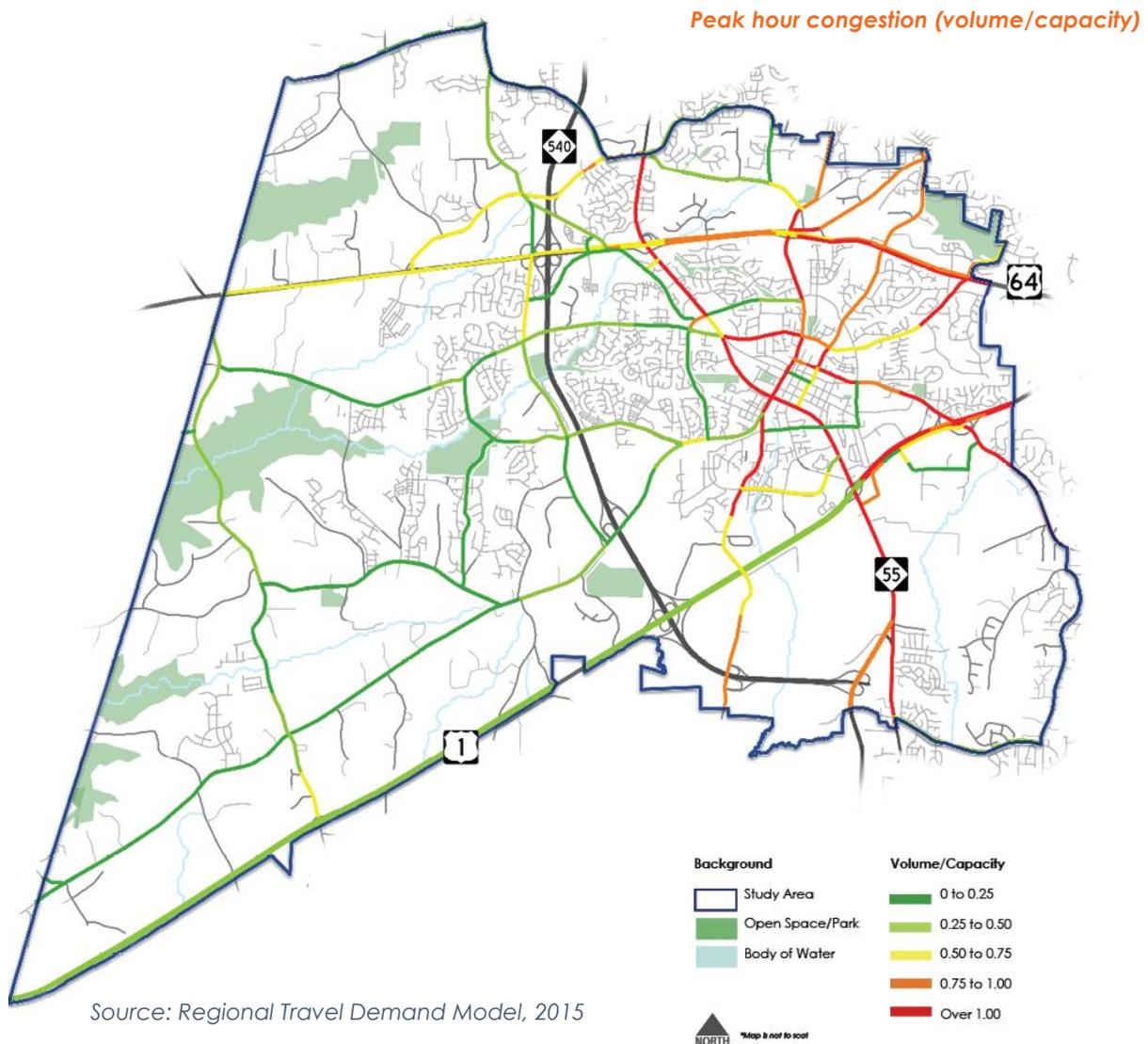


Existing Congestion

The majority of streets in Apex see relatively little traffic, with several notable exceptions. US 1, US 64, NC 540, and NC 55 are the main arterial roadways that carry high volumes of traffic through the area. Based on 2016 NCDOT traffic count data, the busiest section of roadway is the section of US 1 east of Ten Ten Road that sees over 65,000 vehicles per day. Other heavily-traveled segments include US 1 between Ten Ten Road and NC 55 (56,000 vehicles), NC 55 between US 1 and NC 540 (44,000 vehicles) and US 64 between NC 55 and N Salem St (44,000 vehicles).

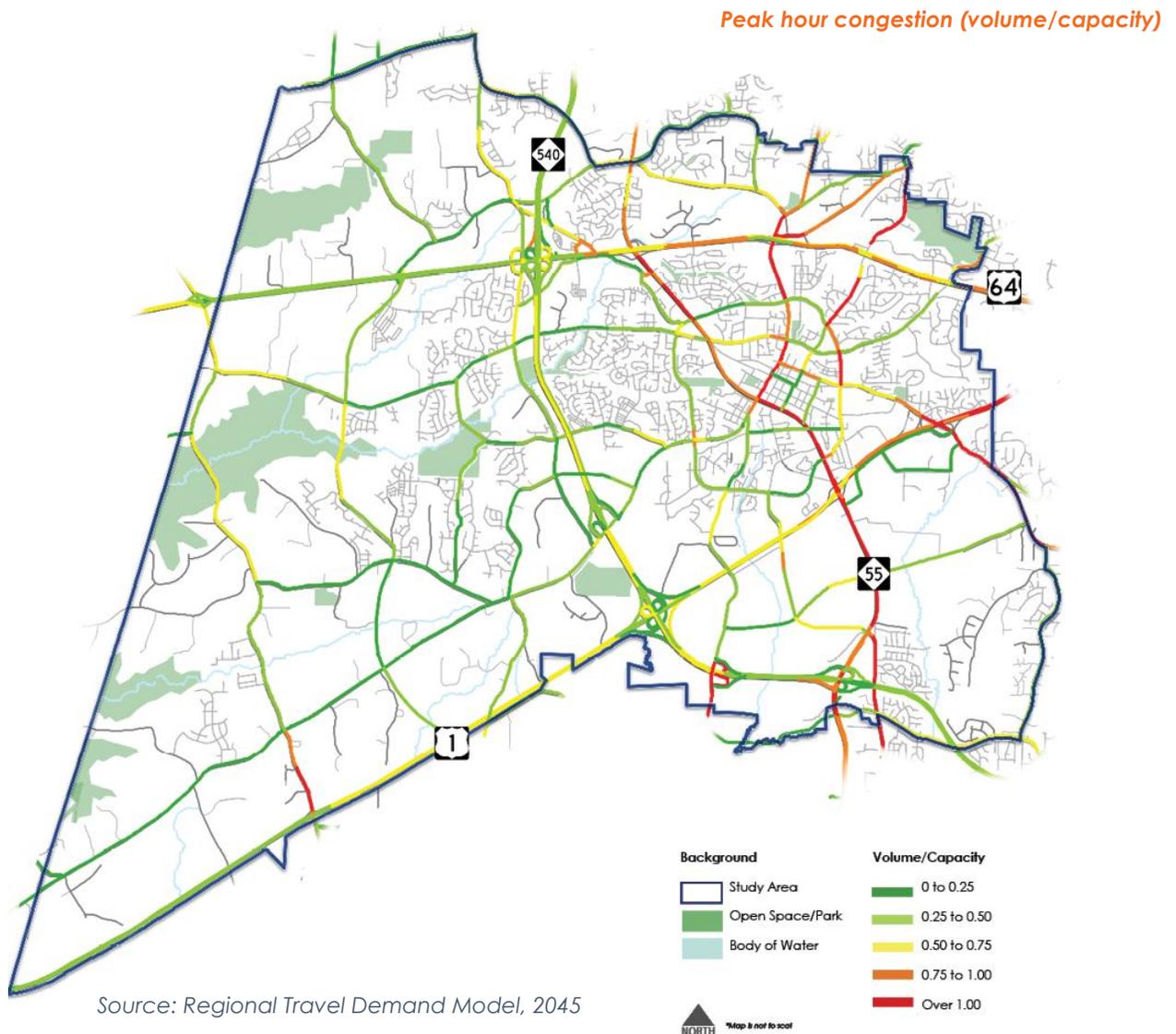


According to the regional travel demand model (considering 2015 information), congestion in Apex is concentrated on the eastern portion of the study area, with several of the main arterial roadways experiencing severe congestion during peak periods. Congestion is a major concern among residents as there is a feeling that rapid growth has caused travel demand to outpace the capacity of facilities. Despite congested conditions on arterials, 68% of roadways within the Town flow at greater than 90% of the posted speed limit during peak hours (e.g., roads with a posted speed limit of 35 m.p.h. typically flow at 32 m.p.h. or faster during peak conditions). The most congested highway conditions can be observed along NC 55 leading south from downtown Apex, on US 1 east of downtown Apex, and on the portion of US 64 between NC 540 and Davis Drive. Other congested roads include Tingen Road, Hunter Street, Center Street, Ten-Ten Road, N Salem Street, and Old Raleigh Road.



Projected Travel Demand

The regional travel demand model predicts travel demand in the year 2045 based on base year 2015 conditions, population projections, and planned projects. The model shows expected conditions if all projects included in the 2045 Metropolitan Transportation Plan were complete. It is anticipated that congestion would decrease on US 64, portions of US 1, and NC 55 between Salem Street and Apex Peakway. The most congested future conditions are anticipated along the remainder of NC 55, N Salem Street just south of US 64, and Laura Duncan Road near the intersection with the Apex Peakway. Other congested roads include US 1 east of Ten Ten Road, and the portion of the Apex Peakway between Old Raleigh Road and Center St.





Committed Roadway Projects

Committed projects are those roadway projects that are fully funded for construction. These include locally-led projects and projects led by NCDOT. It was important to consider committed projects as part of the planning process to confirm the projects are consistent with the themes identified through Advance Apex and to understand what projects are already underway that may address some of the existing and projected deficiencies. The Town's Capital Improvement Plan (CIP) identifies the projects the Town intends to invest in over a five-year period. The State Transportation Improvement Program (STIP) is North Carolina's 10-year State and Federally-mandated plan that identifies the construction funding for and scheduling of transportation projects throughout the State. The following table lists the projects that are funded in the first 5 years of the 10-year STIP, which are considered committed and not subject to reprioritization. The identification number refers to how a project is referenced in the STIP. The projects included in the list are within Apex or immediately surrounding its municipal limits.

STIP ID	Anticipated begin of Construction	Location	Description
U-5537	2018	Lake Pine Drive north of MacGregor Pines Drive to north of Versailles Drive	Widen to 3 lanes
U-5928	2020	Apex Peakway at South Salem Street	Complete a gap in the Apex Peakway at S. Salem Street. Includes a bridge over the railroad and construction of a loop road to tie into S. Salem Street.
R-2721	2020	NC 540 extension	New route
U-2901B	2021	NC 55 from US 1 to Olive Chapel Road	Widen to 4 lanes with median
U-5301	2022	US 64 from Laura Duncan Rd to US 1	Corridor upgrade including interchanges at Laura Duncan and Lake Pine Drive
U-5825A&B	2023	Ten Ten Road from Apex Peakway to Kildaire Farm Road	Widening to multi-lanes with median
U-5981	2026	US 1 at NC 55	Interchange improvements
U-6066	2026	US 1 from NC 55 to US 64 in Cary	Widening

Project Recommendations

The Advance Apex roadway recommendations are divided into three basic categories:

- Spot recommendations: Intersection improvements based on safety and congestion data, or recommendations for new intersections or interchanges based on the future roadway map.
- Thoroughfare recommendations: Improvements or additions to the arterial roadways in the study area.
- Collector and connector recommendations: Improvements or additions to the network of secondary roadways serving thoroughfares, intended to provide connectivity and access.

A poster-size Thoroughfare and Collector Street Plan map showing the three types of recommendations is available on the Town's website and in the Planning Department at Town Hall.

Spot/Intersection Recommendations

Recommendations for the future system include improvements to critical intersections and interchanges. These locations were identified due to operational deficiencies and safety concerns. Additional details on intersection improvements will be determined through more in-depth safety and traffic analyses as a project progresses to design and construction. Recommendations are shown on the Thoroughfare and Collector Street Plan map and are listed in table format in the appendices. Recommendation types include:

- Intersection improvements: These improvements include locations identified due to safety concerns identified through crash data analysis, through public feedback, or to address operational deficiencies.
- New interchanges or interchange improvements: These locations include areas where new interchanges will be added or where improvements are needed as changes are made to the freeways in the area.
- Roundabouts: These locations have been identified as areas needing improvement where a roundabout could be considered as a viable improvement type to improve safety and traffic flow.
- Intersection realignments: These locations include offset intersections where realignment could help improve safety and connectivity.

Thoroughfare Recommendations

Thoroughfare recommendations are intended to alleviate future congestion concerns by adding capacity through roadway widening or new location facilities and easing traffic flow through access management strategies. Recommendations are shown on the Thoroughfare and Collector Street Plan map.

Collector Recommendations

A disconnected roadway system contributes to traffic congestion and long travel times. Connecting and expanding the Town's network of collector streets will enhance travel between local destinations and improve the distribution of traffic throughout the local network. Key goals of this network included improving accessibility to higher intensity residential areas and identified activity centers, while avoiding or minimizing impacts to sensitive areas for the preservation of the natural environment. Responsibility for building a collector street system mostly relies on developers for funding, design, and construction as plans are incrementally implemented. A properly implemented plan can improve accessibility to activity centers and minimize harmful impacts to sensitive areas. Both local and through-traffic can and will benefit from the reduced reliance on thoroughfares.

Recommended collector street spacing differs based on the context area. Approximate spacing that should be considered within each context area is included in Chapter 4. Spacing decreases with increasing density and practicality of active travel modes.

BENEFITS OF A CONNECTED STREET NETWORK



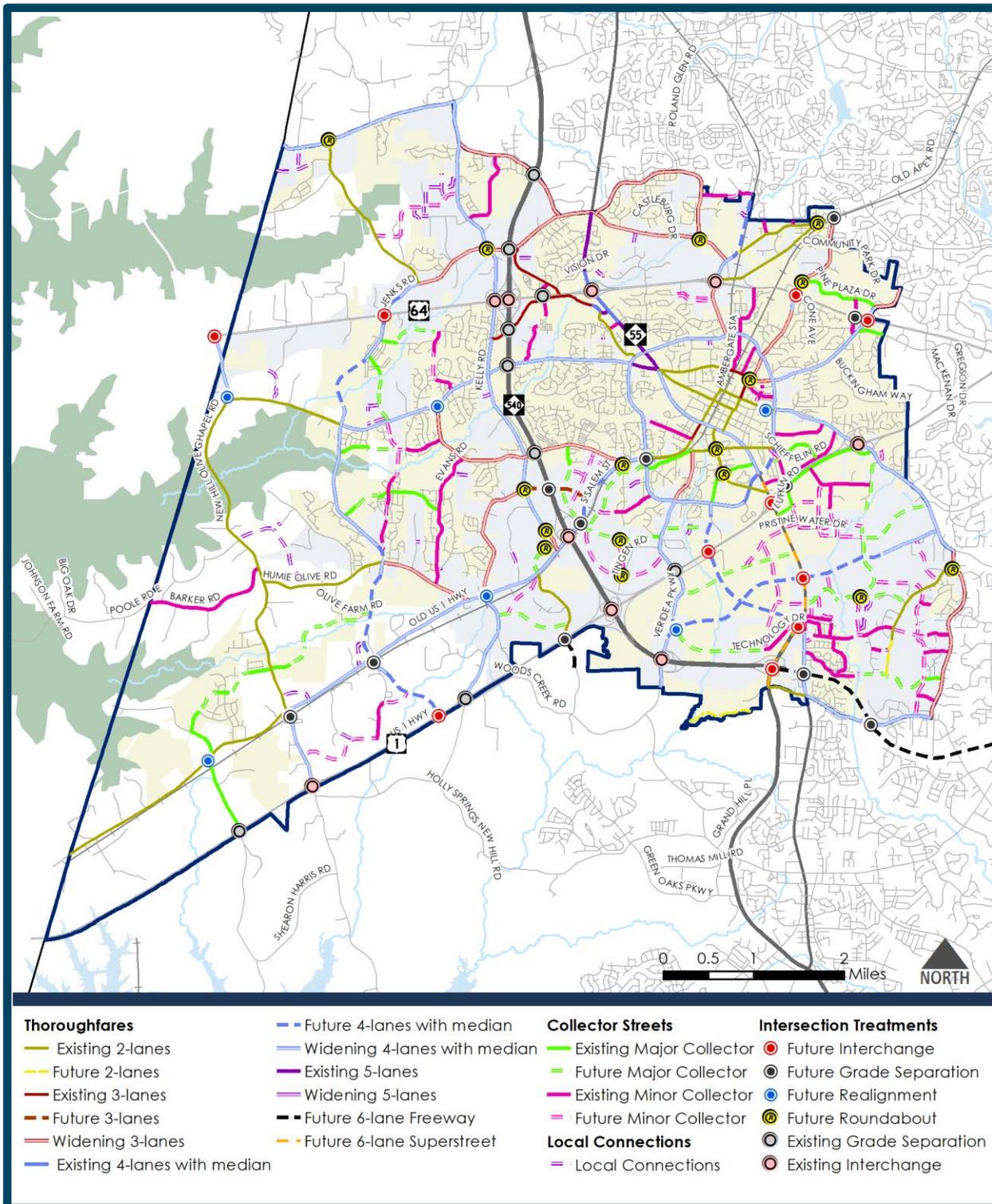
Connected Street Network



Fragmented Street Network

- Offers route alternatives
- Reduces reliance on major routes
- Serves bicyclists, pedestrians, and transit, including school buses
- Improves emergency response time
- Shortens travels time

DRAFT Thoroughfare and Collector Street Plan



Changes may be made up to and through the public hearings. Any changes will be noted during the public hearings.

Policy Recommendations

Policies are an important tool for implementing the Town's transportation vision. A review of current policies was conducted to determine recommended changes and possible initiatives to support implementation of the roadway plan.

Policy recommendations were collected from previous planning efforts and analyzed to determine whether they fit with the current Advance Apex planning themes. Then, those policies were validated against public feedback and input from the Town Council and Steering Committees to identify any policies that may need to be modified, or missing policies that should be added.

Finally, each policy was scored qualitatively based on its potential impact on achieving the Advance Apex goals, as well as its ease of implementation. This scoring system helped to identify the high priority policy opportunities that should become short-term priorities.

The top scoring policy recommendations identified through this process are shown below. A full documentation of the diagnostic scan is available in the Appendix.

- Continue to assess, plan, and fund infrastructure needs through the annual capital needs assessment, capital improvements program, and capital improvements budget process.
- Update the Town's street design guidelines with roadway cross-section alternatives and intersection treatments to promote context-sensitive roadway design.
- Use the future collector street network map as a tool to review proposed development projects and plans as they locate and design future collector streets, allowing design flexibility provided the collector street appropriately connects the beginning and end points.
- Work with the development and real estate community to increase public awareness of the future collector street connections through enhanced signage, indicating locations for future collector street extensions.
- Pursue completion of the Apex Peakway, which is needed to relieve downtown traffic pressures and provide access to infill commercial and residential development sites over the next decade.
- Implement complete street solutions that increase mobility for users of all ages and abilities.
- Restrict cul-de-sac streets in new development except where environmental constraints exist, and require stub streets to allow for future connections.

Technology and Innovation Recommendations

Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) have many potential benefits when implemented in concert with an overall transportation management strategy. ITS solutions use communications and computer technology to manage traffic flow in an effort to reduce crashes, mitigate environmental impacts such as fuel consumption and emissions, and reduce congestion from normal and unexpected delays. Successful systems include a variety of solutions that provide surveillance capabilities, remote control of signal systems components, seamless sharing of traveler information with the public, and even allowances for emergency vehicles to have priority to proceed safely through signalized intersections. Several of these solutions have been implemented throughout the study area. Intelligent Transportation Systems include the following:

- Signalization
- Progression-Controlled Signal System
- Dynamic Message Signs (DMS)
- Emergency Vehicle Preemption
- Transit Vehicle Preemption

Connected & Autonomous Vehicles

The introduction and advancement of connected and automated vehicles (CAV) has the ability to disrupt many facets of the transportation field. Connected vehicles are defined as vehicles equipped with technology for communication with other vehicles and roadside infrastructure. Autonomous vehicles are defined as vehicles that can perform driving functions without a driver at any time.

As CAV advancements expand daily and are introduced into existing transportation systems, it becomes more challenging for agencies to prepare and plan for these advancements. CAV will introduce changes in the way states and local agencies implement transportation projects and future developments.

What role does Apex play?

With the development and introduction of CAV technologies, the infrastructure, investments, and planning to support CAV's increasing presence will need to be thoroughly strategized for the future. Within each travel mode, there are potential strategies and challenges that can be considered now to

help facilitate the eventual incorporation of CAV technologies. In many instances, these planning issues will need to be assessed at a regional level to make their implementation feasible. The Town of Apex can serve as an advocate to encourage the consideration of these issues. Some examples of this are shown in the table on the following page. Future updates to the Comprehensive Transportation Plan should continue to update both the current state and future outlook for CAV and other emerging transportation technologies.

Near-Term Planning Issues for Connected and Autonomous Vehicles (CAV)

Travel Mode	Near-Term Planning Strategies
General	Consider the future impacts of autonomous vehicles on land development and zoning bylaws.
Roadway	Consider design requirements to enhance detection equipment and controller equipment to collect and broadcast speed and safety information.
Roadway	Consider how to begin accommodating autonomous vehicles within a mixed vehicle fleet.
Roadway	Assess the safety and mobility impacts of providing two-way left turn lanes in a CAV setting.
Parking	Consider the implications of converting on-street parking into pick up and drop off lanes.
Bicycle & Pedestrian	Consider impacts of greenway crossings at surface streets in a CAV setting.
Bicycle & Pedestrian	Consider the design impacts to bike lanes as autonomous vehicles are introduced into the fleet.
Bicycle & Pedestrian	Explore additional education and outreach programs designed for both bicyclists and motorists.
Transit	Consider future impacts of potential design requirements to accommodate autonomous transit vehicles.
Transit	Consider dynamic routing and agility in transit stops in response to real-time ridership needs.

Chapter 6: Bicycle and Pedestrian Element

Introduction

Biking and walking are important in Apex – both for recreation and for getting from place to place. Outreach during Advance Apex confirmed that demand for facilities to support these active travel modes is high. The Town proactively requires building infrastructure like greenways, side paths, and sidewalks with site development projects. While this strategy succeeds in rapidly increasing the extent of facilities on the ground, this approach can create a disconnected network with critical gaps. Advance Apex considers infrastructure that is already in place, committed projects that are underway, recommends projects to complete the bicycle and pedestrian network, and prioritizes gaps. Policies are also recommended to continue building out and enhancing the bicycle and pedestrian network, which is critical to maintaining a high quality of life for Apex.

Process

Bike Apex

Concurrent with the development of Advance Apex, in 2017 the Town began developing a comprehensive bicycle plan through grant assistance from the NCDOT. The purpose of this plan, called Bike Apex, is to identify opportunities and constraints for bicycling in Apex, and to establish recommendations for improvement.

The plan aims to use bicycling as a tool for improvements in mobility, safety, health, economy, environment, and overall quality of life. The goal is to create safe and connected routes for bicycling in Apex, with connections towards surrounding communities. The plan makes recommendations for on-road bicycle facilities, such as bike lanes and shared lane markings, as well as separated facilities, such as greenways and side paths. In addition to infrastructure recommendations, the plan also makes recommendations for bicycle-related programs and policies.

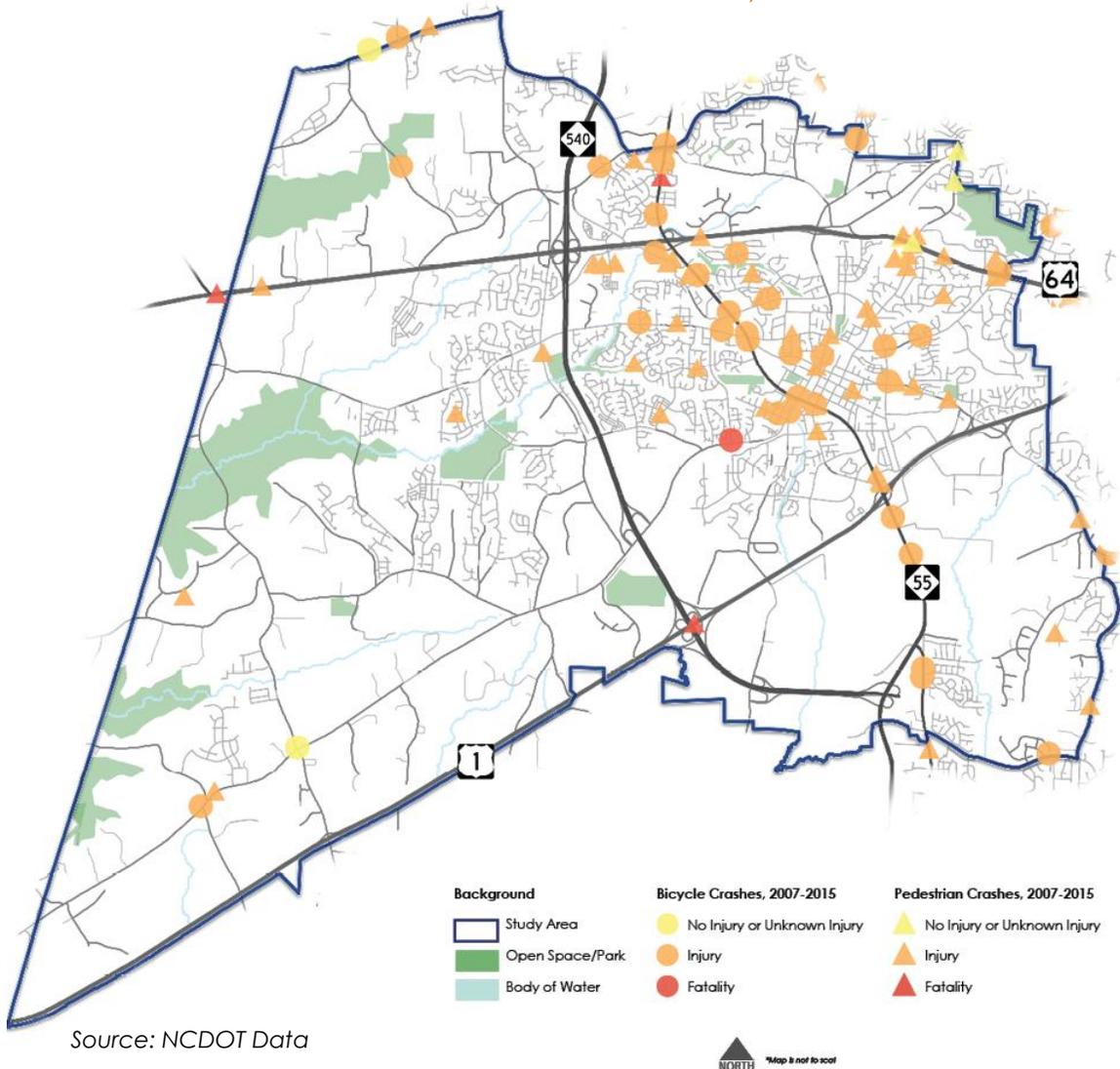
The Bike Apex project recommendations are integrated in the project recommendations included in this chapter. Further details regarding policies, project priorities, and action steps can be found in the standalone Bike Apex plan document.



Safety

According to NCDOT data, 34 crashes involving bicyclists have occurred within the study area between 2007 and 2015, including one fatality in July 2009 at the intersection of the Apex Peakway and S. Salem Street. The majority of these crashes occurred in the downtown area and along the NC 55 corridor. In the same time period, 68 pedestrian crashes occurred, including two fatalities in 2008. Many of these crashes took place in residential areas and occurred in the travel lane, indicating a lack of safe facilities for pedestrians in the area.

Bicycle and Pedestrian Crashes, 2007-2015





Existing Bicycle Network

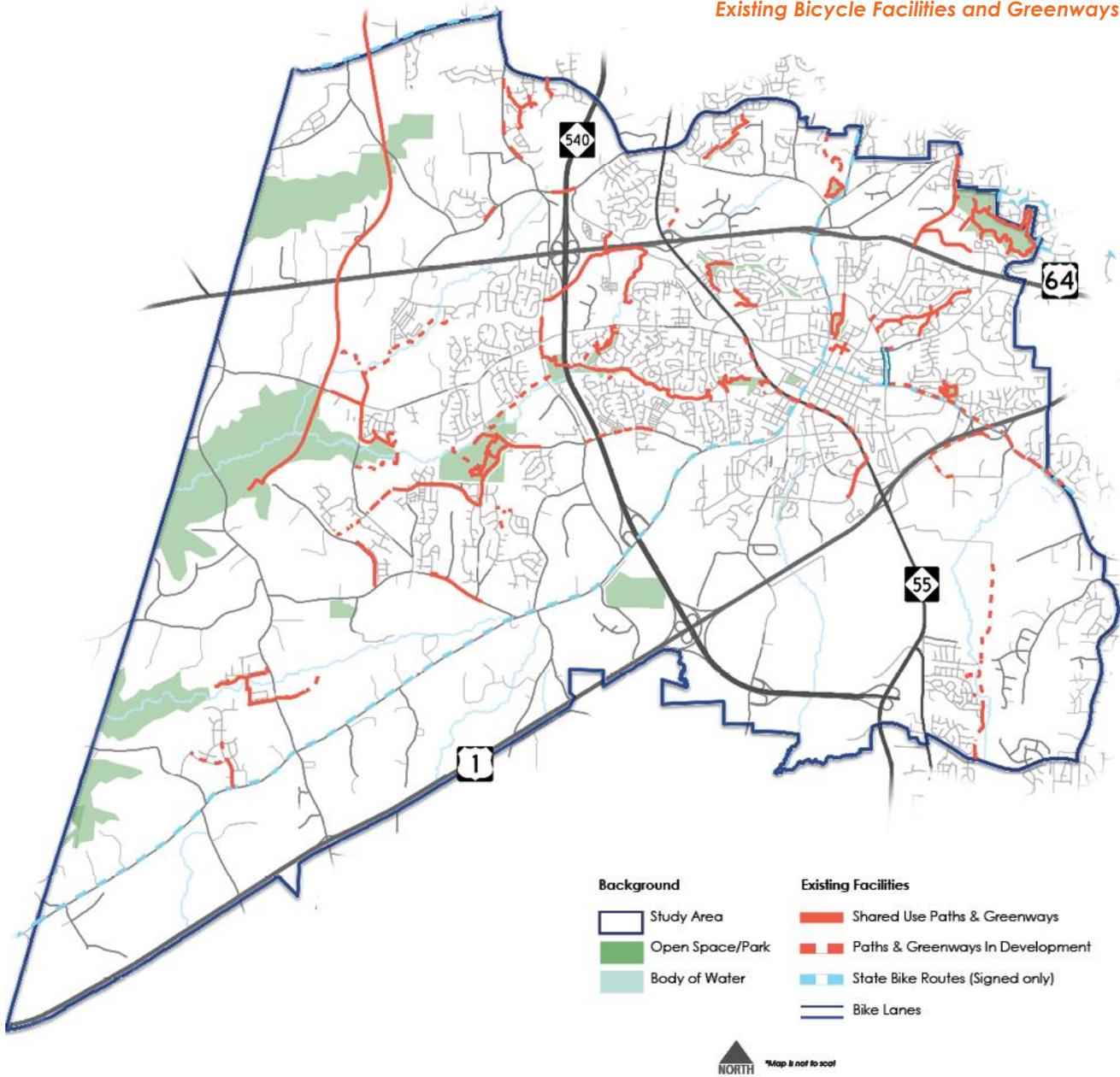
Apex currently has over 10 miles of maintained public greenways. There are currently 23 greenway projects that are either approved or under construction. It is anticipated that an additional 7-10 miles of greenway will be built within the next year. Notable facilities in Apex include Beaver Creek, Haddon Hall, and the Apex Community Park Lake Trail system. The Town is also host to a sizeable segment of the American Tobacco Trail (ATT), which spans over 22 miles from Apex to Durham and provides regional connectivity in addition to recreational opportunities. The community has plans to expand the local greenway system, including several connections to the ATT, greenways to connect downtown to the surrounding neighborhoods, and connections that bring trails to additional corners of the community.

There are less than 1.5 miles of bicycle lanes and wide outside lanes combined within the Town limits. The two dedicated on-street bicycle facilities in Apex are striped bicycle lanes on the Apex Parkway between Center Street and New Dover Road, and wide lanes on Hunter Street between NC 55 and North Salem Street that can accommodate bicyclists. Three of North Carolina's bicycling highways pass through or begin in Apex including Carolina Connection, the Mountains to Sea Route, and Cape Fear Run. However, these routes are currently designated only through signage.

Existing Sidewalk Network

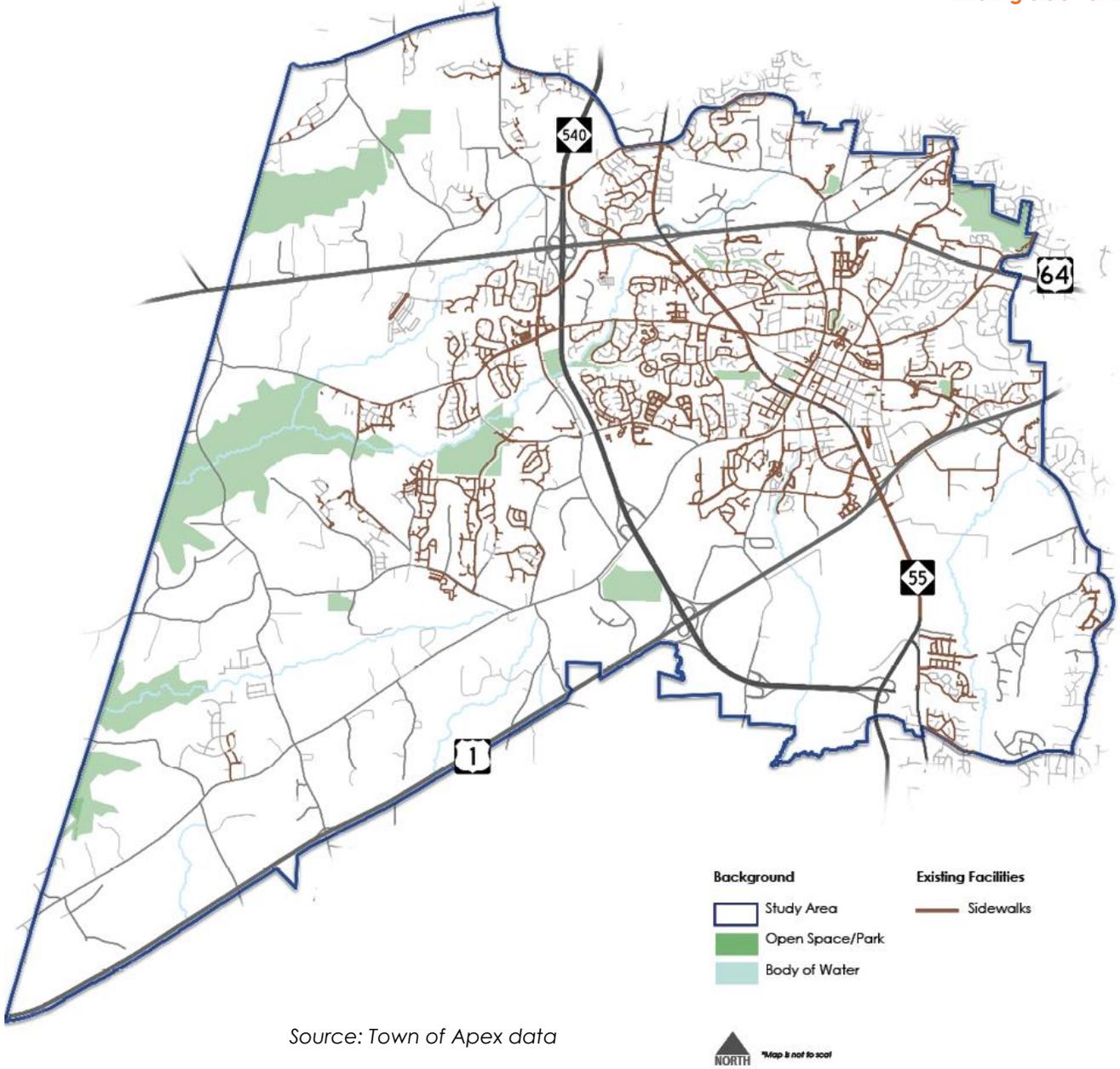
The Town of Apex has approximately 150 miles of sidewalks, centered around the downtown area and in the residential areas just west of downtown. Sidewalks in many areas are limited to collector streets, with local residential streets lacking pedestrian facilities. Critical sidewalk gaps are present in many areas very near major activity centers, including on many streets inside the Apex Parkway, in many areas near schools, and most residential areas to the east of NC 55. Sidewalks are less critical in the rural western portion of the study area. At a minimum, the Town requires that sidewalks be constructed on both sides of all new collector and thoroughfare streets, and on at least one side of all new residential streets.

Existing Bicycle Facilities and Greenways



Source: Town of Apex and NCDOT

Existing Sidewalks



Source: Town of Apex data

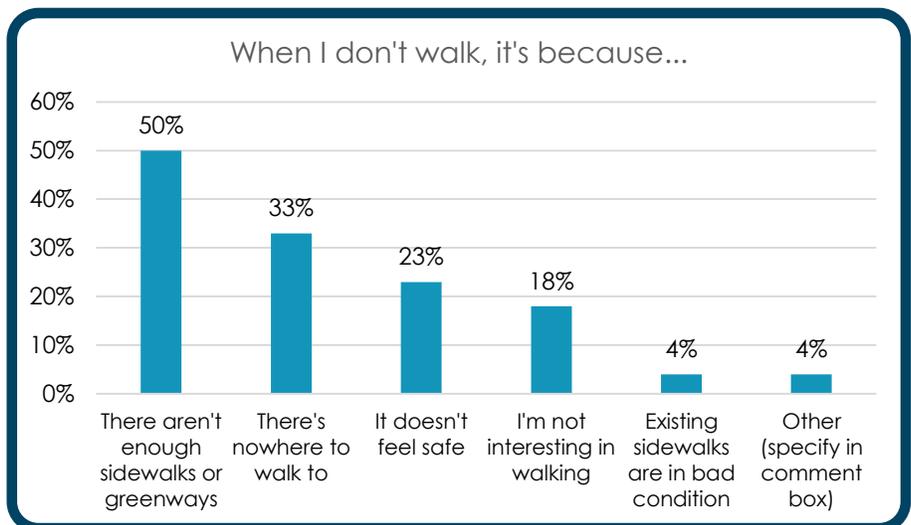
Committed Projects

Committed projects are fully funded and identified for construction. The Town of Apex has a number of planned sidewalk and greenway projects under development that will address critical gaps in the network within the next few years. It is important to acknowledge these projects in the planning process in order to plan for the Town's long-term needs and address gaps and deficiencies that will remain even after these funded projects are finished. The following projects are currently under development:

- Committed roadway projects - Pedestrian and/or bicycle facilities are planned with the committed roadway projects listed in Chapter 5.
- James Street to Downtown Apex – Completes sidewalk from James Street to North Salem Street including improvements to pedestrian infrastructure along North Salem Street.
- East Williams Street sidewalk - Sidewalk along east side of East Williams Street from NC 55 to Sunset Lake Road.
- Kelly Road sidewalk and Apex Barbecue Road side path - Sidewalk along east side of Kelly Road from Beaver Trail to Apex Barbecue Road. Side path along south side of Apex Barbecue Road from Kelly Road to Scotts Ridge Elementary School driveway.
- Beaver Creek Greenway - Greenway connection from Kelly Road Park to Apex Nature Park.
- Middle Creek Greenway - Greenway connection from Ten Ten Road to Holly Springs with phased construction. Section from future Jessie Drive extension to Holly Springs is fully funded by development and municipal projects.
- White Oak Creek/East Coast Greenway - Greenway connection from Green Level Church Road to American Tobacco Trail.

Public Input

Bicycling and walking are currently mostly recreational activities in Apex, with over 90% of respondents in the online survey saying they ride a bicycle for exercise or recreation, rather than as a mode of travel. Several major barriers prevent residents from walking and bicycling more



often. Twenty-three percent of respondents said that they choose not to ride a bike because “it doesn't feel safe, and half said they don't walk because of a lack of facilities. Since encouraging active transportation is a major priority for Advance Apex, focusing on safety improvements and increasing the available facilities became a major goal for the recommendations.

Project Recommendations

Facility Types

Bicycle and pedestrian mobility is provided through a variety of different facility types, each of which are appropriate in different contexts, and for different users. For consistency, the project recommendations in Advance Apex make use of the following types of facilities, as described in the Bike Apex plan:

Bike Lanes



Bike lanes designate an exclusive space for bicyclists, directly adjacent to motor vehicle travel lanes. The preferred minimum width is 6.5 ft to allow bicyclists to ride side-by-side or pass each other without leaving the bike lane, with minimums of 4 or 5 ft in other constrained conditions. Protected bike lanes include a striped or physical buffer between the bicyclist and vehicle traffic for further protection.

Photo: Alta Planning & Design

Paved Shoulders



Paved shoulders on the edge of roadways can be enhanced to serve as a functional space for bicyclists and pedestrians to travel in the absence of other facilities with more separation. Paved shoulders can reduce “bicyclist struck from behind” crashes, which represent a significant portion of rural road crashes.

Photo: Alta Planning & Design

Shared Lane Markings



Shared Lane Markings (SLMs), or “sharrows,” are road markings used to indicate a shared lane environment for bicycles and automobiles. Among other benefits, shared lane markings reinforce the legitimacy of bicycle traffic on the street, recommend proper bicyclist positioning, and may be configured to offer directional and wayfinding guidance.

Photo: Alta Planning & Design

Greenways



Photo: Alta Planning & Design

Greenways offer connectivity opportunities beyond that of the roadway network. These facilities are often located in parks, along rivers, and in utility corridors where there are few conflicts with motorized vehicles. They can provide a low-stress experience for a variety of users, including bicyclists, pedestrians, skaters, wheelchair users, joggers, and other users.

Street Side Greenways



Photo: Alta Planning & Design

'Street-side greenway' is a term used locally for side paths with a greater landscaped buffer between the roadway and trail, allowing the trail to meander slightly for increased user comfort and a more rural aesthetic. These street-side trails typically do not fit within the roadway right-of-way, but can usually be constructed with a town greenway easement of 20-30'.

The easements can overlay streetscape buffers while not affecting setbacks or buffer widths, so long as required planting density can still be achieved. This design should be considered for the more rural side paths that are recommended in this plan.

Side paths



Photo: Alta Planning & Design

A side path is a bidirectional shared use path located immediately adjacent and parallel to a roadway. Side paths offer a high-quality experience for users of all ages and abilities as compared to on-roadway facilities in heavy traffic environments, allow for reduced roadway crossing distances, and maintain rural and small town community character.

Sidewalks



Like side paths, sidewalks are physically separated from the roadway but are still within the right-of-way. Sidewalks are typically 5- to 6- feet wide concrete paths.

Priority Sidewalk Areas

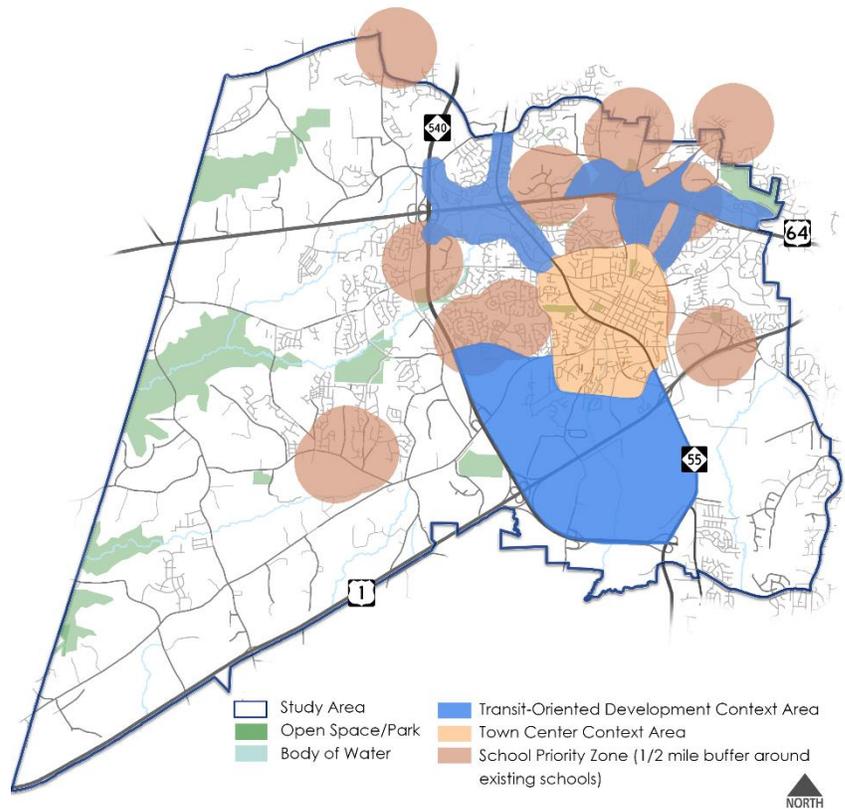
While Advance Apex does not directly recommend specific standalone sidewalk projects, it is emphasized that all roadway projects adhere to complete street concepts and should include context-sensitive accommodations for pedestrians. Therefore, the Town should prioritize the completion of all sidewalk segments within the Town Center and Transit-Oriented Development context areas, where development density patterns calls for a pedestrian-oriented environment, and on all roadway segments within ½ mile of schools. All roadway projects should include

appropriate pedestrian and bicycle facilities, according to their context area and desired cross-section, and these incidental improvements will continually fill gaps in the Town's pedestrian network as roadways are built or improved. However, funding for standalone projects should be reserved for critical missing segments that promote a transit-ready environment, promote safe routes to school, or serve specific activity centers where walking is a priority, such as connections to parks, greenways, and mixed-use activity centers.

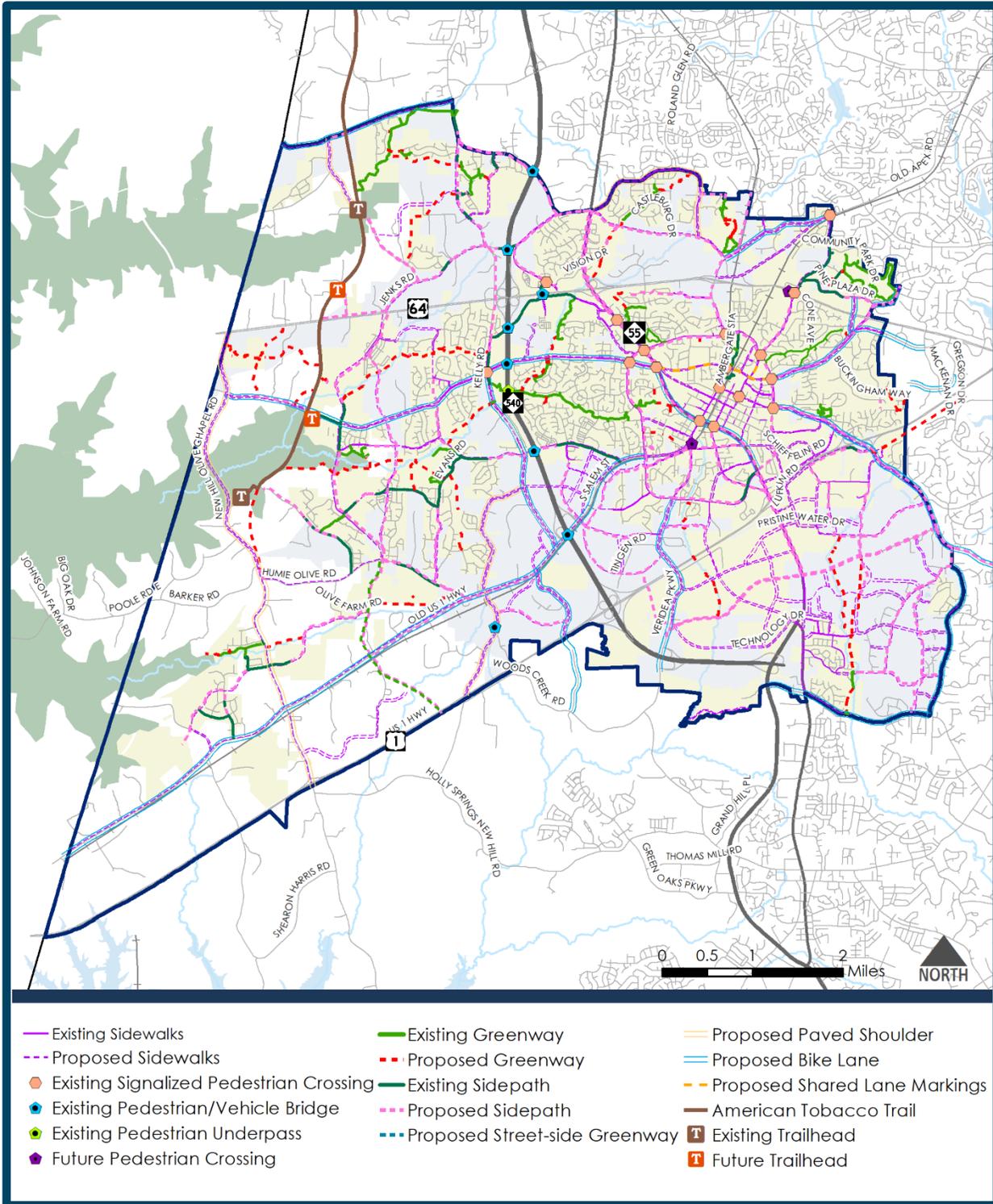
The sidewalk recommendations on the map are only shown for collector streets and thoroughfares; however, sidewalks are required with new residential streets and should be incrementally built on existing residential streets. .

The Bike Apex recommendations are shown to illustrate the connected nature of the bicycle and pedestrian network and the necessity of providing appropriate bicycle and pedestrian mobility to all parts of the study area.

Sidewalk Priority Funding Areas



DRAFT Bicycle, Pedestrian, and Equestrian Plan



Changes may be made up to and through the public hearings. Any changes will be noted during the public hearings.

Policy Recommendations

Walking is a key element to a healthy community's transportation system. Every trip begins and ends as a walking trip. The availability of pedestrian facilities and amenities plays an important role in encouraging the use of alternative modes of travel to the automobile. The success of transit greatly depends on the functionality of pedestrian facilities and amenities.

The below connectivity requirements should be followed:

- The Town should continue to enforce the requirement in the Unified Development Ordinance (UDO), that sidewalks should be constructed on both sides of all new collector streets and thoroughfares.
- Pedestrian facilities within ½ mile of existing and planned schools should be designed and constructed with the goal of providing safe walking routes to school for families and children of all ages and abilities.
- The Town should consider strengthening the requirement in the UDO and require sidewalks on both sides of all new residential streets within the Transit-Oriented Development Context area.
- The Town should consider revisiting the requirement in the UDO to install sidewalk on both sides of all residential streets within all Planned Unit Developments. One side of residential streets may be sufficient in the Rural context area.
- All new developments should continue to be required to provide sidewalk or greenway connections to any adjacent pedestrian networks, as well as provide a comprehensive internal network of pedestrian pathways.
- Sidewalks may be replaced by side paths or street side greenways where appropriate, particularly along roadways with high traffic volumes or to provide recreational corridors that connect destinations.
- Local sidewalk funding should be reserved for priority sidewalk segments in the Town Center and Transit-Oriented Development context areas, areas within ½ mile of existing and planned schools, and where sidewalks serve specific activity centers where walking is a priority, such as connections to schools, parks, greenways, and mixed-use activity centers. Missing sidewalk segments in these zones should be considered for priority funding and standalone projects, while sidewalks in other zones should be implemented as incidental improvements via roadway projects.

Chapter 7: Transit Element

Introduction

Like a complete system of roads, sidewalks, and bikeways, transit must provide connections to the places people want to go at a time when they need to get there. Potential riders are interested in transit service that is fast, frequent, dependable, and easy to use. In 2018, transit service in Apex is limited, but the adoption of the 10-year Wake Transit Plan and voter-approval of the transit-dedicated half-cent sales tax create new opportunities to consider transit as a critical component of the 2045 transportation network. In this chapter, existing transit options are evaluated, changes anticipated with implementation of the Wake Transit Plan are considered, and recommendations to plan future service that leverages these plans are made – along with policies that will help ensure transit is a practical mode of travel in the Town's future.

Process

Evaluation of Current Service

Apex residents have limited options when it comes to public transit. GoTriangle provides connections to the larger region, including Durham, Research Triangle Park, Raleigh, and Cary. Wake Coordinated Transportation Service (WCTS) provides reservation-based services for residents with specific needs.

BENEFITS OF TRANSIT

Transit provides options for those who may not be able to drive a personal vehicle, and a crucial link to jobs, healthcare, and education. It can save costs and be an environmentally-friendly option for those who choose to leave their own cars at home. Some level of transit service will be critical to preserving personal independence as the region's population ages and can also give young people additional independence.

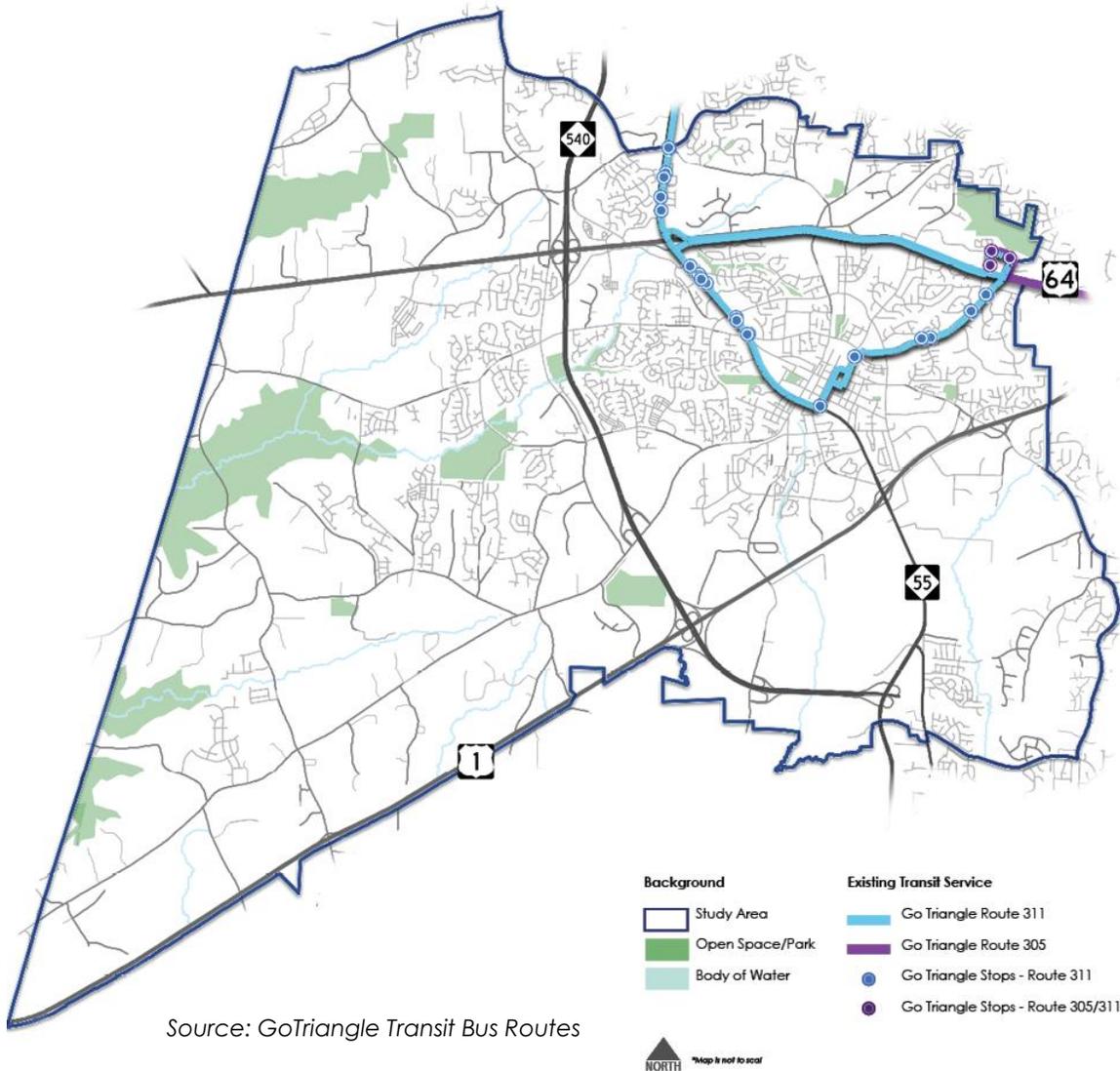
An effective and efficient transit system can benefit those who may never use it. Strong transit ridership can help manage congestion, improve air quality, and spur economic development near stops and stations.

As Apex continues to grow, investing in transit is a smart way to manage the increased travel demand that inevitably follows. In Wake County, a tax is collected to support transit, with an opportunity for communities like Apex to apply for matching funding and leverage this source of funding.

GoTriangle

Go Triangle currently provides two regional route connections to Apex, which serve the community Monday through Friday during the morning and afternoon commute peak period only. Headways for both routes range between 40 minutes to an hour during operation. In general, bus service in Apex is tailored as a park-and-ride commuter service, with stop locations that necessitate driving. Current transit only serves Raleigh and the Regional Transit Center in Research Triangle Park. These factors make transit an unattractive option for Apex commuters. Bus stops and route alignments in Apex are shown in the map below.

GoTriangle transit routes in study area



- Route 305 - serves Apex, Cary, and downtown Raleigh with stops at the North Carolina State University (NCSU) campus. The line terminates at the GoRaleigh station in downtown Raleigh, providing connections with local transit service at that point. Route 305 boarded an average of 108 passengers per day over its entire length in October 2018, with an average of 19 boardings per day within Apex. All boardings during this month occurred at the Lake Pine Plaza park and ride, indicating the high utility of this service compared to neighborhood bus stops.
- Route 311 – Serves downtown Apex and Research Triangle Park, and terminates at the Regional Transit Center for connections to additional routes. Route 311 boarded an average of 77 passengers per day along its entire length in October 2018, with an average of 20 boardings per day in Apex.

Wake Coordinated Transportation Service (WCTS)

WCTS is a Transportation and Rural Access (TRACS) program intended to provide public transportation options to residents living outside the urban areas. Service is provided Monday through Saturday, and rides must be reserved 24 hours in advance. Rides are available to residents of Wake County who reside outside of urbanized areas, have a disability, are 60 or older, are Veterans, or need work-related transportation.

Consideration of Regional Transit Plans

At a regional level, there are many ongoing transit planning efforts. These efforts are briefly described here, and resources for additional information are provided.

GoForward NC

GoForward is a joint initiative between Wake County, Durham County, and Orange County to identify and plan for transit solutions in the future. GoForward will build on county-specific transit plans to create a regional network that provides alternatives to driving on increasingly congested roads and opens up access to more job, education, and health care opportunities for everyone. More information on GoForward NC can be found at www.goforwardnc.org.

Wake Transit Plan

In the November 2016 election, Wake County residents approved a one-half cent local sales tax to fund County-wide transit. Based on the draft bus implementation component, The Wake Transit Plan includes several investments that will benefit the Town of Apex and the region:

- Beginning in 2019, Community Funding Areas, like Apex, are eligible to receive matching funding to provide local service. This could include such improvements as local demand-response, a

fixed circulator route, building bike and pedestrian infrastructure to connect to transit stops, or other needs identified by the Town.

- Beginning in 2020, GoCary will operate a new express route from Holly Springs through Apex to the Cary Depot along Williams Street, Salem Street, and Old Apex Road with three trips in the morning and three trips in the evening – weekdays only.
- The frequency of existing GoTriangle Route 311 will be reduced to every 60 minutes, resulting in three northbound trips and one southbound trip on weekday mornings and three southbound trips and one northbound trip on weekday evenings. Stop locations will also be adjusted.
- The frequency of existing GoTriangle Route 305 will be increased to every 30 minutes during commuting hours, and the route will add hourly service during the weekday midday periods and on weekends.
- A new transfer point is proposed for downtown Apex including a passenger shelter, lighting, and information. Upgrades are also proposed to the existing park and rides on Shepherds Vineyard Drive and S. Hughes Street.

The Town of Apex is also actively participating in the implementation of the Wake County Transit Plan:

- The Town of Apex provides a voting member to serve on the Transit Planning Advisory Committee (TPAC), the technical team charged with implementing the Wake Transit Plan.
- A citizen advisory committee, the Town of Apex Transit Committee, will serve as a liaison between TPAC and the community, and will help to guide the future of transit in Apex by making recommendations regarding transit service to the Town's Planning Board and Town Council.

Western Wake Comprehensive Operational Analysis

The towns of Apex, Cary, and Morrisville are refining the details of the GoForward: Wake Transit Plan with the Western Wake Comprehensive Operational Analysis (COA). This effort is designed to look at the specific details and needs of the fixed-route bus and demand response services in these communities over the next few years.

Planners conducted two rounds of public meetings, along with a public survey to allow the three communities to weigh in on their transit priorities and preferred transit improvements. Some key takeaways from the public outreach include:

- Generally, community members favored expanding service to new areas over improving service to areas already served, specifically in Apex and Morrisville where no local service currently exists.
- Fixed route service was preferred over demand response service at a rate of about 2 to 1.
- Respondents were split on whether they preferred slower service with shorter walking distances to stops and faster service with longer walking distances to stops, suggesting there may be a demand for both types of service.
- More frequent peak hour service was slightly preferred to expanded service hours.

The Western Wake COA ultimately recommends a local Apex Circulator, and a new express route for weekday peak service between Holly Springs, Apex, and Cary. Both of these recommendations are detailed below.

Transit Service Recommendations

Transit service can take many forms. In Apex, a blend of transit types are recommended. The transit service types featured in Advance Apex are defined here.

Commuter Rail



Commuter rail provides comfortable passenger service that allows riders to relax or work on their way to key destinations. Commuter rail service consists of an electric or diesel propelled railway that operates between a central city and outlying areas. Commuter rail typically uses existing railroad tracks where possible, and may share tracks with freight rail service. Stops are typically one to five miles apart.

There is one commuter rail corridor proposed within the study area.

This corridor was part of previous planning efforts, and was originally developed as a light rail alignment. The alignment shown follows an existing rail corridor until it curves south into Salem Village near Apex Barbecue Road and crosses into the planned Veridea development. This portion of the alignment is conceptual, and would ultimately be finalized based on coordination with developers and regional transportation partners.

As planned, the commuter line would serve areas with existing or proposed major destinations with transit-supportive amenities. The proposed alignment is consistent with CAMPO's 2045 Metropolitan Transportation Plan, and would tie into the commuter rail line between Raleigh and Durham proposed in the Wake Transit Plan.

Three proposed stop locations, are shown on the recommendations map at the end of this chapter. These stop locations were proposed as part of previous light rail planning efforts, which calls for stops to be much closer together than commuter rail service. Therefore, it is likely that stop locations will change based on future development, coordination with transit providers and other regional partners, and the ultimate nature of the service provided. The current recommendations are shown to preserve future flexibility and allow for the ultimate stop locations to respond to future development patterns.

Regional Fixed Route Bus



Regional fixed route service provides commuter connections between communities on a scheduled basis. Each fixed route trip serves the same origins and destinations. Recommendations for regional fixed route bus reflect the service enhancements to the two existing fixed route services (Route 305 and 311), the creation of the Holly Springs Express, and future connectivity to Durham via NC 540. These route enhancements address public comments requesting increased service hours and direct connectivity to transit hubs in Cary and Durham. The recommendations are consistent with CAMPO's 2045 Metropolitan Transportation Plan and the Wake Transit Plan, and put the Town closer to establishing high-quality alternative travel options for some of the regions' major commuter destinations.

Apex Circulator

Enhanced local transit services, which would take advantage of the Community Funding Area program in the Wake Transit Plan, is a key recommendation. The Advance Apex Transit Plan map shows future potential local routes, as well as a proposed circulator route which provide local transit service throughout the town and offer connections to existing regional transit services. Local and circulator transit services are intended to operate within a small geographic area such as within a municipality. These services should be aligned to serve key destination points, areas with high population and employment density, low income or low vehicle ownership areas, and connections to regional transit.

As part of the planning process, several different routes were identified for future circulator service. After discussion with stakeholders and the public, a priority circulator route (shown in green on map on the next page) was chosen to connect between the Beaver Creek area and Broadstone Station. Primarily running along NC 55, the proposed circulator route operates within the downtown limits, providing

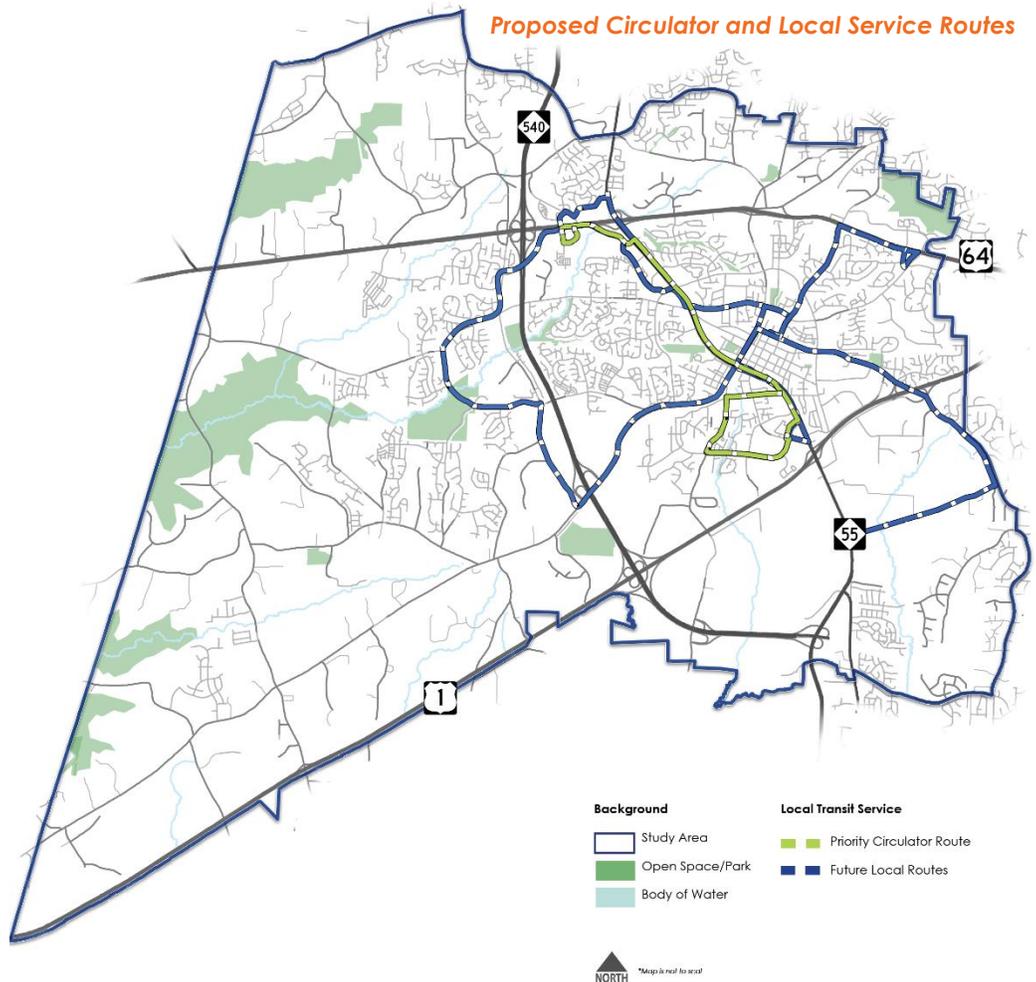
mobility between retail, commercial, and recreational destinations, as well as connections between downtown areas and existing regional transit.

Potential future connecting routes are also proposed to serve downtown, Laura Duncan Road, Jessie Drive, and into a wider residential area (blue on the map below). This service is envisioned as a longer-term recommendation to be implemented as transit-ready development occurs along key corridors and other regional express transit services are implemented. Service along these routes is likely to use smaller vehicles and occur at less frequent intervals, with more frequent service during peak commute hours to allow residents to travel easily to regional transit stations.

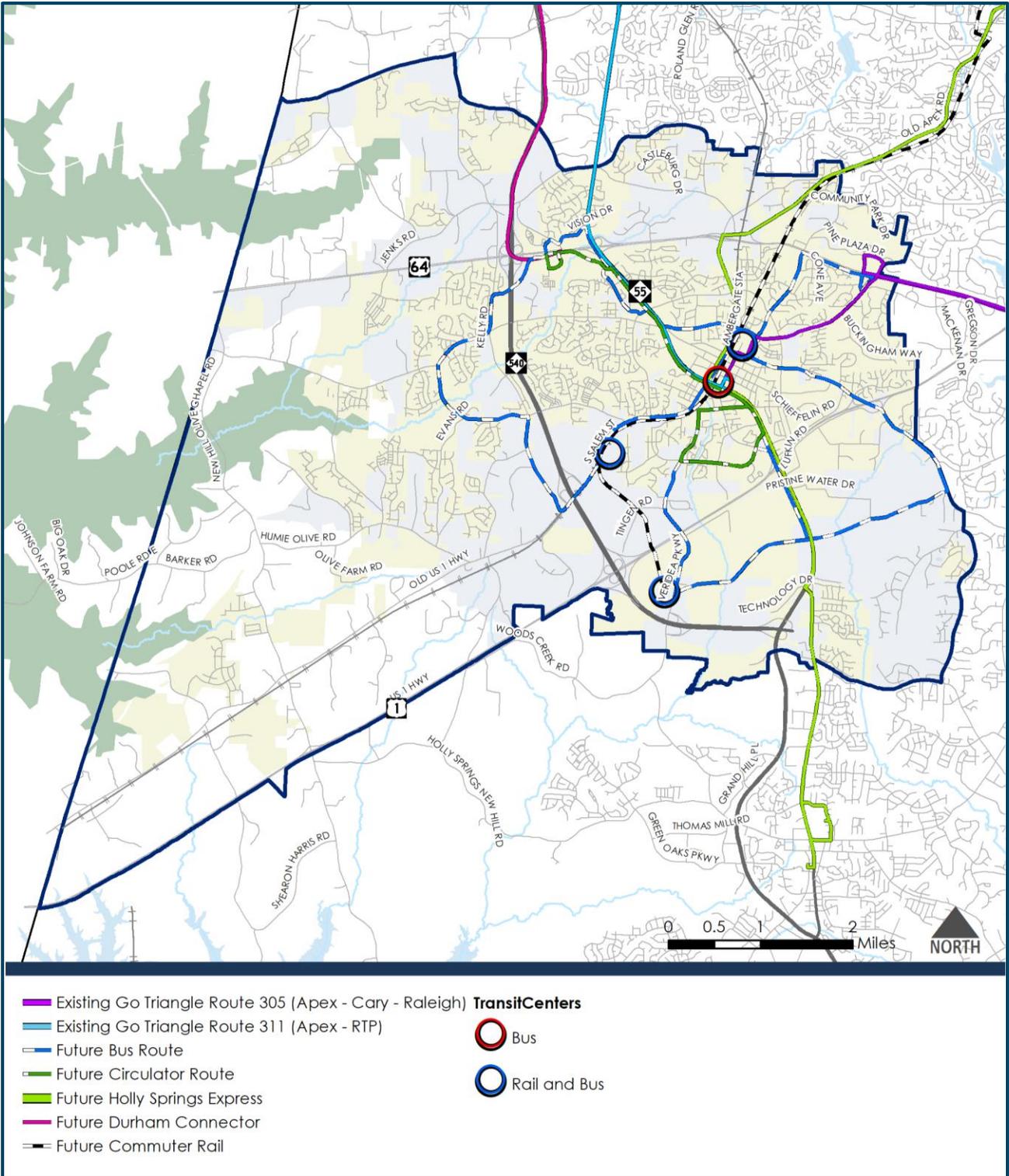
It is recommended that the Town explore moving forward with the priority circulator route as a first step by applying for the Community Funding Areas matching funds. Roadway projects and development proposals along this corridor should be planned to preserve the likelihood of high quality future service.

Future roadway improvement identified on the long-term local service corridors should also be designed for transit readiness.

Recommendations also include the designation of several “transit hubs” where local service meets regional transit service. Special attention should be paid to the development pattern in these areas in order to encourage higher-density residential mixed with commercial services and active transportation facilities that encourage the use of transit.



DRAFT Transit Plan



Changes may be made up to and through the public hearings. Any changes will be noted during the public hearings.

Policy Recommendations

In addition to vehicles and infrastructure, transit must be supported by policies at the local level. The Town has already begun taking steps in this direction by developing a new land use map that will help guide the decision-making process and provide guidance for smart growth. Transit service should be further supported through the provision of bicycle and pedestrian accommodations at stops and along routes. These initiatives are essential factors in providing effective transit options; however, they are not the only elements. The Town will need to continue to support transit as a feasible and imminent alternative mode for all users, as well as a social service for transit-dependent individuals.

While the development of local transit service and the realization of the regional plan are long-term efforts, there are many ways the Town of Apex can continually work toward these long-term goals:

- Continue coordination with GoTriangle in preparation for express bus routes from downtown to Raleigh and Research Triangle Park, and with GoCary in preparation for the implementation of the Holly Springs Express Route.
- Pursue funding through the Community Funding Area program to move forward implementation of recommended circulator routes.
- Support future transit by enabling transit-supportive development near future transit station locations and along future transit corridors. The updated future land use map provides for increased density in many of these areas to support future transit service. The future land use map should continue to be updated as transit plans progress.
- Implement recommendations from Bike Apex that improve bicycle and pedestrian connections to existing bus stops in preparation for enhanced service.
- Work with GoTriangle and other regional partners to find ways to accommodate the future rail system and preserve rights-of-way.
- Formalize the Town of Apex transit committee and use this group as a formal means to progress toward implementation of the recommended transit projects.
- Continue to review parking requirements in the UDO as transit improvements are made, considering reductions as appropriate within the Transit-Oriented Development context area and possible requirements to provide park and ride spaces near major transit stops.
- Continue to actively engage with TPAC, providing input on regional plans that may impact Apex and ensuring that Apex has a voice in the process.

Chapter 8: Implementation

The success of Advance Apex will hinge on the effective collaboration of local, regional, and state officials to implement its projects and policies in a meaningful way. The recommendations in this plan build upon many previous and ongoing efforts by the Town to improve the transportation network through facility improvements, close coordination with agency partners, and Town policies. Completion of this plan represents an important step toward implementing multimodal improvements that affect travel safety, mobility, development patterns, and aesthetics in the Town of Apex. This chapter lays out a simple set of recommendations to help local staff continue to focus their efforts and seek strategic opportunities to expedite the implementation of this plan.

Funding Opportunities

With tight budgets constraining municipalities across the board, the funding to implement the recommendations in Advance Apex will likely come from a patchwork of local, state, and federal programs, as well as through the receipt of private contributions. With this in mind, this chapter identifies available funding resources that are being used now and can continue to be explored to maximize potential revenues for the Town.

It will be important for the Town of Apex, in collaboration with Wake County, CAMPO, and NCDOT, to continue pursuing funding resources to implement the recommendations of this plan. While some projects and programs may be funded locally, alternatives are available to provide a wider base of financial support for improving the local transportation network, as this goal will ultimately benefit the larger region.

Transportation Funding Sources

Funding Source	Description
FAST Act	Transportation funding at the federal level is governed by a spending authorizations bill that sets the nation's agenda and priorities for the next few years' major transportation projects. The Fixing America's Surface Transportation (FAST) Act, was passed in 2015, and sets the country's transportation priorities through 2020.
Governor's Highway Safety Program (GHSP)	GHSP funding is provided through an annual program, upon approval of specific project requests, to undertake a variety of safety initiatives. Communities may apply for a GHSP grant to be used as seed money to start a program to enhance highway safety. Once a grant is awarded, funding is provided on a reimbursement basis and evidence of reductions in crashes, injuries and fatalities is required.

Funding Source	Description
Locally Administered Projects Program (LAPP)	The LAPP program was established by CAMPO in 2010 with the intention of providing municipalities full control over the planning and design phases of roadway, transit, or bicycle and pedestrian projects. Projects ideally suited for this funding source would be smaller in nature, due to the limited funds available and the desire to spread the impact of those funds over several project efforts. LAPP funding is awarded through a competitive process based on a set of criteria and scoring approach. The LAPP may, in any given year, utilize funds from Surface Transportation Block Grant Program Direct Attributable (STBGP-DA) accounts; Congestion Mitigation for Air Quality (CMAQ); Transportation Alternatives Program (TAP), which incorporates Transportation Enhancement and Safe Routes to Schools funds; or any other funds passed through to the MPO for programming. Usage of LAPP funds requires the local government to provide a minimum 20% funding match, as well as money for project planning and design.
North Carolina Clean Water Management Trust Fund (CWMTF)	CWMTF funds, are allocated as grants to local governments, State agencies, and conservation non-profits to help finance projects that specifically address water pollution problems. The funds may be used to establish a network of riparian buffers and greenways for environmental, educational, and recreational benefits.
NCDOT STIP Funding	The State Transportation Improvement Program (STIP) is the traditional source of allocating transportation funding in North Carolina for state roads – most of this funding comes from vehicle sales tax and state and federal gasoline tax revenues. In Apex, all state and federal funding is programmed in collaboration with CAMPO.
Powell Bill	Funds, generated by the state gasoline tax, distributed by the State to municipalities to help fund transportation projects on municipally-maintained roads. Also known as State Aid to Municipalities funding. In 2018, the Town of Apex was allocated \$1.25 million.
Transportation Bonds	Bonds position the Town to better leverage additional funding by allowing the Town to provide necessary funding matches. The Town successfully passed a bond referendum in 2015 totaling \$15 million, which provided funding to finish the Apex Peakway.
Grant Funding	Limited funding is available for transportation projects through competitive grants offered by both non-profit organizations (such as projects that promote health) and the federal government (such as the BUILD program). These opportunities are typically highly competitive and grants are awarded based on specific criteria established for each program.

Funded Projects

There are several roadway projects within the Advance Apex study area that have already been programmed for funding through the STIP and LAPP programs. These projects are shown in the table below. Projects programmed for funding within the TIP are not considered as part of the Advance Apex prioritization process, since they have already been identified as priority projects. However, local match

funding required for LAPP projects or for betterments associated with State-funded roadway projects should continue to be prioritized through the annual development of the municipal budget and CIP.

Funded Projects (2018-2027)

STIP ID	ANTICIPATED BEGIN OF CONSTRUCTION	LOCATION	DESCRIPTION
U-5537	2018	Lake Pine Drive north of MacGregor Pines Drive to north of Versailles Drive	Widen to 3 lanes
U-5530AC	2018	James to Downtown pedestrian project	Construct sidewalk and crossing improvements to complete a pedestrian route from James Street to N. Salem Street.
B-5161	2019	Apex Barbecue bridge	Replace bridge along Apex Barbecue Road near Kinship Lane. Project includes construction of sidewalk and accommodates for future greenway underpass.
EB-5895	2019	NC 55 from Sunset Lake Road to Technology Drive	Construct sidewalk
U-5928	2020	Apex Peakway at South Salem Street	Close gap in the Apex Peakway at S. Salem Street. Includes a bridge over the railroad and construction of a loop road to tie into S. Salem Street.
R-2721	2020	NC 540 extension	New route
C-5604AA	2020	Kelly Road and Apex Barbecue Road	Construct sidewalk along Kelly Road from Beaver Trail to Apex Barbecue. Construct side path along Apex Barbecue from Kelly Road to Scotts Ridge ES.
U-2901B	2021	NC 55 from US 1 to Olive Chapel Road	Widen to 4 lanes with median
U-5301	2022	US 64 from Laura Duncan Road to US 1	Corridor upgrade including interchanges at Laura Duncan Rd and Lake Pine Drive
U-5825A&B	2023	Ten Ten Road from Apex Peakway to Kildaire Farm Road	Widening to multi-lanes with median
EB-5893	2025	Lake Pine Drive to Koka Booth Amphitheater in Cary	Construct Swift Creek Greenway
U-5981	2026	US 1 at NC 55	Interchange improvements
U-6066	2026	US 1 from NC 55 to US 64 in Cary	Widening

Project Prioritization

Roadway Prioritization Process

To assist the Town with identifying how best to advocate for and allocate future funding, Advance Apex includes a prioritization assessment for roadway projects including both quantitative and qualitative metrics. The metrics used were defined using feedback received from Town staff, the plan Steering Committee, the general public, CAMPO, and NCDOT. The following sections define each metric used in the prioritization process. The recommendations were analyzed under a series of qualitative and quantitative metrics to determine the highest priority projects.

The prioritization methodology can be found in the table below. Intersections were prioritized under the same metrics apart from congestion and were given extra consideration if they were classified as either a grade separation or interchange.

Criteria	Metric(s)	Guiding Principle Served
Safety	<ul style="list-style-type: none"> Crash History Conflict Resolution 	<ul style="list-style-type: none"> Safety
Congestion	<ul style="list-style-type: none"> Existing V/C Ratio V/C Reduction 	<ul style="list-style-type: none"> Mobility and Connectivity
Connectivity	<ul style="list-style-type: none"> Critical Connections 	<ul style="list-style-type: none"> Integrated Growth Mobility and Connectivity
Freight	<ul style="list-style-type: none"> Freight Route 	<ul style="list-style-type: none"> Mobility and Connectivity
Local Priority	<ul style="list-style-type: none"> Local Priorities 	<ul style="list-style-type: none"> Safety Sense of Place Downtown

Quantitative Measures

Three metrics were calculated quantitatively based on state and local data.

- Crash History (*Safety*) – includes crash frequency and severity
 - This measure considered crash data from a 5-year period.
- Existing Volume to Capacity Ratio (*Congestion*) – corridors only
 - This data was obtained from the current year (2015) Triangle Regional Model.
- Volume to Capacity Reduction (*Congestion*) – corridors only
 - This metric compares congestion reduction associated with projects based on the 2045 Triangle Regional Model.

Qualitative Measures

Four metrics were determined qualitatively based on state and local data.

→ Critical Connections (*Connectivity*)

- This measure is defined as providing a new or improved linkage for emergency services, connectivity, schools, community facilities, or potential activity centers.

→ Freight Route (*Freight*)

- This measure is defined as projects located on a designated freight route as noted on the roadway recommendations map.

→ Local Priorities (*Local Priority*)

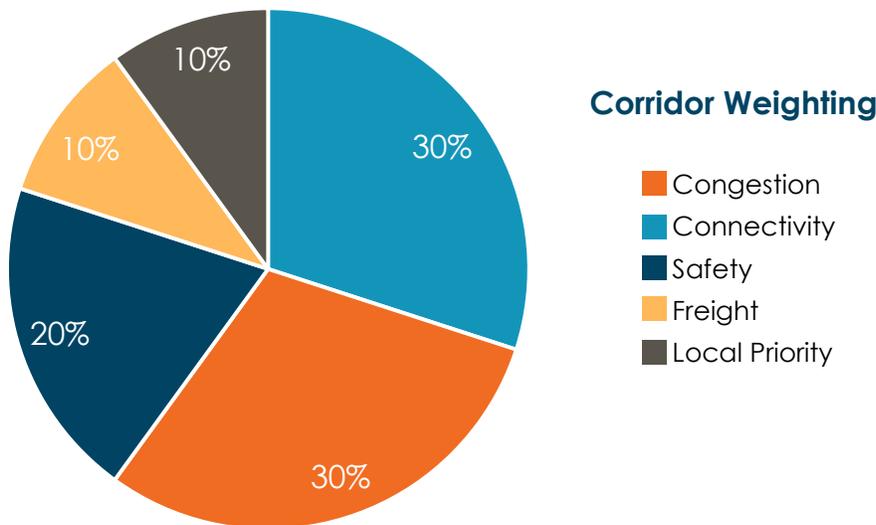
- This measure is defined as those projects receiving public feedback.

→ Conflict Reduction (*Safety*) – intersections only

- This measure is defined as projects with grade separations or interchanges.

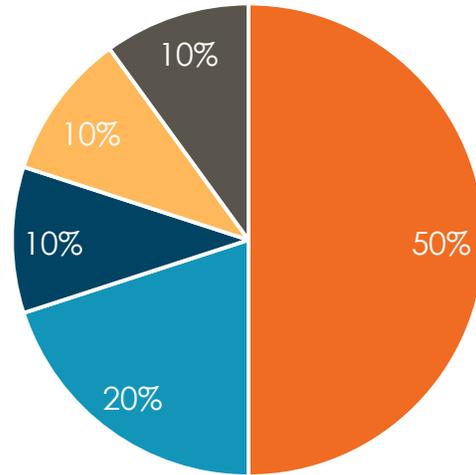
Criteria Weighting

Once prioritization metrics were identified, weighting values were determined for each of the metrics. These weighting values were based on input from the public, stakeholders, and Steering Committee as well as regional and state funding considerations.



Intersection Weighting

- Safety
- Connectivity
- Freight
- Conflict Reduction
- Local Priority



Following the application of the criteria weighting, a total value score was obtained for each project. From that point, each project had an estimated cost identified. The estimated cost was based on available information (such as feasibility studies or CAMPO cost estimates) where possible. Where more localized information was not available, cost estimates were developed using NCDOT unit cost values.

With both value scores and estimated costs available for each project, Advance Apex took the additional step of establishing value/cost scores for each project. Value/cost scores provide a perspective of which projects provide a high value in relation to their cost. While this is not the sole metric that was considered to group roadway priorities, the value/cost is an important indicator of high value projects that can be more easily funded.

Roadway Prioritization Results

The tables that follow reflect the near-term, mid-term, and long-term priorities for roadway recommendations in Advance Apex. Within each grouping, projects are not listed in a specific order. Corridor and intersection projects are broken into state and regional and plan project levels. State and regional corridors and intersections do not have priorities identified. Those projects will need to be coordinated with CAMPO and NCDOT for consideration in the region's Metropolitan Transportation Plan (MTP) and TIP. Plan corridor and intersection prioritization results can be used as a tool by the Town when establishing the annual CIP list. Since Advance Apex is not financially constrained, there are no specific time periods associated with each prioritization grouping. However, the Town should pursue these improvements aggressively and opportunistically to help keep pace with growth and emerging needs.

Plan Corridors

ID	Project Name	To	From
Near Term			
PC-2	Apex Peakway New Location	S Salem Street	James Street
PC-3	Apex Peakway New Location	NC 55	Center Street
PC-4	Apex Peakway Widening	Ten Ten Road	Laura Duncan Road
PC-7	Apex Peakway Widening	N Salem Street	S Salem Street
PC-9	Davis Drive Widening & New Location	US 64	Farmpond Road
PC-11	Gladson Drive New Collector Street Connection	Production Drive Extension	NC 55
PC-17	Horton Ridge Boulevard New Collector Street Connection	Horton Ridge Boulevard (Jordan Point)	Horton Ridge Boulevard (Jordan Manors)
PC-21	Jenks Road Widening & Realignment	Wimberly Road	US 64
PC-22	Jessie Drive (Extension) New Location	Ten Ten Road	NC 55
PC-23	Jessie Drive (Extension) New Location	NC 55	Old Holly Springs Apex Road
PC-25	Kelly Road Widening	Jenks Road	Old US 1
PC-26	Laura Duncan Road Widening	Hunter Street	Apex High School
PC-27	Milano Avenue New Collector Street Connection	Mount Zion Church Road	Milano Avenue (Buckhorn Preserve)
PC-28	N Salem Street Widening	Apex Peakway	US 64
PC-31	Old Raleigh Road Widening	Laura Duncan Road	Apex Peakway
PC-38	Production Drive New Collector Street Connection	Reliance Avenue	Jessie Drive
PC-39	Reunion Creek Parkway New Collector Street Connection	NC 55	Smith Road
PC-40	Richardson Road New Location	Humie Olive Road	Old US 1
PC-44	Roberts Road Widening	Green Level Church Road	Jenks Road
Mid Term			
PC-1	Apex Barbecue Road Widening	Olive Chapel Road	Old US 1
PC-5	Apex Peakway Widening	Laura Duncan Road	N Salem Street
PC-6	Apex Peakway Widening	James Street	Broadstone Way
PC-12	Green Level Church Road Widening	Green Level West Road	Jenks Road
PC-13	Green Level West Road Widening	Chatham County	Green Level Church Road
PC-14	Holland Road Extension New Location	Kelly Road	S Salem Street
PC-18	Horton Ridge Boulevard New Collector Street Connection	Horton Ridge Boulevard (Jordan Manors)	Richardson Road
PC-19	Humie Olive Road Widening	Richardson Road	Old US 1
PC-20	Jenks Road Widening	NC 55	Wimberly Road
PC-30	Old Jenks Road Widening	NC 55	Davis Drive
PC-32	Old Raleigh Road/Lake Pine Road Widening	Apex Peakway	Old Raleigh Road
PC-33	Old US 1 Highway Widening	Humie Olive Road	New Hill Olive Chapel Road
PC-37	Percussion Drive New Minor Collector Street Connection	Smith Road	Sunset Lake Road (E of new school)
PC-43	Richardson Road New Location	Old US 1	US 1
PC-46	Smith Road Extension New Location	Reunion Creek Parkway	Smith Road

ID	Project Name	To	From
Long Term			
PC-8	Apex Town Square Boulevard (Perry Road Extension) New Location	Apex Peakway	NC 55 Bypass
PC-10	Friendship Road Widening	US 1	Old US 1
PC-15	Holland Road Widening	Old US 1	Kelly Road
PC-16	Holt Road Widening	Old Jenks Road	Old Jenks Road
PC-29	Old Holly Springs Apex Road Widening	NC 540	S of NC 540
PC-34	Old US 1 Highway Widening & New Location	Jessie Drive	Humie Olive Road
PC-35	Olive Chapel Road Widening	Kelly Road	Richardson Road
PC-36	Olive Chapel Road Widening	Apex Peakway	Kelly Road
PC-41	Richardson Road Widening	Olive Chapel Road	Humie Olive Road
PC-42	Richardson Road Widening	US 64	Olive Chapel Road
PC-45	S Salem Street Realignment New Location	Future Major Collector	Future Minor Collector
PC-47	Stephenson Road Widening	Sunset Lake Road	Ten Ten Road
PC-48	Sunset Lake Road Widening	NC 55	Stephenson Road
PC-49	Tingen Road Widening	Apex Peakway	Veridea Parkway
PC-50	Veridea Parkway Widening	Tingen Road	Jessie Drive

Intersections

ID	Project Name	Improvement Type
Near-Term		
PI-10	James Street at S Hughes Street	Roundabout
PI-15	Old Raleigh Road/Hunter Street at Laura Duncan Road/Mason Street	Roundabout
PI-16	Olive Chapel Road at New Hill Olive Chapel Road Intersection	Intersection Realignment
PI-17	Perry Road at S Hughes Street	Roundabout
PI-23	Pleasant Plains at US 1	Grade Separation
PI-19	Salem Church Road/Dotson Way at N Salem Street/Old Apex Road	Roundabout
PI-21	Smith Road at Stephenson Road	Roundabout
Mid-Term		
PI-1	Apex Barbecue Road at Olive Chapel Road	Intersection Realignment
PI-2	Apex Barbecue Road at S Salem Street	Roundabout
PI-7	Holland Road at NC 540	Grade Separation
PI-13	Laura Duncan at Railroad	Grade Separation
PI-20	Scheiffelin Road at US 1	Grade Separation
PI-22	Technology Drive at NC 55	New Interchange
Long-Term		
PI-3	Culvert Street at Center Street	Roundabout
PI-4	Green Level West Road at Wimberly Road	Roundabout
PI-5	Holland Road (with Friendship Road)	Intersection Realignment
PI-6	Holland Road at Kelly Road	Roundabout
PI-8	Holt Road at Old Jenks Road (eastern)	Roundabout
PI-9	Horton Road (with Shearon Harris Road)	Intersection Realignment

ID	Project Name	Improvement Type
PI-11	Jenks Road at Green Level Church Road	Roundabout
PI-12	Kelly Road at Street N	Roundabout
PI-14	Old Holly Springs Apex Road (with future Jessie Drive)	Intersection Realignment

Action Plan

Advance Apex lays out a strategy for identifying and implementing recommendations to address the highest priority needs within the community. Through well-guided transportation and land use policies as well as leveraging strategic partnerships, each set of recommendations becomes a set of achievable goals with a basis in realistic expectations.

Priority Network Recommendations

To successfully implement this plan, the Town of Apex will need to partner with responsible agencies that can influence and authorize recommendations. Some of the recommended improvements will be implemented at the local level through the development review process. Major infrastructure improvements most likely will be a product of State and federal funding; however, transportation improvement funds are limited and competition for them is great. The majority of responsibility for implementing these recommendations will be a coordinated effort between NCDOT, CAMPO, the Town of Apex, and private developers.

Roadway

The near-term plan priorities listed in the section above should be pursued opportunistically as funds are available. Priority projects within the near-term section are not listed in priority order; rather, all projects within the near-term list should be considered high priorities. The Town of Apex will coordinate with CAMPO and NCDOT to express the Town's position on these projects, in an effort to position them for state and federal funding (where applicable). Additionally, projects in the near-term section can be considered by the Town for funding within the CIP. The Town of Apex will continue to coordinate with CAMPO and NCDOT to seek funding and implementation for state and regional projects.

Bicycle and Pedestrian

Advance Apex (Chapter 6) and Bike Apex can be used in tandem to reflect the area's priorities for bicycle and pedestrian improvements. Priority sidewalk improvements should include filling gaps in the system within the Town Center and Transit-Oriented Development context areas and in areas that serve schools and activity centers. Incidental projects (those completed as part of a larger corridor project) are the most cost-effective means of implementing non-motorized facilities. As a result, the Town should

continue to advocate for expansion of the pedestrian and bicycle network through other roadway improvements.

Transit

Chapter 7 of Advance Apex details a series of transit recommendations, as well as a proposed alignment for a priority circulator service. The Town is already moving forward with an application for funding to study this service in greater detail, which will position it well for near-term implementation. The Town should continue to have a voice in the ongoing regional transit planning initiatives to help Apex grow its transit presence.

Priority Policy Recommendations

Priority policy recommendations have been studied throughout the assessment of modal needs in Advance Apex, and are outlined in Chapters 5, 6, and 7. Town staff can consider implementation of these priority policies in partnership with the Planning Board and Town Council.