

7. MOVE

Providing Transportation Choices



IN THIS CHAPTER:

- Challenges and Opportunities
- Policy Direction
- Transportation Elements and Maps
- How We Will Achieve Our Vision
- Related Policy Direction in Other Chapters

The wise investments made in transportation infrastructure over the last few decades has created a transportation system that functions for users of all modes - walkers, bikers, drivers, and transit riders. In the future, Cary's transportation system will provide efficient travel for all Cary residents, workers, and visitors.

CARY VALUES:

An Efficient System for All Users

Cary will continue to provide an attractive network of streets and a wide range of functional and well-designed facilities for all mode choices - driving, walking, biking, and transit. This multimodal system will facilitate moving into, out of, and around the community with a design emphasis on people and the human experience.

We dedicate Chapter 7 - MOVE - to Town of Cary Transportation and Facilities Director Lori Cove, P. E. As an accomplished engineer, dedicated public servant, and six-time Ironman, no one better understands or appreciates the life-changing opportunities that extraordinary transportation offers to each person in our community. Her hard work will help keep Cary great for generations to come, and her friendship, strength, and inspiration will remain with us always.

CARY COMMUNITY PLAN ▶ 2040

7. MOVE

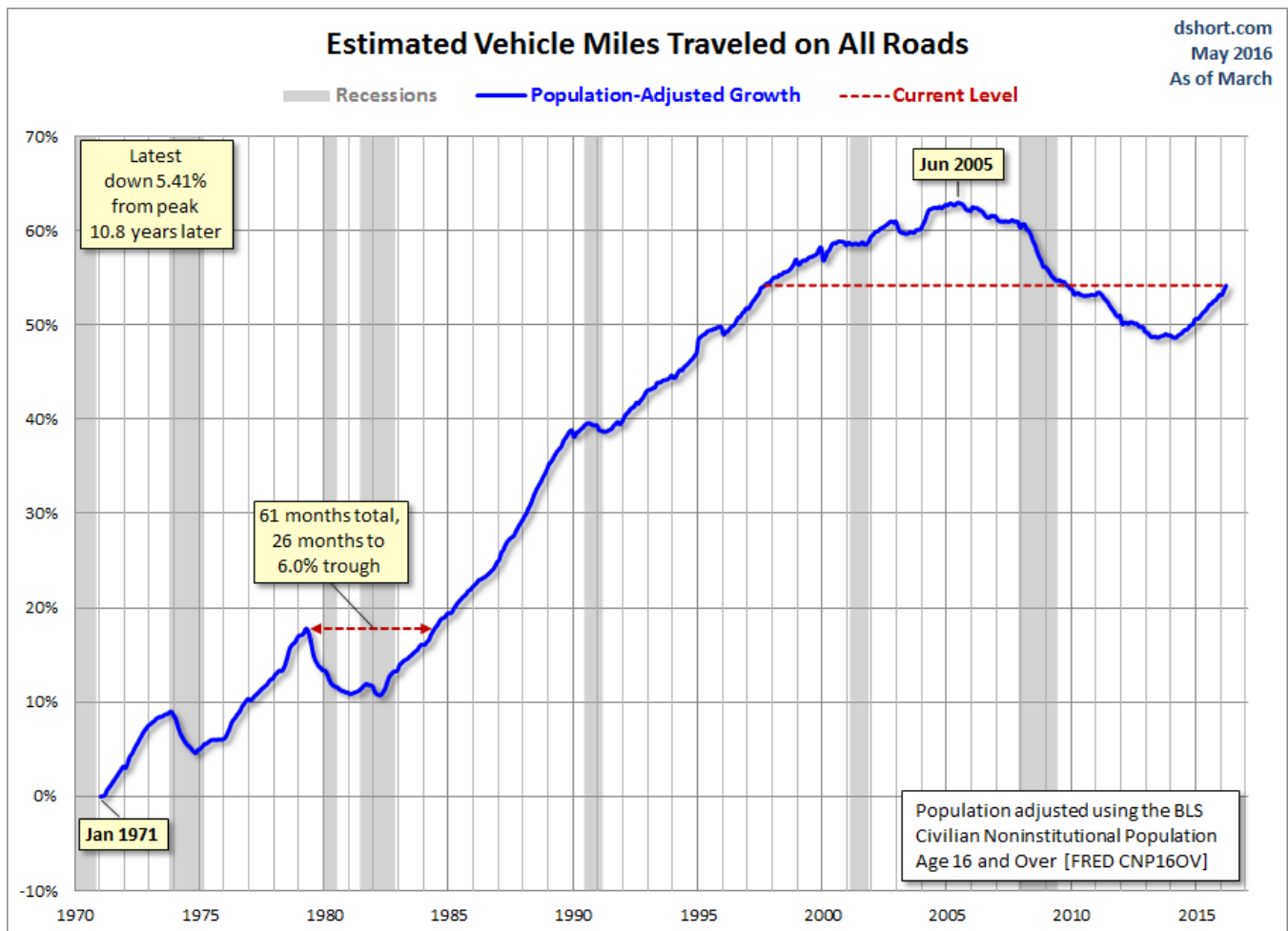
Challenges and Opportunities

Cary has a strong existing transportation network, with well-designed streets, good sidewalk coverage, a variety of bicycle facilities, and an efficient transit system. The quality of the existing system is a result of past prudent investments in infrastructure. As Cary looks to the future, continued investments in infrastructure and implementation of policies will improve mobility for Cary residents, workers, and visitors.

There are several local and national trends and factors that may affect future travel in Cary. These trends present challenges and opportunities for Cary as the transportation, demographic, and technological landscape shifts. Many of these trends are only beginning to emerge and the full extent of their impact on travel and transportation is not fully known. Some of the trends are a result of shifting professional practices, like increased understanding of the interaction between land use and transportation. Together, these trends provide context to the transportation recommendations as factors that currently affect travel in Cary or may in the future.

Nationally, a broad measure of travel behavior is vehicle miles traveled per capita. Since the 1970s, this measure has risen steadily, pausing only during recessions. Encapsulated in the rise of vehicle miles traveled are a number of economic and social trends such as suburbanization, increasing household incomes, women entering the workforce in greater numbers, and decreasing costs of vehicle ownership.

More recently, per capita driving has declined. Much of the decrease can be explained by the 2008 economic downturn and increases in gas prices. However, per capita vehicle miles traveled peaked in 2005, before the recession, and has not fully rebounded since the recession ended, indicating other factors may be affecting people's decision to drive. In the last year, vehicle miles traveled has begun to trend upwards again, perhaps signaling a resumption of historic trends. How demographic, technological, and personal trends affect vehicle miles traveled will help determine the needed transportation network in Cary.



Integration of Land Use and Transportation

Transportation networks and surrounding land uses are often viewed as independent systems; however, both are very much intertwined, and changes to one will influence the other. Transportation infrastructure, services, and policies can determine development patterns, while demand created by businesses and homes create need for streets, sidewalks, transit services, and bike facilities. For example, businesses may locate along major streets and transit lines to increase visibility to customers and accessibility for employees. And, new transportation infrastructure or transit services can lead to accompanying changes in land use such as the development of homes or businesses.

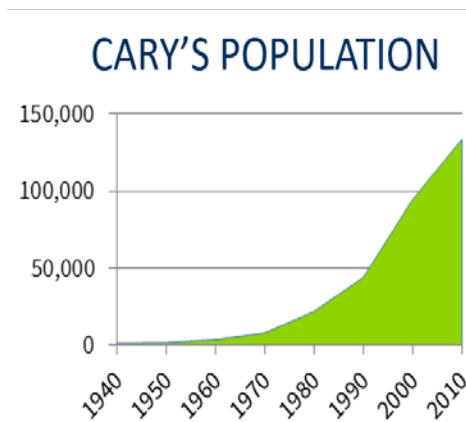
Similarly, land use and development patterns influence new transportation infrastructure. Major commercial developments and trip-generating destinations may require expanded streets, new transit services, connected bike facilities, or additional sidewalks to better serve the people traveling to those locations. As development and redevelopment occurs throughout Cary, it is important to continually reevaluate the transportation network and services to ensure the system functions and provides adequate access to the locations that people desire to go to.

Growing Population

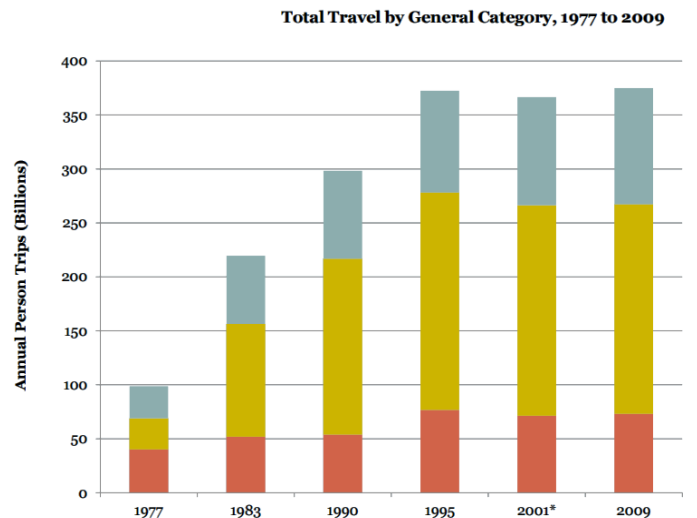
Proper coordination between transportation and land use is increasingly important as the population of Cary continues to grow. Cary's population tripled between 1990 and 2010, increasing from 43,858 in 1990 to 125,234 in 2010. This growth trend is expected to continue through 2040, albeit at a slower rate, with an expected population of 193,000 residents in 2040. New growth will have positive impacts on many aspects of the community, but also places pressure on the transportation infrastructure to continue to function effectively and efficiently with the additional users.

Changing Trip Purpose

Planners and professionals often focus on work trips because they are regular and occur at times of peak demand for transportation infrastructure. In recent decades, however, the importance of work trips has declined as other trip types have increased at a faster rate than work trips. Now, trips like shopping, dining out, taking the kids to school, and visiting friends make up a larger share of total trips. For Cary, this means more demand throughout the day, not just during the morning and evening commute times. Shifting trip purpose can also mean transit service is more complicated, leading to the need for more connections between destinations and increased frequency of service in traditionally off-peak hours.



Cary's population tripled between 1990 and 2010.



Work trips (red) have grown at a slower rate than other trips (leisure in blue and shopping/errands in yellow). Source: McGuckin's analysis of NHTS data series.

Diverse Mobility Needs and Preferences

The transportation system in Cary is designed to function for all residents, workers, and visitors. This means creating a network that allows individuals to choose a preferred mode of travel - driving, walking, biking, transit. It also means adjusting to changing preferences and ensuring all mobility needs are met.

Aging Population

Nationally, the population is aging as the baby boomer generation reaches retirement age and life expectancies increase. This trend is accelerated for warm southern states like North Carolina, and Cary's population reflects this trend. The fastest growing segment of Cary's population is nearing retirement age; between 2000 and 2011 the proportion of Cary's population over 55 increased from 12% to 18%. Cary's population of over 65 individuals is projected to continue to increase in the future.

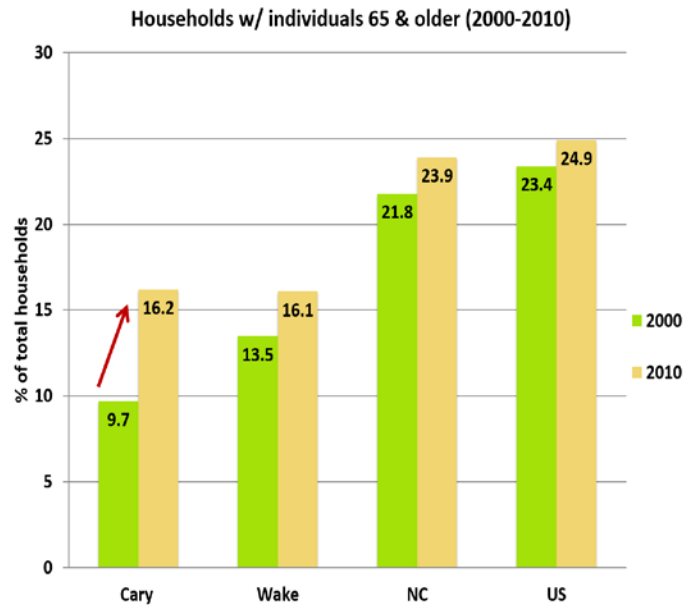
The aging population has several impacts on transportation. First, older individuals drive less than other age groups and tend to make fewer trips at peak travel times (the morning and evening rush hours). Many older individuals choose not to drive - or are no longer able to drive - and must rely on walking, transit, or friends and family for trips. As a result, demand may increase for non-driving modes of travel and travel options at non-peak times.

Millennial Preferences

Millennials (the generation born roughly between 1980 and 2000) and their travel preferences have been a frequent point of discussion over the past several years. In general, surveys have shown millennials prefer walking, biking, and transit at higher rates than other age groups. Also, millennials' economic experiences and personal trends have reduced car ownership and driving. Factors include lower employment, wage stagnation, higher debt levels than previous generations, pursuing more schooling, and postponing marriage and children.

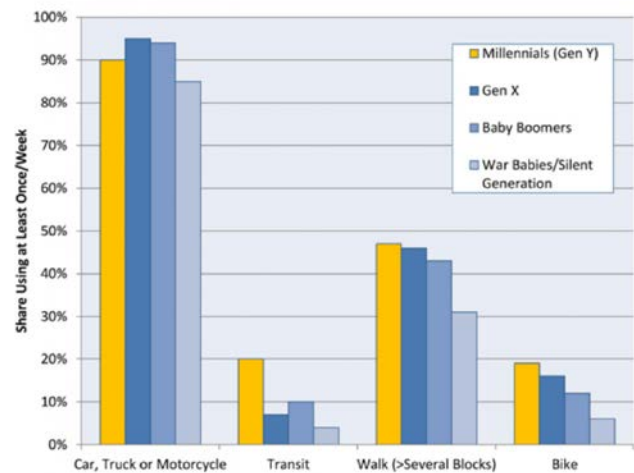
There is some evidence that the prevalence of social networking and ubiquity of internet access has impacted the desire for automobile ownership; the cell phone is the millennial generation's symbol of freedom and connectivity, not the car. Many millennials prefer a transit trip to a car trip, because that time can be spent on other tasks such as reading, working, or connecting with others via a smart phone.

Growth in Seniors



Cary's senior population has grown rapidly and will continue to grow in the future.

Millennial Choices

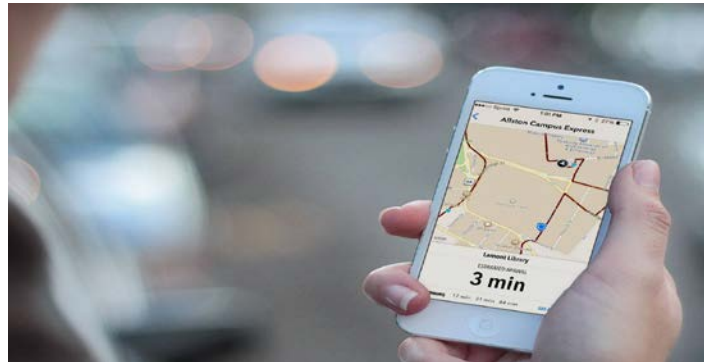


Millennials show a desire to use non-car modes at a higher rate than other generations.

Changing Market Preferences and Technologies

Technology's Effect on Transit

Surveys have shown uncertainty - particularly worrying about missing the bus or taking the wrong bus - is one of the leading reasons people choose not to take transit. Technology improvements have helped allay these fears. Smart phone apps, such as Transloc, can now show, real time, bus locations and arrival times. GoCary, like all transit providers in the Triangle, uses these systems to alleviate uncertainty associated with transit and make transit a more appealing option.



Intelligent Transportation Systems

As street infrastructure becomes built out and mature, there is an increasing focus on managing the existing infrastructure rather than building new infrastructure.

Demands on the existing infrastructure can be better managed through intelligent transportation systems that marry technology and infrastructure, which can yield cost savings and limit the need for building new infrastructure. Signal timing and phasing enhancements, real-time signal timing adjustments, signal preemption for transit vehicles, and real-time communication systems are examples of technologies that monitor the infrastructure usage and adjust the system in response to demand to manage congestion.



Technological solutions are increasingly being deployed to help manage demand on streets and ease congestion.

Healthy Communities

The healthy communities movement is a trend in community planning as a response to the increase in preventable diseases that are linked to the built environment. Concerns over the impact sedentary lifestyles have on personal health have led to a focus on incorporating activity into daily routines, not just as a separate exercise activity. Healthy communities considers land use issues like the proximity of desired destinations (restaurants, parks, schools, jobs) to homes and businesses. Similarly, transportation issues are also reflected in planning efforts. Sidewalks are available and connected, bike accommodations are built into street designs, and street crossings are safe and comfortable. A well-planned healthy community encourages people to incorporate activity into their daily life by making biking and walking a safe, easy, and comfortable choice.



An active lifestyle may include biking, walking, or running on many of Cary's premier greenways such as the American Tobacco Trail.

A Balanced and Efficient Multimodal Transportation System

Complete Streets

In almost all communities, right-of-way for streets represents the largest assemblage of public land in the community, outpacing public parks and buildings. Although commonly considered space for vehicles, streets are for everyone. Complete Streets is an effort to design streets with all people in mind, regardless of mode of choice. Mode is a simple concept that refers to the method someone uses to get around a town - driving, walking, biking, transit, or some other choice. Complete streets are designed and built so that all modes can move safely and efficiently around a community.

Cary strives to apply this concept and design streets that work for all Cary residents, workers, and visitors. Therefore, sidewalks are programmed for at least one side of new streets and often on both sides of the street to allow safe and comfortable walking. Bike accommodations include bike lanes or wide outside lanes, and well-marked bike routes. Transit service connects major destinations and provides Cary residents and workers access to jobs and amenities. The transportation network, specifically transit service and pedestrian infrastructure, is designed to provide safe mobility for individuals with disabilities and considers the needs of all Cary residents. This way of planning and designing ensures that the transportation network is truly for all Cary residents and workers.



Attractive Streetscaping

Attractive streetscaping is a crucial component in street designs, one that Cary residents take pride in. Streetscaping includes plantings in the medians of thoroughfares and collectors and along the sides of streets. These plantings enhance the pleasantness and attractiveness of the streets in Cary, providing additional green space and beauty throughout the town. Corridors lined with flowers, trees, and bushes enhance the travel experience along those corridors, be it by driving, walking, biking, or by bus.

In addition to street plantings, Cary incorporates other streetscaping elements to improve the aesthetic look of the town. Decorative and pedestrian-focused lighting fixtures, brick pavers in sidewalks, benches along sidewalks, attractive signs, and a unified aesthetic for other street elements, like waste receptacles and traffic lights are all techniques to beautify the street. Combined, all of these street elements create a pleasant experience for people traveling around Cary, and enhance the beauty and sense of place within the town.



Policy Direction

In order to respond to the transportation challenges and opportunities, and to provide an efficient, functional, and well-designed transportation system that provides mobility choices, Cary’s transportation policies are below. Policies are not ordered by priority.

Policy	Policy Intent
Policy 1: Ensure Safety for All Users and Modes	
<p>Evaluate the Town’s transportation network to ensure the safety of all roadway users, regardless of age or ability including pedestrians, bicyclists, transit riders, and motorists.</p>	<ul style="list-style-type: none"> ▪ Make safety the top goal by designing streets that seek to minimize crashes and the potential for conflicts. ▪ Design all transportation elements with safety in mind. ▪ Continue to evaluate and reevaluate crash and safety data to identify areas that may need targeted safety improvements.
Policy 2: Apply Multimodal Street Designs	
<p>Apply “complete street ” design guidelines for the cross-sections and intersections of all streets, collectors, and thoroughfares based on system demand and each street’s land use context.</p>	<ul style="list-style-type: none"> ▪ Design streets that are accessible and usable for all Cary residents, workers, and visitors. ▪ Address changing national trends in trip preferences and needs by designing streets that allow individuals to choose their preferred mode of travel. ▪ Address needs of individuals who have a variety of mobility needs and abilities.
Policy 3: Design Transportation Infrastructure to Address Land Use Context	
<p>Incorporate transportation improvements along corridors in a context-sensitive way, balancing community character, historic preservation, environmental protection, and aesthetics with transportation and mobility needs.</p>	<ul style="list-style-type: none"> ▪ Recognize the connection between transportation and land use. ▪ Recognize that different intensities and types of land use require various transportation elements and configurations of transportation infrastructure.
Policy 4: Focus Investments on Improving Connections and Closing Gaps	
<p>Focus transportation investments on bridging connectivity gaps between employment centers, neighborhoods, and mixed use commercial developments. Improve connectivity within and between these destinations by providing opportunities for all modes of transportation: driving, walking, biking, and taking transit. This also includes improving opportunities for connectivity via greenways and trails.</p>	<ul style="list-style-type: none"> ▪ Recognize that much of the transportation infrastructure in Cary is mature or in established neighborhoods. ▪ Maximize transportation investments by focusing on the highest need areas and places where targeted investments will yield significant benefits.

Policy

Policy Intent

Policy 5: Minimize Thoroughfare Widths

Major streets that are being developed or widened to add additional lanes should be limited to four through lanes, wherever possible. Any expansions beyond this standard should be focused in areas with the highest levels of congestion and critical bottlenecks.

- Recognize the public desire to keep most Cary thoroughfares at four through lanes wherever possible.
- Help address needs of pedestrians who find crossing smaller streets easier and more comfortable.
- Create a more attractive street network by designing thoroughfares that are not excessively wide and feature landscaped medians.

Policy 6: Improve Pedestrian and Bicycle Crossings

Improve pedestrian and bicycle crossings in commercial areas, across major streets, and where greenways cross streets to build connected bicycle and pedestrian networks that are comfortable for all ages and abilities.

- Incorporate pedestrian and bicycle crossing improvements to places that are often the most challenging for pedestrians and cyclists to navigate and have the most conflict points.
- Grade separate pedestrian and bicycle crossings (via bridges or underpasses) along major greenway corridors, where feasible, to provide unimpeded crossings, as envisioned in the Parks, Recreation, and Cultural Resources Master Plan.
- Continue investment in the bicycle and pedestrian system.

Policy 7: Target Transit Investments

Target transit investments to support and sustain mobility choice and improve GoCary through increased frequency to major destinations, expanded service to new locations, reliability improvements to reduce travel time, and efficient interconnections with other transit systems throughout the region.

- Continue GoCary's rapid growth through wise investments in infrastructure and services.
- Add new routes and destinations that respond to the demands of current GoCary riders and that attract new riders to the system.

Policy 8: Ensure a Well-Maintained System

Ensure a well-maintained transportation system by emphasizing the need to provide adequate funding for system maintenance needs.

- Recognize that continued good maintenance is a sound investment policy that yields future benefits.
- Improve safety for users by ensuring facilities are well maintained.
- Enhance the attractive streetscaping in Cary with ongoing maintenance and care.

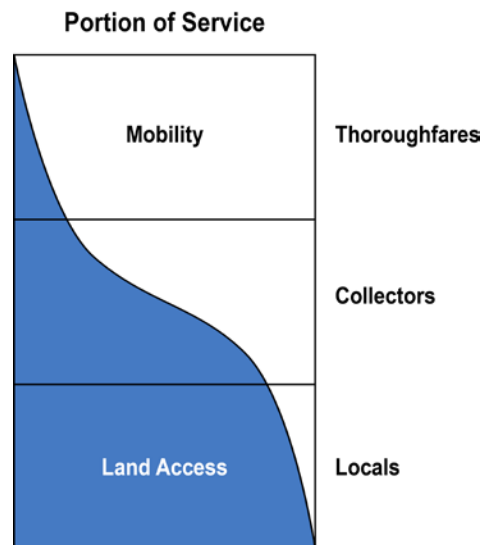
Streets Element

Cary’s street network is a vital component of its success as a growing and vibrant community, providing access to the services, jobs, and amenities that make Cary a wonderful place to live, work, and visit. Cary has been proactive in planning and building high quality street facilities, working in a collaborative manner with federal agencies, NCDOT, metropolitan planning organizations, neighboring municipalities, and developers to create this infrastructure and vital regional connections. Because of the complex funding and regulatory structure, many streets in Cary, in particular the interstates, US routes, and NC routes, are planned and maintained by federal agencies or NCDOT, although the Town of Cary provides input and helps to make decisions regarding changes to these streets.

Functional Classification

Streets in Cary, as in all communities, are designed in a hierarchical manner with different street types serving different purposes within a unified system. At a conceptual level, the design of streets is balanced between two general goals, mobility and accessibility. Mobility is the ability to travel quickly without delay and most streets that focus on mobility are designed to carry high volumes of traffic. Accessibility is the ability to reach destinations. There is a trade-off between mobility and accessibility, and the transportation network in Cary seeks to balance these two broad goals to create an efficient system.

For public streets in Cary, there are three major street types: thoroughfares, collectors, and local streets. Thoroughfares are larger streets that form the backbone of the transportation system in Cary, providing mobility to travel around Cary. Thoroughfares are designed to focus on mobility more than access. Local streets perform the opposite function; they are smaller, slower speed, and feature more driveways and intersections in order to provide access to businesses and homes. Collectors balance the two functions of access and mobility and provide linkages between local streets and thoroughfares. In the hierarchical street system, collectors collect traffic from local streets and distribute to thoroughfares. At a system-wide level, a hierarchical arrangement of streets helps to minimize congestion and maximize safety.



Corridor Profiles

The following corridor profiles describe typical street designs in Cary and their corresponding elements and widths. The design of streets in Cary is dependent on its function within the street network, its land use context, the demand for travel along it, and engineering and environmental considerations. Cary's streets are designed to support users of all modes (driving, walking, biking, taking transit) and to be attractively landscaped and well-maintained.

Common Elements

Pedestrian Accommodations

In general, Cary's collectors and thoroughfares are designed to include five-foot sidewalks on both sides of the street; local streets may only include sidewalks on one side. For all street types, sidewalks are typically separated from the roadway by a five-foot grass buffer. High visibility intersection crossing treatments are also planned to help increase safety and the comfortable feel of walking in Cary. All sidewalks and crosswalks will be designed according to Americans with Disabilities Act requirements to ensure that all Cary residents can use the facilities, regardless of mobility status. In some areas of town, specified on the Pedestrian Elements Map, the pedestrian accommodations will be in the form of a street-side trail, which are typically ten feet wide and only on one side of the street. Street side trails are designed to meander instead of being linear, like sidewalks.



Bicycle Accommodations

Most Cary streets are also designed to have some form of bicycle accommodation appropriate for their speed, volume of traffic, volume of truck traffic, function within the street network, and status within Town-wide and regional bike networks. Most Collector Streets and Collector Avenues are designed to have four-foot bike lanes on both sides of the street. Most thoroughfares are designed to have a wide outside lane which allows vehicles traveling in the outside lane to pass bicyclists safely. Local streets typically do not have specific bike accommodations, but due to their slow speeds and low volumes of traffic are generally appropriate for bikers without special accommodations.



Landscaped Medians

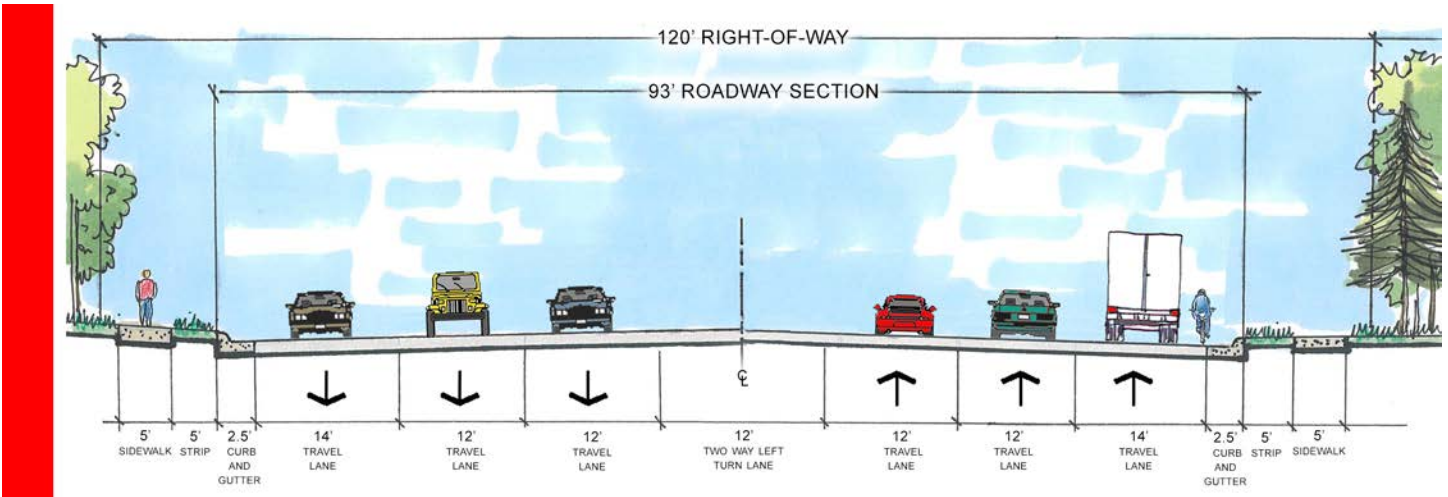
Most thoroughfares and many collectors within Cary are designed to have planted and landscaped medians. The plantings may be formal or informal and may be different combinations of flowers, decorative plants and grasses, shrubs, and trees, depending on environmental and street characteristics. Landscaped medians are a hallmark of Cary streets; they enhance the natural beauty of the town and make traveling along Cary streets a more pleasant experience. The aesthetic appeal of the town is improved through these attractively landscaped medians. Based on engineering and environmental constraints and the judgment of Town staff, medians may vary from their typical size in certain locations.



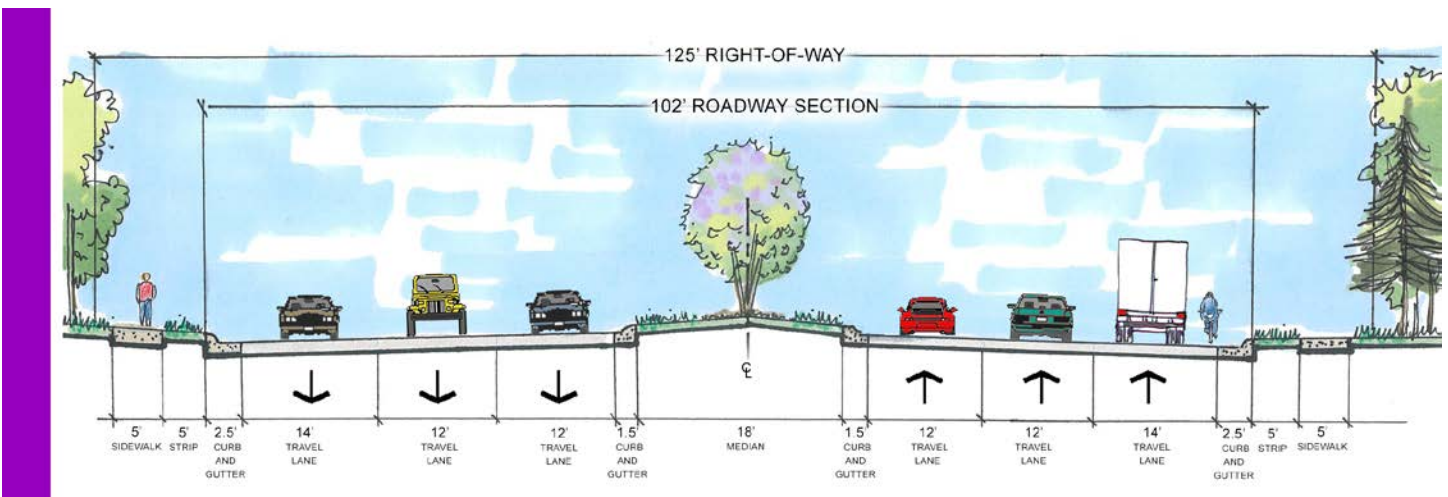
Corridor Profiles - Thoroughfares

Thoroughfares are designed with the primary goal of providing mobility around Cary. They are designed with speeds between 35 and 55 miles per hour. Thoroughfares have between two and seven lanes. In general 2-, 4-, and 6-lane thoroughfares have a landscaped median. 3-, 5-, and 7-lane thoroughfares feature a two-way left turn lane in place of a median. The following cross sections illustrate typical thoroughfare profiles in Cary. Each cross section image contains a colored band on the left side of the image which corresponds to where each profile is deployed on the Planned Roadway Widths Map.

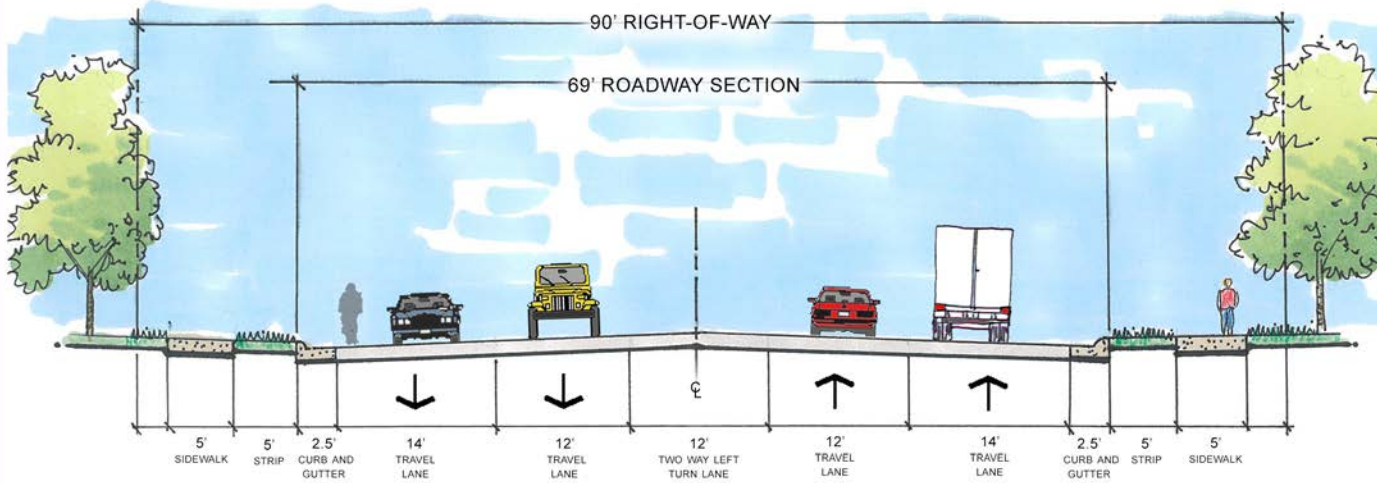
Seven-Lane Thoroughfare



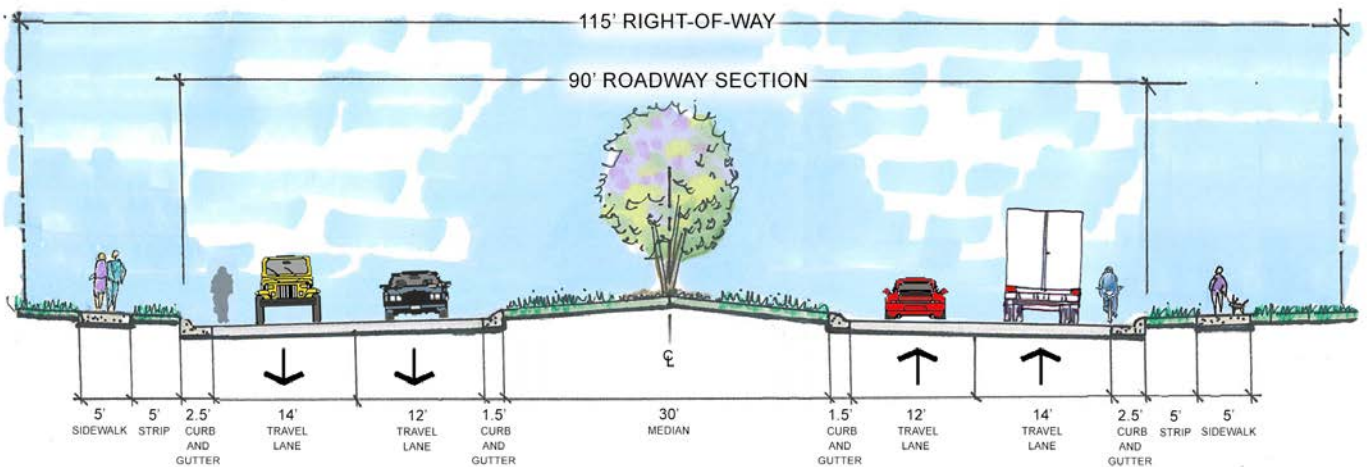
Six-Lane Thoroughfare - 18' Median



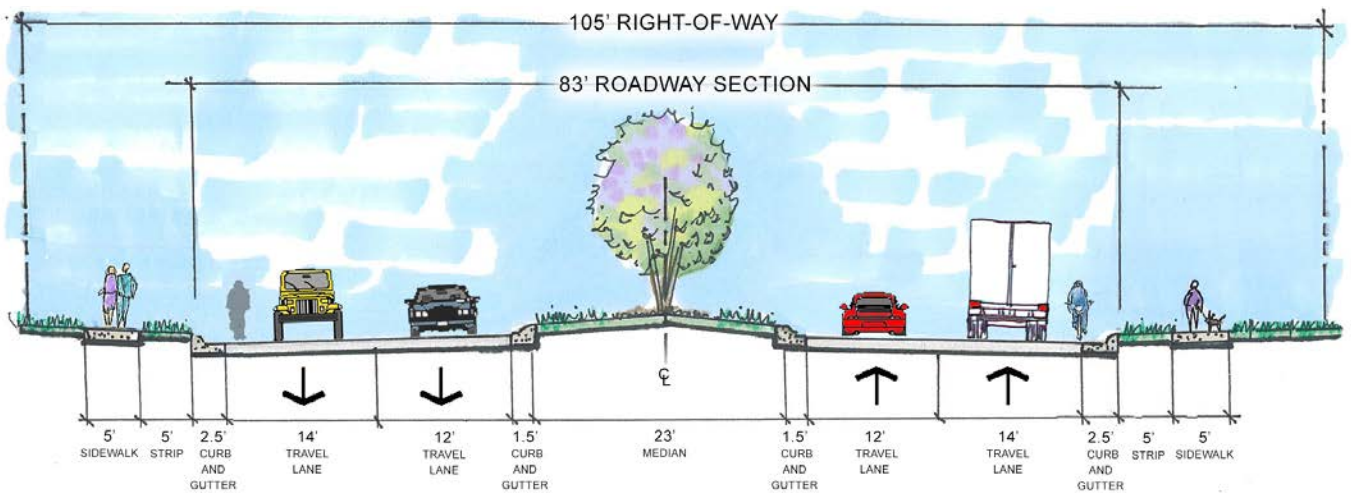
Five-Lane Thoroughfare



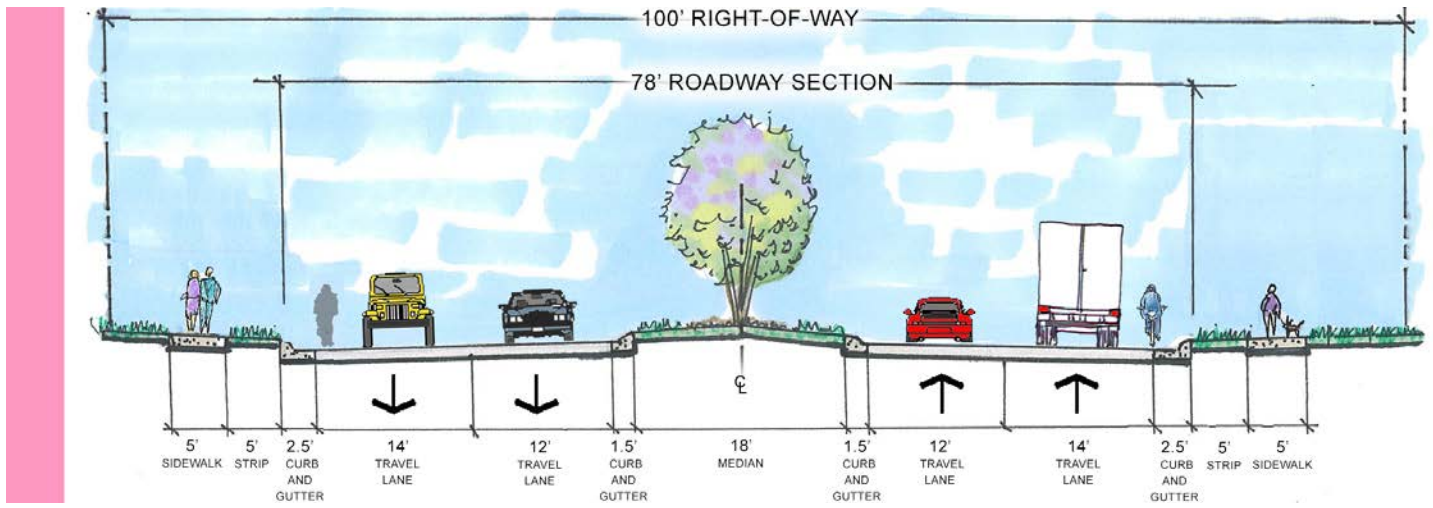
Four-Lane Thoroughfare - 30' Median



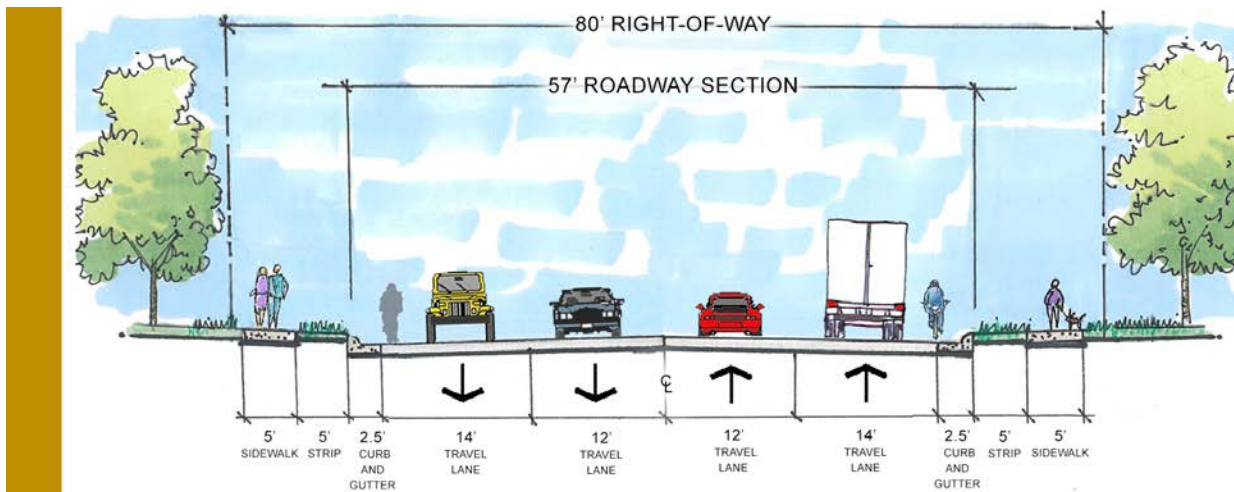
Four-Lane Thoroughfare - 23' Median



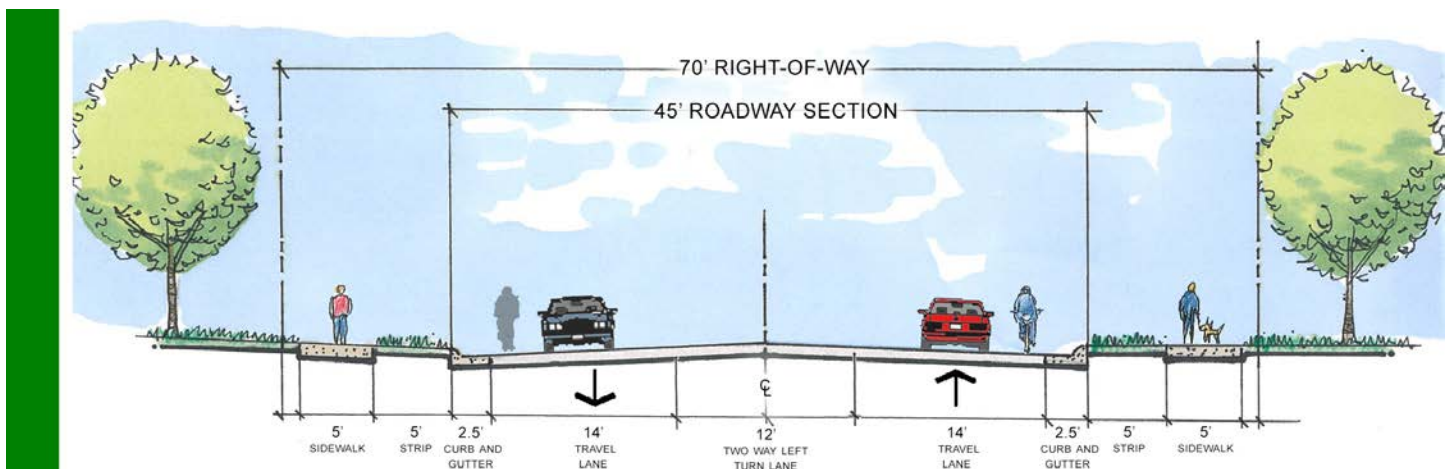
Four-Lane Thoroughfare - 18' Median



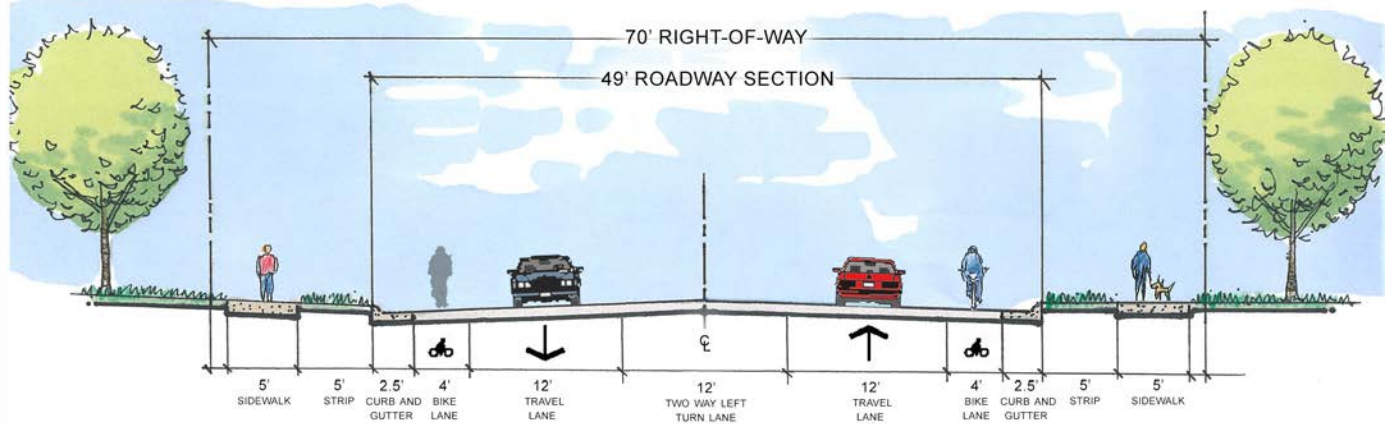
Four-Lane Thoroughfare - Undivided



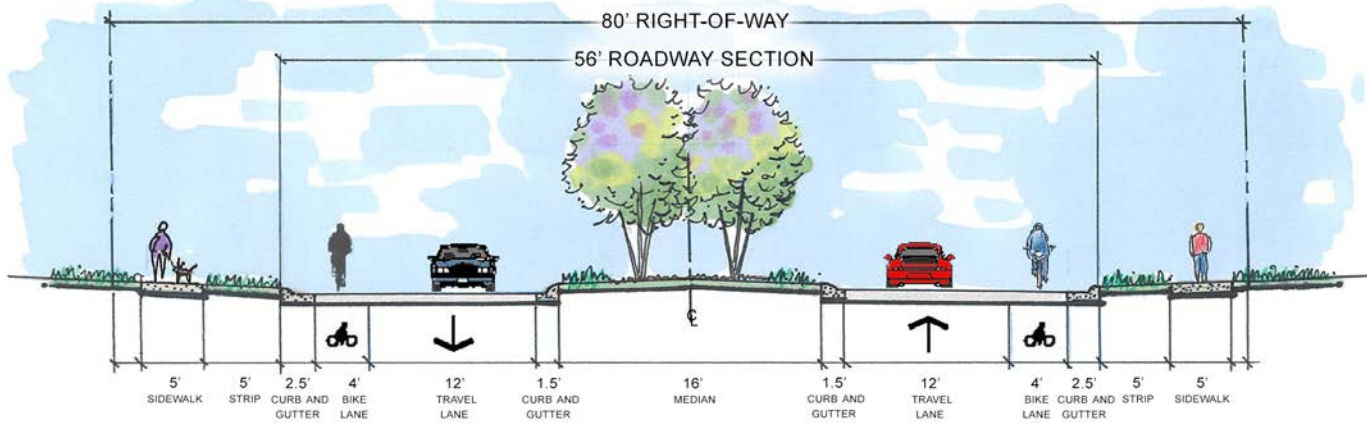
Three-Lane Thoroughfare - Wide Outside Lanes



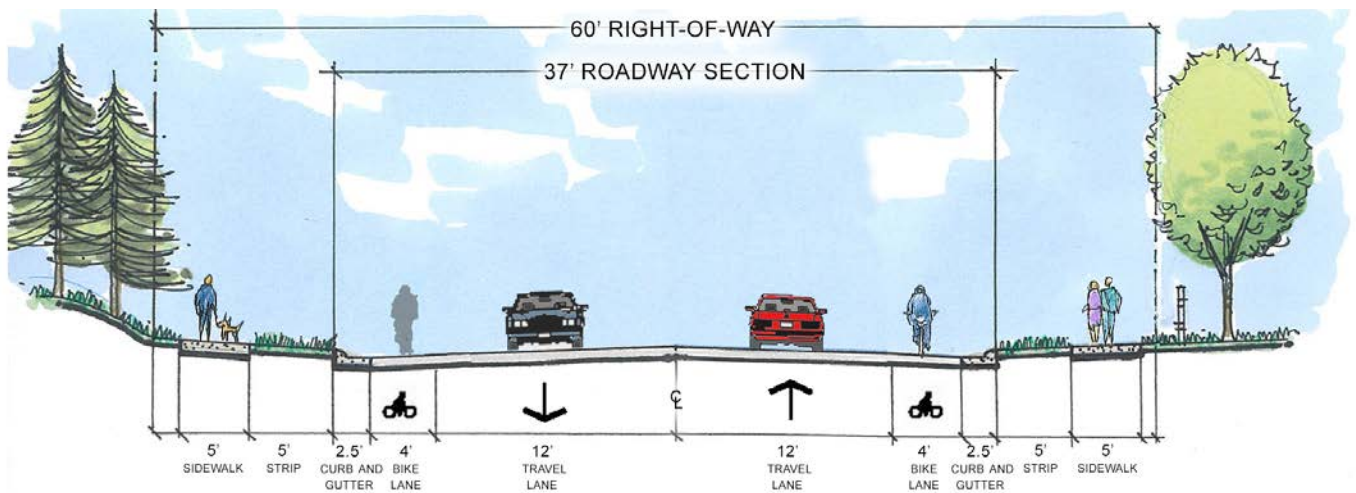
Three-Lane Thoroughfare - Bike Lanes



Two-Lane Thoroughfare - 16' Median



Two-Lane Thoroughfare - Undivided



Corridor Profiles - Collectors and Local Streets

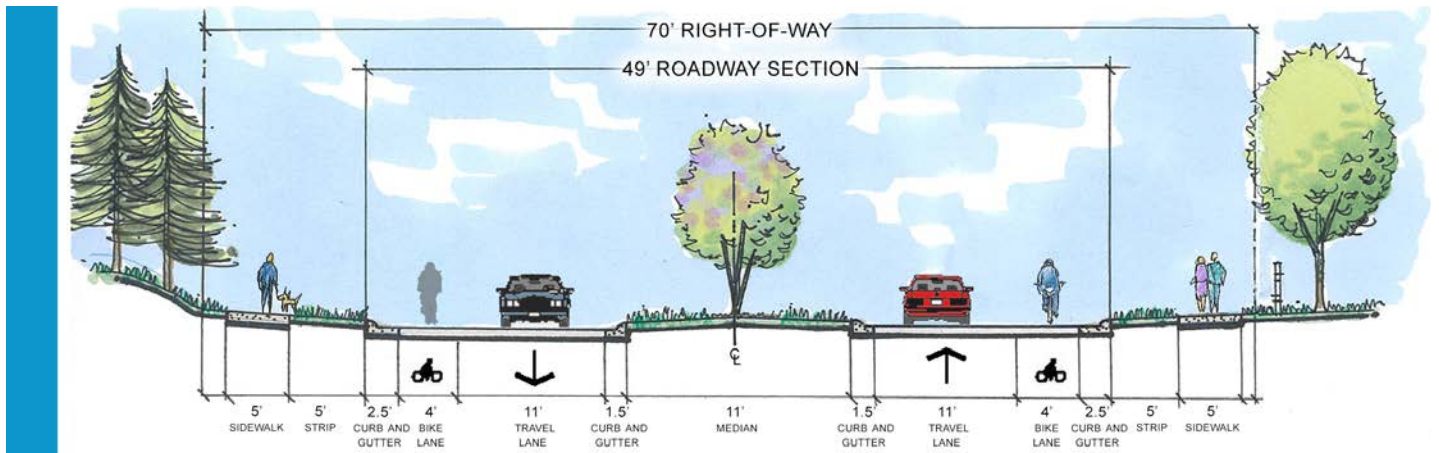
The Town of Cary has two types of collectors – Collector Avenues and Collector Streets. The purpose of collectors is to link local streets and thoroughfares and balance the mobility and access needs of Cary residents and workers. As their name implies, they collect traffic from local streets and funnel it to thoroughfares. Collectors typically have a maximum speed limit of 35 mile per hour.

Collector Avenues – Collector Avenues have two vehicle travel lanes. They are designed to have limited curb cuts, so driveways are held to a minimum. There are two types of Collector Avenues: Collector Avenue – Residential and Collector Avenue – Non-Residential. The residential version is intended for use in residential areas and features a landscaped 11-foot median to enhance the natural beauty of the area. The non-residential collector avenue does not have a median and is primarily intended for use around commercial, industrial, or institutional areas that are primarily non-residential in focus.

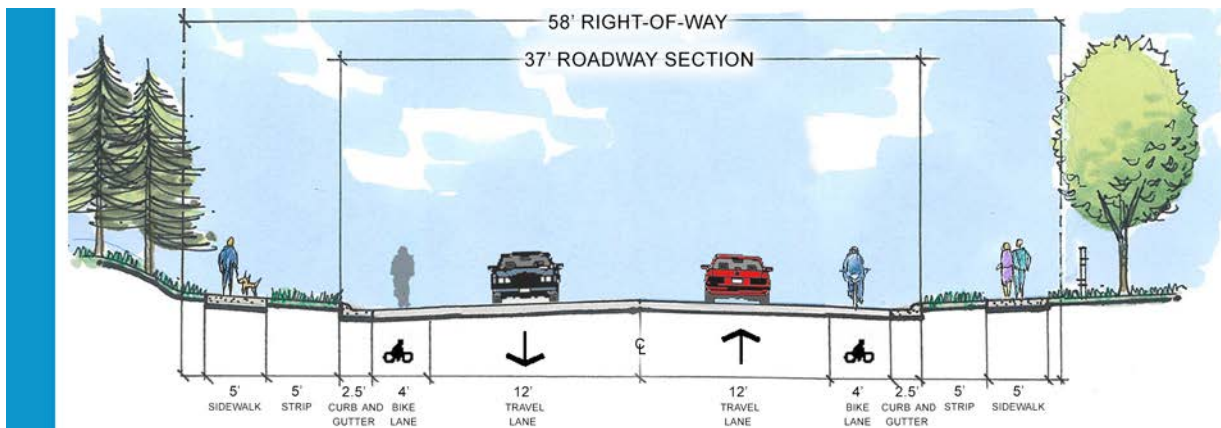
Collector Streets – Collector Streets have a similar functional role to Collector Avenues, but are intended for locations that feature more curb cuts and driveways and higher volumes of traffic than Collector Avenues. There are two Collector Street types: Collector Street - Residential and Collector Street – Non-Residential. The residential version is for use in residential areas and features two lanes without a median. The non-residential version has a two-way left turn lane and is for use around commercial, industrial, or institutional areas that are primarily non-residential in focus.

Local Streets - Local streets are designed for slow speeds and low volumes of traffic. They have frequent curb cuts and driveways that provide access to homes and businesses. Vehicle speeds are limited to 25 or 35 miles per hour. Local streets feature two vehicle travel lanes and do not have medians. Sidewalks may be provided on one or both sides. The typical local street profile is shown below.

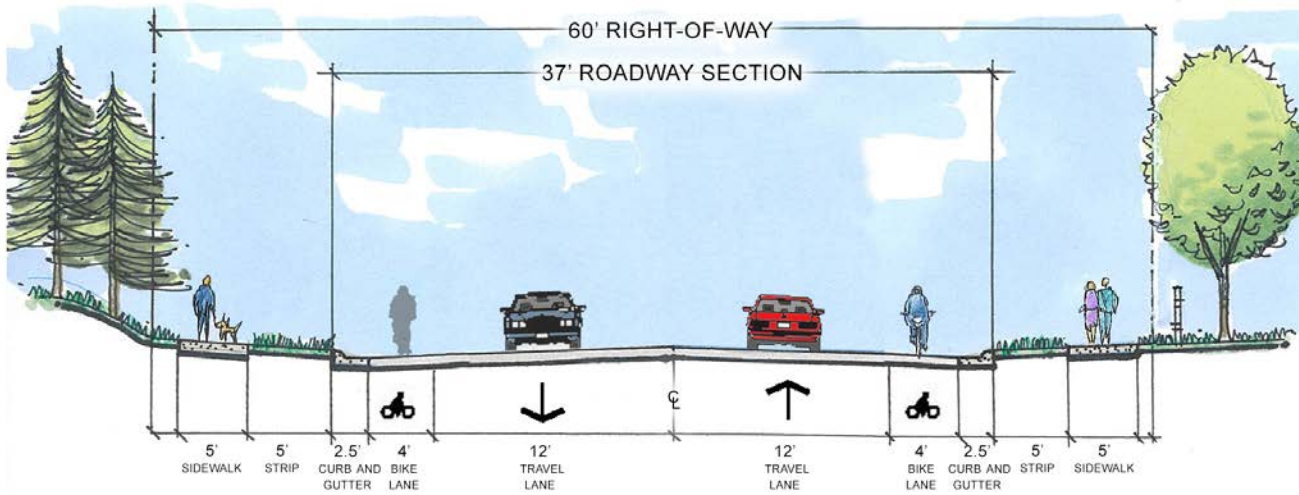
Collector Avenue - Residential



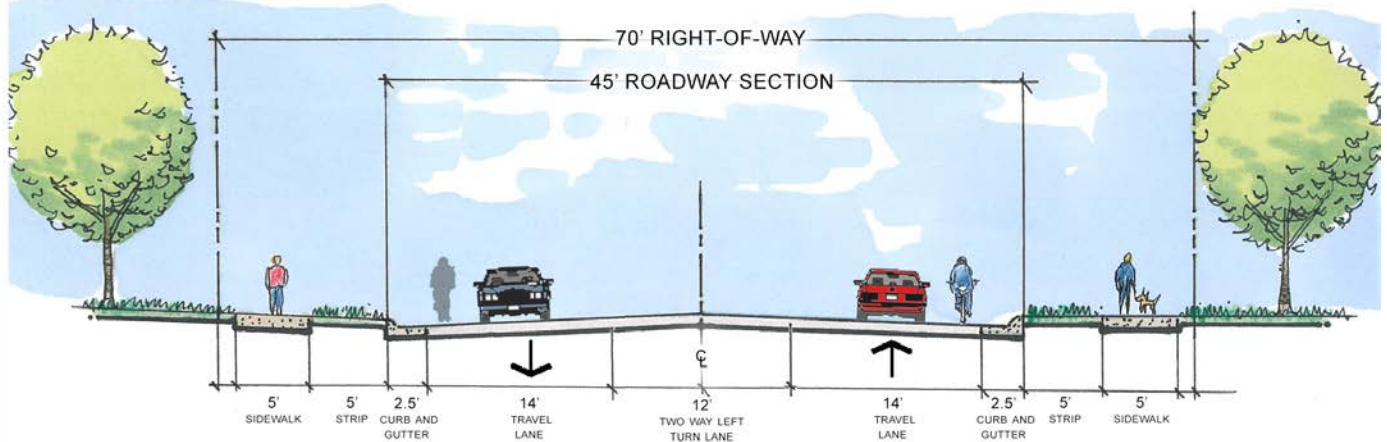
Collector Avenue - Non-Residential



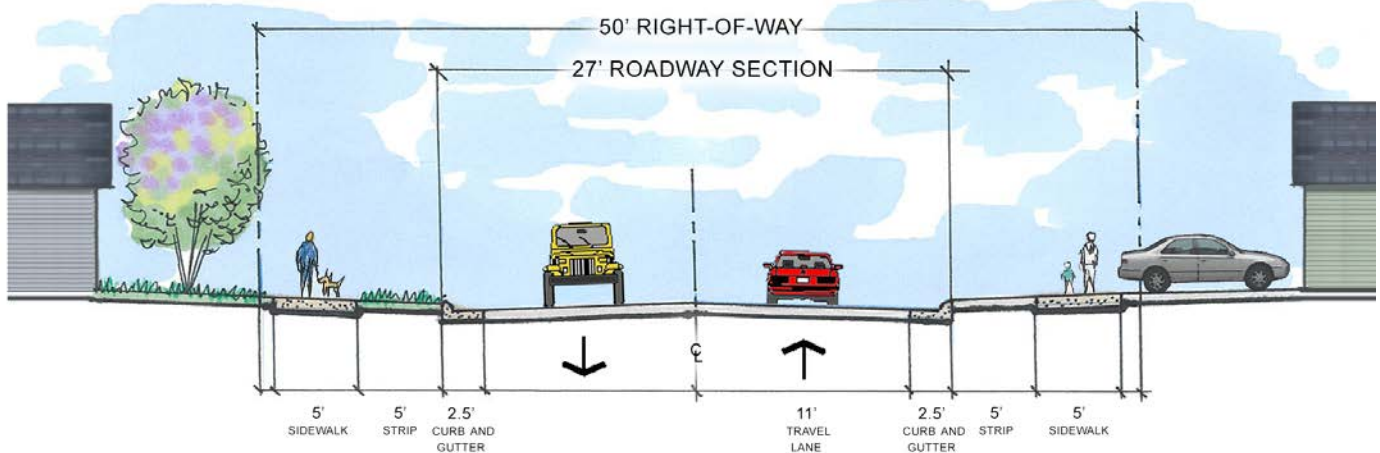
Collector Street - Residential



Collector Street - Non-Residential



Local Street



Future Conditions Modeling

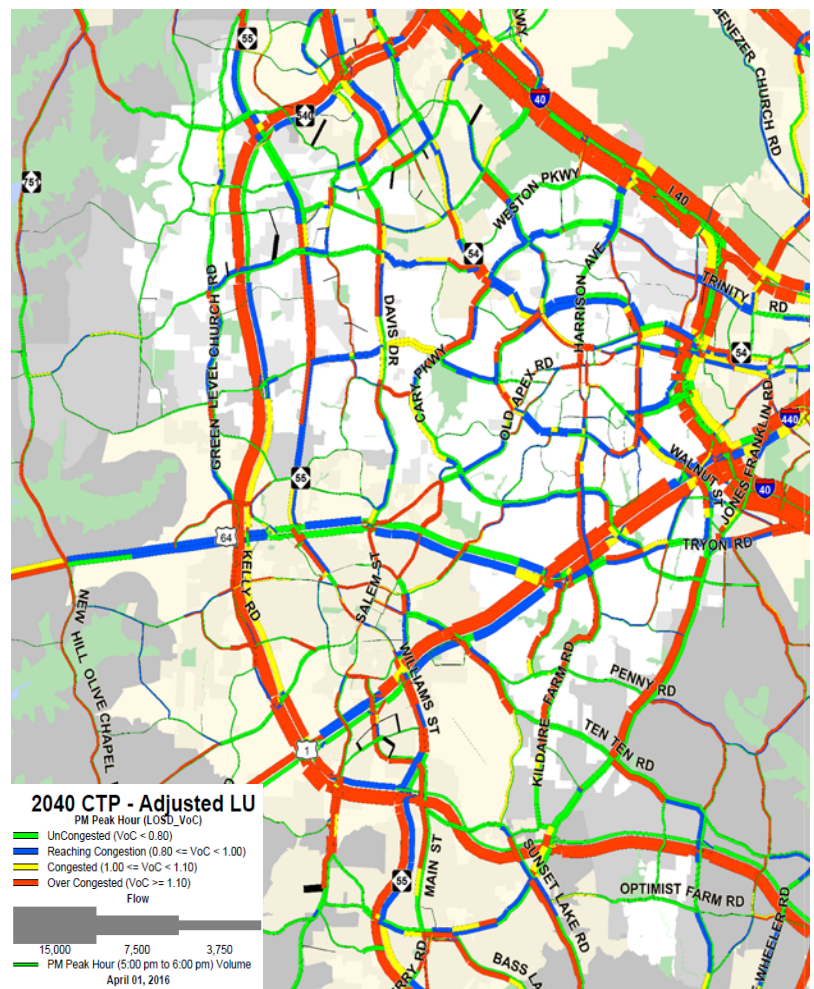
To develop the street recommendations contained in this plan, future transportation and land use conditions were modeled to simulate traffic conditions in 2040. The Triangle Regional Model (TRM), developed and maintained by the Triangle Regional Model Service Bureau was used to model current and future regional transportation conditions. The TRM is based on projected land use development for the entire Triangle region and a set of roadway and transit improvements planned out to 2040. The transportation projects included in the TRM were developed as part of the 2040 Metropolitan Transportation Plan (MTP) developed by the Capital Area Metropolitan Planning Organization. The MTP is fiscally-constrained, meaning the projects included in the plan are programmed within a budget of reasonably expected revenues. Also included in the MTP is the set of projects eligible to be included in the Metropolitan Transportation Improvement Program (TIP). The TIP is a set of projects programmed to be implemented by 2020 that have specific funding sources and amounts allocated to them.

To model the future traffic conditions in the Town of Cary, modifications were made to the TRM land use and transportation network within the Town of Cary limits, but data outside the Town of Cary was unaltered. Employment and population numbers were generated for the Future Growth Framework land use plan developed for this comprehensive plan and edited in the existing TRM. Edits were made to the TRM transportation network to test the street recommendations envisioned in this plan.

The Triangle Regional Model contains a number of assumptions about trip generation, trip distribution, mode of travel, and route choice. The model simulates traffic conditions based on travel behavior assumptions and predicted street conditions. A common measure of network functionality is the volume to capacity ratio (V/C), i.e., demand vs. supply. This represents the volume of traffic estimated to use a street segment compared to the capacity of that street segment. Capacity is a function of many factors like number of lanes, speed limit, left-turn volumes, traffic signal density, and truck volumes, among other factors. The higher the volume/capacity ratio, the greater the congestion.

A planning-level model analysis was performed at Level of Service (LOS) D, where LOS is measure of the traffic conditions assigned a grade between A (least congested) and F (most congested). LOS D is typically the maximum acceptable congestion in urbanized areas. Generally, streets that are under capacity at LOS D ($V/C < 1$) have minimal congestion and streets that are at or above LOS D capacity ($V/C \geq 1$) have congested conditions. In the map below, green and blue represent uncongested conditions, yellow represents LOS D conditions, and red represents over congested conditions.

Overall, the Future Growth Framework land use plan and the streets recommendations envisioned in this plan are compatible. When examining the busiest hour of travel, the afternoon peak hour, conditions on most streets remain at or below acceptable levels of congestion. Where congestion in excess of acceptable levels occurs during the peak period, these conditions typically do not extend beyond the peak hour. This indicates that the street plan and Future Growth Framework are compatible. The planned street network is generally able to handle future expected demand. Complete model results analysis is included in the Technical Appendix.



Travel Behavior Assumptions

Underpinning the TRM are a number of assumptions on travel behavior, demographics, growth, and personal preferences. These assumptions are based on detailed survey data and travel diaries of individuals in the Triangle. The surveys include information on mode of travel, trips, time of trips, origins and destinations, preferences, and other travel behavior characteristics. The TRM uses this information, demographic data, and national experience with travel behavior to simulate transportation conditions, through a four-step process. First, the number of trips is estimated according to land uses to generate the level of trip origins and destinations at each location. Second, trips are distributed by pairing up origins and destinations throughout the model region. Third, modes are assigned based on demographic, income, and travel behavior and preference assumptions. Finally, routes are assigned to link each trip between its origin and destination. This process is performed for all estimated trips in a region to generate a simulation of transportation conditions in the region.

For the modeling work for this process, no changes were made to the regional travel behavior assumptions contained in the TRM. The model is rigorously built on robust data to create a complex, but methodologically sound, set of trip assumptions and patterns throughout the region. The TRM assumes that trip and travel behavior in the model's base year (2010) is the same as trip and travel behavior in the model's future year (2040). Therefore, the number of trips, mode preferences, and the algorithms that determine route selection are assumed to be the same in 2040 as 2010.

Financial Assumptions

The 2040 Metropolitan Transportation Plan includes a set of fiscally-constrained projects planned to be implemented by the year 2040. Fiscally-constrained means that the projects fit within a budget of revenues that are reasonably expected to be available throughout the time line of the plan. This includes revenues from multiple sources - federal formula funds, state matching funds, user fees, transportation taxes, local matching funds, and private transportation revenues. Some projects included in the MTP are already attached to specific funding that has been allocated by federal, state, and local agencies and municipalities. These projects are included in a short-range Metropolitan Transportation Improvement Program, which covers projects out to 2020. For the modeling work on this project, the financial assumptions that underpin the regional projects were assumed to be valid.

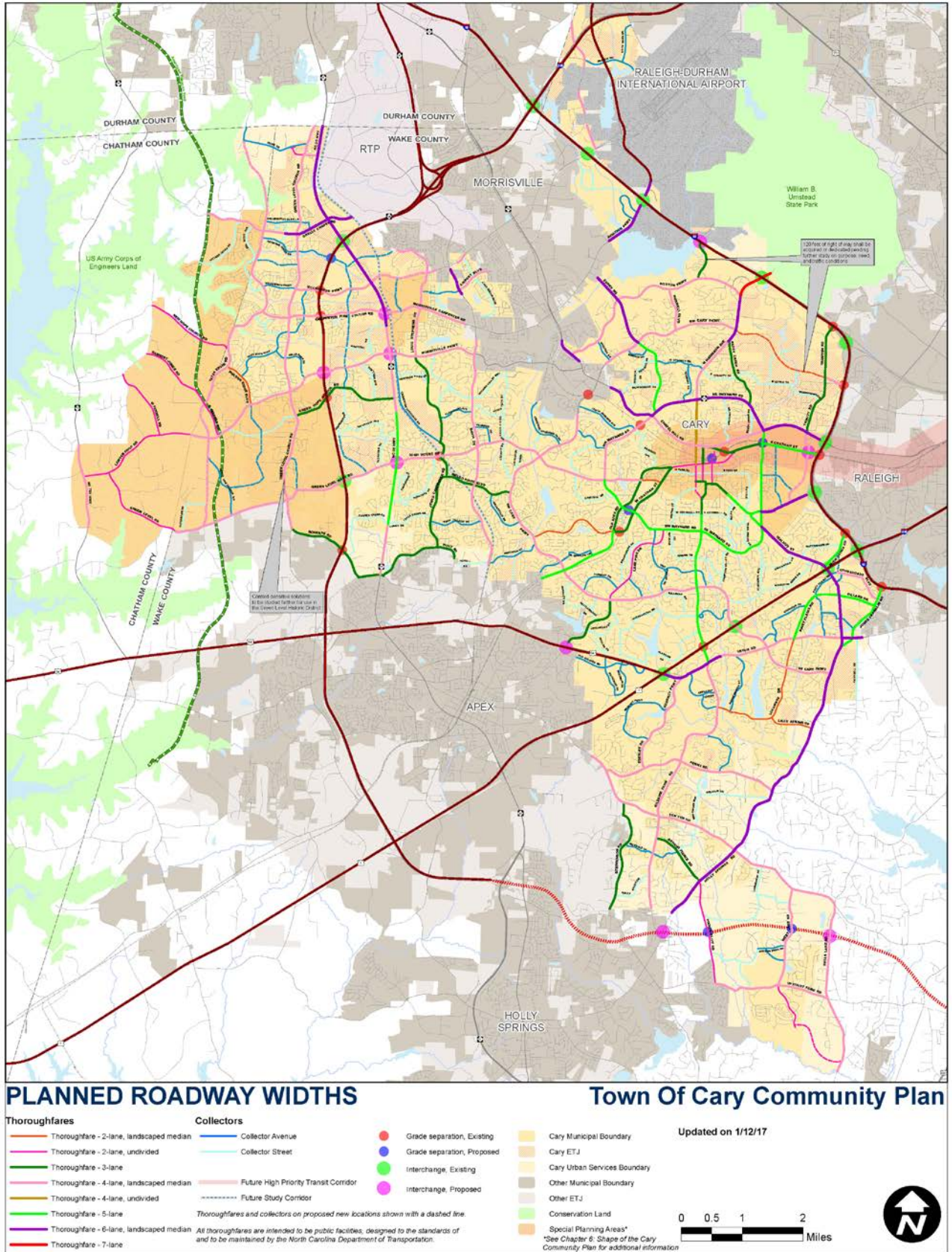
The model for Cary does include some transportation projects within Cary that are not part of the region's 2040 MTP. This planning effort is an update to the Town's Comprehensive Transportation Plan, which is not required to be fiscally-constrained, meaning projects are not expected to fit within a projected budget of costs and revenues. The projects envisioned in this plan which are not part of the regional MTP might be funded through bonds or other sources.

Projects that are in the MTP can compete for funds through North Carolina's competitive program, Prioritization, outlined in the Strategic Transportation Investments (STI) law and may be eligible to compete for funds through the Capital Area MPO's Locally Administered Projects Program (LAPP). STI aims to efficiently fund infrastructure improvements while supporting economic growth, job creation, and higher quality of life. STI also established the Strategic Mobility Formula which is a quantitative ranking of projects to determine funding. The Strategic Mobility Formula uses project costs, benefits, economic impacts, and job impacts, along with local input, to determine which projects receive funding.

In general, street projects are eligible to receive 80 percent federal funding with a 20 percent local match; however there are funding programs that have different funding allocations. Some local streets and intersection improvements may be built by developers as part of a development agreement. Funding decisions are coordinated with neighboring municipalities, regional decision makers, statewide agencies, and federal agencies.

Planned Roadway Widths Map

The recommendations in this plan are an update of the 2008 Comprehensive Transportation Plan and based on input from Cary residents, Cary Town Council, and Cary staff. The Planned Roadway Widths Map shows the locations different corridor profiles will be implemented. The colors on the map correspond to the color bands on the left side of each corridor profile typical section image.



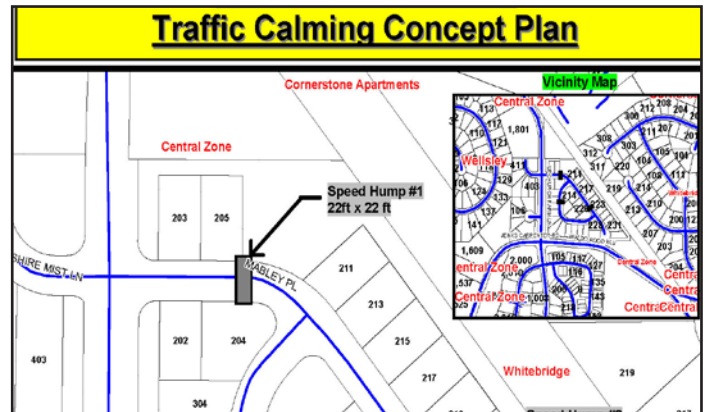
A poster sized version of this map is available at www.townofcary.org and at Town Hall.

Pedestrian Element

The most common type of pedestrian facility are sidewalks, and Cary has extensive coverage of sidewalk facilities. In general, Cary collectors and thoroughfares are designed to include five-foot sidewalks on both sides of the street. All sidewalks and crosswalks will be designed according to Americans with Disabilities Act requirements to ensure that all Cary residents can use the facilities, regardless of mobility status. Greenways and street-side trails are other important infrastructure elements for pedestrians. Street crossing treatments, traffic calming in certain locations, programs, and policies are all important components of the pedestrian experience in Cary as well.

Traffic Calming

Traffic calming describes a range of improvements that reduce traffic speeds and are intended to improve safety for all street users. They are primarily appropriate for local streets not meant for significant through traffic. Traffic calming makes streets more comfortable for pedestrians. The Town of Cary has existing policies on traffic calming criteria and guidelines that set up a process for the installation of traffic calming devices.



The Town of Cary generates a traffic calming concept plan for discussion with neighborhoods that are interested in installing traffic calming.

Trails

Greenway Trails

Greenway Trails are paved multi-use trails separated from the roadway and designed for both bicycling and walking, which conforms to the AASHTO Guidelines for Development of Bicycle Facilities ('AASHTO') and Cary Greenway Construction Standards. Greenway Trails are often located along wooded stream corridors. Those within or adjacent to railroad right-of-ways, such as the American Tobacco Trail, are called 'Rail-Trails.' The minimum width is 10 feet but can be increased upwards to accommodate higher user volume and a variety of user types. Detailed design guidance on greenway trails is documented in the Cary Parks, Recreation, and Cultural Resources Master Plan.



Street-side Trails

Street-side trails are pedestrian and bicyclist accommodations on or adjacent to a roadway where a greenway trail conforming to the standards above is not feasible. Street-side trails may take the form of sidewalks and on-street bicycle facilities or paved multi-use facilities parallel to the roadway. A minimum of 10 feet is recommended. Detailed design guidance on street-side trails is documented in the Cary Parks, Recreation, and Cultural Resources Master Plan.



Sidewalks

Sidewalks are facilities designed primarily for pedestrians and located adjacent to the roadway. Sidewalks are typically concrete and should be 5 feet in width at minimum and wider in areas with higher user volume. Grass buffers and trees between the sidewalk and street offer additional protection and comfort to pedestrians on higher order roadways. The Town of Cary's Land Use Plan provides detailed guidance for sidewalk placement based on development context and roadway characteristics.



Programs

Introduction to the 5 E's

Cary has been recognized as a Bronze level Walk Friendly Community (WFC) for its staff resources devoted to non-motorized travel, extensive trails system, downtown streetscape project, connectivity ordinance, and sidewalk request program. The WFC program is a national initiative intended to encourage communities across the country to improve the local pedestrian environment and to recognize communities who are successfully doing this. A WFC provides safe accommodation for walking and encourages its residents to walk for transportation and recreation. The WFC program is administered by the Pedestrian and Bicycle Information Center (PBIC).

Cary has also been recognized as a Bronze level Bicycle Friendly Community (BFC) for its policies to engineer streets with the consideration of bicyclists, education classes and campaigns, enforcement efforts for bicycle-related laws, and bicycle planning. The BFC campaign is an award program that recognizes municipalities that actively support bicycling activities and safety. A BFC provides safe accommodation for bicycling and encourages its residents to bicycle for transportation and recreation. The program is administered through the League of American Bicyclists.

The WFC and BFC programs recommend a multifaceted approach to bicycle and pedestrian planning based on five categories often referred to as the Five E's: Engineering, Education, Encouragement, Enforcement, and Evaluation & Planning. The Engineering category refers to infrastructure-related elements, such as sidewalks, ADA accommodations, pedestrian amenities, etc. The other four E's refer to non-infrastructure efforts, such as pedestrian safety campaigns, walking events, media campaigns, etc. Research has shown that a comprehensive approach to non-motorized modes of travel is more effective than a singular approach that would address infrastructure issues only. Cary uses the 5 E's framework for bicycle and pedestrian planning. A snapshot of the non-infrastructure four E's is provided below:

- Education – Distributing information about existing facilities and rules of the road, and building skills and confidence for alternative modes
- Encouragement – Creating a strong bicycling and pedestrian culture that welcomes and supports these modes
- Enforcement – Encouraging cyclists, motorists, and pedestrians to recognize and respect each other's rights on the roadway
- Evaluation & Planning – Planning for walking and biking modes as safe and viable transportation options and tracking progress against this goal

Specific recommendations, within all 5 E's, to further promote walking and bicycling in Cary in the short and long term, are provided in the Act chapter.

Bike Element

Neighborhood and Commuter Bikeways

The bicycling community has varying levels of comfort in biking with vehicular traffic; some riders are comfortable riding in mixed traffic and others prefer to be separated from vehicular traffic. In order to address the spectrum of different types of bicyclists in Cary, two distinct bikeway typologies have been developed. This approach parallels a similar movement across the United States towards developing low-stress bicycle networks that provide separated space for bicycling or routes along calmer streets. This development is supported by growing research evidence finding that low-stress bikeways and separated bikeway facilities increase ridership. Wide outside lanes and bike lanes along higher traffic volume/speed roadways are generally only used comfortably by experienced bicyclists, a small percentage of the population. Signed neighborhood routes, multi-use trails, greenways, street-side trails, separated bike lanes, and buffered bike lanes are used by a larger percentage of the population.

The existing and recommended Neighborhood Bikeway system includes a network of low-stress on-street bikeways, along streets with lower speed limits and traffic volumes or streets with separated bicycle lanes, as well as the off-street trail system, along greenway trails and street-side trails. This network will serve those bicyclists who feel most comfortable completely separated from motor vehicle traffic or along residential roadways. The existing and recommended Commuter Bikeway system includes a network of bike lanes, wide outside lanes, and shared lane markings along streets that provide more direct routes for advanced bicycle commuters and those who are comfortable riding in traffic. These two systems are not mutually exclusive.



Neighborhood Bikeway Types

Signed Neighborhood Routes

Signs are the minimum treatment necessary to designate a street as a neighborhood bikeway. They visibly reinforce a shared roadway environment to both bicyclists and motorists. Signs, and in some cases pavement markings, provide wayfinding to help bicyclists remain on the designated route. Signed neighborhood routes are recommended on local streets with speed limits below 30 MPH, no centerline stripe, and traffic volumes below 3,000 AADT (below 1,500 AADT is preferred).



Signed neighborhood route on Wyatts Pond Lane

Neighborhood Bike Lanes

On-street bike lanes designate an exclusive space for bicyclists through the use of pavement markings and signage. The bike lane is located directly adjacent to a motor vehicle travel lane and is used in the same direction as motor vehicle traffic. Bike lanes are typically on the right side of the street, between the adjacent travel lane and curb, street edge, or parking lane. Neighborhood bike lanes are recommended on collector streets with speed limits at or below 30 MPH, two travel lanes, and traffic volumes below 10,000 AADT.



Neighborhood bike lanes on Dynasty Drive

Separated Bike Lanes

Separated bike lanes are conventional bicycle lanes paired with a designated buffer space and vertical separation, physically separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. Separated bike lanes may be one-way or two-way facilities at street level, at sidewalk level, or in between. When used at the sidewalk level, separation from the street is achieved by a curb or median and separation from the sidewalk is achieved by pavement color or texture. When used at street level, vertical separation consists of on-street parking, bollards, or raised medians. Separated bike lanes require more right-of-way than regular bike lanes to accommodate their buffer space.



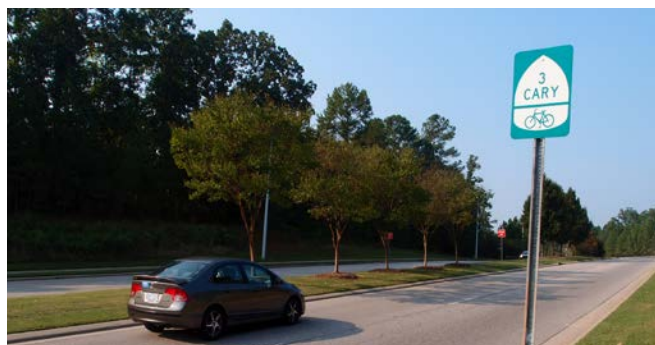
*Separated bike lanes with a raised median as vertical separation
(Not currently in use in Cary)*

Greenway Trails and Street-side Trails - (see pedestrian section)

Commuter Bikeway Types

Signed Commuter Routes

Signed commuter routes are similar to signed neighborhood routes, but used on higher order streets with higher speed limits and traffic volumes. They are selected based on trade-offs between directness, posted speed limit, roadway width, and traffic volumes. Signed commuter routes may overlap with other bicycle facility types like shared lane markings and wide outside lanes.



A commuter bike route on Cary Parkway

Shared Lane Markings

Shared lane markings or “Sharrows” are pavement markings that signal a shared lane environment for bicyclists and automobiles. They recommend where cyclists should position laterally within a travel lane and indicate to drivers that cyclists are expected and are legitimate street users. Sharrows can be used to provide continuity of on-street striped facilities like bike lanes through constrained roadway sections, and are useful on lanes adjacent to on-street parking to help cyclists position outside of the door zone. The use of sharrows was recommended in the 2008 CTP and have since been implemented on several streets in Cary. Shared lane markings are recommended on streets with a speed limit at or below 35 MPH.



Shared Lane markings on Chatham Street

Wide Outside Lanes

Wide outside lanes are found on single- or multi-lane roadways with extra width in the outermost travel lane to accommodate cyclists. The outermost lane width is 14 feet on roadways in Cary. Wide outside lanes are most appropriate on routes with moderate traffic volumes and higher speeds.



Wide outside lanes on Davis Drive

Commuter Bike Lanes

Commuter bike lanes are identical to neighborhood bike lanes, but used on streets with higher speed limits, number of travel lanes, and traffic volumes. Commuter bike lanes are recommended on streets with posted speed limits up to 40 MPH, 2 – 3 travel lanes, and traffic volumes up to 20,000 vehicles per day. When supplemented with a striped buffer of two feet or more, commuter bike lanes may be appropriate on some streets with up to 5 travel lanes and posted speed limits up to 45 MPH.



Commuter bike lanes on Chapel Hill Road

Crossing Improvements

Crossing improvements play a critical role in connected bikeway and pedestrian networks. Many neighborhood bikeways in particular are located along lower-traffic routes parallel to primary roadways that cross multiple thoroughfares with or without traffic signals. Contextually-appropriate pedestrian crossing accommodations are also important to create a comfortable crossing experience and enhance pedestrian safety. Improvements at these locations are therefore the critical link in creating low-stress and comfortable networks of pedestrian infrastructure and bikeways. A set of possible intersection treatment options are provided in the Technical Appendix. Each crossing improvement must be evaluated and specific treatments selected based on localized conditions and the crossing's role in the transportation network.



An at-grade greenway crossing on Maynard Road

Wayfinding and Maps

Successful wayfinding orients people to their surroundings and informs them on how to best navigate to their destination along preferred pedestrian and bicycle routes. Both wayfinding signage and bicycle and pedestrian user maps help to familiarize new users with the network.

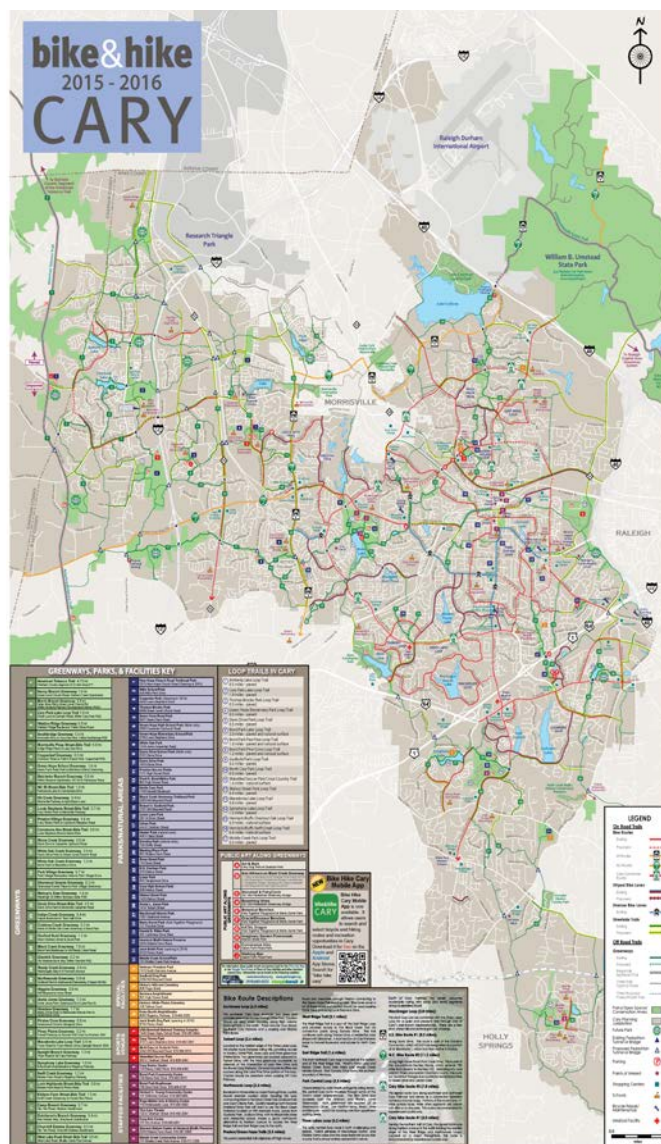
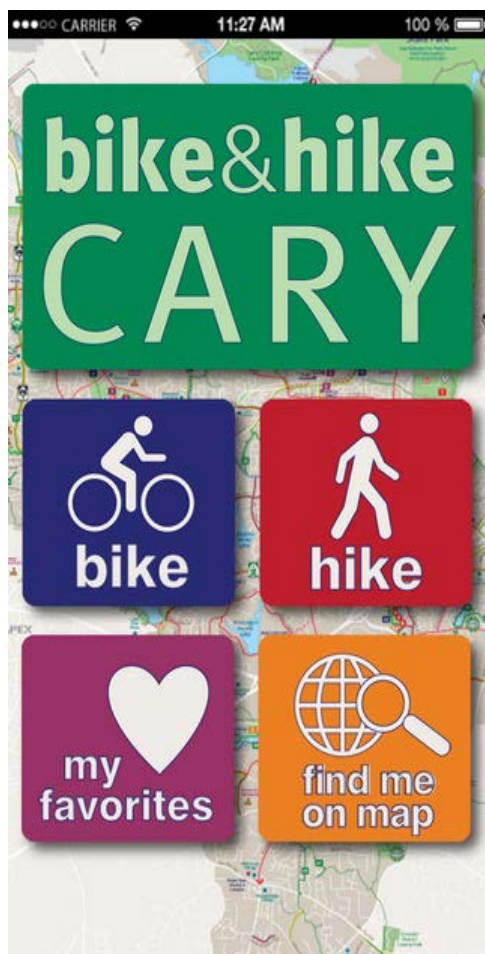
Wayfinding Signage

A wayfinding signage system consists of comprehensive signing and/or pavement markings to guide users to their destinations along preferred routes. Basic elements that can be included in wayfinding signs include direction of travel, destinations, distances, and estimated travel time. Often, the inclusion of travel times dispels common overestimations of time and distance, thus encouraging walking or cycling instead of defaulting to the car. Signs should be placed at decision points (where the navigator must choose whether to continue their route or change direction) along routes.



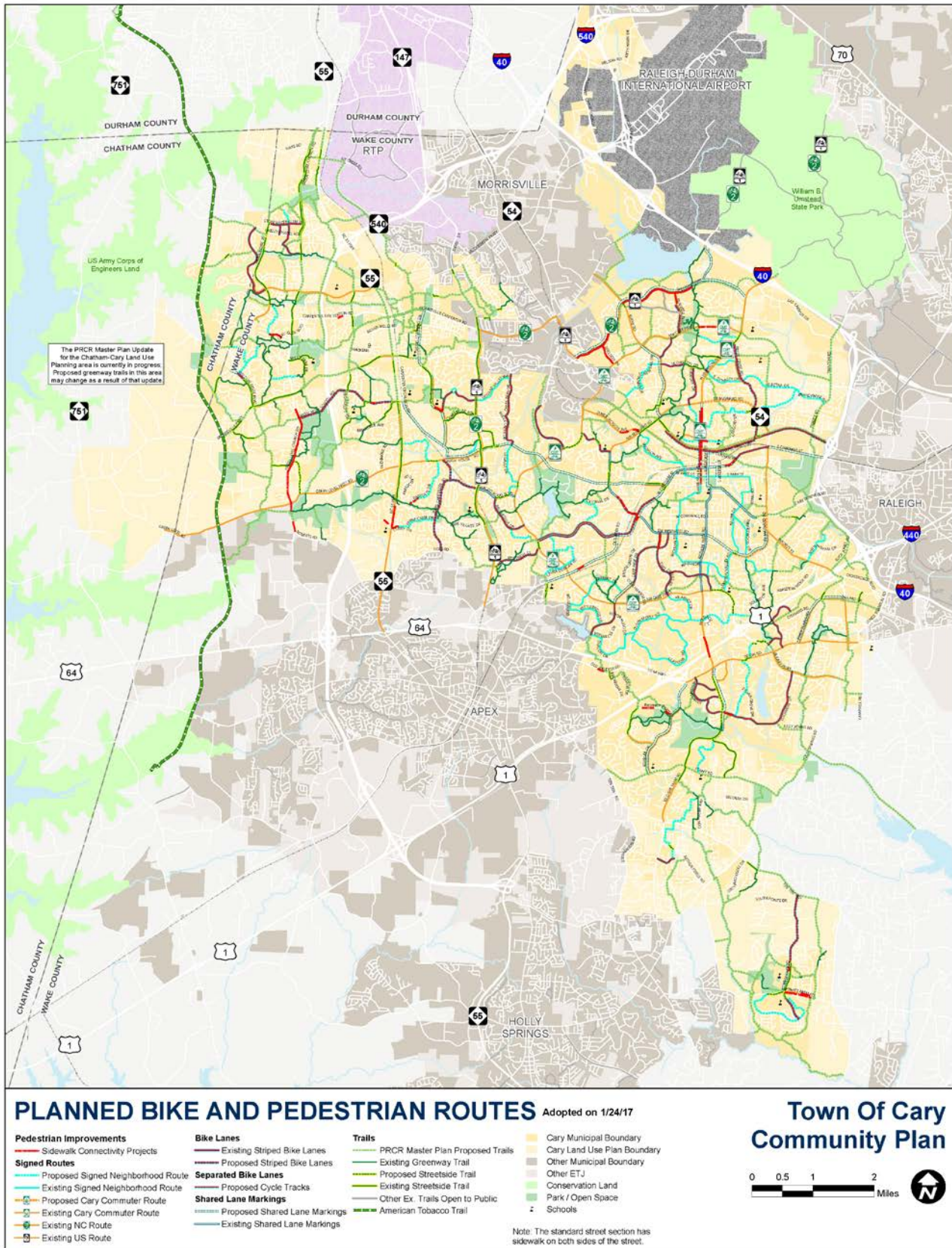
Bike & Hike Map and App

Cary's Bike & Hike Map displays all existing bikeways and trails along with a guide to greenways and parks. The map itself is supplemented with a user guide including valuable information on the rules of the road, tips on safe cycling techniques, and links to other local resources. Cary's web-based Bike & Hike application makes the Bike & Hike map available on smart-phones and allows users to search and select biking and hiking routes and recreation opportunities.



Planned Bike and Pedestrian Routes

The recommendations for bicycle and pedestrian facilities are on the map on the following page. The recommendations focus on gaps in the network. Because many pedestrian and bicycle facilities will be built as streets are constructed, the recommendations also focus on areas where street improvements are not planned in the foreseeable future.



A poster sized version of this map is available at www.townofcary.org and at Town Hall.

Transit Element

As Cary grows, GoCary (formerly C-Tran) also has the opportunity to grow and accommodate an increasing number of trips. This section presents the proposed additions and changes to the GoCary network and service. These changes are based on input from the community open houses, the Transportation Advisory Group (TAG) and Committee for the Future (CFTF) for Imagine Cary, staff input, and analysis of potential transit ridership based on population and employment projections. These recommendations were developed concurrently with the Wake County Transit Plan (WCTP), and the recommendations developed here as part of the Imagine Cary process are intended to complement the WCTP.

The main factors that influence the demand for transit service are population and employment densities. Routes that serve higher density population and employment areas have higher potential for trips per revenue hour of service. These recommendations were developed using counts of population and employment within 1/4-mile of current and potential transit routes with current year data and 2040 projections from the Future Growth Framework model scenario. Forty-three routes and route permutations were analyzed.

When fully implemented, these recommendations will create a GoCary service with increased service frequency, more service days, increased hours of service, and expanded geographic coverage. Combined with expected transit expansions envisioned by the WCTP, these recommendations will give Cary residents much more transit service to destinations in Cary and throughout the Triangle region.

The complete analysis of all proposed changes to the transit network, including a comparison of how each proposal ranked for their proximity to residential and employment populations is presented in the Technical Appendix. Highlights of the recommended changes to the GoCary network include:

Additional Service on Existing Routes

- Increase all routes to a minimum 30-minute weekday and Saturday service frequencies
- Add Sunday service with 60-minute frequency
- Expand span of daily service to 20 hours of service per day (e.g., service between 5:00 am and 1:00 am, daily)

New Destinations for Service

- Cary Depot to Wake Technical Community College
- Cary Depot to downtown Raleigh
- Cary Depot to Crossroads
- Cary Depot to Beaver Creek
- Service on Weston Parkway
- Service to west Cary and the Green Level Church area
- Service on Cary Parkway
- Cary Depot to RDU Airport



More Frequent Service and Expanded Service Hours and Days

The first opportunity to grow GoCary's ridership is to increase the frequency of service to every 30 minutes on weekdays and Saturdays. Increasing frequency to every 30 minutes gives riders more choice about when to travel and offers riders confidence that missing or skipping a bus does not cost an hour of their time. Currently, some routes have 30-minute service at peak travel times, but off-peak service and all day service on some routes is at 60-minute frequencies. The change to 30-minute frequencies throughout the day on weekdays and Saturdays will apply to all current routes as well as new routes when they are added to the GoCary system.

The second opportunity for additional service is to add Sunday service on all routes, which was repeatedly identified as a high priority by the public and TAG throughout the Imagine Cary process. Sunday service is planned with the frequency of service every 60 minutes throughout the day. The addition of Sunday service at 60-minute frequencies is proposed to apply to all current routes as well as new routes when they are added to the GoCary system.

The third opportunity for additional service in Cary is to increase the span of service hours. Currently, service is provided 16 hours per day, from 6:00 am to 10:00 pm. A component of the Wake County Transit Plan is to increase the span of service to 20 hours per day, on area transit providers, including GoCary. Increased service hours help riders who have atypical work hours and to help serve more leisure and non-work trips via transit.

Together these proposed changes to service span and frequency will be a major increase in convenience and will help GoCary better serve existing riders and attract new riders.

Corridors and Growing Areas for Service

In addition to more frequent service and expanded span of service, many areas of town that do not currently have service will be targeted for transit service. This proposed geographic expansion is planned to happen through extensions of existing routes and adding new routes to service. New geographic service areas and new routes are planned to have the same expanded operating services as proposed for the existing GoCary routes - 30-minute frequency Monday through Saturday, 60-minute frequency Sunday, and 20 hours of service per day. This ensures a consistent, high-level of service across the GoCary service area and aids in transfers, both within the system and to other service providers.

The goal of expanded service to new parts of Cary is to respond to growth already being seen outside of the current GoCary service area and to anticipate future growth expected to occur throughout the Town. New services are planned to connect major residential developments, major employment clusters, mixed use developments, and commercial development areas.

New areas for service include commercial centers such as Parkside Town Commons and Davis Commons. Major residential areas in west Cary are also targeted including Alston and Amberly. Major destination centers, such as Wake Community Technical College will have new service. Transit routes will also be provided on several major roads that do not currently have service, including Green Level Church Road, NC 55, Davis Drive, Morrisville Carpenter Road, Cary Parkway, Old Apex Road, and Lake Pine Drive.

Some routes will provide linkages outside of Cary to important destinations, including the neighboring downtowns of Raleigh and Apex, service into Morrisville, and a direct connection to RDU Airport.



Bus Rapid Transit and the Wake County Transit Plan

The Wake County Transit Plan (WCTP) provides a broad set of transit expansion plans for Wake County, including bus rapid transit (BRT) service between the Cary Depot and downtown Raleigh. BRT is bus service designed and operated to provide a level of service comparable to a rail-transit technology, with more frequent service, fewer stops, and dedicated transit right-of-way. BRT systems also typically have more stop amenities similar to rail stations. The Cary to Raleigh BRT route is proposed to provide frequencies at 15 minutes or better all day.

In addition to the BRT corridor, the WCTP includes a significant expansion in traditional bus routes throughout the county, providing more connections between Wake County municipalities and destination centers. These new traditional bus routes would have expanded service hours from what is currently available, provide service seven days a week, and have 15-, 30-, or 60-minute frequencies throughout the day. The WCTP also includes commuter rail service between Durham and downtown Raleigh which is proposed to have a stop in downtown Cary. Commuter rail service would operate during peak hours.

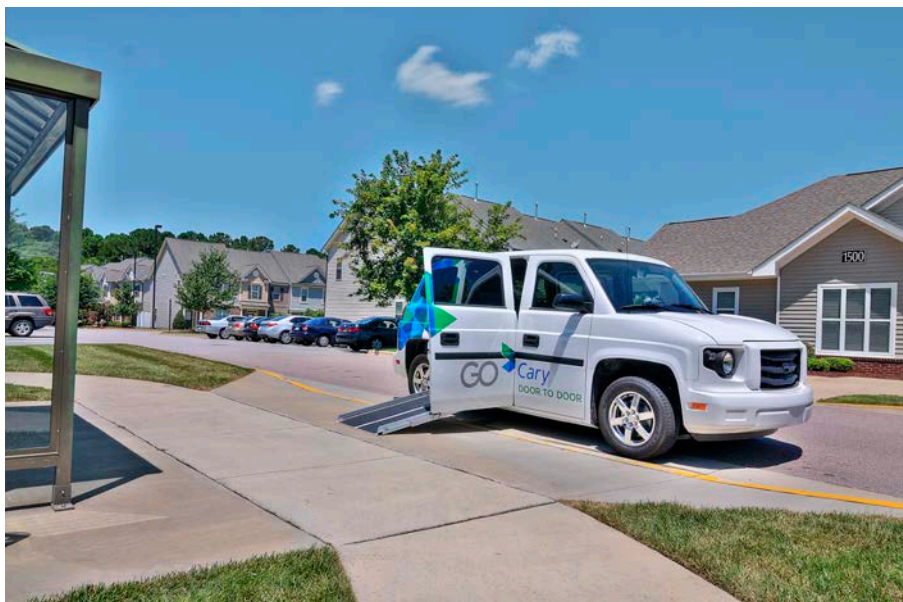
Funding

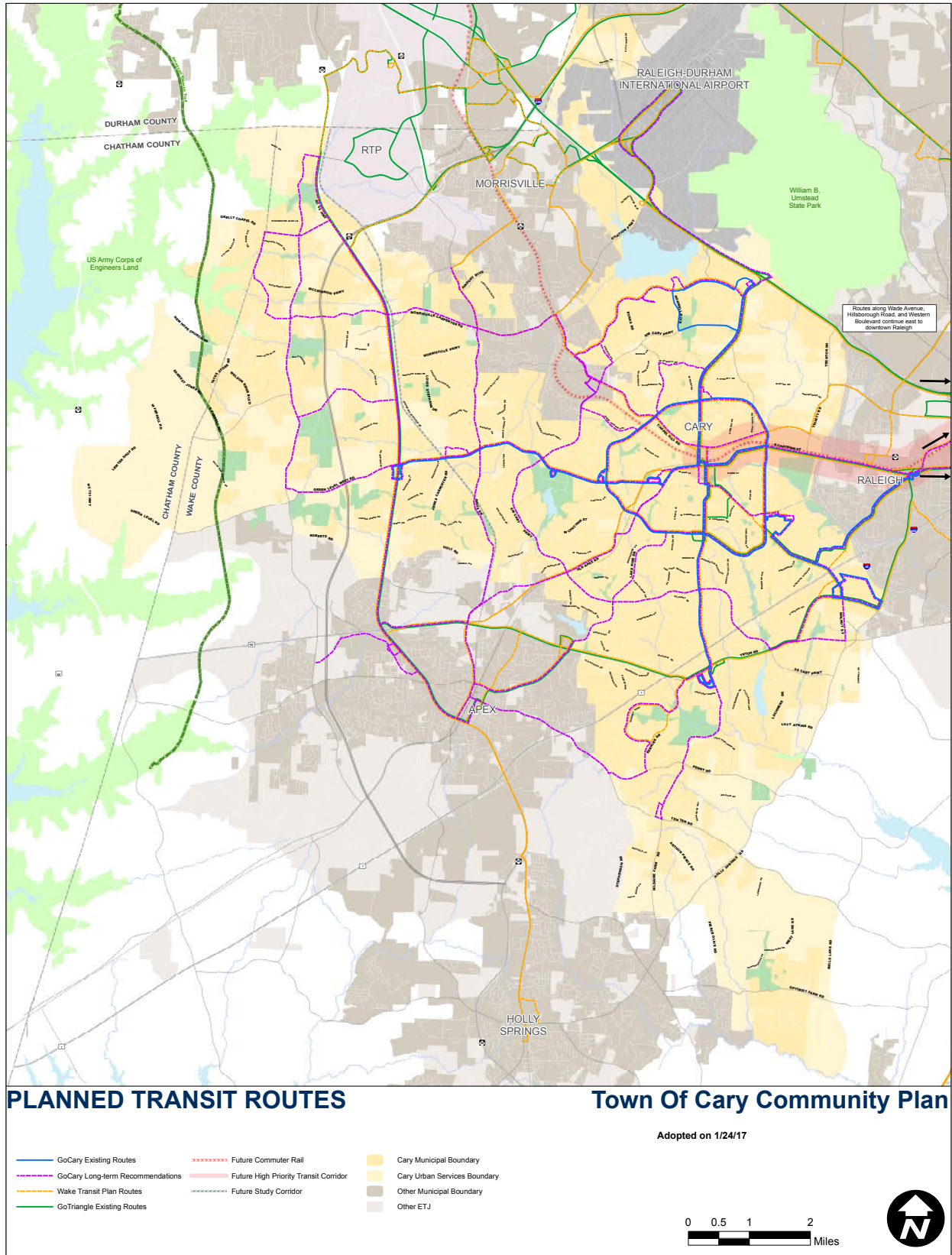
Funding is proposed to be provided by existing sources and new sources. The WCTP includes proposed funding from a 1/2-cent sales tax and other local sources including vehicle registration and rental car taxes. Local general funds would also continue to be needed to fund local bus services and the WCTP proposes a modest annual increase in local transit funding of 2.5 percent per year. Federal and state contributions would provide significant contributions as well. BRT and commuter rail are projected to be 50 percent funded by federal funds. The WCTP also includes farebox and long-term bond proceeds.

GoCary funding will continue to be provided through local contributions, farebox revenue, and state and federal matching funds. For routes that cross out of Cary to provide links to other Triangle communities, local contributions will be sought from neighboring municipalities that benefit from the new connections.

Planned Transit Routes Map

The map on the following page shows the future plan for transit service in Cary. This map includes existing GoCary and GoTriangle bus routes plus long-term GoCary recommendations and WCTP bus routes. The map also shows the Durham to Raleigh commuter rail route and the Cary to Raleigh BRT route that are part of the WCTP.





A poster sized version of this map is available at www.townofcary.org and at Town Hall.

How We Will Achieve our Vision

1 Provide for the Safe and Efficient Movement of People and Goods

Major Actions:

- Conduct a pilot program to construct and evaluate a separated bike lane along Chatham Street.
- Conduct a study with other public/private partners for a future north-south transportation corridor in western Cary along existing rail infrastructure.
- Evaluate holistically more frequent and wider coverage of transit as described by the Wake County Transit Plan.
- Continue the implementation of ADA pedestrian improvements at targeted intersections throughout Town.



2 Create a Balanced Transportation System

Major Action:

- Evaluate and identify feasible corridors for bus rapid transit and opportunities for context-sensitive improvements.

3 Integrate the Built and Natural Environment With an Innovative and Well-Designed Transportation System to Create Great Places and Great Spaces

Major Actions:

- Evaluate the impact of the Future Growth Framework on existing parking/pedestrian/bicycle/transit standards and requirements (e.g. size facilities appropriately in destination centers), and update as necessary.
- Develop an interdepartmental and multi-disciplinary collaboration process for responding to unique transportation situations and contexts, including impacts to the natural environment, special urban centers, and historic features.



4 Make Strategic and Equitable Transportation Investments

Major Actions:

- Explore intelligent transportation systems and emerging technologies and evaluate their integration into Cary's transportation system.
- Focus on public/private investment opportunities and/or cost-sharing for future transportation projects.

Related Policy Direction in Other Chapters

This plan has been organized to address specific topics in specific chapters; however, the policies listed throughout this plan are very much interrelated. Listed here are the policies included in other plan chapters that relate to the Town’s policies on transportation and mobility.

<p>Live: Fostering Strong Neighborhoods</p>	<ul style="list-style-type: none"> ▪ Policy 2: Provide More Housing Choices for All Residents 	<ul style="list-style-type: none"> ▪ Policy 4: Provide the Greatest Variety of Housing Options in Mixed Use Centers 	
<p>Work: Assuring Continued Prosperity</p>	<ul style="list-style-type: none"> ▪ Policy 1: Grow A Sustainable and Diversifying Workforce ▪ Policy 2: Enhance Locational Appeal to Businesses and Workers 	<ul style="list-style-type: none"> ▪ Policy 10: Reserve and Provide Employment Sites in Selected Commercial Mixed Use and Destination Centers 	<ul style="list-style-type: none"> ▪ Policy 12: Transform Selected Office Parks into Employment Mixed Use Campuses
<p>Shop: Creating Vibrant Destinations</p>	<ul style="list-style-type: none"> ▪ Policy 3: Support the Development of a Limited Number of Destination Centers and Commercial Mixed Use Centers 		
<p>Engage: Experiencing the Cary Community</p>	<ul style="list-style-type: none"> ▪ Parks, Recreation & Cultural Resources Master Plan #1, #2, #7 ▪ Public Art Master Plan 		
<p>Shape: Guiding Community Growth</p>	<ul style="list-style-type: none"> ▪ Policy 1: Distribute Commercial Centers, Commercial Mixed Use Centers, and Destination Centers Across Town 	<ul style="list-style-type: none"> ▪ Policy 2: Focus the Most Intense Types of Development in Strategic Locations 	<ul style="list-style-type: none"> ▪ Policy 3: Encourage Mixed Use Development
<p>Enrich: Meeting Sustainability and Environmental Objectives</p>	<ul style="list-style-type: none"> ▪ Policy 5: Improve Air Quality and Reduce Emissions 		
<p>Serve: Meeting Community Needs</p>	<ul style="list-style-type: none"> ▪ Policy 1: Provide Services and Facilities for Current and Future Generations that Balance High Quality and Affordability 		