



COMPREHENSIVE PEDESTRIAN PLAN

CORNELIUS, NORTH CAROLINA

SUMMARY WORKBOOK

JUNE 2012

KIMLEY-HORN AND ASSOCIATES



Numerous studies have documented the benefits of walking. As a society we've sought to reclaim the nostalgia of places that are both accessible and convenient to walk to and from and yet most people find themselves dependent on cars for the majority of their mobility. This is one of the reasons people gravitate to communities like Cornelius. Its small-town charm and human scale are attractive and comfortable. Cornelius, like many communities, understands this benefit and is taking measures to ensure that the experience of living in this place continues to reflect the character of its values. While the transportation benefits are fairly obvious, some of the intangibles related to walking are often forgotten or overlooked. We need only to look to the past for some **quotable quotes** about these virtues...

A vigorous five-mile walk will do more good for an unhappy but otherwise healthy adult than all the medicine and psychology in the world.

~Paul Dudley White

Walking: the most ancient exercise and still the best modern exercise. ~Carrie Latet

The true charm of pedestrianism does not lie in the walking, or in the scenery, but in the talking. The walking is good to time the movement of the tongue by, and to keep the blood and the brain stirred up and active; the scenery and the woodsy smells are good to bear in upon a man an unconscious and unobtrusive charm and solace to eye and soul and sense; but the supreme pleasure comes from the talk. ~Mark Twain

I only went out for a walk and finally concluded to stay out till sundown, for going out, I found, was really going in.

~John Muir, 1913

The civilized man has built a coach, but has lost the use of his feet.

~Ralph Waldo Emerson, "Self-Reliance," 1841

Now shall I walk
or shall I ride?
"Ride," Pleasure said:
"Walk," Joy replied.
~W.H. Davies

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Acknowledgements

The Cornelius Comprehensive Pedestrian Plan was made possible through the joint efforts of Town Staff, the Pedestrian Advisory Committee, North Carolina Department of Transportation (NCDOT), the Town of Cornelius Transportation Advisory Board (TAB) and the Town of Cornelius Department of Parks, Arts, Recreation and Culture (PARC). It was funded through the bicycle and pedestrian planning grant initiative of the NCDOT. The plan highlights Cornelius' commitment to improving walkability and mobility throughout Town.

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Every trip begins and ends with a walking trip...



The Town of Cornelius Comprehensive Master Plan has been established in an effort to enhance Cornelius as a walking community by identifying actions, projects, and programs to improve pedestrian safety while equitably augmenting the vibrancy and health of Cornelius. Therefore, it will serve as a blueprint to improve walkability for many years to come. As pedestrian facilities are put in place it will be necessary for Staff to evaluate the width of any proposed pedestrian improvement prior to construction. Width may vary based on location, topography, budget, etc. Staff may also reevaluate pedestrian improvements as projects are proposed to determine their applicability at time of implementation.



Introduction

The Town of Cornelius received a grant from NCDOT to develop a comprehensive pedestrian plan. The timing of the project coincided with the development of the Town’s first comprehensive master plan entitled, *Navigate Cornelius*. The sequencing of the two plans allowed for an overlap of participation, shared planning resources, and enhanced integration between the two initiatives.

Participants in the process included local planners, pedestrian advisory committee members, PARC Commission, TAB members and the general public. Through a series of activities a vision statement for the plan emerged:

“Our Vision is a community where walking is a reasonable choice for short trips; a place where our citizens encounter a safe and inviting pedestrian network that connects to places of interest; a place where walking contributes to a healthy lifestyle; and a place where families can thrive and visitors can enjoy all that Cornelius has to offer.”

Benefits of Walking

Participants discussed the many benefits of walking and how it can contribute to the community. A brief summary of these benefits includes:

- **Health benefits** – Walking is a form of physical activity that can be accomplished by most citizens. Regular physical activity helps prevent or reduce the risk of heart disease, obesity, high blood pressure, type 2 diabetes, osteoporosis, and mental health problems such as depression.
- **Transportation benefits** – Walking can help to reduce roadway congestion. Many streets and highways carry more traffic than they were designed to handle, resulting in gridlock, wasted time and energy, pollution, and driver frustration. Many of the trips that Americans make every day are short enough to be accomplished on foot or via wheelchair. The 1995 National Personal

Transportation Survey (NPTS) found that approximately 40 percent of all trips are less than two miles in length—which represents a 30-minute walk.

- **Environmental/Energy benefits** - Motor vehicles create a substantial amount of air pollution. In fact, according to the EPA, transportation is responsible for nearly 80 percent of carbon monoxide and 55 percent of nitrogen oxide emissions in the U.S.
- **Economic benefits** – Walking is an affordable form of transportation. Car ownership is expensive, and consumes a major portion of many family incomes. When safe facilities are provided for pedestrians, people can walk more and spend less on transportation, meaning they have more money to save or spend on other things. Walking is free!
- **Quality of life benefits** – The walkability of a community is an indicator of its livability. This factor has a profound impact on attracting businesses and workers as well as tourism. In cities and towns where people can regularly be seen out walking, there is a sense that these are safe and friendly places to live and visit. By providing appropriate pedestrian facilities and amenities, communities enable the interaction between neighbors and other citizens that can strengthen relationships and contribute to a healthy sense of identity and sense of place.
- **Social justice** - Perhaps the most important factor in walking and social justice is choice. When providing pedestrian facilities such as sidewalks and crosswalks, communities allow people to choose how they want to travel. For those who do not have the option to drive, such as adolescents, elderly, those unable to afford a car, and people with certain disabilities, this lack of choice in transportation creates an inconvenient and socially unjust barrier to mobility.

Project Purpose

One community aspiration identified during *Navigate Cornelius* was to “Improve overall access and mobility throughout the study area, including improvements for bicyclists, pedestrians, and transit users.” While Cornelius has improved its pedestrian network through the recent addition of new sidewalks on West Catawba Avenue and completion of the Town’s first greenway, pedestrian facilities are limited throughout the community especially along the major thoroughfares within Cornelius. The Town faces both natural and physical barriers to connectivity. I-77 bisects the Town into east and west and Lake Norman and a rail line limit growth along its western and eastern edges, respectively. Furthermore, the pace of development has resulted in suburban decentralized growth pattern that includes numerous cul-de-sacs, limited connectivity, and curvilinear street patterns.

The purpose of the Comprehensive Pedestrian Plan is to identify and develop safe amenities that encourage a walkable and pedestrian friendly community. This includes a comprehensive assessment of existing facilities, policies, and procedures that relate to “walkability,” a review of planned facilities, identification of pedestrian needs and deficiencies, a review of transportation priorities, safety considerations, barriers to walkability, special population needs and development of short and long term project recommendations, associated cost estimates, and viable funding sources.

Study Area

The study area for the Comprehensive Pedestrian Plan includes all land within the corporate limits and the Town’s designated sphere of influence. The sphere of influence is a mutually agreed upon boundary established with Mecklenburg County which the Town may annex in the future.

A map of the study area is shown on page 1-4.

Pedestrian Master Plan Goals

- Encourage and develop a walkable and pedestrian friendly Cornelius
- Access existing facilities, policies, and guidelines for pedestrian facilities
- Develop a pedestrian system that is accessible by all users
- Develop greenway and other pedestrian facilities that are environmentally sensitive
- Improve connectivity throughout the community through the development of and integrated pedestrian facilities.
- Identification of barriers, both physical and guidelines, that limit walkability
- Create the “Emerald Necklace” by connecting green infrastructure throughout Cornelius

Public Involvement

Pedestrian Advisory Committee: The Consultant Team worked with Town Staff and NCDOT to establish a Pedestrian Advisory Committee (PAC). The PAC met regularly to provide direct oversight and counsel to the planning process. Throughout the planning process the committee was augmented to include input from the PARC Commission and the Transportation Advisory Board given the desire to enhance connectivity and accessibility to community recreation areas.

Public Questionnaire: An informal questionnaire was created and filled out by all members of the PAC to obtain feedback on specific issues related to walkability. The questionnaire was also made available to the general public on the Town’s website and during public workshops. In addition, the questionnaire was distributed in the local schools to students, faculty, and parents. A total of 216

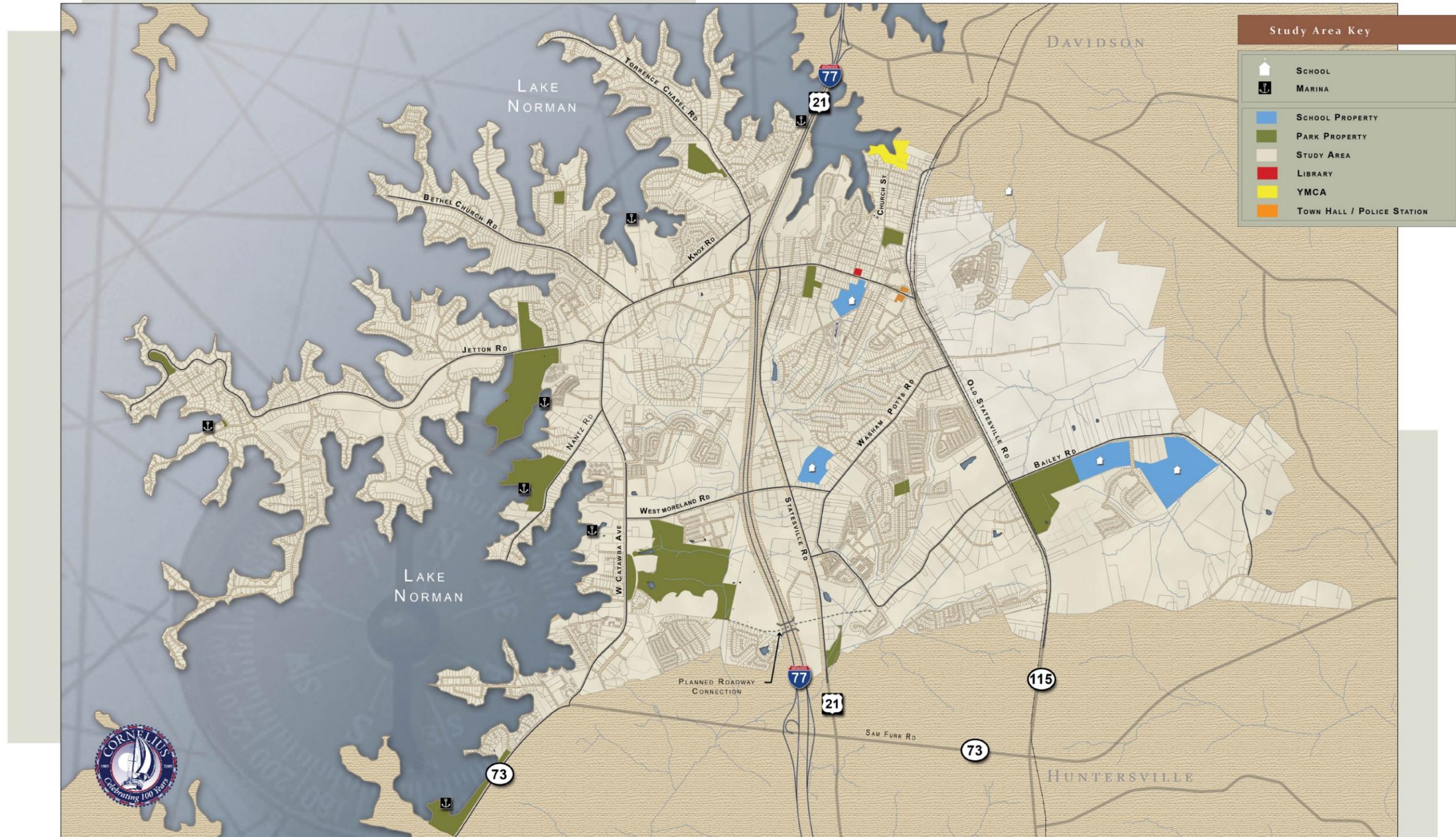
completed questionnaires were collected. The responses were incorporated into the recommendations detailed later in the plan.

Public Workshops: Two public workshops were held during the course of the planning process. The first public workshop was held May 3rd, 2011 at Town Hall. The purpose of this workshop was to increase awareness of the planning process, help with the identification of barriers, safety concerns, pedestrian attractions, and gaps in the existing network.

A second public workshop was held June 7th, 2011 at Town Hall. Participants were offered an opportunity to review and comment on draft recommendations.



e first



Study Area

Cornelius - North Carolina



Existing Conditions

Early in the process an effort was made to observe, identify, and inventory existing conditions. The project team focused on information relevant to walkability with an emphasis on demographics, physical features, pedestrian attractions, and barriers. Existing conditions are summarized on the following pages.



Pedestrian Beacon on Washam Potts Road



40 percent of all trips are less than two miles in length which represents a 30-minute walk...

Town of Cornelius

Demographics at a Glance

Population: The certified population estimate for Cornelius in 2009 was 24,847 according to the North Carolina Office of State Budget and Management (OSBM).

The 2010 median age for residents of the Town of Cornelius is 40, and the average age of Town residents is 38.

The median age for the community is significantly higher than that of the County, the Metropolitan Statistical Area (MSA) and North Carolina as a whole.

Income: The median household income in the Town of Cornelius is nearly \$84,000, which dwarfs the state median of \$46,494, the MSA median of \$55,666, and the Mecklenburg County median of \$58,431. In fact, the income figures for the Town of Cornelius (both median household and per capita) place the community at the high end of the regional income distribution.

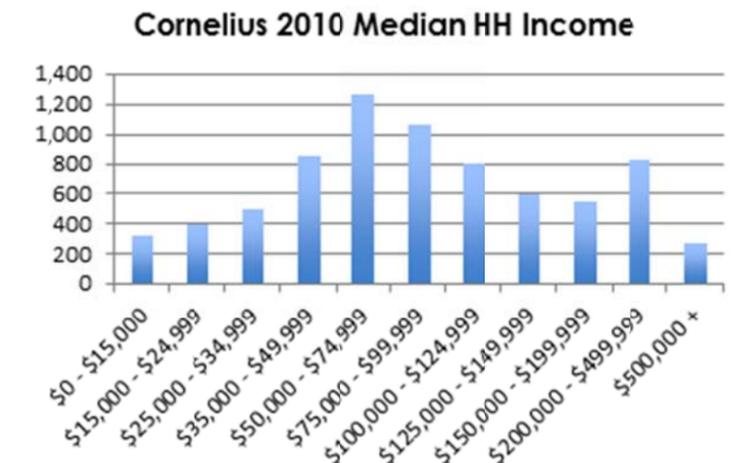
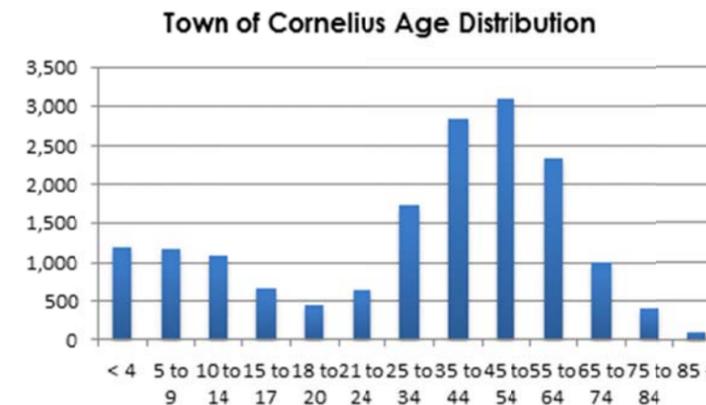
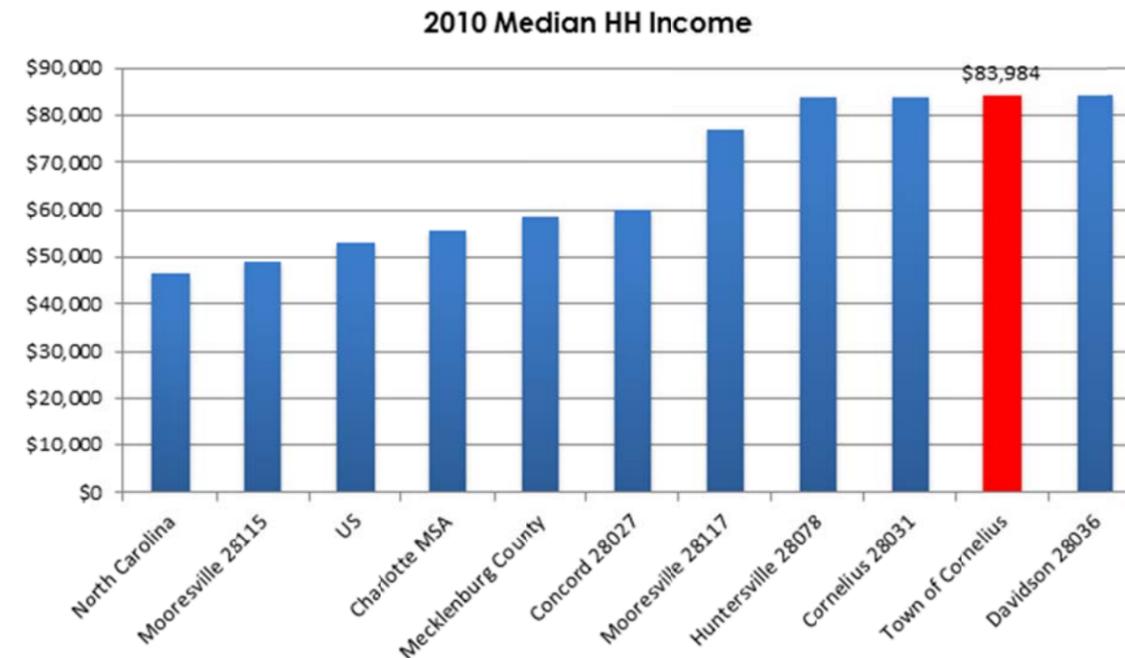
The same is true for per capita income figures. In fact, Cornelius has the highest per capita income figures of the northern Mecklenburg County communities. The per capita income of the Town of Cornelius is over double that of the State of North Carolina and nearly two-thirds higher than that of Mecklenburg County.

A closer look at the median household income distribution for the Town of Cornelius reveals that more households have income levels between \$50,000 and \$74,999 than any other tier. However, there is a significant “spike” at the \$200K to \$499K level for households.

Education: Income levels are often a bellwether statistic related to educational attainment. Over half of the population of Cornelius has a college degree while less than ten percent have not graduated from high school. By contrast, about one third of North Carolina residents possess a degree from an institution of higher learning while 18% have received no high school diploma.

Commuter: Many residents of Cornelius are commuters who travel into Charlotte, with 71.2% staying inside Mecklenburg County. However, the Census Bureau

indicates that one-quarter of the residents of Cornelius travel to other counties for employment. According to Claritas, the average commute time for a resident of Cornelius is 31 minutes and only 22% of residents have less than a 15-minute commute to work.



Physical Features

Effectively planning for Cornelius’ future pedestrian network requires a thorough understanding of current conditions.

Sidewalk Network: There are approximately 120 miles of sidewalk currently constructed in Cornelius. These sidewalks are predominately found in the traditional center of Town and within residential subdivisions. On those streets with sidewalks, there is roughly an even distribution between streets with sidewalks on one side of the street versus those with sidewalk on both sides of the street. The typical sidewalk is five feet wide and constructed of concrete; however, sidewalks on Catawba Avenue are comprised of brick. The sidewalk network along many of the Town’s major streets including West Catawba Avenue, Torrence Chapel Road, and Westmoreland Road are fragmented. Most of the sidewalks are in fairly good condition with the exception of the oldest facilities located in early neighborhoods. Some cracking and lifting has resulted from large specimen trees located adjacent to the sidewalk. The map on page 2.9 shows the network of existing sidewalks in Town.

Greenways Network: Cornelius has one greenway in Town, the McDowell Creek Greenway, which was completed in October 2009. The greenway is 1.5 miles in length and connects several neighborhoods in Cornelius and Huntersville to Birkdale Village. The greenway will eventually connect to Robbins Park and Westmoreland Athletic Complex, both of which are currently under construction.

Destinations

One of the primary goals of the pedestrian plan is to connect people with significant places of activity. The Destinations Map on page 2.10 shows important community locations. Generally these destinations fall into the following categories:

Schools: There are currently four schools in the study area: Cornelius Elementary, JV Washam Elementary, Bailey Middle, and Hough High.

Parks: The Town of Cornelius has over 400 acres of developed parkland across fifteen (15) facilities and an additional 100 acres of undeveloped open space. Developed Town facilities include Bailey Road Park and Recreation Center, Cornelius Arts Center, Glen Oak Green Neighborhood Park, Jetton Neighborhood Park, JV Washam Elementary School Park and Recreation Center, Legion Park, Robbins Park, Smithville Park, Torrence Chapel Park, Walter Henderson Neighborhood Park, Westmoreland Athletic Complex and Yacht Club Playground. The Mecklenburg County Parks and Recreation Department operate Jetton Park, Ramsey Park and the McDowell Creek Greenway within the Town’s limits.

Library: Charlotte Mecklenburg Libraries has a branch location on East Catawba Avenue.

Neighborhoods: 158 neighborhoods in Cornelius, 100 of which are single family. Other neighborhood types include multifamily, mixed housing type, and mixed use.

Activity Centers: Activity centers can be locations where a mix of activities occur and are often destination shopping centers where commercial and service related activities occur. They also can be places where community gatherings occur and local government service occur. The best example is the Town Center located at the intersection of Old Statesville Road and Catawba Avenue.



Shared use path through Bailey Road Park



Westmoreland Road in front of J.V. Washam Elementary School



Recently improved West Catawba Avenue streetscape

Barriers and Field Inventory

Barriers: Several man-made barriers impact walkability in Cornelius, the most significant of which is I-77. Not only is the road a formidable physical barrier, but the highway is also a psychological barrier that can deter citizens from walking altogether. There are few, if any, pedestrian-friendly roadway crossings of I-77 and the shoulders are extremely hazardous to pedestrians.

Development patterns in Cornelius also create a barrier to safe, effective pedestrian connections. As with most suburban communities many developments are largely designed with a priority for automobile access. Large parking lots, setbacks, and limited connectivity severely reduce the opportunities for walking to and from these destinations. However, Cornelius has several good examples of how to integrate a suburban form with design characteristics that contribute to walkability. The live-work units along Catawba Avenue are a good example of in-fill development that intentionally mixes uses with a building form that orients towards the street. West Catawba Avenue is a large street with higher traffic volumes and multiple travel lanes. Despite these roadway characteristics many of the new commercial buildings were encouraged to be constructed with reduced front setbacks, parking behind the buildings and dual sided entrances that allow customers to enter from both the street frontage and the rear parking areas.

Many of Cornelius’s neighborhoods have limited connectivity reflective of the subdivision designs of most post war neighborhoods. Still others are limited by geographic features. The numerous peninsulas along the shoreline offer few opportunities for neighborhood interconnectivity. Located primarily on the west side of Town these lake front neighborhoods offer low connectivity resulting from their cul-de-sac designs.

The railroad tracks in Cornelius create another type of barrier. The tracks themselves can be an obstacle for disabled or elderly citizens. They also restrict future off-road pedestrian connections (greenways and shared-use paths)

because of the expense, liability, and other limitations associated with crossing the tracks.

A review of existing and historic average daily traffic volumes reveal changing traffic volumes along streets within the Town. Average daily traffic volumes represent the total number of vehicles traveling along a roadway segment on an average day. *Table 2.1* provides a breakdown of the tabulated traffic volumes on roadways within Town.

Table 2.1: 2010 Average Annual Daily Traffic Volumes

Location	2010 AADT Counts
I-77 from Exit 28 to Exit 30	88,000
I-77 from Exit 25 to Exit 28	83,000
Catawba Avenue between NC 115 and I-77	17,000
West Catawba Avenue between Jetton Road and I-77	22,000
West Catawba Avenue between Jetton Road and Nantz Road	21,000
West Catawba Avenue between Nantz Road and NC 73	18,000
Torrence Chapel Road	6,800
Bethel Church Road	5,600
Jetton Road	12,000
Nantz Road	1,500
Washam Potts Road	7,900
US HWY 21	19,000
NC 115 south of Catawba Avenue	12,000
NC 115 north of Catawba Avenue	13,000
Westmoreland Road	9,800

The highest traffic volumes were recorded along major roadways including I-77, US 21 and West Catawba Avenue. I-77 from Exit 28 to Exit 30 carried 88,000 vehicles in 2010. Areas around the I-77 interchange with Catawba Avenue had the next greatest volumes in 2010.



Peak hour congestion along I-77 approaching Cornelius

Safety

The NCDOT Bicycle and Pedestrian Division collects many statistics on bicycle and pedestrian crashes including crash numbers, severity, casue, time of day and other vital pieces of information. According to this data Mecklenburg County ranks #1 in the state for pedestrian crashes with cars with 1,940 occurring between 2004 and 2008. This accounts for 12.4% of the stateside crashes.

In looking at the recorded crashes for the Town of Cornelius, as provided by NCDOT, there were seven pedestrian related crashes between 1990 and 2012. The highest frequency of these crashes was located along Catawba Avenue between Ferry Street and South Hill Street. It is important to note that these crashes occurred prior to the streetscape improvements along this section of Catawba Avenue.

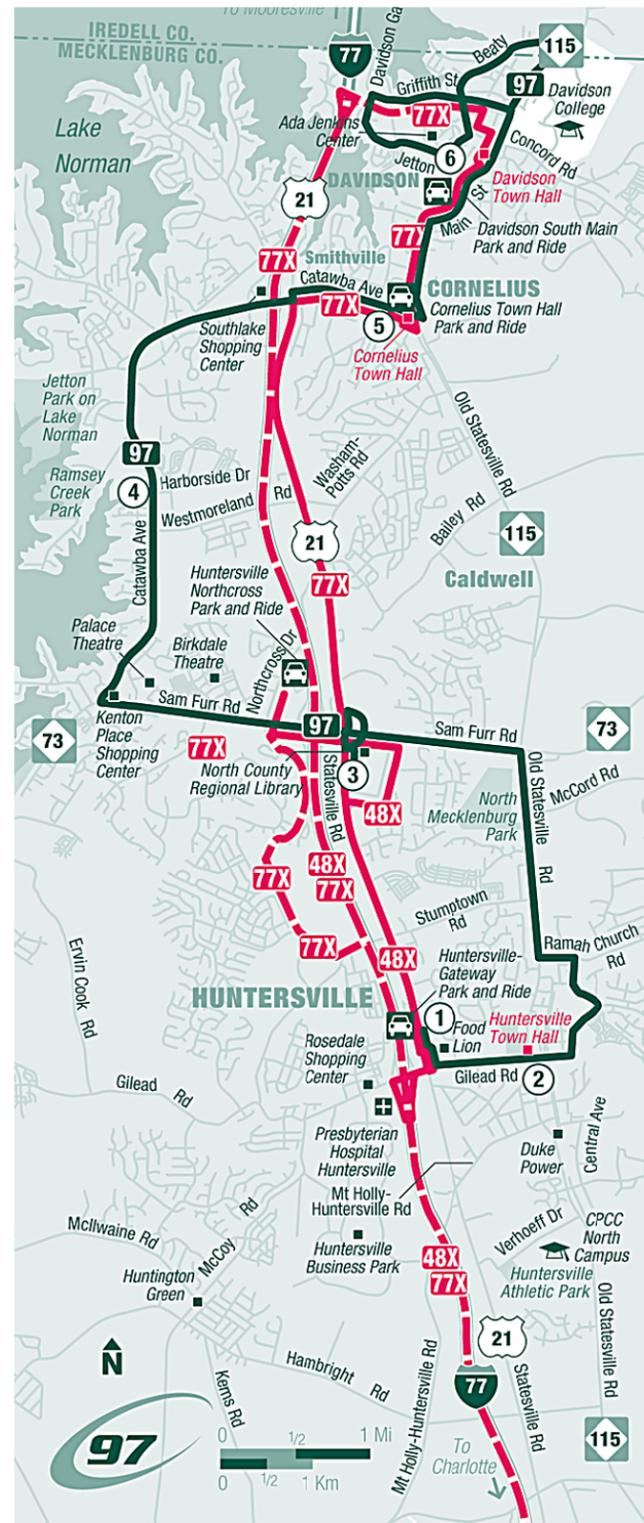
Transit

Charlotte Area Transit (CATS) provides local and express bus, neighborhood shuttle, van pools and car pools, as well as specialized transportation services for the greater Charlotte region. The Town of Cornelius is serviced by CATS with the express route service from Cornelius to Uptown Charlotte via the North Mecklenburg Express (77X) and the Cornelius Village Rider (97) routes.

The Cornelius Village Rider circulates amongst the North Mecklenburg communities of Davidson, Cornelius, and Huntersville. The route includes several bus stops in Cornelius with service generally between 6:30 am to 6:30 pm and service at regular 1 hour intervals. In addition, CATS offers express bus service (route 77x) with connections for commute in to the City of Charlotte. Park and ride facilities located near Town Hall and Huntersville Northcross offer Cornelius commuters an alternative commute to the City of Charlotte. Future commuter rail service is still being planned and includes two stops along Old Statesville Road: one near Caldwell Station and a second near the Town Center.



Existing CATS bus shelter along Catawba Avenue



Park-and-ride lot in downtown Cornelius

CATS also provides park-and-ride lots through the region. A number of park-and-ride lots are located in northern Mecklenburg County, including one in Cornelius near Town Hall. Riders are allowed to park for free and catch either the 97x route to the Charlotte Transportation Center in downtown Charlotte or the Village Rider.

The map on page 2-10 shows the transit stops existing and proposed within the study area.

Currently, commuter rail service does not extend north into Cornelius; however CATS has proposed a North Corridor Commuter Rail Project which would offer commuter rail service between downtown Charlotte and the Mount Mourne Area of Iredell County. Known as the Red Line, the rail line would run through downtown Cornelius creating another travel option for residents commuting to Charlotte.

Past and Going On Efforts

The Town of Cornelius has taken and continues to take proactive steps towards planning for future development and growth. Table 2.2 to the right highlights those efforts by The Town of Cornelius as well as other regional planning agencies.

For additional information please see Appendix D or the Comprehensive Master Plan.

Table 2.2 Current Planning Efforts in Cornelius

Agency	Plans/Policies/ Ordinances	Date Completed	Plan Purpose	Recommendations
MUMPO	2035 LRTP	2010	The LRTP details the transportation improvements and policies to be implemented in the MPO's planning area through 2035.	The LRTP contains recommendations for streets and roads, transit routes, guideways, and greenways and bicycle, and pedestrian facilities in the planning area. These recommendations are illustrated in figures in Ch 11 of the Plan. Recommendations are incorporated into the Planned System Map and the Bike/Greenways/Transit Map.
	Thoroughfare Plan	2004	The thoroughfare plan designates the role of each major route within the local and regional transportation network.	The plan shows the existing interchanges (at I-77 and Catawba Ave and I-77 and Sam Furr Rd) and a proposed interchange at I-77 and Westmoreland Rd. It also recommends two additional major thoroughfare east-west connections and one minor thoroughfare north-south connector.
CDOT	NC 73 Transportation and Land Use Corridor Plan	2004	The impetus of the plan was the recognition that increased development pressures along the corridor, and the resulting vehicular activity, have overwhelmed the roadway's capacity to serve as a reliable facility for its many users. The plan considers needed physical improvements and evaluates current and foreseeable land uses along the corridor.	The plan recommends that each participating jurisdiction adopt a Memorandum of Understanding (MOU) and a Council of Planning (NC 73 Council of Planning). It recommends getting all of NC 73 added to the TIP List. Jurisdiction responsibilities set forth in the plan include maintain land use plans that are consistent with corridor recommendations, undertake area plans at locations identified in the segment plans, require developments to follow corridor access guidelines, maintain or adopt development policies that will maintain ROW necessary for appropriate road typology, require as part of the land use and zoning approval process that some road be funded and built as part of the developments, and take responsibility for implementing some aspects of recommended roadway projects.
CATS	2030 Transit Corridor System Plan	2006	The plan details needed service and facility improvements throughout the Charlotte region through 2030.	The plan recommends 25 miles of commuter rail, 21 miles of light rail, 16 miles of streetcar, 14 miles of bus rapid transit and an expanded network of buses and other transit services. Of particular importance to Cornelius is the planned commuter rail service and rail stop in Cornelius and the construction of HOV lanes along I-77.
Town of Cornelius (PARC Department, Planning Department)	Greenway/Bikeway Master Plan	2004	The purpose of this plan is to guide the planning and implementation of an interconnecting system of greenways and bikeways in Town.	The plan identifies 18 potential greenway/bikeway corridors in Town. These recommendations are shown in the Bike/Greenways/Transit Map.
	Centennial Transportation Plan	2006	The Centennial Transportation Plan is a multimodal plan for the town's future transportation system that seeks to address public safety and mobility while simultaneously supporting economic development and quality of life initiatives.	The plan includes recommendations to improve street connectivity, accommodate pedestrians and cyclists, to facilitate intergovernmental coordination, and to pursue alternative funding sources, along with an action plan to improve streets. Project corridor sheets are included for 6 major corridors in town that include information on recommended projects, project costs, responsible party, and timeframe for completion.
	Cornelius East Village Plan	2003	The plan develops a vision for the east side of Cornelius and for the area west of Davidson-Concord Road in Davidson and serves as a guide for development in the area.	The plan calls for the development of office/institutional uses to occur north of Bailey Road, residential development on the Coulter Farm property, and an employment village between the Coulter Farm and Mayes Road. The plan also calls for improved street connectivity and the development of interconnecting greenways, multi-use paths, and open spaces throughout the study area.
	Land Development Code	adopted 1996, amended through 2009	The Land Development Code (LDC) establishes regulations to the development and use of all land and structures within the study area.	The LDC requires the placement of bicycle lanes when new development occurs as well as requiring their placement on certain connecting thoroughfares. It also provides for bicycle support facilities in new development, requires a curb cut design that is both bicycle friendly and which reduces bicycle/vehicle conflict, encourages a bicycle network, and requires five-foot bicycle lanes on certain designated streets. The LDC also typically requires 5 foot sidewalks to be built on both sides of the street.
	Parks and Recreation Comprehensive Master Plan 2005/2015	2005	The Parks and Recreation Comprehensive Master Plan defines a vision for parks and recreation in town through 2015.	The plan recommends improvements to the park system and greenway network. Additionally, a community needs assessment was conducted as a part of the plan based on 2005 LOS standards for biking (1 mile/1,000 residents). It concluded that the Town needed 30 additional miles of urban bikeway paths by 2015. Bike lane extensions were recommended along Catawba Ave, Old Statesville Road, NC 73, Torrence Chapel Road, Bethel Church Road, Jetton Road, Nantz Road, and Westmoreland Road.
Lake Norman Rural Planning Organization	Lake Norman Regional Bicycle Plan	2009	The plan, when completed, provides a means for bicyclists to travel around Lake Norman through Mecklenburg, Iredell, Catawba, and Lincoln counties.	The plan breaks the route into Initial and Ultimate Routes. Initial routes are those segments already appropriate for bicyclists or segments that only need limited improvements. Ultimate routes include planned future routes. The plan prioritized projects and includes a high priority list of 9 projects currently estimated to be approximately \$15 million. It also includes a range of funding strategies. Some of Mecklenburg's high priority projects are located within the Town of Cornelius including construction/improvements along the McDowell Creek Greenway and Washam Street, Church Street, and Catawba Avenue.
Catawba Lands Conservancy	Carolina Thread Trail	2009	The Carolina Thread Trail (CTT) is a regional network of greenways and trails, that when completed, will link people, places, cities, towns, and attractions in 15 counties and preserve significant natural areas in the region.	The Mecklenburg County Steering Committee and Technical Advisory Team adopted an official Carolina Thread Trail Map for Mecklenburg County. The map identifies proposed CTT connections, priority destinations, and planned greenways and overland connectors. These recommendations are shown in the Bike/Greenways/Transit Map.
Mecklenburg County Parks and Recreation Department	Mecklenburg County Parks and Recreation Greenway Plan Update	2008	The plan serves as the official greenway plan for Mecklenburg County.	The plan identifies primary greenway corridors and overland trail corridors in the county and creates an action plan that includes 5 and 10 year strategies for expanding the trail system. The strategies were ranked and prioritized. High priority projects in Cornelius include the South Prong Rocky River Greenway and the McDowell Creek Greenway. Recommendations from this plan are shown in the Bike/Greenways/Transit Map.

Panned Roadway Projects

Table 2.3 depicts the regionally significant roadway projects that will be constructed by 2035 in the vicinity of Cornelius.

For additional information please see Appendix D or the Comprehensive Master Plan.

Table 2.3 MUMPO 2035 LRTP Funded Projects in Cornelius

NCDOT STIP #	Project Name	Project Description/ Limits	Timeframe	Existing Facilities	Length (miles)
U-5130	Jim Cooke Road	New road (2-3 lanes), Northcross Dr. Ext. to Bailey Rd	2010-2015	n/a	0.20
U-5131	Northcross Drive Extension	New road (3 lanes) from end of Northcross Dr to Westmoreland Rd	2010-2015	n/a	1.35
I-5127	I-77/Westmoreland Rd	New Interchange, SPUI	2010-2015	n/a	n/a
I-5126	I-77 Widening (North)	Adding Managed lanes (1/each way) (6 lanes) from Hambright Rd to Catawba Ave	2010-2015	4-lane road, median divided	5.72
U-5128	Statesville Road (US 21)	Widening (4 lanes) from Northcross Center Ct to Boat House Ct.	2010-2015	2-lane road	1.83
U-5129	Westmoreland Road*	Widening (4 lanes) from W. Catawba Ave to US 21	2010-2015	n/a	1.03
	Westmoreland Road*	Widening (4 lanes), US 21 to Washam-Potts Rd	2010-2015	3-lane road	0.24
I-4733	I-77/ Catawba Avenue*	Convert interchange from simple diamond to urban diamond	2016-2025	simple diamond interchange	n/a
	Old Statesville Rd (NC 115)*	Widening (4 lanes) from Bailey Rd to Potts St	2016-2025	2-lane road	1.65
	Old Statesville Rd (NC 115)*	Widening (2 lanes) from Potts St to County line	2016-2025	2-lane road	3.69
R-2555B	W. Catawba Avenue*	Widening (4 lanes) from Jetton Rd to NC 73	2016-2025	2-lane road	2.37

*=Project is both locally and regionally significant

Required Work on the Ground

New sidewalks are typically built when new development projects are approved. The Land Development Code typically requires 5 foot sidewalks to be built on both sides of the street, except in the Industrial Campus zoning district which requires a sidewalk on one side of the street. In locations where the sidewalk is directly abutting curbs without a planting strip, parallel parking, or when adjacent to walls or other built elements that reduce usable width then the sidewalk will be 6 feet. Sidewalks serving non-residential uses within the Town Center or Village Center zoning districts shall be a minimum of 8 feet in width, with 10-12 feet preferable in front of shops.

All sidewalks are to be constructed of brick pavers, concrete or similar material. Concrete sidewalks are to be a minimum of 4 inches in depth.

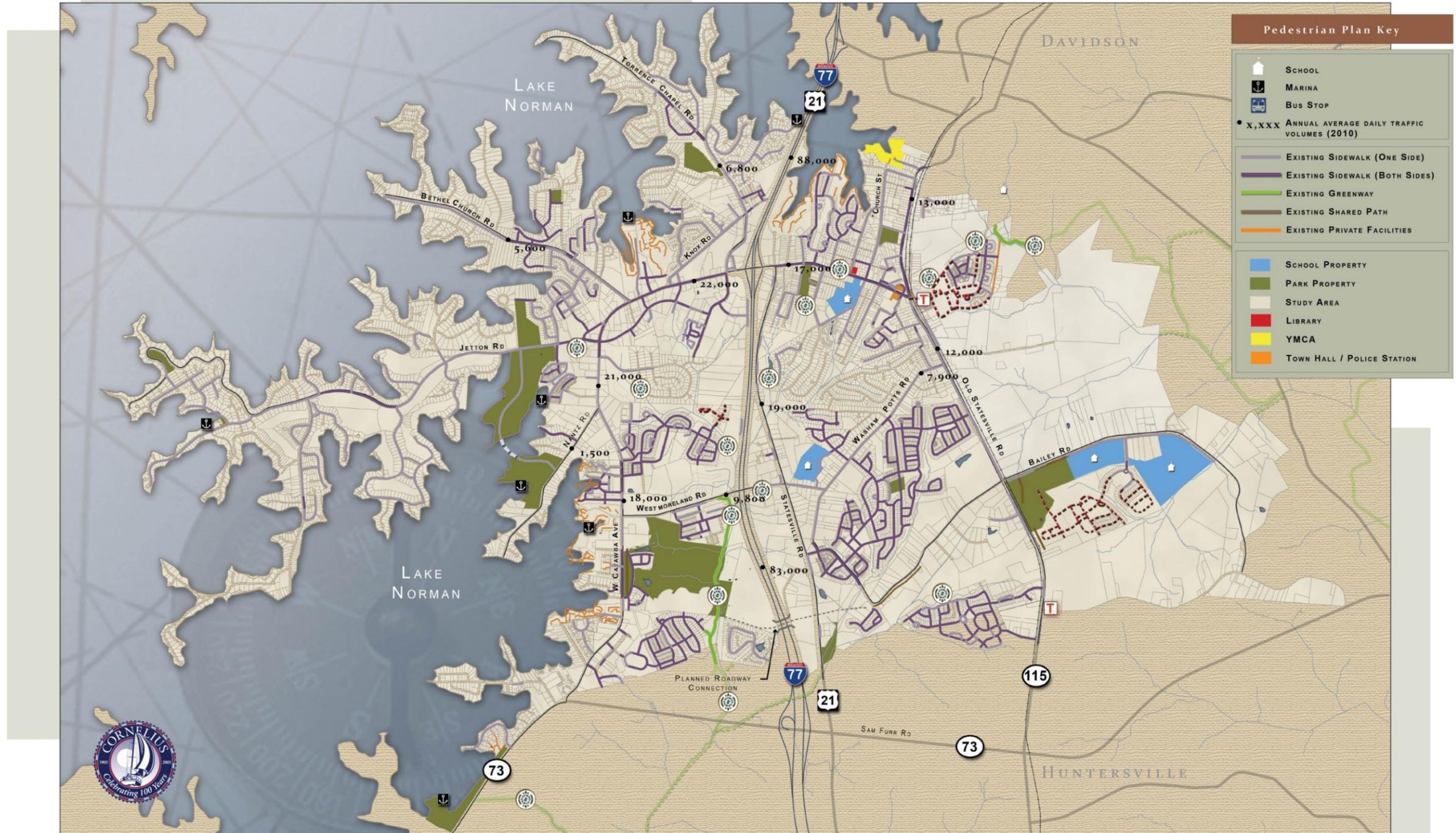
Planting strips are typically located between the curb and sidewalk and parallel to the street. Within the commercial areas in Town and other location with high pedestrian volumes, grated tree wells may be used in lieu of planting strips. The minimum width of all planting strips is 6 feet.

The Town is currently using Powell Bill funds as well as money from the Town's general fund (as funds are available) to fill in gaps in the existing sidewalk network. These funds are also used in the repair of existing facilities, which limits the funding available for new sidewalk construction.

Projects are currently being prioritized based on need, cost, and availability of funds.



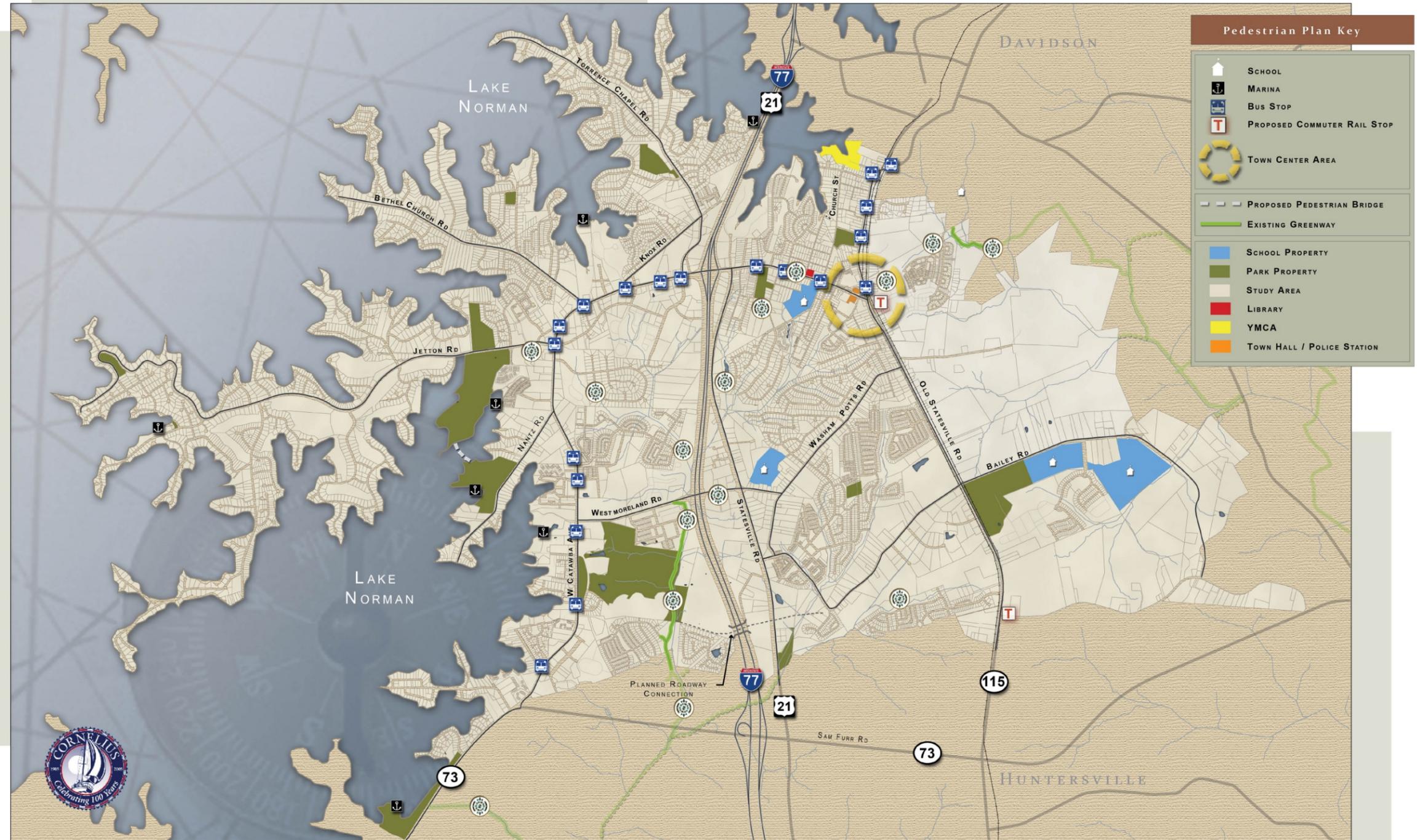
The collage of images depicts a varying array of sidewalk typical sections throughout the Town.



Existing Pedestrian Facilities

Cornelius - North Carolina





P e d e s t r i a n A t t r a c t o r s

C o r n e l i u s - N o r t h C a r o l i n a



Developing a Vision

The impetus for the plan came from initiatives that began during the development of the Town’s comprehensive plan. Maintaining consistency between the two plans was intentional, so that the pedestrian plan would integrate with overarching Town strategies. While the pedestrian plan has its genesis in the comprehensive plan, a series of specific planning activities were conducted in order to bring the plan’s vision into focus. The following contributed to the development of a vision for the pedestrian plan:

- Navigate Cornelius
- Pedestrian Plan Questionnaire
- Public Workshops
- Pedestrian Advisory Committee

Navigate Cornelius

The Town began the development of a comprehensive plan in March 2010. Entitled “Navigate Cornelius”, the plan includes theme committees intended to address the following topics:

- Economic Development
- Place Making and Town Services
- Mobility
- Community Service
- Leisure and Commerce

The Mobility Theme Committee addressed a comprehensive approach to transportation and established a set of Goals and Desired Outcomes for a series of initiatives including:

- Enhance-Maintain a Better Quality of Life
- Safe-Efficient Ways to Get Around on Bicycles
- Safe-Efficient Ways to Get Around on Foot
- Showcase Cornelius
- Better Traffic Flow
- Better and Specific Guidelines for Residential and Commercial Development
- Public Utilization of Lake Norman-Lake Cornelius
- Maintain-Improve Traffic Safety

The desired outcomes for walking and bicycling are summarized below:

Safe-Efficient Ways to Get Around on Bicycles:

- Bikes for commuting, local errands
- Integrate existing infrastructure
- Develop/maintain infrastructure for multi-modal transit
- Improve chances for cyclists to get away from using their car
- Identify target area for cycling improvements
- Examine impact of drive-through businesses
- Safe & consistent speed limits
- Safe routes for cycling to school
- Education/promotion for non-car transit

Safe-Efficient Ways to Get Around on Foot:

- Identify target areas for pedestrian improvements
- Install pedestrian crossings, especially on arterial roads
- Connect current sidewalks/install new
- Develop/maintain infrastructure for multi-modal transit
- Give the pedestrians the choice to not use their car
- Examine the impact of drive-through businesses
- Safe & consistent speed limits
- Safe routes to schools
- Education/promotion for non-car transit

More information regarding Navigate Cornelius can be found at the following: <http://www.cornelius.org/>

Pedestrian Plan Questionnaire

An informal questionnaire was developed specifically for the comprehensive pedestrian plan. It was offered to all plan participants during regular meetings as well as public outreach activities. In addition, the questionnaire was made available online and the Town sent copies to parents of students that attend local schools. There was a total of 216 completed questionnaires resulting in a representative cross-section of the community. The questionnaire allowed the Town to better understand attitudes regarding existing walkability, why and where

people choose to walk, what deters people from walking, community priorities, and the relative importance of improving community walkability.

A review of the results suggests the following:

- A majority of respondents have lived in Cornelius between 5 and 10 years
- Majority of respondents were between 35-44 years of age (those with families), the second and third largest cohort groups included the 25-34 and 45-54 age groups (these three groups combined to represent 87.5% of the 216 respondents)
- Top two reasons for walking (1) Fitness/recreation (2) Walking with children or family pets
- Biggest factor discouraging walking – lack of sidewalks/trails
- Top destination for walking was trails and greenways with parks being a close second
- West Catawba Avenue is the highest priority for improvements

Public Workshops

Two public workshops were conducted during the pedestrian plan development. They were conducted on May 3rd and June 7th, 2011. These workshops were used to communicate the plan objectives, gather input on critical locations, and collect feedback on plan recommendations.

Pedestrian Advisory Committee (PAC)

The PAC met regularly throughout the development of the plan and was responsible for establishing and refining the plan’s visions. They considered the objectives outlined in Navigate Cornelius, results of the questionnaire, and input received during the two public workshops. The result was the following vision statement:

“The Town seeks to develop a community where residents and visitors can safely walk to community features with an emphasis on providing families safe and convenient facilities that connect to the Town’s recreation, education and community facilities.”

Bridging the Gap

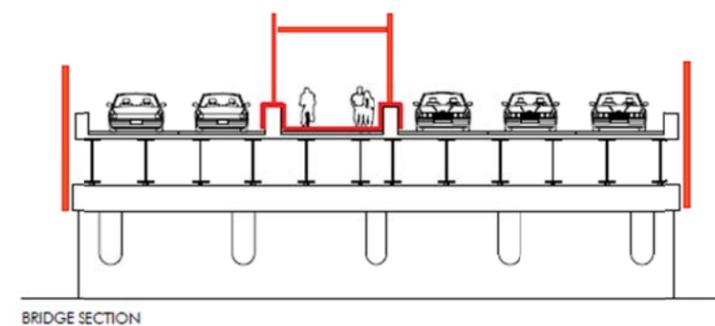
For years, I-77 has been viewed as a barrier to east-west mobility within the Town of Cornelius. Plagued by congestion and a challenging pedestrian realm, the interchange at Catawba Avenue has been a point of concern.

The NC Department of Transportation has plans to modify the existing interchange (Exit 28) into a Diverging Diamond Interchange (DDI). The purpose of the Diverging Diamond Interchange is to improve mobility and minimize congestion. The design accomplishes this by transforming movements that are traditionally left-turns (at a diamond interchange) into through movements.



Capitalizing on this opportunity, the Town is partnering with NCDOT on the development of a design that will seek to enhance the aesthetics of the improved interchange solidifying its place as a recognizable gateway to the community. The goal of the project is to add visual and economic value to the interchange by reflecting on the characteristics of the Town of Cornelius. It will also ensure that safe and comfortable accommodations for walkers and cyclists are included.

Likewise, the design concepts seek to improve the operations and safety of the adjacent "bookend" intersection at Statesville Road-US Hwy 21 (east side) and the Liverpool Pkwy-Torrence Chapel Road intersection (west side).



Early concepts are already underway with final recommendations expected by May 2012. Given the future completion date of this project the Comprehensive Pedestrian Plan defers recommendations at this location in support of the ongoing NCDOT-Town of Cornelius combined efforts.

For additional information regarding this effort please visit the following:

[http://www.communitycollaborate.com/projects/diverging-diamond-interchange-\(ddi\)-enhancements](http://www.communitycollaborate.com/projects/diverging-diamond-interchange-(ddi)-enhancements)

Left: One of many unique design characteristics of a diverging diamond interchange is the inclusion of bicycle and pedestrian facilities within the center island



The NC 73 Transportation/Land Use Corridor Plan suggests that the one possible solution to alleviating congestion along NC 73 is to provide another interchange on I-77 between Exit 25 and Exit 28. Specifically, the study recommends Westmoreland Road.

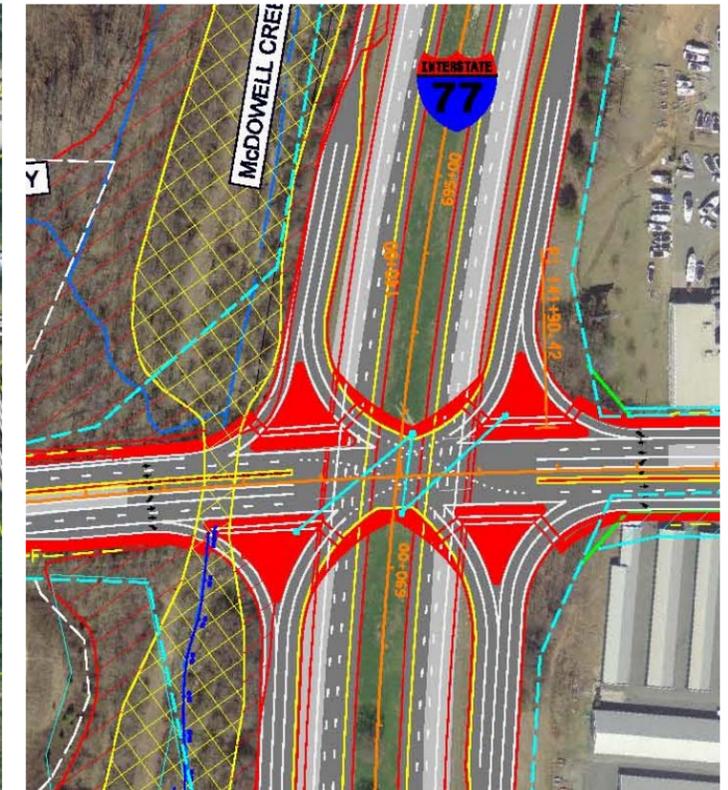
In addition, the plan recommends a grade separation crossing of I-77 south of Westmoreland Road, connecting Bailey Road to the east and Northcross Drive extension to the west.

As discussed earlier, the MUMPO Long Range Transportation Plan currently recommends an interchange between Westmoreland Road and I-77. The interchange is currently planned to be constructed by 2015. Based on current economic conditions and the cost of this improvement the horizon year for construction has been extended to 2025.

As the only unrestricted crossing of I-77, Westmoreland Road plays a vital role in the connectivity of the pedestrian network on the east and west sides of I-77. As the Town of Cornelius is currently doing with Catawba Avenue, partnering with NCDOT on the design of the proposed interchange at Westmoreland Road is critical to ensure pedestrian elements are accommodated.

As with Westmoreland Road, the proposed grade separation south of Westmoreland Road is also a critical piece to the future pedestrian infrastructure for the Town of Cornelius. Ensuring that the grade separation is designed to accommodate all modes of transportation is critical.

With any interstate project, federal, state and local approvals are needed. It is recommended that the Town of Cornelius work with NCDOT, FHWA, and MUMPO on the implementation of any improvements to Westmoreland Road or the planned grade separation to protect and enhance the pedestrian connectivity these elements provide.



Potential interchange configuration at Westmoreland Road and I-77

In order to achieve a well-rounded pedestrian system, it is important to evaluate the performance of infrastructure, guidance, and supporting facilities and programs. The needs of pedestrians are best served when all of these elements complement each other. The recommendations for the Town of Cornelius Pedestrian Plan seek to achieve this balance.

This chapter includes a discussion of physical improvement projects, including on and off-road facilities as well as intersection-level improvements. Policies and guidelines currently in place have been reevaluated in an effort to strengthen demand. Education, encouragement, and enforcement measures are also discussed.

The Town of Cornelius Comprehensive Pedestrian Plan was developed based on feedback from the Pedestrian Advisory Committee, Town Staff, NCDOT, and the public. Draft recommendations were formed and presented at a public workshop on June 7th, 2011 where participants were asked for their feedback and comments related to the draft project recommendations, guidelines, and policy measures. The recommendations discussed in this chapter represent the culmination of these outreach efforts.

Pedestrian Facility Recommendations

Pedestrian facility recommendations were developed based on field review, collaboration with existing planning efforts and ongoing multimodal improvements, public input, and validation by Town Staff and NCDOT. The vision for the plan was referenced throughout this process, serving as a backbone for establishing these recommendations.

Facility recommendations have been developed for the following areas: sidewalks, shared use paths, greenways, and intersection improvements (more information on these facility types can be found in Chapter 2). Areas warranting further study were also identified. It is important for these recommendations to function as a cohesive system. The map on the next page documents all of the pedestrian facility recommendations. This map clearly indicates how the different recommendation types will interface with

each other. Conceptual cross-section treatments with sidewalks, shared use paths, and greenway facilities are also included on this map to provide a reference for future treatments. This map also includes an inventory of the major attractors and destination points within the Town, including the proposed Carolina Thread Trail, in an effort to demonstrate how recommended pedestrian facilities would serve these locations.

The following sections consider the four major recommendation types independently. This process allows for clear communication of priorities within each project type, important for when funding opportunities are identified for a certain improvement type. Each improvement type discussion includes a map noting the proposed project locations, as well as a table providing more details on the recommendations and the priority projects.

Priority Projects

Identifying facility needs and improvement types is only one part of the recommendations development process. Given the existing and anticipated funding sources available for pedestrian projects in the region, there is a possibility that all of the projects recommended here may not be built within the next 30 years.

In order to produce a set of projects that best reflect the potential for funding within the life of this plan, a subset of the highest-priority projects has been identified for each facility type. Priority recommendations for each facility type are listed separately, in an effort to produce a range of projects that could make the best use of a range of funding sources and maximize our effectiveness in allocating limited resources.

A range of criteria were considered to identify the priority projects. Members of the Town's technical staff were consulted in the development of this methodology for determining high priority locations. These criteria included:

- **Making connections to recreational facilities and other pedestrian generators.** The Town of Cornelius

is primarily a bedroom community. With this in mind, emphasis was placed on connecting households to their desired activity nodes such as recreational facilities, bus stops, greenways and civic and community facilities.

- **Represent community equity.** In order to ensure the biggest needs in different sections of town were addressed, priority projects were identified in the four quadrants of the community.
- **Emphasize east-west connections.** Since I-77 serves as a barrier to pedestrian travel between the eastern and western portions of Town, a priority was placed on projects that could span this barrier.

The priority projects are highlighted in the tables that follow later in the chapter.



Catawba Avenue Streetscape near Cornelius Elementary School



P e d e s t r i a n M a s t e r P l a n

C o r n e l i u s - N o r t h C a r o l i n a



Sidewalks

The sidewalk inventory performed for this study is detailed in Chapter 2. This inventory provided a clear picture of the existing facilities, as well as whether facilities are available on both sides of the roadway. Based on this assessment, a list of infill recommendations was prepared. All of the sidewalk facilities recommended are less than a mile in length, with some segments as small as 250 feet. The purpose of these sidewalk recommendations is to create a more cohesive network through infill. Generally, it is recommended to construct sidewalks on both sides of the street if possible. However, infill projects should be constructed to maintain consistency with the existing facilities they connect.

Construction costs of sidewalks are estimated at \$70/LF. With a 5' sidewalk width and sidewalks on both sides of the road, this equates to \$740,000 per mile. Additional right-of-way, utilities, and environmental mitigation costs yield an overall estimated cost of \$33/LF, or \$350,000 per mile.

Shared Use Paths

Shared use paths provide a wide, inviting facility that can be used by both pedestrians and cyclists. They easily facilitate connections to desired activity nodes by using existing roadway corridors. While the current network of shared use paths is limited in the Town of Cornelius, this facility type is highly desired. Recommended shared use paths are slightly longer, varying between fractions of a mile to a couple miles each in length. Shared use paths are only recommended along one side of a roadway, but can be complemented with a sidewalk on the opposing side of the road if desired.

Construction costs of shared use paths are estimated at \$740,000 per mile. With consideration for right-of-way, utilities, and environmental mitigation, total costs are estimated at \$1,000,000 per mile.

Greenways

While exhibiting many of the same design characteristics of shared use paths, greenways are more often located

along natural features, utilities, or their own unique path. Southern Cornelius already benefits from the presence of an existing greenway. The recommended greenways build off of existing easements, serve existing neighborhoods, or forge their own paths. With this flexibility comes the opportunity to efficiently link recreational facilities together. The proposed projects also cover a geographically diverse area of the Town, and provide opportunities for greenway connections to neighboring communities.

Construction costs of greenways are estimated at \$650,000 per mile. With consideration for easements, and environmental mitigation, total costs are estimated at \$500,000 per mile.



McDowell Creek Greenway entrance off Westmoreland Road

Intersection Improvements

The Town of Cornelius has worked with NCDOT to provide intersection crossing amenities for pedestrians at signalized intersections throughout the Town limits. Crosswalks currently exist at almost every major intersection in Town. However, many of these facilities were put in place at a time when design standards were not as rigorous as they are now. Many of the markings have worn over time and are in need of replacement. Consideration for replacement of the worn crosswalks with high visibility markings is recommended.

Potential pedestrian facility upgrades at these intersections may include improvements such as high-visibility crosswalks, pedestrian-level lighting and signage, push button pedestrian signal heads and ADA curb ramps with

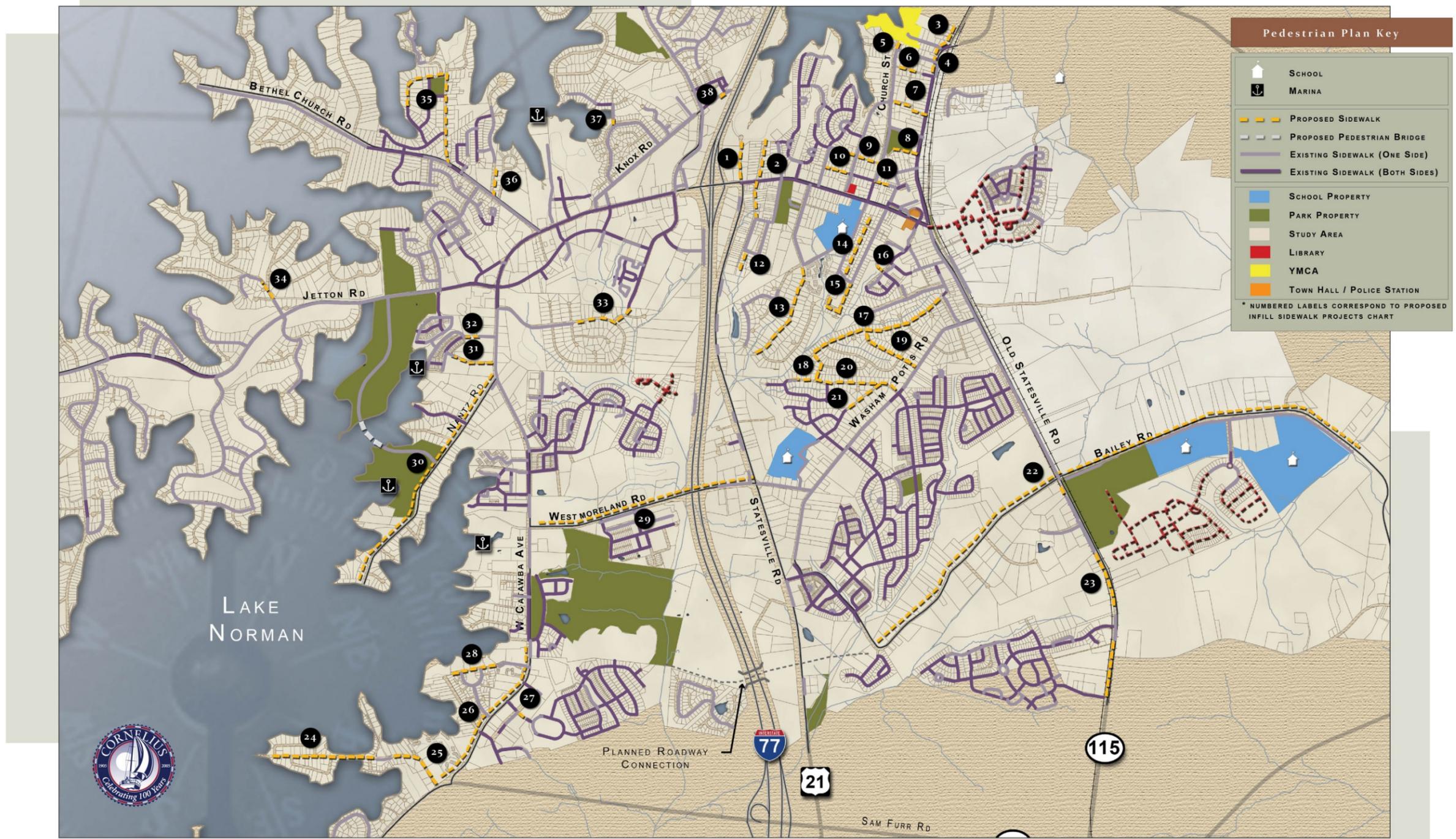
textured pavement. Thermoplastic high-visibility crosswalks are the preferred treatment, similar to those recently put in place at the intersection of Bailey Road and Old Statesville Road. More information regarding recommended design details can be found in Appendix B of this report.

Estimated construction costs of intersection improvement projects vary by improvement type and location.

Special Studies

During the outreach process for this plan, four areas were identified for special study. Due to the complex nature of these issues, additional time is needed to evaluate appropriate treatments at these locations. A brief description of each issue is included here.

- Conduct a feasibility study to evaluate potential pedestrian crossing of I-77. Since I-77 effectively splits the Town of Cornelius in half, a linkage across this facility could help improve crosstown pedestrian connectivity.
- Perform a pedestrian safety analysis to determine enhanced intersection design options at the intersection of Bailey Road and Old Statesville Road. Two schools and a regional park are located near this intersection. High automobile traffic volumes, combined with proximity to a rail line and heavy bus turning movements, create a crossing atmosphere that is daunting to potential pedestrians. Additional study at this location could be used to assess safety issues and recommend potential design solutions.
- Perform feasibility study to evaluate a potential pedestrian bridge connecting both peninsulas. This connection could potentially link pedestrian generators such as Jetton Park and Ramsey Creek Park, and would also provide quick access between two different marinas.
- Perform a mi-block crossing study in the vicinity of Robbins Park.



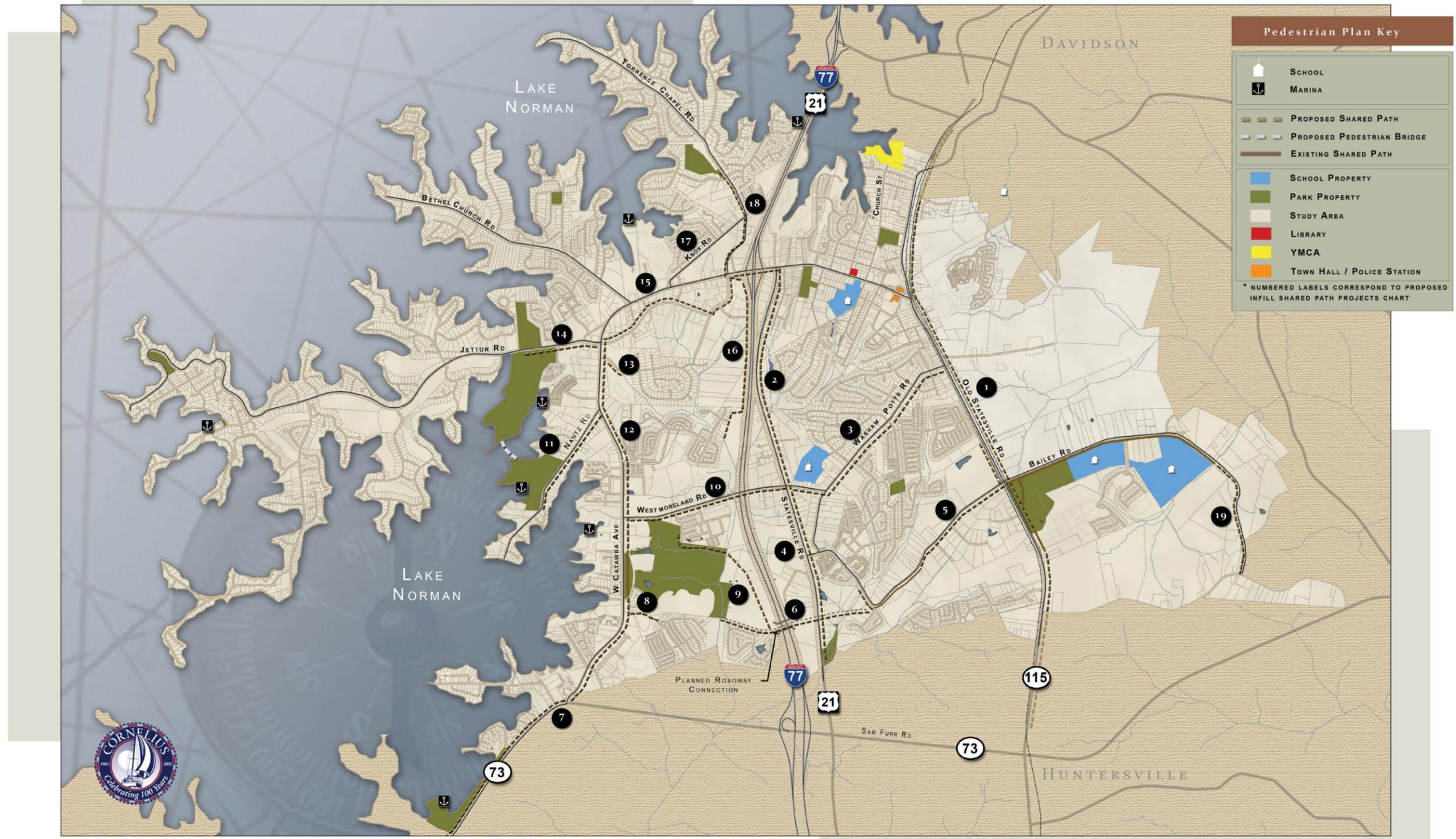
Proposed Infill Sidewalks
Cornelius - North Carolina



Town of Cornelius

Proposed Infill Sidewalks						
Project ID	Project Location	From	To	Length (mi.)	Improvements Needed	Estimated Cost
1	Holiday Lane	Catawba Avenue	Sterling Bay Lane	0.19	New sidewalk	\$70,224
2	Burton Lane/ S. Hill Street	Burton Lane dead end	Vivian Lane	0.34	New sidewalk	\$125,664
3	Potts Street	N. Main Street	Town Limits	0.19	Extend existing sidewalk to make a continuous connection	\$70,224
4	N. Main Street	Pecan Street	Davidson Street	0.12	Extend existing sidewalk to make a continuous connection	\$44,352
5	Church Street	Cornelius Street	Dead end	0.04	Extend existing sidewalk to make a continuous connection	\$14,784
6	Pecan Street	Church Street	N. Main Street	0.18	New sidewalk	\$66,528
7	McCall Street	Church Street	N. Main Street	0.18	New sidewalk	\$66,528
8	Spring Street	Church Street	N. Main Street	0.17	New sidewalk	\$62,832
9	Brinkley Street	Beard Street	Church Street	0.23	Extend existing sidewalk to make a continuous connection	\$85,008
10	Pine Street	Beard Street	Washam Street	0.12	Extend existing sidewalk to make a continuous connection	\$44,352
11	Pine Street	Church Street	Mulberry Street	0.11	Extend existing sidewalk to make a continuous connection	\$40,656
12	S. Hill Street	Weathers Street	Dead end	0.08	Extend existing sidewalk to make a continuous connection	\$29,568
13	Floral Lane	Smith Circle	End of Road	0.5	Extend existing sidewalk to make a continuous connection	\$184,800
14	Center Street	Dead End	Carter Circle	0.3	New sidewalk	\$110,880
15	Meridian Street	Millard Street	Carter Circle	0.19	Extend existing sidewalk to make a continuous connection	\$70,224
16	Feriba Place	Kimbrough Lane	Aftonshire Drive	0.15	Continue sidewalk to intersection with Aftonshire Drive	\$55,440
17	Danesway Lane	Bon Meade Lane	Tryon Street	0.63	New sidewalk	\$232,848
18	Bon Meade Lane-Footsman Place	Danesway lane	Coachmans Trace	0.14	New sidewalk	\$51,744
19	Heartland Street	Danesway Lane	Washam Potts Road	0.29	New sidewalk	\$107,184
20	Coachmans Trace	Squires Way	Washam Potts Road	0.49	New sidewalk	\$181,104
21	John Hawks Road	Treetop Lane	Coachmans Trace	0.23	Extend existing sidewalk to make a continuous connection	\$85,008
22	Bailey Road	Bailey Road	William A. Hough High Sch	2.5	New sidewalk	\$924,000
23	Old Statesville Road	Treynorth Drive	Caldwell Depot Road	0.58	Extend existing sidewalk to make a continuous connection	\$214,368
24	Norman Island Drive	End of Road	100 Norman Place	0.43	Extend existing sidewalk to make a continuous connection	\$158,928
25	Norman Island Drive	Fidler Lane	NC 73	0.29	Extend existing sidewalk to make a continuous connection	\$107,184
26	West Catawba Avenue	Robbins Crescent Drive	Sam Furr Road	0.75	New sidewalk	\$277,200
27	Dunmore Drive	Kenton Drive	Kenton Drive	0.02	Connect Sidewalk along Dunmore Drive	\$7,392
28	Vineyard Point Lane	Monbrison Circle	Tuscany Lane	0.24	New sidewalk	\$88,704
29	Westmoreland Road	West Catawba Avenue	Statesville Road	1.00	New sidewalk	\$369,600
30	Nantz Road	End of Road	West Catawba Avenue	1.10	New sidewalk	\$406,560
31	HM Junker Drive	Harbor View Drive	West Catawba Avenue	0.19	Extend existing sidewalk to make a continuous connection	\$70,224
32	Harbor View Drive	Amy Lee Drive	West Catawba Avenue	0.06	Extend existing sidewalk to make a continuous connection	\$22,176
33	Magnolia Estates Drive-Dutch Iris Lane	Brookgreen Garden Place	Liverpool Parkway	0.29	New sidewalk that ties into existing sidewalks on Liverpool Parkway	\$107,184
34	Meta Road	Bustle Road	Scotsraig Lane	0.05	New sidewalk that ties into existing sidewalks on Liverpool Parkway	\$18,480
35	Deep Cove Court-Walter Henderson Road	End Of Road	Bethel Church Road	0.65	New sidewalk	\$240,240
36	Norman Colony Road	McKenzie Place Drive	Bethel Church Road	0.16	Extend existing sidewalk to make a continuous connection	\$59,136
37	Trintella Lane	Baltic Drive	Harken Drive	0.62	Extend existing sidewalk to make a continuous connection	\$229,152
38	Knox Road	Burlington Way	End of Road	0.09	New sidewalk	\$33,264
				13.89		\$5,133,744

Denotes a high priority project



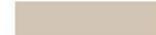
Proposed Shared Use Paths

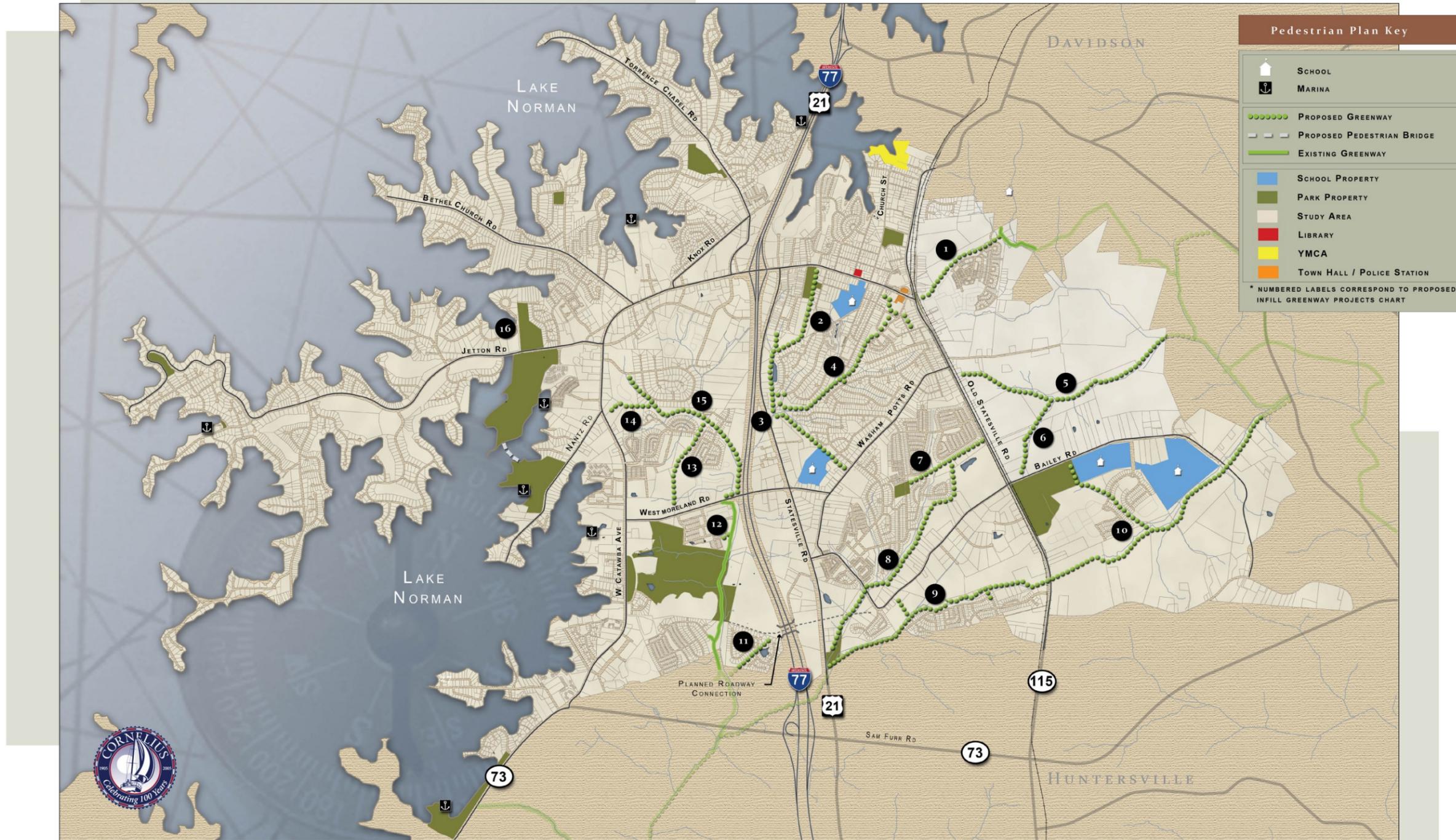
Cornelius - North Carolina



Town of Cornelius

Proposed Shared Use Paths						
Project ID	Project Location	From	To	Length (mi.)	Improvements Needed	Estimated Cost
1	Zion Avenue	Summerbrook Drive	Town Limits at Mayes Road	2.41	Connect Cornelius along Old Statesville Road from the northern edge to Bailey Middle School	\$1,566,500
2	Statesville Road	Catawba Avenue	Westmoreland Road	1.5	Proposed shared use path from I-77 to Westmoreland Road along Statesville Road	\$975,000
3	Washam Potts Road	Westmoreland Road	Old Statesville Road	1.31	Connect Statesville Road to Proposed Greenway at Old Statesville Road	\$851,500
4	Statesville Road	Westmoreland Road	Northcross Center Court	1.21	Connect Westmoreland Road to southern edge of Cornelius along Statesville Road	\$786,500
5	Bailey Road	Northline Drive	Old Statesville Road	0.7	Connect existing shared path along Bailey Road to Old Statesville Road	\$455,000
6	Future Extension	Forest Shadow Circle	Bailey Road	1.15	Connect existing Carolina Thread Trail to existing shared path at Bailey Road	\$747,500
7	West Catawba Avenue	Robbins Crescent Drive	Blythe Landing Park	0.22	Connect existing shared path to Blythe Landing Park along West Catawba Avenue	\$143,000
8	West Catawba Avenue	Vineyard Point Lane	Invermere Avenue	1.8	Connect proposed shared path along West Catawba Avenue to Invermere Avenue	\$1,170,000
9	Northcross Drive extension	Northcross Drive	Westmoreland Road	1.1	Connect Northcross Drive to greenway and Westmoreland Athletic Complex	\$715,000
10	Westmoreland Road	West Catawba Avenue	Statesville Road	1	Connect West Catawba Avenue along Westmoreland Road to proposed shared path	\$650,000
11	Nantz Road	Arbor Place	West Catawba Avenue	0.7	Connect Jetton Park to West Catawba Avenue	\$455,000
12	West Catawba Avenue	Jetton Park Road	Robbins Crescent Drive	1.3	Connect proposed shared path along West Catawba Avenue to existing shared path	\$845,000
13	Magnolia Estates Drive	West Catawba Avenue	Proposed greenway	0.2	Connect proposed shared path along Magnolia Estates Drive to proposed Carolina Thread Trail	\$130,000
14	Jetton Road	Jetton Park Road	West Catawba Avenue	0.4	Proposed shared use path from I-77 to Jetton Road	\$260,000
15	West Catawba Avenue	I-77	Jetton Road	1.09	Proposed shared use path from I-77 to Jetton Road	\$708,500
16	Chartown Drive	West Catawba Avenue	Proposed McDowell Creek Greenway	1.12	Proposed shared use path from I-77 to southern edge of Cornelius along Chartown Road	\$728,000
17	Knox Road	West Catawba Avenue	Torrence Chapel Road	0.61	Proposed shared use path connecting Catawba Avenue to Torrence Chapel Road	\$396,500
18	Torrence Chapel Road	West Catawba Avenue	Schooner Drive	0.8	Proposed shared use path connecting Torrence Chapel Park to West Catawba Avenue	\$520,000
19	Bailey Road	Bailey Springs Drive	Mayes Road	0.75	Proposed shared use path connecting William Amos Hough High School to Mayes Road	\$487,500
				19.37		\$12,590,500

 Denotes a high priority project



Proposed Greenways

Cornelius - North Carolina



Town of Cornelius

Proposed Greenways						
Project ID	Project Location	From	To	Length (mi.)	Improvements Needed	Estimated Cost
1	Antiquity	North Main Street	South Street	0.6	New greenway to connect Cornelius to existing gateway	\$390,000
2	No existing path	Catawba Avenue	Willow Pond Road	0.63	Connect Smithville Park and Catawba Avenue to proposed greenway #3	\$409,500
3	Parallels Statesville Road	South Hill Street	Washam Potts Road	1.1	Connect proposed greenway #2 to JV Washam Elementary	\$715,000
4	No existing path	Floral Lane	Meridian Street & Oak Street	1.28	Connect proposed greenway #3 to Town Hall area	\$832,000
5	No existing path	Zion Avenue	Existing Multi-Use path	1.55	Connect Old Statesville Road to existing greenway	\$1,007,500
6	Easement	Bailey Road	Proposed Greenway (#5)	0.54	Connect Bailey Road to proposed greenway #5	\$351,000
7	Easement	Coachmans Trace	Old Statesville Road	0.55	Connect neighborhood park to Old Statesville Road	\$357,500
8	No existing path	Old Statesville Road	Proposed Greenway (#7)	1.57	Connect proposed shared path along Statesville Road to proposed greenway #7	\$1,020,500
9	No existing path	Statesville Road	Old Statesville Road	1.75	Connect proposed shared path along Statesville Road to Old Statesville Road	\$1,137,500
10	No existing path	Old Statesville Road	Davidson Greenway	1.91	Connect Statesville Road to Davidson - Concord Road	\$1,241,500
11	Easement	Forest Shadow Circle	Existing Multi-Use Path	0.26	Connect proposed shared path to Carolina Thread Trail	\$169,000
12	McDowell Creek Court	McDowell Creek Court	Existing Multi-Use Path	0.03	Connect McDowell Creek Court to existing Carolina Thread Trail	\$19,500
13	No existing path	Westmoreland Road	Lake Path Drive	0.67	Connect Westmoreland Road to proposed Carolina Thread Trail	\$435,500
14	No existing path	West Catawba Avenue	Magnolia Estates Drive	0.23	Connect Nantz Road and proposed shared path to proposed Carolina Thread Trail	\$149,500
15	No existing path	Magnolia Estates Drive	Chartown Drive	1.18	Connect proposed shared path along Magnolia Estates Drive to Chartown Drive	\$767,000
16	No existing path	Jetton Road	Enclave Oaks Court	0.3	Connect north Jetton Park to Jetton Road and proposed shared use path	\$195,000
				14.15		\$585,000

Denotes a high priority project



Proposed Intersection Improvements

Cornelius - North Carolina



Town of Cornelius

Proposed Intersection Improvement Locations								
Project ID	Intersection	Traffic Control	Ped Signal	Crosswalks	Transit Stop	Curb Radii	Curb Ramps	Median
1	Catawba Avenue at Main Street	Signal	Yes	Yes - Paint	Yes	Large	Yes (4/4)	No
2	S. Main Street at Washam Potts Road	Signal	Yes	Yes - Paint	No	Medium	Yes (2/4)	No
3	S. Main Street at Bailey Road	Signal	Yes	Yes - Paint	No	Medium	Yes (2/2)	No
4	Bailey Road at Statesville Road	Signal	Yes	Yes - Paint	No	Medium	Yes (2/4)	No
5	Westmoreland Road at Statesville Road	Signal	No	No	No	Large	Yes (2/4)	No
6	Westmoreland Road at Washam Potts Road	Stop Controlled	-	Yes - Paint	No	Large	Yes (2/4)	No
7	Catawba Avenue at School Street/Church Street	Signal	Yes	Yes-Brick	No	Tight	Yes (4/4)	No
8	Catawba Avenue at Smith Circle	Signal	Yes	Yes - Brick	Yes	Tight	Yes (4/4)	No
9	Catawba Avenue at Statesville Road	Signal	No	No	No	Large	No	No
10	Catawba Avenue at I-77 Ramps	Signal(s)	No	No	No	Large	Yes (1/4)	No
11	West Catawba Avenue at Torrence Chapel Road	Signal	Yes	Yes - Paint	No	Medium	Yes (4/4)	Yes
12	West Catawba Avenue at One Norman Boulevard	Signal	Yes	Yes - Paint	Yes	Medium	Yes (4/4)	Yes
13	West Catawba Avenue at Bethel Church Road	Signal	Yes	Yes - Paint	No	Medium	Yes (4/4)	Yes
14	West Catawba Avenue at Jetton Road	Signal	Yes	Yes - Paint	No	Medium	Yes (4/4)	Yes
15	Jetton Road at Jetton Park Road	Stop Controlled	-	Yes - Paint	No	Medium	Yes (2/4)	Yes
16	West Catawba Avenue at Nantz Road	Stop Controlled	-	No	No	Large	No	No
17	West Catawba Avenue at Westmoreland Road	Signal	No	No	Yes	Medium	No	No
18	West Catawba Avenue at Dunmore Drive	Stop Controlled	-	No	No	Medium	Yes (2/4)	No
19	N. Main Street at Davidson Street	Stop Controlled	-	No	Yes	Tight	No	No
20	Harbor Light Boulevard at Flying Jib Road	Stop Controlled	-	No	No	Medium	Yes (2/3)	No
21	Washam Potts Road at Ruffner Drive/Oakbranch Lane	Stop Controlled	-	Yes - Paint	No	Tight	Yes (2/4)	No
22	Bethel Church Road at Queensdale Drive	Stop Controlled	-	No	No	Medium	Yes (4/4)	No
23	North Main Street at Legion Street	Stop Controlled	-	Yes - Paint	Yes	Tight	No	No
24	Torrence Chapel Road at Knox Road	Stop Controlled	-	No	No	Large	Yes (2/4)	No
25	Torrence Chapel Road at Torrence Chapel Neighborhood Park	None	No	Yes - Paint	No	Medium		No

 Denotes a high priority project

Policies and Guidelines

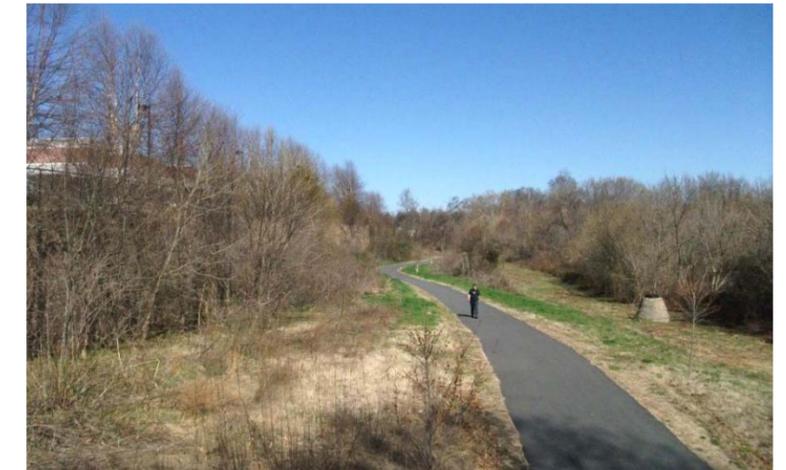
The Town of Cornelius has supported moving pedestrian projects forward through the establishment of smart policies and providing good guidance. The Town currently requires sidewalks be constructed as new development projects are completed in the area. However, there are some other policy and guidance initiatives that could be put in place to further improve the pedestrian environment.

- Revisit design guidelines periodically to ensure consistency with best practices. Appendix B of this report provides a summary of design guideline best practices.
- Develop a capital improvements program for the Town of Cornelius. This program should include a dedicated funding source for pedestrian facilities.
- Take a more active role in promoting enhanced funding opportunities through grant applications and other initiatives. More information on existing and potential funding sources can be found in Appendix A.
- Adhere to the agreed-upon set of priorities to ensure funds are directed towards priority projects. Funding opportunities are limited, so conforming to the vetted methodology is a good way to allocate money where it is most needed. It is recommended that a criteria system be developed to establish and rank priority projects.
- Partner with the Charlotte Area Transit System on regional transit initiatives. Placing emphasis on quality bus stop locations and amenities (benches, covered areas, route information, etc.) and supporting those bus stops with pedestrian facility improvements leads to a more integrated the multimodal network.
- Consider making the PAC a permanent oversight committee for pedestrian related decisions-making promoting consistency with the adopted pedestrian plan.

Education, Enforcement, Encouragement

Improvements to pedestrian infrastructure and enhanced local policies will result in a better walking environment. However, the positive impacts of these improvements can be further expanded by complementing them with a set of encouragement, enforcement, and education programs.

- The four schools within the Town of Cornelius should continue to participate in the National Walk to School Day each year. This program offers encouragement to children, parents, faculty, and staff to walk to school and provides an opportunity to educate students about safe practices and the benefits of walking.
- Work with the Chamber of Commerce and local businesses to expand the concept of the walk to school day by also including walk/bike to work days.
- In order to improve pedestrian crossing safety, local enforcement agencies should monitor driving speeds on local roads and actively ticket speeders when problems are identified.
- Work with local schools to take part in the Safe Routes to School program to encourage and provide a safe environment for children and educators to walk or bike to school. More information on this program can be found at www.safety.fhwa.dot.gov/saferoutes.
- Participate in the North Carolina School Crossing Guard Training Program to properly train law enforcement officers who are responsible for training crossing guards.
- Coordinate with Charlotte Area Transit System to encourage locals to use transit in combination with walking to reach their desired destination.



Jogger using the McDowell Creek Greenway



Meandering sidewalk along US 21 to avoid the built environment



Existing shared use path along West Catawba Avenue **4-12**

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Appendix

Appendix A Funding Opportunities

Appendix B Design Resources

Appendix C Questionnaire/Results

Appendix D Community Inventory and Assessment Report

Items in the Technical Appendix represent components that have been developed outside the process of creating the Comprehensive Pedestrian Plan. The placement of *Funding Opportunities* (Appendix A) and *Design Resources* (Appendix B) in this section was done to keep the narrative of the summary workbook specific to the Town of Cornelius allowing for ease of use by a broad spectrum of readers. The appendix therefore serves as a technical resource for practitioners and staff.

The construction of a comprehensive connected pedestrian network and ancillary facilities can occur through incremental adoption of local policies and programs and state programs, as well as through the receipt of private contributions. With this in mind, it will be important for the Town of Cornelius to identify funding sources to implement the recommendations of this plan. While some projects and programs will be funded by the Town, alternatives are available to provide financial support for improving the local pedestrian network.

Local and Regional Programs

Local funds should be used for projects not on major state routes. Usually these are most successful when a state-funded incidental project — such as a road widening — has already been programmed. Local funding sources tend to be flexible, and include general revenue expenditures as well as proceeds from bond programs. An exception to this policy may include high priority connections along roads unlikely to be developed.

Capital Improvement Program

As mentioned in Chapter 4, the Town of Cornelius does not currently have an established capital improvement program. Formally developing this program would provide the Town with a formalized way to allocate their resources and stick to their vetted prioritization methodology.

Powell Bill

Powell Bill funds are collected by the state in the form of a gasoline tax. The amount of these funds distributed to a municipality is based on the number of street miles to be maintained and the Town's population. These funds are most often used for maintenance of existing or construction of new sidewalks.

Transportation Bonds

Transportation bonds have been instrumental in the strategic implementation of local roadways, transit, and non-motorized travel throughout North Carolina. Voters in communities both large and small regularly approve the

use of bonds in order to improve their transportation system. Improvements to the pedestrian system in Cornelius would be a type of project that could be funded using a transportation bond program.

Mecklenburg-Union Metropolitan Planning Organization (MUMPO)

Cornelius is a member of the Mecklenburg-Union MPO, one of 17 MPOs designated by NCDOT. MUMPO aids in local planning efforts and provides services and guidance in coordinating with NCDOT. MUMPO is responsible for developing the Unified Planning Work Program (UPWP) which allocates funds for planning and administration to its members. In some cases, MUMPO oversees the disbursement of federal or state monies to the Town.

State and Federal Programs

In comparison with local funds, state and federal funds are not as flexible in terms of their use. Usually these projects focus on the needs of vehicles, either in terms of capacity or safety — for example, widening projects. It can be difficult, however, to secure sidewalk and pedestrian crossing facilities in state construction projects.

On August 10, 2005, the President signed into law the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). With guaranteed funding for highways, highway safety, and public transportation totaling \$244.1 billion, SAFETEA-LU represents the largest surface transportation investment in our nation's history. Provisions address specific safety issues, including pedestrian and bicycle safety. New federal transportation legislation is currently under consideration by Congress.

Funds for pedestrian and bicycle projects come from several different sources that are described in this section; however, allocation of those funds depends on the type of project or program and other criteria. The information provided in this section is intended to present a basic overview of the process.

Transportation Improvement Program (TIP)

As a part of the state's Transportation Improvement Program (TIP), pedestrian TIP projects can receive allocations through an array of funding resources including Federal Aid Construction Funds and State Construction Funds. As a part of the application process, strict criteria must be met before project selection. These criteria include providing right-of-way information, meeting a set of design standards, showing a need for a project, local support of the project, and the inclusion of the project in a pedestrian planning process. Pedestrian projects may appear in the TIP as standalone projects or as incidental projects through another roadway project.

Safe Routes to School

Safe Routes to School receives funding through the federal SAFETEA-LU legislation and provides funding for individual schools to create route plans or develop facilities that create a safer walking and biking environment for their students. North Carolina has a yearly application program for which any school, school district, municipality or other governmental body, or non-profit association may apply. The Town of Cornelius is encouraged to partner with local schools in pursuing funding from this source. For more information, visit <http://www.saferoutesinfo.org/>.

Enhancement Grants

The Enhancement Grant program promotes the implementation of projects not typically associated with the road-building mindset. While the construction of roads is not the intent of the grant, the construction of bicycle and pedestrian facilities is one of many enhancements that the grant targets. Enhancement funding is administered through the TIP. For more information, visit <http://www.ncdot.org/programs/enhancement/>.

Congestion Mitigation and Air Quality (CMAQ)

Mecklenburg County is currently designated as a non-attainment area for the 8-hour ozone standard and as a maintenance area for the 8-hour carbon monoxide

standard. SAFETEA-LU devoted approximately \$8.6 billion in an effort to promote the implementation of projects that would reduce congestion and air quality emissions. Pedestrian and bicycle projects historically receive about 5% of this funding. The Town of Cornelius should work with MUMPO to identify and promote priority projects that could be funded using this mechanism. For more information, visit http://www.fhwa.dot.gov/environment/air_quality/cmaq/.

Recreational Trails Program

The Recreational Trails Program is a federal initiative assisting with the development of non-motorized and motorized trails. Grant recipients must demonstrate conformity with North Carolina's Statewide Comprehensive Outdoor Recreation Plan (SCORP). This program is administered for North Carolina through the NC Division of Parks and Recreation. For more information, visit http://www.ncparks.gov/About/trails_RTP.php.

Land and Water Conservation Fund (LWCF)

The Land and Water Conservation Fund was developed in 1965 with the objective of encouraging the creation of local parks and recreation facilities. This fund is now the primary source of federal money for land acquisition for open space, parks, and natural areas. Grants from the LWCF can be used for a range of recreational facilities, including trails and greenways. For more information, visit http://www.ncparks.gov/About/grants/lwcf_main.php.

Community Development Block Grant

Federal funding for pedestrian projects can come from sources outside the transportation and environmental realms. The Community Development Block Grant program is administered by the U.S. Department of Housing and Urban Development (HUD). The intent of this grant is to serve the needs of moderate or low-income areas through activities such as neighborhood revitalization, economic development, and facilities improvements. These grants have successfully been used for the development of pedestrian facilities in the state of North Carolina. For more information, visit

http://portal.hud.gov/hudportal/HUD?src=/program_office/comm_planning/communitydevelopment/programs.

Hazard Elimination and Railway-Highway Crossing Programs

These funds are an additional subset of the State Transportation Improvement Program (STIP) funding, constituting 10% of a state's funds. This program is intended to inventory and correct the safety concerns of all travel modes. These funds can be used to construct corridor or intersection-level improvements that focus on safety enhancements.

NCDOT Division Funds

NCDOT separates the state into 14 divisions. Mecklenburg County is in Division 10. Division funds are another resource that provides allocations or discretionary funding for special projects within each division.

North Carolina's Clean Water Management Trust Fund (CWMTF)

At the end of each fiscal year, 6.5 percent (or a minimum of \$30 million) of the unreserved credit balance in North Carolina's General Fund is placed in the CWMTF. The revenue of this fund is allocated as grants to local governments, state agencies, and conservation nonprofits to help finance projects that specifically address water pollution problems. CWMTF funds may be used to establish a network of riparian buffers and greenways for environmental, educational, and recreational benefits. For more information, visit <http://www.cwmtf.net/>.

North Carolina Parks and Recreation Trust Fund (PARTF)

The NC Parks and Recreation Trust Fund provides funding to acquire park lands and to build and maintain park facilities. This program, managed by the North Carolina Division of Parks and Recreation, offers grants to local communities that can be used for programs such as trail construction or maintenance. For more information, visit http://www.ncparks.gov/About/grants/partf_main.php.

North Carolina Conservation Tax Credit

The North Carolina Conservation Tax Credit was developed with the intent of preserving natural or rural areas by incentivizing conservation. Through this program, open spaces or natural areas can be set aside for future use as greenways or trail facilities. For more information, visit <http://www.onencnaturally.org/pages/conservationtaxcredit.html>.

Governor's Highway Safety Program (GHSP)

The Governor's Highway Safety Program is committed to enhancing the safety of the roadways in North Carolina. To achieve this, GHSP funding is provided through an annual program, upon approval of specific project requests, to undertake a variety of pedestrian and bicycle 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. For more information, visit www.ncdot.org/secretary/GHSP.

North Carolina Adopt-A-Trail Grant Program

The North Carolina Division of Parks and Recreation oversees this grant program with the intent of funding trail construction and maintenance projects. Grant amounts typically do not exceed \$5,000. For more information, visit http://www.ncparks.gov/About/trails_AAT.php.

Public/Private Initiatives

Active Living by Design (ALbD)

Active Living by Design is a program sponsored by the Robert Wood Johnson Foundation. ALbD seeks to bring together the health care and transportation communities to create an environment that encourages residents to pursue active forms of transportation such as walking and bicycling. Grants are awarded each year to a selected number of communities that are then required to produce a local match. These grants can be used to create plans, change land use policies, institute education policies, and

develop pilot projects. For more information, visit www.activelivingbydesign.org.

Fit Together

Fit Together is a partnership of the NC Health and Wellness Trust Fund and Blue Cross and Blue Shield of NC. The grant initiative “recognizes and rewards North Carolina communities’ efforts to support physical activity and healthy eating initiatives in the community, schools, and workplaces, as well as tobacco-free school environments.” This program awards up to nine partnerships with up to \$30,000 annually for a two year period. For more information on the Fit Together grant initiative, visit www.healthwellNC.com.

The Trust for Public Land

Founded in 1972, the Trust for Public Land (TPL) is the only national nonprofit working exclusively to protect land to enhance the health and quality of life in American communities. TPL works with landowners, government agencies, and community groups to create urban parks and greenways as well as to conserve land for watershed protection. For more information on the Trust for Public Land, visit www.tpl.org.

National Trails Fund

The National Trails Fund was established by the American Hiking Society in 1998. This privately-funded grant program awards money for the construction and maintenance of

hiking trails. Awards range between \$500 and \$5,000, and are targeted for non-profit organizations. For more information, visit <http://www.americanhiking.org/>.

Developer Contributions

Through diligent planning and early project identification, regulations, policies, and procedures can be developed to protect future pedestrian corridors and require contributions from developers when the property is subdivided. The Town of Cornelius does a good job with its coordination with developers on the construction of pedestrian facilities. This collaboration has allowed the Town to benefit from new pedestrian facilities, which are also viewed as an asset to the new development to prospective residents and businesses

Impact Fees

Developer impact fees and system development charges are another funding option for communities looking for ways to pay for transportation infrastructure. They are most commonly used for water and wastewater system connections or police and fire protection services, but they have recently been used to fund school systems and pay for the impacts of increased traffic on existing roads. Impact fees place the costs of new development directly on developers and indirectly on those who buy property in the new developments. Impact fees free other taxpayers from the obligation to fund costly new public services that do not directly benefit them. Although other states in the country use impact fees, they have been controversial in

North Carolina and only a handful of communities have approved the use of impact fees. The use of impact fees requires special authorization by the North Carolina General Assembly.

Corporate Partnerships

Involvement between public and private entities does not have to be strictly financial in nature. By providing area businesses with information on the benefits of walking and bicycling, along with material on the infrastructure available in the community, employees may be encouraged to pursue alternate forms of transportation. These collaborative relationships can also be used when building support for new infrastructure projects.

Volunteer Participation

When considering the development of off-road trail systems, volunteer participation is a definitive way to express community buy-in and build a case for financial support. Much of the clearing and natural-surface trail building work can be completed through volunteer efforts. The Town should collaborate with local interest groups and organizations such as the Chamber of Commerce to gather volunteers. Volunteer input is also a great way to emphasize the desire for priority projects to potential funding agencies.

Design Resources – Best Practices

The Comprehensive Pedestrian Plan isn't intended to be a substitute for feasibility analysis or engineering design. However, the provision of best practices regarding design and placement is intended to aid planners and decision makers as incremental implementation occurs. The information contained within this appendix represents an assemblage of information collected by the project team and NCDOT. Over time these standards may change as new techniques evolve. Therefore, it's important to reference new reference material when published by industry leaders including Federal Highway Administration (FHWA), American Association of State Highway and Transportation Officials (AASHTO), Institute of Traffic Engineers (ITE), American

Sidewalks

Sidewalks are extremely important public right of-way components often times adjacent to, but separate from automobile traffic. In many ways, they act as the seam between private residences, stores, businesses, and the street. Sidewalks are spaces where children play, neighbors meet and talk, shoppers meander casually, parents push strollers, and commuters walk to transit stops or directly to work. Because of the social importance of these spaces, great attention should be paid to retrofit and renovate areas with disconnected, dangerous, or otherwise malfunctioning sidewalks.

The Federal Highway Administration (FHWA) defines sidewalks as "walkways that are parallel to a street or highway" and walkways as generally being "pedestrian paths, including plazas and courtyards."

Sidewalk Widths

BPTD recommends a minimum travel path width of 5 ft. for a sidewalk or walkway, in accordance with the American Association of State and Highway Transportation Officials (AASHTO), the Federal Highway Administration (FHWA), and the Institute of Transportation Engineers (ITE). A sidewalk width of 5 feet is considered ample room for two people to walk abreast or for two pedestrians to pass each other.

Often downtown areas, near schools, transit stops, or other areas of high pedestrian activity call for much wider sidewalks. Sidewalks are typically built with curb and gutter sections. The division recommends that areas with significant pedestrian traffic should feature eight- to ten-foot wide sidewalks. Where sidewalks align with the edge of an angled or 90-degree parking lot, a minimum of 30 inches of parked car overhang obstructing the sidewalk shall be taken into account in order to maintain the minimum travel path width.

AASHTO recommends the construction of sidewalks on all city or town streets, including those in rural areas. The Institute of Transportation Engineers (ITE) recommends sidewalk installation on both sides of the street whenever possible for new urban and suburban streets, especially in commercial areas, residential areas with 4 or more units per acre, or residential areas on major arterials and collectors. If sidewalks on both sides of the road are not possible, lower density rural residential or suburban areas might adequately serve its pedestrians with a sidewalk on only one side. Under certain low-traffic, low-density situations, a wide paved shoulder can serve as an adequate pedestrian path.

It is important to note the potential for conflict between pedestrians and bicyclists on paved shoulder. Both bicyclists and pedestrians must exercise caution in order to avoid potential crashes on paved shoulders.

Construction Materials and Methods

Improvements for new, retrofitted, and repair to sidewalks throughout the municipality should be constructed using the following methods and materials:

Materials — Sidewalks should be constructed of Portland Cement Concrete (PCC) with a 14-day flexural strength that is not less than 3,000 pounds per square inch (psi).

Subgrade Preparation — Subgrade should be thoroughly compacted and finished to a smooth, firm surface, and should be moist at the time the concrete is placed.

Subgrade Compaction — Except in areas where it is impractical to use standard type rollers, compaction should be by means of vibratory hand compactors.

Final Finish — Surface finish for sidewalks should be completed by brushing (with brooms) or by another approved method to provide a uniform non-skid surface.

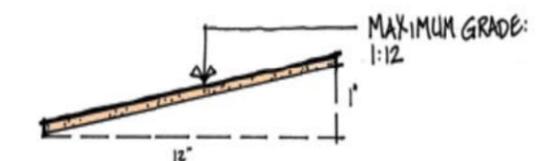
Inspections and Performance — Sidewalk forms should be inspected by municipal staff prior to the placement of concrete. Concrete that does not meet minimum mixture and strength standards or settles after placement should be removed and replaced by the installer.

Alternative Materials Usage — Use of materials for sidewalks other than concrete and the construction methods used therewith must be approved by the city or town engineer or designated representative on a case by case basis. There are some successful examples where other materials such as asphalt, crushed stone, granite fines, or other slip resistant material have been used. Concrete is preferred surface, providing the longest service life and requiring the least maintenance.

Grade

AASHTO recommends the following grades for sidewalks: Continuous sidewalk grades should not exceed 5% (1:20). However, in areas where the existing topography or the adjacent street cause grades of more than 5%, sidewalk grades of up to 8.33% (1:12) may be used for a rise of no more than 2.5 feet, provided that level landings (grades less than 0.5%) are provided at the end of such grades and are at least 5 feet long.

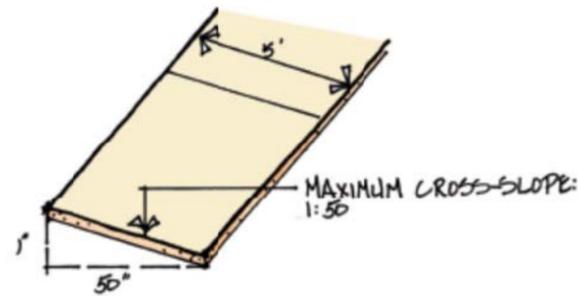
In cases where grades greater than 8.33% (1:12) must be negotiated, switchbacks or other approved ramping techniques must be provided and will conform to ADA requirements. Additional right-of-way and/or easements necessary to accommodate these features will be obtained by the applicant and legally dedicated to the city or town.



Cross-Slope

Sidewalks and walkways should be designed such that grades and cross slopes are minimized to allow those with mobility impairments to negotiate with greater ease. The maximum allowable cross-slope for sidewalks is 2% (1:50). At driveways, curb cuts, and both marked and unmarked crosswalks, the maximum allowable cross-slope must be maintained for a minimum width of 3 feet. Cross-slope

should be oriented toward the adjacent roadway and sufficient to provide storm water runoff without creating standing water on the walkway.



Sidewalk Thickness

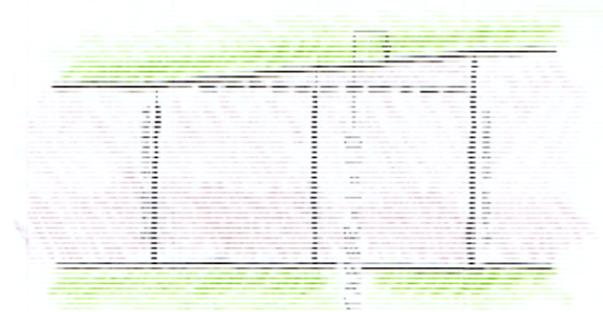
A minimum thickness (or depth) of 4 inches of concrete is required for all new sidewalks except as noted. To accommodate the additional loading caused by pedestrian density or by vehicles crossing a sidewalk, a thickness of 6 inches is required where sidewalks intersect at wheelchair/crosswalk ramps, and at driveways that use a ramp or apron-type access to cross the sidewalk from the adjacent public street.

Transitions

Wheelchair ramp and driveway transitions to or crossing sidewalks must conform to current ADA requirements.

Tapers

Transitional tapers to and from sidewalks of different widths are to be at a maximum rate of 1-foot of width per 10 feet of length (1:10) except as approved by the Town.



Sidewalk Alignment

Sidewalks should parallel the roadway. Typical exceptions include:

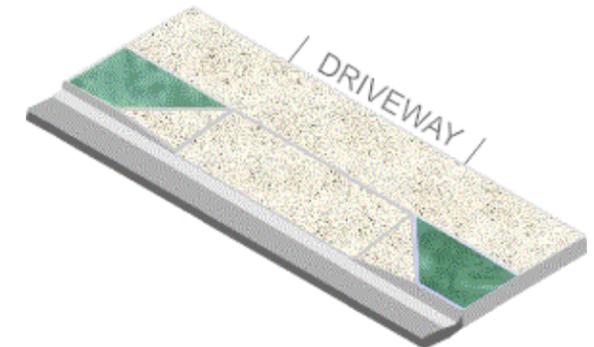
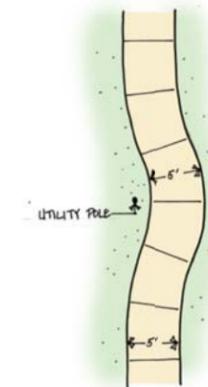
Horizontal Curve Sections on Roadways — In situations where a roadway curves at an angle greater than 60 degrees (and where right-of-way permits), the designer is permitted to adjust the curve of the sidewalk to more easily accommodate pedestrians.

Presence of Natural and Manmade Features — The 5-foot minimum width of the travel path must be free of obstructions. The designer may be permitted to alter the sidewalk path to avoid significant obstructions including but not limited to: transformers, utilities, fire hydrants, and traffic signal hardware. Sidewalk path exceptions should be evaluated and approved on a case-by-case basis by the Town. Care should also be used to ensure that the travel path does not interfere with the integrity of trees or of historic features.

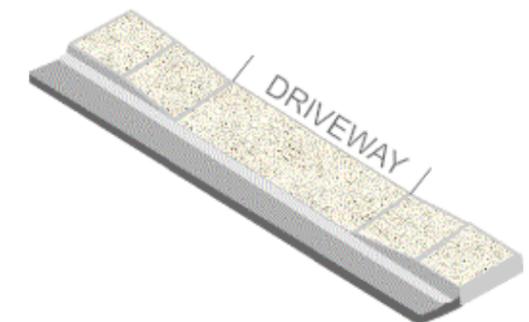
Meanders — Sidewalk meandering is encouraged providing it complies with ADA and AASHTO standards. People generally prefer to walk in a straight line, particularly when walking for utilitarian purposes. Meanders must meet minimum ADA requirements unless otherwise approved by the Town.

ADA: Dealing with Cross-Slope from Driveways

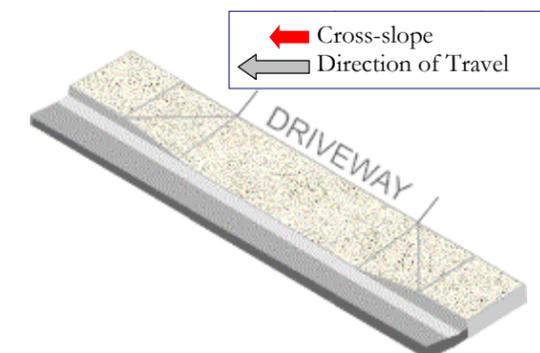
The figures at right indicate the preferred (top), conditionally acceptable (middle), and unacceptable (bottom) design solutions for new driveways as they interface with sidewalks. The intent is to make wheelchair travel safe along the sidewalk without directing the user into traffic through angled (cross) slope designs. Cross-slope on sidewalks should not exceed 2%, preferably not 1.5% where possible.



Preferred – The sidewalk is set behind the driveway apron and planting strip.



Conditionally Acceptable – The “dip” at the driveway apron allows for safer passage with no cross-slope.



Not Acceptable – The cross-slope at the driveway apron provides a difficult challenge for a person using a wheelchair or cane.

Sidewalk Buffers

Buffer zones between pedestrian paths and vehicular traffic provide a sense of security to those on foot or in wheelchairs and give the path a comfortable scale and clear definition. Buffers can also provide other benefits to pedestrians depending on the type used. Buffer zones may either be paved, providing space between the pedestrian and traffic, or they may involve a planting strip with trees and shrubs, but is not recommended for high-traffic pedestrian areas. Much like the sidewalk itself, the form and topography of a buffer may vary greatly. AASHTO recommends a buffer width of two to four feet for local or collector streets, and a buffer width of five to six feet for arterial or major streets, whether for a paved buffer zone or a planting strip.

Planting Strips

Continuous zones of landscape, located between the sidewalk and the street curb or the edge of road pavement, perform a multitude of essential tasks. Planting strips contribute to the walkability of a street by providing shade. In addition to providing shade, street trees - along with turf and other plantings - help reduce urban temperatures, improve water quality, lower stormwater management costs, and add beauty to the street for the pedestrian, the driver, and the adjacent land use.

The recommended planting width to permit healthy tree growth is 4 to 10 feet measured from the back of curb. Planting strips, or tree lawns, are the preferred means of providing a buffer, but are not feasible or appropriate in all pedestrian situations.

The width of the planting strip shall increase with a greater plant density and potential as the intensity of development increases. This separation from motorized traffic decreases road noise while increasing a pedestrian’s sense of security and comfort. Added benefits of this separation include space for signage, utilities (fire hydrants), and vegetation.

Paved Buffer Zones

In some situations, continuous planting strips are not feasible, particularly where there is a high degree of foot traffic between the sidewalk and the street. As such, these planting strips are typically used in downtown or commercial areas. In these cases, a paved buffer zone should be provided between the travel path of the sidewalk and the curb. Though a constant width is

preferred for this buffer zone, the width may vary as long as the buffer does not interrupt the pedestrian travel path. Items located in the buffer zone can include street furniture, planters, trees planted with tree grates, streetlights, street signs, fire hydrants, etc. Such items are placed in the buffer zones so as not to restrict pedestrian flow in the travel path.

Street tree plantings in tree pits with grates and guards have historically proven to work successfully within these buffer zones. They regulate micro-climate, create a desirable sense of enclosure, promote a local ecological identity and connection to place, and can act as a pleasant integration of nature into an urban environment. For healthy trees, attention should be given to amending the soil and providing drainage within the tree pits. In the event that a paved or vegetative buffer zone is not possible, a row of parked cars or a bike lane can be used to create this buffer.

Type	Sidewalk Width	Planting Strips/ Buffer	
		With Street Tree	No Street Tree
Local residential	5 ft.	4 - 6 ft.	3 - 5 ft.
Thoroughfares/ Collectors	6 - 8 ft.	6 - 10 ft.	5 - 6 ft.
Downtown or business districts	*10 - 15 ft.	n/a	n/a

* Planting strip or tree pit would be located within sidewalk width.

A different type of paving from the sidewalk paving could be considered for the buffer zone for various reasons.

Textured pavements, pavers or pervious pavement can be used to add significant aesthetic value and help define a unique place. Using pervious materials for parking, sidewalk furniture areas, and for frontage zones could reduce environmental concerns. A change in paving type can help distinguish the pedestrian buffer zone from the pedestrian travel path. Sand-set pavers are recommended in the buffer zone for ease of utility maintenance. In designing sidewalk buffers, it is important to provide adequate clearance from potential obstructions.

Additional Considerations

Though the buffers described above each provide some sort of physical barrier from moving vehicular traffic, it is vital for pedestrians on the sidewalk to have a clear view of drivers and vice-versa. This is a particularly important consideration in designing and maintaining planting strips. It is important to eliminate both high and low contact points with tree branches, mast-arm signs, overhanging edges of amenities or furniture. In addition, it is necessary to provide two feet of clear space from store fronts to accommodate shy distance from walls and the opening and closing of doors.

Paths/Greenways

Shared-Use Paths

Shared-use paths are paved road-like facilities designed to be used by pedestrians and bicyclists as well as others, including those on roller blades, skateboards and other alternative modes of transportation. Paths can be paved or unpaved, can be along creeks or streams, and can be designed to accommodate a variety of path users.

The alignment of these corridors should avoid road right-of-way whenever possible to minimize intersection and driveway crossings. Because these paths typically do not cross roads at signalized intersections, they should include pedestrian crosswalks, underpasses, culverts, or overpasses at each road crossing for safety.

Design Criteria

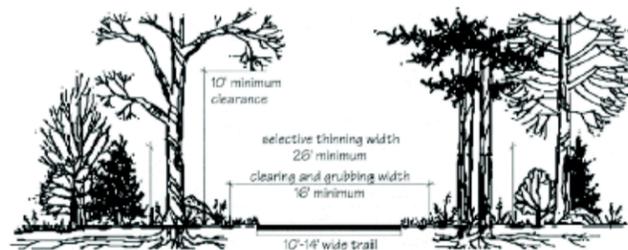
Shared-use paths shall be designed with clearance requirements, minimum radii, stopping sight distance requirements, and other criteria — similar to the criteria for roadway design. High standards should be observed when designing these paths.

Shared-use paths shall be a minimum of 10 feet wide; with minimum 2 foot wide graded shoulders on each side (AASHTO recommends 5 foot shoulders) to protect users from grade differences. These shoulders can be grass, sand, finely crushed rock or gravel, natural groundcover, or other material. Sections of the path where shoulders cannot be provided because of stream crossings or other elevated grade issues should have protection such as rails, fences, or hedges.

Paths of 12'-14' in width are preferred for areas where high volumes of users are expected. If it is not possible to increase the width, including a divider line down the center for bi-directional traffic can be helpful as a means of increasing safety for path users. Width of a path may be reduced to 8 feet, depending upon physical, environmental or right-of-way constraints and topography.

These paths should keep the contour of the land for aesthetic and environmental reasons, but for practicality reasons should not be unnecessarily curved. The minimum radii or curvature recommended by AASHTO is 30-50 feet, and the cross slope should typically be less than 2%. The grade should not be more than 5%, but could reach 11% for short distances according to ADA and AASHTO guidelines. Right angles should be avoided for safety reasons, especially when considering bridge and road crossings.

Vegetation clearing guidelines for path



Vertical and Horizontal Clearance

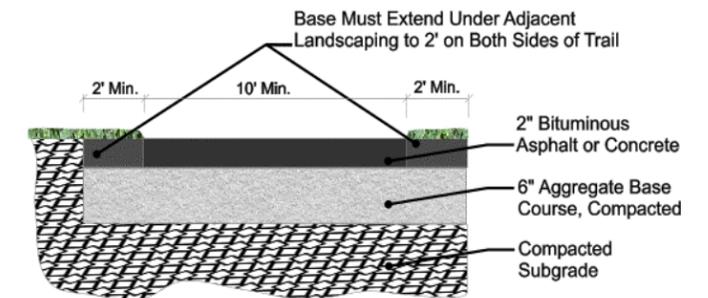
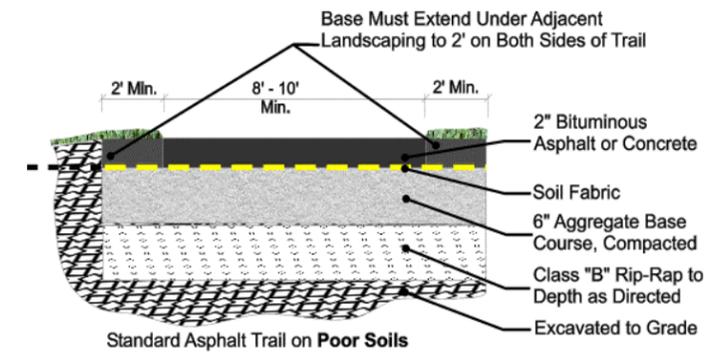
Selective thinning of vegetation along a path increases sight lines and distances and enhances the safety of the path user. This practice includes removal of underbrush and limbs to create open pockets within a forest canopy, but does not include the removal of the forest canopy itself. A total of 8 to 10 feet of vertical clearance should be provided.

Pavement Types

Each path is unique in terms of its location, design, environment, and intended use. For each segment of the path, care should be given to selecting the most appropriate pavement type, considering cost-effectiveness, environmental benefit, and aesthetics.

Typical pavement design for a paved, off-road, shared-use paths and greenway paths should be based upon the specific loading and soil conditions for each project. These paths should be designed to withstand the loading requirements of occasional maintenance and emergency vehicles. Pavement types may vary between conventional or pervious concrete, asphalt, crusher fines, dirt or boardwalk.

Conventional Concrete – In areas prone to frequent flooding, it is recommended that concrete be used because of its excellent durability. Concrete surfaces are capable of holding up well against the erosive action of water, root intrusion and subgrade deficiencies such as soft soils. Of all surface types, it is the strongest and has the lowest maintenance requirement, if it is properly installed. Installation of concrete is the most costly of all surface types, but, when properly installed, requires less periodic maintenance than asphalt or crusher fines. It is recommended to install 4-inch thickness on compacted 4-inch aggregate base course.



Pervious Concrete – This concrete is a recent invention which allows storm water to percolate, reducing pollutants included in the stormwater runoff, when used over permeable soils, superior traction, unfavorable to rollerblading and skateboarding, higher installation cost.

Asphalt – Asphalt is a flexible pavement and can be installed on virtually any slope. Asphalt is smooth, joint free and softer than concrete, preferred by runners, rollerbladers, cyclists, handicap users, and parents pushing baby buggies. In most cases, construction costs significantly less. Standard installation calls for a minimum of 2-inch 1-2 asphalt thickness with 4-inch aggregate base course. Installation of a geotextile fabric beneath a layer of aggregate base course (ABC) can help to maintain the edge of a path. Asphalt pavement is also helpful in supporting a path in poor soils. Asphalt pavement can last up to 20 years with periodic maintenance. One important concern for asphalt paths is the deterioration of path edges. It is important to provide a 2' wide graded shoulder to prevent path edges from crumbling.

Crusher fines – Excellent for running paths, as well as walking, mountain bike and equestrian use. Can be constructed to meet ADA requirements. Paths must be smoothed out and graded several times per year.

Constructed of small, irregular and angular particles of rock, crushed into an interlocking tight matrix. It does require additional maintenance.

Dirt – Recommended for hiking trails, mountain bike tracks, and equestrian uses. It is important to grade swells on steep slopes to avoid erosion.

Boardwalk – A structure made of wooden planks constructed for pedestrians or cyclists along beaches or through wetlands, coastal dunes and other sensitive environments.

Environmental Issues

Environmental protection should be a priority with the planning and construction of a path. Path design, construction type, and construction schedule should all reflect environmental considerations. For example, a path offers some leniency with its alignment compared to a sidewalk, offering opportunities for selective clearing of vegetation. Also, asphalt may not be considered a good surface material in wet areas because of its petroleum base and its tendency to float when flooded.

Greenway paths improve water quality by establishing buffers along creeks and streams. These buffers provide habitat for a diversity of plant and animal species. They serve as natural filters, trapping pollutants from urban runoff, eroding areas and agricultural lands. Stream buffers also reduce the severity of flooding by releasing storm water more gradually, giving the water time to evaporate, or percolate into the ground and recharge aquifers, or be absorbed and transpired by plants. In addition, paths provide more transportation choices for people who wish to walk or bicycle. By doing so, they help to decrease dependence upon automobiles and thus contribute to improved air quality. All proposed paths and other improvements should be designed, constructed and maintained with their ecological value in mind. Any disturbance of natural features should be kept to a minimum and conform to all jurisdictional environmental policy and ordinances.

The protection of streams by easement and the creation of paths along this greenway easement can help to ensure that no dumping occurs in the waterway, as users of this facility would report dumping to authorities. There is a need to help preserve these resources by ensuring that there is sufficient space between the greenway path and the waterway, by avoiding building adjacent to trees, and

by avoiding constructing on rock features, such as escarpments.

Path Amenities and Accessibility

Though paths should be thought of as roadways for geometric and operational design purposes, they require much more consideration for amenities than do roadways. Shade and rest areas with benches and water sources should be designed along shared-use paths. Where possible, vistas should be preserved. Way finding signs (e.g., how far to the library or the next rest area, or directions to restrooms) are important for non-motorized users.

Path amenities should be just as accessible as the paths themselves. Periodic rest areas off to the side of accessible paths are important features as well, and should be level and placed after a long ascent.

Sidepath/Wide Sidewalk

A sidepath is essentially a shared-use path that is oriented alongside a road. The AASHTO *Bike Guide* and *North Carolina Design Guidelines* strongly caution those contemplating a sidepath (or wide sidewalk) facility to investigate various elements of the roadway corridor environment and right-of-way before making a decision. AASHTO provides nine cautions/criteria for designing sidepaths.¹

In addition to the AASHTO cautions, research from the US and abroad confirm that bicycle/ motor vehicle crash rates are higher for bicyclists riding on a sidepath than on a roadway.^{2,3,4,5,6}

¹ AASHTO, pp. 34-35.

² Kaplan, J. "Characteristics of the Regular Adult Bicycle User." FHWA, U.S. Department of Transportation, 1975.

³ Moritz, W. "Adult Bicyclists in the United States - Characteristics and Riding Experience in 1996." *Transportation Research Record 1636*, TRB, Washington, DC, 1998

⁴ Wachtel, A. and D. Lewiston. "Risk Factors for Bicycle-Motor Vehicle Collisions at Intersections." *ITE Journal*, September, 1994.

⁵ Räsänen, M. "How to decrease the number of bicycle accidents? A research based on accidents studied by road accident investigation teams and planning guides of four cities." Finnish Motor Insurer's

Consequently, designers are advised to be very careful when choosing to design sidepaths. There are some high-volume, high-speed roadways where sidepaths are the only bicycle facility that can be provided without very costly changes to the roadway corridor. In these cases, a sidepath may be the preferred alternative. This decision must consider the magnitude of intersecting driveway and roadway conflicts. If possible, sidepaths should be provided on both sides of the roadway to encourage bicyclists to ride in the same direction as adjacent traffic. Finally, the long-term strategy on these roadways should be to widen the road or narrow the lanes to provide additional space for bicyclists in on-road bike lanes or shoulders.



One recently completed research study suggests that there may be ways to mitigate some of the safety risks associated with sidepaths.⁷ This research effort found that crashes occur less often when the speed of the trail user is reduced. This means some sort of "traffic calming" treatment for the trail may be appropriate at intersections. At signalized intersections, it is best to treat the path

Centre, Traffic Safety Committee of Insurance Companies. VALT. Finland, 1995.

⁶ Summala, H., E. Pasanen, M. Räsänen, and J. Sievänen, J. "Bicycle Accidents and Drivers' Visual Search at Left and Right Turns." *Accident Analysis and Prevention*. Elsevier Science Ltd., 1996/03, 28(2), pp.147-53, 1996.

⁷ Petritsch, Landis, Huang, Challa. "Sidepath Safety Model - Bicycle Sidepath Design Factors Affecting Crash Rates," submitted to TRB for publication, July 2005.

roadway crossings as crosswalks, bringing the pathway close to the adjacent roadway so its signals can be incorporated into the overall signalization plan. Additional treatments to the typical pedestrian heads may be desirable at these intersections. At unsignalized intersections it is best to move the sidepath out of the area of the side street intersection with the adjacent roadway. This allows motorists to deal with one intersection at a time. Additionally, bicyclists are only required to scan in two directions.

Roadway Features

Raised or Lowered Medians

Medians are barriers in the center portion of a street or roadway. Medians allow for less interaction between cars and bicycle and pedestrians, and make more opportunities for bicycle lanes. A center turn lane can be converted into a raised or lowered median thus increasing motorist safety. Travel lanes may be narrowed to accommodate the placement of a median. Raised or lowered medians should provide ample cues for people with visual impairments to identify the boundary between the crossing island and the roadway. According to AASHTO guidelines, the length of a median should be at least 20 feet.

A continuous median can present several problems when used inappropriately. If all left-turn opportunities are removed, there runs a possibility for increased traffic speeds and unsafe U-turns at intersections. Additionally, the space occupied may be taking up room that could be used for bike lanes or other treatments. An alternative to the continuous median is to create a segmented median with left turn opportunities.

Sensitivity to large vehicles (buses, trucks and fire equipment) dictates some elements of the median design, curb style, and placement. Median-controlled roadways reduce the number of turning conflicts and are generally preferred for both pedestrians and cyclists over a two-way, left-turn lane (TWLTL) roadway.

Landscaping

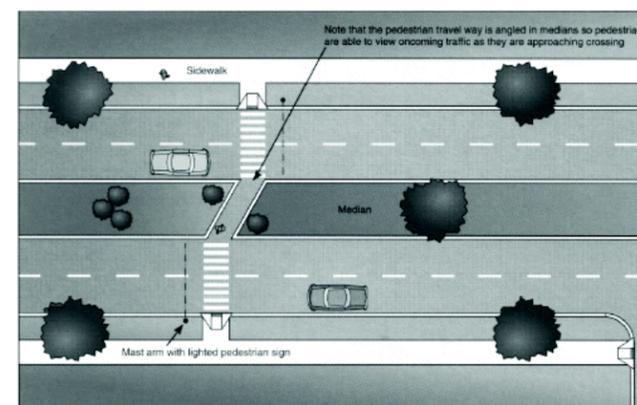
Medians provide opportunities for landscaping that in turn can change the character of the street and help to slow traffic. Landscaping should not obstruct the visibility between motorists and pedestrians.

Median Pedestrian Refuge Islands

When used in conjunction with mid-block or intersection crossings, medians can be used as a crossing island to provide a place of refuge for pedestrians. Pedestrian refuge islands should be designed along roadways with fewer lanes and pedestrian signals that will allow the pedestrian enough time to cross the street.

Median pedestrian refuge islands should be provided as a place of refuge for pedestrians crossing busy or wide roadways at either mid-block locations or intersections. Median crossings should be at least 6 feet wide in order to accommodate more than one pedestrian, while a width of 8 feet (where feasible) should be provided for bicycles, wheelchairs, and groups of pedestrians.

The graphic below indicates the design and markings associated with refuge islands. Note that pavement markings delineate the approach to the islands and that the islands are “split” to allow for a level platform for wheelchair use. Median crossings should possess a minimum of a 4 foot square level landing to provide a rest point for wheelchair users. In cases where there are wide roads and high traffic volumes, a push-button pedestrian signal may be mounted in the refuge area to allow pedestrians to split their trip into two halves as they cross the street. Note that the crosswalk on the right side of the diagram is configured at a skewed angle as it crosses the median. This allows pedestrians to have a better angle of sight as they approach and cross each side of the street. In all cases, a minimum 10-foot travel lane is maintained for pedestrians.



Median Pedestrian Refuge Island

Marked Crosswalks

A marked crosswalk designates a pedestrian right-of-way across a street. It is often installed at controlled intersections or at key locations along the street (a.k.a. mid-block crossings). A study should be completed prior to placing crosswalks to determine the need and the best type and location of that crosswalk.

North Carolina state law permits crossing at all intersections whether the intersection is marked with a crosswalk or not. Every attempt should be made to install crossings in places where pedestrians are most likely to cross. A well-designed traffic calming location is not effective if pedestrians are using other unmodified and potentially dangerous locations to cross the street.

Marked pedestrian crosswalks may be used under the following conditions: 1) At locations with stop signs or traffic signals, 2) At non-signalized street crossing locations in designated school zones, and 3) At non-signalized locations where engineering judgment dictates that the use of specifically designated crosswalks are desirable.

There is a variety of form, pattern, and materials to choose from when creating a marked crosswalk. It is important however to provide crosswalks that are not slippery, are free of tripping hazards, or are otherwise not difficult to maneuver by any person including those with physical mobility or vision impairments.

Although marked crosswalks provide strong visual clues to motorists that pedestrians are present, it is important to consider the use of these elements in conjunction with other traffic calming devices to fully recognize low traffic speeds and enhance pedestrian safety.

Width - Marked crosswalks should not be less than six feet in width. In downtown areas or other locations of high pedestrian traffic, a width of ten feet or greater should be considered.

An engineering study may need to be performed to determine the appropriate width of a crosswalk at a given location.

Paint - Reflective paint is inexpensive but is considered more slippery than other devices such as inlay tape or thermoplastic. A variety of patterns may be employed as detailed in the figure above. Crosswalk markings should be white, per MUTCD. Crosswalk markings should extend the full length of the crossings. Crosswalk lines of 10-12 inches of width are the recommended minimum. Curb

ramps and other sloped areas should be fully contained within the markings.

Pavement Treatment

A variety of colors or textures may be used to designate crossings. These materials should be smooth, skid-resistant, and visible. Although attractive materials such as inlaid stone or certain types of brick may provide character and aesthetic value, the crosswalk can become slippery. Also, as it degrades from use or if it is improperly installed, it may become a hazard for the mobility or vision impaired.

Raised Crosswalk



In areas with a high volume of pedestrian traffic, particularly at mid-block crossings, a crosswalk can be raised to create both a physical impediment for automobiles and a reinforced visual clue to the motorist. Raised crosswalks are typical on two-lane streets with a speed limit of less than 35 mph. In conjunction with raised crosswalks, it is necessary to use detectable truncated dome warnings at the curb lines. Visible pavement markings are necessary for the roadway approach slopes.

Mid-Block Crossings

Midblock crossings can help pedestrian access by supplementing crossing options. Midblock crossings may be used in areas where there are substantial pedestrian generators or where intersections along a roadway are spaced far apart. Mid-block crossings pose special problems for many state and local departments of transportation, since pedestrians will often choose to cross at the location that is the most convenient for them to do so, not necessarily where it is the safest. As a result,

engineers and planners have developed guidelines for mid-block crossings.

Below are some general guidelines on mid-block crossings:

- Provide only on roads with a speed limit of less than 45 MPH.
- Do not install within 300 feet from another signalized crossing point.
- Base installation of a mid-block crossing on an engineering study or pedestrian route placement.
- These crossings are recommended near schools, pedestrian routes, retail areas, recreation, and residential areas.
- Require advance auto-warning signs and good visibility for both the driver and the pedestrian.
- Providing a safe crossing point is necessary since pedestrians tend not to walk far for a signalized intersection.
- Provide an audible tone.
- Include a pedestrian refuge island on wide streets that:
 - a) Have fast vehicle speeds, or with large vehicle or pedestrian traffic volumes.
 - b) Where children, people with disabilities, or elderly people would cross.
 - c) Have complex vehicle movements.

Advance Stop Bars

Vehicle and pedestrian visibility is increased by placing a vehicle advance stop bar 4 to 10 feet back from the pedestrian crosswalk at signalized crossings and mid-block crossings. In certain situations, a larger setback of the advance stop bar may be required. Advance stop bars are 1-2 feet wide and they extend across all approach lanes at intersections. The time and distance created allows a buffer in which the pedestrian and motorist can interpret each other's intentions. Studies have shown that this distance translates directly into increased safety for both motorist and pedestrian. One study in particular claims that by simply adding a "Stop Here for Pedestrians" sign reduced pedestrian motorist conflict by 67%. When this was used in conjunction with advance stop lines, it increased to 90%.

Pedestrian Signals

Traffic signals assign the right of way to motorists and pedestrians and produce openings in traffic flow, allowing pedestrians time to cross the street.

When used in conjunction with pedestrian friendly design, proper signalization should allow for an adequate amount of time for an individual to cross the street. The suggested amount of pedestrian travel speed recommended in the Manual on Uniform Traffic Control Devices (MUTCD) is 4ft/sec. However, a longer crossing time may be necessary to accommodate the walking speed of the elderly or children. Therefore it is suggested that a lower speed of 3.5ft/sec be used whenever there are adequate numbers of elderly and children using an area.

Engineering, as well as urban design judgment, must be used when determining the location of traffic signals and the accompanying timing intervals. Although warrants for pedestrian signal timing have been produced by the MUTCD, each site must be analyzed for factors including new facility and amenity construction (i.e. a popular new park or museum) to allow for potential future pedestrian traffic volume. In addition, creating better access to existing places may in fact generate a higher pedestrian volume.

Pedestrian Signals & Intersections

International Pedestrian Symbols - According to the MUTCD, international pedestrian signal indication should be used at traffic signals whenever warranted. As opposed to early signalization that featured "WALK" and "DON'T WALK", international pedestrian signal symbols



Advance stop bar

Source: Pedestrian and Bicycle Information Center Image Library

should be used on all new traffic signal installations. Existing "WALK" and "DON'T WALK" signals should be replaced with international symbols when they reach the end of their useful life. Symbols should be of adequate size, and clearly visible to make crossing safe for all pedestrians.

Countdown Signals - Countdown signals are pedestrian signals that show how many seconds the pedestrian has remaining to cross the street. The countdown can begin at the beginning of the WALK phase, perhaps flashing white

or yellow, or at the beginning of the clearance, or DON'T WALK phase, flashing yellow as it counts down.

Audible Signals - Audible cues can be used to pulse along with a countdown signal. The signals are used for visually and audibly impaired individuals. Consideration should be paid to the noise impact on the surrounding neighborhoods when deciding to use audible signals.

Pedestrian Signal Timings - The timing of these or other pedestrian signals needs to be adapted to a given situation. There are three types of signal timing generally used: concurrent, exclusive, and leading pedestrian interval (LPI). The strengths and weaknesses of each will be discussed with an emphasis on when they are best employed.

Concurrent signal timing refers to a situation where motorists running parallel to the crosswalk are allowed to turn into and through the crosswalk, left or right, after yielding to pedestrians. This condition is not considered as safe as some of the latter options, however this type of signal crossing generally allows for more pedestrian crossing opportunities and less wait time. In addition, traffic is allowed to flow a bit more freely. Concurrent signal timing is best used where lower volume turning movements exist.

Where there are high-volume turning situations that conflict with pedestrian movements, the exclusive pedestrian interval is the preferred solution. The exclusive pedestrian interval stops traffic in all directions. In order to keep traffic flowing regularly, there is often a greater pedestrian wait time associated with this system.

A proven enhancement that prevents many of the conflicts addressed under either of the former methods is Leading Pedestrian Signal (LPI). An LPI works in conjunction with a concurrent signal timing system and simply gives the pedestrian a few seconds head start on the parallel traffic. An advance walk signal is received prior to a green light for motorists. This creates a situation where the pedestrian can better see traffic, and more importantly, the motorists can see and properly yield to pedestrians. As with the exclusive pedestrian interval, an audible cue will need to accompany the WALK signal for the visually impaired.

The use of infrared or microwave pedestrian detectors has increased in many cities worldwide. These devices replace the traditional push-button system. Although still experimental, they appear to be improving pedestrian signal compliance as well as reducing the number of

pedestrian and vehicle conflicts. Perhaps the best use of these devices is when they are employed to extend crossing time for slower moving pedestrians. Whether these devices are used or the traditional push-button system is employed, it is best to provide instant feedback to pedestrians regarding the length of their wait. This is thought to increase and improve pedestrian signal compliance.



A low cost sign that restricts right-hand turns at a red light.

Source: Pedestrian and Bicycle Information Center

Passive pedestrian detection equipment is becoming more common, and can be recommended in high-volume locations where many pedestrians are crossing a five-lane (or greater) street cross-section.

Right Turn on Red Restrictions

Introduced in the 1970's as a fuel saving technique, the Right Turn on Red (RTOR) law is thought to have had a detrimental effect on pedestrians. The issue is not the law itself but rather the relaxed enforcement of certain caveats within the law such as coming to a complete stop and yielding to pedestrians. Often motorists will either nudge into a crosswalk to check for oncoming traffic without looking for pedestrians or slow, but not stop, for the red-light while making the turn. There is legitimate concern that eliminating an RTOR will only increase the number of right-turn-on-green conflicts where all of the drivers who would normally have turned on red, now are anxious to turn on green.



R10-11



R1-5

Consider elimination on case by case basis and only where there are usually high pedestrian volumes.

Curb Ramps

Curb ramps are critical features that provide access between the sidewalk and roadway for wheelchair users, people using walkers, crutches, or handcars, people pushing bicycles or strollers, and pedestrians with mobility or other physical impairments. In accordance with the 1973 Federal Rehabilitation Act and to comply with the 1990 Federal ADA requirements, curb ramps must be installed at all intersections and mid-block locations where pedestrian crossings exist. In addition, these federal regulations require that all new constructed or altered roadways include curb ramps. Although the federally prescribed maximum slope for a curb ramp is 1:12 or 8.33% and the side flares (or "sidewings" as listed in the graphic) of the curb ramp must not exceed a maximum slope of 1:10 or 10.0%, it is recommended that much less steep slopes be used whenever possible. It is also recommended that two separate curb ramps be provided at each intersection. The minimum width for the curb ramp is four feet. With only one large curb ramp serving the entire corner, there is not safe connectivity for the pedestrian. Dangerous conditions exist when the single, large curb ramp inadvertently directs a pedestrian into the center of the intersection, or in front of an unsuspecting, turning vehicle. To provide a tactile warning to the visually impaired, raised truncated domes with a color contrast to the background material (typically concrete) should be used. Two separate curb ramps, one for each crosswalk, should be provided at each corner of an intersection.

For additional information on curb ramps see the Federal Highway Administration and Designing Sidewalks and Trails for Access, Parts I and II, by the Federal Highway Administration.

Curb Extensions ("Bulb Outs," "Chokers," "Neckdowns") and Curb Radii

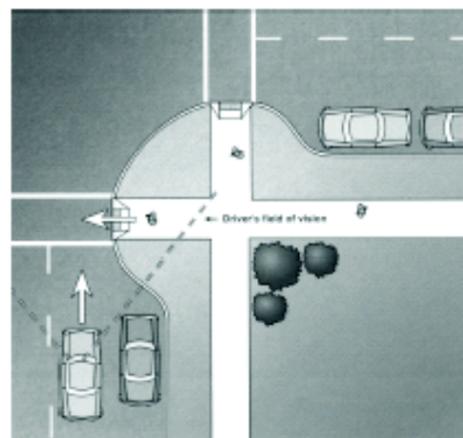
A curb extension, or bulb out, is an extension of the sidewalk into the parking lane of a street. Because these curb extensions physically narrow the roadway, a pedestrian's crossing distance and consequently the time spent in the street is reduced. In addition, curb extensions may encourage motorists to drive slower by narrowing the travel lane and reducing vehicular speeds during turning movements at intersections. Curb extensions can be

placed either at mid-block crossings or at intersections. Curb extensions at midblock locations are known as “chokers.” Curb extensions at intersections can also be referred to as “neckdowns.”



Sightlines and pedestrian visibility are reduced when motor vehicle parking encroaches too close to corners creating a dangerous situation for pedestrians. When placed at an intersection, curb extensions preclude vehicle parking too close to a crosswalk. Also, curb extensions at intersections can greatly reduce turning speed, especially if curb radii are set as tight as possible. Finally, curb extensions also reduce travel speeds when used in mid-block crossings because of the reduced street width. Curb extensions should only be used where there is an existing on-street parking lane and should never encroach into travel lanes, bike lanes, or shoulders.

By reducing a pedestrian’s crossing with a bulb out, less time is spent in the roadway, and pedestrian vehicle conflicts are reduced.



Posted Speed Limit (mph)	Minimum Curb Radius (Feet)
Residential Street, 15-25 mph	5
Residential Street, 25-35 mph	10
Collector Street, 30-45 mph	20

Maximum Desired Speed and Curb Radii

The following table illustrates the relationship between posted speeds and the curb (often called “corner”) radius. Motorists will travel more slowly around corners with smaller curb radii even without the use of curb extensions.

Lighting

Proper lighting in terms of quality, placement, and sufficiency can greatly enhance a nighttime urban experience as well as create a safe environment for motorists and pedestrians. Two-thirds of all pedestrian fatalities occur during low-light conditions. Attention should be paid to lighting walkways and crossings, so that there is sufficient ambience for motorists to see pedestrians. Pedestrian lighting should be considered for areas of higher pedestrian volume, including downtown and key intersections. Lighting in commercial areas should be provided on both sides of the street.

In most cases, roadway street lighting can be designed to illuminate the sidewalk area as well. The visibility needs of both pedestrian and motorist should be considered. In commercial or downtown areas and other areas of high pedestrian volumes, the addition of lower level, pedestrian-scale lighting to streetlights with emphasis on crossings and intersections may be employed to generate a desired ambience. Lighting for sidewalks and off-street paths should be provided where considerable pedestrian traffic is expected at night, where there is insufficient available light from the surrounding area, and at all designated road crossings.

Each lighting situation is unique and must be considered on a case-by-case basis. Average maintained horizontal illumination levels of 5 lux (0.5 foot candles) to 22 lux (2 foot

candles) should be considered. Sometimes, higher levels are advisable in special areas where security problems might exist. Light poles should generally be 12 to 15 ft. high for lighting pedestrian areas. Luminaries and poles should be at a scale appropriate for pedestrian use.

Light fixtures, as well as other on-street facilities, like street furniture, can add a great deal in terms of street aesthetics and reinforce community identity. It is recommended that the community adopt a particular style of street lighting fixture appropriate for the municipality’s identity and coordinate this choice with stylistic choices in other street facilities.

Sophisticated lighting needs to be directional and focused upon the street. A flat lens light is the best choice in lighting the street. Fixtures that produce glare should be avoided, as they produce diffused light, and sometimes make visibility difficult. The pedestrian-level lighting that is preferred includes mercury vapor, metal halide, or incandescent. Although low-pressure sodium lights may be energy-efficient, they are less desirable due to the color distortion they create. High-pressure sodium lights are preferable, as they create less color distortion.

Lighting should be sufficient so that pedestrians can see cars, and cars can see pedestrians. However, overlighting of an area can produce an environment that is unattractive to pedestrians, and the resulting glare becomes an environmental issue.



Source: Pedestrian and Bicycle Information Center

It is important to note that every effort should be made to address and prevent light pollution. Also known as photo pollution, light pollution is “excess or obtrusive light created by humans.” Whenever urban improvements are made where lighting is addressed, a qualified lighting expert should be consulted early in the process. This individual should not only create a safe and attractive ambience,

but will do so with the minimum of fixtures, an awareness of the importance of minimizing photo pollution,

and with a focus on minimizing future energy use. A thoughtful plan of how and where to light will reap benefits not only in potential reduced infrastructure cost, but future energy costs as well.

Signage

Signage can be an effective tool to alert drivers to reduce speeds and allow pedestrians to exercise extra caution. It is important not to cause “clutter” when using a variety of signage. This can cause complacency and noncompliance with signs in general. Signs, and the sign text, should be large enough to be seen from a distance. It is imperative that all signs be properly located so as not to obstruct the pedestrian and visibility triangles of motorists.

Signage is governed by the MUTCD, which provides specifications on the design and placement of signage on the right-of-way. There are three types of signage: 1) *Wayfinding* signage 2) *Regulatory* and 3) *Warning signs*. Maintenance of signage is as important as walkway maintenance. Clean, graffiti free, and relevant signage enhances guidance, recognition, and safety for pedestrians.

Wayfinding

Wayfinding or guide signs give notice of traffic laws or regulations that pedestrians, cyclists, and motorists are required by law to follow. Wayfinding signage should orient and communicate in a clear, concise and functional manner. It should enhance pedestrian circulation and direct visitors and residents to important destinations. In doing so, the goal is to increase the comfort of visitors and residents while helping to convey a local identity. Regulations should also address the orientation, height, size, and sometimes even style of signage to comply with a desired local aesthetic.

It is recommended that municipalities adopt consistent and descriptive graphics to identify pedestrian routes. This signage system would assure pedestrians that they are safe and will not encounter gaps in facilities along these routes. A map should be incorporated into each route illustrating the entire pedestrian system and their location. Bus stops, destinations, and mileage should also be identified on the signs.

Regulatory Signs and Warning Signs

Regulatory signs give notice of traffic laws or regulations that pedestrians, cyclists and motorists are required by law to follow. Warning signs call attention to unexpected conditions on, or adjacent to, a roadway, bike or pedestrian facility that can be potentially hazardous to users.

Pedestrian-related signage serves primarily to notify motorists and others of the presence of pedestrians. The intended effect is to cause motorists drive more cautiously and reduce their speeds, thereby improving the safety for pedestrians in the given area. Signs can be used in a variety of places, including at crosswalks, at intersections, in-street, and near schools. National standards for sign placement and use can be found in the Manual for Uniform Traffic Control Devices (MUTCD). The MUTCD provides guidance for warning signs which can be used at both crosswalks, or along the roadway:

The following are some recommended signs which municipalities should consider installing. For more signs and more detailed guidelines for sign installation and use, the municipality should consult the MUTCD. The S4-3/R1-6 as well as the W11-2 signs are regulatory, while the sign furthest to the right is a wayfinding signs. The remaining signs directly below are warning signs.

The first sign is usually installed within the street to warn motorists to yield to pedestrians in a crosswalk. The “school” sign (MUTCD S4-3) is added to the in-street sign for placement near a school. The second and third signs are commonly used pedestrian warning signs, while the fourth and fifth signs notify motorists of specific instances to watch for pedestrians. The fourth sign, “Turning Traffic”, is usually placed at intersections to warn motorists that are turning right or left to yield to pedestrians in crosswalks. The sign at the far right is an examples of typical wayfinding signage to help direct cyclists at major decision points along a route. For the fifth sign, the top sign can either be combined with the smaller “ahead” sign or the arrow symbol to indicate the presence of a crosswalk to motorists in a school zone.



School Zone Treatments / School Routes

Section 7 of the MUTCD is entirely devoted to “Traffic Controls for School Areas” and is the dominant guidance available to municipalities for installing signs and markings in school zones. The section provides valuable additional guidance for school crossing treatments that can be utilized for the planning and design of schools that should be considered when making safety improvements.

MUTCD Pedestrian-Related Signage
Regulatory Signs



School, Warning, and Informational Signs



Sign	MUTCD Code	MUTCD Section	Conventional Road	
Yield here to Peds	R1-5	2B.11	450x450 (18x18)	Crosswalks
Yield here to Peds	R1-5a	2B.11	450x600 (18x24)	
In-Street Ped Crossing	R1-6, R1-6a	2B.12	300x600 (12x36)	
Peds and Bikes Prohibited	R5-10b	2B.36	750x450 (30x18)	
Peds Prohibited	R5-10c	2B.36	600x500 (24x12)	
Walk on Left Facing Traffic	R9-1	2B.43	450x600 (18x24)	
Cross only at Crosswalks	R9-2	2B.44	300x450 (12x18)	
No Ped Crossing	R9-3a	2B.44	450x450 (18x18)	
No Hitch Hiking	R9-4	2B.43	450x600 (18x24)	
No Hitch Hiking (symbol)	R9-4a	2B.43	450x450 (18x18)	
Bikes Yield to Peds	R9-6	9B.10	300x450 (12x18)	School, Warning, and Informational Signs
Ped Traffic Symbol	R10-4b	2B.45	225x300 (9x12)	
School Advance Warning	S1-1	7B.08	900x600 (36x36)	
School Bus Stop Ahead	S3-1	7B.10	750x750 (30x30)	
Pedestrian Traffic	W11-2	2C.41	750x750 (30x30)	
Playground	W15-1	2C.42	750x750 (30x30)	
Hiking Trail	I-4	--	600x600 (24x24)	

1. Larger signs may be used when appropriate.
 2. Dimensions are shown in millimeters followed by inches in parentheses and are shown as width x height.
 3. First dimension in millimeters; dimensions in parentheses are in inches.
 4. All information in table taken directly from MUTCD.

Street Trees

Street trees enhance the landscape for pedestrians, creating an attractive and comfortable environment for walking. Street trees also act as a traffic calming device, encouraging drivers to drive more slowly. In addition, a large line of leafy street trees can absorb engine noise, providing enough of a buffer to block street traffic noise from reaching private yards and homes. Trees also improve air quality by consuming carbon dioxide and emitting oxygen. Street trees may also increase real estate values by increasing curb appeals of homes. This Plan strongly recommends that municipalities adopt a tree ordinance to give direction for tree installation and maintenance.

Planting requirements - All street trees should be selected according to the standards described in the American Standard for Nursery Stock of the American Nursery and Landscape Association. Install and maintain trees according to the International Society of Arboriculture (ISA) guidelines. A landscape architect should be consulted to select the proper tree and planting technique.

Visibility - Street trees should never be allowed to obscure the line of sight between pedestrians and drivers. A clear view should be maintained between 30" and 72" above street. This area must be free of limbs and foliage for safe cross visibility. Other plantings should also follow this rule within 50 ft. proximity of street corners and other designated crossing points. In order to maintain visibility, provide shade, and a comfortable pedestrian corridor, street trees should primarily be vase shaped, columnar, or oval in form (habit) with large spreading crowns.

Roots - Avoid trees with aggressively invasive roots adjacent to pavement or buildings.

Size - Large trees (growing over 35 ft. in height at maturity) are preferred as street trees except near overhead utility lines. Small trees (growing less than 35 feet in height at maturity) should be used in areas directly adjacent to or under utility lines.

Spacing - typically, large trees should be spaced approximately 40 – 50 feet on center when planted in a line, and small trees spaced at approximately 30 ft. The spacing of street trees in a planting strip will depend upon the size of the tree and upon the demand for sidewalk furniture and parking.

Tree Pits and Tree Grates - Street trees should generally be located in open planting strips. However, tree pits with tree grates may be a practical, although expensive, alternative in very high pedestrian traffic areas. Tree grates should generally not encroach upon the travel path. For optimal pedestrian safety and comfort, all tree grates used should meet the ADA standards for "accessible pathway".

Maintenance - Trees and landscaping require ongoing maintenance. Local municipalities typically take responsibility for maintenance of these amenities, although there are instances where local community groups have provided funding and volunteers for maintenance. In order to reduce the amount of maintenance necessary, it is helpful to use native plant material that is already adapted to the local soil and climate. Growth pattern and space for maturation, particularly with larger tree plantings, are important to avoid cracking sidewalks and causing a pedestrian obstruction.



Pedestrian Overpass/Underpass

Pedestrian overpasses and underpasses efficiently allow for pedestrian movement across busy thoroughfares. These types of facilities typically feature very high construction costs.



Attempting to separate pedestrians from the street is often problematic. As shown here, given the opportunity, many choose to cross at street level.

These facilities are problematic in many regards and should only be considered when no other solution is expected to be effective. Research shows that pedestrians will avoid using such a facility if they perceive the ability to cross at grade as taking about the same amount of time. ADA requirements for stairs, ramps, and elevators often require the construction of an enormous structure that is visually disruptive.

Overpasses and underpasses should only be considered with rail lines, high volume traffic areas such as freeways, and other high volume arteries.

In addition, they should be considered only for crossing arterials with greater than 20,000 vehicle trips per day and speeds 35 - 40 mph and over. Minimum widths for these structures should follow the guidelines for sidewalk width. Underpasses should have a daytime illuminance minimum of 10 fc achievable through artificial and/or natural light provided through an open gap to sky between the two sets of highway lanes, and a night time level of 4 foot-candle. In underpasses, where vertical clearance allows, the pedestrian walkway should be separated from the roadway by more than a standard curb height. Consider

acoustics measures within underpasses to reduce noise impacts to pedestrians and bicyclists.

Transit Stop Treatments

To accommodate as many users as possible, a transit system must include well-planned routes and safe, accessible stops. Bus stops should be designed to accommodate the appropriate number of users and should be highly visible to pedestrians and motorists.

Bus or other transit stops should be located in places that are most suitable for passengers. For example, stops should be provided near higher density residential areas, commercial or business areas, and schools, and connected to these areas by sidewalk.

As with any human scale design element discussed, safety is an important factor to consider when locating bus stops. In the case of a bus stop, special attention should be paid to the number of lanes and direction of traffic when deciding to locate a stop on the near or far side of an intersection. Also special consideration must be paid to the wheelchair lifts in terms of how and where the mobility impaired will exit and enter the bus. It is good practice to construct a transit stop just beyond an intersection, which encourages riders to cross the intersection behind the bus and in full view of approaching motorists. The location also should be set back enough from the roadway to buffer users from traffic without impeding pedestrian activity.

Safety and comfort at a bus stop is determined by the amenities offered to users. Bus stop signage including route information, shelter with seating, trash cans, and bicycle parking encourage transit use. Pedestrian-level lighting improves the visibility of pedestrians to motorists and increases the level of safety for users. At a minimum, marked crosswalks (especially at mid-block stops), curb ramps, and proper sidewalk widths should be considered.

Bridges

Provisions should be made to include a walking facility as a part of vehicular bridges, if there is an indication that pedestrians would use the facility. It is important to consider the needs of pedestrians when planning for a bridge replacement or the construction of a new bridge. Sidewalks on bridges should be a minimum of 5 feet wide, with a minimum handrail height of 42."

*Images Right: standard DOT bridge with sidewalk and railing
Bottom High quality bus station amenities*



Traffic Calming Techniques

Traffic Calming Devices (TCDs) are physical measures in street design that cue drivers to slow down. The effectiveness of TCDs does not depend upon a driver’s compliance with traffic signs and signals, or police enforcement, though they may be used effectively in conjunction with them. In coordinated combinations, TCDs reduce speeds, alert drivers to pedestrians, and reduce the severity of collisions. TCDs listed below are generally recommended for consideration on a project-by-project basis. These include traffic circles, roundabouts, speed humps, speed tables, textured pavements and curb extensions (bulbouts). Curb extensions are discussed in detail earlier in this section.

Neighborhood Traffic Circles - a small, raised circular island positioned in the center of an intersection, designed to slow traffic by requiring traffic to maneuver around the island.

Roundabout -circular intersection with raised circular islands in the center, with “yield on entry” and deflecting islands on all approaches designed to slow traffic. Traffic proceeds in a counterclockwise direction. Roundabouts are highly engineered to accommodate specific traffic types, volumes and speeds.

Speed Humps - raised sections of a roadway. They are similar to a speed bump in their application, but a speed hump is wider and has a sloping side taper so they are easy to navigate at slower speeds. They are placed across residential streets to control chronic speeding problems where other methods of slowing traffic have not been effective. They are designed to calm traffic in residential areas, particularly near parks and schools. The physical impact on passing vehicles is less severe at slower speeds than at higher speeds. Studies indicate that speed humps reduce speeds by approximately six miles per hour. A standard speed hump has a length of approximately 22 feet and a height of 3 and 5/8 inches at its center.

Speed Tables - flat-topped speed humps typically long enough for the entire wheelbase of a passenger car to rest on the flat section. They are often constructed with brick or other textured materials on the flat section.

Textured Pavements - stamped pavement or alternate paving materials to create an uneven surface for vehicles and pedestrians to traverse. Textured street pavement provides a visual and tactile cue for both drivers that they are driving in an area of high pedestrian usage. Similarly,

they cue pedestrians that they are entering a vehicular zone, and are a particularly effective treatment to warn visually impaired pedestrians. Textured street pavements should be used in areas of substantial pedestrian activity and where noise is not a major concern.

Curb Extensions -rounded extensions of the curb which slow vehicles by alerting drivers to potential pedestrians, visually tightening the vehicular path, and physically reduces turning radii, thereby encouraging a decrease in vehicle speeds. Curb extensions also increase safety for pedestrians by shortening the road crossing distance. Curb extensions are covered in more detail earlier in this section.



Top left: neighborhood traffic circle

Top right: modern roundabout

Bottom left: raised crosswalk

Bottom right: Speedbump

Temporary Work

Temporary work should be accessible. Where construction blocks a public sidewalk for more than a short time, an alternate accessible route should be provided that is cane-detectable. Sidewalk barriers should be continuous and cane-detectable as well. Temporary events and facilities should also meet accessibility criteria.



ⁱ Vanguard Company, accessed November, 2005
(<http://www.vanguardonline.com/downloads.asp>)

ⁱⁱ City of Durham Public Works “Reference Guide for Development,”
Table of Minimum Design Requirements for Public and Private
Residential Streets. Rev. October, 2003. Page 154.
(http://www.ci.durham.nc.us/departments/works/handbook/reference_guide.pdf)

Cornelius Comprehensive Pedestrian Plan

1. INTRODUCTION

The Town of Cornelius needs your input concerning pedestrian access and mobility in Town. Your responses to this questionnaire will be combined with other materials collected during the study to help shape recommendations of the Comprehensive Pedestrian Plan.

1. How long have you lived in Cornelius?

Less than one year

1-5 years

5-10 years

More than 10 years

Do not reside in Cornelius

2. How old are you?

Under 18

18-24

25-34

35-44

45-54

55-64

65 or older

3. How important to you is the goal of creating a walkable community?

Very important

Somewhat important

Not important

Don't know

4. How pedestrian friendly is Cornelius today?

Very pedestrian friendly

Somewhat pedestrian friendly

Somewhat unfriendly to pedestrians

Very unfriendly to pedestrians

Cornelius Comprehensive Pedestrian Plan

5. How often do you make walking trips now?

5+ times per week

3-4 times a week

At least once a week

A few times a month

Never

6. For what purpose do you walk now or would you want to walk in the future? (check all that apply)

Fitness or recreation

Primary transportation

Social visits

Shopping

Walking the baby or dog

Other (please specify)

7. What are the biggest factors that discourage walking in Town? (check all that apply)

Lack of sidewalks or trails

Poorly maintained sidewalks

Traffic

Unsafe road crossings

Lack of nearby destinations

Aggressive motorists behavior

Physical barriers

Lack of time

Lack of interest

Other (please specify)

Cornelius Comprehensive Pedestrian Plan

8. What destinations would you most like to get to in Town? (select your top THREE destinations)

- Trails and greenways
- Parks
- Shopping
- Restaurants
- Civic buildings (library, town hall)
- Work
- Entertainment
- Public Transportation
- School
- Other (please specify)

9. The Town has limited funding to address all of the pedestrian needs in Town. To help prioritize, which types of improvements are most important to you (select your top THREE)

- Replace/repair existing sidewalks
- Fill in the gaps in the existing sidewalk network
- Add new sidewalks
- Add crosswalks and other improvements at key crossings
- Construct a greenway trail/multi-use path system
- Plant street trees
- Create more pedestrian friendly destinations
- Improve public transportation
- Other (please specify)

Cornelius Comprehensive Pedestrian Plan

10. Rate the importance of adding crosswalk and sidewalk improvements to the following locations.

	Very important	Important	Somewhat important	Not important
Transit stops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Schools	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Retail developments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grocery stores	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pharmacies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Parks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Neighborhoods	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (please specify) _____				

11. What do you think are the top THREE roadway corridors most needing pedestrian facilities or pedestrian facility improvements?

- _____
- _____
- _____

12. What do you think are the top THREE intersections most needing pedestrian facilities or pedestrian facility improvements?

- _____
- _____
- _____

13. What strategies would you be supportive of the Town using to develop/improve pedestrian facilities in Town? (check all that apply)

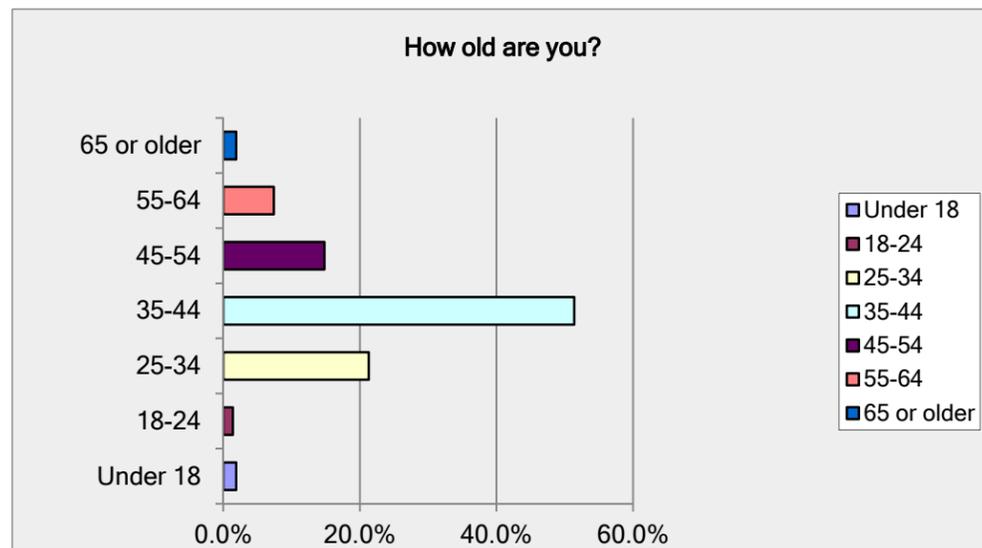
- Provisions in the Land Development Code (LDC)
- Dedicated funding sources in Town budget
- Bonds
- Grants
- Private financing
- Other (please specify)

Question 1: How long have you lived in Cornelius?

How long have you lived in Cornelius?		
Answer Options	Response Percent	Response Count
Less than one year	6.0%	13
1-5 years	23.1%	50
5-10 years	38.4%	83
More than 10 years	28.2%	61
Do not reside in Cornelius	4.2%	9
<i>answered question</i>		216

Question 2: How old are you?

How old are you?		
Answer Options	Response Percent	Response Count
Under 18	1.9%	4
18-24	1.4%	3
25-34	21.3%	46
35-44	51.4%	111
45-54	14.8%	32
55-64	7.4%	16
65 or older	1.9%	4
<i>answered question</i>		216



Question 3: How important to you is the goal of creating a walkable community?

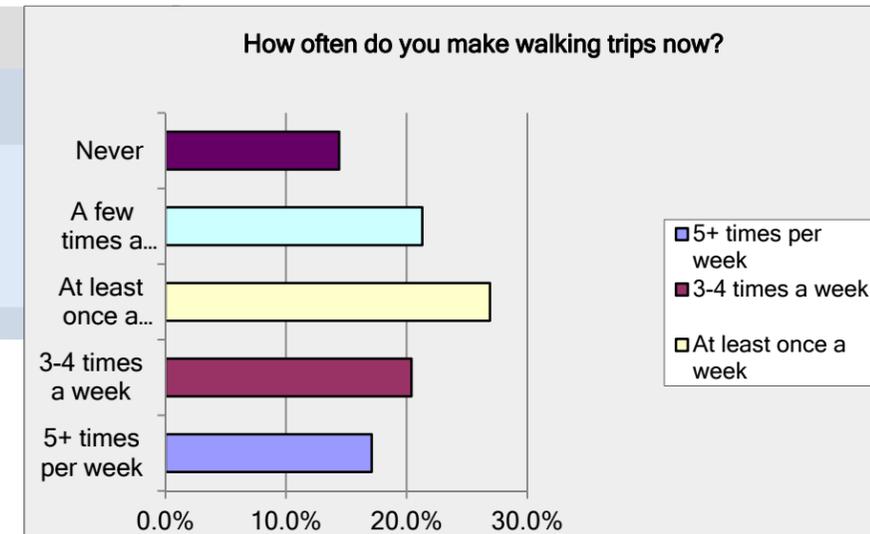
How important to you is the goal of creating a walkable community?		
Answer Options	Response Percent	Response Count
Very important	74.1%	160
Somewhat important	20.4%	44
Not important	4.2%	9
Don't know	1.4%	3
<i>answered question</i>		216

Question 4: How pedestrian friendly is Cornelius today?

How pedestrian friendly is Cornelius today?		
Answer Options	Response Percent	Response Count
Very pedestrian friendly	13.9%	30
Somewhat pedestrian friendly	55.6%	120
Somewhat unfriendly to pedestrians	24.5%	53
Very unfriendly to pedestrians	6.0%	13
<i>answered question</i>		216

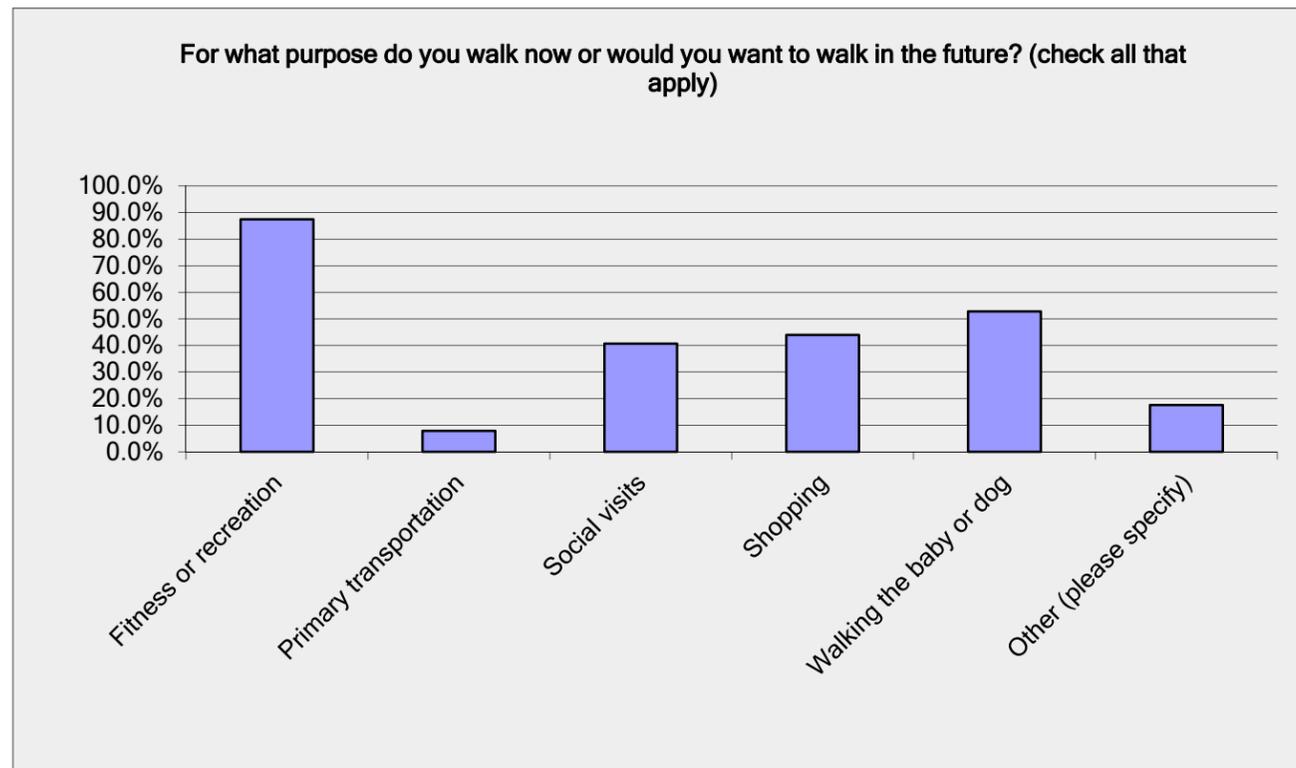
Question 5: How often do you make walking trips now?

How often do you make walking trips now?	
Answer Options	Response Percent
5+ times per week	17.1%
3-4 times a week	20.4%
At least once a week	26.9%
A few times a month	21.3%
Never	14.4%
<i>answered question</i>	



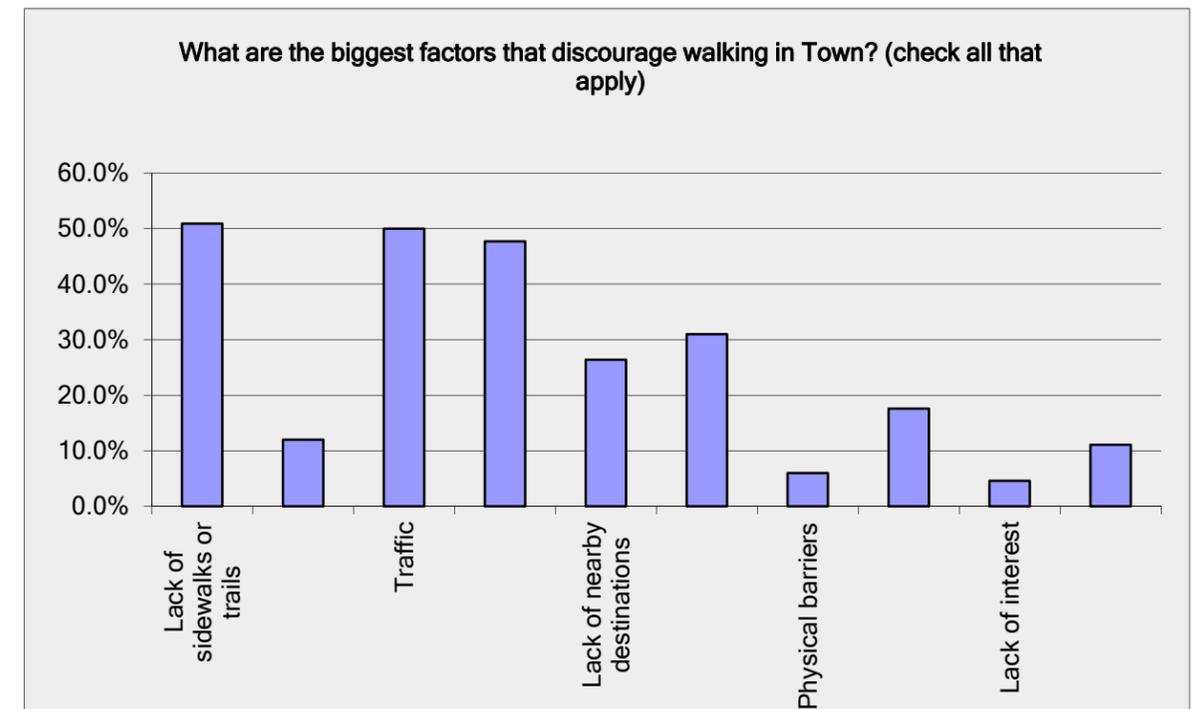
Question 6: For what purpose do you walk now or would you want to walk in the future?

For what purpose do you walk now or would you want to walk in the future? (check all that apply)		
Answer Options	Response Percent	Response Count
Fitness or recreation	87.5%	189
Primary transportation	7.9%	17
Social visits	40.7%	88
Shopping	44.0%	95
Walking the baby or dog	52.8%	114
Other (please specify)	17.6%	38
<i>answered question</i>		216



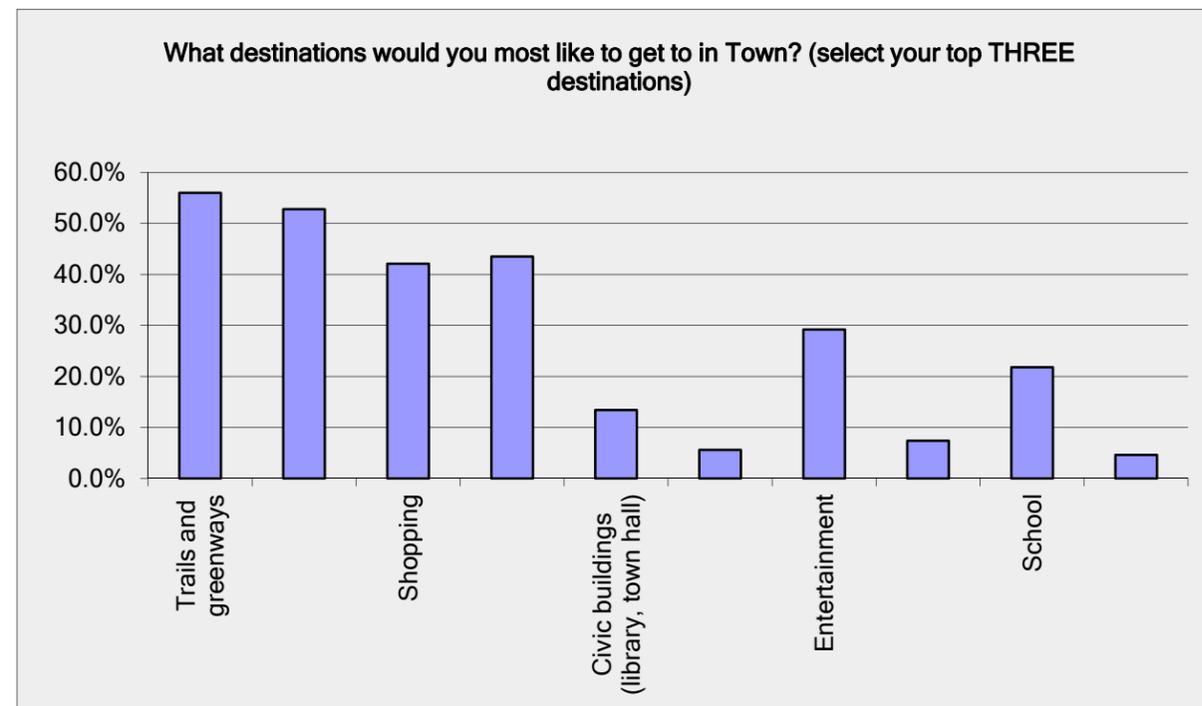
Question 7: What are the biggest factors that discourage walking in Town?

What are the biggest factors that discourage walking in Town? (check all that apply)		
Answer Options	Response Percent	Response Count
Lack of sidewalks or trails	50.9%	110
Poorly maintained sidewalks	12.0%	26
Traffic	50.0%	108
Unsafe road crossings	47.7%	103
Lack of nearby destinations	26.4%	57
Aggressive motorists behavior	31.0%	67
Physical barriers	6.0%	13
Lack of time	17.6%	38
Lack of interest	4.6%	10
Other (please specify)	11.1%	24
<i>answered question</i>		216



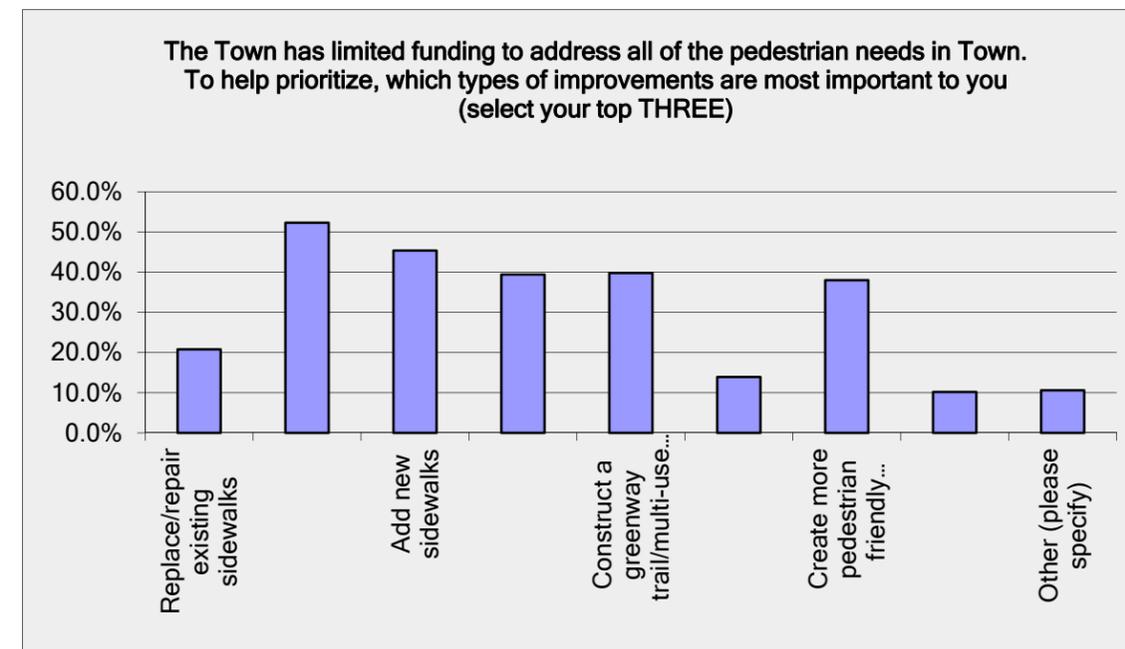
Question 8: What destinations would you most like to get to in Town?

What destinations would you most like to get to in Town? (select your top THREE destinations)		
Answer Options	Response Percent	Response Count
Trails and greenways	56.0%	121
Parks	52.8%	114
Shopping	42.1%	91
Restaurants	43.5%	94
Civic buildings (library, town hall)	13.4%	29
Work	5.6%	12
Entertainment	29.2%	63
Public Transportation	7.4%	16
School	21.8%	47
Other (please specify)	4.6%	10
<i>answered question</i>		216



Question 9: The Town has limited funding to address all of the pedestrian needs in Town. To help prioritize, which types of improvements are most important to you?

The Town has limited funding to address all of the pedestrian needs in Town. To help prioritize, which types of improvements are most important to you (select your top THREE)		
Answer Options	Response Percent	Response Count
Replace/repair existing sidewalks	20.8%	45
Fill in the gaps in the existing sidewalk network	52.3%	113
Add new sidewalks	45.4%	98
Add crosswalks and other improvements at key crossings	39.4%	85
Construct a greenway trail/multi-use path system	39.8%	86
Plant street trees	13.9%	30
Create more pedestrian friendly destinations	38.0%	82
Improve public transportation	10.2%	22
Other (please specify)	10.6%	23
<i>answered question</i>		216



Town of Cornelius

Question 10: Rate the importance of adding crosswalk and sidewalk improvements to the following locations.

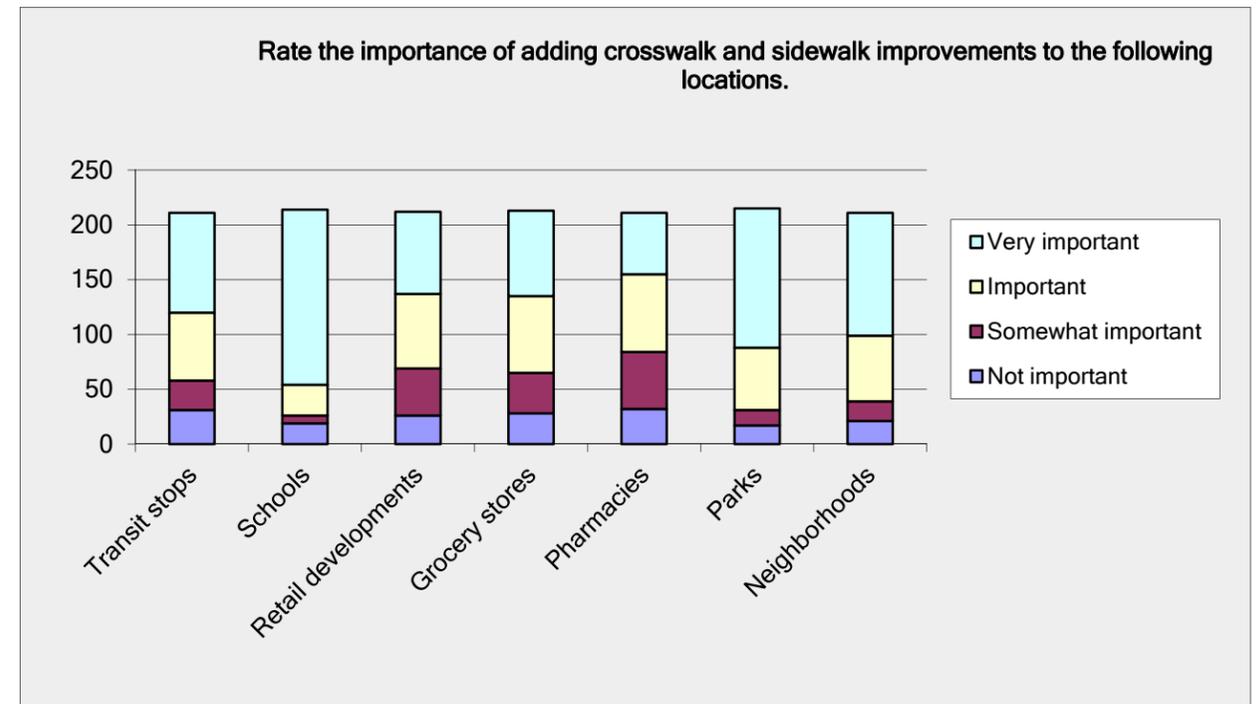
Rate the importance of adding crosswalk and sidewalk improvements to the following locations.					
Answer Options	Very important	Important	Somewhat important	Not important	Response Count
Transit stops	91	62	27	31	211
Schools	160	28	7	19	214
Retail developments	75	68	43	26	212
Grocery stores	78	70	37	28	213
Pharmacies	56	71	52	32	211
Parks	127	57	14	17	215
Neighborhoods	112	60	18	21	211
Other (please specify)					22
<i>answered question</i>					216

Question 11: What do you think the top three Roadway corridors most needing pedestrian facilities or pedestrian facility improvements?

1. West Catawba Avenue
2. US 21
3. NC 115

Question 12: What do you think are the Top THREE intersections most needing pedestrian facilities or pedestrian facility improvements?

1. West Catawba Avenue at Bailey Road
2. US 21 at Catawba Avenue
3. West Catawba Avenue at NC 73



Question 13: What strategies would you be supportive of the Town using to develop/improve pedestrian facilities in Town?

What strategies would you be supportive of the Town using to develop/improve pedestrian facilities in Town? (check all that apply)		
Answer Options	Response Percent	Response Count
Provisions in the Land Development Code (LDC)	37.5%	81
Dedicated funding sources in Town budget	68.5%	148
Bonds	39.8%	86
Grants	46.3%	100
Private financing	27.8%	60
Other (please specify)		41
<i>answered question</i>		216

Appendix D contains a complete copy of the Community Inventory and Assessment Report developed as a part of the Town of Cornelius Comprehensive Master Plan



Charting Course into the Future:
Town of Cornelius Comprehensive Master Plan



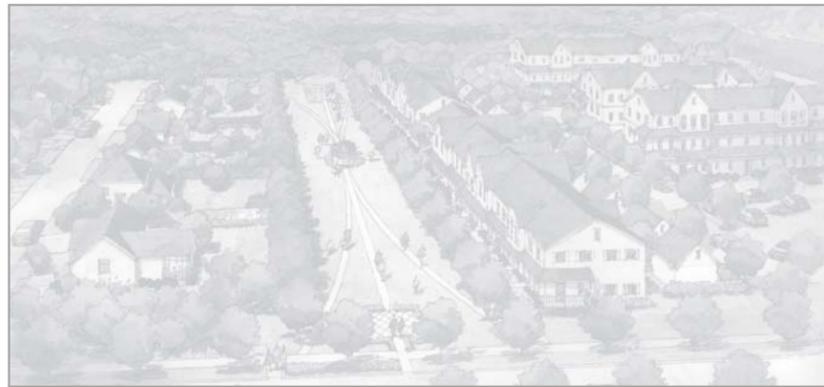
■ **Community Inventory and Assessment Report**

December - 2010



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Section A:
■ Introduction

Community Inventory & Assessment

Section A - Introduction

The Community Inventory and Assessment (CIA) Report is a supporting document to the Navigate Cornelius Comprehensive Master Plan. The Report documents existing conditions and community features noted in the planning area, identifies current deficiencies, and provides a benchmark for evaluating future year impacts.

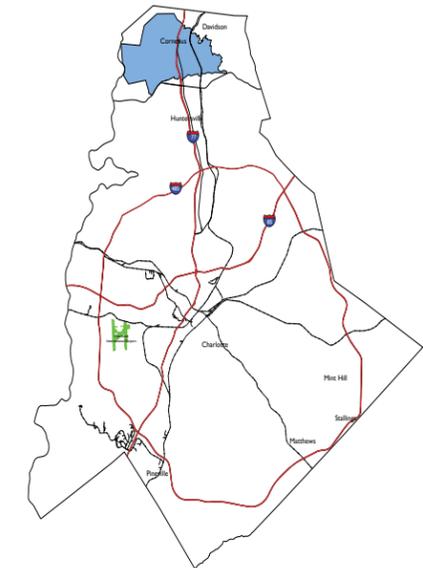
The CIA Report also describes other planning initiatives in the region and their impact on the Town of Cornelius. Finally, the CIA Report includes a community views section to capture comments raised by stakeholders involved in the planning process.

Description of the Study Area

The Town of Cornelius is located in northern Mecklenburg County, on Lake Norman. It is bounded to the north and east by the Town of Davidson, to the south by the Town of Huntersville, and to the west by approximately 60 miles of shoreline.

The study area for Navigate Cornelius includes all land within both the corporate limits and the extraterritorial jurisdiction (i.e., sphere of influence). The sphere of influence is a mutually agreed upon boundary which the Town may annex in the future. The Town exercises planning, zoning, and subdivision powers over the entire study area.

A map of the study area can be found in Exhibit A at the end of this section.



Report Organization

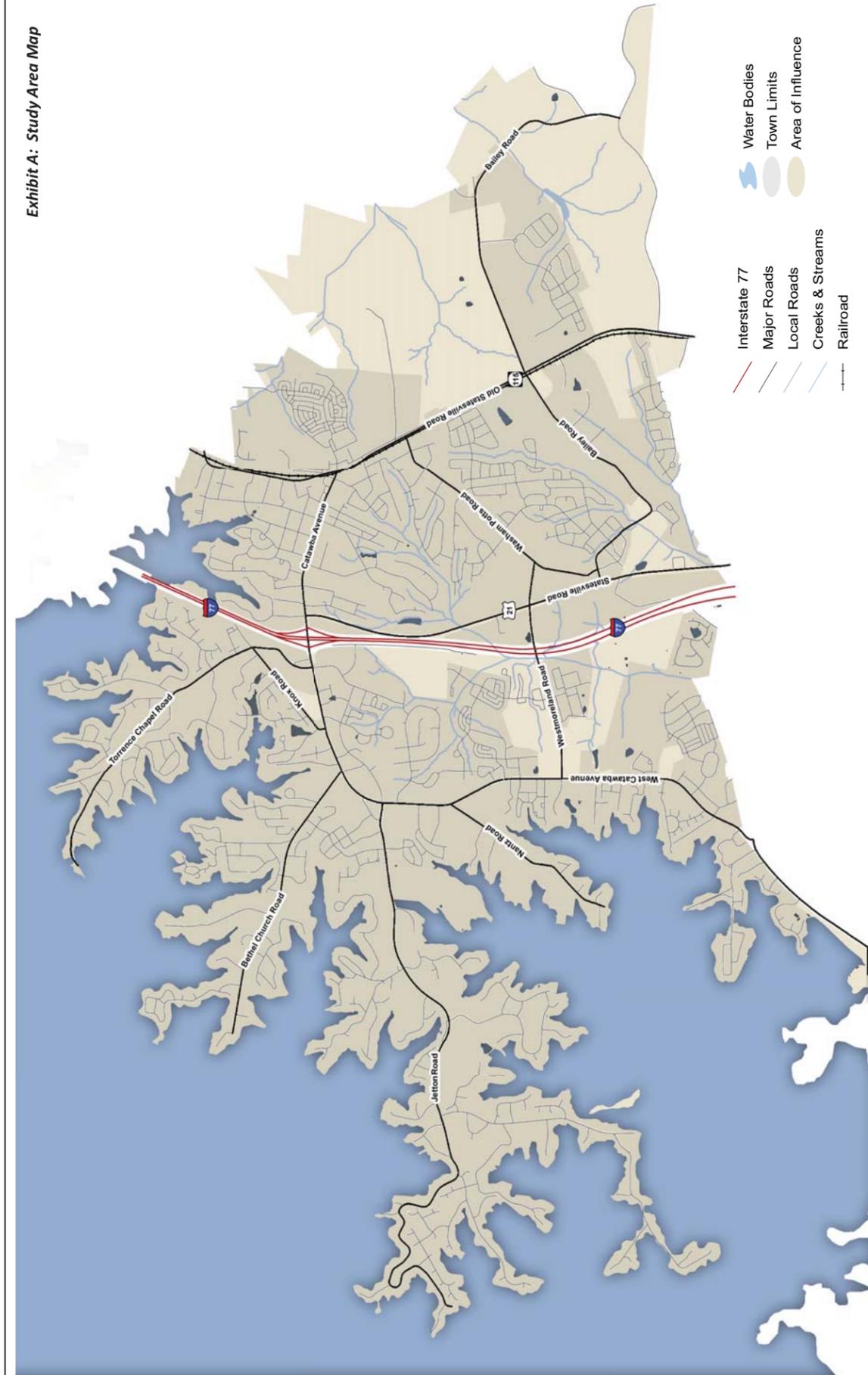
The CIA report is organized into twelve sections:

1. An introduction including purpose of the report and a description of the study area.
2. A section on the governance structure in place in the Town.
3. A summary of regional influences considered during the planning process.
4. A market analysis that provides a demographic profile, real estate market overview, and information on anticipated growth and real estate market potential in the study area.
5. A comprehensive inventory and assessment of the natural environment including key environmental features.
6. A comprehensive inventory and assessment of the built environment including general development patterns, supporting infrastructure, community design, housing and neighborhoods, and the transportation system.

7. A review of community facilities and services available in Town including water and sewer, solid waste, storm water, parks and recreation, police protection, fire protection, emergency medical services, and education.
8. An economic vitality strategy that includes a description of what makes a place competitive and threats to economic vitality.
9. A review of the cultural and historic resources within Town.
10. A section on Town finances.
11. A section documenting the community concerns and aspirations that arose during focus group meetings and public workshops.
12. A review of emerging trends in the area that includes a summary of community assets, areas for improvement, and threats to quality of life.

Collectively, these twelve sections provide the reader with a thorough analysis of existing conditions, and the factors that will guide future growth and development in the study area.

Exhibit A: Study Area Map





Section B:

■ Governance

Community Inventory & Assessment

Section B - Governance

Ensuring that the Town performs its duties promised to residents, there is a well established governance structure that delegates the responsibilities of Town management. This structure ensures public services are provided to residents in a timely and efficient manner.

Town Structure

The Mayor and Board of Commissioners for the Town of Cornelius are elected during non-partisan elections held in odd-numbered years. They take office the first regular Town Board meeting in December for two years. The Town operates as a Council-Manager form of government. The Town Manager and his staff carry out policies created and enacted by the Board of Commissioners. There are five commissioners on the Board of Commissioners.

Town Departments

Finance Department

The Finance Department administers the Town's financial policies, maintains the condition of the Town's finances, and represents the Town on financial matters with various parties. The Finance Department duties include financial reporting, accounts payable, cash management, budgeting, procurement, risk management, and payroll.

Planning Department

The Town's Planning Department is responsible for administering the Land Development Code, handling rezoning requests, and issuing citations for violations of the Land Development Code. The Planning Department also reviews all plans

and plats for development in the study area as well as building and sign applications. Finally, the Planning Department is responsible for long range planning initiatives.

Parks, Arts, Recreation & Culture (PARC) Department

The mission of the PARC Department is to serve the recreation needs of Town residents by offering an array of leisure service and recreation programs (including numerous summer camp activities for children of all ages). The PARC Department also manages a growing system of parks, greenways, and open space in Town.

Public Works Department

The Cornelius Public Works Department conducts routine maintenance on Town-owned property and local streets, including surface maintenance and patching, ditch cleaning and mowing, sidewalk maintenance and repair, minor grading, and street cleaning.

Fire Department

The Town of Cornelius Fire Department provides fire suppression and prevention, emergency medical services, and rescue services to the citizens of Cornelius and surrounding Mecklenburg County.

Police Department

The Town of Cornelius Police Department maintains safety and security for the study area. Under cooperation with the Towns of Davidson and Huntersville, the Police Department operates the North Mecklenburg Communications facility.

Boards & Commissions

The Town Board of Commissioners appoints members to various other town boards and commissions. Currently, the Town of Cornelius has six volunteer boards/commissions which include:

- Architectural Review Board
- Historic Preservation Commission
- Parks and Recreation Advisory Commission (PARC)
- Planning Board
- Transportation Advisory Board
- Land Development Code Advisory Board

Architectural Review Board

The Town of Cornelius established an Architectural Review Board in 2007. The board consists of seven residents or property owners in the Town, at least four of whom are architects, landscape architects, or other design professionals. One member must also be a resident of Cornelius east of I-77. The board meets regularly to review all commercial and residential development applications in portions of Town east of I-77. Applicants requesting development approval go before the Architectural Review Board before seeking approval from the Town Board, providing the applicant an opportunity to revise plans. All recommendations provided by the Architectural Review Board are passed along to the Town Board for consideration. The duties of the Board include:

- advising the Planning Director and/or staff on applying and interpreting the East Cornelius Design Guidelines on a project-by-project basis
- reviewing or recommending changes to any proposed design or architectural guidelines, policies, standards

- responding to requests from the Town Board or Planning Director for the opinion of the board on any other architectural or design matter for which their input is desired.

Historic Preservation Commission

The Town of Cornelius established the Historic Preservation Commission in 2003. Commissioners are appointed by the Town Board of Commissioners for three year terms.

The Commission is charged with identifying and pursuing historic designation for structures of historical significance in Cornelius.

PARC Commission

The Town of Cornelius established a Parks and Recreation Advisory Commission in 1998. The Commission consists of eight members and a representative from Visit Lake Norman. Commission members are appointed by, and function in an advisory capacity to, the Mayor and the Town Board of Commissioners. Among the members' duties are making recommendations regarding the lease, sale, acquisition, design, improvement, maintenance, and scheduling of park resources and recreation activities.

Planning Board

The Town Planning Board consists of a chairman, six additional members, and two alternates. Planning Board Members are appointed by the Town Board of Commissioners, with three new members appointed each year. Duties of the Planning Board include exercising functions in the administration and enforcement of various means for carrying out plans directed by the Town Board, and keeping the Town Board and general public informed and advised as to matters within their duties and responsibilities.

Transportation Advisory Board

The Town of Cornelius established a Transportation Advisory Board in 2008. The Transportation Advisory Board is a 13-member group appointed by the Mayor and Board of Commissioners. They meet regularly to review and evaluate the following:

- connectivity as it affects neighborhoods
- interconnectivity between neighborhoods and commercial centers
- bus routes, pedestrian walkways, and bicycle lanes as alternative modes of transportation
- the impact of future transit and transit centers and turning lane improvements.

Land Development Code Advisory Board

The Town of Cornelius established a Land Development Code Advisory Board in 2004. The Land Development Code (LDC) Advisory Board is responsible for maintaining and improving the Town's Land Development Code. LDC members are appointed by the Town Board for two-year terms and meetings are held monthly.



Section C:

■ Regional Influences

Community Inventory & Assessment

Section C - Regional Influences

Regional influences are organizations or entities that have decision-making authority in the study area. Decisions made by these organizations not only affect the region, but future development in the Town of Cornelius as well. This section provides a summary of regional forces in and around the study area.

Cornelius, Davidson, Huntersville and the greater Lake Norman Region. The mission of the LNREDC is to expand the region's tax base and improve quality of life through the creation of new, highly skilled jobs.



NC 73 Council of Planning

The Council of Planning (COP) is a multi-jurisdictional body tasked with monitoring and managing a 35-mile section of the NC 73 corridor in northern parts of the Charlotte Region. The COP was formed in 2005 from recommendations in the NC 73 Transportation and Land Use Plan. Members meet quarterly and include Cornelius, Davidson, Huntersville, Kannapolis, Concord, Lincoln County, Mecklenburg County, and Cabarrus County.



The LNREDC focuses on the following:

- product development
- marketing available office and industrial buildings and sites
- business retention and expansion
- investor relations,
- communication and networking
- community involvement
- recruiting and marketing

Together the three towns have developed an interlocal agreement that enables them to share development costs and tax revenues for economic development projects related to commerce.²

Each member of the COP submits development plans affecting the corridor for review and comment to ensure that development along the corridor is consistent with the adopted plan. Originally each member contributed financially to the COP. Over time some of the members have withdrawn funding, making the future of the body unclear. The Town of Cornelius continues to contribute funding to the COP.¹

Lake Norman Transportation Commission

The Lake Norman Transportation Commission (LNTC) is an advocacy group for needed road, interstate, and commuter rail infrastructure in the Lake Norman Region. The LNTC, created by an interlocal agreement in July 2009, was born out of a six month Mayors Transportation Task Force that stressed the importance of making transportation decisions on a regional level. The LNTC helps organize and prioritize planned and needed transportation projects in the region. The Town of Cornelius is one of four towns (others include Huntersville, Davidson, and Mooresville) with representation on the Commission.³

Lake Norman Regional Economic Development Corporation

The Lake Norman Regional Economic Development Corporation (LNREDC) was formed in 2003 and is responsible for the development and implementation strategy for the Towns of

¹ <http://www.nc73.net>

² <http://www.lakenormanregion.com>

³ <http://www.lakenormantrans.org>

Visit Lake Norman

VisitLakeNorman(VLN)is a non-profit organization with full time staff (4.5 full time equivalent) and 21 volunteers whose mission is to market the Lake Norman region to potential visitors. VLN makes it easy for a visitor to learn about the area by providing information on upcoming events, local venues, available discounts, and directions and maps. They also support local businesses by offering advertising opportunities and hosting a media room on their website to highlight news and activities in the area.²



VLN is funded by a percentage (28%) of the accommodations tax distributed through the Towns of Cornelius, Davidson, and Huntersville. VLN is currently in their last year of a three year interlocal agreement with the Town. A new agreement is currently under negotiation.³

Lake Norman Chamber of Commerce

The Lake Norman Chamber of Commerce provides programs, information and outreach opportunities to promote the area's business economy and encourage business and industrial investment. Membership has grown steadily since 2000, increasing from 800 members to approximately 1,150 members. Examples of Chamber involvement in 2009 include advocating for businesses in the area, hosting events like the Chamber Business Expo, hosting leadership

² <http://visitlakenorman.org>

³ MacIntyre, Amber. Visit Lake Norman. Phone Interview. August 8, 2010.

programs, distributing e-links and newsletters, attending and promoting briefings and workshops, and advocating for the business community.

The Chamber has a 5-year strategic plan to guide its actions and produces an annual report and plan of action to ensure it is meeting member needs.⁴

MUMPO

The Mecklenburg Union Metropolitan Planning Organization (MUMPO) is a transportation body that is responsible for overseeing the development of the transportation system in Mecklenburg and Union Counties of North Carolina. MUMPO coordinates transportation policy for local government jurisdictions within the Charlotte area and oversees citizen input into the transportation planning process. MUMPO uses a weighted voting system distributed as follows:

- City of Charlotte - 16 votes
- Huntersville, Matthews, Mint Hill & Monroe - 2 votes
- Mecklenburg & Union Counties - 2 votes
- All other municipalities - 1 vote
- NC Board of Transportation - 1 vote

Under this voting system, Cornelius has one voting representative, giving the Town a voice in local transportation decision-making.⁵

CATS

The Charlotte Area Transit System (CATS) is the public transit system in the Charlotte Region. CATS' mission is to improve the quality of life in the greater Charlotte



⁴ <http://www.lakenormanchamber.org>

⁵ www.mumpo.org

Regional Influences

region by providing outstanding community-wide public transportation services while proactively contributing to focused growth and sustainable regional development.

CATS currently operates the bus system and coordinates the park and ride locations serving the Town of Cornelius. Additionally, CATS' long range transit system plan includes a future commuter rail project (North Corridor Commuter Rail Project) that would include a stop in downtown Cornelius and at Caldwell/Sam Furr Road. Cornelius is actively assessing the infrastructure and financials necessary to support a future commuter rail station in Town.⁶

McGuire Nuclear Station

McGuire Nuclear Station is one of three nuclear stations designed, built, and operated by Duke Power. The station is located on Lake Norman and the lake provides cooling water for the station. The station has a 2,200 megawatt capacity, and in conjunction with Duke Energy's two other nuclear stations, provides electricity to approximately one-half of Duke Energy's customers in the Carolinas.⁷



⁶ <http://charmack.org/city/charlotte/cats/Pages/default.aspx>

⁷ <http://www.duke-energy.com/power-plants/nuclear/mcguire.asp>

The study area lies within the McGuire Nuclear Station Emergency Planning Zone (EPZ) and is part of Duke Energy's Nuclear Emergency Preparedness Plan. If a problem occurs at the station, Duke Energy would immediately notify federal, state, and local authorities who would alert citizens using sirens and radio and television messages. If school were in session, students would be transported to designated reception centers.

The Town of Cornelius is located within three EPZs: A, G, and H. Each zone has a primary evacuation route and designated reception center(s). The reception centers for Zones A and H are South Iredell High School and West Iredell High School and the reception center for Zone G is Northwest Cabarrus Middle School. In the event of an emergency, officials will announce specific instructions for the emergency planning zones.⁸

Mecklenburg County

The Town of Cornelius is located in northern Mecklenburg County. The County supplies water, sewer, storm water, library, transit, and school services to the Town.

Cornelius has an annexation agreement in place with Mecklenburg County that stipulates where the Town can expand its municipal limits. The area it is allowed to annex, known as the sphere of influence, is a 3.7 square mile area outside the 11.5 square mile corporate limits.⁹

⁸ <http://www.duke-energy.com/nuclear-emergency-preparedness/mcguire.asp>

⁹ http://www.charmeck.org/Planning/Maps_Data/Spheres_of_Influence.pdf

City of Charlotte

The City of Charlotte is a major employment center located 18 miles south of the Town of Cornelius. The Town's proximity to Charlotte has resulted in significant growth in recent years and continues to make Cornelius an attractive location for many people commuting into the City for jobs.

Neighboring Communities: Huntersville, Davidson, Mooresville

The Town of Cornelius does not operate in a vacuum -- decisions regarding development, infrastructure, and economic development made in other communities impact the Town's future.

The Lake Norman region has realized the fluidity of community boundaries and in many respects has a collective vision for the future of the area. This recognition is obvious through the number of joint planning efforts/agreements between communities. These include the North Mecklenburg Communications Center, mutual aid agreements for police and fire, interlocal agreements for economic development and marketing, and regional bicycle planning.



Section D:
■ Market Analysis

Community Inventory & Assessment

Section D - Market Analysis

The market study for Navigate Cornelius evaluated existing residential, retail, office, and industrial market sectors and assessed the potential for future development through 2020. A summary of the study's findings are below. Full details can be found in a separate Market Report for the Town of Cornelius, North Carolina prepared in conjunction with this study.

Demographic Profile

This section provides demographic information for the Town of Cornelius related to population growth, household and per capita income, education, employment, and market segmentation. Demographic figures are examined alongside Mecklenburg County, the Metropolitan Statistical Area (MSA), and the State of North Carolina. Statistics are projected through the year 2020.

Current Population

Population growth in Cornelius has been dramatic over the past several decades, as the population has doubled roughly every ten years. In 2009, the population reached 24,738 (based on 2009 Census Estimate numbers). This growth has greatly outpaced that of Mecklenburg County, the MSA, and the State of North Carolina.

Much of the population growth in Cornelius was attributed to annexation of land area and subsequent new development occurring on this land. The total land area of Cornelius grew by 2.3 square miles or 27.4% between 2000 and 2008. This new land area accommodated 61.4% of the total population growth of Cornelius, accounting for 7,350 new residents. The growth rate of the existing urban area of Cornelius during the same time period was about 38%. This rate still

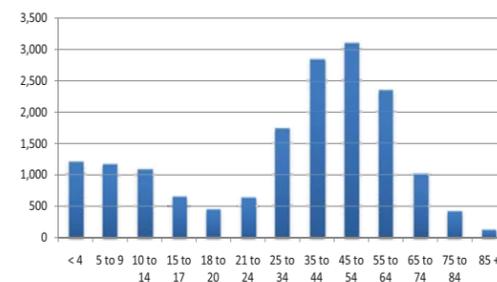
outpaces that of Charlotte, the MSA, and North Carolina.

Due to this rapid growth, Cornelius has nearly tripled its percentage share of the County's population since 1990 growing from a 1.1% share in 1990 to 2.7% in 2009.

Age Distribution

The 2010 median age for residents in the Town of Cornelius is 40, and the average age of Town residents is 38. The chart below provides a look at the age distribution of residents in the Town of Cornelius.

Town of Cornelius Age Distribution



Source: Claritas, Inc.

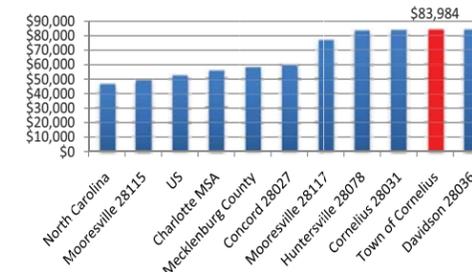
The median age for the community is higher than that of the County (35.67), the MSA (35.87), and North Carolina as a whole (37.11).

Income

The income figures for the Town of Cornelius place the community at the high end of the regional income distribution.

The median household income in the Town of Cornelius is nearly \$84,000, well above the State median of \$46,494, the MSA median of \$55,666, and the Mecklenburg County median of \$58,431.

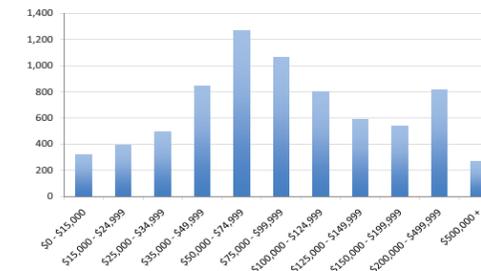
2010 Median HH Income



Source: Claritas, Inc.

Although the majority of households have income levels between \$50,000 and \$74,999, there is a significant "spike" in households with median household incomes in the \$200,000 to \$499,999 range, increasing the overall median household income.

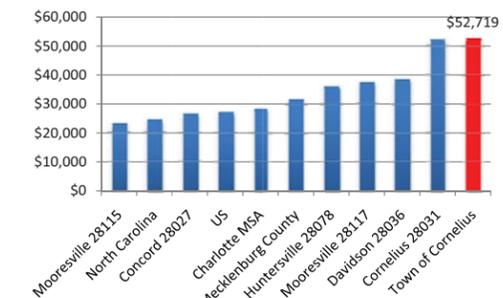
Town of Cornelius 2010 Median HH Income



Source: Claritas, Inc.

At \$52,719, Cornelius also has the highest per capita income figures of the northern Mecklenburg County communities. The per capita income for the Town of Cornelius is over double that of the State of North Carolina and nearly two thirds higher than that of Mecklenburg County.

Per Capita Income



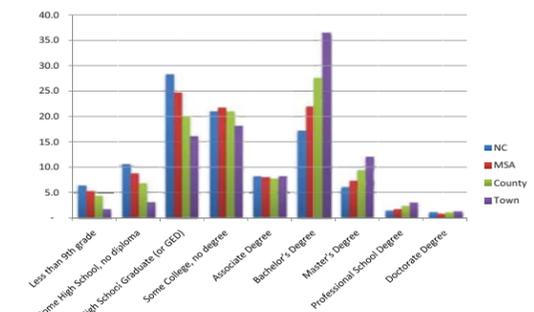
Source: Claritas, Inc.

A closer look at the median household income distribution for the Town of Cornelius reveals that more households have income levels between \$50,000 and \$74,999 than any other tier. However, there is a significant "spike" at the \$200K to \$499K level for households.

Educational Attainment

High income figures in Cornelius are likely a reflection of the high level of educational attainment of its residents. Cornelius has more residents with a bachelors degree, masters degree, professional schooling degree, and PhD than Mecklenburg County, the Metropolitan Statistical Area, and the state of North Carolina.

Educational Attainment



Source: Claritas, Inc.

Population Projections

Three techniques were used to project the 2020 population of Cornelius, the County, the region, and the state: linear projection model, exponential growth model, and a modified exponential model. The linear projection model was found to best approximate the kind of population share growth that Cornelius has experienced in the past. According to this model, the population in Cornelius is expected to grow by 12,615 residents reaching 37,353 by 2020. For specifics on the techniques used to estimate population growth in Town see the Market Report.

Employment

Major employers in Cornelius are in the governmental and retail sector. However, these major employers account for less than 20% of those employed in Cornelius (this number is conservative still because some of these positions are likely held by non-residents).

These statistics reveal that the majority of residents commute outside of Cornelius for employment. Approximately 71% of residents commute to locations within Mecklenburg County, the majority to jobs in Charlotte. One quarter of residents travel to other counties for employment. The average commute time for a resident of Cornelius is 31 minutes and only 22 percent of residents have less than a 15 minute commute to work.¹

The North Carolina Employment Security Commission collects data related to employment in the state. Unfortunately, it does not track data for the Town of Cornelius. However, a look at employment in the nearby communities of Concord and Huntersville reveal an

¹ Claritas, Inc.

unemployment rate under 8% as compared with the City of Charlotte at 9.4% and the MSA at 11.2%. It can be inferred because of the higher income and educational demographics that Cornelius is very likely to have an unemployment rate under 8%; similar to that of nearby Huntersville.

Overall, Charlotte MSA's unemployment rate has improved from a year ago by 1.2% but has remained at a relatively high 11.1%. This is an improvement but still above the national average of 9.6% as of June 2010 and places the Charlotte MSA at 284th out of 376 metropolitan areas for unemployment.

Seventy-six percent of the workforce in Cornelius is in a white-collar profession. The remaining 24% are split evenly between service jobs and blue-collar employment. In fact, nearly 18% of those employed work in management jobs and another 17% work in a sales related profession.

Table D.1:
Workforce Distribution

Profession	Percent
Management	18.00
Sales/Related	16.86
Office/Admin Support	10.58
Business/Financial Ops	7.78
Health Practitioner/Tec	5.95
Edu/Training/Library	5.06
Construction/Extraction	4.04
Building Grounds Maint	3.86
Food Prep/Serving	3.76
Transportation/Moving	3.54
Computer/Mathematical	3.19
Personal Care/Svc	2.59
Maintenance Repair	2.26
Architect/Engineer	2.10
Arts/Entertain/Sports	2.07
Production	1.81
Legal	1.58
Community/Soc Svcs	1.54
Protective Svcs	1.37
Life/Phys/Soc Science	1.04
Healthcare Support	1.03
Total	100.00

Market Segmentation

Market segmentation describes the make up and spending habits of the residents living in the local market. Analysis revealed that the psychographics of Cornelius have an interesting “split personality.” Some residents view Cornelius as a city closely aligned with Charlotte while others view the area as a small town with more rural characteristics. Details of this analysis can be found in the Market Segmentation Chapter of the Market Report.

Residential Market Potential

Existing Residential Supply

According to the Town of Cornelius, there are 12,281 housing units within the Town limits. (as of September 2010). Over half of the units (61%) are single-family homes. The balance is multi-family homes in both traditional multi-family developments and mixed residential neighborhoods. The vast majority of residential development within the Town of Cornelius is within subdivisions, with less than 10% of the housing as non-subdivision, single-family residential units.

In addition to the 12,281 units currently constructed in Cornelius, the Town has approved an additional 2,096 units that have yet to be built. The split between these unbuilt units is virtually a 50/50 between single family and multi-family residential.

Residential Development Activity

Housing starts in Mecklenburg County have declined precipitously over the last four-and-a-half years, with the number of starts in the first five months of 2010 equal to the one-month average in 2006.

Residential development activity in Cornelius has experienced similar declines. There were 428 single family building permits issued in 2006 versus 113 in 2009. Similarly, multi-family development has declined from 143 permits in 2006 to 26 in 2009. Table D.2 below details the building permits issued in Cornelius between January 1, 2006 and May 31, 2010.

Table D.2: Building Permit Data

	2006	2007	2008	2009	2010*
Single Family	428	309	108	113	137
Multi-family	143	117	19	26	0

*through 5/31/2010

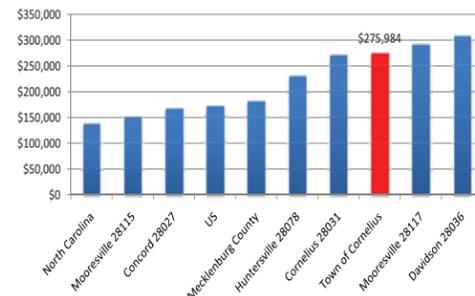
As the housing market continues to unwind because of a glut of existing stock and continued foreclosures, demand for new housing is almost certain to remain flat.

The same trend holds true when looking at housing units sold in Cornelius through the Multiple Listing Service (MLS). While average sales prices have risen consistently, the number of homes sold has dropped precipitously from the high of 705 in 2006. In fact, 2009 saw home sales drop back to numbers not seen since 2002. The average sales price for a home has also flattened in the past two years.

Housing Values

Housing values in the Town of Cornelius are very high on national, state, and regional levels. The median home value in the Town of Cornelius is \$275,984, vastly higher than the North Carolina state median of \$138,752 and the Mecklenburg County median of \$181,121. Regionally, only the Mooresville 28117 zip code (\$291,904) and Davidson 28036 zip code (\$308,046) have higher figures than Cornelius.

2010 Median Home Value



Source: Claritas, Inc.

Future Housing Demand

Population projections were used to estimate future housing demand in Cornelius. By 2020, Cornelius can expect between 13,044 and 16,455 housing units, a gain of between 2,502 and 5,557 additional units. For specific information on future housing demand see the Market Report.

As discussed earlier, Cornelius has approved 2,096 housing units that have yet to be built. Assuming housing growth is more in line with the lower end of the projections, residential development already permitted would almost fill demand, yielding a pent up demand for only 409 new residential units by 2020. Assuming growth is more in line with the higher end of the projection, Cornelius would need to accommodate an additional 3,464 residential units.

Past trends point to a decline in the percentage share of single family residential in the community as multi-family developments have become more prevalent. Currently roughly 50% of the pent up approvals are for multi-family development. It is safe to assume that the 50/50 split between single family and multi-family development is likely to remain intact over the coming years. The demographic trends also

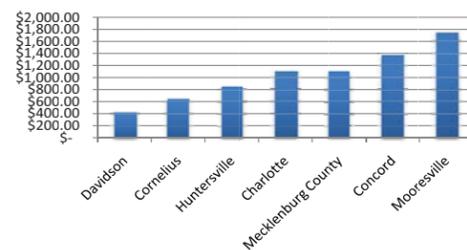
point to Cornelius continuing to be at a higher price point when compared with the county and region.

Retail Market Potential

Existing Retail Supply

According to the North Carolina Department of Revenue, Cornelius had \$16.2 million in taxable retail sales in June 2009. This represents 1.6% of all retail sales in Mecklenburg County and less than half of retail sales in nearby Huntersville. The chart below displays retail sales per capita in Cornelius compared with nearby communities, the City of Charlotte, and Mecklenburg County. Only Davidson, with less than \$500 in per capita sales, has lower sales per person than Cornelius, while Mooresville has sales per capita exceeding \$1,700.

June 2009 Per Capita Retail Sales



Source: NC OSBM, NC Dept. of Taxation, and Arnett Muldrow & Associates. Ltd.

Retail development in Cornelius clusters mainly along West Catawba Avenue. The largest shopping center in the community is the Shops at the Fresh Market at 131,247 square feet of retail space anchored by a Fresh Market supermarket and a Stein Mart department store. Other shopping centers in the community include Jetton Village, Shops On The Green, Turnberry Place, St. Andrews Place, Magnolia Place, Kenton Place, and Harborview. To the east of Interstate 77 is the Cornelius Town Center, which is a mixed-use development in the heart of the

community anchored by City Hall and a Food Lion super market.

Retail Market Characteristics

Retail development along the I-77 corridor has witnessed dramatic change in the last twenty years as commercial construction has been built to satisfy the surging population. Nearby Huntersville is home to a major mixed-use lifestyle center, Birkdale Village. This 323,549-square foot center was the first mixed-use development of its size in the metro Charlotte market. It opened in 2003. In 2005, Northlake Mall opened with over one million square feet of gross leasable square footage. All of this development activity has brought a great deal of change to the retail climate in the community as developers clamor to satisfy residential growth of the area. Cornelius saw similar activity though at a smaller scale. A look at retail development in the area shows that while many retail categories are saturated with development, there are still others that are underserved by retail store types. Furthermore, the recession has resulted in retail vacancy rates in Charlotte at the highest they have been since 2001.

Retail Market Potential

Cornelius could support an additional 128,820 to 304,577 square feet of retail space by 2020. The major categories of stores that could be supported are supermarkets, furniture stores, and general merchandise (e.g., Wal-Mart or Target). In addition, there are a number of specialty retail store types that could be supported at a smaller scale. These represent a significant opportunity for Cornelius to carve out a specialty retail niche in addition to the basic goods the community already supplies. It is unlikely that major shopping goods stores

will locate in Cornelius because those store types are going to continue to cluster near the super-regional centers of Birkdale and Northlake Mall.

According to the Charlotte Business Journal (August 2010), the North Retail Submarket (which includes the extents of the study area) has 244,595 sq. ft. of vacant retail space. The majority of retail demand in the study area could be filled by upfitting existing vacant retail space in the region.

Employment Market Potential

Existing Development

There are 478,173 total square feet of vacant office space (a vacancy rate of 20.6%) in the North submarket of the larger Charlotte Region (which includes the Town of Cornelius). Additionally, there is 1,691,942 square feet of industrial space available, a vacancy rate of 19.8%. When considering these figures in addition to the vacancies in the ten other submarkets in the Charlotte Region, it is obvious that Cornelius will have to compete to win office and industrial development in the future.¹

The study area has a number of unbuilt sites that offer opportunities for future growth. Cornelius has eight sites identified by the LNREDC as potential for development. Some of these sites are more retail and commercial office in nature while others are more industrial in character. The largest site identified by the LNREDC is the Cooke Site with 81 acres zoned for office or industrial use.

Market Characteristics

The Northeast/I-77 corridor has 4,536,413 square feet of employment space of which 922,536 square feet or 20.3% is vacant.² This is the highest vacancy rate of the thirteen submarkets analyzed

¹ Charlotte Business Journal Commercial Real Estate Quarterly from the week of August 6, 2010.

² Cassidy/Turley

in the Charlotte Region (See the Market Report for more information on employment market characteristics).

On the positive side, the Northeast/I-77 corridor had positive absorption rates, which means that office space is filling in the area. However, absorption rates are not expected to reach pre-recession levels of slightly over one million square feet per year until after 2011. Under this scenario, it would take until 2019 for Charlotte to absorb all of its existing vacant office space if no additional construction were to occur.

Market Potential

Assessing market potential for industrial and office space in Cornelius is difficult for several reasons. First, much of the development activity in office has clustered outside of Cornelius at the Harris Boulevard and Huntersville interchanges with I-77. Cornelius does not have large format speculative office or industrial space on par with locations to the south toward Charlotte. Moreover, the glut of space in the I-77 corridor place it in a position to have a slower recovery, further hampering speculative construction in Cornelius for the foreseeable future. However, Cornelius can incentivize and encourage office and industrial space as a matter of policy in order to have a more balanced fiscal policy and land use patterns.



Section E:

■ Natural Environment

Community Inventory & Assessment

Section E: Natural Environment

This section represents a comprehensive inventory and assessment of the natural environment in the study area.

Natural Environment

The natural environment includes elements of blue and green infrastructure that defines the environmental cohesiveness of a community. Safeguarding this infrastructure improves water quality, reduces flooding in low-lying areas, manages storm water, balances the physical impacts of development, and increases opportunities for recreation in the study area.

The following elements were identified as key features of the natural environment for the study area: lakes, streams and creeks, wetlands, floodplains, watershed protection areas, and permanent conservation lands. These elements are illustrated in the Environmental Features Map found in Exhibit B at the end of this section.

A brief description of key environmental features follows:

Lake Norman

The Town of Cornelius is located on the southeastern shores of Lake Norman, the largest man made body of fresh water located entirely within North Carolina.

The lake provides electricity and water to area residents as well as many recreational opportunities like boating, fishing, and canoeing. The lake also has been a large contributor to the area's economy, sparking the development of many communities and attracting new residents to the area.



The Lake Norman watershed within the Town of Cornelius was designated as a critical area. Land within this watershed is subject to more stringent development regulations. See the discussion on watershed protection areas on page E.5 of this document for more information on these regulations.¹

Lake Cornelius

The lake east of I-77 is known as Lake Cornelius. The lake is in proximity to the historic core of Town and serves as the only water accessible on the eastern portion of the study area.

Mountain Island Lake

Mountain Island Lake is located south of Cornelius. Several creek tributaries feeding the lake have their headwaters in the study area. The portion of the Mountain Island Lake Watershed within Cornelius has been designated as a protected area. See the discussion on watershed protection areas on page E.5 of this document for more information on these regulations.²

1 http://charmeck.org/stormwater/Lakes/Pages/MountainIsland-LakeMemorandumofUnderstanding_MILMOU.aspx

2 http://charmeck.org/stormwater/Lakes/Pages/MountainIsland-LakeMemorandumofUnderstanding_MILMOU.aspx

The Town also signed the Mountain Island Lake Memorandum of Understanding (MILMOU) in 2004. The Town of Cornelius is one of ten communities who pledge to prevent future degradation of the lake. As a part of this effort, a working group was also established to develop the Mountain Island Lake Watershed Protection Guidelines, which provide jurisdictions around the lake with water protection strategies for use at their discretion.

The Town also participated in the Mountain Island Lake Symposium in 2006. The intent of the symposium was to gain an understanding of efforts to date and future opportunities for protecting Mountain Island Lake.³

Streams and Creeks

Several streams and creeks run through the study area including McDowell Creek, Caldwell Station Creek, the south prong of the Rocky River, and other unnamed tributaries. An inventory of streams and creeks in the study area is provided on the Environmental Features Map found in Exhibit B at the end of this section.



The increase in developed land in Mecklenburg County has exacerbated pollutants in storm water runoff and stream bank erosion. These effects have significantly degraded the quality

3 http://charmeck.org/stormwater/Lakes/Pages/MountainIsland-LakeMemorandumofUnderstanding_MILMOU.aspx

of streams and creeks throughout the County. Over 73% of major stream miles in the County are designated by the Federal Environmental Protection Agency (EPA) as impaired or not meeting their designated uses. One stream of particular importance is McDowell Creek. While the creek predominantly lies within Huntersville, a portion of the headwaters are in Cornelius.

McDowell Creek empties into Mountain Island Lake at McDowell Creek Cove, which is just upstream of a drinking water intake owned and operated by Charlotte Mecklenburg Utilities. The intake provides an average of 80 million gallons of drinking water a day for Charlotte-Mecklenburg residents.

Watershed Management Plans

In response to the degraded conditions of the watershed, Charlotte-Mecklenburg Storm Water Services developed the McDowell Creek Watershed Management Plan. The plan was originally completed in 2006. It is on its fourth version and has been updated as recently as March 2008. This plan was the first of its kind in Charlotte-Mecklenburg County and serves as a comprehensive, strategic roadmap for the management and restoration of surface waters within the watershed.

The watershed management plan does the following:

- summarizes water quality information
- describes current and historical water quality conditions/ trends
- describes current efforts underway to protect and restore water quality
- prioritizes areas for restoration, retrofit, and preservation efforts
- describes the process moving forward for implementing water quality efforts

Several of the highest priority areas were in or near Cornelius, including Sam Furr Road, Downtown Cornelius, and Old Statesville Road.⁴

Several stream restoration projects have been completed or are underway as a result of findings in the management plan. One project, Upper McDowell Restoration, was recently completed between Pine Ridge Drive and Danesway Lane. The project was a partnership between the Town, private property owners along the roadways, and Storm Water Services. It included five acres of open space and 1,700 linear feet of stream bank between two small waterways. The restoration involved construction of a series of wetlands, a rain garden, and enhanced buffers and floodplains along the two streams.

Other stream restoration projects were completed along the McDowell Creek Greenway (from Sam Furr Road to Westmoreland Road) and near the animal shelter.⁵



The Town's PARC Department is currently working with the State on a project for a section of the Caldwell Station stream behind Caldwell Commons. This project will eventually result in a future greenway.

4 Charlotte-Mecklenburg Storm Water Services. McDowell Creek Watershed Management Plan. Version 4. March 2, 2008.
5 <http://charmeck.org/stormwater/Projects/Pages/McDowell-Creek.aspx>

According to Mecklenburg County Land Use and Environmental Services, a management plan is currently under development for the Rocky River.⁶ Like the McDowell Creek Watershed Management Plan, the Rocky River Management Plan establish strategies for managing and restoring water quality in the Rocky River.

Floodplains

Floodplains represent the low-lying areas adjacent to water bodies that flood regularly with a significant rain event. FEMA designated 100-year floodplains in Town were identified along the lakeshore and streams and creeks within Town (see the Environmental Features Map in Exhibit B at the end of this section).

The Town of Cornelius has an interlocal agreement with the Storm Water Services Department of Mecklenburg County which allows them to serve as the Town's floodplain administrator and enforce floodplain regulations. Development is allowed within the floodplain; however the developer must obtain a floodplain development permit (FDP). There are two types of FDPs: general and individual. A general floodplain development permit (GFDP) is issued for passive land use activities that do not cause a technically-measurable increase on the base flood elevation. An individual floodplain development permit (IFDP) is required for grading/filling/dredging/drilling, new construction, some renovation projects, and all projects that do not meet GFDP requirements. For more specific information on floodplain regulations, visit the Charlotte-Mecklenburg County Storm Water Services Department website.⁷

6 Aug, Joe, Land Use & Environmental Service Agency. Personal Interview, August 17, 2010.

7 <http://charmeck.org/stormwater/FloodZone/Pages/default.aspx>

Stream Buffer Requirements

In addition to watershed management plans for specific streams and creeks, the Town has also implemented other regulations to protect stream water quality.

The Town of Cornelius has two types of buffer requirements in place pertaining to streams and bodies of water. The first buffer is part of the Lake Norman Overlay District requirements found in Chapter 5 of the Town's Land Development Code. The district requires a minimum of 100 ft undisturbed buffer along the shoreline of Lake Norman and all perennial streams for a high impervious cover option which includes new projects with more than two dwelling units per acre or impervious of over 24%. All other areas within the overlay are subject to a 50 ft buffer unless otherwise noted on a recorded plat.

The second buffer requirements relate to Surface Water Improvement and Management (S.W.I.M.) Buffers, found in Chapter 9 - Environmental Protection of the Town's Land Development Code. SWIM buffers are "no build zones" along local creeks. Minimum stream buffer widths vary based on the location and size of the upstream drainage basin as follows:

1. All streams with upstream drainage basins greater than 50 acres and less than 300 acres in size require an undisturbed natural buffer width of 35 feet from each side of the stream as measured from the top of the stream bank.
2. All streams with upstream drainage basins greater than 300 acres and less than 640 acres in size require an undisturbed natural buffer width of 50 ft from each side of the stream as measured from the top of the stream bank.

3. All streams with upstream drainage basins greater than 300 acres and less than 640 acres in size require an undisturbed natural buffer width of 50 feet from each side of the stream as measured from the top of the stream bank.
4. All streams with upstream drainage basins greater than 640 acres require an undisturbed natural buffer representing the entire floodplain but no less than 100 feet from each side of the stream as measured from the top of the stream bank.
5. Where stream buffers are also required in another section of the Town's Land Development Code, the more stringent requirement apply.⁸

The Town also adopted a Post-Construction Storm Water Ordinance in June 2007. The ordinance applies to all development and redevelopment within the study area. The ordinance requires a developer to obtain a storm water management permit from the designated Storm Water Administrator. In Cornelius, the Zoning Administrator serves as the Storm Water Administrator. The permit governs the design, installation, and construction of storm water management and control practices on the site. More specific requirements set forth in the Town of Cornelius' Post-Construction Storm Water Ordinance may be found on the Town website.⁹

8 The Cornelius Planning Department. Town of Cornelius Land Development Code. Adopted on Oct. 7, 1996 as amended through Dec. 7, 2009.

9 Town of Cornelius Post-Construction Storm Water Ordinance. Effective June 30, 2007.

Wetlands

Wetlands represent low-lying areas saturated with water for an extended period of times (sometimes permanently). Small wetland areas near Lake Norman and major streams and creeks in Town were identified using National Wetlands Inventory data published by the U.S. Fish and Wildlife Service (see the Environmental Features Map in Exhibit B at the end of this section).



Watershed Protection Areas

The Water Supply Watershed Protection Act of 1989 requires the State to classify each drinking water supply watershed. Two watersheds in Cornelius, the Lake Norman Watershed and Mountain Island Watershed, are classified as WS IV. This classification is assigned to waters used as sources for drinking, culinary, or food processing water sources that are located in moderate to highly developed areas.

The North Carolina Division of Water Quality (DWQ) also has designated the portion of the Lake Norman watershed within the study area as a critical area and the portion of Mountain Island watershed within the study area as a protected area. Land within these two areas is subject to more stringent development regulations as

described in the Town’s Land Development Code.

The Lake Norman Overlay District generally applies to all areas within one-half mile of the shore. The Mountain Island Lake Overlay District applies to the portion of town east of the Lake Norman watershed and west of I-77 (see the Environmental Features Map in Exhibit B at the end of this section). Land within the watershed protection areas is subject to more stringent development regulations relating to use, density, and impervious coverage.

Land Trust Lands

Often times, government agencies or qualified conservation groups purchase sensitive lands as part of a local land conservation strategy. Land may be designated for permanent conservation through a variety of mechanisms, including purchase of development rights, fee-simple purchase of the property, conservation easements, or transfer of development rights.

The Catawba Lands Conservancy is a nonprofit land trust that operates in the study area. The Catawba Lands Conservancy has protected more than 7,300 acres in a six-county area that includes Catawba, Gaston, Iredell, Lincoln, Mecklenburg, and Union Counties. Currently, the Conservancy owns no land inside the study area.

Permanent Conservation Lands

The Environmental Protection chapter of the Town’s Land Development Code stresses preservation to the extent that it is reasonable and practical of significant vegetative areas. Significant vegetative areas are those of a site that contain natural floodplain or floodways, wetlands, existing tree canopy, forest stands, or significant vegetation on slopes exceeding 25%, and which present severe slopes or prohibit development.

Developers are required to incorporate a Tree and Root Preservation Plan as part of a Landscape Plan and conduct an environmental survey prior to advanced preparation of development plans which provides the Town and the applicant the ability to evaluate the proposed development in order to determine those areas of the site that should be preserved.

Permanent Open Space

The Town also has preserved open space areas dedicated for permanent conservation. These areas are typically undisturbed and protected from development by government agencies or by public, private, and nonprofit organizations. In the study area, these include community parks, golf courses, greenways, cemeteries, and dedicated open space within residential communities.

Permanent conservation lands are identified on the Environmental Features Map in Exhibit B at the end of this section.

Air Quality

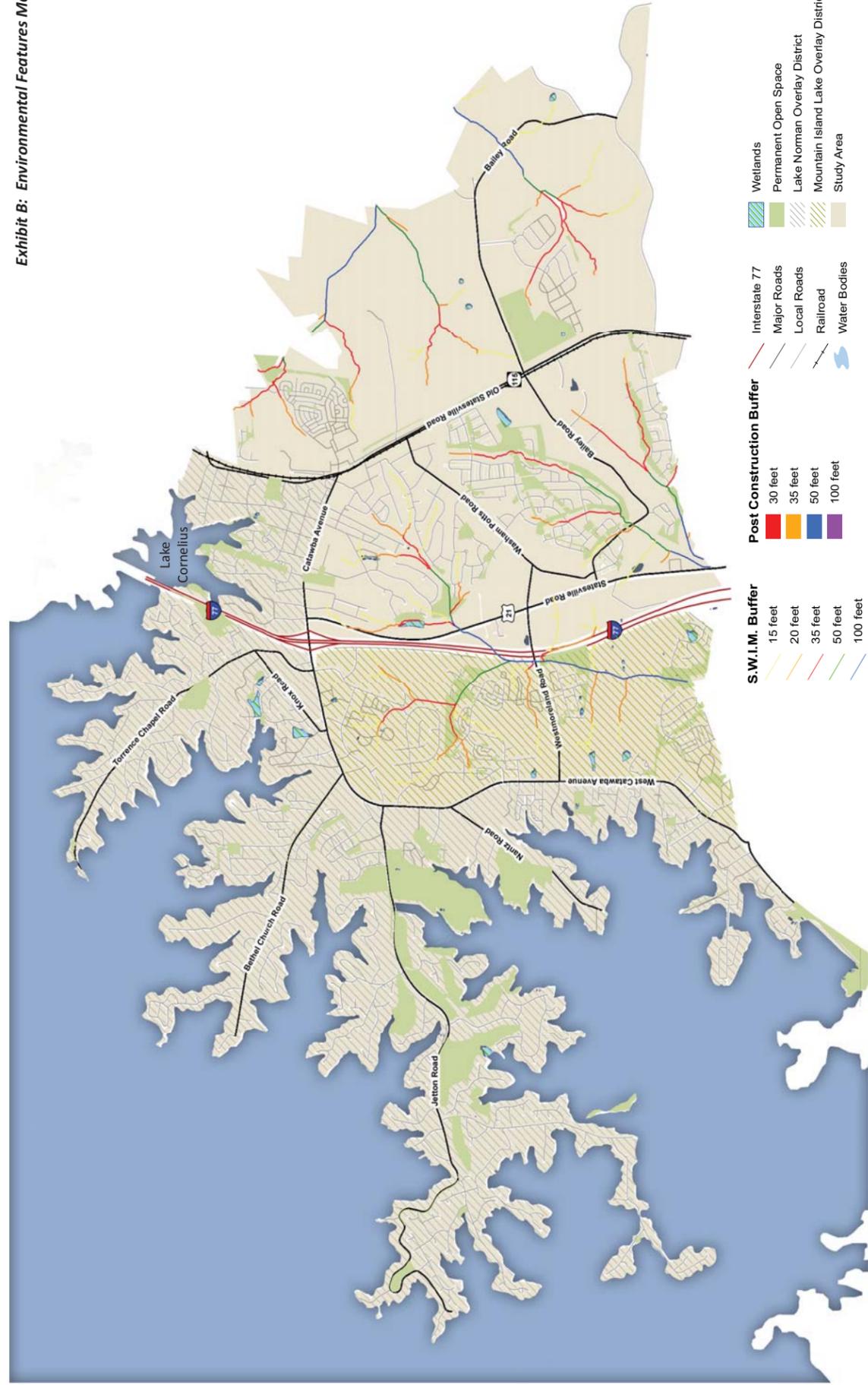
Under the Clean Air Act, Mecklenburg County (and the larger MUMPO Planning Area) is currently classified as in non-attainment. When in non-attainment, the Environmental Protection Agency (EPA) establishes a specific timetable to attain the standard and requires the nonattainment areas demonstrate progress in reducing air pollution emissions until such time that an area can demonstrate attainment.

In February 2010, MUMPO (in conjunction with Cabarrus-Rowan MPO, Gaston Urban Area MPO, and the NCDOT Transportation Planning Branch) submitted a Conformity Analysis and Determination Report demonstrating how the

planning area will reach attainment.¹⁰ In order to demonstrate conformity, MUMPO had to amend the Long Range Transportation Plan (LRTP) and Transportation Improvement Program (TIP). Priority projects are those that include high occupancy vehicle (HOV) facilities, transit improvements, signal timing, and bicycle and pedestrian facilities. These criteria increase the importance of regional transportation projects such as the North Corridor Commuter Rail Project, fast lanes on I-77, and the Carolina Thread Trail (described in detail in the Mobility section of the Plan).

The Conformity and Determination Report is significant because it ensures the area is eligible to receive federal transportation funds. When an area is unable to demonstrate they can attain standards, federal sanctions can be imposed. These include construction prohibition or withholding of federal highway funds, air pollution control grants, or waste water treatment plant facility grants. These sanctions can prevent needed road improvements and seriously deter economic development activity in a region. In addition, non-attainment has public health impacts as well. Although most healthy adults do not feel the effects of polluted air, young children, the elderly, and people with respiratory problems such as asthma and emphysema can be greatly affected.

¹⁰ Conformity Analysis and Determination Report. February 8, 2010.



Section F:
■ Built Environment

Community Inventory & Assessment

Section F - Built Environment

The built environment refers to the human-made elements of a community. Features of the built environment include development history, existing development patterns, pipeline development, community design, housing and neighborhoods, and mobility.

Development History

The Town of Cornelius experienced minimal housing growth during its first 50 years of existence. It was not until the creation of Lake Norman in the early 1960s that the town experienced significant growth, mostly in the form of low density single family residential housing developments (most of which are upscale). The creation of the lake, in combination with the town's proximity to the City of Charlotte and accessibility to I-77, has continued to attract residents to the area. As a result, the town has largely become a bedroom community in the Region. Subdivisions and houses constructed during this high growth period are characterized by a decentralized growth pattern that favors single-use, low-density development that is generally isolated or not well connected. This type of growth pattern has led to increased traffic congestion and consumption of sensitive land.

Existing Development Patterns

The western portion of the study area on Lake Norman is dominated by large lot single family homes (many of which are newly constructed) interspersed with environmentally sensitive lands. The desire to live in close proximity to Lake Norman has resulted in the area being almost entirely built out. The area between West Catawba Avenue and NC 115 is a mixture of

residential housing types and price points, including single family, multifamily, mixed residential, and mixed use. Commercial development is concentrated along major thoroughfares including West Catawba Avenue, I-77, and US 21. Industrial development is limited in the study area and is concentrated in the Town's industrial area, located on Bailey Road near NC 115.

Historical development patterns are evident in portions of town east of I-77 where older residential neighborhoods and a grid street system are prevalent. The portion of the study area east of NC 115 remains largely undeveloped. Some new developments have been recently completed or are underway in this area, including Antiquity and Bailey's Glen. In addition Bailey Road Middle School and Hough High School are located in this area. Because this portion of the study area has the largest contiguous tracts of undeveloped land, it represents the most significant remaining development potential in the study area. New development in the area should be carefully considered against goals for future development in the study area.

Exhibit C at the end of this section highlights the existing development patterns in the study area.

The Figure Ground Map in Exhibit D at the end of this section further details the current state of the study area's suburban fabric and building density. A review of building footprints shows large homes on large lots along the water, with very little development potential remaining. Suburban, decentralized growth patterns are evident throughout the study area through the numerous cul-de-sacs, limited connectivity, and curvilinear street patterns found in the majority of residential subdivisions.



Looking Forward

Moving forward, the Town must work within several development constraints. First, the Town has agreed upon annexation boundaries with Mecklenburg County and neighboring Towns that limit the extents to which the town can expand outward. The town has limited large scale development opportunities remaining, mostly in the sphere of influence, so the town must encourage sustainable build-out of remaining undeveloped lands and shift its focus to redevelopment of certain areas that are underdeveloped. The Town also wants to expand marketing efforts to attract business, office, and retail style development in addition to large employment centers.

Attracting new non-residential uses will also help improve the jobs to housing balance in the Town.

Pipeline Development

New residential neighborhoods, businesses, and employment centers approved by the Town of Cornelius but not yet built are classified as pipeline development. Tightening credit markets in the region have halted construction of most pipeline development in the study area.

For purposes of this report, pipeline development includes the following:

- approved developments where no improvements have been made
- approved developments where only infrastructure has been built
- approved developments where infrastructure has been built and previous phases have been constructed

These projects are illustrated in the Pipeline Development Map found in Exhibit E at the end of this section assuming their approved development status. One or more of these projects could be reevaluated in subsequent stages of the planning process as the Town re-evaluates its vision for the future. These discussions may advocate for a change in the status in some of these projects.

Table F.1 on page F.5 and Exhibit E at the end of this section depict the pipeline development projects in Cornelius.

Significant Pipeline Development Projects

Augustalee

Augustalee, a master-planned, mixed-use development, was approved by the Cornelius Town Board in April 2008. The 104-acre site is located between I-77 and US 21 on the south side of Cornelius. The approved development plan includes a mix of high-rise condos, upscale shops, offices, and hotels.

A number of major infrastructure improvements were proposed in association with the development including the widening of I-77, construction of a new interchange, and improving other roads. The original approval was contingent on developer financing of improvements, later reimbursed through a portion of the increased tax revenues generated by the project.

Augustalee has been foreclosed by its lender and the property is currently on the market. All of the entitlements are still in place. Although residents still strongly support a major activity center at this location, there are differing opinions about what types of uses should be approved on the site.

Antiquity

Antiquity is a mixed-use development that was originally approved by the Cornelius Town Board in 2001 and has undergone numerous revisions. When completed, the development will include a village center with approximately 250,000 sq. ft of retail shops and restaurants with outdoor dining, over 700 housing units (a combination of apartments, townhomes, and single-family homes), a 30-acre park and nine mini parks, a 2,500 amphitheater, and a community pool. The development is designed to function as a Transit Oriented Development (TOD) at its completion.

Currently the residential portion of the development is under construction, with a significant amount of street infrastructure already installed, including the extension of Catawba Avenue across the rail into the development.

Bailey Commerce

Bailey Commerce is a 303,850 sq. ft. development containing nine individual industrial campus lots located on Bailey Road. The development was approved by the Cornelius Town Board in 2007 and includes approximately 34 acres. To date, a grading permit has been issued and some preliminary grading has occurred.

Cornelius Village Center

The Cornelius Village Center is a 169,000 sq. ft. commercial development planned for the intersection of Jetton Road Extension and Bethel Church Road. The development was approved by the Cornelius Town Board in 1998 and includes approximately 6.5 acres. The development was approved prior to the adoption of the watershed ordinance and significant infrastructure

including parking lots and curb and gutter have been installed. The development has also been subdivided and preliminary building pads have been developed.

Kenton Place

Kenton Place, approved by the Cornelius Town Board in 1997, was designed as a 16.5 acre mixed-use center located on Kenton Drive. The site has had numerous revisions and amendments since its original approval. The anchor movie theater closed and subsequent deed restrictions have prevented another movie theater from taking its place. To date, the project is partially built with a mixture of residential housing units, restaurants, and offices. Another 183 multi-tenant units and 60,000 sq. ft of commercial development is planned for the site.

Remaining Development Potential

The Town of Cornelius is largely built out. There are limited large contiguous vacant tracts of land available within town limits, mostly along I-77. The majority of undeveloped land is located east of NC 115.

In total 26% (2,416 acres) of the study area is undeveloped. The Existing Development Patterns Map found in Exhibit C at the end of this section shows the location of undeveloped lands in the study area.

Based on current development controls and available land in the study area, it is estimated that the Town could support 5,652 new dwelling units, 2.15 million sq. ft. of new retail space, 1.37 million sq. ft. of new office space, and 0.44 million sq. ft. of new industrial space.

Table F.1: Pipeline Development in Cornelius

Map Key	Subdivision Name	Area/Location	Planned Lots	Acreage	Status of Development
Single-Family Residential					
1	Kaneel Bay	Norman Colony @ Colony Point	12	15.86	approved, no construction started
2	Bluff Point	Bluff Point Road	7*	3.88	approved, infrastructure installed
Multi-Family Residential					
3	Alexander Ridges/Legacy Cornelius	Westmoreland Road	245	37.74	approved, no construction started
4	Villas @ Magnolia Estates	Magnolia Estates Drive	62	20.23	approved, no construction started
Map Key	Development Name	Area/Location	Estimated Square Feet	Acreage	Status of Development
Non-residential					
5	Antiquity	Main St. @ Catawba Avenue	250,000	77.08	approved, infrastructure installed
6	Artistry Florals	Sefton Park Road	3,867	0.75	approved, no construction started
7	Bailey Commerce Point/Legacy Pointe	Bailey Road	303,850	34.33	approved, preliminary grading
8	Caldwell Depot	Hwy. 115 @ Caldwell Station	30,000	3.31	approved, site cleared
9	Cornelius One	West Catawba across from Edinburgh Square	24,748	9.11	approved, no construction started
10	Cornelius Sports Complex	I-77 Access Road	55,065	15.68	approved, site cleared only
11	Cornelius Station	S. Main Street	22,550	1.06	approved, no construction started
12	Cornelius Village Center	Jetton Road Extension @ Bethel Church	169,000	6.43	approved, infrastructure installed
13	Fountain Court	West Catawba @ Edinburgh Square	15,230	2.14	approved, no construction started
14	Fountain Plaza	Jetton Road Ext.	20,000	0.82	approved, infrastructure installed
15	Greystone Square	Statesville @ Catawba	2,066	0.13	approved, site cleared
16	Hannaford Grocery	West Catawba @ One Norman Blvd.	55,500	10.76	approved, no construction started
17	Harbor View	West Catawba	7,274	3.00	approved, no construction started
18	Harborside II	West Catawba @ Harborside Drive	48,600	2.59	approved, no construction started
19	Horizon Eye Care	Jetton Road Ext.	55,486	2.47	approved, no construction started
20	HWY 21 Business Park	Statesville Road	21,000	2.13	approved, no construction started
21	Jameson Square Lots 3 & 4	Nantz Road	24,000	2.38	approved, site cleared
22	Junker Property	West Catawba @ HM Junker	85,500	8.32	approved, no construction started
23	Kenton Place	Kenton Drive	60,000	16.46	approved, infrastructure installed, site is partially built
24	Kunkleman Property	West Catawba @ Kunkleman Drive	239,300	7.14	approved, infrastructure installed
25	Lake Norman Nissan	Statesville @ Boat House	7,000	1.14	approved, infrastructure installed
26	Norman Island Business Park	Hwy. 73 @ Norman Island	172,500	0.62	approved, no construction started
27	Park View Business Center	Hwy. 115 @ Bailey Rd.	80,010	10.30	approved, no construction started
28	Rocket Carwash	Statesville Road	7,710	1.05	approved, site cleared
29	Sefton Park	Sefton Park @ One Norman Blvd.	40,000	5.09	approved, infrastructure installed
30	Sheraton	Holiday Lane	67,994	3.05	approved, no construction started
31	Shoppes at the Peninsula Amendment	Jetton Road Ext.	48,800	3.15	approved, infrastructure installed
32	Shops at Cornelius	Emporia Street @ Sefton Park	74,200	8.45	approved, infrastructure installed
33	Silver Quay	West Catawba @ Harborside Drive	39,000	3.00	approved, no construction started
34	Stallings Holdings	Jetton Road Ext.	63,900	1.76	approved, infrastructure installed
35	Village at LKN (Augustalee)	Statesville @ Westmoreland	1,559,650	103.13	approved, no construction started
36	Waterstreet Seaport	Waterview Drive	7,300	0.40	approved, infrastructure installed

* Infrastructure is in place

Community Design

The identity of a community comes from its environment, tradition, and culture. A branding of that identity represents the pride of community members, and a promise made to visitors for what to expect when they arrive. In its simplest terms, the brand distinguishes a community in the marketplace. It should be apparent throughout the community, including its waterfront, public spaces, transportation corridors, gateways, building architecture, signage, and overall site design.

This section examines the town's current physical form and urban design policies and current initiatives to reinforce a sense of place in the study area.

Prominent community features noted in the study area include the waterfront, public space, transportation corridors, Interstate 77, neighborhoods, building architecture/site design, signage, gateways, wayfinding, design continuity/code enforcement, and street trees.

Waterfront

The damming of the Catawba River in 1963 to create Lake Norman provided the area with several miles of lakeside property. Of Lake Norman's 520 miles of shoreline, 60 miles are located in the Town of Cornelius (the most shoreline of any town along the lake).

The desirability of waterfront property, combined with its unique environmental constraints, create an area with distinct character. Like in most communities, waterfront property is highly desirable. Despite high land prices, the majority of waterfront areas are developed and in private ownership. Opportunities for public use of the waterfront are limited to Jetton Road Park,

Ramsey Creek Park, and Blythe Landing.

Development along the waterfront is largely characterized by luxury single family homes on a minimum of half acre lots. Existing smaller homes on smaller lots are often purchased and torn down to accommodate larger lot sizes. The majority of homes with frontage on the lake have private boat slips. Many lakefront communities include access to upscale amenities, including yacht clubs and country clubs. The majority of streets within these communities end in cul-de-sacs for increased privacy. Connectivity is limited (both because of design and natural barriers), as is the availability of goods and services in close proximity, increasing dependency on the automobile. Waterfront communities include, but are not limited to, The Peninsula, Joy's Serenity Point, Nantz Road at Lake Norman, Sterling Pointe, Bahia Bay, and Island Forest.



Architectural styles along the waterfront are a mixture of Old World, French Country, Mediterranean, and English Tudor style homes. Building materials are largely brick, stone, or stucco. The majority of homes are ornate and include a variety of features, including balconies, open decks/porches, pitched roofs, gables, and raised doorways. Homes are mostly two stories, oriented toward the street, and with large front and side yard setbacks (i.e., at least 25 feet).

Public Space

Public spaces promote human contact, social activities, and community involvement. The best public spaces are safe and welcoming. They accommodate a diversity of users and relate well to adjacent uses. Great public spaces also reflect local culture or history and include visually interesting features. Also, in more formal settings these spaces can be programmed with events, and can become opportunities for local retailers and businesses to showcase their products and services. Examples include plazas, squares, parks, marketplaces, and public greens.



Public space, outside of town parks, is limited. Older neighborhoods (those built prior to 1996) do not have community gathering spaces. Some residential subdivisions have pools and/or clubhouses, but use of these facilities is limited to neighborhood residents. Some residential subdivisions have small pockets of permanently protected open space; however, these areas are often fragmented or unreachable and do not provide quality open space to Town residents. Developers have recently started including public space in their development plans. In developments such as Antiquity,

Oakhurst, and the Preserve at Robbins Park, homes are constructed on smaller lots around neighborhood squares that can be utilized by the entire development.

The majority of nonresidential developments in Cornelius are located along busy commercial corridors like West Catawba Avenue and US 21. These corridors were designed to accommodate the automobile and lack human scale. Few outdoor seating and dining opportunities are available to activate the street, streets lack pedestrian facilities such as benches, and developments rarely include the use of public art or architectural features such as fountains or courtyards.

Currently, inclusion of natural or green areas and public spaces are required in all commercial zoning districts and optional in commercial zoning districts. Town greens are required in village center and town center districts with more than eight total residential units and are optional in all other zoning districts.

Transportation Corridors

Transportation corridors are the routes used to move people and goods between origins and destinations in the community. Transportation corridors are the main way that residents and visitors experience the town on a day-to-day basis.

Major transportation corridors, including West Catawba Avenue and US 21, are commercial in nature. Numerous driveway cuts threaten traffic flow and limited connectivity within and between adjacent uses forces people to use their cars to access multiple businesses. Additionally, bike and pedestrian facilities, transit opportunities, and streetscape elements are limited.

The Town recognizes that streets are an integral component of overall community design and that enhancing these corridors is one of the most visible

Neighborhoods

The majority of housing units in the Town of Cornelius are located within neighborhoods. In total, there are 158 neighborhoods in Cornelius; 100 of which are single family.¹ Other neighborhood types include multi-family, mixed housing type, or mixed use. Newer neighborhoods are lined with street trees and sidewalks on both sides of the street as a result of amendments to the Land Development Code.

Some of the neighborhoods have a distinct architectural style, while others are an eclectic combination. Infill development and redevelopment activities threaten the character and fabric of some existing neighborhoods without proper design guidelines. Residents have differing opinions about desirable architectural styles for the town. Some residents would like all neighborhoods to reflect housing styles prevalent in the town’s traditional center, whereas others feel that newer housing does not need to be a “copy” of what currently exists, but rather should respect relationships of surrounding structures (in terms of height, massing, spacing, textures, materials, setbacks, streetscape, and overall character). Others still feel that although there is value in preserving the traditional architectural style of historic homes in the traditional town center, this style does not need to prevail throughout the entire community. The location and age of housing, like along the waterfront for example, may dictate the need for a variety of architectural styles.



1 The Town of Cornelius Planning Department

ways to enhance community identity and character in town. As such, they have undertaken a variety of planning efforts, including collector and local street planning, small area plans, greenway and bikeway master planning, corridor plans, and progressive design codes. The Town has also developed a set of principles to influence the design of streets in town. These principles have been initiated along West Catawba Avenue and Catawba Avenue, redefining these corridors and making them more pedestrian friendly. More detailed information on these principles can be found in the Land Development Code.

Interstate 77

Interstate 77 roughly divides the town into east and west. Although it provides quick access to commuters traveling to Charlotte or Mooresville, it limits east-west connections within the study area. Development along I-77 (the portion within the study area) is concentrated at the town’s interchange with West Catawba Avenue and is comprised exclusively of commercial uses. The interchange is also landscaped with trees and shrubs.

The diverging diamond interchange planned for the intersection of I-77 and Catawba Avenue will change the design of this area. Details on this project can be found in the Mobility Section of this report.

The rest of I-77 is largely undeveloped. Little landscaping has occurred along I-77 in the study area; however, significant amounts of existing vegetation exist on both sides of the interstate. Businesses rely on visibility from the interstate to attract regional customers, but highway signage is limited in the study area.

Building Architecture / Site Design

Building architecture and site design are critical components of quality development. Architectural and site design standards are intended to promote compatibility within a development and its surrounding environment. They allow creativity and diversity of design, protect property values and neighborhood quality, and provide a safe and attractive environment for residents and visitors alike to destinations in the community.

The Town of Cornelius has architectural requirements and design guidelines in place to influence building architecture and site design in town limits. A brief summary follows:

Architectural Requirements

Structures in all zoning districts (except Rural Preservation and General Residential) are subject to architectural requirements found in Chapter 4 of the Land Development Code. Key architectural elements are building type and frontage, which include components of setbacks, height, and use. Structures must adhere to a set of general principles specific to residential buildings, manufactured housing, commercial and mixed use buildings, light and heavy industrial buildings, and civic buildings.

Design Guidelines

On April 2, 2007 the Town of Cornelius adopted design guidelines for the portion of Town east of I-77. These guidelines are a policy document and not part of the Town's Land Development Code. The intent of the design guidelines is to preserve the historical character of the traditional core of town. The design guidelines ensure that new development respects the existing fabric of established neighborhoods and the surrounding context. They also help to enhance a sense of place and community character, reflect local and regional heritage, and encourage the mix of housing types that have historically existed in the community. The design guidelines were created for both residential and non-residential streetfront structures and include site design, parking, materials, streetscape, building mass and proportions, among others.



Architectural Review Board

The Town of Cornelius established an Architectural Review Board in 2007. The board consists of seven residents or property owners in the Town, at least four of whom are architects, landscape architects, or other design professionals. One member must also be a resident of Cornelius east of I-77. The board meets regularly to review all commercial and residential development applications in portions of Town east of I-77. Applicants requesting development approval go before the Architectural Review Board before seeking approval from the Town Board, providing the applicant the opportunity to revise plans. All recommendations provided by the Architectural Review Board are passed along to the Town Board for consideration. The duties of the Board include:

- advising the Planning Director and/or staff on applying and interpreting the East Cornelius Design Guidelines on a project by project basis
- reviewing or recommending changes to any proposed design or architectural guidelines, policies, standards
- responding to requests from the Town Board or Planning Director for the opinion of the board on any other architectural or design matter for which their input is desired.

Architectural and site design guidelines can contribute to quality development, but thought must be given to the context of the development and what the Town is trying to achieve. For example, the town had good intentions to create a pedestrian-friendly environment along West Catawba Avenue by bringing the buildings up to the street and placing the parking in the rear. However, the rooftops necessary to support the developments do not exist, so the desired

outcome was not achieved. Many citizens do not view the development in this area favorably.²

Additionally, architectural and site design guidelines should not be uniform throughout the town. As discussed, community character differs throughout town and architectural and site design guidelines should reflect those characteristics unique to each area.

Signage

Signage is a critical component of the economic and business climate. Signage helps identify, advertise, and communicate a place of business and is a primary tool used by business owners to attract customers. However, too much signage, signage that is too large or tall, or signage that is poorly located can detract from the visual appearance of a streetscape, diminishing the message of each sign, increasing visual clutter, distractions, and obstructions to pedestrians and auto traffic.

Signage in town varies in terms of size, height, materials, landscaping, condition, and architectural character.

Current sign regulations require a uniform sign plan for all major site plans, major subdivisions, office and retail complexes, multi-tenant buildings, and multi-family developments. The town has sign design guidelines that address architectural compatibility, scale, maintenance, and upkeep, but these guidelines have not been enforced consistently.

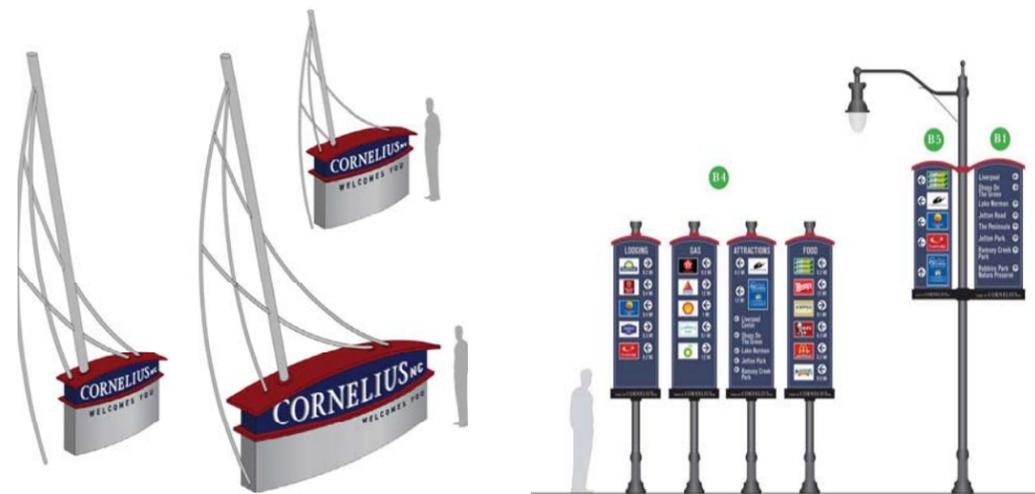
The Town is in the process of amending its sign ordinance. The Town has established a sign committee and has also held meetings with the business community and general public. Amendments to the sign ordinance will go before Town Council at their December 2010 meeting.

² Stakeholder Interviews, Town Staff

Gateways

Gateways are areas, intersections, or interchanges that announce a traveler has entered a place that is different and new. They are one of the first ways a community has to establish a defined character for an area. Gateways for Cornelius were identified at the following locations: Interstate 77 /Catawba Avenue Interchange (Exit 28), NC 115 from both Davidson and Huntersville, US 21, and West Catawba Avenue and NC 73.

The current gateway treatments at town limits are generally ineffective at distinguishing Cornelius within the region. The town hired a consultant to develop gateway signage for all its gateways. The planned treatments are consistent with current branding initiatives, easy to see and read, well landscaped, and reduce existing sign clutter. The gateway treatments will be considered by the Town Board in December 2010 as a part of updates to the sign ordinance.



Wayfinding

A wayfinding system relies on a series of signs that orient a user while also directing them to various civic, cultural, recreational, and public uses within the community in a safe and efficient manner.

Currently, the Town of Cornelius does not have a wayfinding system. The consultant developing the gateway treatments also developed a wayfinding system for the town. The wayfinding system will incorporate a consistent community brand and direct users to available lodging, gas, attractions, and eating establishments. The wayfinding system will include identification signs and trailblazer signs that denote area parks, bike paths, and greenways and trails. The wayfinding system will be considered by the Town Board in December 2010 as a part of updates to the sign ordinance.

Design Continuity / Code Enforcement

Consistency in design quality for new development plans or public improvement projects is important to creating a more livable community and a higher quality-of-life. Equally important, is governance of property maintenance for existing developments. Proper code enforcement activity serves to protect and enhance property values throughout the community.

Code enforcement in the Town of Cornelius has lacked consistency. Responsibility has shifted from the planning department to the police department and is now back to the planning department (as of August 2010).³ Currently, there is one staff member who responds to requests on a complaint basis.



³ Information provided by Town Staff

Street Trees

The presence of street trees enhances the overall appeal of the urban environment. Their shade and beauty contribute to the community's quality of life and soften the hard appearance of concrete structures and streets.

Currently, the Town requires street trees to be planted along all street frontages in all zoning districts (see Chapter 9 Environmental Protection of the Land Development Code).

In May 2010, the Town commissioned a study of its public tree population to inventory and evaluate the current condition of its street tree population. The study revealed that the majority of street trees in Cornelius exist on residential streets. Many of these residential areas are new developments with new and densely planted street trees, making for a uniquely young street tree population.

The findings of the study revealed several areas of immediate concern for which the Town needs to address including: increasing diversity of street trees, removing stumps and trees in poor condition, and identifying trees that require immediate or critical maintenance. The study also recommended a long-term management plan for the Town which specified tree types, planting and maintenance standards, planting specifications, tree pruning and removal specifications, transplanting specifications, stump removal specifications, and tree protection procedures and specifications. To date, the Town has not adopted any such management plan. However, the Town has executed and remedied many of the issues identified in the study.

Housing & Neighborhoods

The essential components of a community are its neighborhoods. These areas where residents make their homes are the building blocks of communities. Frequently, residents associate strong feelings of pride, security, and familiarity with their neighborhoods, sometimes more than the Town in which they live. Cultivating strong neighborhoods with identifiable character traits is as important as linking those neighborhoods together. The neighborhoods in Cornelius, and their impact on the Town, are described below.

Neighborhoods in the Planning Area

The study area consists of 158 defined neighborhoods, each having unique characteristics, strengths and weaknesses. Additionally, 93% of committed residential development in Cornelius is located within a subdivision neighborhood. Neighborhoods range in size from five units to 700 units. The majority (63%) of the neighborhoods in Cornelius are single family residential. Most neighborhoods have strong cohesiveness both within the community, as well as, the Town.



Neighborhood Challenges

Challenges that neighborhoods are faced with can be classified using three major categories:

- mobility
- revitalization
- economic downturn

Many neighborhoods within Cornelius are situated on peninsulas similar to fingers on Lake Norman. This results in unique challenges where residents have only one way in and out of their community. This also limits options where future connections can be created which some neighborhoods feel burden their street unfairly.

Due to timing of development there are also challenges when planned roadway projects get closer to development. Neighborhoods fear cut-through traffic will increase and safety of families will be jeopardized.

Several neighborhoods within Cornelius are ones that can be defined as Areas of Opportunity. These neighborhoods are faced with absentee landlords and frequent code violations. These neighborhoods typically have a strong sense of community; however, are faced with challenges of an aging population.

There are some neighborhoods that have stalled due to the recent economic downturn. These neighborhoods are faced with half constructed communities and roads that are not complete. These neighborhoods will be facing road maintenance issues and code enforcement issues in the future if construction does not resume in the coming years.

Housing Choices

In 2007, the Growth Management Committee conducted a study that addressed residential growth in Cornelius. At the time of the study, the Committee discovered that Cornelius was 83% residential and 17% commercial. The Committee believed it was time to reprioritize housing in Cornelius and recommended the Town focus on ensuring that a diverse and affordable housing stock was available to a variety of different economic groups.

As previously stated there are 158 neighborhoods in Cornelius that have varying housing types, including single family homes, town homes, apartments, and condominiums. Cornelius is also unique in that homes significantly range in size from under 1,000 square feet to over 10,000 square feet.

Residential Tax Burden

A heavily skewed housing to jobs ratio can place stress on the tax base as typically residential development does not pay for itself. In Cornelius; however, the high housing prices associated with lakefront homes bring in a significant tax base. As a result, although Cornelius is comprised of 83% residential uses, the tax base is still relatively healthy.

On the Market

A study from Multiple Listing Service (MLS) was conducted in June 2010 to determine for sale housing units in Cornelius. At the time there were almost 400 homes on the market. The average price was \$700,000 and the median price was \$389,900.

The majority (35%) of homes were priced from \$150,000 to \$299,000 category. The second greatest price was \$300,000 to \$499,000

slightly edging out the over \$1 million dollar price point. Cornelius is also unique that 60% of the homes on the market are currently priced over \$500,000.

Sales

Currently, sales of homes are weaker than they have been since 2003. The peak of home sales occurred during 2005 and 2006 at the peak of the housing boom seen across the Nation. The trend has significantly trailed since 2007 where it has decreased by almost half of what was experienced at the peak.

Sales in the Lake Norman area, which includes the study area, continue to outperform the majority of Charlotte Multiple Listing Service (MLS) in sales volume and average price. In August 2010, this area closed \$38 million, which was the third highest behind South Mecklenburg and Union County. The Lake Norman Area has the second highest average closing price. So while the number of closings are down significantly in Cornelius, it appears that people are still willing to pay to live in the Lake Norman area.

Affordable Housing

According to a study conducted by the Center for Housing Policy in 2010 for the Charlotte area, it was determined that an individual would need to make at least \$47,463 annually to afford a home priced at \$159,000.

As of June 2010, there were 25 (about 6%) of the homes that met the \$159,000 threshold in Cornelius. According to this same study, an individual would need to make about \$15.50 per hour to afford a two bedroom apartment for \$806. In perspective, the average salary for elementary school teacher is \$50,000 (24.41 per hour) and a nurse \$39,923 (\$19.19 per hour).

As stated, the Growth Management Committee recommended that the Town ensure that Cornelius' housing stock remains diverse and affordable to a variety of different economic groups. When this topic was asked to the 249 participants within the Focus Groups, it was determined that there seemed to be an appropriate mix of housing in the study area.

Mobility

Transportation is one of the most important services provided by government. It connects citizens with their jobs, schools, and other community activities and allows the movement of goods and services between buyers and sellers (i.e. commerce). The overall transportation system is comprised of the following: the street system, the non-motorized system, and the public transportation system.

This section documents conditions of the existing transportation system, previous planning efforts, and planned system improvements.

Existing Street System

The Town of Cornelius classifies its streets and the functions they serve into three categories: 3, 2, and 1.

Category 3 streets, or the "workhorse" streets in Town, include freeways and major/minor thoroughfares. These streets are characterized by:

- High traffic volumes and speed
- Limited access
- Wide right-of-way

Category 3 streets in Cornelius include NC 73, West Catawba Avenue, Catawba Avenue, Main Street, Old Statesville Road, Statesville Road, and NC 115.

Category 2 streets are collector streets which provide less overall mobility, operate at lower speeds, have more frequent and greater land use access flexibility, and serve shorter distance travel than category 3 streets.

Category 2 streets:

- Collect traffic from neighborhoods and distribute it to the system of major and minor thoroughfares throughout the area
- Provide good connectivity
- Provide ample facilities for pedestrians and bicyclists
- Limit excessive speeds and traffic

Category 2 streets in Cornelius include Bailey Road, Bethel Church Road, Jetton Road, Knox Road, Torrence Chapel Road, Nantz Road, and Washam Potts Road, and Westmoreland Road.

Category 1 streets are local streets which provide greater access and the least amount of mobility.

Local streets:

- Serve short distance travel
- Have low posted speed limits
- Are made up of local residential streets and alleyways

Most roadways within the study area are classified as Category 1.

The Existing Street System Map in Exhibit F found at the end of this section shows the existing Category 3, 2, and 1 streets within the Town limits.

Traffic Volumes and Congestion

A review of existing and historic average daily traffic volumes reveals changing traffic volumes along streets within Town. Average daily traffic volumes represent the total number of vehicles traveling along a roadway segment on an average day. The Traffic Volumes & Congestion Map in Exhibit G found at the end of this section illustrates the 2008 average daily traffic volumes in Cornelius. Table F.2 provides a breakdown of the tabulated traffic volumes on roadways within Town.



The highest traffic volumes were recorded along major roadways including I-77, NC 73, and West Catawba Avenue. I-77 from exit 28 to exit 30 carried 85,000 vehicles in 2008. Areas around the I-77 interchange with Catawba Avenue had the next greatest volumes with 26,000 and 28,000 vehicles respectively in 2008. A section of NC 73 east of Woods Lane also carried a high volume of vehicles, 28,000 in 2008.

However, traffic volumes alone should not be used to determine congested corridors because this measurement does not take into account different functional classifications and roadway capacities. A better measurement for capacity

is volume-to-capacity (V/C) ratios. V/C ratios are calculated by dividing the traffic volume of a roadway segment by the theoretical capacity of the

Table F.2: 2008 Average Annual Daily (AADT) Traffic Counts

Location	2008 AADT Counts
From Exit 28 to Exit 30	85,000
From Exit 25 to Exit 28	81,000
East of Woods Ln	28,000
East of I-77	28,000
West of Glen Furness Rd	27,000
West of SR 2195	26,000
North of SR 2148	21,000
North of Vineyard Pt	21,000
East of Burton St	19,000
South of McCall St	17,000
North of SR 2599	14,000
North of 2416	13,000
South of 2745	11,000
West of Charles Town Ln	11,000
East of SR 5544	10,000
North of SR 2147	7,700
South of Knox St	7,700
North of SR 5544	5,400
West of NC 115	4,100
West of SR 2195	3,200
West of SR 2149	3,100
East of SR 2431	2,700
East of SR 2429	2,000
West of SR 5544	1,600
South of SR 2433	460
East of NC 115	130

roadway. The result is a universal measurement. These ratios can be compared to roadway Level of Service (LOS), which places roadways into six letter grade levels of the quality of service to a typical traveler on a facility. LOS A demonstrates the best level of service (least congestion) and LOS F demonstrates the poorest level of service (most congestion). As shown on the Traffic Volumes & Congestion Map, segments along the following roadways are operating above capacity: I-77, West Catawba Avenue, Davidson-Concord Road, Griffith Street, NC 115, NC 73 (Sam Furr Road), US 21, and Westmoreland Road.

Existing Public Transportation System

Charlotte Area Transit System (CATS) provides local and express bus, neighborhood shuttle, van pools, and car pools, as well as specialized transportation services for the greater Charlotte region (which includes the Town of Cornelius).

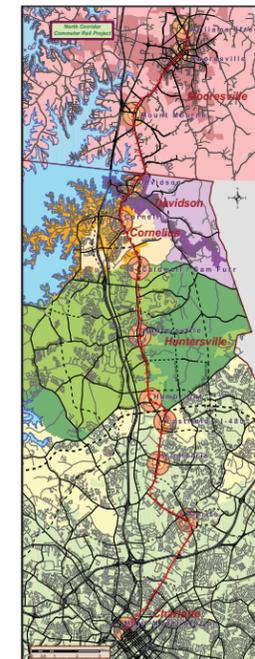
CATS currently operates 39 local routes, 14 express routes, 7 neighborhood shuttles, 7 regional express routes, 2 goldrush routes, and 3 village rider routes. Cornelius is served by the North Mecklenburg Express (77x) and the Cornelius Village Rider (97) routes. Routes operating in Cornelius are shown in Exhibit H found at the end of this section.



CATS also provides park-and-ride lots throughout the region. A number of park-and-ride lots are located in northern Mecklenburg County, including one in Cornelius near Town Hall. Riders are allowed to park for free and catch either an express bus to the Charlotte Transportation Center in downtown Charlotte or the Village Rider.



Currently, commuter rail service does not extend north into Cornelius; however CATS has proposed a North Corridor Commuter Rail Project which would offer commuter rail service between downtown Charlotte and Mount Mourne. The rail line would run through downtown Cornelius creating another travel option for residents commuting to Charlotte.



Non-Motorized System

The non-motorized system is comprised of bicycle lanes, sidewalks, and greenways. These facilities are limited in Cornelius due to natural barriers like the lake and the lack of connections across I-77 and the rail line).

Bicycle lanes are currently located in disjointed segments throughout the Town and often span only the length of property boundaries.



Currently, there are four streets in Town with on-street bicycle lanes (see Exhibit I at the end of this section). Catawba Avenue, however, features bicycle lanes that were installed in conjunction with that corridor’s recent development. Currently there are four streets in town with on-street bike lanes. Table F.3 identifies the streets that include bike lanes and their corresponding lane widths.

Table F.3: Bikeway Inventory

Street	Bicycle Lane Width
Catawba Avenue	4 feet
Torrence Chapel Road	4 feet
Knox Road	4 feet (on one side)
Bethel Church Road	4 feet

There are 20 miles of sidewalks in the study area. These sidewalks are predominantly found in the traditional center of Town and within residential subdivisions.

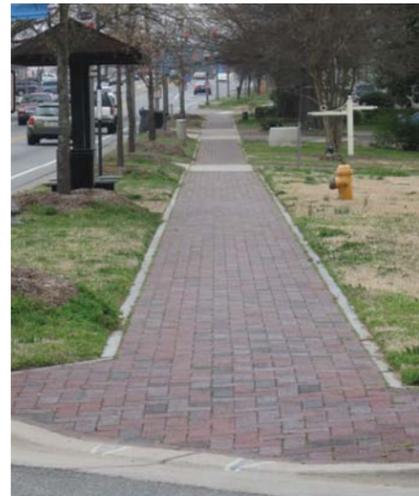


Exhibit J found at the end of this section shows the network of sidewalks in town. New sidewalks are typically built when new development projects are approved. The Land Development Code typically requires 5 foot sidewalks to be built on both sides of the street, except in the industrial campus land use which requires a sidewalk on one side of the street. The town uses Powell Bill funds as well as money from the Town’s general fund (as funds are available) to fill in the gaps in the existing sidewalk network. These funds are also used for sidewalk maintenance, limiting funding available for new sidewalk construction.

According to the Mecklenburg County Park and Recreation Department, 30 miles of greenways have been constructed in Mecklenburg County. The first greenway built in Cornelius, a 1.5 mile stretch along McDowell Creek, was completed in October 2009.

The greenway connects several neighborhoods in Cornelius and Huntersville to Birkdale Village and will also include a connection to Robbins Park and Westmoreland Athletic Complex (both of which are currently under design) (see the Bicycle and Greenway Map in Exhibit I found at the end of this section).

Transportation Planning in the Region

The transportation network in Cornelius has and will continue to be influenced by a variety of agencies. Several plans have been completed over the past few years with recommendations for improving the street network, public transportation network, and non-motorized network in Cornelius. These agencies and their associated plans are found in the Appendix to this report. Recommendations from these plans should be considered in the development of planned system and facility recommendations.

In addition to these various agencies, there are other organizations that manage, monitor, and provide guidance related to transportation decisions in the area. Two of these organizations are regional in nature, NC 73 Council of Planning and Lake Norman Transportation Commission (see the Regional Influences section for details). The other organization, the Transportation Advisory Board, is local.

Planned Roadway Projects

To help address the volume and congestion issues discussed above and achieve the recommendations set above by the various agencies, several local and regional transportation projects are planned for the town and surrounding area. Together, these projects are intended to ensure that the future transportation network operates safely and efficiently.

Local Projects

Local roadway projects, including the construction of new roadways and road widenings, help address the volume and congestion issues discussed previously. According to MUMPO’s 2035 Long Range Transportation Plan, there are 11 funded roadway projects planned in Cornelius through 2035: seven short-term (2010-2015), three mid-term (2016-2025), and one long-term (2026-2035). A list of these projects is provided in Table F.4 shown on the following page.

Of the 11 funded local projects, five are associated with the Augustalee development. Although the future of this development is uncertain, the Town believes these roadway projects are necessary for any significant economic development activity to occur at this site.

Table F.4: MUMPO 2035 LRTP Funded Projects in Cornelius

NCDOT STIP #	Project Name	Project Description/ Limits	Timeframe	Existing Facilities	Length (miles)
U-5130	Jim Cooke Road	New road (2-3 lanes), Northcross Dr. Ext. to Bailey Rd	2010-2015	n/a	0.20
U-5131	Northcross Drive Extension	New road (3 lanes) from end of Northcross Dr to Westmoreland Rd	2010-2015	n/a	1.35
I-5127	I-77/Westmoreland Rd	New Interchange, SPUI	2010-2015	n/a	n/a
I-5126	I-77 Widening (North)	Adding Managed lanes (1/each way) (6 lanes) from Hambright Rd to Catawba Ave	2010-2015	4-lane road, median divided	5.72
U-5128	Statesville Road (US 21)	Widening (4 lanes) from Northcross Center Ct to Boat House Ct.	2010-2015	2-lane road	1.83
U-5129	Westmoreland Road*	Widening (4 lanes) from W. Catawba Ave to US 21	2010-2015	n/a	1.03
	Westmoreland Road*	Widening (4 lanes), US 21 to Washam-Potts Rd	2010-2015	3-lane road	0.24
I-4733	I-77/ Catawba Avenue*	Convert interchange from simple diamond to urban diamond	2016-2025	simple diamond interchange	n/a
	Old Statesville Rd (NC 115)*	Widening (4 lanes) from Bailey Rd to Potts St	2016-2025	2-lane road	1.65
	Old Statesville Rd (NC 115)*	Widening (2 lanes) from Potts St to County line	2016-2025	2-lane road	3.69
R-2555B	W. Catawba Avenue*	Widening (4 lanes) from Jetton Rd to NC 73	2016-2025	2-lane road	2.37

*=Project is both locally and regionally significant

Projects of Regional Significance

Although not entirely within the study area limits, there are several planned regional roadway projects that will directly impact the Town of Cornelius by altering current travel behavior in the region. These projects, combined with local projects, are designed to create a roadway system that serves the area’s future traffic levels. Information about these projects is provided below. The location of these projects is shown in the Planned Projects Map. For specifics about each project see the MUMPO 2035 Long Range Transportation Plan.

I-485

I -485, known as the Charlotte Outer Loop, is a beltway around Charlotte. It provides an alternative route to travelers wishing to bypass the City, providing connections to both I-77 and I-85. Currently, the northeast quadrant of the beltway is the only remaining portion to be constructed.

Although I-485 does not pass within the jurisdiction of Cornelius, once completed it will have a profound effect on the regional travel in the north Mecklenburg Region. The beltway and planned interchanges at I-77, NC 115, and Prosperity Church Road will offer more route choices, dispersing traffic and relieving congestion on overcrowded roadways.

Prosperity Church Road Extension

Prosperity Church Road currently terminates at Eastfield Road in northeast Mecklenburg County. The 2035 Long Range Transportation Plan recommends the extension of Prosperity Church Road from its current terminus to the intersection of Davidson-Concord Road and NC 73 in Davidson.

While the Prosperity Church Road project is outside of the study area, the construction of the roadway within the town. This project provides an additional north-south connector in the region (currently only three exist: I-77, US 21, and NC 115), distributing traffic volumes between four facilities instead of three.

NC 73 Widening

The widening of NC 73 to four lanes between US 21 and NC 115 under NCDOT TIP project R-2632 will also help to alleviate congestion on the limited east-west travel options in the region. This improvement, combined with the completion of the I-485 beltway, will improve east-west travel in the region.

I-77 Widening & Fast Lanes

I-77 is projected to be widened to accommodate an additional northbound and southbound lane from Exit 23 NB and I-485 SB to Exit 28 in Cornelius by 2015. The NCDOT and FHWA along with regional transportation partners are examining the feasibility of creating High Occupancy Toll Lane or HOT lanes on I-77 to expedite the construction of these lanes. The NCDOT completed a study of HOT lanes on I-77 in 2009 and is working with MUMPO and FHWA on implementation.

I-77 and Exit 25 Improvements

The Town of Huntersville in 2009 completed an evaluation of the Exit 25/I-77 interchange. The study focused on long-term improvements to the interchange that will be needed to meet future traffic demands, including improved connectivity between I-77 and US-21 and provisions for additional (non-interchange) crossings of the interstate. The study identified six different interchange alternatives. Alternative 2, the split diamond interchange configuration, was the preferred alternative. The next phase of the project will require development of the required environmental documentation.

Diverging Diamond

The Diverging Diamond is a unique interchange planned at Exit 28 on I-77 in Cornelius and would be one of the first in North Carolina. Although the Diverging Diamond is a local project, it is going to have regional impacts. The current diamond interchange has reached its functional life with its inability to process the traffic demand on the interchange. The design allows left-turning motorists to turn unopposed by shifting the travel lanes to the opposite side creating an “English” style of driving. The traffic signals at either ramp terminal have simplified traffic phasing which allows more time for all movements to be processed. Additionally, northbound and southbound traffic exiting I-77 can flow more freely reducing traffic queues. The interchange design should reduce the high occurrence of crashes and left-turn backups at this location.



Exhibit C: Existing Development Patterns Map

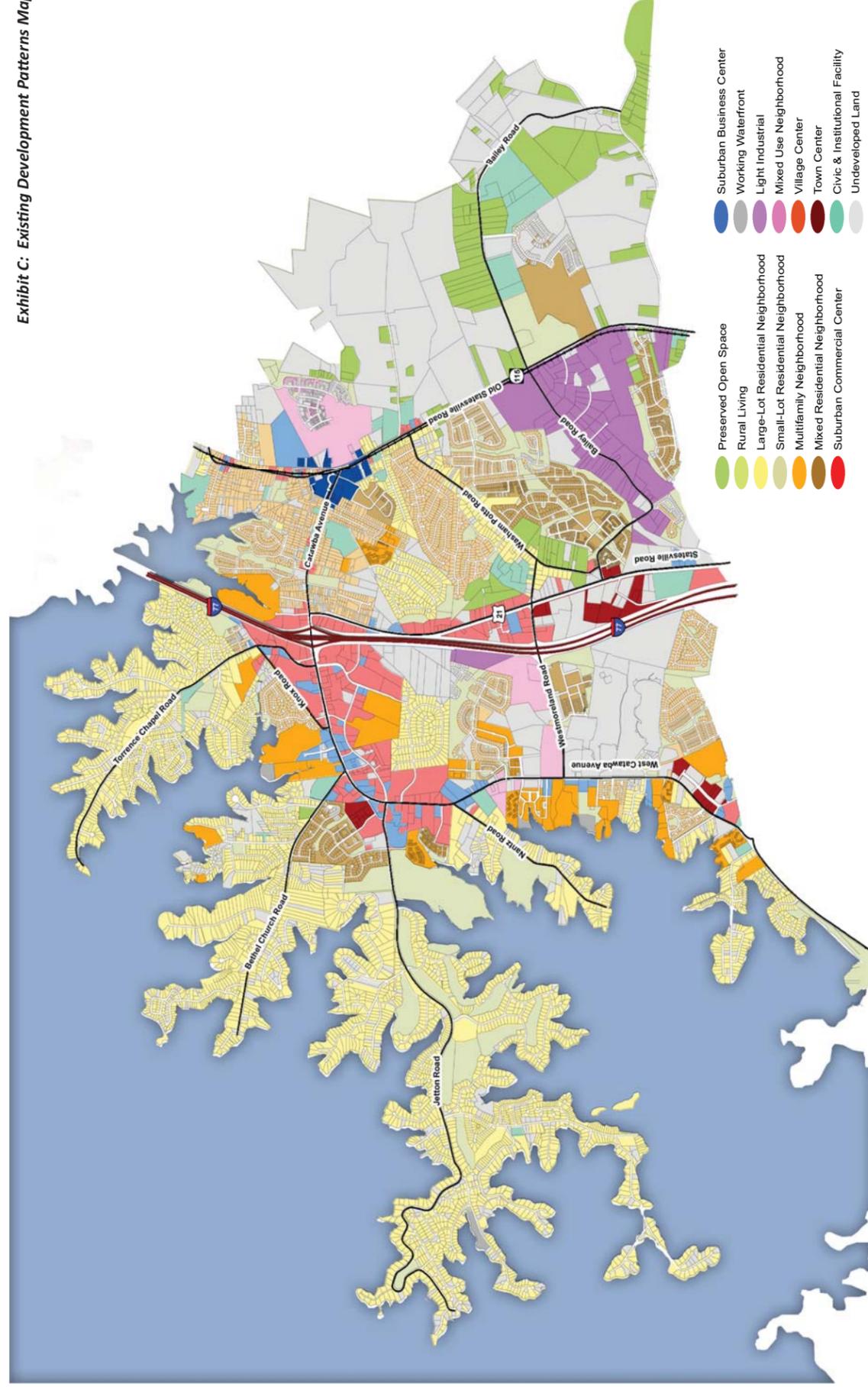


Exhibit D: Figure Ground Map

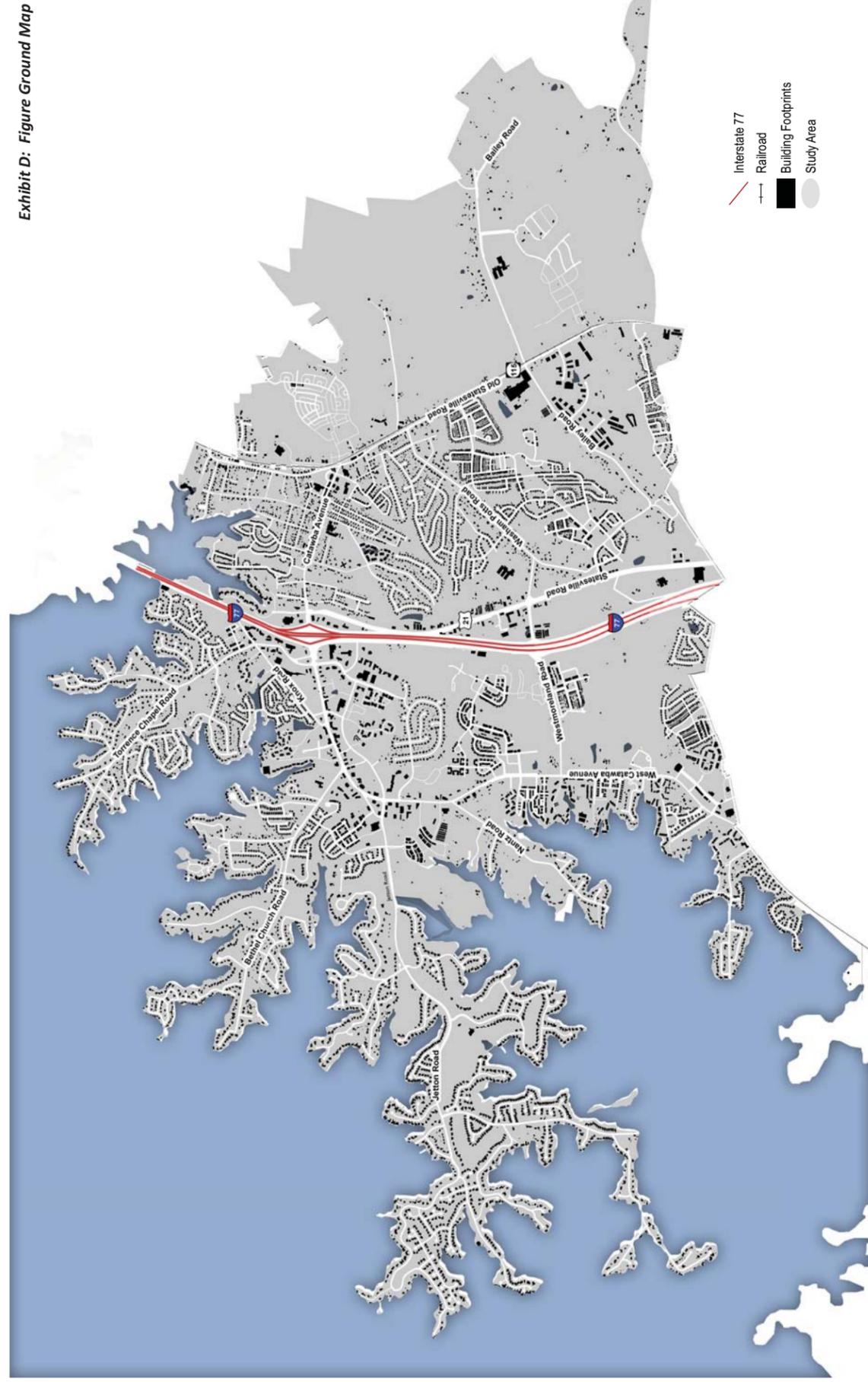
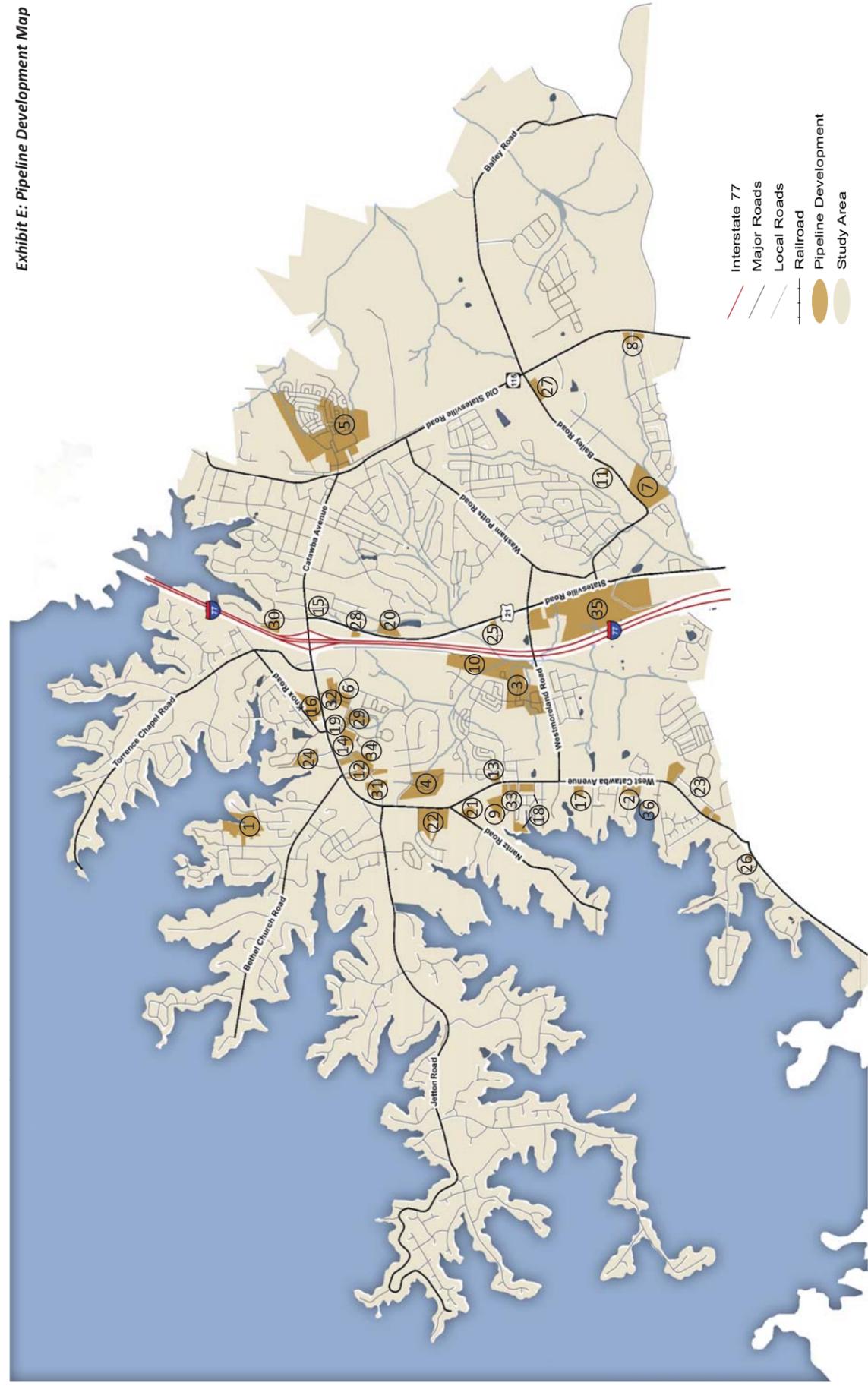
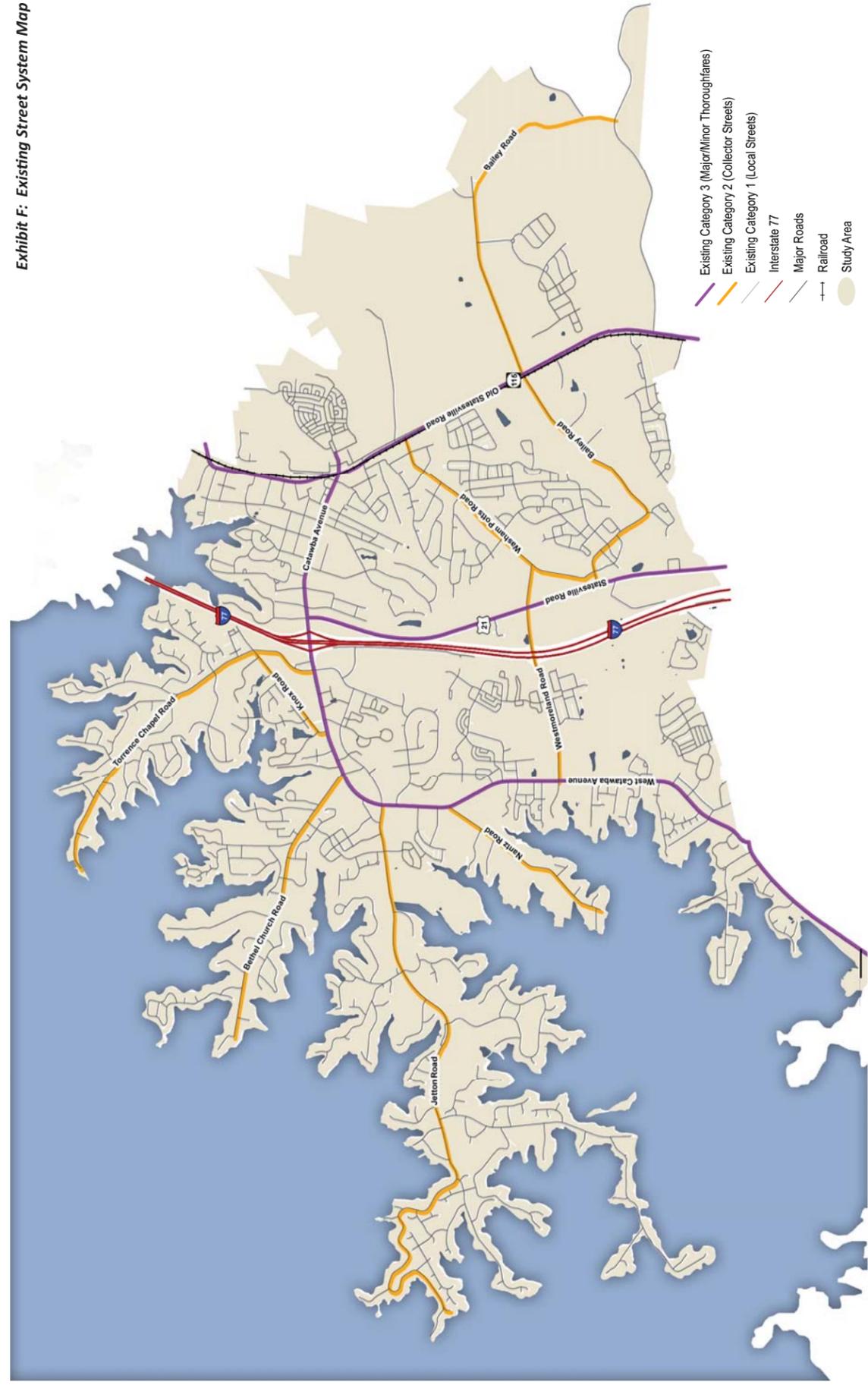


Exhibit E: Pipeline Development Map



- Interstate 77
- Major Roads
- Local Roads
- Railroad
- Pipeline Development
- Study Area

Exhibit F: Existing Street System Map



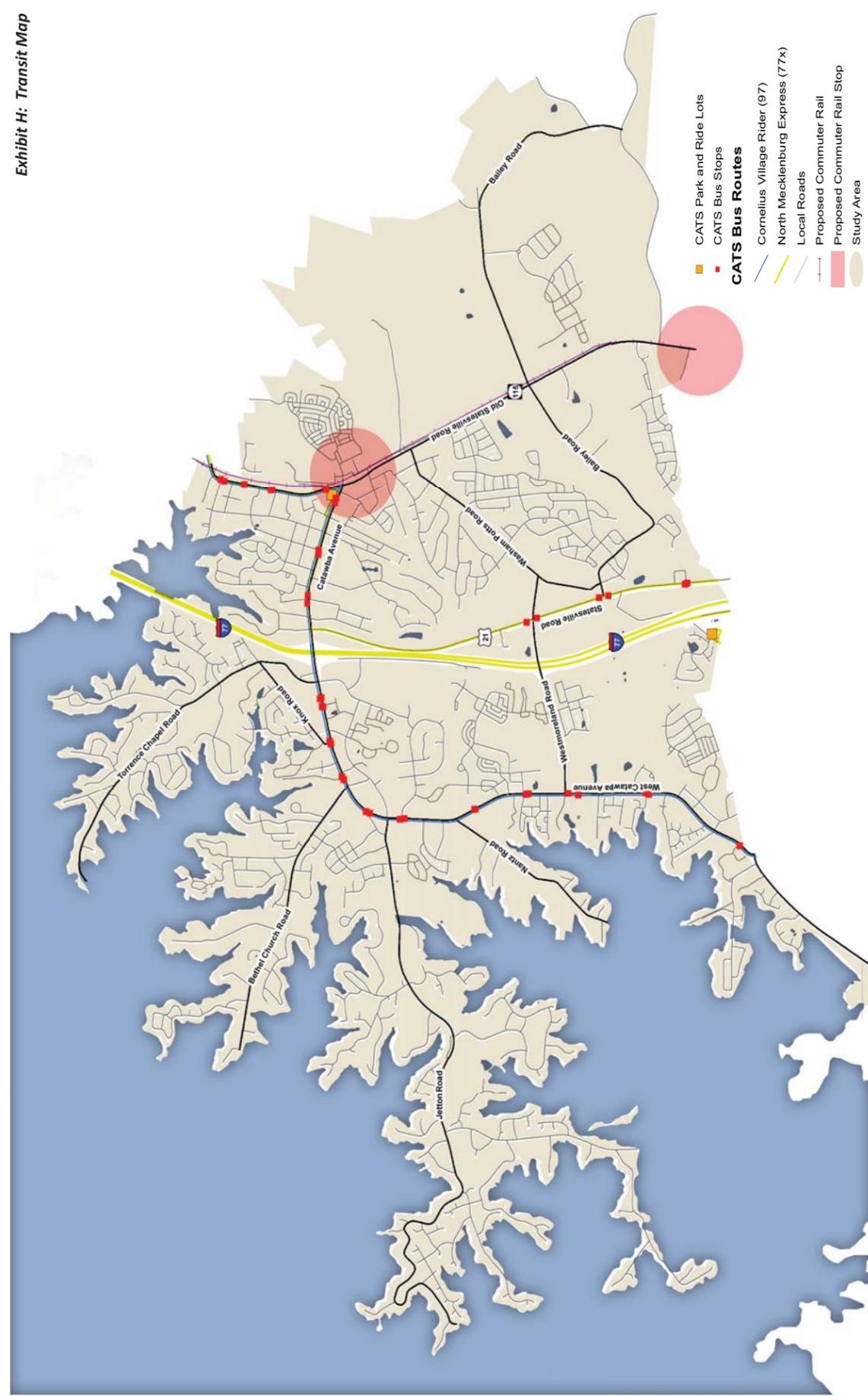
- Existing Category 3 (Major/Minor Thoroughfares)
- Existing Category 2 (Collector Streets)
- Existing Category 1 (Local Streets)
- Interstate 77
- Major Roads
- Railroad
- Study Area

Exhibit G: Traffic Volumes & Congestion Map



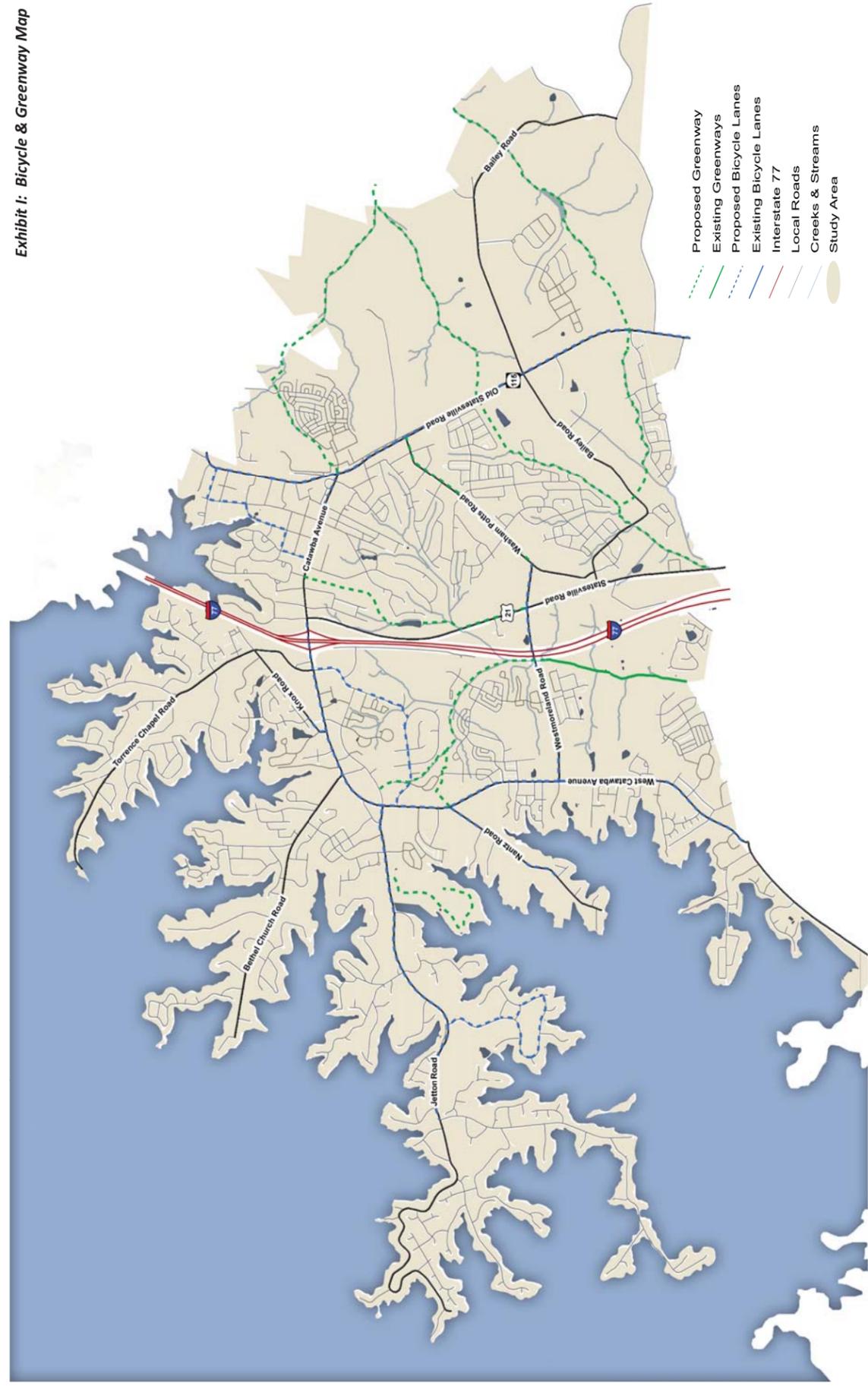
Charting course into the future

Exhibit H: Transit Map



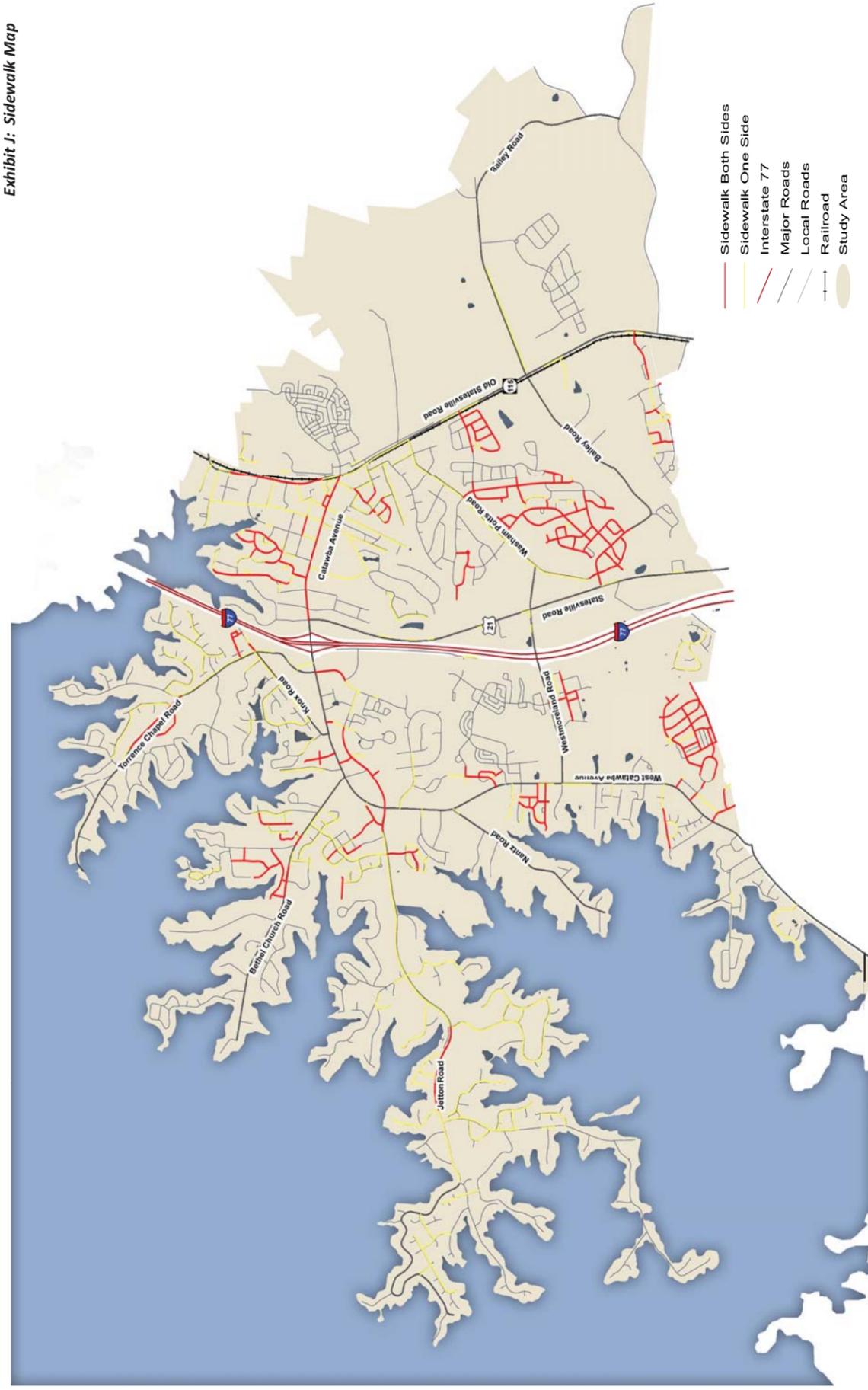
Charting course into the future

Exhibit I: Bicycle & Greenway Map



Charting course into the future

Exhibit J: Sidewalk Map



Charting course into the future

Community Inventory & Assessment

Section G - Community Facilities & Services



Section G:
■ Community Facilities & Services

Community Facilities and Services include provision of water and sewer, solid waste management, storm water management, parks & recreation facilities, police protection, fire protection, emergency medical services, and education. These services are usually provided by Town or County government, or, in some cases, the financial responsibility for providing these services is shared among more than one jurisdiction. A detailed inventory of these services is included below.

Potable Water

Potable water facilities are defined as structures designed to collect, treat, or distribute potable water—including water wells, treatment plants, reservoirs, and distribution mains. The Charlotte-Mecklenburg Utilities department serves the City of Charlotte, greater Mecklenburg County and the Towns of Matthews, Mint Hill, Pineville, Huntersville,

Davidson, and Cornelius. There are three treatment plants and 4,064 miles of water mains in the county's system. The main source of drinking water for the Town of Cornelius is Lake Norman. Cornelius' water is treated at the Lee S. Dukes Water Treatment Plant in Huntersville.

According to an interview with Charlotte-Mecklenburg Utilities, water service is comprehensive and widespread in Cornelius (see Exhibit K found at the end of this section).¹ There is one water project currently underway in town. Water lines are being extended on Bailey Road to serve the new high school and to supply water to the eastern portion of

Mecklenburg County. One additional water project in Cornelius has been identified in CMU's FY 2011-2015 Capital Improvements Program. The project includes construction of approximately 4,400 linear feet of 24 inch water main along NC 115 in the Town of Cornelius. The project, anticipated to cost \$2,000,000 and be completed in FY 2011-12, will increase area system pressures and fire flow capacities in the area.²

Some properties located within the study area, especially areas east of NC 115, are not connected to the potable water system. These homes are generally located on relatively large lots and use wells for the collection, treatment, and distribution of potable water.

Sanitary Sewer

Sanitary Sewer facilities are defined as structures or systems designed for the collection, transmission, treatment, or disposal of sewage—including trunk mains, interceptors, treatment plants, and disposal systems. Sewer service is provided by the Charlotte-Mecklenburg Utilities department. There are 5 treatment plants with a combined capacity to treat 123 million gallons per day (mgd). Wastewater in Cornelius is treated at the McDowell Creek Wastewater Treatment Plant (WWTP) in Huntersville. The plant has been upgraded twice to expand treatment capacity since its opening in 1980. According to an interview with Charlotte-Mecklenburg Utilities, sanitary sewer service is comprehensive and widespread in Cornelius (see Exhibit K found at the end of this section). Current plant capacity at the McDowell Creek WWTP is 12 mgd and plenty of capacity is available to serve areas north of Charlotte.³

¹ Czerr, David. Charlotte-Mecklenburg Utilities. Phone Interview, August 27, 2010.

² http://charmeck.org/city/charlotte/Utilities/Divisions/Documents/Approved_CIP_FY2011_2015.pdf

³ Czerr, David. Charlotte-Mecklenburg Utilities. Phone Interview, August 27, 2010.

Currently there are no sanitary sewer projects in Cornelius included in CMU's FY 2011-2015 Capital Improvements Program. CMU does however, offer three options for extension of sewer mains to specific properties that are not included in the CIP. The first option is for large projects (at least 3,000 to 4,000 ft in length or \$500,000 or greater in cost). Projects of this size are unlikely in Cornelius since most areas are served. Two other options include the street mains extension program and the donated projects program. The street mains extension program is available to developments within 1,000 feet of an existing street main. For private residences, CMU will extend service. For commercial extensions, CMU will split the cost 50/50 with the developer. Under the donated projects program, the private developer pays for the design and construction of the main. Ownership is then transferred to CMU who agrees to maintain the main.

Additionally, CMU meets with town managers and planners during development of the CIP. They look to the towns for guidance on priority projects or areas where service should be extended.

Some properties located within the study area, especially areas east of NC 115, are not connected to the sanitary sewer system. These homes are generally located on relatively large lots and use septic tanks for the collection, treatment, and disposal of wastewater.

Electric

Electricity is provided to the study area by three providers: Electricities, Duke Power, and EnergyUnited. Between all three providers the study area is well served, and services are provided at rates that are competitive with any region in the country.

Natural Gas

Natural gas is provided to the study area by two providers: PSNC and Piedmont Natural Gas. Between these providers the study area is well served, and services are provided at rates that are competitive with any region in the country.

Storm Water Management

Charlotte-Mecklenburg Storm Water Services provides storm water services for the Town of Cornelius. According to a representative with the department, there are no major storm water issues in Cornelius. Residents file complaints with the County. The County explores the complaint and forwards results to the Town.

In 2005 the Town of Cornelius secured a joint Phase II National Pollutant Discharge Elimination System (NPDES) permit with Mecklenburg County and the Towns of Davidson, Cornelius, Huntersville, Matthews, Mint Hill, and Pineville to manage storm water in the County. Under Phase II permit requirements, the jurisdictions are required to develop and implement a Storm Water Management Plan.⁴

Additionally, the regulations discussed in the Natural Environment section pertaining to stream buffering and post-construction also help to manage storm water in the study area.

Solid Waste Management

Solid waste management encompasses the collection, recycling, and disposal of solid waste generated by local residents and businesses. The Town provides one day per week collection service through a private contractor, Republic Services. This collection also includes the pick-up of yard waste. Recycle collection is also handled by Republic

⁴ <http://charmeck.org/stormwater/Contractors/Documents/Storm-WaterManagementProgramPlanRevisions.pdf>

Services and is collected every other week. Items for pick-up can be curbed in a Town provided bin. There are no public landfills within the Town of Cornelius, but residents may bring bulk items to the North Mecklenburg Recycle Center, the North Mecklenburg Landfill, or the Highway 49 C&D Landfill & Recycling Center.

Parks and Recreation

There are twelve park and recreation facilities in the study area. Some of these parks are owned and maintained by the County, some by the Town, and some are owned by Duke Power and leased/maintained by the County. A list of these parks and their amenities can be found in Table G.1. The location of parks in the Town can be found on the Community Facilities Map found in Exhibit L.

Two of these parks, Blythe Landing and Ramsey Creek Park, have public boat ramps (6 at Blythe

Landing and 4 at Ramsey Creek Park). There are also three private marinas - Kings Point Marina, Peninsula Yacht Club, and Holiday Marina - that the public can use for a fee. Additionally, there is one private single boat ramp at Lake Norman Cove and one private dry dock storage facility at Crown Harbor.



Additionally, the Town has joint use agreements in place between the Parks, Art, Recreation, and Culture (PARC) Department and the Charlotte

Table G.1: Park Facilities and Amenities

Name	Type	Acres	Baseball	Softball	Football	Soccer	Basketball	Tennis	Multi-Purpose Field	Volleyball	Picnic Shelter	Playground	Hiking/Walking	Community Center	Disc Golf Course	Swimming Pool	Bicycling	Garden Areas	Water Access
Bailey Road Park	Community	75.00	2			3	2	3			1	2	1						1
Robbins Park	Community	107.00						2	4		1	1	1	1	1				
Westmoreland Athletic Complex	Athletic Complex	19.00	4																
Torrence Chapel Park	Neighborhood	14.26	1	1			1	2			1		0.5						
Smithville Park	Neighborhood	8.78	2			1					1	1							
Legion Park	Neighborhood	7.16	1								1	1	0.5						1
Jetton Road	Neighborhood	6.00							1			1	0.35						
Walter Henderson Road	Mini	2.97									1	1	0.25						
Blythe Landing	County	26.00								2	1	1							1
Ramsey Creek	County	46.00									3	1	1						1
Jetton Park on Lake Norman	County	106.00						8			3	1	2						1
Yacht Club Park	Playground	0.61										1							
Total Undeveloped Open Space		136.87																	
TOTAL ACREAGE		555.65																	

Mecklenburg School (CMS) system for all Town schools. The PARC department sold 22 acres of Bailey Road Park to CMS in 2004 for construction of Bailey Road Middle School. As part of this sale, the park lost four planned softball fields and a planned soccer field. However, Bailey Road Middle School provided the town's first football field, track, and a gymnasium that are accessible by the community.

The Town also relinquished \$1 million of Mecklenburg County Land Banking allocation to CMS to purchase land for Hough High School. As part of this agreement, a gymnasium, ballfields, and other amenities are accessible to the community. In addition, mountain bike and greenway trails are planned in the future.

The final joint use facilities are located at Cornelius Elementary School and JV Washam Elementary School. The Town has limited program access to a multipurpose room, a playground, two basketball courts, and two multipurpose fields at Cornelius Elementary School. At JV Washam Elementary a joint use agreement allows the Town to use the football field, gymnasium, and some school classrooms.

The PARC Department manages town park and recreation facilities and oversees park and recreation related activities in the study area. PARC department staff run the town's recreation centers and athletic programs, plan and host special events, and maintain park grounds.

The Town also has a PARC Advisory Commission. Among the members' duties are making recommendations regarding the lease, sale, acquisition, design, improvement, maintenance, and scheduling of park resources and recreation activities. The Parks and Recreation Advisory Commission members are appointed by and functions in an advisory capacity to the Mayor and the Town Board of Commissioners, with meetings held the first Thursday of the month.

In 2005, PARC completed the 2005/2015 Master Plan for the Town. The master plan inventoried existing public facilities, including parks, and identified new and anticipated deficiencies. Facilities were proposed to meet anticipated deficiencies including Jetton Park II, Robbins Park, and a Transit Oriented Development (TOD) site to include facilities similar to those at Torrence Chapel Park, McDowell Creek, Glenridge Heritage/Oakhurst, and Cornelius East.⁵

The National Recreation and Park Association (NRPA), a national, non-profit service organization dedicated to advancing parks and recreation as part of quality of life recommends between 6.5-10.5 acres of parkland per 1,000 residents. Currently, the town exceeds national standards with a standard of 22 acres per 1,000 residents. According to population projections established in the Market Report, the Town can expect an additional 4,762 to 12,506 people by 2020. Even without building new facilities, the Town is still anticipated to exceed national standards through 2020.

Although acreage appears to be more than sufficient, the Town needs to focus on the distribution of parks as well as provision of an appropriate mix of amenities at these facilities. While the Town's overall park acreage exceeds national standards, certain locations within Town do not. Some areas have an abundance of parks, while other areas, particularly neighborhoods east of I-77, have a significant shortage. Additionally, access to the lake is limited and many residents expressed a desire for increased access.

⁵ PARC. Town of Cornelius Parks and Recreation Comprehensive Master Plan 2005 - 2015. July 18, 2005.

Police Protection

The Town of Cornelius Police Department maintains safety and security in the study area. The Department currently has 53 sworn officers and 18 full-time civilian positions that are based out of one station. Under cooperation with Davidson and Huntersville, the Police Department operates the North Mecklenburg Communications facility and has drafted a North Mecklenburg Communications Equipment Replacement Plan. Capital improvements for this plan are listed through 2015. The Charlotte Mecklenburg Police Department (CMPD), the County Sheriff, and the Davidson and Huntersville Police Departments work with the Town of Cornelius Police Department via mutual aid agreements that are facilitated by the Centralina Council of Governments.



Fire Protection/Emergency Medical Services

The study area is located in the Cornelius-Lemley Fire & Rescue District. The Department is a mix of part-time employees and volunteers; there are no full time employees. During the majority of the day there are three part-time firefighters at each of the Town's two stations.



The District is divided into 14 fire demand zones. Hydrants are assigned to a demand zone and flow tested on a three year basis to ensure sufficient water pressure for fire suppression.

As of March 1, 2005, the Cornelius-Lemley Fire and Rescue Department maintains a Class 4 ISO rating (on a scale of 1-10 with 1 being the highest). The rating was an improvement from a split 6/9 and is the second best in Mecklenburg County, only behind Charlotte, which is rated a 3. Some portions of the study area, located in Mecklenburg County, have a split 4/9 rating. Those properties in the County rated a 9 received that rating because they are not within 1,000 feet of a fire hydrant.

The Cornelius-Lemley Fire & Rescue District also provides Rescue and EMS first responder services within the Cornelius-Lemley Fire District. Under mutual-aid agreements with Gilead, Davidson, and North Mecklenburg Rescues it also provides services as needed to those locations.

The Fire Department has 29 North Carolina certified EMT's. The Fire Department has two rescue companies, four engine companies, two ladder companies, a brush fire truck, the chief's vehicle, a new fire boat, and an operations vehicle which can run EMS first responder calls. The marine unit can respond to incidents on the water.

Education

The Town of Cornelius is included in the Charlotte Mecklenburg Schools' Northeast Learning Zone. The five-zone structure took effect in July 2010, and is part of the 2010-2011 budget reduction process. The intent of the new zone structure is to allow the district to effectively manage and deliver learning and instruction, and human and financial resources more strategically to schools.

Before 2005, only one school existed in Cornelius: Cornelius Elementary School. Due to significant overcrowding, additional schools were built in the study area. As of August 2010, Charlotte Mecklenburg Schools (CMS) operates four schools in the Town of Cornelius. These include: Cornelius Elementary School, JV Washam Elementary, Bailey Middle, and Hough High (which opened in 2010). To date, all schools are operating below capacity (see Table G.2).⁶



⁶ Muri, Scott. Northeast Learning Zone Superintendent. Charlotte-Mecklenburg Schools. Personal Interview, August 17, 2010.

Table G.2: CMS Facilities in Cornelius

Name	Type	Student Stations	Enrollment	Average Class Size
Cornelius	Elementary	876	696	22.45
JV Washam	Elementary	981	850	21.80
Bailey	Middle	1,464	1,197	19.79
Hough	High	no information available to date		

Several private schools are also located in the study area. These include the Phoenix Montessori Academy, Grace Covenant Academy, and the Academic Illumination Day School.

In 2007, Mecklenburg County passed a \$516 million bond referendum (NOTE: A bond is a loan issued by a local government to finance long-term construction projects). Mecklenburg County sells bonds to borrow money to pay for CMS new construction, and/or repairs, and renovate existing educational facilities. County commissioners allocate money to CMS and voters have to approve the bonds. CMS originally planned to spend the approved bond money on 40 projects—including 12 new schools. Of the original bond money, \$150 million has been spent, and portions of this money were used to construct Hough High School.

Given the current economic climate, the remaining \$350 million is being held by the County and they are not selling bonds. The list of schools receiving bond money has not changed since 2007, but the County and CMS intend to revisit and update this list as necessary when the County chooses to sell bonds again. Currently, schools in the Northeast Learning Zone that are scheduled to receive bond funds include Cornelius Elementary and Davidson I.B. Middle. These renovations were estimated to cost \$6,667,870 (2007 dollars).

The bond was approved in 2007 due to increases in student population in North Mecklenburg County. Mallard Creek High School was opened in 2007 to relieve the largest school in the district, North Mecklenburg High School. Mallard Creek High

serves students in northeastern portions of the County. Hough High was the next high school to be completed with 2007 bond funds (opened in 2010) and serves students in Cornelius, North Mecklenburg County, Hopewell, Davidson, and Huntersville.

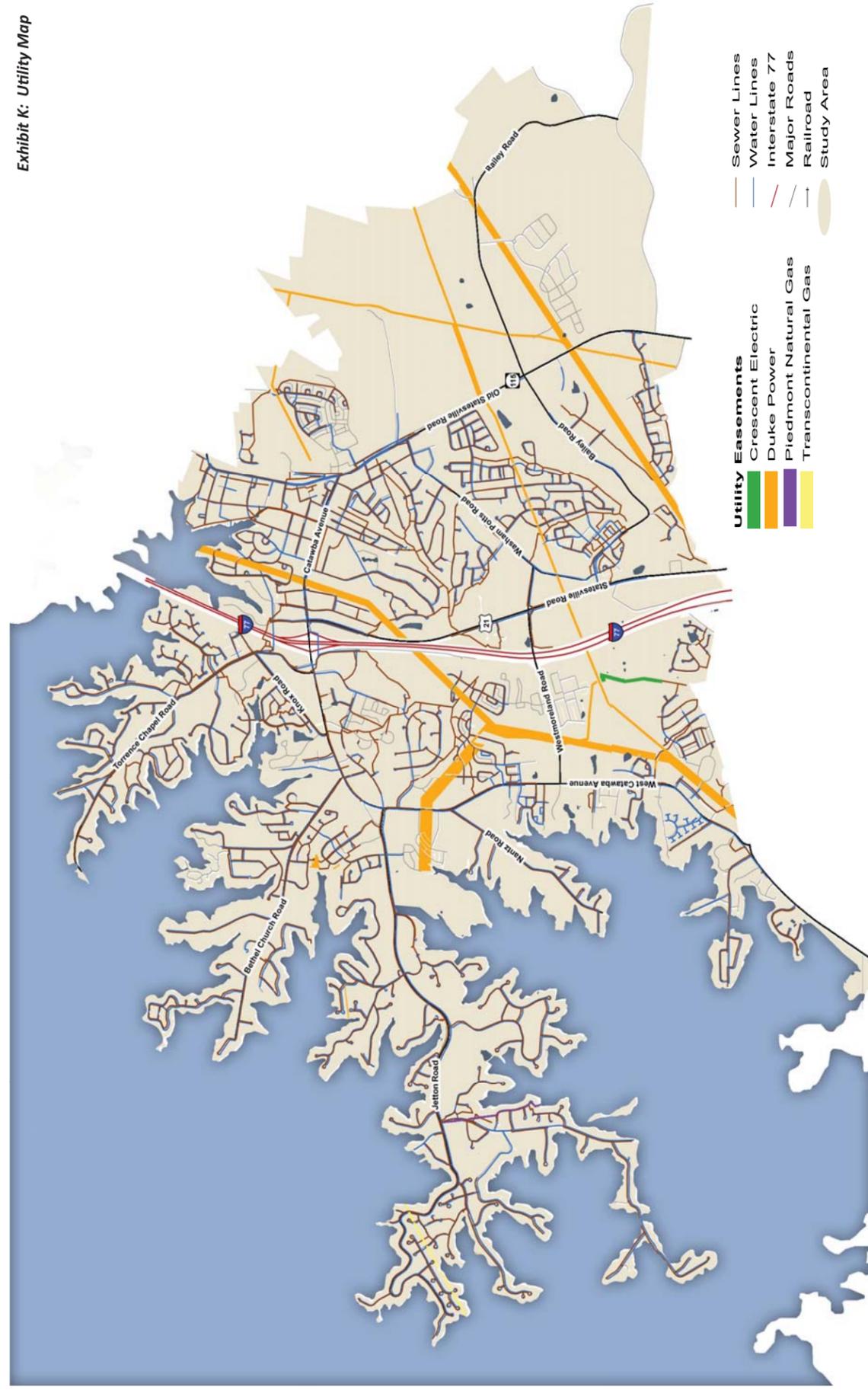
Although construction of new schools in North Mecklenburg County has provided students with better instructional facilities, it has also left many portable classrooms unused. CMS estimates that each portable classroom requires \$25,000 to move.

Financial constraints on the school system have made removal of these facilities impossible at this time.

Other issues of critical consideration for CMS and the North Community include: revising student assignments and co-location and joint use of school facilities and athletic facilities. By maximizing the use of school facilities beyond school hours, CMS can recognize increased utility in critical investments. For example, Hough High, the prototype high school, has an auditorium that was designed for community use and includes an outside entrance. CMS meets monthly with the County Parks Department to discuss ongoing joint use agreements and future plans.

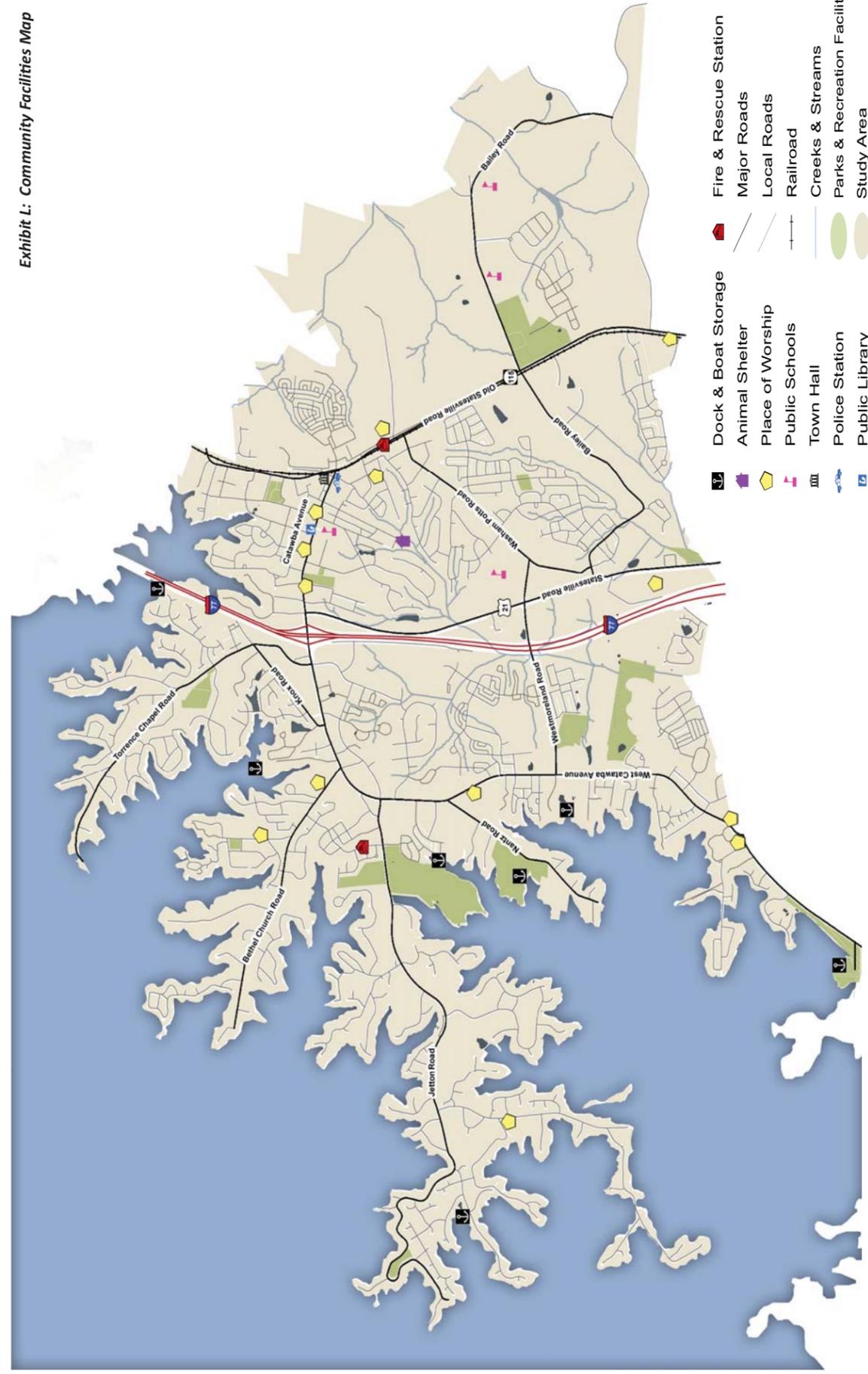
CMS places a strong emphasis on coordinating with local communities in site selection for new schools—sidewalks, roadway improvements, safety, and maintenance concerns are all considered as part of this process. CMS will revisit new school construction when the 2007 bond money is reissued by the County.

Exhibit K: Utility Map



Charting course into the future

Exhibit L: Community Facilities Map



Charting course into the future

Community Inventory & Assessment

Section H - Economic Vitality



Section H:

■ Economic Vitality

This section describes the characteristics necessary for long-term economic sustainability in the study area. It also evaluates the community's economic competitiveness in the region and identifies threats to sustained economic growth.

What Makes a Place Competitive?

Accessibility

One of the major factors considered by employers when determining where to locate is accessibility. Accessibility is measured by a location's proximity to interstate or highways, ports, rail, and commercial and civic airports. The Town of Cornelius has general access to three interstates (I-77, I-40, and I-85). The Town is roughly bisected by I-77, an interstate running from Columbia, SC to Cleveland, OH. I-77 provides easy access to the City of Charlotte and is the region's link to I-40, I-85, and I-485.

I-85 runs just a few miles to the east of the Lake Norman region. It is the primary route to Atlanta and also connects the region to I-65 in Alabama and I-95 in Virginia (which is the major north/south highway on the East Coast).

I-40 is a major east/west route approximately 25 miles north of Cornelius, stretching from Wilmington, NC to Barstow, CA.

I-485 is an outer beltway around Charlotte that is almost complete. The beltway will connect Cornelius to other suburban communities, link I-77 and I-85, and provide additional access to Charlotte Douglas International Airport and the UNC Charlotte Campus.

The Lake Norman Region is served by Norfolk Southern Corporation and is part of the largest

consolidated rail system in the United States. Charlotte and the Lake Norman Region are well served by passenger trains linking local travelers to 15 other North Carolina cities daily, as well as major markets in the New York – Miami corridor.

The center of Cornelius is about 19 miles from one of the nation's busiest international airports: Charlotte/Douglas International Airport. Several smaller airports in proximity to the study area include Concord Regional Airport, Hickory Regional Airport, Lake Norman Airport, and Wilgrove Air Park.

Seaports are a valuable resource for many companies and provide excellent market access. Although no ports are within the study area, both interstates and rail provide direct access to several major east coast ports, including Wilmington and Morehead City in North Carolina; Charleston, Georgetown, and Port Royal in South Carolina; and Richmond and Hampton Roads in Virginia. Shipments in and out of these ports are aided by inland terminals in Charlotte and Greensboro.

Workforce

Another key component that drives the search for a new business location is whether the candidate site has the workforce needed to support the business. Businesses are looking for employees that possess the skills, experience, and education to perform the job duties and who are easily trainable.

According to the Lake Norman Region Economic Development Corporation website (LNREDC), the region is well educated, with 30-37 percent of the region's residents having a bachelor's degree and between 11 and 20 percent having a master's degree or higher. Of the total Lake Norman Region population, 74 to 76 percent of all residents are employed in white collar management, professional,

sales, or administrative jobs. In 2007, the median household income among the three towns' residents ranged from \$84,957 to \$90,260 with a median age range of 33 to 38 years of age.

A readily available workforce clearly exists in the region; however, training for these employees must continue as the economy continues to diversify. Area training programs are provided by the North Carolina Department of Commerce and Central Piedmont Community College. Additionally, there are several higher education facilities in proximity of the study area including UNC-Charlotte, and Davidson College.

Available and Affordable Land

Another factor businesses consider is the availability of land (both size and appropriate zoning). According to the LNREDC website, there are more than 1,000 acres in planned and zoned business and industrial parks in the region (August 2010 data).¹

Although available land is more limited in Cornelius than in Huntersville and Davidson, there are eight sites, totaling 310.40 acres, available in Cornelius. Additionally, the town has increased its ability to benefit from future economic development activity in the region by partnering to create the LNREDC. Through the creation of the LNREDC, the Town of Cornelius entered into a joint venture with Davidson, Huntersville, and Mecklenburg County where the towns share the revenue and expenses of building industrial/business parks in the region. One project has been completed to date under this arrangement - the North Mecklenburg Industrial Park in Huntersville.

¹ <http://www.lakenormanregion.com/BuildingsSites/IndustrialBuildings/tabid/582/Default.aspx> (August 2010)



The park currently has one business, Prairie Packaging, and one planned facility. In September 2010, ABB Inc., a global leader in power and automation technologies for utility and industrial customers, announced they will build a new manufacturing facility in Commerce Station Business Park. Other opportunities for joint ventures have been discussed in both Davidson and Cornelius.

An affordability analysis wasn't included in this report, but anecdotal information suggests that sites are competitively priced for the region. Additionally, the LNREDC and towns negotiate land prices on publicly owned lands on a case-by-case basis depending on the project (the size of the project, the number of jobs created, etc.).

Several factors go into making a site "available" for a project in addition to the size and zoning. Businesses are looking for sites with access and available utilities. Many of the sites identified by the Town and LNREDC as high priority sites are not shovel ready. In some instances, utility companies are conducting site readiness analyses to determine what would need to be done to make the site shovel ready. In other cases, the town needs to conduct these analyses. To make these sites truly available, the property owner, town, or some combination would then need to address

deficiencies found during the site readiness analyses.

Available Inventory

In addition to the availability and affordability of land, buildings in move-in ready condition also attract some employment opportunities. According to the Charlotte Business Journal Commercial Real Estate Quarterly, there is 478,173 s.f. of vacant office space and 1,691,942 s.f. of vacant industrial space in the North submarket (which includes the Town of Cornelius).²

Utility Service & Rates

Available utilities at competitive rates are crucial considerations to many economic development opportunities (especially industrial sites). Most employers are looking for energy, water, and sewer rates that are stable and competitive. They want predictable pricing so that they can focus on other cost escalations related to their business.

Water and sewer within the study area is provided by Charlotte Mecklenburg Utilities. The expansion and pricing of services provided by Charlotte Mecklenburg Utilities is not something over which the Town has direct influence.

A water/sewer rate increase was approved for fiscal year 2011 which became effective July 1, 2010. The impact of the rate increase depends on a customer's individual water use. Fixed water account and sewer account monthly charges increased \$0.02 per day for all customers, and sewer consumption charges increased. Water consumption charges did not increase.

Fixed water charges are \$2.40 a month (up from \$1.80 in FY10). Water consumption charges are as

² Charlotte Business Journal Commercial Real Estate Quarterly from the week of August 6, 2010.

follows:

- Tier 1: 0-4 ccf, \$1.45
- Tier 2: 4-8 ccf, \$1.64
- Tier 3: 8-16 ccf, \$2.69
- Tier 4: 16+ ccf, \$5.32
- Non-Residential (per ccf): \$2.04
- Fixed sewer charges are \$2.40 a month (up from \$1.80 in FY10). The volume charge (per ccf) increased from \$4.00 to \$4.31.

A comparison of 14 cities prepared by a nationally recognized rate consultant found that Charlotte area water and sewer customers pay less than all but three of the other cities. Customers in cities such as Concord, Durham, Cary, NC, Atlanta, GA, Birmingham, AL, and Austin, TX pay significantly more for water and sewer than do Charlotte area residents.

Charlotte Mecklenburg Utilities is currently discussing another rate increase. As of October 2010, the July 2010 rates are still in place.

Cooperative electric power is readily available, reliable, and affordable within the study area. Electricity is provided by ElectricCities, Duke Power, and EnergyUnited. PSNC and Piedmont Natural Gas provide natural gas service to residential, commercial, and industrial customers in the study area.

Available Incentives

The Town of Cornelius is authorized to award Lake Norman Region Economic Development Incentive (EDI) grants to encourage the location and expansion of manufacturing and commercial enterprises in or near town. The grants are based on a variety of criteria, including size and type of project, job creation, growth potential, and environment impact.

Businesses are also eligible to obtain grants through the Charlotte-Mecklenburg County Business Investment Program. The program seeks to encourage the creation, retention, or expansion of new or existing businesses and jobs in identified Investment Zones within the community. Many of the grants are not available to the Town; however, because it is not classified as a distressed community. Grants are provided based upon the amount of property tax generated by the business investment being made.

There are other state funded incentive programs applicable to this region available through the North Carolina Department of Commerce. These programs include grants, tax credits, revenue bonds, and infrastructure assistance.

Site Selection Criteria

The National Association of Industrial and Office Properties (NAIOP) documented the following site selection criteria for various types of employment centers. Many of these considerations are highly applicable to the Town of Cornelius:

- At or near an intermodal facility
- In a high population state
- State with population growth
- Near customers or suppliers
- Near a major international airport
- Served by a superior road system
- In a free trade zone
- In a park where land costs are reasonable, sites vary in size, and there is a mix of uses

Other intangibles that are mentioned by NAIOP include:

- Government agencies that are pro business
- Good local schools and colleges that are

willing to meet company training needs

- Sites that are fully permitted
- A high assurance that development permits will be issued in a timely and predicible manner
- All utilities are available and at reasonable cost
- Alternativesourcesofbroadbandcommunication exists
- Incentives are available for expansions and relocations
- Quality housing is available and affordable for the workforce
- There is a good quality of life
- Proximity to a “job generator” or business cluster

When considering this list, the Town of Cornelius has a number of positive qualities for attracting new employers to the area. However, careful steps must be taken to ensure that these positive characteristics aren’t diminished over time and that a healthy balance is sustained.

Market Strategy

The LNREDC reviews and approves its Marketing Plan annually. The FY 2011 Marketing Plan includes a variety of strategies to meet the economic development needs of the Lake Norman region. Elements include upgrades and maintenance to the LNREDC website, product development (including development of virtual industrial buildings in the region) continued support of the Business Retention and Expansion program, fundraising, and advertising.

Although LNREDC is the lead economic development agency in the region, they have many allies in local and national site section consultants, developers, the real estate brokerage community, the Mecklenburg County Economic Development Department, the North Carolina Department of Commerce, the Charlotte Regional Partnership, and the Charlotte and Lake Norman Chambers of Commerce. These

partners assist in economic development by identifying potential projects, leveraging available dollars, and developing marketing materials.

Threats to Economic Vitality

Congestion/Connectivity

Mobility can enhance or detract from a region’s attractiveness for new employers and industries. Congestion and lack of connectivity in Cornelius as well as the Lake Norman Region as a whole threaten the economic well-being of the area. Overloading of I-77, lack of east-west connectivity-especially across the freeway and railroad, limited north-south connections, and the potential for gridlock on reliever roads during daily accidents on the interstate have been, and could continue to be, a deterrent for corporate relocations to or expansions in the area. In fact, increased traffic congestion could become a motivator for relocations out of the area.

Land Availability

Cornelius has limited undeveloped land remaining. As a result, it is important to ensure the readiness of prime remaining sites. Also, because large, contiguous undeveloped tracts are limited, Cornelius needs to concentrate marketing efforts on smaller office, retail, and flex spaces.

Lack of Transit Facilities

Public transportation provides a variety of economic and social benefits to residents. Efficient and well-located facilities help create jobs, provide greater access to employment, expand the labor pool, reduce travel time for commuters, and reduce traffic congestion. As fuel prices and roadway project costs rise,

congestion increases, and health and environmental concerns intensify. In this context, the availability of transportation alternatives has become more important.

Currently, transit facilities in the study area include local and express bus service, neighborhood shuttles, van/car pools, and park-and-ride lots (see the Mobility Chapter for more details). CATS has plans for a North Corridor Commuter Rail Project that would offer commuter rail service between downtown Charlotte and Mount Mourne in Mooresville. The project would include a rail station in downtown Cornelius. In addition to the benefits described above, commuter rail helps support transit oriented development (TOD), which would further enhance economic activity in the region. According to the Urban Land Institute, the potential for improved economic impact in the region is greatly enhanced by the presence of commuter rail.³

Transit oriented development (TOD) could be built at commuter rail station sites, which would generate significant tax revenue and provide immediate and long-term employment opportunities in the region. Without commuter rail and associated TOD, the scale, density, timing, and profitability of planned projects in the region could be drastically affected.

For estimates on projected tax and employment impacts in the region with and without TODs see the Lake Norman Area Charlotte, North Carolina Urban Land Institute Advisory Services Panel Report available at the Town Planning Department.

³ Urban Land Institute. Lake Norman Area Charlotte, North Carolina. January 25-29, 2010



Section I:

■ Cultural & Historic Resources

Community Inventory & Assessment

Section I: Cultural & Historic Resources

The Town of Cornelius strives to provide an environment where cultural activities are accessible to residents and where preserving the historic foundation of the Town is a respected component of continued development. The agencies and facilities described below help preserve history and facilitate cultural activities within the Town.

Historic Preservation Commission

The Historic Preservation Commission was established in 2003. Commissioners are appointed by the Town Board of Commissioners for three year terms.

The Commission is charged with identifying and pursuing historic designation for structures of historical significance in Cornelius.

Historic Survey

The Town of Cornelius has many historical homes, as well as churches, farms, and commercial buildings. The Town conducted a survey to identify potential landmark designations in 2007. According to the survey, there are over 450 structures that could be eligible for landmark designation.

Libraries

The Cornelius Branch Library, located on Catawba Avenue, is part of the Public Library of Charlotte and Mecklenburg County. The 5,500 square foot branch opened in February 2000. County budget cuts have reduced hours and services at all branches, which became effective in July 2010. The Town raised funds to help build and provide books to the library.



The Cornelius Branch is located across the street from Cornelius Elementary School. Its proximity allows for the establishment of a special relationship between the school and the branch to service children. It offers classes/events such as storytime and game days and has many resources and learning tools targeted to kids and teens. Adult services include outreach services, business and career services, and educational assistance.

Public Art

Performing arts in Cornelius are managed by the Cornelius Parks, Arts, Recreation, and Culture Department (PARC).

The Department operates three recreation and arts centers: Bailey Road Recreation Center, J.V. Washam Recreation Center, and the Cornelius Arts Center. The Bailey Road and J.V. Washam Recreation Centers are located in grade schools, while the Cornelius Arts Center is located in the Oak Street Mill, behind the Cornelius Police Department. The Town currently leases the building supporting the Cornelius Arts Center. These recreation centers host a variety of cultural activities, including youth orchestra, art classes and workshops, and summer camps.

In addition to PARC, there is also an active nonprofit arts organization located in Cornelius called The Community Arts Project (CAP). The CAP is a nonprofit organization that formed in July 2009 when two existing non-profits merged: Creative Art Exchange and The Children's Arts Project. The non-profit entity sub-leases gallery, administrative, and studio space from the Town in the Cornelius Arts Center and provides art experiences to students from 18 months to adults throughout North Mecklenburg County.



The Town also has an Arts Task Force that are part of the larger PARC Department. The Task Force met in June 2010 to discuss the financial, programmatic, and operation aspects of the Cornelius Arts Center as well as future opportunities for the Center. The Town currently leases the building for the Cornelius Arts Center and the lease is set to expire in April 2011.

At this meeting, the Task Force recommended that PARC explore a five-year plan for the arts in Cornelius.

Festivals and Events

The Town of Cornelius hosts several annual festivals and events throughout the year. PARC hosts The Cornelius Outdoor Cinema Series every summer. Movies are free and open to the public and are shown at various locations in Town, including Town Hall, Jetton Village, and various other town parks. PARC also hosts the

Charlotte Symphony Orchestra, a concert series (called Big Band in the Park) in Bailey Road Park, and other various concerts. The events are free and family-oriented and offer concessions and children's activities.

Since 2006, the Town has also hosted the Charlotte Dragonboat Festival at Ramsey Creek Park. Corporate and community teams race across Lake Norman in Dragon Boats in name of a charity. The race includes an opening ceremony, Miss Asian Festival Contest, a cultural presentation, and awards ceremony.

The Town sponsors a variety of sports, recreation, and art camps throughout the summer.



Section J:
■ Finance

Community Inventory & Assessment

Section J - Finance

The Finance Department is responsible for administering the town's financial policies and procedures, maintaining the town's financial condition, and representing the town on financial matters with internal and external parties. One of the Finance Department's primary duties is preparing the annual budget, which is defined by state law as a "proposed plan for raising and spending money for specified programs, functions, activities, or objectives during a fiscal year." Information included in this report is based on the Town of Cornelius' adopted Fiscal Year 2011 budget. The Town of Cornelius' Operating Budget consists of three primary funds: the General Fund, the Electric Fund, and the 911 Special Revenue Fund.

For purposes of this report and the accompanying CommunityViz Fiscal Impact Analysis, the information examined is focused on the revenues and expenditures that are influenced by growth and development in the study area. In addition, no revenues allocated to the county was inventoried or evaluated because the Town has no financial responsibility for these revenue streams or their intended uses.

As the town looks to enhance its vision of a "great place to live, work, and play", the Manager has recommended specific initiatives to be funded in the FY 2011 budget. These initiatives include continued support of public safety as the Town's top priority, transportation improvements, and minor modifications in electric rates and the PARCs and Planning fees. With these initiatives in place, the FY 2011 lays out a fiscally solvent town budget that upholds key components of the Town's vision statement.

Town Revenues

Ad Valorem Taxes

The primary source of revenue for the Town of Cornelius is ad valorem taxes, including those generated by real and personal property. Real property is comprised of land and buildings. Ad valorem taxes contribute more than 60% of the Town's annual operating budget. Ad valorem taxes are collected annually by Mecklenburg County and the Town of Cornelius. The Town's tax rate is \$0.275 per \$100 assessed value. This report only considers the Town's portion of ad valorem taxes collected for a parcel.

Vehicles, business personal property and personal property such as watercraft are also subject to property taxes. Ad valorem taxes are collected annually on automobiles in Mecklenburg County and the Town of Cornelius. The Town of Cornelius assesses a \$10 fee on each motor vehicle registered in town limits. Automobile tax is calculated using the average local fair market value set by Mecklenburg County (\$12,198) for vehicles in the Town of Cornelius. The Town's tax rate is \$0.275 per \$100 assessed value. The CV analysis only calculates the Town's portion of ad valorem taxes collected for automobiles.

Sales and Use Tax

In North Carolina, each county collects a local option sales tax and transfers it to the Department of Revenue (DOR) in Raleigh. Mecklenburg County collects 8.25% State Sales Tax, which includes the 0.5% local sales and use tax for public transportation. Sales tax generated throughout Mecklenburg County is shared among all County local governments based on the percentage of total property tax levied within the County. This revenue stream contributes 13% of the Town's annual operating budget, making it the second largest source of revenue for Cornelius.

The Town's revenue in 2010 was \$2,166,112; reported in the Town's Draft 2010 Financial Statement. Existing retail square footage in the Town was estimated at 3,177,755 s.f. based on a survey completed by Kimley-Horn and Associates in preparation of this study. This equates to \$0.69 per square foot, which was assumed constant for this report.

Cities in North Carolina also share in the tax on sales of both beer and wine based on municipal population levels. This study assumes \$3.31 per new resident in new beer and wine tax revenue consistent with assumptions in the Fiscal Impact of Development Scenarios for the Village of Lake Norman dated February 29, 2008.

Permitting and User Fees

This type of revenue is generated from permits and fees charged in return for rendered services. The Town of Huntersville and Davidson College both pay fees for use of the North Mecklenburg Communication Center. This report assumes 62% of the annual operating costs (\$332,000) for the Center will be funded by the two municipalities identified above.

Telephone users in Cornelius are assessed a monthly fee on wireless or landline phones to support 911 services. Distribution from the state is estimated at \$288,708 per year. The Town also receives monthly distributions of stormwater collection fees from Mecklenburg County based on impervious area. This analysis assumes a constant revenue stream into the future (\$328,000).

Revenue returned to the Town from taxes levied on annual receipts from electric, local telephone (including wireless), cable, and natural gas services is also included in this section. This analysis assumes \$27.28 per new resident or

new employee in new utility franchise tax revenue consistent with assumptions in the Fiscal Impact of Development Scenarios for the Village of Lake Norman dated February 29, 2008.

Other fees include planning and zoning fees, transit fees and map sales and parks and recreation fees. Parking, moving, nuisance, and noise violations also contribute to the permit and fee revenue. For a detailed list of fees, please see the adopted Town Budget, available on The Town's website.

Miscellaneous Sources of Revenue

Other sources of revenue for the Town include the Powell Bill and annual grants and donations. Powell Bill revenue is allocated to the Town in two increments: seventy-five percent (75%) on the basis of relative population and twenty-five percent (25%) on the basis of relative non-state system local street mileage. This analysis assumes constant revenue from street centerline miles and an annual increase in revenue based on new residents (i.e., \$18.79 per new resident). Source: NC League of Municipalities, FY10-11 Municipal State-Collected Revenue Estimates.

The Town anticipates grant and donation monies each year to fund specific programs and activities. A fixed level of \$50,000 per year is assumed for the future.

The total taxes and funds expected to be levied in FY 2011 are shown below in Table J.1.

Table J.1: FY 2011 Budget

Revenue Type	FY 2011 Budget
Ad valorem taxes	10,776,000
Other taxes	362,412
Interest earnings	149,000
Miscellaneous revenues	122,000
Shared restricted revenues	644,000
Shared unrestricted revenues	4,423,000
Charges for svcs and fees	890,000
Debt Issued	193,000
Appr Fund Balance	2,250,000
Total Revenues	19,809,412

Town Expenditures

Expenditures are classified by departments spending the money and the source of the funds. The FY 2011 budget continues to appropriate funds necessary to improve or maintain current levels of service for public services with the Town. Major expenditures include those associated with the Governing Board, General Government (Administration), General Services, Police, Communications, 911 Communications, Animal Control, Property management, Lake Norman Transportation Commission, Powell Bill, Solid Waste and Recycling, Stormwater Management, Planning and Land Development, Tourism, Parks and Recreation, and Debt Service.

The two uses separate funds for the Electric service and state distributions of 911 wired and wireless fees. Expenditures, by object, are divided into personnel services, operating expenditures, transfers to other funds, debt service, and capital outlays.

Police

The Cornelius Police department receives up to 24% of the total General Fund spending. Increases in this department for the 2011 Fiscal Year include an additional \$15,000 to maintain adequate training, continued replacement of police vehicles, \$14,000 towards nuisance administration. Headcount changes in this department include full year funding of officers added in the prior year, continuation of two officers funded through the Governor’s Highway Safety grant, and a new school resources officer for Hough High School opening in the Fall partially funded by CMS. In addition to these increased expenses, the police department responded to 48,089 calls in 2009. In order to obtain a “per call” estimate, the Town’s total police budget (operating and capital costs) was divided by the

total number of calls to realize a cost per response of \$88.

General Services—Fire

The General Services include the Town’s professional services provided by outside contractors and services funded by the Town including fire and EMS. The FY 2011 budget provides for \$3,202,250 of fire related expenditures. Service call estimates for the fire department were created using the same method as police expenses. In 2009, the fire department responded to 2,334 calls, of which 1,118 were fire related and 1,216 were EMS related.

Solid Waste

Solid waste expenditures are expected to remain constant across the Fiscal Years 2010 and 2011. Solid waste is provided through a contract service with Republic Services of Charlotte, Inc. The current contract includes collection of household garbage, small business garbage, and recycling and yard debris. The Town provides curbside collection of residential and small business waste, recycling, and yard debris at approximately 8,600 collection points.

Street Maintenance

Street improvements for the Town of Cornelius are funded through a state-shared tax known as “Powell Bill” funds. These funds are used to maintain the street resurfacing program, construct new streets, repair existing sidewalks, and improve existing streets with bike paths and sidewalks. Transportation improvements funded in the FY 2011 budget include Zion Street extension (\$170,000), Bethel Church Road sidewalk addition (\$180,000), and funding West Catawba Avenue sidewalks along with resurfacing of various neighborhood streets from existing Powell Bill proceeds. The Town is also schedule to fulfill financial obligations to the Town of Huntersville by increasing

funding for the Verhoeff flyover (\$54,450). Total Powell Bill funds set aside in the FY 2011 budget total \$533,752.

Parks and Recreation

The Parks, Art, Recreation and Culture (PARC) Department mission is to provide great parks, natural areas, and recreational experiences. These are provided almost exclusively for residents, not businesses. The Department’s \$1.3 million annual operating budget remains constant from the Fiscal Year 2010 expenditures, with the exception of an additional \$30,000 appropriated for funding the Westmoreland Athletic Complex Phase 1.

General Administration

The Town Manager serves as the Chief Administrative Officer for the Town and directs implementation of policies drafted by the Board of Commissioners. Administrative functions include budgeting and finance, tax collections, contract administration, information technology, project management, legal services, custodial services, human resources, and customer service.

Communications Department

The North Mecklenburg Communications Center exists to provide emergency communications services to residents and visitors of Cornelius, Huntersville, and Davidson College. Public safety requests, animal control services, and emergency calls are handled by the Communications Center.

The 911 Communications fund is used to account for 911 fees collected from local businesses and residents for wired and wireless

communications. The expenditures have historically been paid from the Communications budget in the General fund. These funds are used to provide the necessary equipment for the receipt and handling of 911 calls for service in Cornelius, Huntersville, and the campus of Davidson College.

The Electric Fund

ElectriCities operates the Town of Cornelius and Huntersville electric systems. ElectriCities is a regional power utility that is funded through separate town revenues. Residential fees for electric service are available on the Town’s website.

Small commercial and medium commercial fees are also available on the Town’s website. These fees are expected to remain as shown below throughout the duration of FY 2011.

Conclusion

Although the Town has been through the 2008 recession, it was able to improve many service areas, including adding new police officers and creating an animal control facility. In 2011 and beyond the Town Finance department wants to minimize the impact of the impending

Mecklenburg County tax revaluation, provide transportation alternatives on already overcrowded roads, and maintain quality of life for Town of Cornelius citizens through varied recreational alternatives. The FY 2011 budget responds to these concerns. Future development projects will be judged according to similar metrics, and this fiscal impact analysis will serve as the basis for evaluating the fiscal solvency of new development in the Town of Cornelius.



Section K:

■ Community Concerns and Aspirations

Community Inventory & Assessment

Section K - Community Concerns and Aspirations

Community concerns and aspirations unique to the Town of Cornelius were identified early in the planning process. The following list was generated by comments collected during focus group meetings, stakeholder meetings, and four public workshops held in support of the comprehensive master plan. These comments will be considered in subsequent phases of the planning process especially to identify a preferred development framework for the study area and supporting goals and policies.

- Reinforce the entire study area as one cohesive community, especially by linking together assets and opportunities east and west of I-77.
- Maintain a variety of housing types and preferences in the study area.
- Increase the quantity and quality of community facilities and services to town residents and business owners; especially more opportunities for recreation and community gathering areas.

Community concerns and aspirations recorded during early phases of the planning process include:

- Maintain or enhance overall quality-of-life for current and future residents.
- Preserve scenic view sheds, town parks, natural areas, and other environmentally-significant land inside the study area.
- Create new local activity centers in strategic locations and connect, repurpose, and reuse existing local activity centers to increase the quantity and quality of public spaces and community gathering areas in the study area.
- Limit the sheer magnitude and associated impacts of new residential development throughout the study area.
- Attract new employment centers to the study area that increase tax base, economic vitality, and access to jobs in the study area.
- Activate the water's edge along Lake Norman for recreation and/or economic development initiatives, which all reinforce Cornelius as the town by the lake.
- Preserve and protect the historic core of town, generally identified east of I-77 and near Catawba Avenue.
- Improve overall access and mobility throughout the study area, including improvements for bicyclists, pedestrians, and transit users.



Section L:
■ Emerging Trends

Community Inventory & Assessment

Section L - Emerging Trends

The primary focus for Navigate Cornelius is to protect the quality of life valued by residents and safeguard the community's assets. This section identifies those features of the community valued most by Town residents and identifies threats to quality of life and opportunities for improvement that, if not addressed, could hinder the success of the community in the future.

Community Assets

Community assets are the characteristics of a community that make it attractive. They not only provide direct benefits to residents, but they make the community appealing to visitors and potential employers by giving it a unique identity and sense of place.

Community assets in the Town of Cornelius include:

Location

The Town of Cornelius is located just 20 miles north of the City of Charlotte and 8 miles south of Mooresville. It is also positioned on the southeastern shores of Lake Norman, the largest manmade body of fresh water in the state. It is in proximity to three major interstates, one of the nation's top international airports, and the largest consolidated rail system in the United States.

Lake Norman

The Town of Cornelius has more miles of shoreline than any other municipality on the lake. The lake has been a large driver of economic activity, attracting new residents and businesses to the area. It also offers many recreation opportunities like boating, fishing, and canoeing and provides a valuable source of drinking water for area residents.

Skilled Workforce

A skilled workforce is a key component that drives a company's search for a new business location. Businesses are looking for employees that possess the skills, experience, and education to perform job duties and who are easily trainable.

Residents of Cornelius are well educated and highly skilled. Over half the population of Cornelius has a college degree and there are more people with a master's degree and professional school degree than in the County, State, and Metropolitan Statistical Area (MSA). The majority of residents are employed in white collar industries including office, administrative, and sales related jobs. The median household income in Cornelius is nearly \$84,000, well above the State median of \$46,494, the MSA median of \$55,666, and the Mecklenburg County median of \$58,431.

Public Utilities

Public utilities in Town are available and dependable. Access to water and sewer service is widespread. Utilities are provided at competitive rates, lower than rates in Concord, Durham, and Cary (NC); Atlanta (GA); Birmingham (AL); and Austin (TX).

Healthy Housing & Retail Market

Cornelius has not been immune to the economic downturn. However, compared to the county, state, and country as whole, the Town (and larger Lake Norman Region) is faring better than most. Home sales are down, but sales volume and average price for home sales continues to outperform the majority of the Charlotte Multiple Listing Service (MLS). Average rent, vacancy rate, and positive absorptions and additions to the market indicate that the area is among the healthiest in the retail market.

Parks & Recreation

The Town of Cornelius has over 550 acres of parkland. With 22 acres of parkland per 1,000, the Town exceeds the national standard of 6.5 10.5 acres per 1,000 residents. Additionally, the Town has a strong relationship with Charlotte-Mecklenburg Schools (CMS) and agreements in place for several joint use facilities in Town.

Opportunities for Improvement

Opportunities for improvement are those areas Town residents felt to be the least appealing aspects of Cornelius. Residents felt improvements should be made in the following areas:

Bicycle and Pedestrian Facilities

Bicycle and pedestrian facilities are limited in the study area because of natural barriers (i.e. Lake Norman) and the existing street network (i.e. I-77 and the Norfolk Southern rail line). Only four streets in town have on-street bike lanes and the sidewalk network is fragmented. Only one greenway exists in town which was only recently completed. In addition to on-street facilities like bike lanes, residents would like to see more multi-use paths constructed off road that could be used by residents of all ages and skill sets. Residents would also like to see increased connections between these facilities and community attractions like schools and parks.

Town Center/Community Gathering Spaces/ Public Spaces

The Town of Cornelius lacks a true town center and associated community gathering spaces and public spaces. Currently, development in Cornelius caters to the automobile and lacks

human scale. Neighborhoods lack community gathering places and quality open space and few restaurants offer outdoor dining opportunities. Residents enjoy the festivals and events held in Town, but feel the lack of quality public spaces prevents the frequency and type of events that can be held in Town. Many residents stated that they went outside Cornelius for experiences they wish were offered in Town.

Access to the Lake

The majority of lakeshore in Cornelius is privately owned. Public access is limited to town parks and to portions of the study area west of I-77. Residents expressed a desire for lakefront beach areas where they could swim, play volleyball, and sunbathe. Additionally, residents expressed a desire for working waterfront areas that activate the water's edge through a combined mix of employment, shopping, and entertainment options and public spaces.

Park Distribution & Amenities

Park acreage per resident in Cornelius exceeds national level of service standards. While the Town's overall park acreage exceeds national standards, certain locations within Town do not.

Some areas have an abundance of parks, while other areas, particularly neighborhoods east of I-77, have a significant shortage. Additionally, park facilities offer different amenities. The Town needs to ensure the right mix of amenities at each facility type to meet resident's needs and desires.

Code Enforcement

Code enforcement in Cornelius lacks consistency. Responsibility has shifted from the planning department to the police department and back to the planning department. There is limited staff available to respond to complaints or to proactively

seek out violations. Residents believe violations exist in aging or partially constructed neighborhoods and believe outside storage, boat storage, and broken down vehicles are a problem in some commercial areas of Town.

Community Design

Portions of the study area, like the historic downtown, have a unique identity and sense of place. Other areas of town lack identifiable character. The rapid pace of growth in the study area resulted in many ad hoc development decisions without thought to the larger development context or the overall principles the town is trying to achieve. Design guidelines and architectural styles need not be applied uniformly throughout the study area. Many areas of town like the waterfront, the historic downtown, and the rural areas east of NC 115 have unique identities and individual identifiable characteristics.

Cornelius also needs to take steps to distinguish itself within the region. The Town lacks gateway treatments which announce to visitors that one has entered a place that is different and new. Additionally the town has no wayfinding system to direct residents and visitors to civic, cultural, recreational, and public uses with the community. Finally, the Town needs a brand to represent the pride and identity of the community.

Housing Variety

Cornelius is a bedroom community to Charlotte, with 83% of its land uses classified as residential. Of these residential uses, the majority are low density single family homes in subdivisions. Housing markets are shifting in response to changing demographic and socioeconomic characteristics, lifestyle choices, and market conditions. The market indicates that more

people prefer homes in compact, walkable, mixed-use neighborhoods as opposed to small-lot suburban neighborhoods.

Additionally, although a healthy housing market is a sign of stability, it has kept closing prices and rents high. It is important to offer well-located, attractive executive housing in Town, but it is equally important to maintain ample workforce housing for the community's policemen, firemen, and teachers.

Commercial Centers

Many commercial centers in Cornelius have vacancies, are approaching the end of their useful life, or are poorly designed. Residents would like to see improvements/upfits to existing retail centers before more land is dedicated for retail uses in Town.

Employment Opportunities

The majority of residents commute outside of Cornelius for employment. Approximately 71 percent of residents commuting within Mecklenburg County, mostly to Charlotte. The average commute time is 31 minutes, with only 22 percent of residents commuting less than 15 minutes to work.¹ As a result, residents have longer commutes and travel times, while intensifying traffic congestion and air pollution.

Many residents indicated a desire to have more job opportunities in proximity to their home. Additionally, many residents believe that an oversupply of single family residential housing units is taking up limited available land for future employment opportunities. Residents overwhelmingly supported limited to no growth in the number of single family housing units during the lifetime of this Plan to preserve land for future employment opportunities.

¹Claritas, Inc.

Also, Cornelius markets itself through the Lake Norman Regional Economic Development Corporation (LNREDC). Currently, the LNREDC primarily concentrates on recruiting large office and industrial uses. Cornelius; however, is the most built-out of the region's communities and has limited large land tracts available for development at this scale. The Town needs to develop a marketing plan to attract smaller office, retail, and flex spaces.

Transit

CATS currently offers bus services in the area, but most of these routes provide service to and from Charlotte. Many residents expressed a desire for additional local routes throughout Town.

Also, commuter rail service does not currently extend north into Cornelius. The majority of residents expressed a desire to see CATS extend the rail line north, creating another travel option for residents commuting to Charlotte.

Community Cohesiveness

Interstate 77 roughly bisects the town into east and west. Although it provides quick access to commuters traveling to Charlotte or Mooreville, it limits east-west connections (vehicular,

bicycle, and pedestrian) within Town. Residents expressed concern over the limited amount of interaction between neighborhoods and would like to see additional connections made across the interstate.

Threats to Way of Life

Threats to way of life are those issues so severe that residents believe they will not only deter future residents and businesses from moving to the area, but will also threaten the quality of

life that attracted residents to the area.

Congestion

Traffic volumes are increasing on the majority of area roads and several roads are operating above capacity. There are limited east-west and north-south connections in the study area, forcing all trips to only a handful of roads.

Residents believe congestion is associated with deteriorating vitality of an area. It has resulted in added travel delay for residents and a status of nonattainment for air quality in the region. It has also had negative impacts on the community by promoting "cut-through" traffic in residential neighborhoods and impeding travel safety. Most importantly, residents fear congestion has been, or will become, a deterrent to corporate relocations to or expansions in the area.

Water Quality

Many of the area's waterbodies are degraded. The Lake Norman watershed has been designated as a critical watershed while the Mountain Island Lake watershed is classified as a protected area. Additionally, 73% of streams and creeks in Mecklenburg County are impaired. Although several regulations have been introduced to improve water quality, continued growth and development threaten their success. Impacts to water quality threaten the water supply, recreational opportunities, and overall desirability of the area.



Appendix:

■ Transportation Agencies & Plans

Agency	Plans/Policies/ Ordinances	Date Completed	Plan Purpose	Recommendations
MUMPO	2035 LRTP	2010	The LRTP details the transportation improvements and policies to be implemented in the MPO's planning area through 2035.	The LRTP contains recommendations for streets and roads, transit routes, guideways, and greenways and bicycle, and pedestrian facilities in the planning area. These recommendations are illustrated in figures in Ch 11 of the Plan. Recommendations are incorporated into the Planned System Map and the Bike/Greenways/Transit Map.
	Thoroughfare Plan	2004	The thoroughfare plan designates the role of each major route within the local and regional transportation network.	The plan shows the existing interchanges (at I-77 and Catawba Ave and I-77 and Sam Furr Rd) and a proposed interchange at I-77 and Westmoreland Rd. It also recommends two additional major thoroughfare east-west connections and one minor thoroughfare north-south connector.
CDOT	NC 73 Transportation and Land Use Corridor Plan	2004	The impetus of the plan was the recognition that increased development pressures along the corridor, and the resulting vehicular activity, have overwhelmed the roadway's capacity to serve as a reliable facility for its many users. The plan considers needed physical improvements and evaluates current and foreseeable land uses along the corridor.	The plan recommends that each participating jurisdiction adopt a Memorandum of Understanding (MOU) and a Council of Planning (NC 73 Council of Planning). It recommends getting all of NC 73 added to the TIP List. Jurisdiction responsibilities set forth in the plan include maintain land use plans that are consistent with corridor recommendations, undertake area plans at locations identified in the segment plans, require developments to follow corridor access guidelines, maintain or adopt development policies that will maintain ROW necessary for appropriate road typology, require as part of the land use and zoning approval process that some road be funded and built as part of the developments, and take responsibility for implementing some aspects of recommended roadway projects.
CATS	2030 Transit Corridor System Plan	2006	The plan details needed service and facility improvements throughout the Charlotte region through 2030.	The plan recommends 25 miles of commuter rail, 21 miles of light rail, 16 miles of streetcar, 14 miles of bus rapid transit and an expanded network of buses and other transit services. Of particular importance to Cornelius is the planned commuter rail service and rail stop in Cornelius and the construction of HOV lanes along I-77.
Town of Cornelius (PARC Department, Planning Department)	Greenway/Bikeway Master Plan	2004	The purpose of this plan is to guide the planning and implementation of an interconnecting system of greenways and bikeways in Town.	The plan identifies 18 potential greenway/bikeway corridors in Town. These recommendations are shown in the Bike/Greenways/Transit Map.
	Centennial Transportation Plan	2006	The Centennial Transportation Plan is a multimodal plan for the town's future transportation system that seeks to address public safety and mobility while simultaneously supporting economic development and quality of life initiatives.	The plan includes recommendations to improve street connectivity, accommodate pedestrians and cyclists, to facilitate intergovernmental coordination, and to pursue alternative funding sources, along with an action plan to improve streets. Project corridor sheets are included for 6 major corridors in town that include information on recommended projects, project costs, responsible party, and timeframe for completion.
	Cornelius East Village Plan	2003	The plan develops a vision for the east side of Cornelius and for the area west of Davidson-Concord Road in Davidson and serves as a guide for development in the area.	The plan calls for the development of office/institutional uses to occur north of Bailey Road, residential development on the Coulter Farm property, and an employment village between the Coulter Farm and Mayes Road. The plan also calls for improved street connectivity and the development of interconnecting greenways, multi-use paths, and open spaces throughout the study area.
	Land Development Code	adopted 1996, amended through 2009	The Land Development Code (LDC) establishes regulations to the development and use of all land and structures within the study area.	The LDC requires the placement of bicycle lanes when new development occurs as well as requiring their placement on certain connecting thoroughfares. It also provides for bicycle support facilities in new development, requires a curb cut design that is both bicycle friendly and which reduces bicycle/vehicle conflict, encourages a bicycle network, and requires five-foot bicycle lanes on certain designated streets. The LDC also typically requires 5 foot sidewalks to be built on both sides of the street.
	Parks and Recreation Comprehensive Master Plan 2005/2015	2005	The Parks and Recreation Comprehensive Master Plan defines a vision for parks and recreation in town through 2015.	The plan recommends improvements to the park system and greenway network. Additionally, a community needs assessment was conducted as a part of the plan based on 2005 LOS standards for biking (1 mile/1,000 residents). It concluded that the Town needed 30 additional miles of urban bikeway paths by 2015. Bike lane extensions were recommended along Catawba Ave, Old Statesville Road, NC 73, Torrence Chapel Road, Bethel Church Road, Jetton Road, Nantz Road, and Westmoreland Road.
Lake Norman Rural Planning Organization	Lake Norman Regional Bicycle Plan	2009	The plan, when completed, provides a means for bicyclists to travel around Lake Norman through Mecklenburg, Iredell, Catawba, and Lincoln counties.	The plan breaks the route into Initial and Ultimate Routes. Initial routes are those segments already appropriate for bicyclists or segments that only need limited improvements. Ultimate routes include planned future routes. The plan prioritized projects and includes a high priority list of 9 projects currently estimated to be approximately \$15 million. It also includes a range of funding strategies. Some of Mecklenburg's high priority projects are located within the Town of Cornelius including construction/improvements along the McDowell Creek Greenway and Washam Street, Church Street, and Catawba Avenue.
Catawba Lands Conservancy	Carolina Thread Trail	2009	The Carolina Thread Trail (CTT) is a regional network of greenways and trails, that when completed, will link people, places, cities, towns, and attractions in 15 counties and preserve significant natural areas in the region.	The Mecklenburg County Steering Committee and Technical Advisory Team adopted an official Carolina Thread Trail Map for Mecklenburg County. The map identifies proposed CTT connections, priority destinations, and planned greenways and overland connectors. These recommendations are shown in the Bike/Greenways/Transit Map.
Mecklenburg County Parks and Recreation Department	Mecklenburg County Parks and Recreation Greenway Plan Update	2008	The plan serves as the official greenway plan for Mecklenburg County.	The plan identifies primary greenway corridors and overland trail corridors in the county and creates an action plan that includes 5 and 10 year strategies for expanding the trail system. The strategies were ranked and prioritized. High priority projects in Cornelius include the South Prong Rocky River Greenway and the McDowell Creek Greenway. Recommendations from this plan are shown in the Bike/Greenways/Transit Map.

Charting Course into the Future