US 521 / SC 9 Corridor Study *Moving Forward*

Transportation

Chapter 4

Introduction

The US 521 and SC 9 corridors are important transportation connections stretching across Lancaster County and crossing in the City of Lancaster. These regional corridors connect with two interstates and multiple US and state routes and link residents, commuters, and travelers to destinations in the communities along the corridors, and to destinations around the periphery. Up to 32,200 vehicles per day (vpd) travel along US 521 and 12,300 vpd along SC 9, demonstrating the local importance of these corridors to the adjacent communities and the region's transportation network. Given the current travel demands on these roadways and their ideal locations within the regional transportation network, they will undoubtedly experience continued traffic growth as development pressures occur.

This chapter provides an overview of best practices in transportation planning and outlines the system (roadway), bicycle and pedestrian, and transit solutions that will collectively ensure the future transportation network operates safely and efficiently. Effective improvement of corridors such as US 521 and SC 9 requires careful planning and the resolve to protect the investment as development pressures occur. Based on sound engineering and planning principles, strong community outreach and a solid implementation plan, the plan described herein seeks to address physical changes to the corridor while building upon the community's vision for the corridors.

Regional Planning Context

The recommendations contained in this chapter were developed in a collaborative approach with consideration given to the planning efforts occurring in the surrounding communities and states. To develop a concise set of recommendations for the study area, the following were considered in the planning process for this study:

- Rock-Hill Fort-Mill Area Transportation Study (RFATS)
- Lancaster County Comprehensive Plan
- Western Union County Local Area Regional Transportation Plan
- Mecklenburg-Union Metropolitan Planning Organization (MUMPO) Long Range Transportation Plan
- Carolina Thread Trail

Guiding Principles

The consultant team, through collaboration with the Project Advisory Committee (PAC), stakeholder interviews, and public feedback received from a questionnaire and input at public work sessions and community events, created a set of guiding principles for influencing the transportation system in the study area. These principles are designed to help the community handle the inevitable growth anticipated in the study area in a manner that reduces reliance on major thoroughfares, promotes real transportation choices, enhances safety, and emphasizes connections to the region.

Principles for guiding the transportation component of the *US 521/SC 9 Corridor Study* include:

- Develop a transportation system that offers safe, efficient, and affordable travel choices within the study area.
- Better integrate land use and transportation decision-making processes for a more sustainable transportation system.
- Improve overall mobility and safety along both US 521 and SC 9 with implementation of a comprehensive access management plan.
- Coordinate with state and regional transportation agencies to prepare for future growth in the study area.

Transportation Assessment

This section represents a comprehensive inventory and evaluation of the transportation conditions currently found in the study area. The intent of this section is to capture and assess the corridor operations, issues and concerns, as well as existing constraints. The assessment explores the systems level dynamics (relationships, feedbacks, and interactions of the transportation system at regional and county scale) before determining site specific solutions to localized problems.

Functional Classification

The classification of streets into several "functional" categories aids in communication among policy makers, planners, engineers, and citizens for discussing the transportation system. Functional classification groups streets according to the land use served (or to be served) and provides a general designation of the type of traffic each street is intended to serve. The street functional classification system primarily defines the street in terms of roadway design and character as well as operational features for the movement of vehicles.

Two major considerations for distinguishing arterials from neighborhood streets are access and mobility. The primary function of local or neighborhood streets is to provide access. These streets are intended to serve localized areas or neighborhoods, including local commercial land uses and mixed-use areas (i.e. low speeds, low volumes, and short distances). Local streets are not intended for use by through traffic. In contrast, one of the primary functions of arterials is transportation mobility. Limiting access points (intersections and driveways) on arterials enhances mobility. However, too much mobility at high speeds limits access by pedestrians and bicyclists. The arterial is designed with the intent to carry more traffic than is generated within its corridor (i.e. higher speeds, higher volumes, and longer distances).

Classifying the street system in the vicinity of the study area required close examination of roles that each street performs in the overall transportation system. Transportation planners review quantitative and qualitative classification criteria to develop the hierarchy of streets. The existing public street network in the study area is divided into several functional classifications, including arterials, collectors, and locals. The Street Hierarchy and Future Collector Streets Map on page 4-7 illustrates the functional classifications for the study area's roadway network.

Major Thoroughfares

Ideally, principal thoroughfares have tightly controlled access and few, if any, individual site driveways. These facilities serve medium to longer distance travel and typically connect minor thoroughfares and collector streets to freeways and other higher type roadway facilities. Generally, roadway improvements and maintenance on principal thoroughfares are funded by the state. Examples of Major Thoroughfares within the study area include US 521, SC 9, SC 160, and SC 5.

Minor Thoroughfares

Minor thoroughfares primarily serve a mobility function but often have more closely spaced intersections, some individual site driveways, and generally lower design and posted speeds compared to other arterials. The minor thoroughfare network primarily serves local traffic and connects to other minor thoroughfares, major thoroughfares, and collector streets. Minor thoroughfares provide a higher level of access to adjacent land uses than major thoroughfares and typically have lower traffic volumes.

Most minor thoroughfares in the study area have two-lane undivided cross sections with little or no paved shoulders and an occasional left-turn lane at intersections and major driveways. Some segments have two-way left-turn lanes to provide optimal access to surrounding land uses. Posted speed limits range from 35 mph to 45 mph. Minor arterials include Marvin Road, Shelley Mullis Road, Jim Wilson Road, Doby's Bridge Road, Waxhaw Road, and Riverside Road.

Collectors

Collectors typically provide less overall mobility, operate at lower speeds (35 mph or less), have more frequent and greater land use access flexibility, and serve shorter distance travel than arterials. Collectors provide critical connections in the roadway network by bridging the gap between arterials and locals. Thus, the majority of collector streets connect with one another, with local streets, and with non-expressway/freeway arterials. These streets provide ample facilities for pedestrians and bicyclists and are designed to limit excessive speeds and traffic.

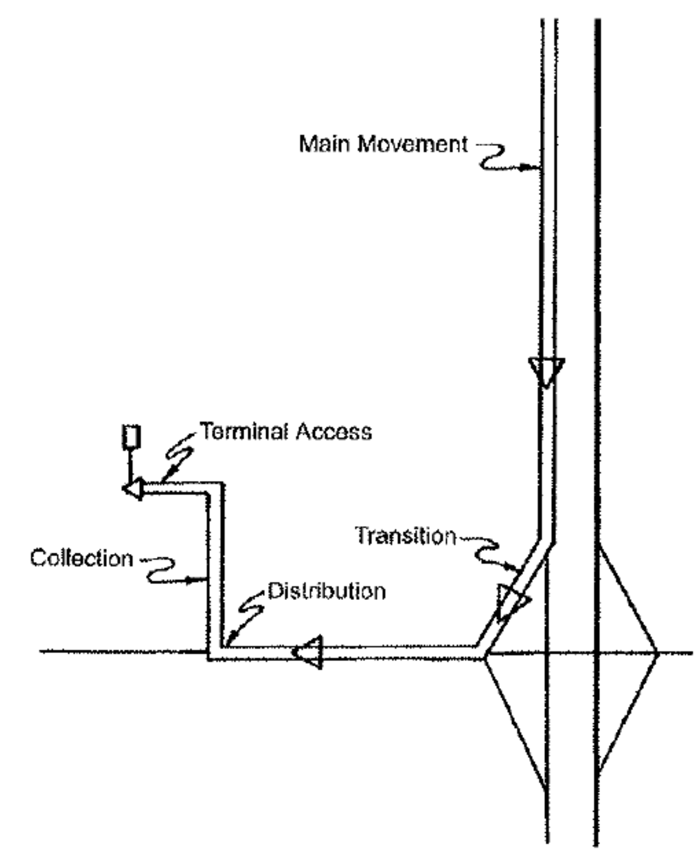
The primary purpose of the collector street system is to collect traffic from neighborhoods and distribute it to the system of major and minor arterials throughout an area. In general, collector streets have two lanes and often have exclusive left-turn lanes at intersections with major and minor arterials and less frequently at intersections with other collector streets. Collector streets are rarely constructed and funded by the state.

Responsibility for collector streets usually falls to the local government and the development community for funding, design, and construction.

Within the study area, collector streets have a wide range of physical characteristics, some of which are attributable to the neighborhoods in which they exist. One commonality between collector streets, however, is that of providing good connectivity. Examples of collector streets in the study area include Barberville Road, Possum Hollow Road, Henry Harris Road, and Van Wyck Road.

Locals

Local facilities provide greater access and the least amount of mobility. These facilities typically connect to one another or to collector streets and provide a high level of access to adjacent land uses/development (i.e., frequent driveways). Locals serve short distance travel and have low posted speed limits (20 mph to 35 mph). Most roadways within the study area are classified as locals. All remaining streets in the study area are classified as locals.



Hierarchy of Movement [Source: AASHTO Geometric Design of Highway,2004]

Existing Roadway Characteristics

The US 521 corridor is primarily a 4-lane divided roadway with depressed landscaped medians and outside shoulders. There are however, three sections where a center bi-directional turn lane exists. Just south of Del Webb Boulevard to Van Wyck Road and between Rebound Road and Andrew Jackson State Park, is a 5-lane section with a center bi-direction turn lane and sidewalks. Just north of Shiloh Unity Road the 5-lane section returns without the presence of sidewalks and continues into the City of Lancaster. The entirety of the SC 9 corridor within the study area is a 4-lane median divided section. Both corridors are major thoroughfares connecting destinations east, west, north and south and intersecting in the City of Lancaster.

The overall width of US 521 including through lanes, shoulder, turn lanes, and medians, varies between 100 feet with the median divided section and 60 feet with the 5-lane section. Along SC 9 the overall width varies between 90 feet and 130 feet with the widest section between the Catawba River and the interchange with Riverside Road/SC 9 Business.

There are 12 signalized intersections between the North Carolina State line and the interchange with SC 9. These locations include:

- Sandra Lane/Walmart Driveway
- SC 160
- Edgewater
- Marvin Road
- City of Light Boulevard
- Doby's Bridge Road
- River Road/Collins Road
- Shelley Mullis Road
- Del Webb Boulevard
- Jim Wilson Road
- Shiloh Unity Road
- Hubbard Road/Craig Manor Road

The only signalized intersection along SC 9 is at Grace Avenue.

In addition to the signalized intersections on US 521 there are 68 unsignalized median crossovers, which average to approximately three per mile. According to the South Carolina Department of Transportation (SCDOT) Access and Roadside Management Standards (ARMS) manual, Section 3D-1, a median crossover should be placed no closer than 500 feet to the nearest crossover in urban conditions and 1,000 feet in rural conditions.

While most of the existing crossovers meet the current guidelines in the ARMS manual, several need to be removed or closed because they are too close to a signalized intersection or do not meet current guidelines. Such examples include the median breaks north and south of the intersection of US 521 and Marvin Road. Being located just 265 feet north and 200 feet south of the intersection, traffic movements can become erratic and congested as motorists try to avoid the signal by cutting through the gas station. Other examples include the median opening north of the City of Light Boulevard signal, the crossover at Dogwood Trail Lane, and the crossover just west of the SC 9 and Riverside Road interchange.

In addition to the spacing of the median crossovers, only one unsignalized median crossover and five signalized intersections are designed with offset left turn lanes. The purpose and benefit of offset left-turn lanes is discussed later in this chapter. Based on discussions with SCDOT, all modified or relocated median crossovers will need to be upgraded to the offset layout as shown in the representative photo to the right.

Sidewalks are only present on US 521 in the vicinity of Shiloh Unity Road. The sidewalks are 5 feet in width and are located at the back of the curb. There are several locations where sidewalks are present along the intersecting streets such as Edgewater and Del Webb Boulevard, but do not continue across the frontage of the US 521 property. Currently, there are no sidewalks along SC 9 or any of its intersecting side streets. Additionally, there are no pedestrian signal heads at signalized intersections within either corridor. At the Doby's Bridge Road intersection with US 521 it is posted as "No Pedestrian Crossing." No bicycle facilities are present along the corridor.

The speed limit along US 521 varies from 45 miles per hour to 55 miles per hour. The suburban sections in Indian Land are posted at 45 miles per hour with the exception being posted at 35 miles per hour during school hours. As the corridor transitions to the rural area, south of Shelly Mullis Road, the speed limit increases to 55 mph. Along SC 9 the posted speed limit is 55 miles per hour throughout the corridor.

Traffic Volumes & Congestion

A review of existing and historic average daily traffic volumes reveals changing traffic volumes along US 521 and SC 9 corridors. Average daily traffic volumes represent the total number of vehicles traveling along a roadway segment on an average day. The Transportation Map on the following page illustrates the 2008 Average Daily Traffic volumes along the US 521 and SC 9 corridors. Table 4-1 provides a breakdown of the tabulated traffic volumes at various points along the corridors.

Table 4-1 - Average Daily Traffic Volumes Along Market Street (2005 - 2009)*						
Corridor	Segment	2005	2006	2007	2008	Growth Rate (2005-2009)**
US 521	SC 160 to N.C. State Line	24,100	26,400	32,200	32,200	4.30%
	SC 160 to SC 75	17,500	18,700	22,500	23,300	4.20%
	SC 75 to SC 5	11,100	10,700	11,800	10,900	-0.30%
	SC 5 to S - 56	17,800	16,700	16,700	18,200	0.30%
SC 9	Chester County Line to S-612	12,700	12,200	12,400	11,100	-1.90%
	S - 612 to S -67	15,200	15,200	13,900	12,600	-2.70%

* Average Daily Traffic Volumes provided by Catawba Regional Council of Governments and SCDOT

**The growth rates represented were calculated based on 2008 and 2005 numbers. The actual growth rate at these locations may vary based on the analysis years.

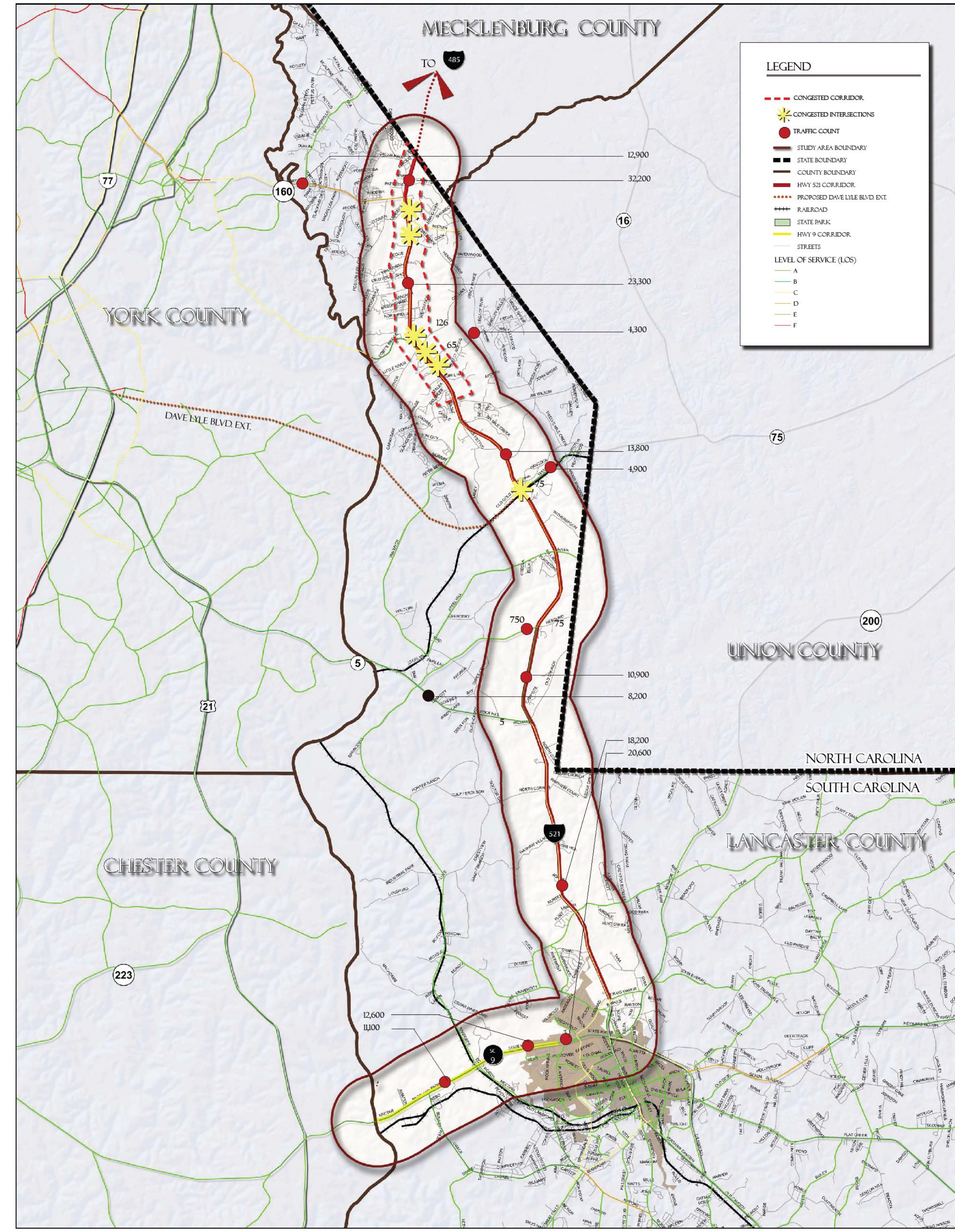
The rural portion of the US 521 corridor, south of SC 75 experienced a reduction in traffic volumes during 2008, while the section of US 521 closer to the City of Lancaster experienced minor growth in traffic volumes. Conversely, the portion of the corridor between US 75 and the North Carolina state line experienced significant growth in traffic volumes. Increasing traffic volumes in the Indian Land area is not surprising because this is where the majority of development has occurred in the County. Furthermore, Indian Land also experiences a large volume of commuter traffic from Union County, North Carolina as commuters must travel through Lancaster County to reach Mecklenburg County, North Carolina and York County, South Carolina.

The Transportation Map to the right illustrates the 2008 average annual daily traffic (AADT) volumes provided by SCDOT for roadways in Lancaster County. The highest traffic volumes in the study area occur along US 521 around SC 160 approaching the North Carolina state line. These volumes range from 32,200 vehicles per day (vpd) to 23,300 vpd. Other streets with notably high volumes include SC 160, SC 9, and US 521 approaching the City of Lancaster.

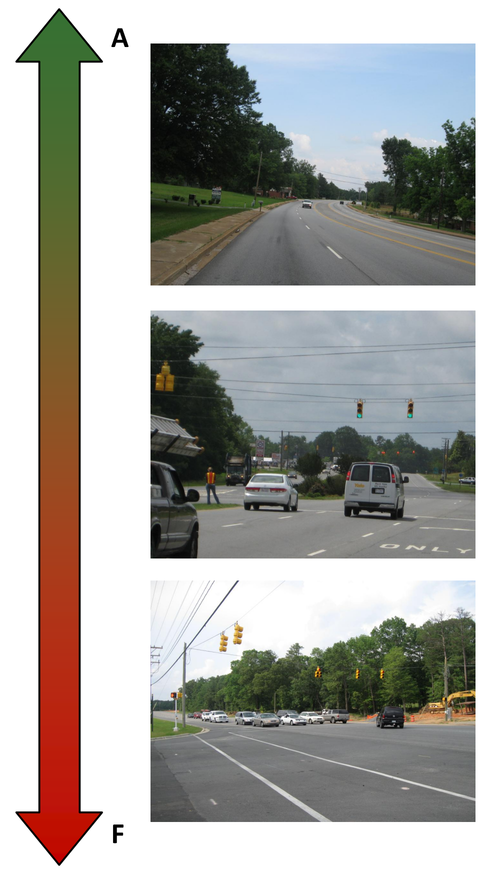
However, traffic volumes alone should not be used to determine congested corridors because this measurement does not take into account different functional classifications and roadway capacities. A better measurement for this comparison is volume-to-capacity (V/C) ratios. V/C ratios are calculated by dividing the traffic volume of a roadway segment by the theoretical capacity of the 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. An "A" describes the highest level (least congestion) and level "F" describes the lowest level (most congestion). The level of service analysis for this plan was corridor based. The information in the Transportation Map represents the best available data gathered from SCDOT and the Council of Governments. The Levels of Service (and V/C ratios) shown in the figure are grouped into one of the following categories.

Transportation Map



- **LOS A or B** — *Well Below Capacity* (V/C = less than 0.8) — Roadways operating with a V/C ratios less than 0.8 operate at optimal efficiency with no congestion during peak travel periods. These corridors are not shown in the congested corridors map due to the relative ease of travel during most time periods.
- **LOS C** — *Approaching Capacity* (V/C = 0.8 to 1.0) — As the V/C nears 1.0, the roadway becomes more congested. A roadway approaching capacity may operate effectively during non-peak hours, but may be congested during morning and evening peak travel periods.
- **LOS D or E** — *Slightly Over Capacity* (V/C = 1.0 to 1.2) — Roadways operating at capacity are somewhat congested during non-peak periods, with congestion building during peak periods. A change in capacity due to incidents impacts the travel flow on corridors operating within this V/C range. On the upper end of this category, corridors experience heavy congestion during peak periods and moderate congestion during non-peak periods. Changes in capacity can have major impacts on corridors and may create gridlock conditions.
- **LOS F** — *Well Over Capacity* (V/C = greater than 1.2) — Roadways in this category represent the most congested corridors in the study area. These roadways are congested during non-peak hours and most likely operate in stop-and-go gridlock conditions during the morning and evening peak travel periods.



Growth in the Panhandle has made it difficult if not impossible to construct enough road lanes to handle increases in traffic. Likewise, the limited options for east-west travel make roads like SC 160, SC 5, Marvin Road, and Doby's Bridge Road susceptible to major congestion during peak hours when incidents occur. The data shown in the Transportation Map represent an average of the peak-hour conditions throughout the year and does not account for congestion resulting from such incidents.

Traffic Safety

A thorough examination of crash history and traffic patterns usually can predict key locations where an improvement in traffic safety will benefit motorists and the community as a whole. Traffic safety, second only to traffic congestion, is a major concern for residents in Lancaster County. This section examines a three-year (3) crash history along US 521 and SC 9 (based on data obtained from SCDOT), which includes the identification of high crash intersections which help shape the recommendations discussed later in this chapter.

In a three year period between January 2005 and December 2008 there were 470 crashes between the North Carolina state line and the SC 9 interchange. These crashes included 3 fatalities, 344 property damage only crashes, and one crash involving a pedestrian. There were also 16 major collisions along the corridor during the same time period. A summary of the top 16 crash locations can be found in Table 4-2 below. The top crash location, with 47 crashes, is US 521 at SC 160. Angle collisions are the most predominant crash type along US 521, making up 34% of the crashes reported. Angle collisions are typical in locations with high median and driveway frequencies. Thirty-three percent of all crashes were rear end collisions, making this type the second most prevalent in the study area. Rear end crashes are typically attributed to driver inattentiveness and stop and go driving conditions, which are common along US 521. The peak hour volumes along with frequent driveway spacing and signal spacing in the Indian Land section of the corridor create an atmosphere that is favorable to the collision types observed.

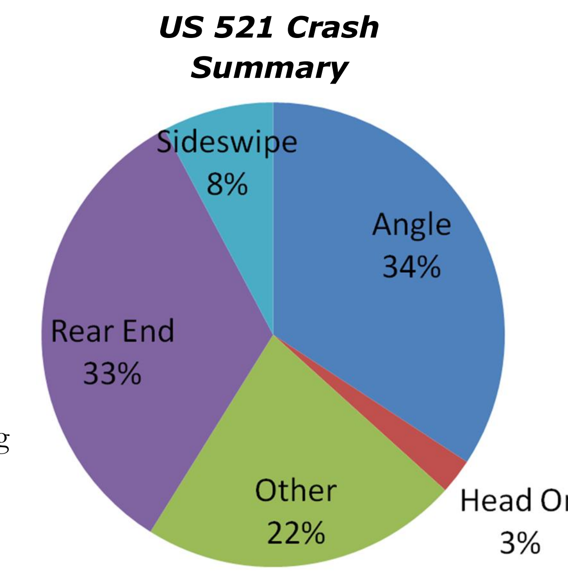


Table 4-2 - US 521 Crash Study Intersections (January 2005 to December 2008)

No.	Intersecting Road or Milepoint	Crashes	Fatality	Injury	PDO	Predominant Crash Type	EPDO Rate*
1	SC 160/Tom Hall St	47	0	6	4	Rear end	335
2	Shiloh Unity Rd	32	0	16	16	Angle 2	16
3	River Rd/Collins Rd	25	0	2	23	Rear end, Angle 2	199.4
4	Edgewater Rd	21	0	2	19	Rear end	161.8
5	Shelly Mullis Rd	23	0	7	16	Rear end, Angle 2	91.6
6	Doby's Bridge Rd	20	0	5	15	Angle 2	99
7	Jim Wilson Rd	19	0	3	16	Rear end	125.2
8	Mile Marker 43.9	18	0	6	12	Rear end	62.4
9	Mile Marker 41.1	17	0	4	13	Rear end	88.6
10	Marvin Rd	17	0	5	12	Rear end	70.8
11	S - 165	14	0	7	7	Angle 2	7
12	Charles Pettus Rd	12	0	0	12	Sideswipe	112.8
13	Rebound Rd	12	0	3	9	Angle 2	59.4
14	Hwy 75/Waxhaw Hwy	12	0	4	8	Rear end	41.6
15	North Corner Rd	11	0	3	8	Head on, Rear end	50
16	Mile Marker 42	11	0	4	7	Angle 2	32.2

Source: SCDOT

*EPDO= Equivalent Property Damage Only

Along the SC 9 corridor there were 108 reported crashes with 56 sustaining injures and 72 causing only property damage. There were 7 locations that experienced more than 4 crashes in the three year period studied. The top location along SC 9 was the intersection with Grace Avenue, with 19 crashes reported. The predominant type of crash along SC 9 was angle at 33% of all crashes reported, with "other" crashes being a close second at 33%.

The "other" category includes crashes with animals, fixed objects and other types not associated with another vehicle. Table 4-3 below lists the top 7 crash locations along the SC 9 corridor.

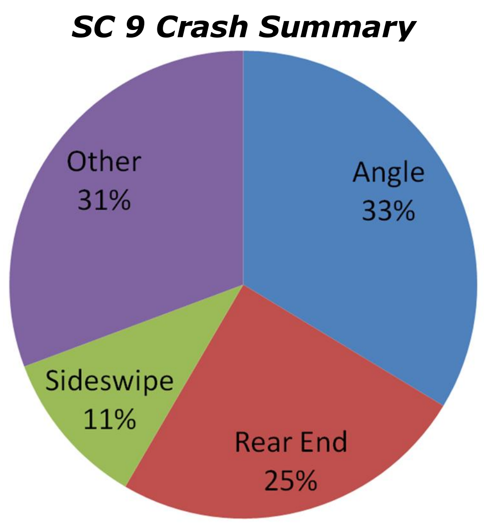


Table 4-3 - SC 9 Crash Study Intersections (January 2005 to December 2008)

No.	Intersecting Road or Milepoint	Crashes	Fatality	Injury	PDO	Predominant Crash Type	EPDO Rate*
1	Grace Ave	19	0	6	13	Rear end	71.8
2	Rugby Rd	11	0	5	6	Angle 2	14.4
3	Aviation Blvd	7	0	2	5	Angle 2	30.2
4	River Road	7	0	3	4	Head on, Angle 1	12.4
5	SR 29	6	0	2	4	Rear end, Sideswipe, Angle	20.8
6	SC 9 Business	4	0	0	4	Rear end, Sideswipe, Angle	37.6
7	Nebo Rd	4	0	2	2	Rear end	2

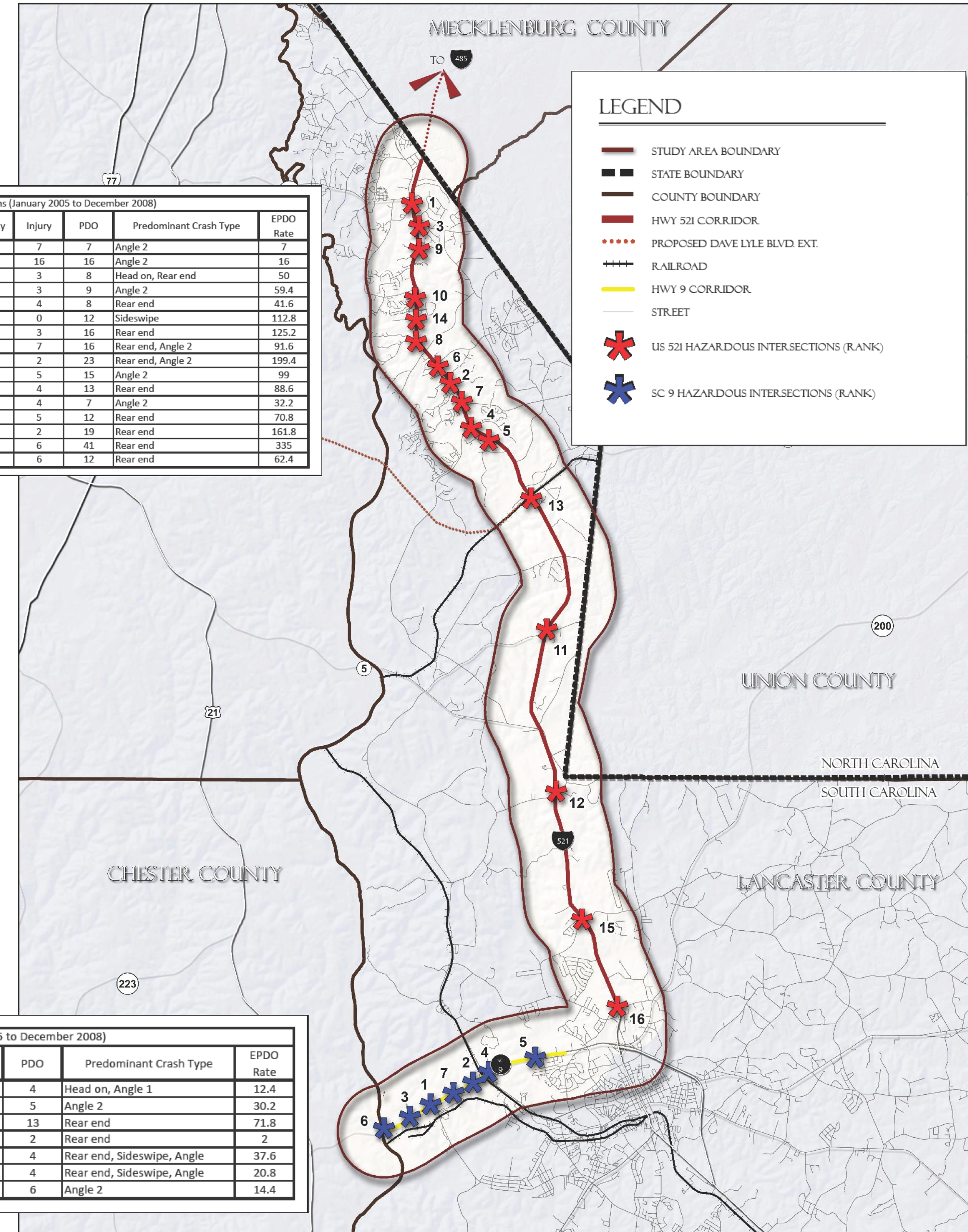
Source: SCDOT

*EPDO= Equivalent Property Damage Only

Contributing factors to a location's high crash frequency include intersection design, access considerations, and traffic congestion. Many of the locations identified with high crash frequency were also locations where congestion often exists. A direct relationship exists between traffic congestion and crash frequency, which justifies the ongoing efforts to provide adequate funding for transportation projects that minimize traffic congestion. Driveway access in proximity to intersections also can contribute to crash frequency by increasing unexpected conflict points near the intersection.

US 521 Crash Study Intersections (January 2005 to December 2008)

No.	Intersecting Road or Milepoint	Crashes	Fatality	Injury	PDO	Predominant Crash Type	EPDO Rate
16	S-165	14	0	7	7	Angle 2	7
15	Shiloh Unity Rd	32	0	16	16	Angle 2	16
12	North Corner Rd	11	0	3	8	Head on, Rear end	50
11	Rebound Rd	12	0	3	9	Angle 2	59.4
13	Hwy 75/Waxhaw Hwy	12	0	4	8	Rear end	41.6
5	Charles Pettus Rd	12	0	0	12	Sideswipe	112.8
4	Jim Wilson Rd	19	0	3	16	Rear end	125.2
7	Shelley Mullis Rd	23	0	7	16	Rear end, Angle 2	91.6
2	River Rd/Collins Rd	25	0	2	23	Rear end, Angle 2	199.4
6	Doby's Bridge Rd	20	0	5	15	Angle 2	99
8	41.1	17	0	4	13	Rear end	88.6
14	42.0	11	0	4	7	Angle 2	32.2
9	Marvin Rd	17	0	5	12	Rear end	70.8
3	Edgewater Rd	21	0	2	19	Rear end	161.8
1	SC 160/Tom Hall St	47	0	6	41	Rear end	335
10	43.9	18	0	6	12	Rear end	62.4



SC 9 Crash Study Intersections (January 2005 to December 2008)

No.	Intersecting Road or Milepoint	Crashes	Fatality	Injury	PDO	Predominant Crash Type	EPDO Rate
6	River Road	7	0	3	4	Head on, Angle 1	12.4
3	Aviation Boulevard	7	0	2	5	Angle 2	30.2
1	Grace Avenue	19	0	6	13	Rear end	71.8
7	Nebo Road	4	0	2	2	Rear end	2
2	SC 9 Business	4	0	0	4	Rear end, Sideswipe, Angle	37.6
4	SR 29	6	0	2	4	Rear end, Sideswipe, Angle	20.8
5	Rugby Road	11	0	5	6	Angle 2	14.4

Crash Analysis Map

Planned & Committed Improvements

There is one committed transportation project in the study area: SC 160 Widening-Phase II. The project is 2.30 miles in length, spanning fromS-157 to the York County Line. As of March 2010, the project is estimated to cost $11,254,000.

As detailed in Chapter 2, there are several major planned roadway improvement projects in the region including the Dave Lyle Boulevard extension in the study area. Details of this project are provided in the Proposed Dave Lyle Boulevard Extension section of this chapter.

Street Connectivity

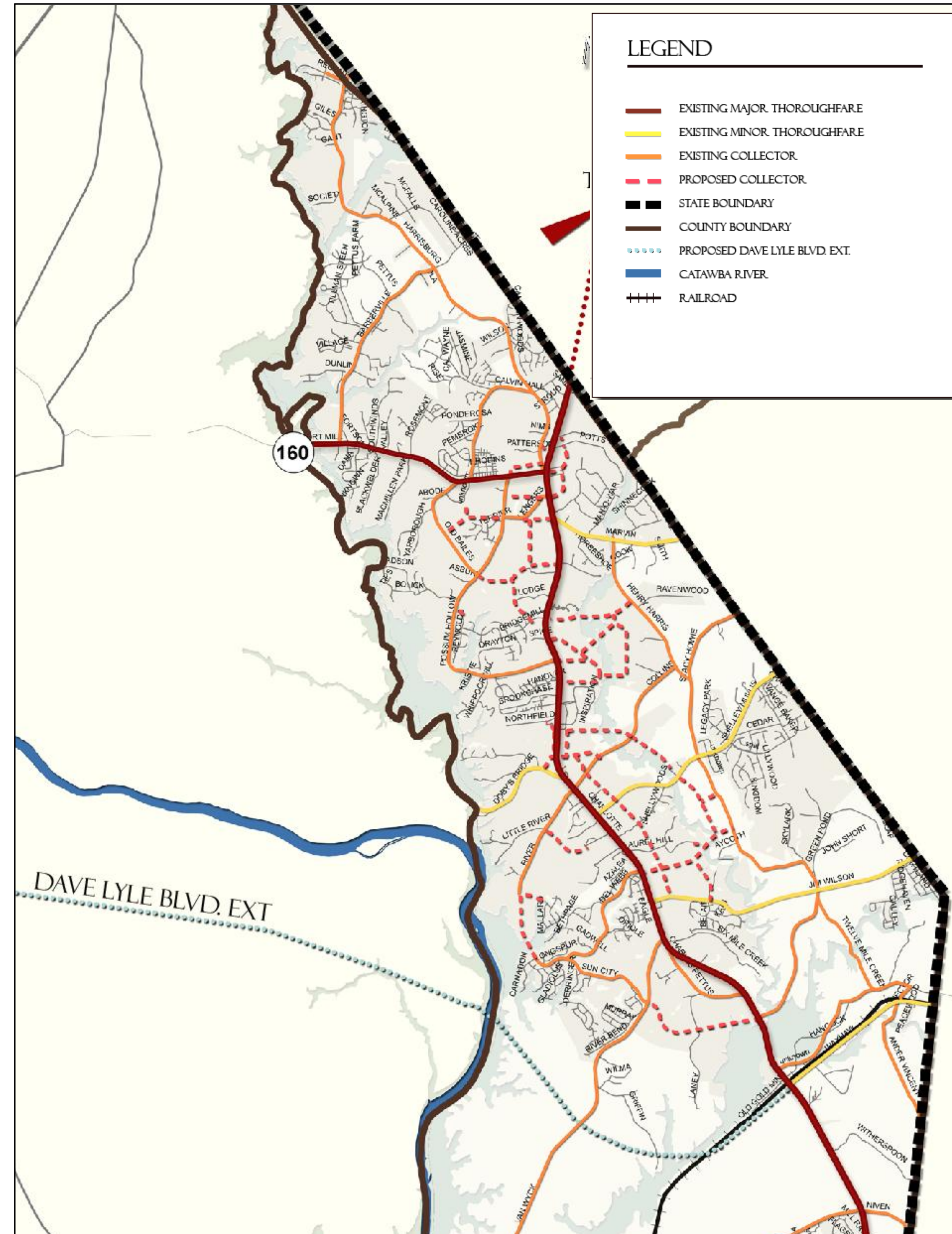
Healthy neighborhoods and regions require an interconnected network of streets of varying sizes, providing transportation alternatives to its residents and visitors. The US 521 and SC 9 corridors are surrounded by a wide variety of uses, including neighborhoods, regional shopping centers, industrial uses, and major employment centers. In many locations, it is difficult to move between destinations without accessing US 521 or SC 9, adding to the congestion and delays already experienced on the corridor due to through trips.

The role of a collector street in a balanced transportation system is to collect traffic from neighborhoods and distribute it to the network of arterials. As such, these streets provide relatively less mobility but higher overall accessibility compared to higher level streets. The lower design speeds and multimodal amenities make these streets attractive for bicyclists and pedestrians. The proper design and spacing of collector streets is critical to ensuring the balanced transportation network envisioned by the residents and local officials in Lancaster County.

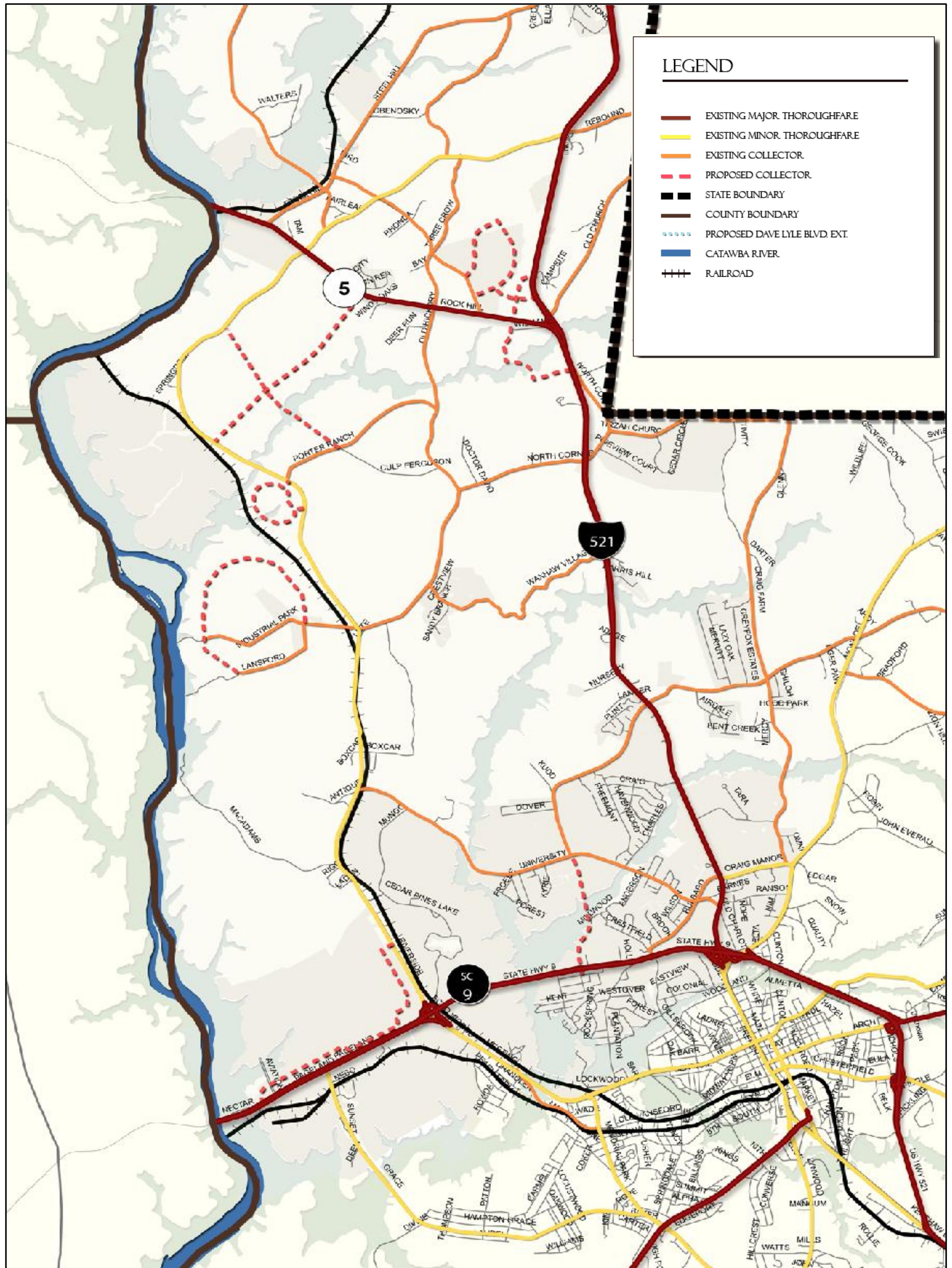
Like many other communities across the nation, residential and non-residential development patterns in Lancaster County lack internal vehicular and pedestrian connectivity. In 2006, a connectivity index was added to the Unified Development Ordinance that requires a minimum level of connectivity between and within subdivisions. No connectivity requirements exist outside of residential subdivisions.

> ***Implementation Strategy:***
>
> *Use the future collector street map to review development plans and help locate future collector streets.*

A network of well-connected streets will allow motorists options for accessing US 521 and SC9 and moving between the major arterials in the project area. The Street Hierarchy and Future Collector Streets Map shows the current and proposed collector street connections surrounding US 521 and SC 9. The solid orange lines indicate the existing collector street network. As the map indicates, there is already an extensive network of collector streets providing connections and alternate entry points between major subdivisions and destinations. The dashed red line indicates the proposed collector streets.



Street Hierarchy and Future Collector Streets Map (northern portion of County)



Street Hierarchy and Future Collector Streets Map (southern portion of County)

Policy Considerations

The design of a collector street network must respect present and future conditions, the public's vision for the future, and how the network can best balance the natural environment, connectivity, access, mobility, and safety.

Street Spacing and Access

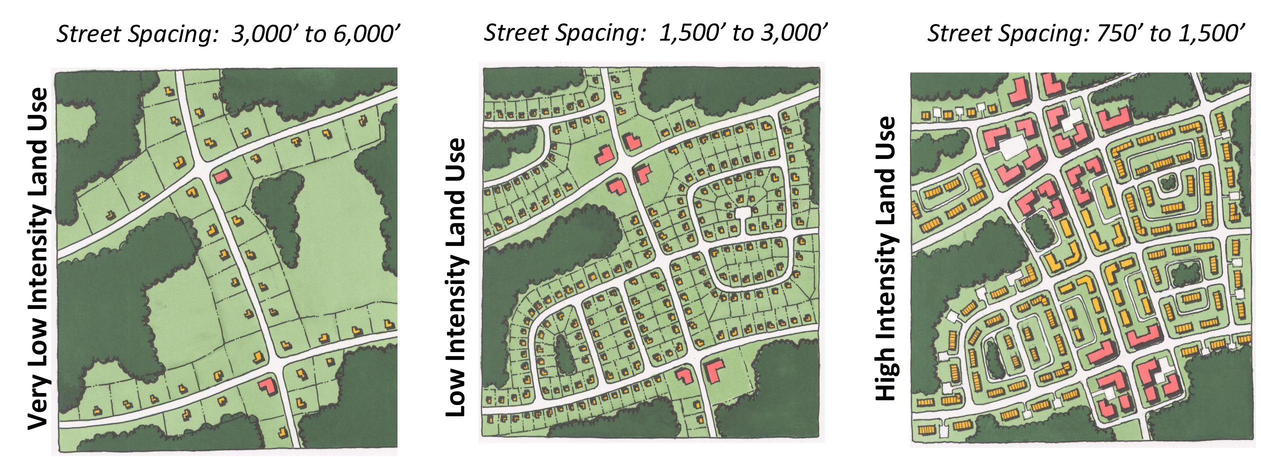
Local officials also must consider street spacing guidelines to promote the efficient development of an expanding transportation system (see Table 4-4). Ultimately, these street spacing guidelines could be used as "rules of thumb" during the development review process. Different spacing standards are necessary for different development types and intensities. Understanding this principle, Kimley-Horn developed a theoretical model largely influenced by land use intensity ranges that shows the desired collector street spacing for different intensities.

In addition to these recommendations, individual driveway access to collector streets should be limited to local streets when possible.

Table 4-4— Collector Street Spacing Standards

Land Use/Type of Collector Street	Intensity (dwelling units per acre)	Access Function	Approximate Street Spacing
Very Low Intensity Residential	Less than 2	High	3,000 to 6,000 ft
Low Intensity Residential	2 to 4	High	1,500 to 3,000 ft
Median and High Intensity Residential	More than 4	High	750 to 1,500 ft
Activity Center	Mixed-Use	Medium	750 to 1,500 ft

Collector Street Spacing



Design Elements

As most communities' largest collection of public space, streets need to reflect the values of the community and reinforce a unique "sense of place" to be enjoyed by citizens — whether in urban, suburban, or rural contexts. This is especially true for a collector street system that serves as the backbone for local mobility, property access, and non-vehicular transportation modes.

Recently, municipalities across the country have started implementing "complete streets" as one way to transform their transportation corridors from vehicle-dominated roadways into community-oriented streets that safely and efficiently accommodate all modes of travel — not just motor vehicles. The complete street movement does not advocate for a one-size-fits- all approach — a complete street in an urban area may look quite different from a complete street in a more rural area. However, both facilities are designed to balance mobility, safety, and aesthetics for everyone using the travel corridor. Furthermore, design considerations supportive of complete streets include elements in both the traditional travel corridor (i.e., the public realm) as well as adjacent land uses (i.e., the private realm) for reinforcing the desired "sense of place."

General Policy Recommendations

The following general policy recommendations are offered for consideration in an effort to increase the number of collector streets to better facilitate travel between local streets and arterials:

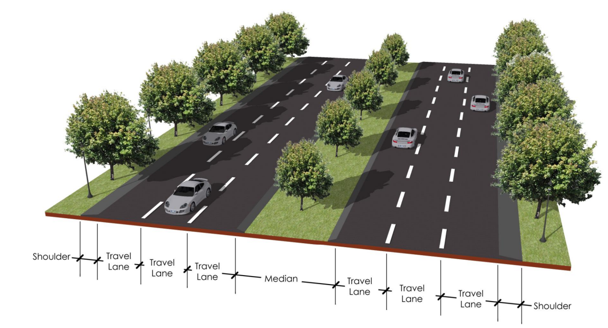
- Use the future collector street network as a tool to review proposed development projects and plans as future collector streets are located
- Amend the collector street network to include new streets as they are identified during the development review process
- Work with the development and real estate community to increase public awareness of future collector street connections through enhanced signage – i.e., "Future Street Extension"
- Provide <u>temporary</u> turnaround accommodations for collector street stub-outs to allow access by maintenance and emergency vehicles if length exceeds 150'; right-of-way needed for these turnarounds would revert back to property owners once the connection is made
- Require new developments to reserve right-of-way for, and in some cases construct, future collector streets
- Consider adopting policies and dedicating funding to help construct traffic calming measures on existing collector streets that become connected to new collector streets
- Require all new developments to provide connections or stub-out streets in each of the four cardinal directions (where applicable)

Growth Areas

The US 521 corridor has a multitude of characteristics between the North Carolina state line and the city limits for Lancaster. The corridor transitions from a suburban feel in the north to a more urban feel in the south as it approaches the City of Lancaster. SC 9 also exhibits a similar transition along the roadway. US 521 is a living example of the rural to urban transect, often cited by planners and engineers to describe the human environments and their relationship with land use and transportation.

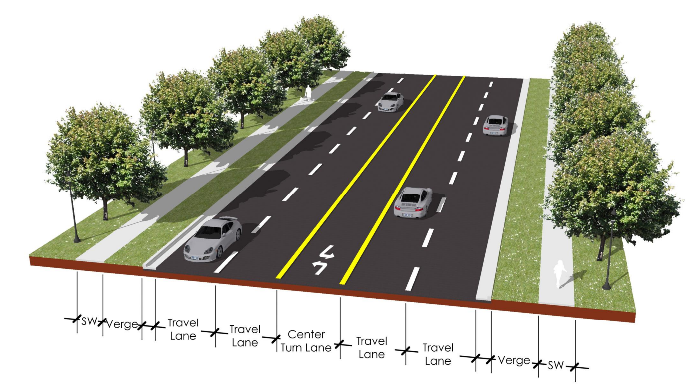
For some corridors, access management solutions alone will not solve congestion problems forecasted through the 2035 planning horizon. Some facilities are currently operating over capacity and others are projected to be over capacity. Additional lanes are needed to accommodate the increased traffic volumes projected through the planning horizon. The Recommended Cross Section Map reveals the road widths of both existing and proposed roads necessary to accommodate projected traffic volumes. Based on the characteristics of the context zones identified throughout the corridors, the following proposed cross sections were developed for the US 521 and SC 9 corridors.

6-Lane Median Divided Section



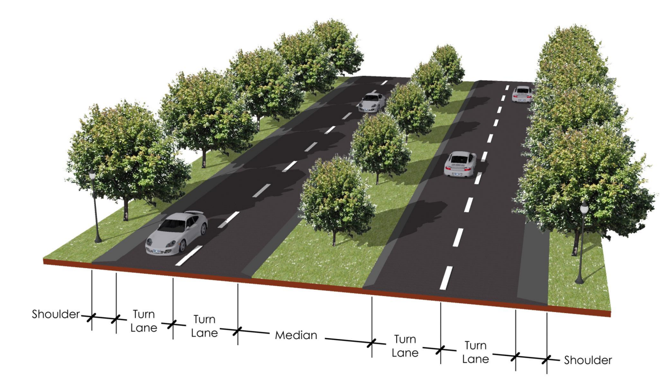
Based on the projected traffic volumes and potential growth of the US 521 corridor from the North Carolina state line to the Dave Lyle Boulevard, a 6-lane section is recommended for this area. This typical section has three travel lanes in each direction divided by a plantable median, with provisions for experienced cyclists on the wide outside shoulder. No curb and gutter is recommended for this section.

5-Lane Section



Given the suburban context and number of residential driveways found between Rebound Road and Andrew Jackson State Park and between Shiloh Unity Road to the City of Lancaster along US 521, the proposed cross section for US 521 between these streets remains the same as the existing facility. By maintaining the continuous two-way left turn lane, higher levels of access are retained for the adjacent businesses and residences.

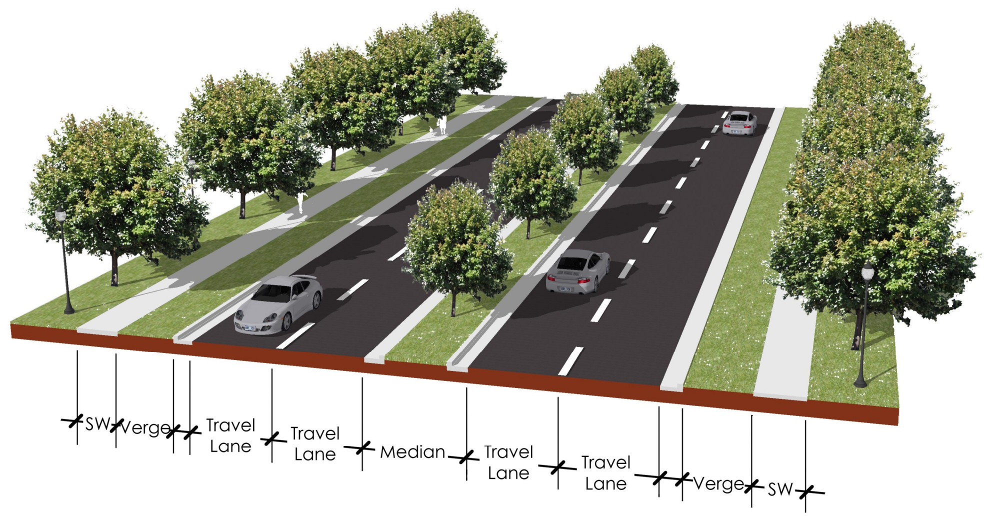
4-Lane Median Divided Section



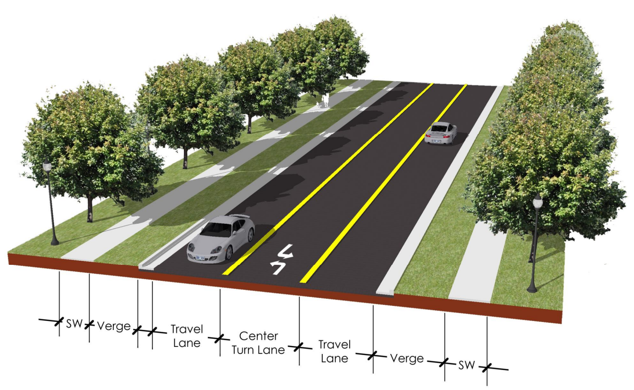
Given the rural context of the US 521 corridor and the suburban context of the SC 9 corridor, a 4-lane median divided section is proposed. This section is the same as the existing one, and blends seamlessly with the natural environment by varying the depressed median width disallowing curb and gutter.

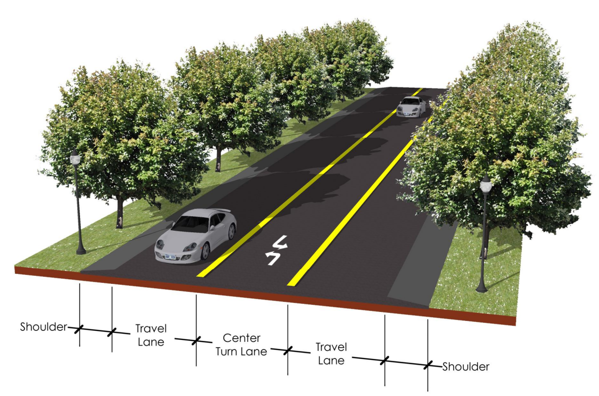
4-Lane Narrow Median Divided Section

Portions of intersecting streets will need to be widened to accommodate the growth in traffic volumes and increases in commuter traffic from neighboring counties. To accommodate this growth, a widened section is recommended. This typical section is a variation of the 4-lane divided section discussed previously with the addition of curb and gutter. This addition allows for a smaller footprint which consumes less right-of-way.



3-Lane Sections

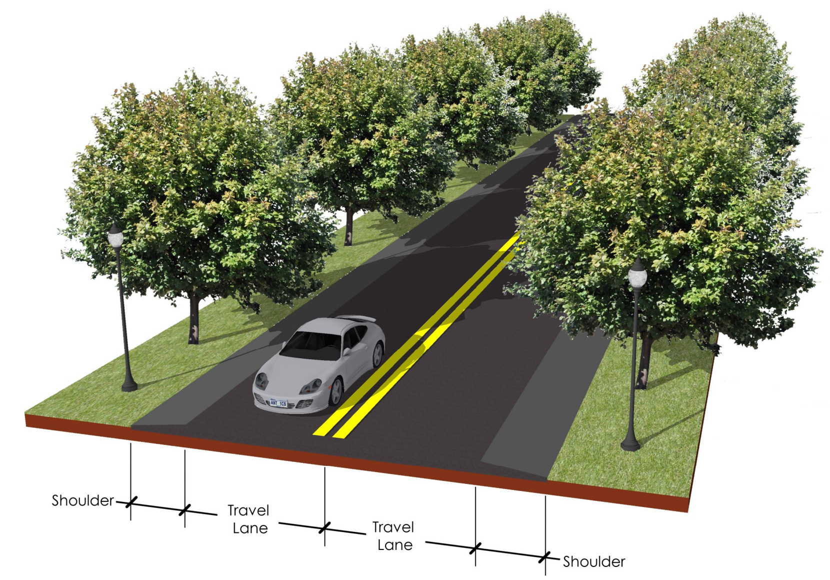


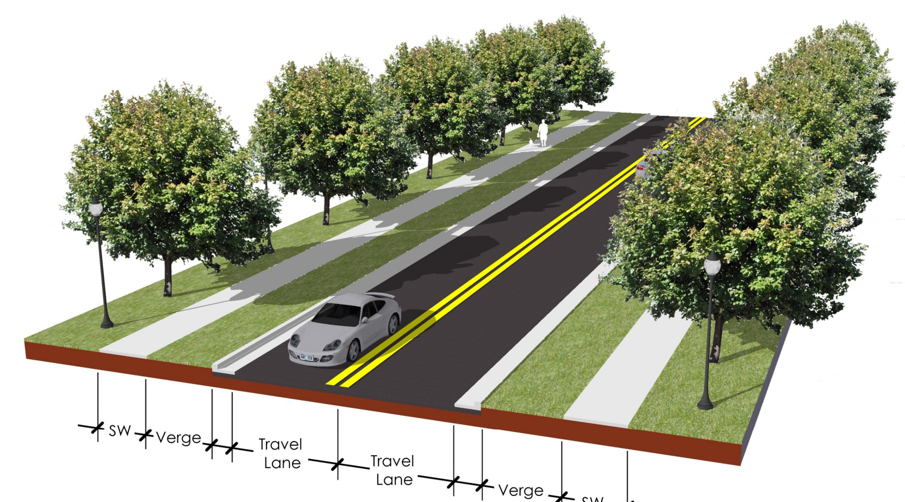


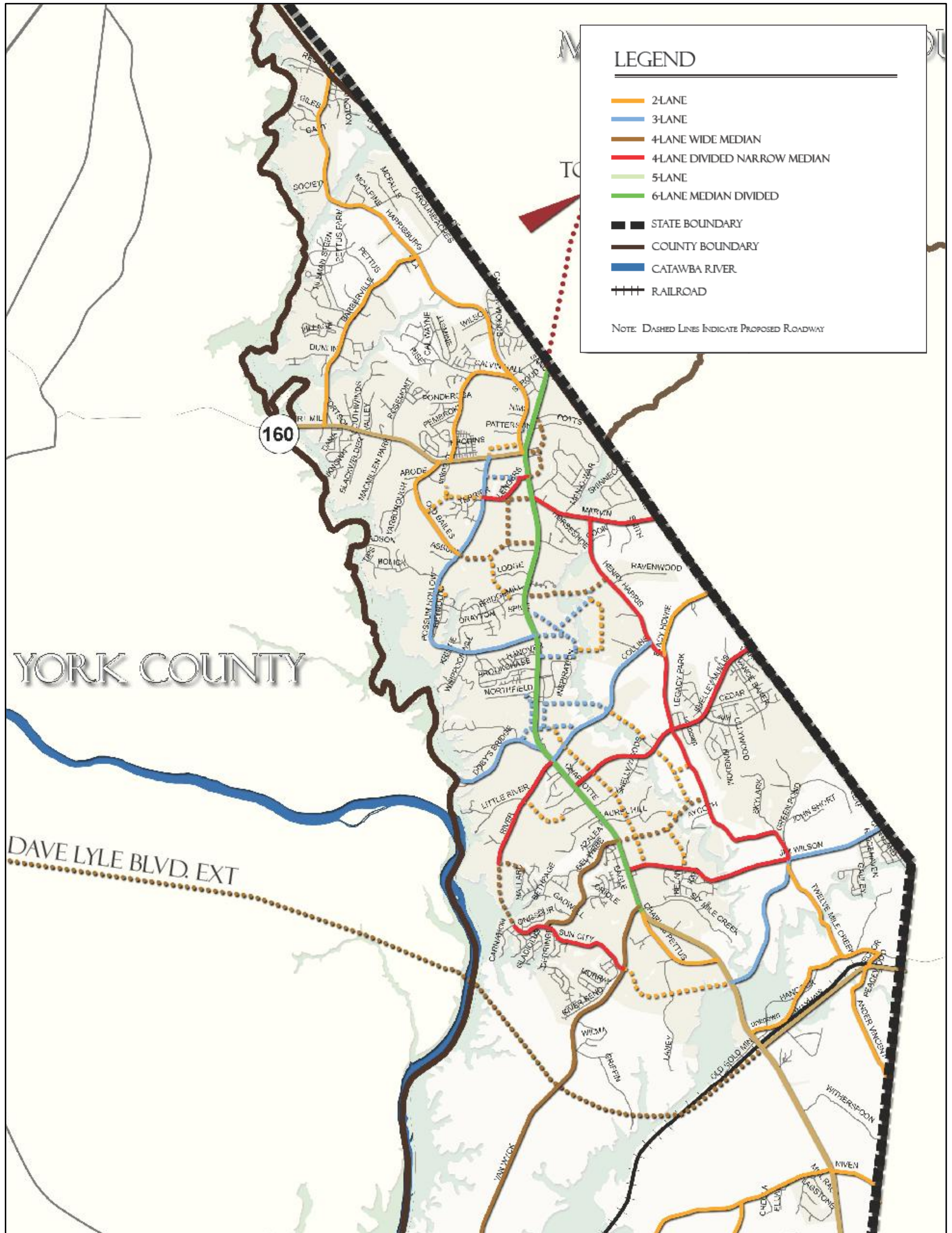
Preserving available capacity of the roadway will become increasingly important as traffic volumes increase throughout the network of collector streets. Achieving roadway longevity will require removing the left-turning vehicle from the travel lane. Three lane sections accomplish this with the provision of left-turn lanes either at intersections or across portions of roadways where there is a high frequency of driveways. Two variants of the 3-lane section are shown below, one with curb and gutter and the other without.

2-Lane Sections

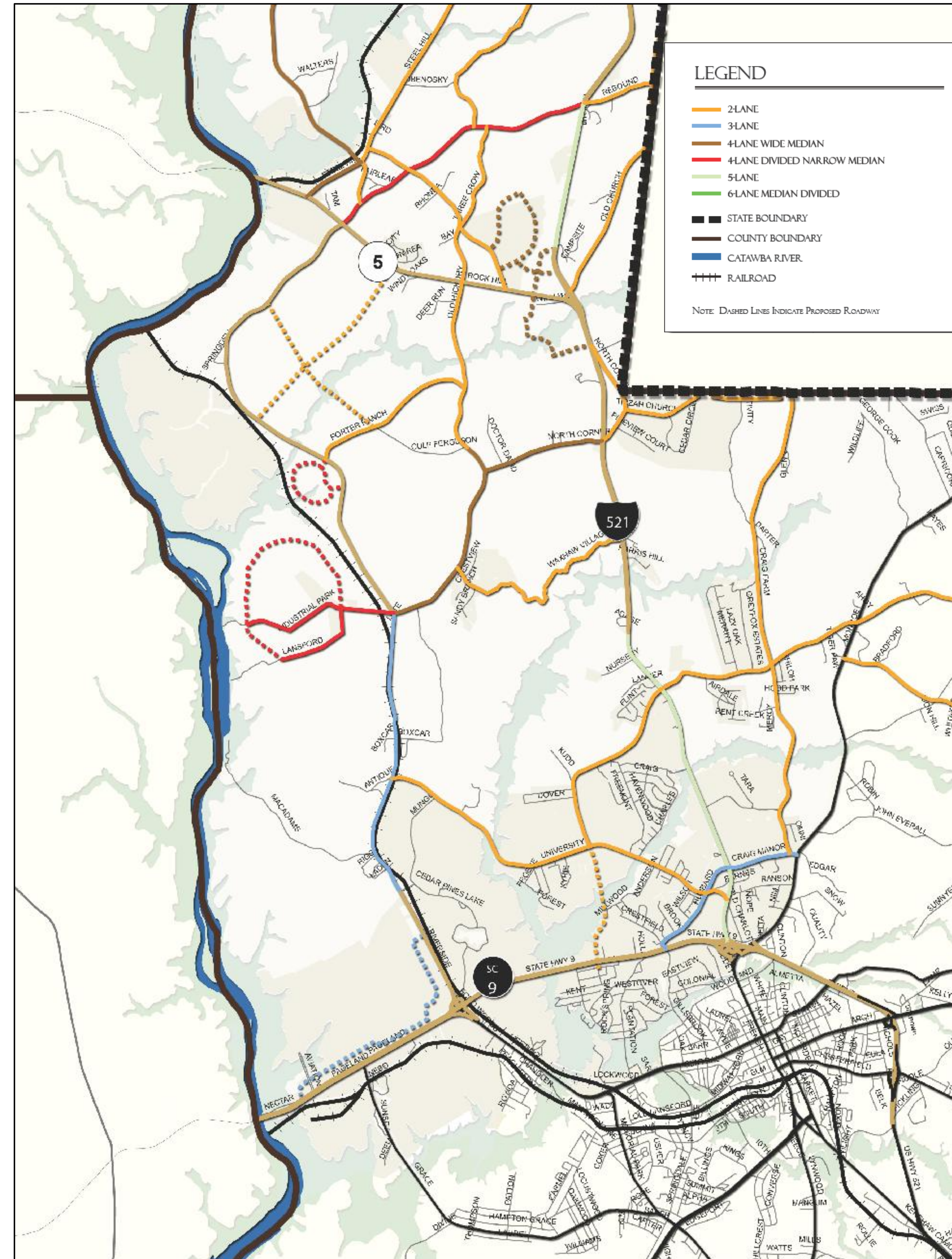
Local streets or neighborhood streets are the most common street throughout the study area. Sections are shown with and without curb and gutter. Their application should be used where appropriate. The curb and gutter section is more appropriate in neighborhood settings while the shoulder section is appropriate elsewhere. The cross sections reflect the concept of complete streets that provide safe and convenient travel for all modes. To create a transportation network that respects the needs of pedestrians, bicyclists, and motorists, certain elements may require designs different from the current norm. Right-of-way for the recommended cross sections will vary dependent on the elements incorporated within the street.







Recommended Cross Sections Map (northern portion of County)



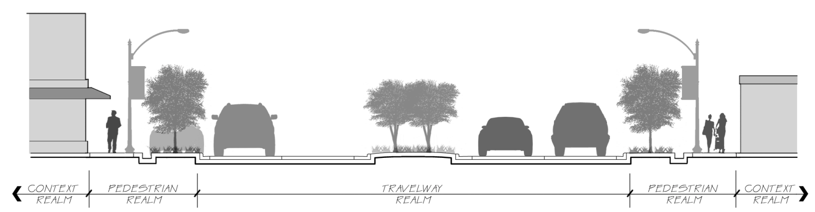
Recommended Cross Sections Map (southern portion of County)

Land Use/Transportation Connection

In order to link transportation and development character, a planning tool was created to serve as a local representation of the complete streets-context sensitive solutions philosophy. The tool needed to be customized to the study area. The result was a Street Design Priority Matrix. The matrix communicates the elements of each type of street and includes:

Travel Realm

- Number and width of travel lanes
- Traffic operations
- Design for large vehicles
- Access management
- Multi-modal intersection design



Pedestrian Realm

- Wide sidewalks with amenities
- Standard sidewalks with verge
- Multi-use paths
- Urban design features

Additional considerations include the need for connectivity and on-street parking and bicycle accommodations. The resulting priority matrix communicates the priorities for each street element as it relates to the place types of the community (i.e. Rural Living, Suburban Neighborhood, Suburban Commercial Center, etc) and should indicate those high priority items that should NOT be compromised during the design process. The matrix reinforces the relationship between transportation and land use by adding design and context to each corridor within a place type.

Table 4-5, Street Typology Matrix, describes the elements of street typology for the streets illustrated on the following pages as well as local streets not illustrated. The table details the multimodal building blocks that form a complete street.

Table 4-5 Street Typology Matrix

	US 521	SC 9	Major Thoroughfare	Minor Thoroughfare	Collectors	Locals
TRAVEL REALM						
Number and width of travel lanes	High Priority	High Priority	High Priority	High Priority	Medium Priority	Low Priority
Traffic operations	High Priority	High Priority	High Priority	High Priority	Medium Priority	Low Priority
Design for large vehicles	High Priority	High Priority	High Priority	Medium Priority	Medium Priority	Low Priority
Access management	High Priority	High Priority	High Priority	Medium Priority	Low Priority	N/A
Multimodal intersection design	Medium Priority	Medium Priority	*Influenced by designated Place Type*			
PEDESTRIAN REALM						
Wide sidewalks with amenities	Low Priority	Low Priority	Medium Priority	Medium Priority	High Priority	High Priority
Standard sidewalks with verge	Medium Priority	Medium Priority	Medium Priority	High Priority	High Priority	High Priority
Multi-use paths	High Priority	High Priority	High Priority	Medium Priority	Medium Priority	Low Priority
Urban design features	N/A	N/A	*Influenced by designated Place Type*			
OTHER ELEMENTS						
Interconnected street system	High Priority	High Priority	High Priority	High Priority	High Priority	High Priority
On-Street parking	N/A	N/A	N/A		Limited	Informal
On-street bicycle accomodations	Medium Priority	Medium Priority	*Influenced by system strategy and bicycle origin and destinations*			
Gateway treatments	YES	YES	*Influence by designated Place Type*			

High Priority	(blue)
Medium Priority	(yellow)
Low Priority	(gray)
N/A	(white)

Access Management

Table 4.6 – Benefits of Corridor Access Management

User	Benefit
Motorists	• Fewer delays and reduced travel times • Safer traveling conditions
Bicyclists	• Safer traveling conditions • More predictable motorist movements • More options in a connected street network
Pedestrians	• Fewer access points and more median refuges increases safety • More pleasant walking environment
Transit Users	• Fewer delays and reduced travel times • Safer, more convenient trips to and from transit stops in a connected street and sidewalk network
Freight	• Fewer delays and reduced travel times lower cost of delivering goods and services
Business Owners	• More efficient roadway system serves local and regional customers • More pleasant roadway corridor attracts customers • Improved corridor aesthetics • Stable property values
Government Agencies	• Lower costs to achieve transportation goals and objectives • Protection of long-term investment in transportation infrastructure
Communities	• More attractive, efficient roadways without the need for constant road widening

As US 521 continues to attract commercial and residential development and SC 9 attracts industrial development, protecting the through capacity becomes essential for the efficiency of the transportation system and continued economic growth. Access management balances the needs of motorists using a roadway with the needs of adjacent property owners dependent upon access to the roadway. In an environment with limited funds for transportation projects and competing agendas, access management is not just good policy but crucial to the health of the entire transportation network.

The Federal Highway Administration (FHWA) defines access management as "the process that provides access to land development while simultaneously preserving the flow of traffic on the surrounding system in terms of safety, capacity, and speed." According to the Access Management Manual, access management results from a cooperative effort between state and local agencies and private land owners to systematically control the "location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway."[1] Access management requires cooperation between government agencies and private land owners.

The following sections provide access management policy measures and guidelines that should be integrated into the design review process for pending and future development along the study corridors.

Symptoms and Benefits of Access Management

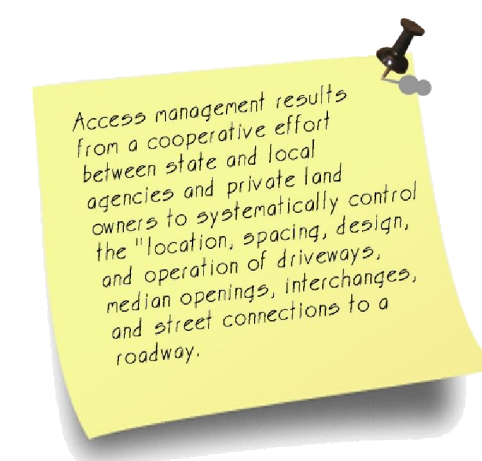
Poor access management directly affects the livability and economic vitality of commercial corridors, ultimately discouraging potential customers from entering the area. A corridor with poor access management lengthens commute times, creates unsafe conditions, lowers fuel efficiency, and increases vehicle emissions. Signs of a corridor with poor access management include:

- Increased crashes between motorists, pedestrians, and cyclists
- Worsening efficiency of the roadway
- Congestion outpacing growth in traffic
- Spillover cut-through traffic on adjacent residential streets
- Limited sustainability of commercial development

Without access management, the function and character of major roadway corridors can deteriorate rapidly and adjacent properties can suffer from declining property values and high turnover. Access management has wide-ranging benefits to a variety of users as shown in Table 4-6.

Implementation Strategy:

The policies and guidelines found in the Access Management toolkit should be integrated into the design review process for pending and future development



[1] Access Management Manual, Transportation Research Board, National Academy of Sciences, Washington DC, 2003

Access Management Strategy Toolkit

Access management is not a one-size-fits-all solution to corridor congestion. Successful strategies differ throughout a region and even along the same road. The *Access Management Strategy Toolkit* (which is consistent with the *SCDOT Access and Roadside Management Standards*) provides a general overview of the various strategies available to mitigate congestion and its effects. A comprehensive access management program includes evaluation methods and supports the efficient and safe use of the corridors for all transportation modes. The purpose of the toolkit is to provide local engineering and planning officials with access management strategies as well as an overview of their application, use, and, in some cases, unit cost.

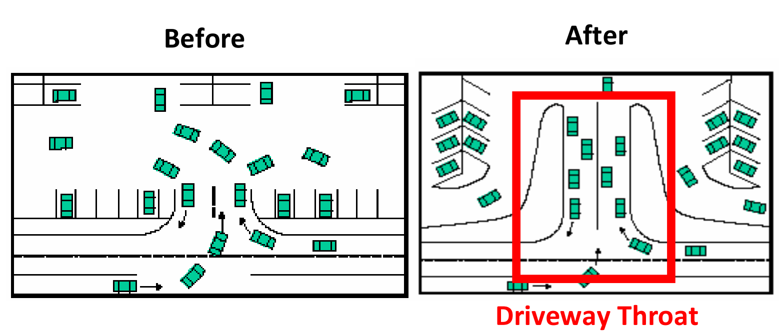
Site Access Treatments

Improvements that reduce the total number of vehicle conflicts should be a key consideration during the approval of redeveloped sites along corridors identified for access management programs. Site Access Treatments include the following:

- *Improved On-Site Traffic Circulation*
- *Number of Driveways*
- *Driveway Placement/Relocation*
- *Cross Access*

Improved On-Site Traffic Circulation

One way to reduce traffic congestion is to promote on-site traffic circulation. Pushing back the throat of an entrance, as shown in the figures to the right, helps avoid spillback onto the arterial. This action improves both the safety and efficiency of the roadway. A minimum separation of 100 feet should be provided to prevent internal site operations from affecting an adjacent public street, ultimately causing spillback problems.



Approximate construction cost varies and usually is the responsibility of private development.

Number of Driveways

Only the minimum number of connections necessary to provide reasonable access should be permitted. For those situations where outparcels are under separate ownership, easements for shared access can be used to reduce the number of necessary connections. Reducing the number of access points also decreases the number of conflict points, making the arterial safer and more efficient. Approximate construction cost varies and usually is the responsibility of private development.

Driveway Placement/Relocation

Driveways located close to intersections create and contribute to operational and safety issues. These issues include intersection and driveway blockages, increased points of conflict, frequent/unexpected stops in the through travel lanes, and driver confusion as to where vehicles are turning. Driveways close to intersections should be relocated or closed, as appropriate. As a best planning practice, no driveway should be allowed within 100 feet of the nearest intersection.

As a best planning practice, no driveway should be allowed within 100 feet of the nearest intersection.

Cross Access

Cross access is a service drive or secondary roadway that provides vehicular access between two or more continuous properties. Such access prevents the driver from having to enter the public street system to travel between adjacent uses. Cross access can be a function of good internal traffic circulation at large developments with substantial frontage along a major roadway. Similarly, backdoor access occurs when a parcel has access to a parallel street behind buildings and away from the main line. When combined with a median treatment, cross access and backdoor access ensure that all parcels have access to a median opening or traffic signal for left-turn movements.

Median Treatments

Segments of a corridor with sufficient cross access, backdoor access, and on-site circulation may be candidates for median treatments. A median-divided roadway improves traffic flow, reduces congestion, and increases traffic safety — all important goals of access management. While medians restrict some left-turn movements, overall traffic delays are reduced by removing conflicting vehicles from the mainline. Landscaping and gateway features incorporated into median treatments improve the aesthetics of the corridor, in turn encouraging investment in the area. Median Treatments include the following:

- Non-Traversable Median
- Median U-Turn Treatment
- Directional Cross (Left-Over Crossing)
- Left-Turn Storage Bays
- Offset Left-Turn Treatment

Non-Traversable Median

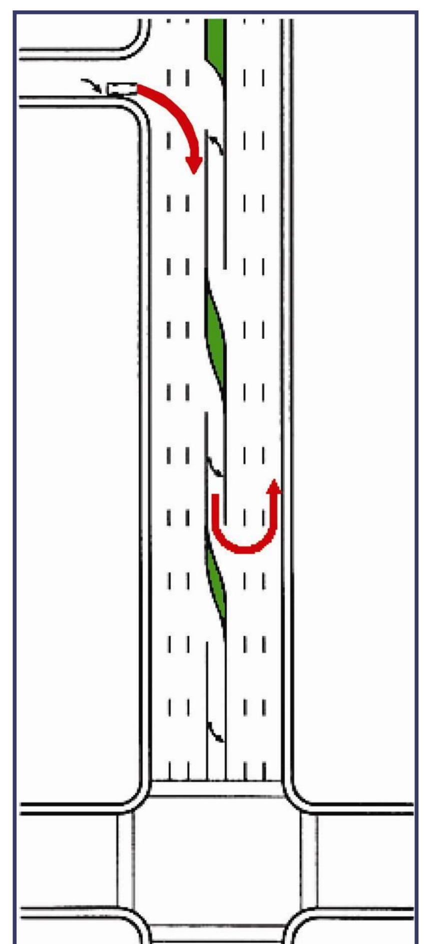
These features are raised or depressed barriers that physically separate opposing traffic flows. Inclusion in a new cross-section or retrofit of an existing cross-section should be considered for multi-lane roadways with high pedestrian volumes or collision rates as well as in locations where aesthetics are a priority. A non-traversable median requires sufficient cross and backdoor access. As these treatments are considered, sufficient spacing and locations for U- and left-turn bays must be identified.

The advantage of non-traversable medians includes increased safety and capacity by separating opposing vehicle flows, providing space for pedestrians to find refuge, and restricting turning movements to locations with appropriate turn lanes. Disadvantages include increased emergency vehicle response time (indirect routes to some destinations), inconvenience, increased travel distance for some movements, and potential opposition from the general public and affected property owners. To overcome some of these disadvantages, sufficient spacing and location of U- and left-turn bays must be identified. Approximate construction cost varies.

Median U-Turn Treatment

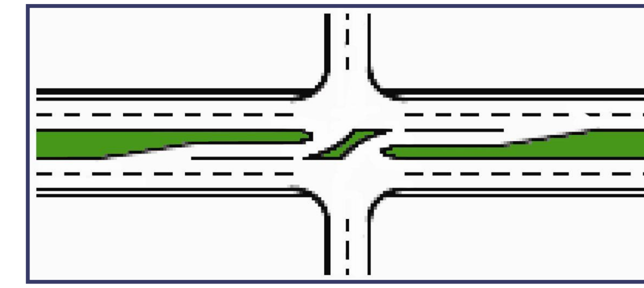
These treatments involve prohibiting or preventing minor street or driveway left turns between signalized intersections. Instead, these turns are made by first making a right turn and then making a U-turn at a nearby median opening or intersection. These treatments can increase safety and efficiency of roadway corridors with high volumes of through traffic, but should not be used where there is not sufficient space available for the provision of U-turn movements. The location of U-turn bays must consider weaving distance, but also not contribute to excessive travel distance.

Advantages of median U-turn treatments include reduced delay for major intersection movements, potential for better two-way traffic progression (major and minor streets), fewer stops for through traffic, and fewer points of conflict for pedestrians and vehicles at intersections. Disadvantages include increased delay for some turning movements, increased travel distance, increased travel time for minor street left turns, and increased driver confusion. Approximate construction cost is $50,000 to $60,000 per median opening.



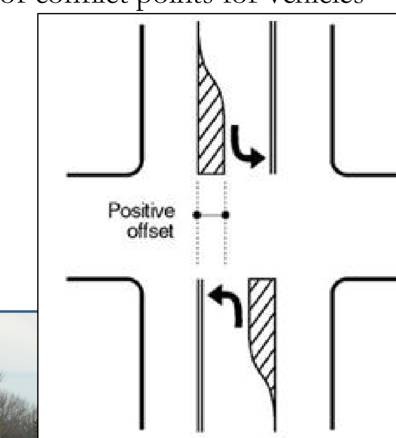
Median U-Turn Movement

Directional Crossover (Left-Over Crossing)



When a median exists on a corridor, special attention must be given to locations where left turns are necessary. A left-over is a type of directional crossover that prohibits drivers on the cross road (side street) from proceeding straight through the intersection with the main road, but allows vehicles on the mainline to turn left onto the cross road. Such designs are appropriate in areas with high traffic volumes on the major road and lower volumes of through traffic on the cross road, particularly where traffic needs to make left turns from the main line onto the minor street. A properly implemented left-over crossing reduces delay for through-traffic and diverts some left-turn maneuvers from intersections. By reducing the number of conflict points for vehicles along the corridor, these treatments improve safety.

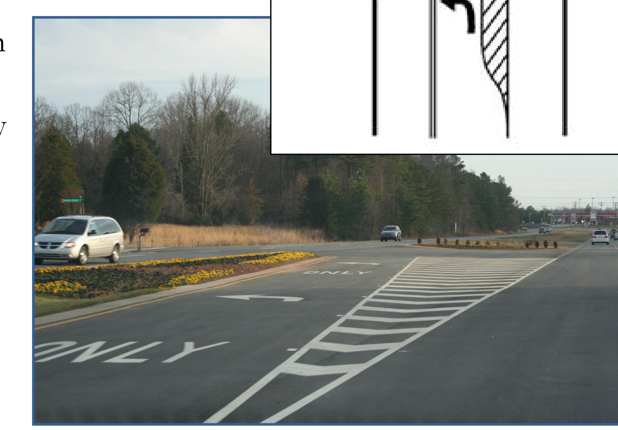
Left-Turn Storage Bays



Where necessary, exclusive left-turn lanes/bays should be constructed to provide adequate storage space exclusive of through traffic for turning vehicles. The provision of these bays reduces vehicle delay related to waiting for vehicles to turn and also may decrease the frequency of collisions attributable to lane blockages. In some cases, turn lanes/bays can be constructed within an existing median. Where additional right-of-way is required, construction may be more costly.

Offset Left-Turn Treatment

Exclusive left-turn lanes at intersections generally are configured to the right of one another, which causes opposing left-turning vehicles to block one another's forward visibility. An offset left-turn treatment shifts the left-turn lanes to the left, adjacent to the innermost lane of oncoming through traffic. In cases where permissive left-turn phasing is used, this treatment can improve efficiency by reducing crossing and exposure time and distance for left-turning vehicles. In addition, the positive offset improves sight distance and may improve gap recognition. In locations with sufficient median width, this treatment can be easily retrofitted. Where insufficient right-of-way width exists, the construction of this treatment can be difficult and costly. As a result, approximate construction costs vary.

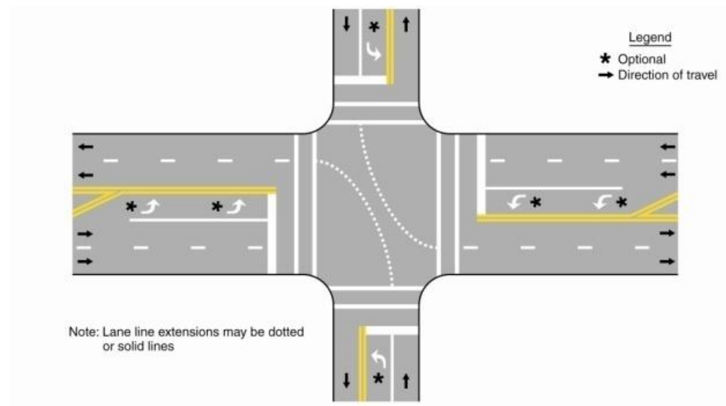


Offset left turn lane on US 521

Intersection and Minor Street Treatments

The operation of signalized intersections can be improved by reducing driver confusion, establishing proper curb radii, and ensuring adequate laneage of minor street approaches. Intersection and Minor Street Treatments include the following:

- Skip Marks (Dotted Line Markings)
- Intersection and Driveway Curb Radii
- Minor Street Approach Improvements



Skip Marks (Dotted Line Markings)

These pavement markings can reduce driver confusion and increase safety by guiding drivers through complex intersections. Intersections that benefit from these lane markings include offset, skewed, or multi-legged intersections. Skip marks are also useful at intersections with multiple turn lanes. The dotted line markings extend the line markings of approaching roadways through the intersection. The markings should be designed to avoid confusing drivers in adjacent or opposing lanes.

Intersection and Driveway Curb Radii

Locations with inadequate curb radii may cause turning vehicles to use opposing travel lanes to complete their turning movement. Inadequate curb radii may cause vehicles to "mount the curb" as they turn a corner and cause damage to the curb and gutter, sidewalk, and any fixed objects located on the corner. This maneuver also can endanger pedestrians standing on the corner. Curb radii should be adequately sized for area context and likely vehicular usage.

Damage due to insufficient curb radius

Minor Street Approach Improvements

At signalized intersections, minor street vehicular volumes and associated delays may require that a disproportionate amount of green time be allocated to the minor street, contributing to higher-than-desired main street delay. With laneage improvements to the minor street approaches, such as an additional left-turn lane or right-turn lane, signal timing often can be re-allocated and optimized.

Intelligent Transportation System

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

Signalization

The volume of traffic attracted to some side streets or site driveways is more than can be accommodated acceptably under an unsignalized condition. Delays for minor street movements as well as left-turn movements on the main street may create or contribute to undue delays on the major roadway and numerous safety issues. The installation of a traffic signal at appropriate locations can mitigate these types of issues without adversely affecting the operation of the major roadway provided they are spaced appropriately. Approximate construction cost is $50,000 to $60,000 per signal.

Progressive-Controlled Signal System

A progressive-controlled signal system coordinates the traffic signals along a corridor to allow vehicles to move through multiple signals without stopping. Traffic signals are spaced appropriately and synchronized so when a vehicle is released from one intersection the signal at the next intersection will be green by the time the vehicle reaches it.

Likewise, adaptive signal control involves continuously collecting automated intersection traffic volumes and using the volumes to alter signal timing and phasing to best accommodate actual—real-time—traffic volumes. Adaptive signal control can increase isolated intersection capacity as well as improve overall corridor mobility by up to 20% during off-peak periods and 10% during peak periods. Approximate construction cost is $250,000 per system and $10,000 per intersection in addition to 25% of capital costs in training, etc.

Emergency Vehicle Preemption

This strategy involves an oncoming emergency or other suitably equipped vehicle changing the indication of a traffic signal to green to favor the direction of desired travel. Preemption improves emergency vehicle response time, reduces vehicular lane and roadway blockages, and improves the safety of the responders by stopping conflicting movements. Approximate construction cost is $5,000-$7,000 per intersection plus $2,000 per equipped vehicle.

Preferred Access Plan

Based on the principles outlined in the Access Management Strategy Toolkit, a preferred access plan was developed for US 521 and SC 9 for the study area. The preferred access plan provides the framework for improvements to access and mobility along both of the corridors. The access plan provides for locations of signalized intersections, median breaks and directional cross-overs, non traversable medians, and grade separations. The maps on the following pages show the preferred access plan for US 521 and SC 9.

> ***Implementation Strategy:***
>
> *The local governing bodies should adopt the preferred access plans as official guiding documents for use in the development review process*

Spacing standards for signalized intersections and median openings were developed based on the *AASHTO Policy on Geometric Design of Streets and Highways* and the *SCDOT Access and Roadside Management Standards*. Table 4-7 below provides the spacing standards used for the development of the preferred access plan. The spacing standards differ between urban and rural context zones, given the characteristics of travel and the roadway.

Table 4.7— Minimum Median Opening, Driveway, and Signal Spacing

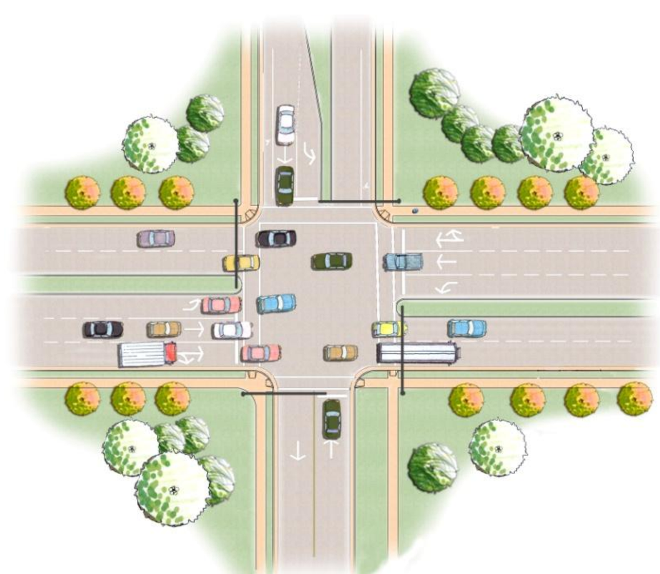
Context	Signal/Full Median Opening Spacing	Directional Median Opening Spacing	Adjacent Driveway Spacing	Opposite Street Driveway Spacing
Urban	1,500 ft	700-1,000 ft	300 ft	300 ft
Suburban-Rural	1,500 ft	1,200 ft	500 ft	500 ft

Notes:

1. No median opening shall be placed where it would interfere with the storage length requirements of an existing intersection.
2. A directional median opening represents a median that prohibits specific turning movements (e.g. directional crossover, channelized restrictions, etc.), usually through the use of channelization.

This plan recommends that Lancaster County adopt these maps as official guiding documents for use in the development review process and that SCDOT endorse these maps. The spacing standards shown, as well as the access management policies in the previous sections, should be incorporated into local development ordinances to guide future projects adjacent to the corridors.

There are three types of intersection treatments recommended for the US 521 and SC 9 corridors: Full Movement Signalized intersection, Median Crossover intersection, and Grade Separated intersection treatments.

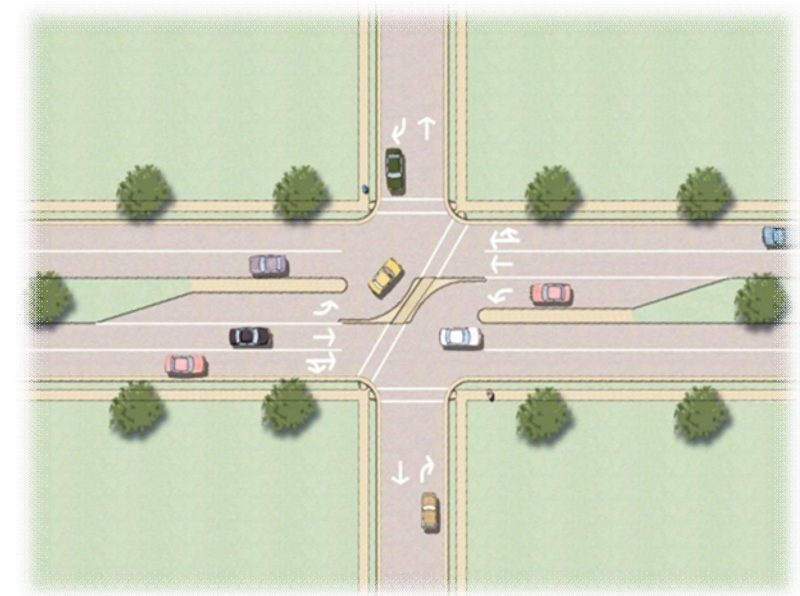


Full Movement Signalized Intersection

Full movement signalized intersections are proposed at those locations with the heaviest traffic volumes. In total there are 18 proposed full movement intersections along US 521 and 2 along SC 9. Five new signals are proposed along US 521 at Corporate Center Drive, Bridgemill Road, Possum Hollow Road, Realigned Northfield Road, Andrew Jackson State Park entrance, and one along SC 9 at Aviation Boulevard.

Full movement intersections should incorporate multimodal transportation features, such as crosswalks, pedestrian push-button signal activation, pedestrian countdown lighting, sidewalks, and pedestrian refuge in the non-traversable median. The picture to the right indicates a typical full movement intersection configuration along the corridors.

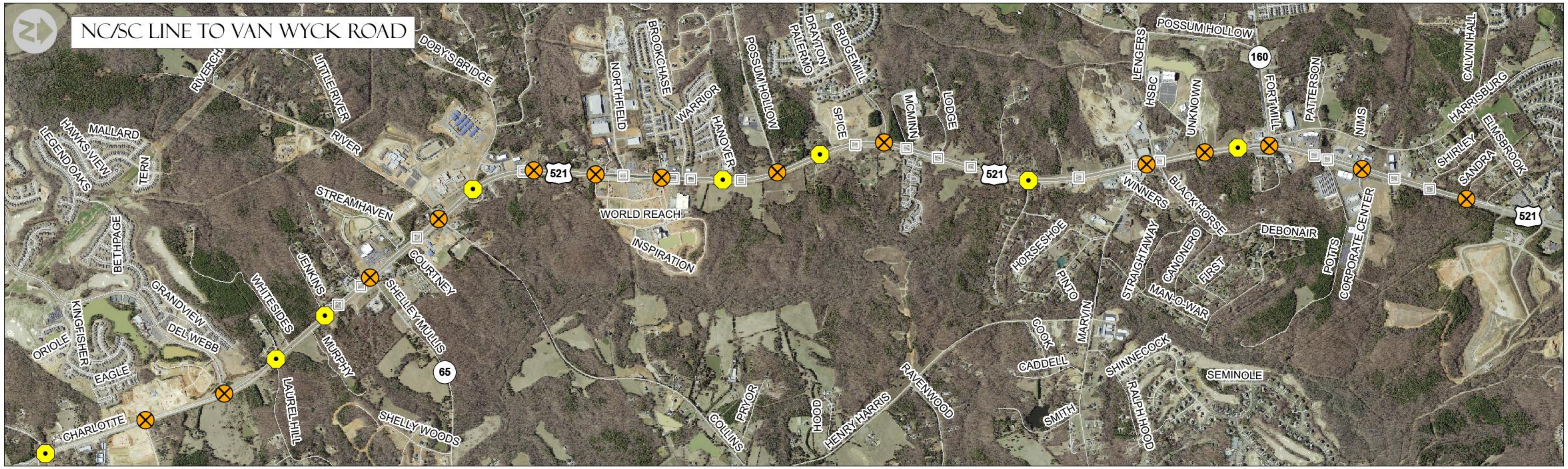
Median Crossover Intersection

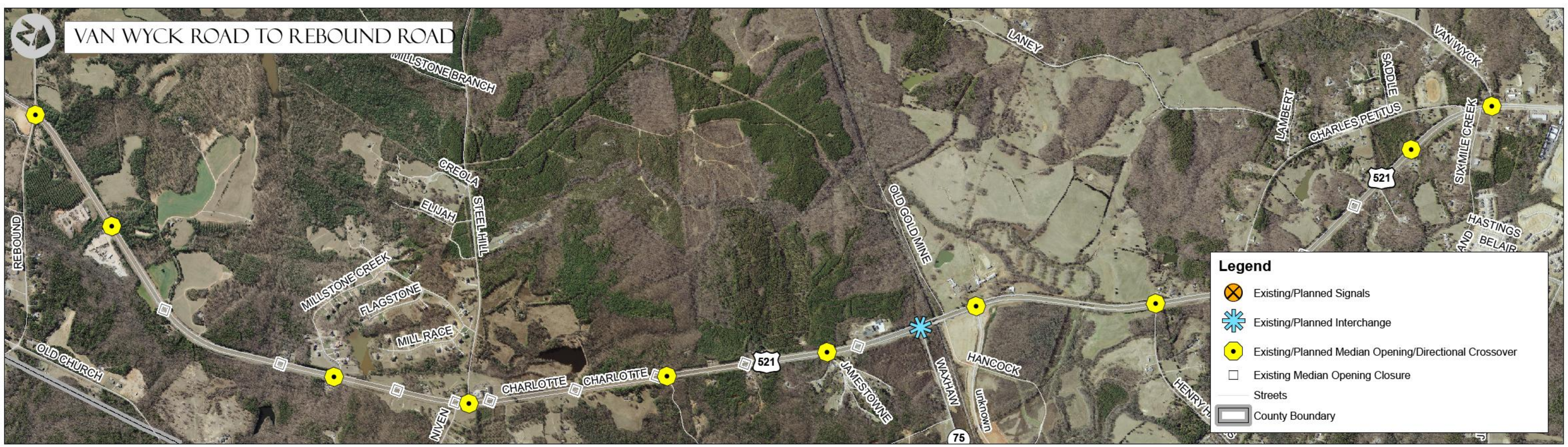


Inevitably there are a variety of median crossover treatments that could be implemented along US 521 and SC 9, but the most prevalent is the "left-over" treatment (shown right) which allows vehicles from the mainline to either turn left onto the minor leg or a U-turn movement to reach a downstream destination.

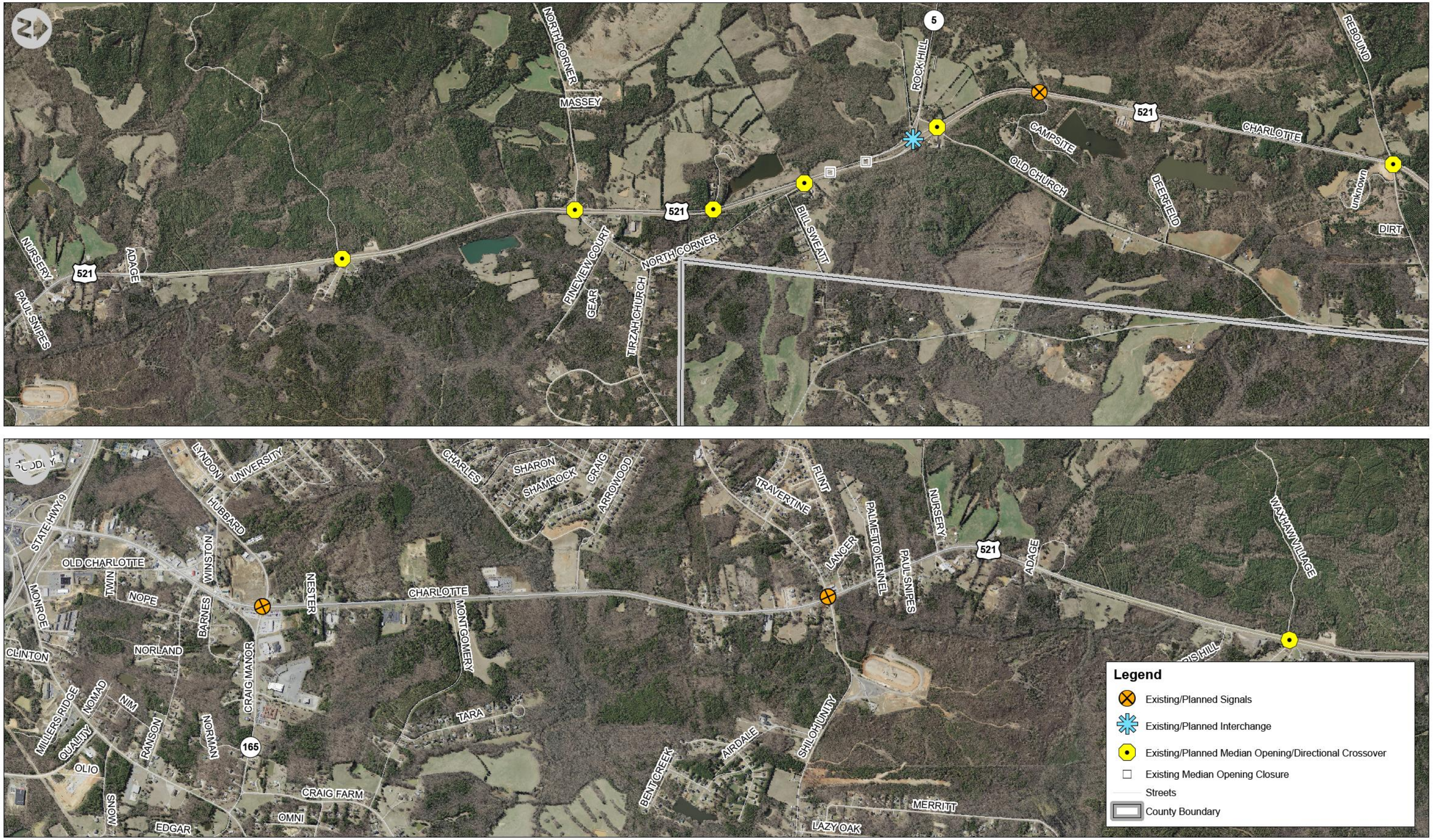
Median crossover intersections are proposed at those locations where the minor leg movement is not heavy enough to warrant full median openings. At these locations, vehicles turning left from the minor movement will make a right turn onto US 521 or SC 9 and perform a U-turn movement at the next upstream intersection. There are multiple locations throughout both of the corridors that are acceptable for such an installation. Each should be field located and verified before installation.

US 521 Recommended Access Plan

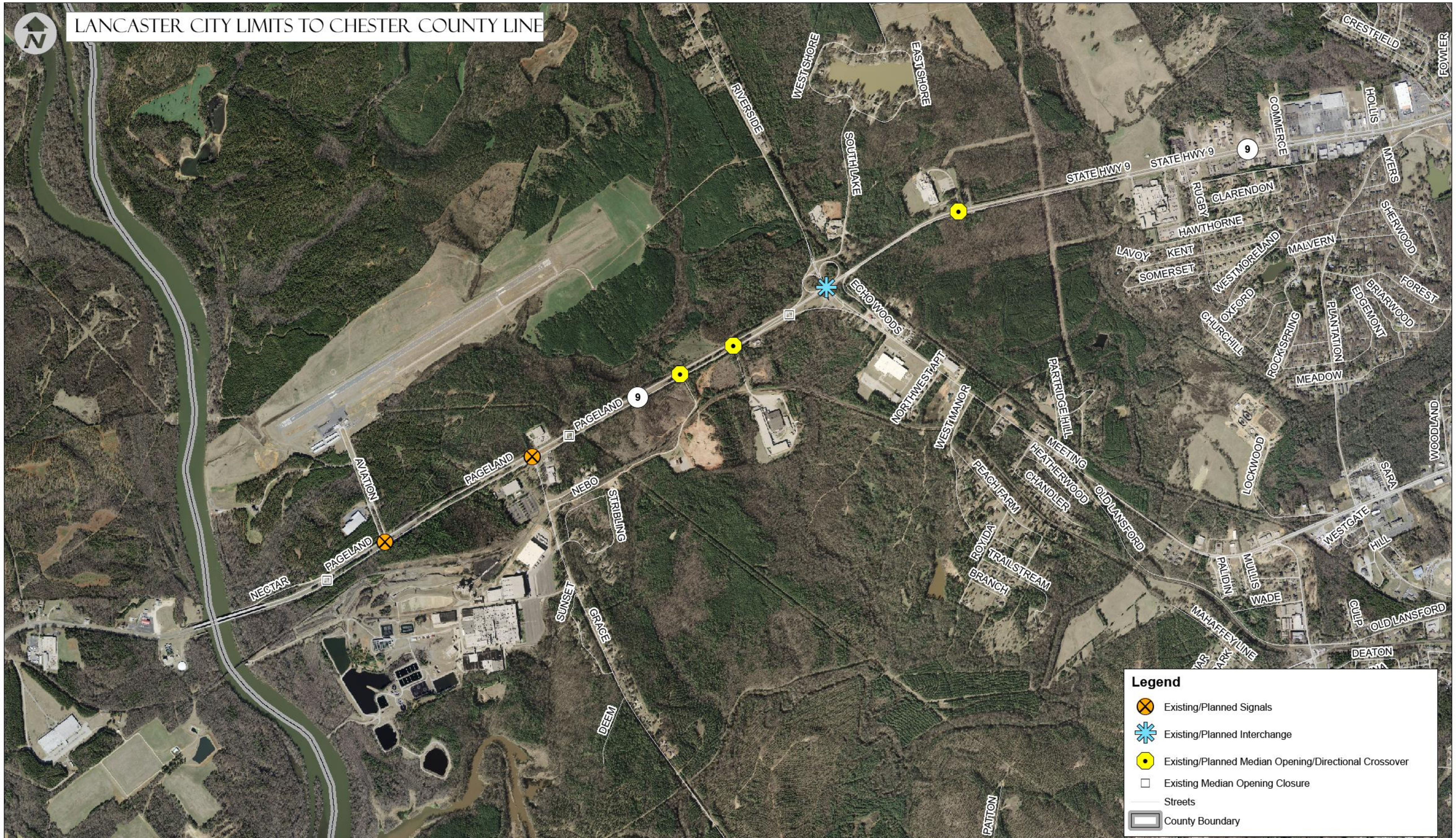




US 521 Recommended Access Plan



US 521 Recommended Access Plan



Landscaping Plan

The main focus of this study is to provide congestion relief and safety improvements along the corridors. An ancillary goal is to provide aesthetic improvements, transforming the corridor from a perceived eyesore to a gateway into and through the community. The addition of landscaped medians and street trees within and outside of the right-of-way will provide a facelift along the corridor, and make the area more attractive for development and enjoyable for motorists and pedestrians. The median is landscaped in several areas of the corridor such as at Sun City Carolina Lakes and the City of Light. The type of tree used along the corridor will depend on the distance from passing vehicles. The following sections describe the proposed trees.

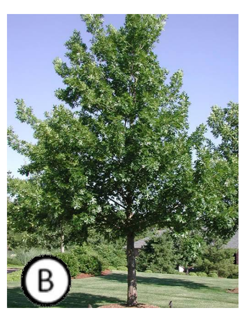
Canopy Trees

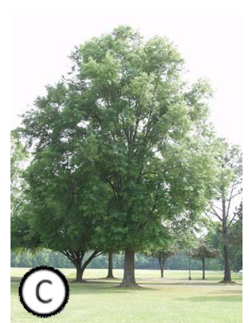
Canopy trees can only be used at locations with adequate distance from passing vehicles. Given the typical travel speeds along US 521 and SC 9, canopy trees would need to be at least fifteen feet from the travelway. Posted speed limits of 45 mph require these types of trees to be at least 18 feet from the travelway and posted speeds limits of 55 mph require these types of trees to be at least 22 feet. The pictures below provide a few examples of the types of canopy trees that could be used along the US 521 and SC 9 corridors.

Ornamental Trees

Ornamental trees should only be used at locations with shorter distances from passing vehicles. The pictures below provide a few examples of the types of ornamental trees that could be used along the corridors.

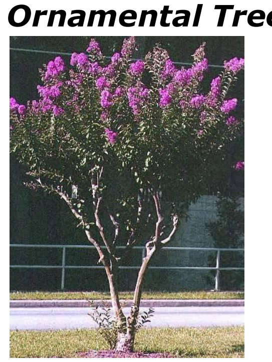
Canopy Tree Examples





A	Zelkova
B	Shumard Oak
C	Willow Oak

Ornamental Tree Examples



Catawba Crape Myrtle

Natchez Crape Myrtle

Table 4-8- ARMS Manual Planting Guidelines

Roadside Feature	Roadway Design Speed	Offset from Edge of Travelway for Current Volume (ADT) of:	
		≤ 1,500 ft.	>1,500 ft.
Non-Interstate Routes			
Guardrail*	All speeds	4	4
Vertical face curb and gutter	40 mph (60 km/hr) and less	1.5	1.5
	45 and 50 mph (70 and 80 km/h)	6	8
	55 mph (90 km/h)	10	12
6:1 or flatter cut slope** (Metric 1:6)	40 mph (60 km/hr) and less	10	14
	45 and 50 mph (70 and 80 km/h)	14	18
	55 mph (90 km/h)	16	22
4:1 to 5:1 cut slope (Metric 1:4 to 1:5)	40 mph (60 km/hr) and less	10	14
	45 and 50 mph (70 and 80 km/h)	12	18
	55 mph (90 km/h)	14	20
4:1 to 5:1 fill slope (Metric 1:4 to 1:5)	40 mph (60 km/hr) and less	12	16
	45 and 50 mph (70 and 80 km/h)	16	24
	55 mph (90 km/h)	20	26
3:1 cut slope (Metric 1:3)	40 mph (60 km/hr) and less	10	14
	45 and 50 mph (70 and 80 km/h)	10	14
	55 mph (90 km/h)	10	16
3:1 to 5:1 fill slope**** (Metric 1:3)	40 mph (60 km/hr) and less	12	16
	45 and 50 mph (70 and 80 km/h)	16	24
	55 mph (90 km/h)	20	26
Interstate Routes			
Without Guardrail***	All speeds	45 (for trees ≥ 4" caliper at maturity	
	All speeds	30 (for trees ≤ 4" caliper at maturity	
With Guardrail***	All speeds	4	

*Where vertical face curb or guardrail exists, offset is measured from face of curb or guardrail.

Please note that a vertical face curb and gutter in the median does not allow a 4" or greater diameter tree to be planted

**Use for all medians with curbing.

***Measured from edge of travelway.

****The 3:1 fill slope is not to be used as part of the offset distance. Proper offset should be achieved by utilizing the distances specified as a total offset measured before and after the 3:1 fill slope. Fixed objects should not be present in the vicinity of the toe of these slopes.

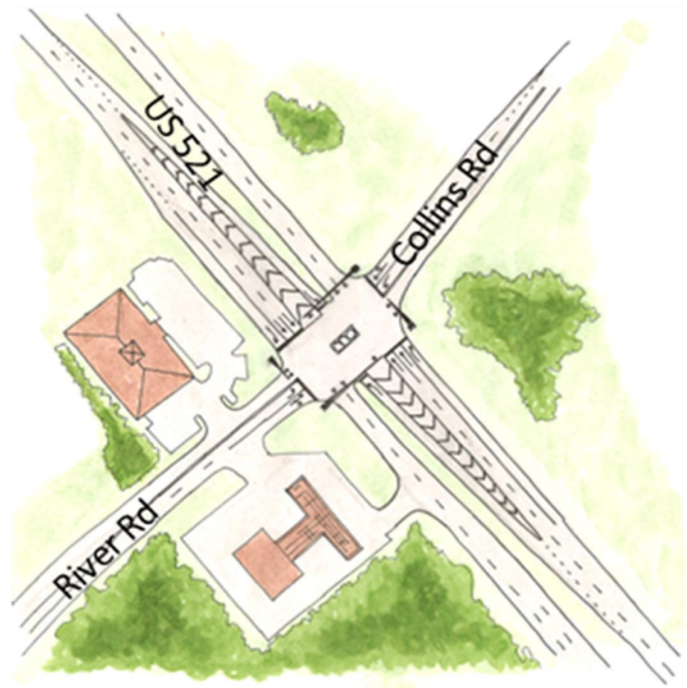
Table 4-8 is from the SCDOT ARMS Manual outlines the planting guidelines within the right-of-way.

Intersection Improvement Recommendations

The following section outlines potential improvements at intersections of interest for the community. Improvements at critical intersections would provide additional capacity and increase the service life of the intersection. The descriptions listed below are based on field observations and available intersection data. It is recommended that as development occurs in and around these intersections that the following traffic control and laneage recommendations be considered.

Collins Road/River Road and US 521

Collins Road/River Road is located +/960 feet south of the intersection with Doby's Bridge Road. River Road provides access to all three of the Indian Land Schools (High, Middle, and Elementary). During peak school hours and peak rush hour traffic, intersection congestion is common in this area. The following geometric improvements are recommended at this intersection:



- Wireless Traffic Signal Interconnect
- Offset left-turn lanes on US 521
- Southbound right-turn lane on US 521
- Right-turn lane on River Road
- Right and left-turn lanes on Collins Road
- Stripe northbound right-turn lane on US 521

Shelly Mullis Road and US 521

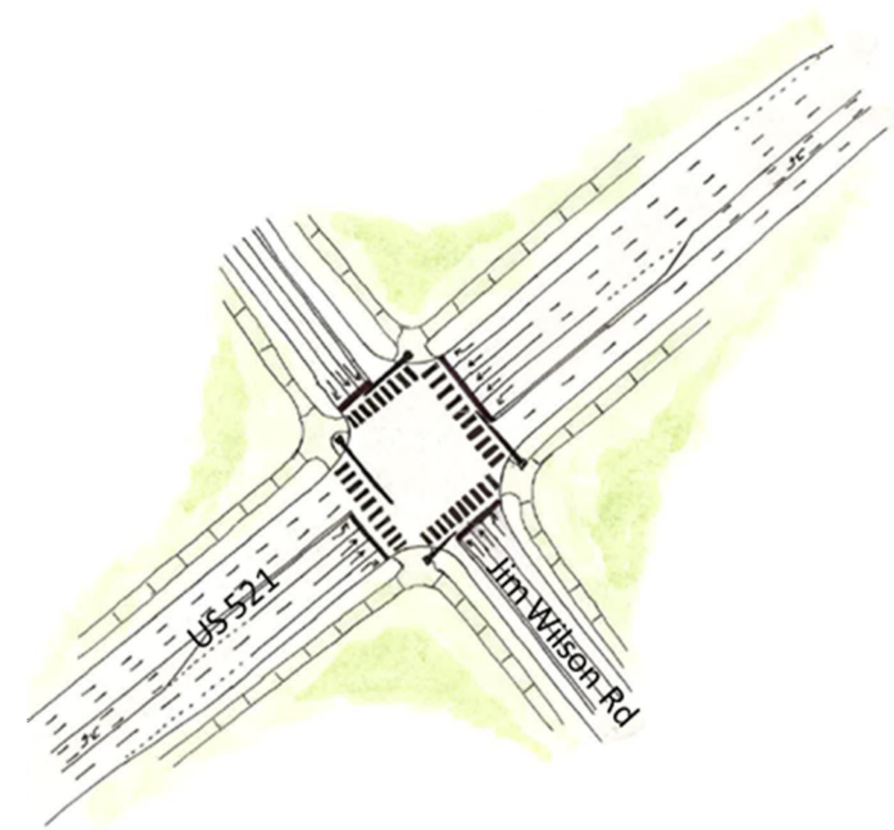
Shelly Mullis Road is located 1,900 feet south of the intersection with River Road/Collins Road. It is one of several key roadways providing access to Union County (NC). As the County and the many communities adjacent to the Union County/Lancaster County line continue to grow, traffic volumes will require the need for intersection improvements. Several geometric improvements are already present at this intersection, but the following improvements would provide additional benefits:.

- Wireless Traffic Signal Interconnect
- Northbound right-turn lane onto US 521
- Right-turn lane on Shelley Mullis Road

Jim Wilson Road and US 521

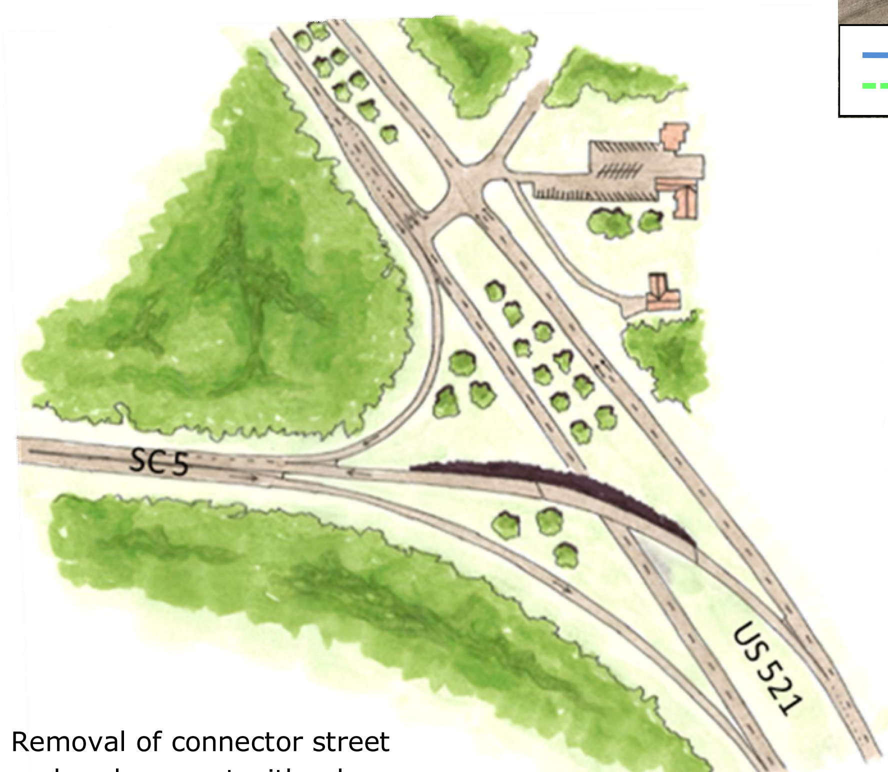
Jim Wilson Road is located south of the Del Webb intersection with US 521 and is in the heart of the retail and office development associated with the Sun City Carolina Lakes community. This area has seen a dramatic change over the past three years. This section of US 521 is a multi-lane undivided section. Pedestrian amenities including crosswalks and signals with pushbuttons are present, however, sidewalks and wheelchair ramps are not. As development continues to occur around this intersection, the following improvements are recommended:

- Wireless Traffic Signal Interconnect
- Northbound right-turn lane on US 521
- High Visibility crosswalks
- Right and left-turn lanes on Jim Wilson Road
- Wheelchair Ramps and sidewalks



SC 5 and US 521

Located in the heart of the US 521 corridor, SC 5 provides one of two crossings of the Catawba River and one of only 4 east-west movements into the adjacent counties (York and Chester) to the west. SC 5 is a two lane roadway connecting to Rock Hill, SC and points westward. At the intersection with US 521, movements have been separated to decrease the delay associated with the northbound to westbound and eastbound to southbound movements. Other movements are cumbersome and unsafe given the interchange configuration. Consideration for the removal of this left-over should be given. The movement can be accomplished in a safer manner as depicted below. The total length of the movement is increased by 4,700 feet, eliminating the safety concerns associated with the existing movement.



Removal of connector street and replacement with a loop ramp

Given the age of the structure and the cost of a reconfiguration of the interchange it is unlikely that a total rebuild will occur anytime soon. However, one has been contemplated. The following are recommended as potential improvements to this interchange if a total replacement is considered:

- Remove the northbound to southbound flyover
- Construct an at-grade signalized intersection
- Install appropriate auxiliary turn lanes
- Signalization

Reconfiguration of intersection with removal of SC 5 flyover bridge.

SC 9 Business and SC 9 Bypass

One of the two interchanges within the study area, the SC 9 Bypass and SC 9 Business interchange was constructed to reduce delay to the through movements. The interchange is a result of the construction of the realignment of SC 9 to the north of the City of Lancaster. The interchange is constructed in a partial cloverleaf configuration with loop ramps on the north side of the interchange. The interchange was constructed in a period when land uses were accommodated in lieu of being removed. With that in mind, several homes and businesses have access from the ramps.

As the lifecycle of the interchange draws near or redevelopment occurs within the area, consideration for the reconfiguration of the ramps should be considered. One such potential option is shown below.

Reconfiguration of SC 9 BYP and SC 9 interchange.

Aviation Boulevard SC 9 Bypass

Aviation Boulevard provides access to the McWhirter Field. Additional development and/or redevelopment is anticipated in this area, and as such additional traffic volumes will be incurred. As depicted on the recommended access plan, the intersection of Aviation Boulevard and SC 9 is recommended for signalization upon meeting applicable Manual on Uniform Traffic Control Devices (MUTCD) warrants. In addition to the signalization of the intersection, the following roadway improvements are recommended:

- Offset left-turn lanes on SC 9
- Removal of the center median in the intersection

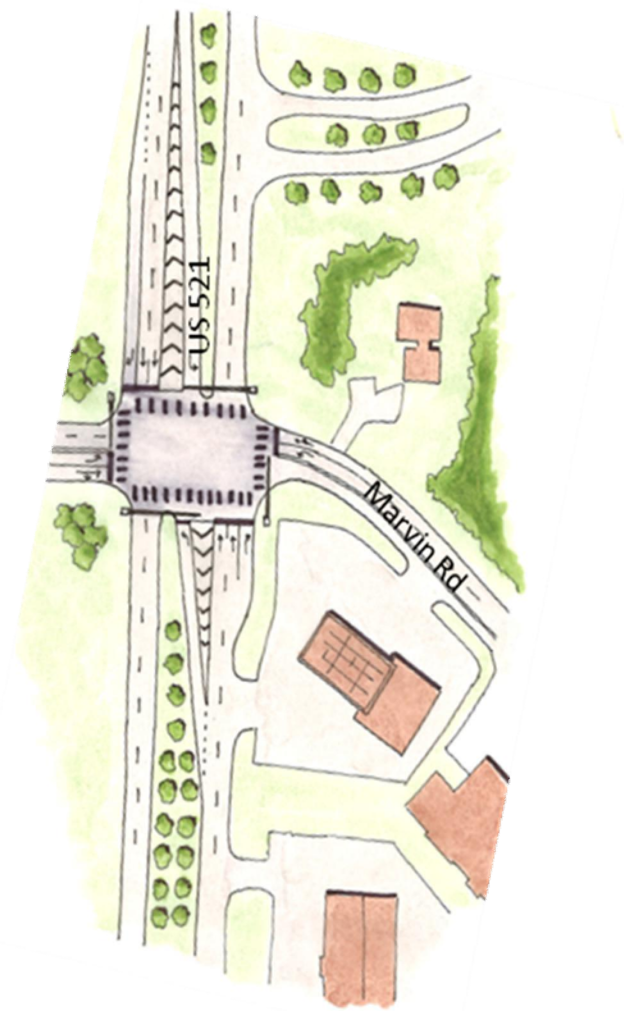
Reconfiguration of intersection at Aviation Blvd and SC 9.

Marvin Road and US 521

Marvin Road is located 2,600 feet south of the intersection of SC 160 and is the first eastward traveling roadway encountered with a southbound direction on US 521. While separated by over 2,600 feet, Marvin Road acts as a continuation of the SC 160 corridor providing access into Union County, North Carolina and points eastward.

As depicted on the recommended access plan, there are several median breaks which are recommended for closure. As redevelopment occurs, driveways should be consolidated, designated medians for closure should be closed, and key intersection laneage should be implemented. The following roadway improvements are recommended:

- Offset left-turn lanes on US 521
- Southbound right-turn lanes
- East and westbound left-turn lanes on Marvin Road



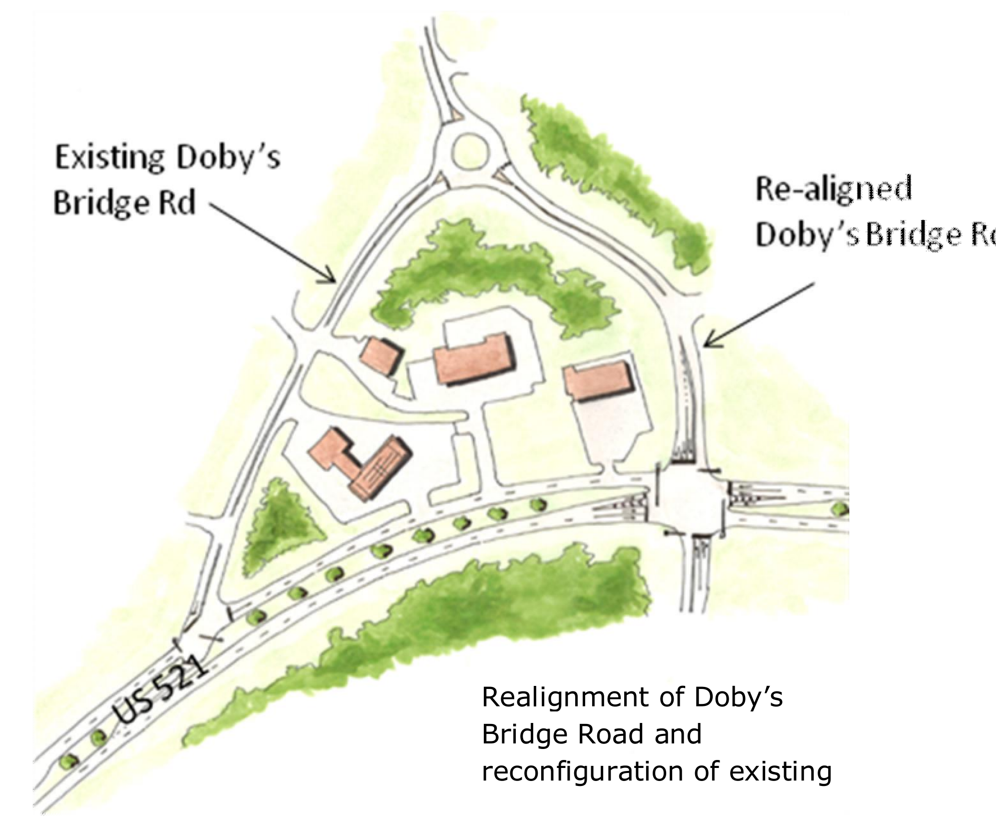
US 521 and Marvin Road Intersection with potential roadway improvements.

Doby's Bridge Road and US 521

As one of four crossings of the Catawba River and its tributaries, Doby's Bridge Road is a vital intersection with US 521. The intersection skew and topography has resulted in the occurrence of several significant crashes. Doby's Bridge Road approaches US 521 with a 6% downgrade and a 30 degree intersection skew. The combination of the skew, topography and horizontal curvature of US 521 all contribute to an intersection with traffic safety concerns. Additionally, the intersection's proximity to the intersection of Shelly Mullis Road and US 521 along with a mix of school and commuter traffic, creates a congested corridor during peak hours.

To eliminate the intersection skew as well as improve the signalized intersection spacing along the US 521 corridor, a realignment of Doby's Bridge Road is recommended to the north of its current intersection. To minimize impacts to adjacent residential neighborhoods as well as provide improved circulation to the adjacent school sites, a roundabout is offered as one possible traffic control measure for the new intersection of Doby's Bridge Road and realigned Doby's Bridge Road. With the realignment of Doby's Bridge Road, the existing intersection of Doby's Bridge Road is recommended to be converted to a left-over with the potential to be signalized. The new Doby's Bridge Road intersection would be signalized as well.

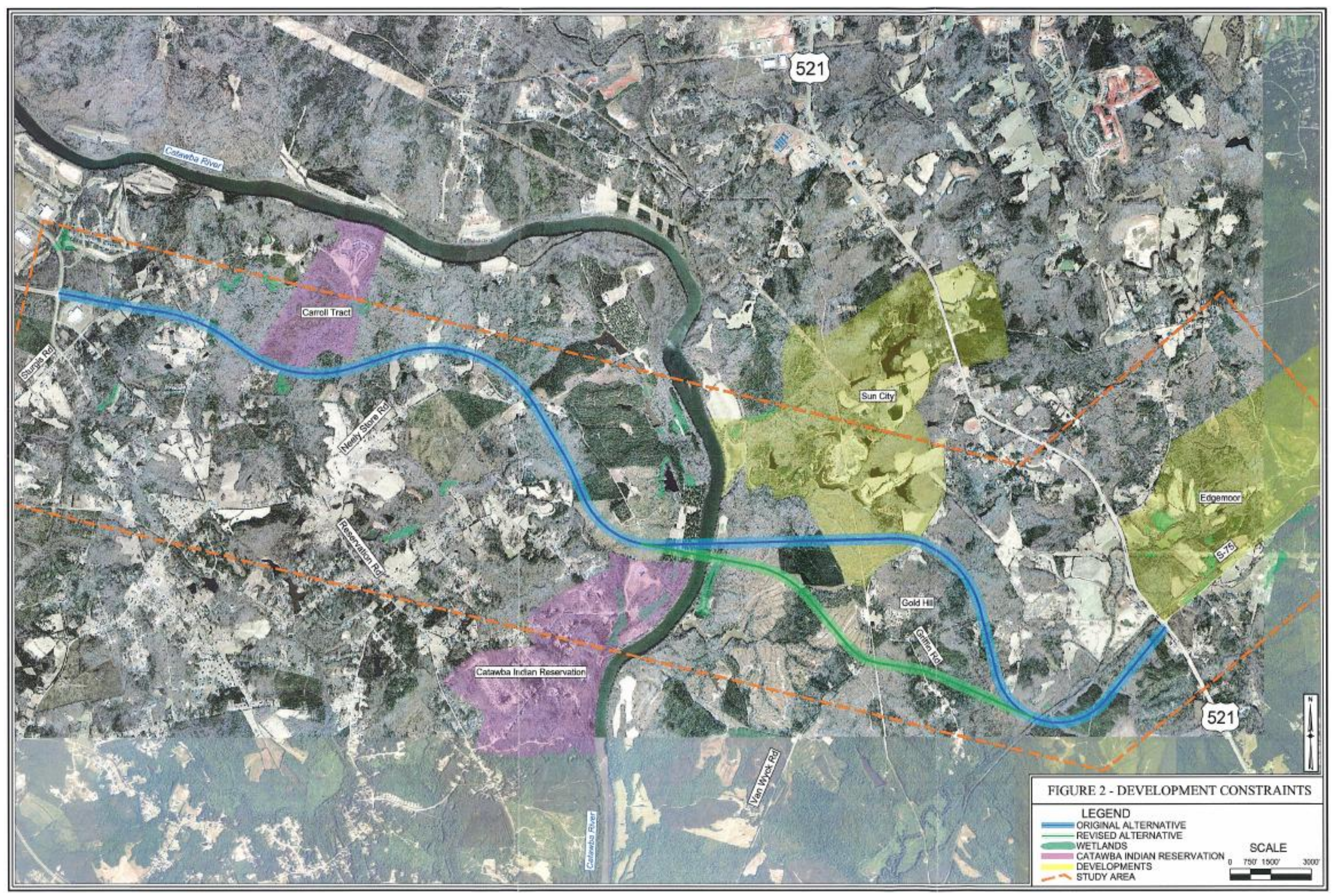
Additional traffic volumes will be incurred as part of the new development and/or redevelopment anticipated in this area. As such, the potential for realignment as a part of a development project is possible.



Realignment of Doby's Bridge Road and reconfiguration of existing

Proposed Dave Lyle Boulevard Extension

Since the 1980's the Dave Lyle Boulevard project has been included within several long range transportation plans from both a local and regional level to the statewide level. Connecting US 521 to I-77 in Rock Hill, the original purpose of the project was to direct growth by placing strategic infrastructure development along key corridors. In addition, the project would provide another much needed crossing of the Catawba River. Currently there are four crossings of the Catawba River and its tributaries over a distance of 20 miles. With these few crossings, east-west connectivity is limited at best.



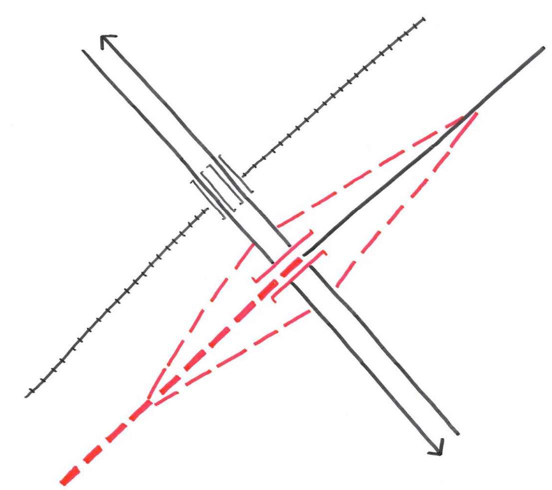
Source: Florence & Henderson, Dave Lyle Boulevard Extension Alternative Alignment and Cost Estimate Study

The proposed 9 mile project would extend existing Dave Lyle Boulevard from its current terminus in Rock Hill to a new at grade separated interchange with US 521 at or near the current intersection of SC 75 and US 521. The project incorporates four bridges, three interchanges, five underpasses, and one railroad crossing.

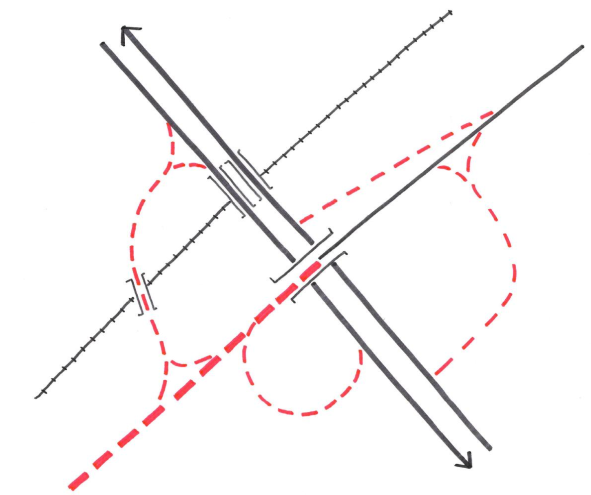
In 2002 a Final Environmental Impact Statement (FEIS) was adopted for the Dave Lyle Boulevard project. Due to the lack of funding the project was suspended. Since 2002, there has been significant development in the study area for the project, including construction in Sun City Carolina Lakes. The development of Sun City Carolina Lakes required a revised alignment. In 2008, Florence & Hutcheson prepared the *Dave Lyle Boulevard Extension Alternative Alignment and Cost Estimation Study*. The study developed a revised alignment that shortened the overall length by 1 mile with similar impacts to the environment.

With the tie in location occurring at SC 75 and US 521, careful consideration should be given to the type and layout of the interchange for this critical junction point. Several constraints exist within the area of influence for the interchange that will impact the traffic flow, mitigation requirements, and impacts to the existing and built environment. These constraints include the planned signalized entrance to the Edenmoor development, a Fire/EMS facility, railroad line, existing homes, and a graveyard, in addition to the cultural and environmental impacts listed in the FEIS. Prior to the selection of a preferred interchange configuration, the critical movements that need to be accommodated along with the degree of access and delay associated with each movement should be determined. Further study of the interchange configuration is recommended to identify the likely and potential impacts.

Two possible configurations are represented below. There are positive and negative aspects to each of these configurations. It is important to remember that the alternatives listed below are not inclusive of all configurations but rather possibilities.



Tight Diamond



Offset Clover

In 2008 the Dave Lyle Boulevard Extension project was estimated to cost $165,000,000. The project is included as unfunded on the Rock Hill-Fort Mill Area Transportation Study (RFATS) and the Catawba Regional Council of Governments (COG) Transportation Improvement Programs (TIP). SCDOT removed the project from the 2007-2012 Statewide Transportation Improvement Program (TIP) because of its unfunded status. Currently, the project is being considered for funding by the State Infrastructure Bank (SIB). An application was submitted to the SIB in 2009. A formal decision has yet to be determined on the status of the project.

Alternative Modes of Travel

Travel by private vehicle is — and will continue to be — the predominant mode of transportation for the majority of Lancaster County residents. As a result, it will remain a primary focus of long-range transportation planning. However, bicycle, pedestrian and public transportation infrastructure must be examined in long range transportation planning for a community.

Transportation plans once focused solely on roadway solutions, with planners and local officials concentrating on commuter traffic and travel patterns. Today, it is understood that community travel is not limited to morning and afternoon rush hours, and each trip does not begin and end in the driver's seat. In fact, every trip begins and ends with a pedestrian trip. For improved quality of life, citizens now strive for livable communities that balance travel between modes. A common theme of any livable community is how well it accommodates pedestrians and cyclists, for both recreational and utilitarian trips.

The value of bicycling and walking has numerous benefits, including:

- **Personal benefits** — Cardiovascular fitness and cost savings
- **Societal benefits** — Reduced vehicle miles of travel, improved public health through a cleaner environment and healthier citizens, and improved mobility for those without access to private automobiles
- **Social benefits** — walkable communities tend to result in places where individuals know and interact more with nearby neighbors
- **Environmental benefits** — Reduced air and noise pollution and fewer parking lots/spaces/structures

The existing bicycle and pedestrian network is limited. Results from surveys conducted during the development of the *US 521& SC 9 Corridor Study* show residents recognize the short-comings of the existing multi-modal network. Almost 80% of respondents rated the bicycle paths/lanes and greenways as "poor" along US 521 and close to 70% rated them as "poor" along SC 9. Additionally, about 85% of respondents said that sidewalks/crosswalks were "very important" or "somewhat important, " almost 80% said bike lanes were "very important" or "somewhat important, " and almost 90% said that greenways were "very important" or "somewhat important, " to improving the US 521 corridor. In addition to the need for pedestrian and bicycle facilities there has been an increasing interest in the use of alternative vehicles especially golf carts, to conduct local trips around their neighborhoods.

Bikeways

Lancaster County does not have a bicycle master plan and has a limited network of bicycle facilities and routes. Roads through the majority of the study area are insufficient in width or of poor quality for all but the experience cyclist. Many roads, especially within the more urban and suburban area, are littered with driveways and curb cuts, heavy traffic and high speeds. The rural portion of the study area includes roads with narrow lanes and limited - if any – shoulders. However, despite these limitations, there is an active group of cyclists that use US 521 and other roads within the study area.

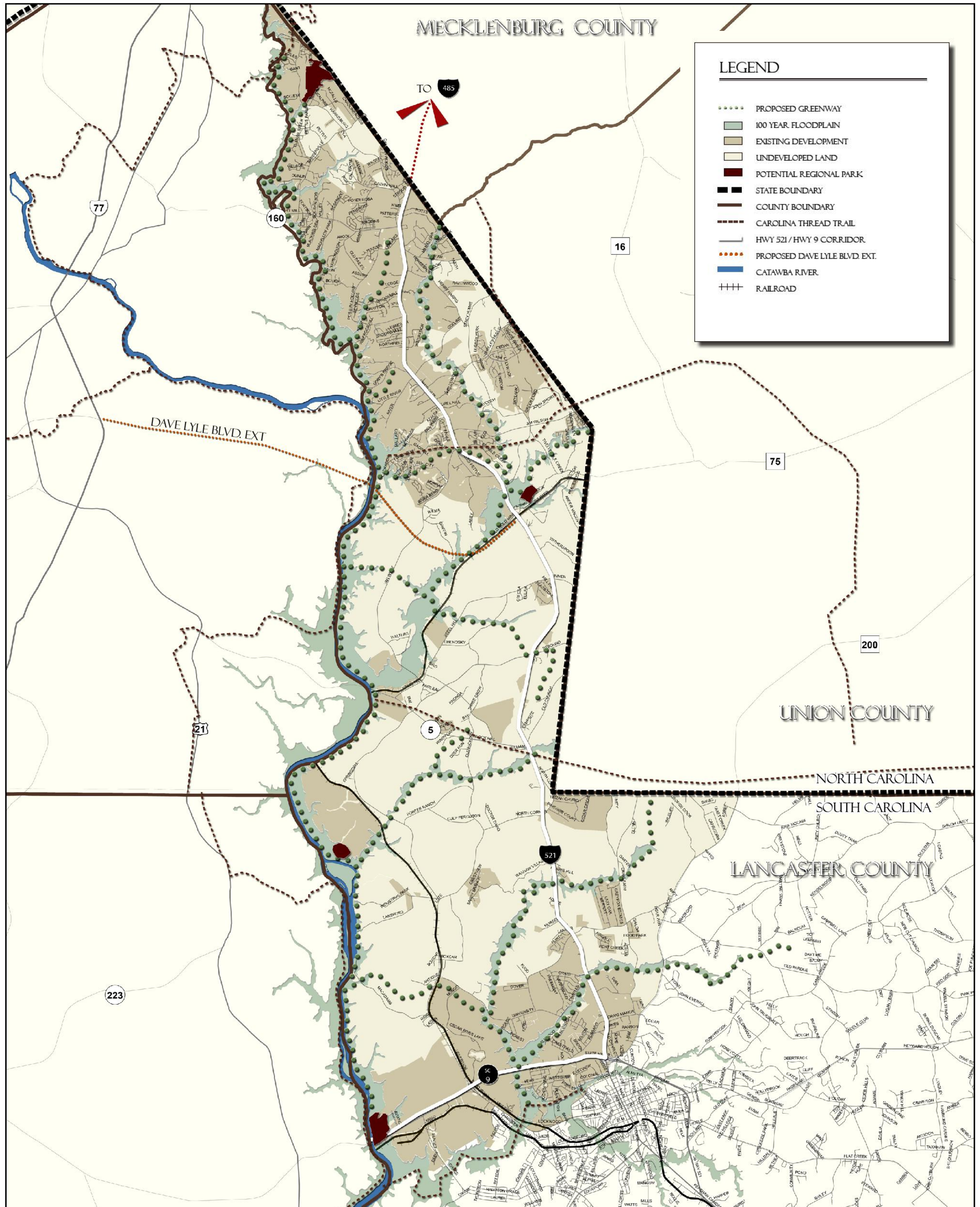
Sidewalks

Currently, there are only small sections of sidewalk along US 521 and no sidewalks along SC 9. Between Adage Road and just south of Trusdale Drive a 5 foot sidewalk exists back of curb on both sides. This sidewalk begins as the roadway transitions from a 4-lane divided roadway to a 5-lane divided section. The current UDO for Lancaster County does not have a requirement for sidewalk construction, resulting in limited facilities within the County and study area. Despite this, there is ample room along most of the roadways to accommodate a future sidewalk facility.

Greenways

The abundant natural resources in Lancaster County, as noted on the Environmental Features Map in Chapter 3, provide an excellent framework for the County's greenway system. Greenway facilities, also called "multi-use paths," generally are independent of the road network. When running parallel to existing streets, the paths are different from sidewalks not only in their width and intended user group but also because they typically do not share right-of-way with streets. Greenways can be paved or have a crushed gravel surface but generally are designed to be environmentally sensitive and aesthetically pleasing. Throughout South Carolina, greenways have been designed along creeks, through utility easements, and as part of 'rails-to-trails' conversions.

Lancaster County does not have a greenway master plan. Existing facilities in the County include the Lancaster Greenway in the City of Lancaster.



Proposed Greenways Map

Carolina Thread Trail

Lancaster County is one of 15 counties that will be part of a regional network of greenways and trails called the Carolina Thread Trail. The goals of the trail are to preserve significant natural areas, link regionally significant trails and attractions, and connect towns, cities, and counties.

Master plans have already been completed for Gaston, Mecklenburg (Phase I), and York counties. Although the Carolina Thread Trail has identified potential trail locations within Lancaster County, no detailed master planning has taken place. The County has established a committee to undertake the task of identifying specific trail locations within the County. The trail locations identified on the Proposed Greenway Map are intended to serve as a guide to the committee when determining actual greenway locations.

As discussed earlier, the County does not currently have a greenway master plan. The Proposed Greenway Map on page 4-26 details those locations throughout the County that would be ideal for greenways in the future. The majority of the greenways would be located in the floodplain adjacent to major creeks. These greenways also connect to natural features in the County such as proposed regional parks, Andrew Jackson State Park, and the Catawba River.

CAROLINA THREAD TRAIL
Weaving Communities Together

Public Transportation

Public transportation includes modes ranging from taxis and shuttles to commercial airlines and inter-city buses, all of which can have a greater or lesser impact on our lives on any given day. Public transit, on the other hand, is local and greatly affects the daily lives of those who rely on it to get to and from work, to and from medical appointments, to and from the grocery store — in other words, to and from any location that otherwise might be reached by private automobile.

The rural nature of Lancaster County has resulted in minimal opportunities for public transportation. There are several human service organizations in Lancaster County that provide transportation, primarily for the agency's own clients. The largest of these agencies are Lancaster Council on Aging, Chester-Lancaster Disabilities and Special Needs, and Lancaster Adult Day Care.

In 2008, the CRCOG formed the Lancaster County Transportation Work Group to assist with identifying gaps and expanding public transportation services within Lancaster County. Primarily, the Work Group determined that there is a significant portion of Lancaster County's population that does not have the resources for regular and dependable transportation, especially to access medical services. The Work Group received a grant from the J. Marion Sims Foundation to assist in planning for the provision of transportation services in Lancaster County. In February, 2008, the *Lancaster County Transit Feasibility Study* was published which included the framework for the development of a new countywide service called LARS (Lancaster Area Ride Service).

Lancaster County received additional funding of $455,000 from J. Marion Sims to implement the LARS system. In October, 2009, Lancaster Area Ride Service (LARS) was unveiled to Lancaster County residents. The service operates a dial-a-ride system that transports non-Medicaid recipients for scheduled appointments to licensed medical providers. Dial-a-ride systems provide the greatest geographic coverage and are well suited to serve dispersed origins and destination patterns that are prevalent in Lancaster County. Riders are required to call in advance to reserve their ride. A vehicle is dispatched to pick up the riders and transport them to their destinations. The vehicles do not travel over a fixed route or on a fixed schedule and may pick up several riders at different points before taking them to their appointments. Fares are tiered and are charged for each one-way trip. Most health care is concentrated in the City of Lancaster so most of the trips have the City as a destination.

LARS
LANCASTER AREA RIDE SERVICE

The Lancaster Transportation Work Group looks forward to expanding LARS into a public dial-a-ride service with funding provided through the SCDOT.

Low Speed Vehicles

A growing form of transportation in the Indian Land area, along with other locations throughout the state, is the use of low speed vehicles (i.e. golf carts). Residents are using golf carts within their neighborhoods to facilitate local trips in and out of their communities. With the growing popularity of golf carts on public and private streets intended for motor vehicles, many states not unlike South Carolina have developed regulations to handle the use of these vehicles.

The following is a summary of the regulations that are applicable for the use of low speed vehicles on SC roadways:

- The vehicle must be registered with the DMV, providing proof of liability insurance
- The vehicle may only be driven during daylight
- Each driver of the vehicle must possess a valid driver's license
- Vehicles may only be driven on secondary streets with a posted speed limit of 35 mph or less

- Only the owners of the vehicle may drive the vehicle
- Registration for the vehicle must be on-hand during use
- Vehicles may only be driven within 2 miles of the residence to which it is registered
- A low speed vehicle may cross a highway at an intersection where the highway has a posted speed limit of 35 mph or lower

Summary of Recommendations

The transportation recommendations for the *US 521 and SC 9 Corridor Study* include a wide variety of solutions intended to provide congestion relief, reduce crashes, and benefit the surrounding community. The recommendations described in this chapter range from regional improvements to spot location improvements. The proposed improvements are presented from a top down perspective, starting at the regional level and progressing to intersection level recommendations. This chapter includes the following recommendation types:

- **Regional Level** – collector street connectivity, intended to reduce vehicular demand on US 521 and SC 9 by providing alternate routes
- **Community Based** – cross section recommendations for the US 521 and SC 9 corridors that account for the surrounding environment
- **Policy Based**– standard access management policies and considerations intended to reduce congestion and increase motorists' safety
- **Corridor Level** – preferred access strategy for the corridor, outlining proposed signalized locations and median openings
- **Intersection Level** – specific section and intersection improvements intended to combat spot congestion and safety problems
- **Multimodal Considerations** – improvements intended to provide alternative travel modes and a safer, more efficient transportation system within and adjacent to the US 521 and SC 9 corridors.

1. ***Reduce reliance on the arterial street network by promoting connectivity within the study area.***

   The County Planning Department and County Council should promote the connectivity of new development through the creation of collector streets as described in this study. The County should refer to the collector street network when reviewing development projects and require developers to reserve right-of-way for, and in some cases construct, collector streets as generally represented in the Street Typology Map. Likewise, new development should be encouraged to provide internal and external connectivity. Connectivity between parking fields and amongst project phases should be required. Improved connectivity will help improve safety, reduce traffic congestion and increase trip making choices for emergency response vehicles. If implemented, this recommendation will reduce the prevalence of strip development.

2. ***Protect travel times to regional attractions (especially Charlotte, York County, and I-77).***

   Protecting travel times should be viewed as a priority to maintain quality of life and to promote the economic vitality of the corridors. A combination of transportation strategies is recommended to accomplish this goal, including:

   - Improve corridor operations through a preferred access management strategy. County Council should adopt the Preferred Access Management Strategy detailed in the Transportation Chapter of the study. Council should work with SCDOT to ensure driveway permits, median breaks, etc. are generally consistent with recommendations set forth in the strategy and develop a formal appeals and amendment procedures.
   - SCDOT and Lancaster County should improve roads in accordance with the Recommended Cross Sections Map. The design and detail of these roads should be generally consistent with the cross-sections detailed in the Transportation Chapter of the study. Amendments to the cross-sections may be required if the conditions/assumptions made in the study change. As gaps in funding are encountered, the County should seek additional funding via grants and existing programs (state & COG), and investigate the creation of new funding sources as well as public-private ventures.
   - Coordinate traffic signals to optimize traffic flow along the corridor (based on location and distance between signals). Consider reallocating some of the County's rural transportation dollars obtained from the COG to fund a timing study.
   - Require developers to pay costs associated with the installation of new traffic signals and the coordination of the signal timing of the new signal with upstream and downstream signals.
   - Construct median treatments on segments of US 521 in locations that have sufficient cross access, backdoor access, and onsite circulation for median treatments. Median treatments include non-traversable medians, median u-turn treatments, directional crossovers, left-turn storage bays, and offset left-turn treatments.
   - Promote intersection and minor street treatments throughout the study area. These include establishing proper curb radii and ensuring adequate laneage of minor street approaches as described in the plan.
   - Implement the intersection and transportation improvements detailed in the Transportation and Focus Area Chapters of the study (including the realignment of Doby's Bridge Road and relocated traffic signal).

3. ***Improve corridor safety by reducing the number of vehicle conflicts throughout the study area.***

Limiting the number of conflict points on a roadway improves on-site traffic circulation and reduces the potential for traffic accidents. The number of conflict points can be reduced through the following: limiting the number of driveways and median breaks, locating driveways strategically, relocating driveways, and promoting cross access.

4. ***Increase travel choices throughout the study area by integrating multiple modes into the transportation system.***

- Develop a Greenway Master Plan consistent with recommendations shown on the Development Considerations Map. The County should work in conjunction with the Katawba Valley Land Trust to identify greenway opportunities and secure easements.
- Complete a Carolina Thread Trail master plan. Lancaster County has established a committee to identify specific trail routes associated with the Carolina Thread Trail. This committee needs to move forward identifying routes, designing and planning the corridors, acquiring land, and constructing the trails. The committee should refer to the Development Considerations Map for ideal thread trail routes. The County should work to obtain a Planning Grant from the Carolina Thread Trail to help offset associated costs.
- SCDOT and Lancaster County should construct wide outside shoulders along US 521 and SC 9 to accommodate experienced cyclists.
- Educate users of low speed vehicles (golf carts) about SCDMV laws regarding the proper use of such vehicles.
- Work to accommodate low speed vehicles into mixed use designs where feasible.
- Lancaster County should work with the Charlotte Area Transit System (CATS) to develop a park and ride facility in the panhandle along US 521 during the short-term planning horizon, 2015.
- Lancaster County should work with CATS to develop an express route commuter bus service to Uptown Charlotte from the Indian Land area during the short-term planning horizon, 2015.
- Lancaster County should work with CRCOG to develop a fixed route bus service or circulator service within the Indian Land Area during the mid-term planning horizon, 2020.
- Lancaster County should work with CRCOG to investigate the potential extension of the LYNX Blue line (light rail or commuter rail) into the County within the planning horizon of this plan (2035).

5. ***Improve pedestrian accommodations throughout the corridor.***

- Pedestrian level improvements at all full median opening signalized intersections are recommended in the areas north of Twelve Mile Creek where population densities are greatest and pedestrian attraction are most prevalent. These improvements include crosswalks, pedestrian refuges in median splitters, and pedestrian signal timing with countdown heads.
- Lancaster County should provide pedestrian level improvements at mid-block areas as indicated on the *Conceptual Design Plans* found in this study.

6. ***Promote street design that is responsive to the local land use character and purpose of the street.***

SCDOT and Lancaster County should refer to the Street Design Priority Matrix found in the Transportation Chapter of the study when designing future streets. Those items indicated as high priority in the matrix should not be compromised during the design process.

7. ***Support regional efforts to improve transportation mobility.***

Lancaster County should coordinate regularly with adjacent counties and transportation agencies, including York, Union, Chester, and Mecklenburg counties (and their municipalities), CRCOG, SCDOT, and the State Infrastructure Bank on proposed and committed transportation projects in the region. One project of particular importance currently is the construction of the Dave Lyle Boulevard extension.