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Western Connector Corridor Study

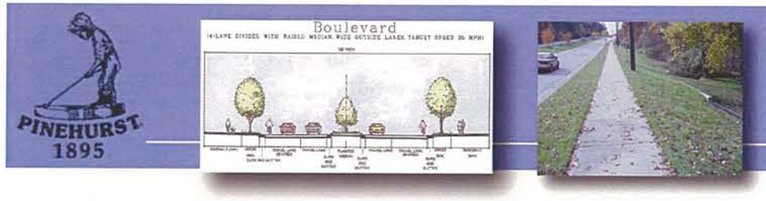
Pinehurst, NC

Linking Pinehurst: Preserving our History while Planning for our Future

Final Report August 2008

PINEHURST 1895

Kimley-Horn and Associates, Inc.



Acknowledgements

The development of the Western Connector Corridor Study was a collaborative process that involved numerous stakeholders, including the Western Connector Advisory Committee, the Village of Pinehurst, the Town of Aberdeen, the Village of Foxfire, Moore County, and the North Carolina Department of Transportation.

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Thank you to the Pinehurst Community for providing the foundation for this plan

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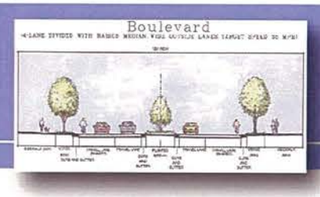
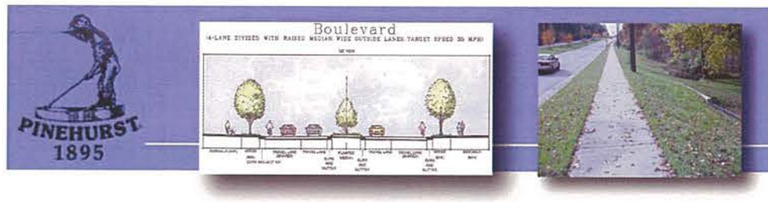


Table of Contents



Chapter 5 – Implementation Plan

Figures

Tables

Chapter 1 —Corridor Context & Vision

Introduction

The Western Connector Corridor Study combines a feasibility study and preliminary functional design for the proposed Western Connector, a facility intended to enhance access, mobility and safety for the Pinehurst area. This project builds on the work of earlier studies and represents a joint effort between residents and the business community as well as collaboration between the Village of Pinehurst, Foxfire Village, the Town of Aberdeen, and Moore County.

Historical Context

Though the Village of Pinehurst has been incorporated for only a few decades, it has served as a home to a variety of residents. Early inhabitants included Siouan Indians who camped and hunted buffalo throughout the area. The buffalo created paths across Moore County, which were used by Native Americans and later became more permanent. English, Ulster Scot, and German settlers arrived around 1739 to settle the fertile lands of Moore County. Immigrants from the Scottish Highlands established themselves in the following decades and produced goods from the vast forests of longleaf pines.

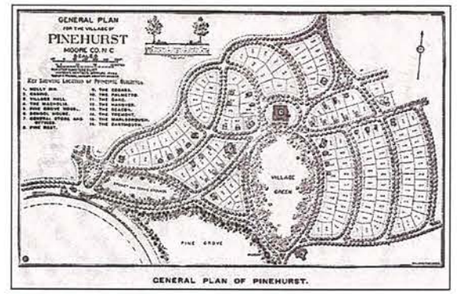
Moore County formed a few years after the American Revolution as an offshoot of Cumberland County. The Sandhills area's industrial economy emerged from the Revolution more slowly than the northern portions of the County. The Civil War slowed the area's progress even further, but the arrival of the Raleigh and Augusta Railroad provided access to the area's pine forests and lumber products.

A significant catalyst to the area's business came in the form of the resort industry, which arrived in the late 19th century when northerners traveled south by rail to seek refuge from the harsh northeast winters. Southern Pines, then known as Shaw's Ridge, became a popular destination. In 1895, James Walker Tufts purchased 598 acres of land near the present-day Pinehurst Village Center with the vision of transforming the area clear-cut by the timber industry into a health-oriented resort. Tufts contacted Frederick Law Olmstead, designer of Central Park in New York and landscape designer of the Biltmore Estate in Asheville, to help build the resort.

For a fee of $300, Olmstead and his colleagues designed a typical New England Village of curved roads radiating from a central village green. The Holly Inn opened on December 31, 1895, fulfilling Tuft's resort dream. In addition to the standard amenities at the Inn, the village boasted electricity and a telephone system.

In the 1960s, the resort became a year-round destination and was in desperate need of updating. The Tufts family sold the resort to the Diamondhead Corporation in 1971. The new owners sold lots with membership rights to the resort facilities, adding residents who were increasingly aware of the quality of life in the area. These residents of the growing resort had no way to formally express their concerns or manage needed change to their community, so in 1980 the Village incorporated with a population of 1,746.

The area's historic appeal was officially recognized in 1996 when the Village of Pinehurst became a National Historic Landmark. In addition to recognizing the historic village and early residences, the designation applies to the Pinehurst Resort and Country Club and several of its golf courses.



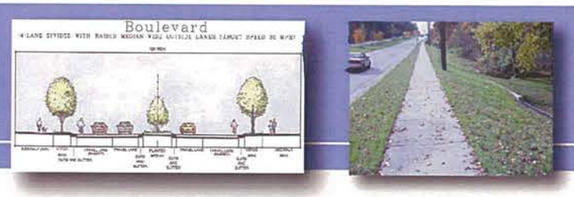
Olmstead's Original Design for the Village of Pinehurst
(Courtesy of www.tuftsarchives.org)

Need for the Western Connector

From 1980 to 1990, the Village's population tripled to 5,103. By 2000, Pinehurst had a population of 9,706, a population of 12,000 in 2008, and projections of close to 20,000 by 2020. These figures do not include the thousands of residents that may come to the area as Fort Bragg expands. Regardless, the mild weather and small town charm continues to attract new residents, and the growth has provided new cultural, economic, and recreational opportunities to residents. Growth, however, also poses the regional challenges of increased traffic congestion and changing commuting patterns. The area must plan for infrastructure improvements to preserve and enhance the quality of life residents both old and new value.

The Western Connector Corridor Study follows the NC 5 corridor feasibility study (TIP # FS-0108B), which found the existing NC 5 corridor to be at capacity but noted the difficulty in widening due to physical constraints and adjoining railroad right-of-way. The feasibility study also listed cultural and social impacts to the historic areas in the Village as barriers to NC 5 expansion. Ultimately, the NC 5 Feasibility Study recommended that an alternative corridor be identified to relieve the congestion along the NC 5 corridor.

Early image of Pinehurst
(Courtesy of www.villageofpinehurst.org)



This Western Connector Corridor Study combines a feasibility study and preliminary functional design for the proposed Western Connector. The study includes environmental and cultural resource screenings that result in a preliminary functional alignment that local jurisdictions and NCDOT can use to preserve the needed right-of-way for the future roadway construction. The associated preliminary functional design is in general conformance with NCDOT and Village of Pinehurst standards and enables the Village to request inclusion of the proposed project in the state's Transportation Improvement Program (TIP).

The intent of this facility is to enhance access and mobility for the Pinehurst area by connecting NC 211, NC 5, and US 15-501. The Western Connector is an alternative to widening NC 5 and should provide relief to congested roadways throughout the Village of Pinehurst, as well as to surrounding communities such as Aberdeen and Foxfire Village. The facility should protect the integrity of historic downtown Pinehurst in the face of the continued growth.

Public Outreach

The transportation planning process continues to become more inclusive, addressing not only federal law mandates but also the realization by local decision-makers that local residents offer a unique perspective. As is typical in the planning process, Pinehurst residents have an intimate understanding of existing conditions and a collective vision for the future. To accommodate that understanding and vision, the Study relied on public input through a variety of media beginning early in the planning process.

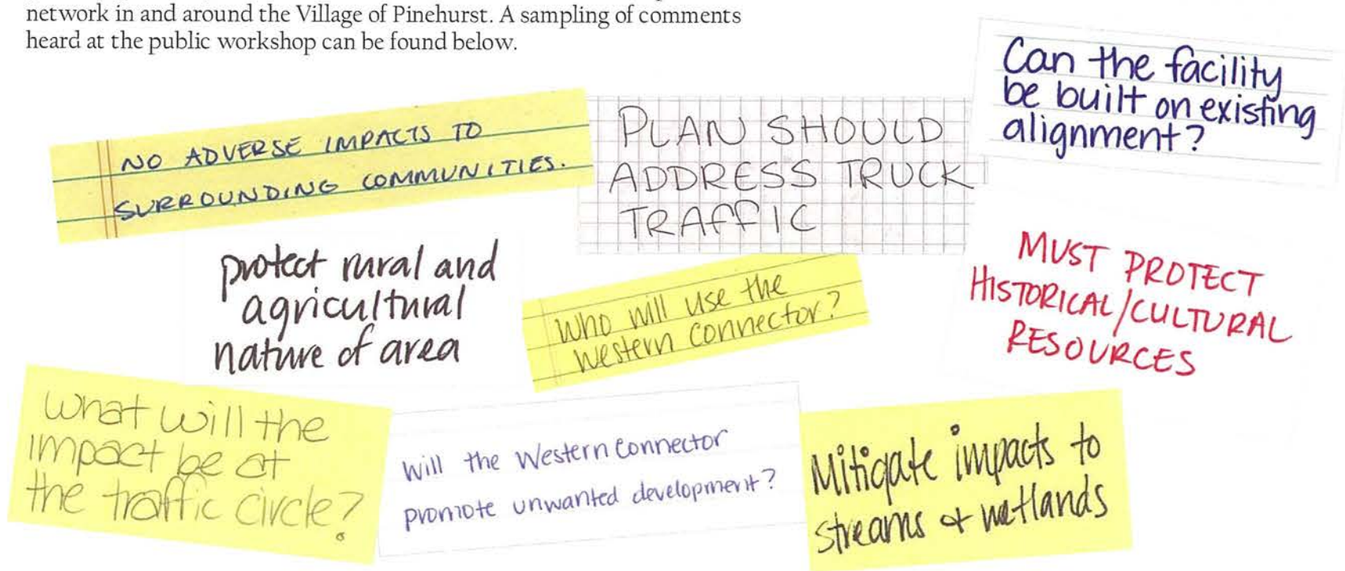
Advisory Committee and Public Workshop

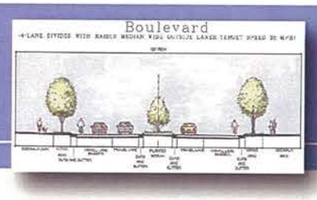
The proposed corridor is the result of detailed analysis and the guidance of a diverse Advisory Committee (AC) consisting of Municipal staff, local citizenry, property owners and select stakeholders. The AC was selected to reflect a broad base of local interests so that a number of viewpoints and concerns could be incorporated into the selected corridor. The AC provided guidance throughout the development of the plan by serving as a sounding board for technical work and recommendations, describing and mapping their own ideas and suggestions, and promoting the public workshop.

A public workshop was conducted to inject public input into the process. The workshop was designed to help facilitate public participation, generate and share ideas, and build consensus. More than 45 people attended the workshop held November 8, 2006. The workshop was designed to educate stakeholders and the public about the importance and function of the Western Connector within the larger transportation network as well as to translate ideas and values into shared and concrete goals. The evening opened with an overview presentation of the historic transformation of the Village's transportation system, followed by a discussion of the current and anticipated traffic problems associated with the NC 211, NC 5, and US 15-501 corridors. The workshop closed with a series of interactive small group sessions to document areas of concerns, offer feedback on local development and roadway projects, identify potential corridor alignments, and discuss ways to enhance opportunities for alternate nodes.

Public Workshop

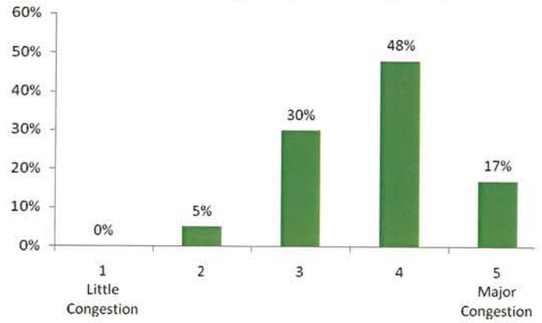
Several issues and concerns were identified at the public workshop, pertaining not only to the Western Connector but also the transportation network in and around the Village of Pinehurst. A sampling of comments heard at the public workshop can be found below.



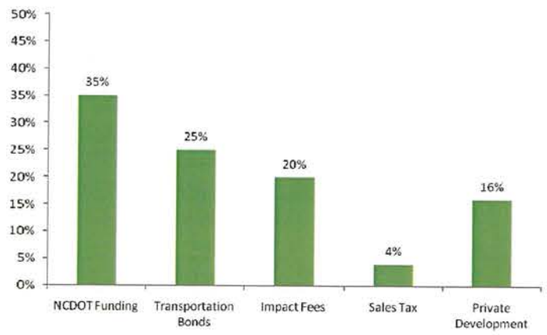


Attendees were asked to respond to a survey regarding the information presented at the workshop. The questions included issues about the most important impacts to minimize, the general perception of congestion, and the most popular funding strategies for implementing the Western Connector. The attendees at the public workshop ranked historic properties as the number one impact to avoid, followed by wetlands, existing homes and businesses, protected species, and farmlands.

Public perception of existing congestion along NC 5, NC 211, and US 1



Public support for various funding strategies



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Goals and Objectives

The goals and objectives for this study were developed based on thoughtful community discussions including public outreach, community surveys, and meaningful technical and planning staff and committee involvement. The following goals attempt to balance the vision and objectives expressed by committee members *and* comments received at the public workshop.

- Reduce congestion on NC 5, NC 211, US 1, and US 15
- Provide an alternate route for truck traffic
- Protect surrounding communities
- Avoid environmental, social, and cultural impacts
- Minimize impacts to land owners
- Minimize impacts to industry and new residences on NC 5
- Provide provisions for bicyclists and pedestrians
- Coordinate corridor analysis with associated transportation, future land use, and zoning plans
- Evaluate land use decisions surrounding the corridor
- Identify policies for corridor protection

Technical Report

The *Western Connector Corridor Study* report organizes the analysis and public input that has resulted in the proposed alternative. The goal of this new roadway is to provide relief to the area's congested roadways, protect the integrity of historic downtown Pinehurst, and accommodate future growth. The remainder of this report outlines the analysis and methodology used to achieve this goal. The report includes the following elements:

- Corridor Context & Vision
- Public Outreach
- Existing and Future Conditions
- Alignment Alternatives and Evaluation
- Preferred Alternative Selection
- Roadway Design Criteria
- Probable Construction and Right-of-Way Costs
- Implementation/Action Plan

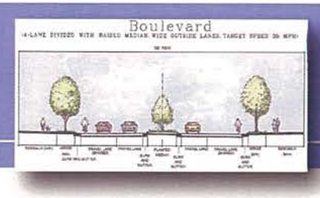
Payne Stewart celebrates his 1999 U.S. Open Championship at Pinehurst No. 2 (Courtesy of www.usga.org)

References

http://www.villageofpinehurst.org/VOP_history.htm

http://www.moorecountync.gov/main/page.asp?rec=/pages/AboutMooreCounty/historical_outline.htm

http://www.tuftsarchives.org/village_template.htm



Chapter 2 —Area Dynamics

Today's Pinehurst results from a combination of the access railroads provided to the region's timber resources, the vision of James Walker Tufts for a southern resort, and the area's burgeoning appeal to golfers and tourists around the world. Pinehurst grew steadily from its roots as an escape from the cold, wet winters of the northeast before it was incorporated in the early 1980s. Growth in Pinehurst has accelerated since then with the current population projected to nearly double by 2020.

Balancing the transportation needs of a growing region like Pinehurst requires a complete understanding of what has been accomplished in the past, what the current conditions are, and what needs to be achieved in the future. The following chapter presents an overview of the current transportation system and how well it functions based on several criteria. The chapter also provides a summary of the environmental, historic, and social resources within the study area. Analysis by the project team and information provided through public outreach and the involvement of the Advisory Committee all served as the basis for this chapter.

These existing conditions directly inform the future conditions detailed at the end of the chapter and provide a base level of measure from which to compare the alternative corridors and selected preliminary functional design.

The System Today

Transportation System

A high-quality transportation system balances the needs of all users by operating safely and efficiently while supporting the community and enhancing its character. The existing roadway network in the Pinehurst area serves local residents and commuters along the north-south routes of US 1 and US 15-501. Major roads in the study area include US 1, US 15-501, NC 5, NC 211, NC 2, Hoffman Road, Roseland Road, Foxfire Road, Midland Road, and Linden Road [**Figure 2.1**]. These facilities collect the traffic from local roads serving neighborhoods and businesses around the study area.

Several railroads cross the region, including the Aberdeen Rockfish, Seaboard Coastline, and Southern Norfolk Railroads. These railroads were instrumental in the development of the region's timber industry following the Civil War. Today, the lines connect the area with points throughout the region and nation, carrying freight across the nation and Amtrak passengers between New York and Miami. NC 5 runs parallel to and is contained within the right-of-way limits of the Aberdeen Carolina Western Railway through the Pinehurst area, reducing the feasibility of widening the roadway in a cost-effective manner.

Congestion

During the public outreach efforts, the Advisory Committee and general public pointed to growing congestion within the study area and throughout the region as a matter of concern. Analysis of current average daily traffic volumes provided by NCDOT show congestion to be a current problem. The Level of Service categories presented in **Figure 2.2** are determined by volume-to-capacity ratios based on 2004 NCDOT Average Daily Traffic Counts. **Table 2.1** details four categories of level-of-service and the corresponding volume-to-capacity ratios.

A review of the traffic volumes of the roadways shown in **Table 2.2** reveal that more than half operate at or above 75% capacity, with a third operating beyond capacity.

Table 2.1 – Level of Service Categories

Level of Service	Volume-to-Capacity Ratio
LOS C or Better	Less than 0.8
LOS D	0.8 to 1.0
LOS E	1.0 to 1.2
LOS F	Greater than 1.2

Typical peak-hour congestion

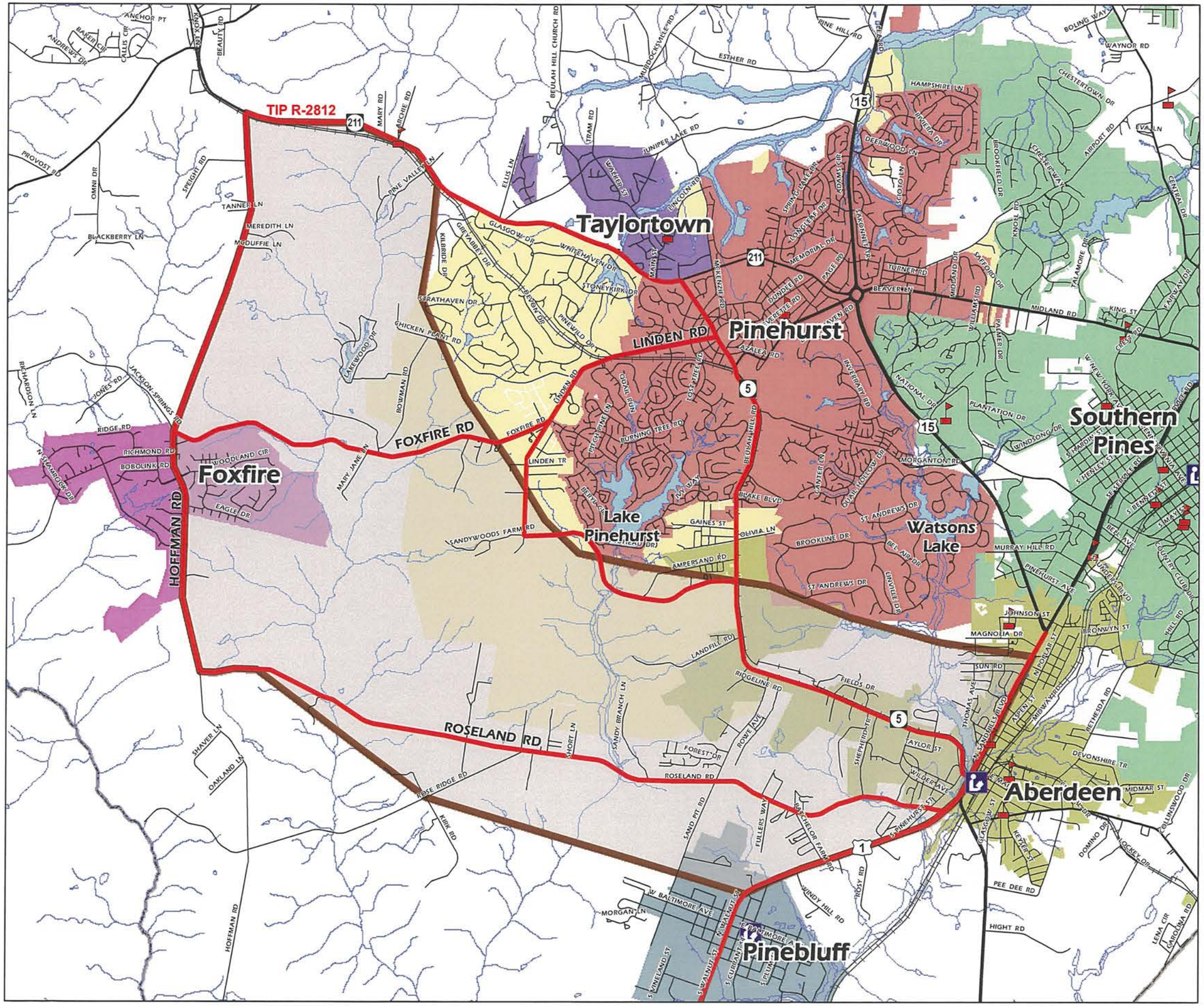
Table 2.2 – Highest Traffic Volume Segments (2004)

Roadway	ADT Range*	Highest Segment
US 1	8,800 to 15,000	From Roseland Rd to US 15-501
US 1/US 15-501	25,000 to 37,000	From US 15-501 to NC 5
Hoffman Rd (SR 1004)	2,300 to 2,500	From Foxfire Rd to Roseland Rd
Roseland Rd (SR 1112)	1,400 to 3,400	From Rose Ridge Rd to Pinehurst St
Foxfire Rd	2,000	From Hoffman Rd to Linden Rd
Linden Rd	1,700 to 2,800	From Foxfire Rd to NC 5 (northern intersection)
NC 211	11,000 to 16,000	From Main St to NC 5
NC 5	9,300 to 17,000	From NC 2 to Monticello Dr

* ADT – Average Daily Traffic

Village of Pinehurst Western Connector Corridor Study

Figure 2.1 – Study Area and Major Roads



- Aberdeen
- Foxfire
- Pine Bluff
- Pinehurst
- Southern Pines
- Taylortown
- Extra Territorial Jurisdiction
- Study Area
- Bodies of Water
- Streams/Rivers
- Schools
- Libraries
- Major Roads
- US Highways
- State Highways
- Local Streets
- Railroad

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0 1 Miles

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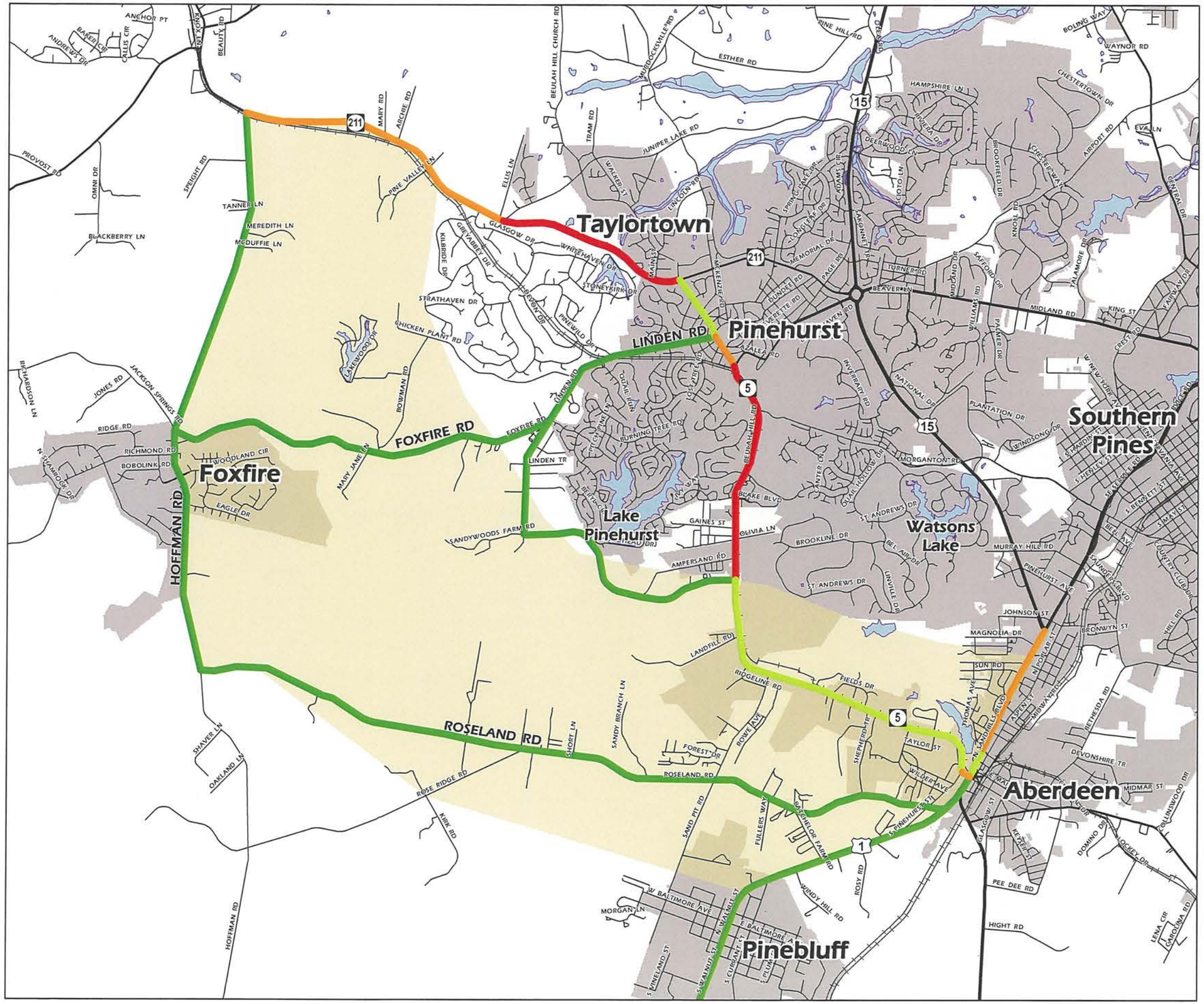
N W E S

Village of Pinehurst Western Connector Corridor Study

Figure 2.2 – Congested Corridors



Level of Service*

- LOS C or Better
- LOS D
- LOS E
- LOS F
- Study Area
- Bodies of Water
- Streams/Rivers
- US Highways
- State Highways
- Local Streets
- Railroad

* Level of Service determined by Volume-to-Capacity ratios based on 2004 NCDOT Average Daily Traffic Counts

Level of Service	Volume-to-Capacity Ratio
LOS C or Better	Less than 0.8
LOS D	0.8 to 1.0
LOS E	1.0 to 1.2
LOS F	Greater than 1.2

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0 1 Miles

N W E S

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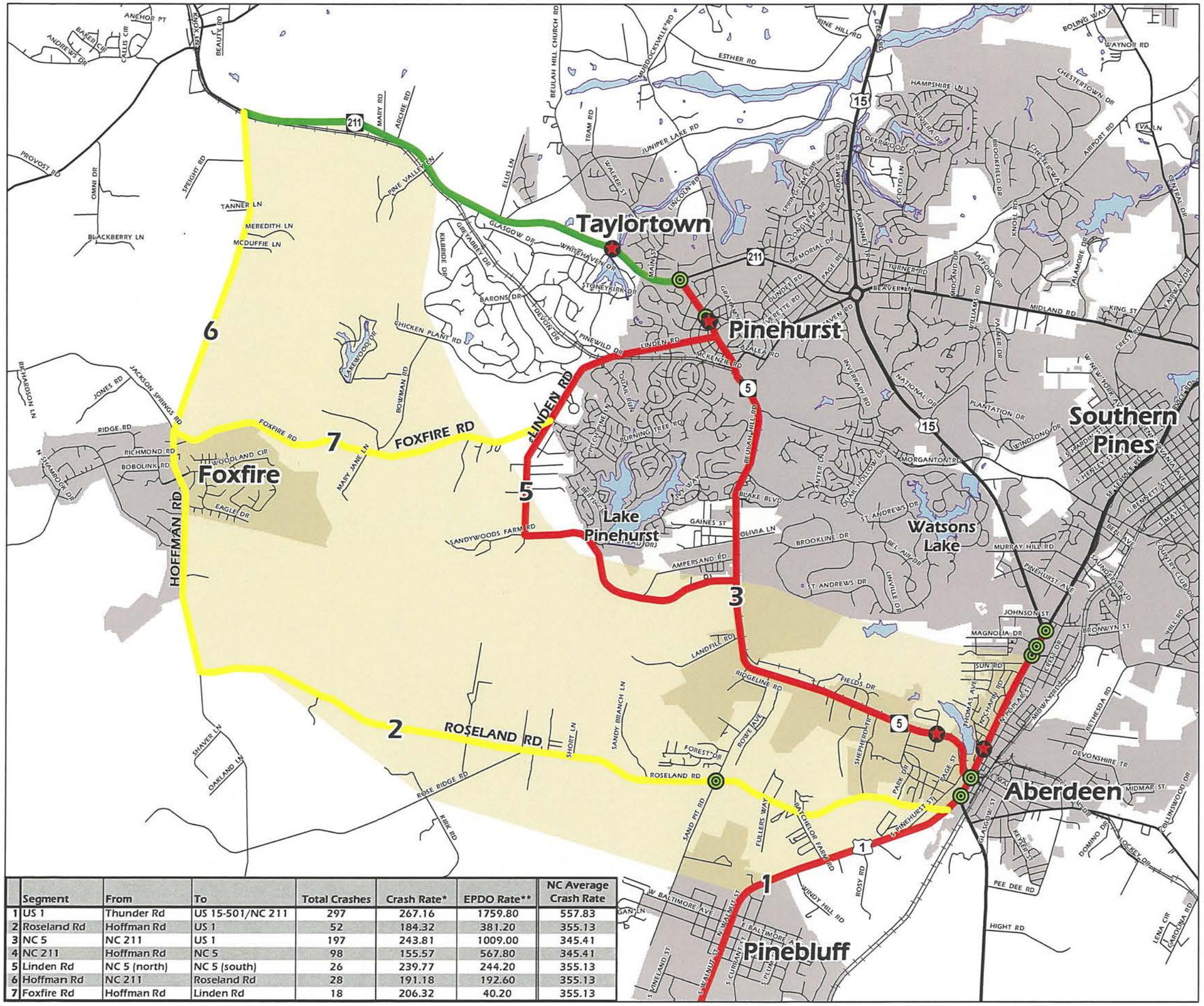
Village of Pinehurst Western Connector Corridor Study

Figure 2.3 – Crash Data

(Jan. 2003 to Dec. 2005)



	Segment	From	To	Total Crashes	Crash Rate*	EPDO Rate**	NC Average Crash Rate
1	US 1	Thunder Rd	US 15-501/NC 211	297	267.16	1759.80	557.83
2	Roseland Rd	Hoffman Rd	US 1	52	184.32	381.20	355.13
3	NC 5	NC 211	US 1	197	243.81	1009.00	345.41
4	NC 211	Hoffman Rd	NC 5	98	155.57	567.80	345.41
5	Linden Rd	NC 5 (north)	NC 5 (south)	26	239.77	244.20	355.13
6	Hoffman Rd	NC 211	Roseland Rd	28	191.18	192.60	355.13
7	Foxfire Rd	Hoffman Rd	Linden Rd	18	206.32	40.20	355.13

Crash Rate*

- Less than 160 crashes per MVM
- 160 to 220 crashes per MVM
- More than 220 crashes per MVM
- Locations with 10+ Crashes
- Fatal Crash Locations
- Study Area
- Bodies of Water
- Streams/Rivers
- US Highways
- State Highways
- Local Streets
- Railroad

* Crash Rate is the number of crashes per million vehicles miles.
** EPDO (Equivalent Property Damage Only) Rate = (76.8*(F+A)+8.4*(B+C)+PDO)/Total Crashes

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0 1 Miles

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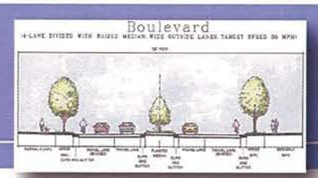
N W E S



Congestion in the area is at its worst on NC 5, NC 211, and US 1/US 15-501. Based on the estimated capacity of the facility, NC 5 operates poorly between NC 2 and Monticello Drive with a volume-to-capacity ratio of 1.77, which corresponds to level of service F. All of the links on this section of NC 5 operate at capacity. For NC 211, the volume-to-capacity ratio ranges from 1.14 to 1.67 but should be resolved with the current plans to widen the roadway. US 1/US 15-501 has a higher capacity than NC 5 and NC 211, but its congestion level remains high. For the segment between Maple Avenue and the US 15-501 split, the roadway has a volume-to-capacity ratio of 1.18, which corresponds to level of service E. **Table 2.3** summarizes the volume-to-capacity ratios for these three facilities.

A major concern expressed by local citizens was the daily peak-hour congestion and spill-back problem at the traffic circle intersection of US 15-501, NC 211, and NC 2. The traffic circle connects major roadways in the region, and for many visitors, serves as a gateway entrance into the Pinehurst area. The Western Connector has the potential to relieve traffic congestion at the traffic circle by diverting traffic to an alternate route. However, a more in depth review of the existing conditions and potential alternatives of this intersection may be necessary.

Trucks

Available vehicle classification data is limited around the Pinehurst area, and no available counts within the study area were available. Counts were obtained, however, in three locations just adjacent to the study area; two along US 1 and one on US 15-501. **Table 2.4** lists the counts and truck percentages for these three locations.

Safety and Crash History

NCDOT crash records provided the base measurement of traffic safety for roadway segments and intersections in the study area. The crashes of note occurred between January 2003 and December 2005. The type and frequency of crashes were analyzed along seven roadways, as summarized in **Table 2.5** and shown in **Figure 2.3**. A description of the data and detailed information regarding high crash intersections follows.

Table 2.3 –Volume-to-Capacity Ratios (2004)

Segment	Volume	Practical Capacity	Volume/ Capacity
NC 5 from NC 211 to Linden Rd (north)	9,900	10,000	0.99
NC 5 from Linden Rd (north) to NC 2	11,400	10,000	1.14
NC 5 from NC 2 to Monticello Dr	17,700	10,000	1.77
NC 5 from Monticello Dr to Linden Rd (south)	13,500	10,000	1.35
NC 5 from Linden Rd (south) to W. Saunders Ave	9,900	10,000	0.99
NC 5 from W. Saunders Ave to Pinehurst St	9,700	10,000	0.97
NC 5 from Pinehurst St to US 1/US 15-501	11,400	10,000	1.14
NC 211 from Hoffman Rd to Juniper Lake Rd	11,400	10,000	1.14
NC 211 from Juniper Lake Rd to Main St	13,500	10,000	1.35
NC 211 from Main St to NC 5	16,700	10,000	1.67
US 1/US 15-501 from US 15-501 (south) to NC 5	26,000	34,000	0.76
US 1/US 15-501 from NC 5 to Maple Ave	28,100	32,500	0.86
US 1/US 15-501 from Maple Ave to US 15-501 (north)	38,500	32,500	1.18

Table 2.4 – Truck Counts and Percentages

Roadway	Total Vehicles	Total Trucks (Percent) Medium	Heavy
US 1 south of Pinebluff*	3566	175 (4.9)	237 (6.6)
US 1 south of Southern Pines*	6442	207 (3.2)	393 (6.1)
US 15-501 north of Pinehurst**	5202	201 (3.9)	114 (2.2)

* February 2004;
** August 2005

Table 2.5 – Crash Rates

Segment	Length	ADT	Crashes Total	Fatal	Injury	Truck	EPDO Rate*	Crash Rate**	NC Average Crash Rate
US 1 from Thunder Rd to US 15-501/NC 211	6.30	16,100	297	1	123	16	1759.80	267.16	557.83
Roseland Rd	7.80	3,300	52	0	26	5	381.20	184.32	355.13
NC 5 from NC 211 to US 1	6.89	10,700	197	2	80	6	1009.00	243.81	345.41
NC 211 from Hoffman Rd to NC 5	4.83	11,900	98	1	44	1	567.80	155.57	345.41
Linden Rd	5.82	1,700	26	0	11	0	244.20	239.77	355.13
Hoffman Rd from NC 211 to Roseland Rd	5.81	2,300	28	0	13	3	192.60	191.18	355.13
Foxfire Rd	3.98	2,000	18	0	3	0	40.20	206.32	355.13

* EPDO (Equivalent Property Damage Only) Rate = (76.8*(F+A)+8.4*(B+C)+PDO)/Total Crashes
** Crash Rate is the number of crashes per million vehicles miles

US 1 from Thunder Road to US 15-501/NC 211

Of the 297 total crashes along this 6.3 mile segment, 16 involved heavy trucks and 123 resulted in non-fatal injuries. One fatal wreck was reported. The highest crash location occurred at the junction of US 1, US 15-501, and NC 211. At this intersection, 49 crashes occurred, including 20 with injuries. A total of 25 crashes (12 with injuries) occurred at the intersection with NC 5. Other intersections with high crash occurrences were the roadway's intersection with Dogwood Drive (15 crashes, 3 with injuries), Magnolia Drive (15 crashes, 5 with injuries), and the southern intersection with US 15-501/NC 211 (18 crashes, 13 with injuries). The fatal wreck occurred in the vicinity of Maple Avenue.

Roseland Road

A total of 52 crashes occurred along Roseland Road, half of which resulted in injuries (no fatalities). Five crashes involved heavy trucks. The only intersection with 10 or more crashes was at Sand Pit Road (14 crashes, 8 with injuries).

NC 5 from NC 211 to US 1

Along this 6.9 mile section of NC 5, 197 crashes (80 with injuries, 2 with fatalities) occurred. Six crashes involved heavy trucks. A total of 13 crashes (6 with injuries) occurred at the intersection with NC 211. The NC 5 intersection with McCaskill Road/Barrett Road intersection saw 12 crashes of which 8 had injuries. The majority (10) of these crashes were angle crashes. The two fatal crashes on NC 5 occurred when vehicles ran off the road.

NC 211 from Hoffman Road to NC 5

Of the 98 crashes during the three-year analysis period, 44 involved non-fatal injuries. One fatal crash, a head-on collision in wet conditions, occurred during this period. The highest crash intersection was NC 5/NC 211 at which 13 crashes (6 with injuries) occurred.

Linden Road

A total of 26 crashes were reported on Linden Road, 11 of which involved non-fatal injuries.

Hoffman Road from NC 211 to Roseland Road

Between NC 211 and Roseland Road, 28 crashes (13 with injuries) occurred. Three crashes involved heavy trucks. No intersection had 10 or more crashes.

Foxfire Road

The analysis segment with the fewest crashes was Foxfire Road, which saw 18 crashes (3 with injuries). No heavy trucks were involved in these crashes and none involved fatal injuries.

TIP Projects

The Transportation Improvement Program (TIP) provides a financially constrained list of the most immediate priority transportation improvements for an area. The current TIP projects of interest in the Pinehurst area include:

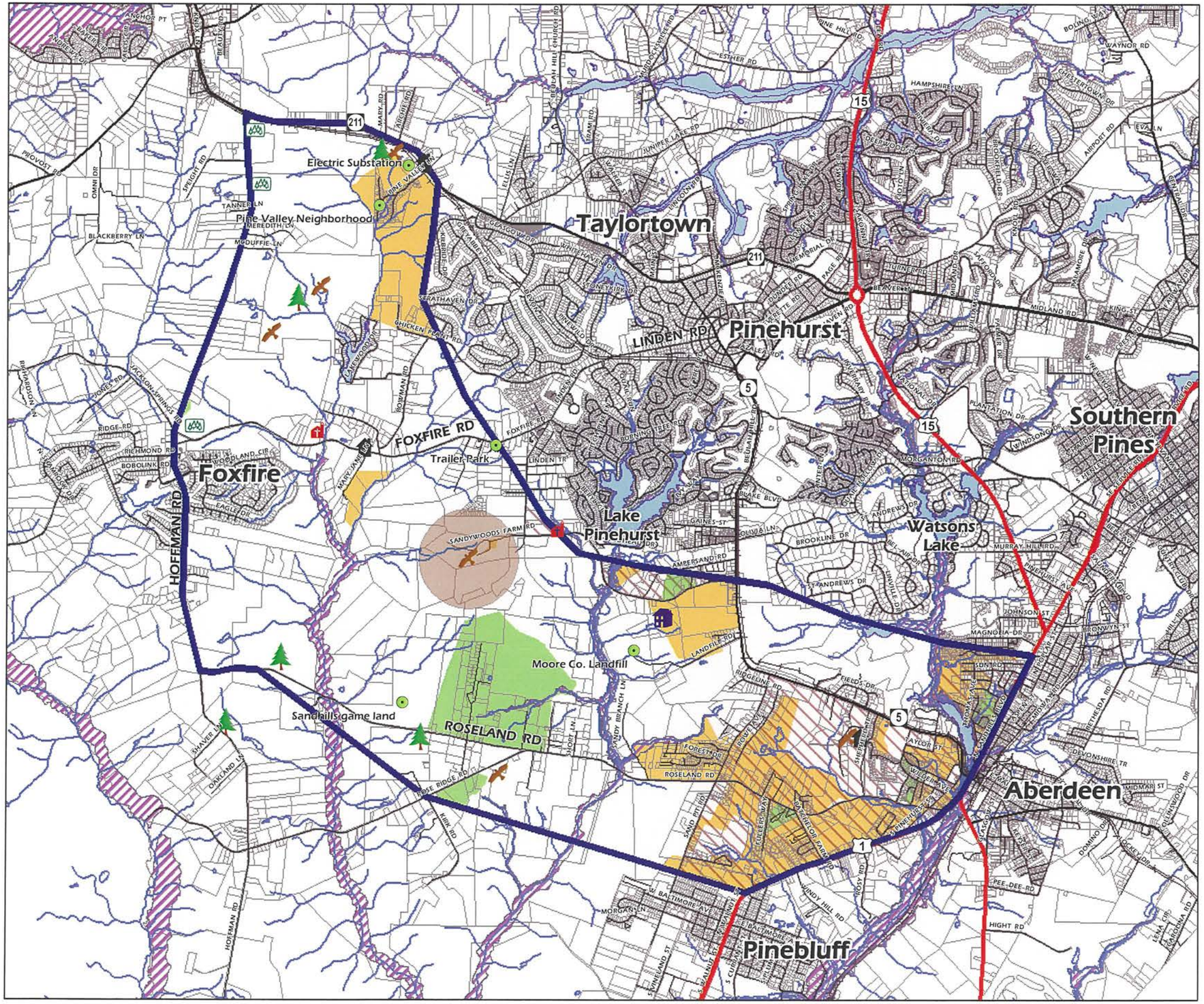
- Widen NC 5 to multi-lanes from US 1 in Aberdeen to southern city limits of Pinehurst (*R-4743; unfunded*)
- Widen NC 211 to multi-lanes from NC 73 (west) to the traffic circle in Pinehurst (*R-2812; in planning/design stage; construction slated for FY 09*)
- Replace CSX Transportation bridge No. 2 on US 15-501 (*B-3680; right-of-way acquisition in FY 07; construction in FY 08*)

Environmental, Historic, and Social Resources

Transportation projects can significantly impact the natural, historic, and social environments that contribute to the quality of life cherished by residents. For this reason, the project team—with the help of the Advisory Committee, stakeholders, and the public— identified these resources early in the planning process. The early identification of significant features allows the preferred alternative to avoid as many impacts as possible. Most of the constraints mentioned below are displayed in **Figure 2.4**.

Village of Pinehurst Western Connector Corridor Study

Figure 2.4 – Environmental and Cultural Constraints



- Potential Red-Cockaded Woodpecker (RCW) Habitat
- Longleaf Pine
- Planted Pine
- Lloyd-Howe House
- Potential Historic House
- Church
- Other (Labeled)
- Study Area
- 1/2 Mile Buffer of RCW
- 8% to 13% Below Poverty*
- Greater than 10% Hispanic**
- Greater than 10% Minority**
- Parcels
- Floodplains
- Wetlands
- Bodies of Water
- Streams/Rivers
- US Highways
- State Highways
- Local Streets
- Railroad

** Census Block Group Level*
*** Census Block Level*

Source: CGIA, USGS Mapping, Village of Pinehurst, NCDWQ, and NCDOT

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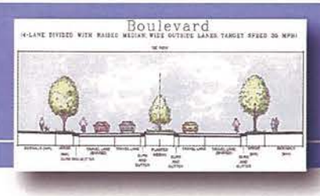


Environmental Features

An initial review, including existing resource agency database and field review, of the natural resources within the corridor study area identified the approximate location of a variety of environmental features. Several streams bisect the study area, including Deep Creek, Sandy Run, Rays Big Branch, Horse Creek, Aberdeen Creek, and McCallum Branch. These streams and their unnamed tributaries, shown in **Figure 2.4**, are potential wetland areas identified during field reconnaissance.

Projects that use federal or state funding, or require a federal or state permit, must address protected species. Because the construction of the Western Connector may require a federal Section 404 permit from the U.S. Army of Engineers and state 401 water quality certification from the N.C. Department of Environment and Natural Resources Division of Water Quality, protected species present in the study area are relevant in the selection of the proposed corridor. According to the United States Fish and Wildlife Service (USFWS), four species listed for federal protection are found in Moore County. **Table 2.6** lists these four species and their potential habitat in the study area. **Figure 2.4** shows the potential locations within the study area of the Red-Cockaded Woodpecker (RCW).

Table 2.6 – Federally Protected Species in Moore County

Species	Type	Potential Habitat in Study Area
Red-Cockaded Woodpecker (RCW)	Vertebrate Animal	Present
Cape Fear Shiner	Vertebrate Animal	Not Present
American Chaffseed	Vascular Plant	Not Present
Michaux's Sumac	Vascular Plant	Potential Habitat

The Red-Cockaded Woodpecker's ability to live in the region is closely tied to the presence of Longleaf Pines, which the woodpecker requires to provide open stands for nesting and roosting. The RCW buffer shown in **Figure 2.4** represents the required radius around a tree stand marked with an endangered species sign. The one-half mile radius around clustering or potential RCW habitat could be based roughly on tree coverages. The buffer shown in this figure will need to be investigated in more detail prior to determining final alignment and design.

Michaux's Sumac is a 1- to 3-foot tall shrub with small, greenish-yellow to white flowers that bloom from June to July. The shrub exists on highway rights-of-way and roadsides.

The longleaf pine locations detailed in **Figure 2.4** refer to naturally growing pine forest dominated by longleaf pine. While current regulations do not restrict constructing a roadway through such an area, the disruption of longleaf pine forests should be minimized. Planted pine refers to trees planted for commercial, recreational, or aesthetic reasons. These tree stands have been planned and cultivated more than their longleaf pine counterparts.

Historic Properties and Places

The North Carolina State Historic Preservation Office (SHPO) maintains databases of nationally registered historic sites. SHPO resources indicated a historic home—the Lloyd-Howe House—located south of Lake Pinehurst near Linden Road. A field visit revealed the following locations of potential historic structures:

- Residential Structure: NC 211 north of Pine Valley Lane
- Residential Structure: Foxfire Road west of Pine Crest Court
- Residential Structure: Allison Page Road north of Login Cabin Lane

The Western Connector will lessen the impact on the National Historic Landmarks of the Village of Pinehurst and resorts. Though none of these landmarks are located within the study area, this report acknowledges the role of the proposed roadway in securing the sustainability of these resources.

Environmental Justice

Environmental justice is a law intended to avoid the use of federal funds for projects, programs, or other activities that generate disproportionate or discriminatory adverse impacts on minority or low-income populations. This effort is consistent with Title IV of the 1964 Civil Rights Act, and is promoted by the U.S. Department of Transportation as an integral part of project planning and design. The environmental justice assessment for the Western Connector Corridor Study was based on three basic principles derived from USDOT guidelines:

- The planning process should avoid, minimize, or mitigate economic, social, and human health impacts that affect minority and low-income populations with disproportionate severity.
- Transportation benefits should not be delayed, reduced, or denied to minority and low-income populations.
- Any community potentially affected by outcomes of the transportation planning process should be provided with the opportunity for complete and equitable participation in decision-making.

This assessment used 2000 Census Data to identify the geographic distribution of minority, Hispanic, and low-income populations within the study area. This information is depicted in **Figure 2.4**.

Pockets of residences surrounded by open space cover the study area. The eastern portion along US 1 between Pinebluff and Aberdeen is the most populated area. Much of this section is more than 10% minority and below poverty. Some census blocks indicate greater than 10% of the population is Hispanic.

Other avoidance areas include locations between Linden Road and Landfill Road as well as near the Pine Valley neighborhood where higher percentages of minorities reside. Also, a high percentage of Hispanics reside along Roseland Road central to the study area. This census block covers a large area, but residences are concentrated along Beagle Run Lane, Cloud Court, Guy Lane, and Boyce Lane.

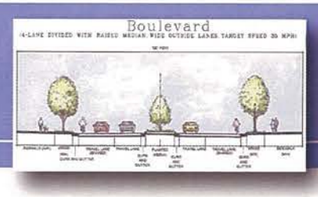
It should be noted that **Figure 2.4** shows the location of these populations within the study area. In some cases, the boundaries of census blocks and block groups extend beyond the study area. These blocks and block groups were clipped to the study area boundary for presentation purposes, and the percentages include populations residing outside the study area. The assessment of minority and Hispanic populations should be compared with overall rates for Moore County. Nearly 20% of the county is minority, and approximately 4% of county residents are Hispanic.

Environmental justice assessment does not attempt to quantify specific impacts to the populations of interest. Rather, the assessment guides the selection of the preferred alternative by ensuring potential impacts are noted and the benefits and impacts of the proposed roadway are evenly distributed among the study area population.

Future Year Conditions

Southern and western Moore County has experienced rapid growth over the past several decades. Nowhere is this more evident than the Village of Pinehurst, which has grown from a population of 1,746 when it was incorporated in 1980 to 9,700 in 2000. In 2006, the Village's population was estimated to be approximately 12,000. The Village of Pinehurst and surrounding area currently is experiencing steady growth, averaging 200 new homes per year. The area's population is expected to nearly double in size by the year 2020.

With this dramatic increase in the region's population will be an increased strain on a transportation system that is already at the limits of its capacity. The volumes on the major facilities that service the Village (NC 5, NC 211, US 1, and US 15/501) are expected to increase by as much as 15,000 vehicles per day. Facilities like NC 5 will carry nearly 25,000 vehicles per day — significantly more than it was designed to handle.



Future Year Transportation System

The analysis of existing traffic conditions is a function of the number of vehicles utilizing the roadway and the capacity of the facility. The analysis of future year traffic conditions is slightly more nebulous, and requires projections of population and employment growth and their effects on the transportation system. Travel Demand Modeling is a tool that measures the way people travel and is used to estimate future traffic levels and problematic locations based on roadway features and growth patterns.

The Southern Moore County Urban TransCAD Model was used to determine the resulting congestion and roadway operations of the existing and future roadway network. The model incorporates key components affecting traffic, such as population, employment, and roadway specifications. The results of the model were used to help analyze the alternatives suggested by the Advisory Committee, as well as a no-build scenario to determine congestion levels without the Western Connector. The results of these analyses are documented below.

Existing Conditions

The results of the existing conditions scenario (for the same seven links detailed in this chapter) are provided in **Table 2.7**. The existing conditions scenario was run to calibrate the model with the average daily traffic data also detailed in this chapter. Once the existing year results closely resemble the traffic counts measured by NCDOT, future year scenarios will more accurately reflect the anticipated conditions. These volumes are very similar to those found in **Table 2.2**, indicating the validation of the travel demand model.

Table 2.7 – Existing Scenario Results (2004)

Roadway	Volume Range*
US 1	9,700 to 13,700
US 1/US 15-501	30,000 to 35,000
Hoffman Rd (SR 1004)	1,600 to 2,000
Roseland Rd (SR 1112)	1,300 to 2,800
Foxfire Rd	2,000 to 2,400
Linden Rd	1,000 to 3,700
NC 211	10,500 to 16,000
NC 5	5,000 to 14,500

* Daily volumes (i.e., average daily traffic)

Future No-Build

The results of the future no-build scenario are provided in **Table 2.8**. The future no-build scenario was run to determine the impacts of the expected growth in and around the Village of Pinehurst without the mitigating effect of the Western Connector. These results can be used to determine the impacts each alternative makes to the transportation system. This analysis symbolizes the worst case scenario (the only programmed roadway improvement is the widening of NC 211), which is the existing roadway network with projected traffic growth.

Table 2.8 – Future No-Build Results (2030)

Roadway	Volume Range*	Percent Growth (from 2004)
US 1	15,250 to 24,100	75%
US 1/US 15-501	46,000 to 48,000	37%
Hoffman Rd (SR 1004)	7,200 to 8,600	330%
Roseland Rd (SR 1112)	6,900 to 11,900	325%
Foxfire Rd	5,800 to 6,900	187%
Linden Rd	2,700 to 10,400	181%
NC 211	18,700 to 30,000	87%
NC 5	10,500 to 28,000	93%

* Daily volumes

Future Build

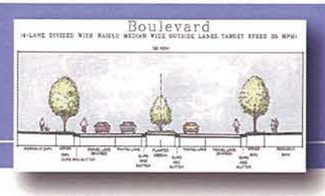
The results of the future no-build scenario document the expected increase in traffic volumes based on the projected growth in the Village of Pinehurst. A similar scenario was run to analyze the impacts of the Western Connector (i.e., future build scenario). All variables from the no-build model were held constant, with the only change being the addition of the Western Connector corridor. The results of the future build scenario are provided in **Table 2.9**.

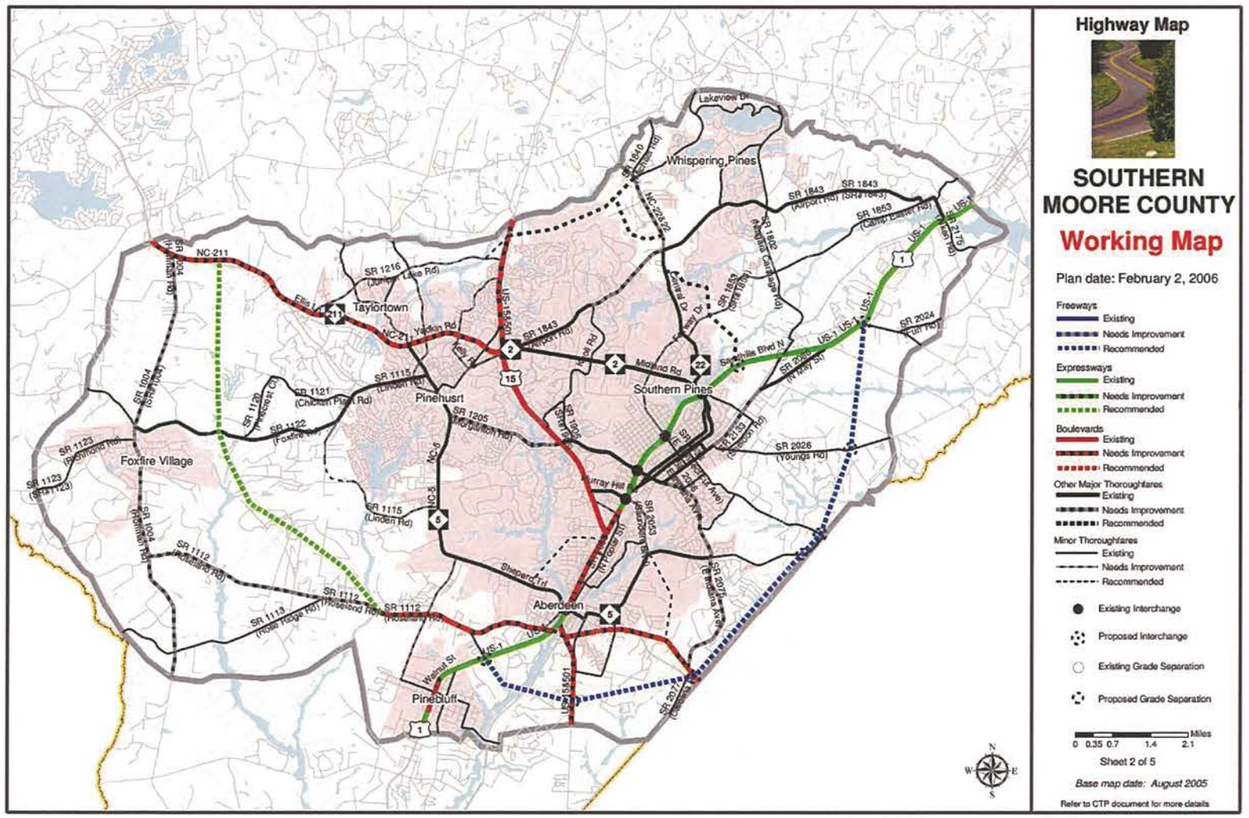
Table 2.9 – Future Build Results (2030)

Roadway	Volume Range*	Percent Growth (from 2004)
US 1	17,000 to 26,000	90%
US 1/US 15-501	43,000 to 46,000	31%
Hoffman Rd (SR 1004)	4,000 to 10,000	400%
Roseland Rd (SR 1112)	3,000 to 10,000	257%
Foxfire Rd	6,000 to 10,000	317%
Linden Rd	1,000 to 3,700	0%
NC 211	14,000 to 20,000	25%
NC 5	12,000 to 20,000	38%
Western Connector	5,000 to 16,300	N/A

* Daily volumes

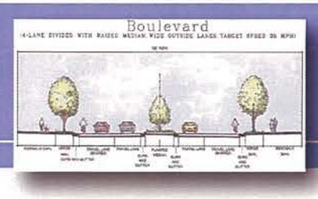
The results of the future build scenario show some roadways experiencing a decrease in total volume, while others see an increase. The facilities that show a decrease in volume are those that would be considered parallel to the Western Connector (i.e. NC 5, NC 211, etc.). The facilities that show an increase in total volume are those that typically have a potential connection with the new corridor (i.e. Hoffman Road, Foxfire Road, or Roseland Road).





Thoroughfare Plan

The Southern Moore County Thoroughfare Plan (adopted February 2, 2006) already addresses the need for an additional connection on the western edge of the Village of Pinehurst to alleviate traffic growth. Based on the recommendations of the thoroughfare plan, this is the only new facility that will service the western portion of the community. Based on the thoroughfare plan, the corridor represented is identified as an expressway, effectively bypassing the community. While some of the congestion on NC 5 and NC 211 is created by through traffic — significant levels of congestion can be attributed to trips generated within the region's large residential developments. With this in mind, it is more appropriate to envision this corridor as a parkway or boulevard that promotes high levels of mobility, while providing alternative access points to the major generators in and around the study area.



Chapter 3 —Alignment Alternatives

Based on discussions with both the Advisory Committee and the general public, four potential alternatives were developed and analyzed to determine the preferred corridor alignment. The different alignments are a distinct reflection of the concerns and insight provided by the Advisory Committee, the Village Staff, and public input obtained through the public workshop and surveys. Ultimately, the Village Staff selected the preferred alternative by balancing the evaluations presented in this chapter of the report and the underlying needs of the community. The evaluation determined impacts to existing structures, historic properties, and environmental features, while assessing benefits to constructability and travel mobility. The following sections detail the four alignment alternatives, as well as the evaluation that led to the preferred alignment.

Alternatives Development

The alternative corridors were developed through several mapping exercises performed by the general public, the Advisory Committee, and the Village Staff. The goal of these exercises was to develop corridors that avoid impacts to wetlands, stream crossings, endangered species, planted pine stands, landfills, schools, hospitals, churches, cemeteries, parks, historic properties, and existing dwelling units. However, in some cases impacts to environmental issues were unavoidable. The impact results may vary based on the corridor routes selected by the individual or group. Some corridors focus on the use of existing roadways to minimize impacts to undeveloped land while others focus on travel mobility by providing a closer connection to NC 211 and NC 5 and coming in proximity to the residential developments on the outskirts of the Village.

Figure 3.1 shows the four alternatives developed through the mapping exercise. The following sections provide a brief description of each alternative and how they were developed.

Alternative A

Alternative A is intended to utilize existing alignment as much as possible, while avoiding impacts to developed areas, such as Foxfire Village and residential areas along Roseland Road. The beginning terminus is the existing intersection of Hoffman Road and NC 211. The proposed alignment follows Hoffman Road for over 2 miles before breaking away to avoid Foxfire Village. The purpose of this approach was to divert heavy vehicle traffic from the Foxfire community, as this was a concern of several Advisory Committee members.

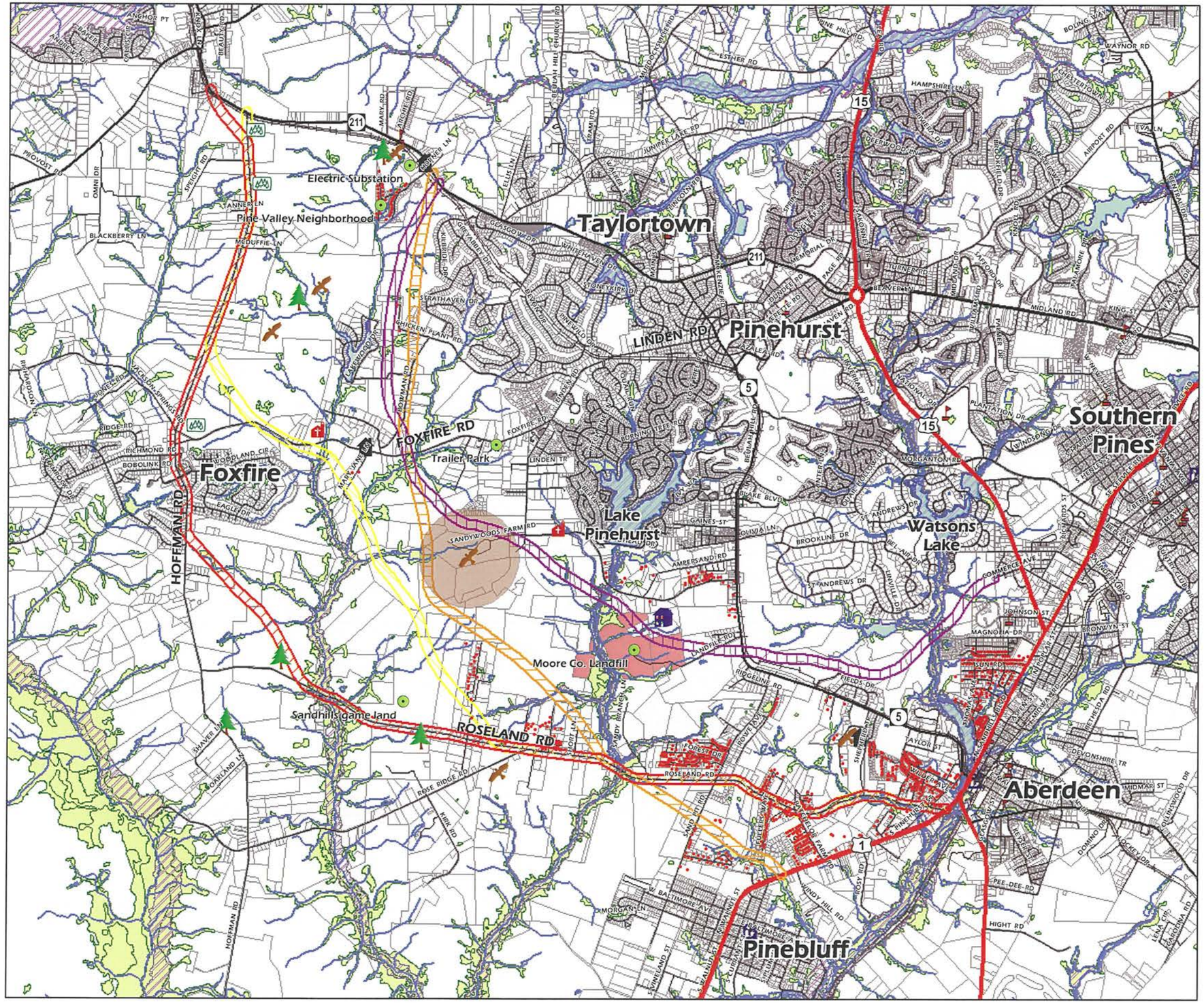
From Hoffman Road, the alternative alignment follows about one mile of new location through largely undeveloped land, until connecting with Foxfire Road. The proposed alternative follows about a half mile of the existing Foxfire Road. From Foxfire Road, the alternative alignment follows about four miles of new location through a mixture of developed and undeveloped land. This alternative alignment extends to Roseland Road, intersecting just west of Rose Ridge Road. The remainder of this alternative utilizes the existing alignment of Roseland Road, extending to the terminus at US 1.

Major observations with Alternative A include:

- Major potential residential impact - approximately 37 homes potentially impacted along existing Hoffman Road, Foxfire Road, and Roseland Road
- Longest total length of roadway (14 miles total; approximately 9 miles on existing roadway, 5 miles on new location)
- Provides minimal congestion relief to NC 211 and NC 5
- Would require some additional bridge and culvert work along Roseland Road
- Minimizes impacts to undeveloped land

Village of Pinehurst Western Connector Corridor Study

Figure 3.1 – Alignment Alternatives



- Alternative A
- Alternative B
- Alternative C
- Alternative D
- Potential Red-Cockaded Woodpecker (RCW) Habitat
- Longleaf Pine
- Planted Pine
- Lloyd-Howe House
- Potential Historic House
- Church
- Other (Labeled)
- Rooftops
- Landfill
- 1/2 Mile Buffer of RCW
- Floodplains
- Wetlands
- Bodies of Water
- Streams/Rivers
- US Highways
- State Highways
- Local Streets
- Railroad

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0 1 Miles

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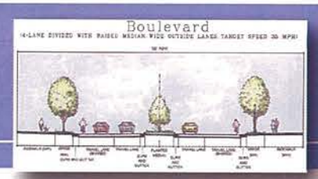


Alternative B

Alternative B is intended to provide another north-south connection to relieve the already over-congested NC 5 and NC 211 corridors. The termini of this alternative are NC 211 to the north and US 1 to the south. The northern terminus intersects NC 211 near Pine Valley Lane. From NC 211, the alternative alignment skirts the Pinewild subdivision on new location, running north-south for approximately two miles, until reaching Bowman Road. The proposed alternative follows approximately three-quarters of a mile along the existing Bowman Road. From Bowman Road, the alternative alignment continues for approximately 4.25 miles on new location through a mixture of farm, developed, and undeveloped land.

The alternative alignment crosses Roseland Road using approximately a quarter mile of existing alignment along Roseland Road. The remainder of this alternative extends for approximately 1.75 miles on new location between Roseland Road and US 1. The alternative alignment continues through a mixture of developed and undeveloped land. The intersection with US 1 occurs just west of Windy Hill Road.

Major observations with Alternative B include:

- Minimal potential residential impacts
- Shortest total roadway length (9 miles total; approximately 1 mile on existing roadway, 8 miles on new location)
- Provides moderate congestion relief to NC 211 and NC 5
- Some potential impacts to red-cockaded woodpecker habitats

Alternative C

Alternative C is intended to provide an alternative connection between NC 211 and US 15/US 501 to relieve congestion on NC 5 through the study area. The NC 211 terminus occurs to the east of Pine Valley Lane. Much like Alternative B, this alternative skirts the Pinewild subdivision. The entire length of this corridor occurs on new location, through both developed and undeveloped land. The alternative runs north-south between NC 211 and Foxfire Road, at which point it begins to run eastward, remaining close to the residential areas of the Village – ultimately providing additional access points for the large number of trips generated by these local developments.

The alternative alignment crosses NC 5 south of Landfill Road. Due to the proximity of the railroad corridor to NC 5, this crossing most likely will require a grade separation. The remainder of this corridor runs south of the new Pinehurst #9 golf course, which is currently in the planning stage. The alternative alignment continues east, gradually turning northward to connect to a commercial area near US 15/US 501. A stub-out at Commerce Avenue could potentially connect this alternative to US 15/US 501 at an existing intersection.

Major observations with Alternative C include:

- Minimal potential residential impacts
- Shortest total roadway length (approximately 9 miles on new location)
- Provides highest level of congestion relief to NC 211 and NC 5 of all four alternatives
- Some potential impacts to red-cockaded woodpecker habitats
- Some potential impacts to existing landfill
- Potential impacts to existing development between NC 5 and US 15

Cultural/ Community

This category indicates the presence of community services, cultural resources, and institutions—including schools, churches, parks, protected lands, and historic areas. The impacts to these types of community resources often reflect proximity to the resource or when right-of-way is required from these sites. In the most extreme cases, buildings may be directly impacted. Specific features in this category include:

- Schools
- Hospitals
- Churches/cemeteries
- Park properties
- Historic resources
- Existing dwelling units

Environmental Justice

Environmental justice considerations at the systems planning level typically involve the analysis of available demographic data from the U.S. Census. When reviewing the potential alternatives, it is important to consider not only specific project impacts, but also the distribution of projects and transportation investments throughout the study area. The review of environmental justice factors seeks to minimize the disproportionate impacts to minority and low-income groups. For the purposes of this screening exercise, projects were evaluated for their relative impacts to minority, Hispanic, and low-income populations.

Mobility and Implementation

As the alternatives are evaluated against each other, we must account for the relative benefits as well as the difficulties that may be encountered during implementation and construction. For this reason, the relative mobility benefits and constructability difficulties have been included in this evaluation. This is one of the first steps in understanding the expected ratio between costs and benefits. While this evaluation is not intended as a quantitative assessment of specific benefits and project costs, providing this information allows the selection of an alternative that has a realistic chance of being implemented.

Constructability

For the purposes of this evaluation, constructability was considered to ascertain the difficulties associated with project permitting, right-of-way acquisition, and traffic control. Alternatives with challenging constructability issues may be more costly due to impacts on design and delays associated with maintaining traffic flow during construction. An example of an alternative with minor constructability issues would be a road widening project where sufficient right-of-way exists and few sensitive areas are affected. Conversely, an example of a major constructability challenge would be an alternative that encroaches on an environmentally sensitive area where limited crossing opportunities exist and requires an elevated structure to minimize impacts to the environmental area. The following guidelines were used to rate impacts in this screening process:

Minor Constructability Impacts

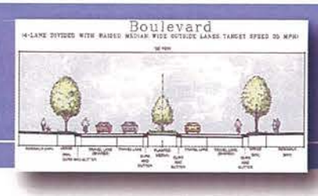
- Road widening where little or no right-of-way is required and few sensitive environmental features are present. Traffic can be maintained during construction along the existing facility.
- New alignment located outside of sensitive areas where few impacts to the built environment are expected.

Moderate Constructability Impacts

- Road widening where some sensitive areas are impacted. Traffic can still be maintained but there may be disruptions along links in the corridor. Environmental permitting may impact the project schedule.
- New alignment that traverses through a sensitive area but where no changes in typical design are required. Environmental permitting may impact the project schedule.

Major Constructability Impacts

- Road widening that traverses sensitive environment areas for significant length where atypical designs are required and/or significant environmental permitting process is expected. Creative designs and traffic control may be necessary for implementation.
- New alignment with multiple environmental impacts and/or structures. Creative design solutions and significant permitting may be required.



Travel Demand (Mobility) Benefits

The assessment of mobility benefits was considered during the evaluation process. While all of the previous evaluation criteria relate to a project's potential impacts, this category seeks to qualify the relative travel benefits associated with implementing the project. The Southern Moore County Urban TransCAD model was employed to determine how each alternative impacts traffic mobility and congestion to adjacent corridors. The evaluation matrix considers these benefits using a rating system as defined below:

Category	Expected Level of Benefit
***	Provides a low level of congestion relief to roadway system
**	Provides a moderate level of congestion relief to roadway system
*	Provides a high level of congestion relief to roadway system

Evaluation Matrix Results

Using the environmental, cultural, environmental justice, constructability impacts, and the travel demand benefits information, a total score was developed for each alternative. The total score attributed to each alternative is based on both objective and subjective criteria, and was calculated based on "weighted values" identified by the Advisory Committee members. The scoring process was based on the following steps.

Step 1: Advisory Committee used to identify "weighted values" for evaluation criteria.

Traffic Demand Benefits (Mobility)	26 points
Constructability	18 points
Environmental Justice	8 points
Cultural/Community Features	29 points
Environmental/Natural Features	19 points
Total Points	100

Step 2: Converted "level of impact values" for constructability, environmental justice, cultural/community features, environmental/natural features to point values (total potential points 74).

The lower the impact of the project, the higher score it received.

Step 3: Developed traffic demand benefits based on the following criteria.

- Relief of future congestion on NC 211, NC 5, and surrounding roadway network
- Total volume of traffic carried on proposed alternative

The results of the of the evaluation matrix analysis are provided in Table 3.1.

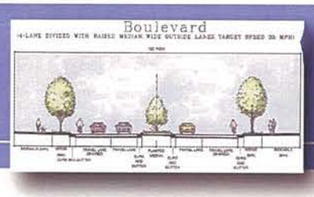


Table 3.1 – Alternative Evaluation Matrix

		ENVIRONMENTAL / NATURAL FEATURES				CULTURAL / COMMUNITY					ENVIRONMENTAL JUSTICE			MOBILITY AND IMPLEMENTATION		Total Score
Alternative	Limits / Description	Wetlands/Stream Crossings	Natural Heritage Occurrence	Natural/Planted Pine Areas	Hazardous Waste Sites/ Landfill	Schools/Hospitals	Churches / Cemeteries	Park Properties	Historic Resources	Dwelling Units	Minority	Hispanic	Low Income	Constructability	Travel Demand Benefits	
A	NC 211 to US 1 - Utilize existing alignment	***	**	**			**		*	***	***	***	***	***	C	46
B	NC 211 to US 1 - Provide alternative north-south connection	**	***	*						*	*	*	*	**	B	77
C	NC 211 to US 15/US 501 - Parallel route to NC 5	***	***	*	**			*	*	*	*	*	*	**	A	76
D	NC 211 to US 1 - Utilize existing alignment	**	**	**						***	***	***	***	***	B	57

General Notes:

(1) Qualitative screening only. Observations were made by overlaying potential alignments on map with environmental and community resource information. Limited field review was conducted.

(2) General "rules of thumb" were followed (see "Key" examples below) to assess potential impacts to environmental issues.

Environmental Justice Notes:

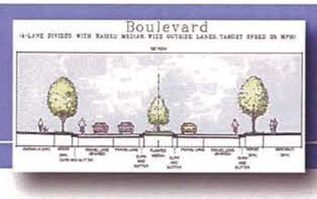
(3) Not intended to determine impacts, only to identify those communities in proximity to proposed alternatives. A much more detailed analysis including a field survey will need to be undertaken to determine specific community impacts when preferred alternative is selected.

(4) Environmental justice impacts are directly related to the estimated number of impacted dwelling units combined with culturally sensitive zones

KEY Example Impacts			
	*	Minor	Minimal stream/wetland crossing, minimal environmental impacts along existing location, historic properties adjacent to corridor, minimal residential impacts
	**	Moderate	Large area wetland crossing on existing location, multiple stream crossings on existing location, <10 residences impacted, major environmental impacts along existing location
	***	Major	Large area wetland crossing on new location, muliple stream crossings on new location, >10 residences impacted, major environmental impacts on new location

KEY Constructability Impacts			
	*	Minor	**Existing alignment**: minimal right-of-way acquisition, minimal environmental impacts, maintain traffic flow; **New Location**: outside sensitive areas, few impacts to built environment
	**	Moderate	**Existing alignment**: some environmental impacts, slightly disturbed traffic flow, some permitting required; **New Location**: some sensitive impacts, typical design, some permitting
	***	Major	**Existing alignment**: significant sensitive impacts, creative design, significant permitting; **New Location**: multiple environmental/structural impacts, creative design, significant permitting

KEY Travel Demand Benefits		
	C	Provides a low level of congestion relief to roadway system
	B	Provides a moderate level of congestion relief to roadway system
	A	Provides a high level of congestion relief to roadway system



Chapter 4 —Preferred Alternative

Following an analysis of the alternatives, the Village staff used the results to choose the preferred alternative. This decision was based on numerous factors, including the results of evaluation matrix, which took into account potential environmental and social impacts, as well as congestion reduction benefits. Additionally, the Village staff analyzed how each alternative would best benefit the transportation needs of not only the Village community, but also western and southern Moore County. The following chapter presents the basis for the selection of the preferred alternative, the roadway design criteria utilized, and the probable cost estimate.

Selection of Preferred Alternative

Alternatives B and C scored highest based on discussions with the Advisory Committee, as well as the results of the alternative analysis and the evaluation matrix. The results of the evaluation matrix (see **Table 4.1**) show a very small difference in the scores between these two alternatives. The scores of these two alternatives are much higher than those for Alternatives A and D. The difference in the scores is based on a couple of factors, including:

- Both alternatives minimize potential residential and commercial takings.
- Alternative B has slightly fewer potential wetland impacts.
- Alternative C skirts the extents of the landfill, which is viewed as a minor potential impact.
- Alternative C has the highest travel demand benefits of all four alignment alternatives.

Using these results, the Village staff selected a combination of these two alternatives to best maximize travel demand benefits, minimize the potential impacts and meet the transportation needs of the Village community. The proposed alignment utilizes 2.3 miles of existing alignment, and has 8.1 miles of new alignment, for a total of 10.4 miles. The alignment can be seen in **Figures 4.1 to 4.7**.

The preferred alternative begins at NC 211, just east of Pine Valley Lane. The roadway travels south on new alignment, following the edge of the Pinewild subdivision, until reaching Chicken Plant Road. From here the roadway uses the existing alignment along Bowman Road until reaching Foxfire Road. The roadway then travels southeast towards Linden Road on new alignment, until reaching the intersection of Linden Road and Sandy Woods Farm Road.

From here the roadway utilizes the existing alignment of Linden Road until breaking away at Ashley Lane, towards Landfill Road. The preferred alternative will require a realigned entrance point onto Landfill Road and a realigned connection at Linden Road to maintain connections with NC 5. The preferred alternative then follows new alignment, crossing NC 5 at a grade separation, and paralleling NC 5 until turning northwest after Fields Drive. From here the roadway continues to travel northwest on new alignment until reaching the existing Commerce Avenue, where it makes use of that short portion of existing alignment to reach US 15-501.

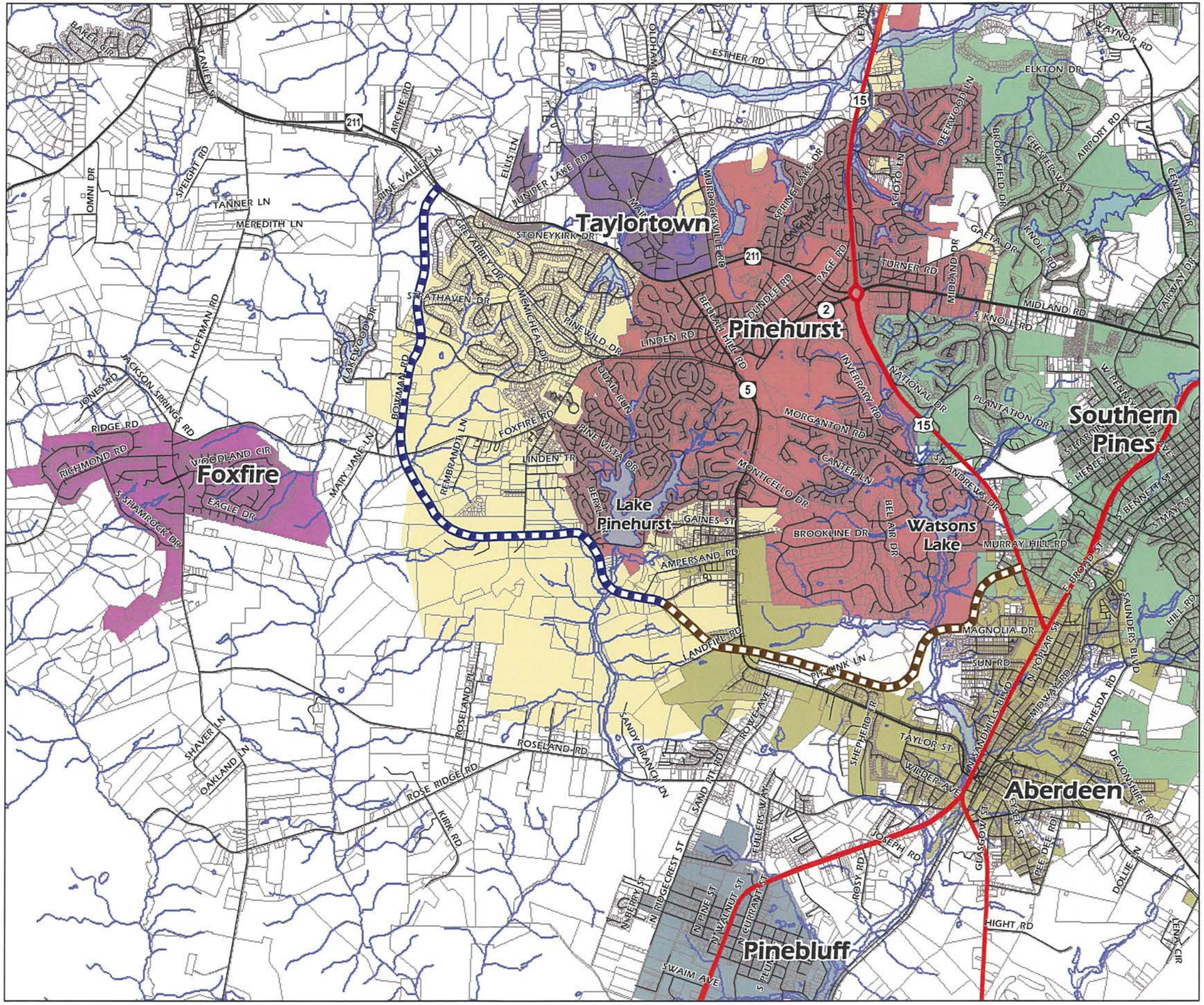
Roadway Design Criteria

For design purposes, the proposed Western Connector should be classified functionally as an arterial. As a connection between NC 211, NC 5, and US 15-501, the Western Connector is intended to enhance access and mobility for the Pinehurst area. Arterials typically provide high mobility, operate at higher speeds (45 mph and above), provide significant roadway capacity, have a greater degree of access control, and serve longer distances. Arterials include facilities with full access control such as freeways and expressways, as well as boulevards and major thoroughfares.

The following categories detail the design criteria for the Western Connector. This information is summarized in **Table 4.1**, which is located at the end of this chapter. Typical sections for the proposed Western Connector, as well as major side streets such as NC 5, follow **Table 4.1**.

Village of Pinehurst Western Connector Corridor Study

Figure 4.1 - Proposed Alignment



Preferred Alternative Phasing

- Short- to Mid-Term
- Long-Term
- US Highways
- State Highways
- Local Streets
- Railroad
- Bodies of Water
- Streams/Rivers
- Extra Territorial Jurisdiction
- Aberdeen
- Foxfire
- Pine Bluff
- Pinehurst
- Southern Pines
- Taylortown
- Parcels

Linking Pinehurst:
Preserving our History while Planning for our Future

0 1 Miles

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N W E S

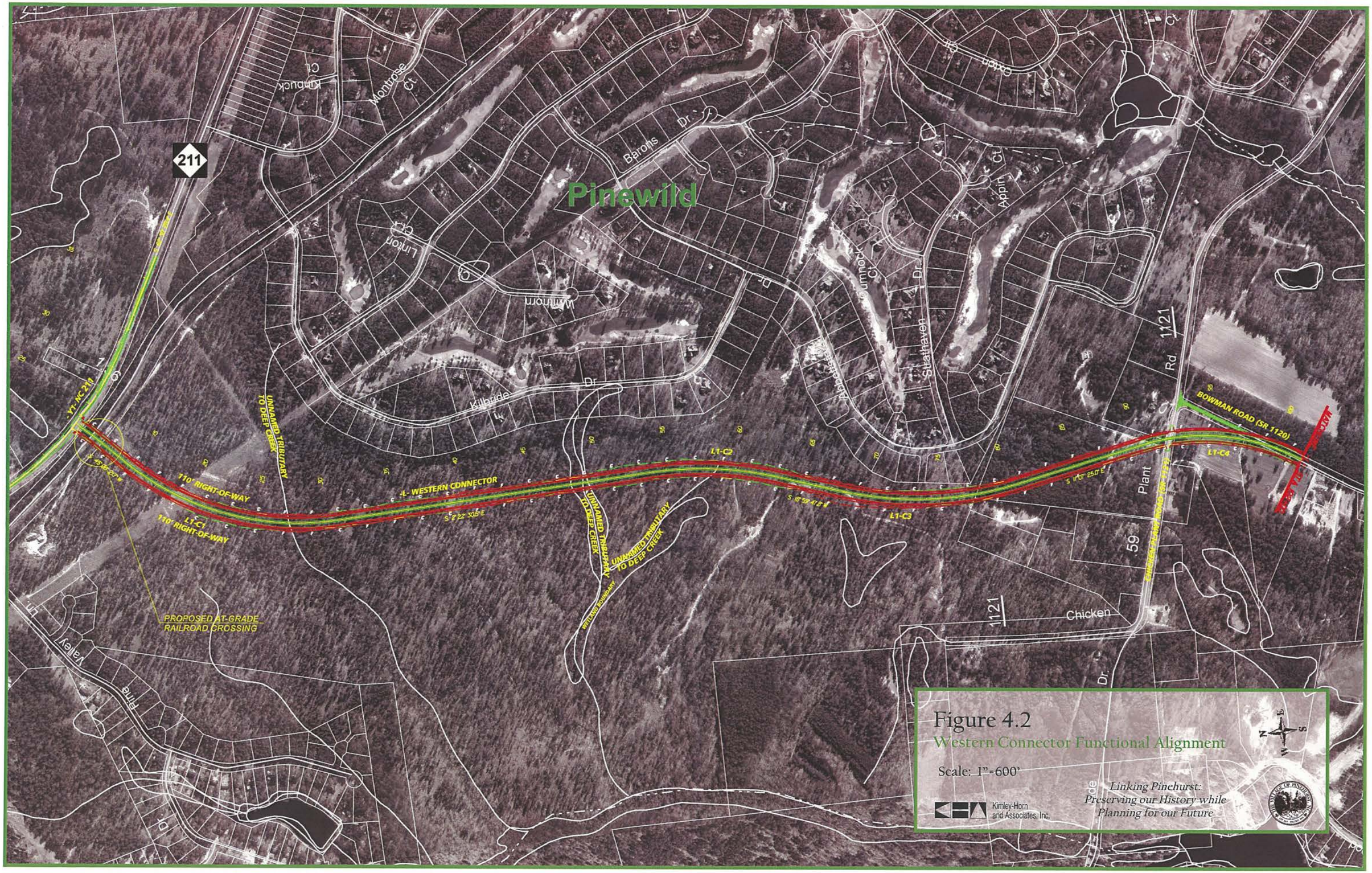
Pinewild
211
Kimbuck Ct
Montrose Ct
Barons Dr
Linton Ct
Linton
Killbride Dr
Dr
Appin Ct
Strathaven Dr
Rd 1121
BOWMAN ROAD (SR 1120)
L1-C2
L1-C4
L1-C3
L1-C1
110' RIGHT-OF-WAY
-L- WESTERN CONNECTOR
UNNAMED TRIBUTARY TO DEEP CREEK
WETLAND BOUNDARY
PROPOSED AT-GRADE RAILROAD CROSSING
Valley
Plant
59
1121
Chicken
Dr.
Figure 4.2
Western Connector Functional Alignment
Scale: 1"=600'
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Figure 4.3
Western Connector Functional Alignment

Scale: 1"=600'

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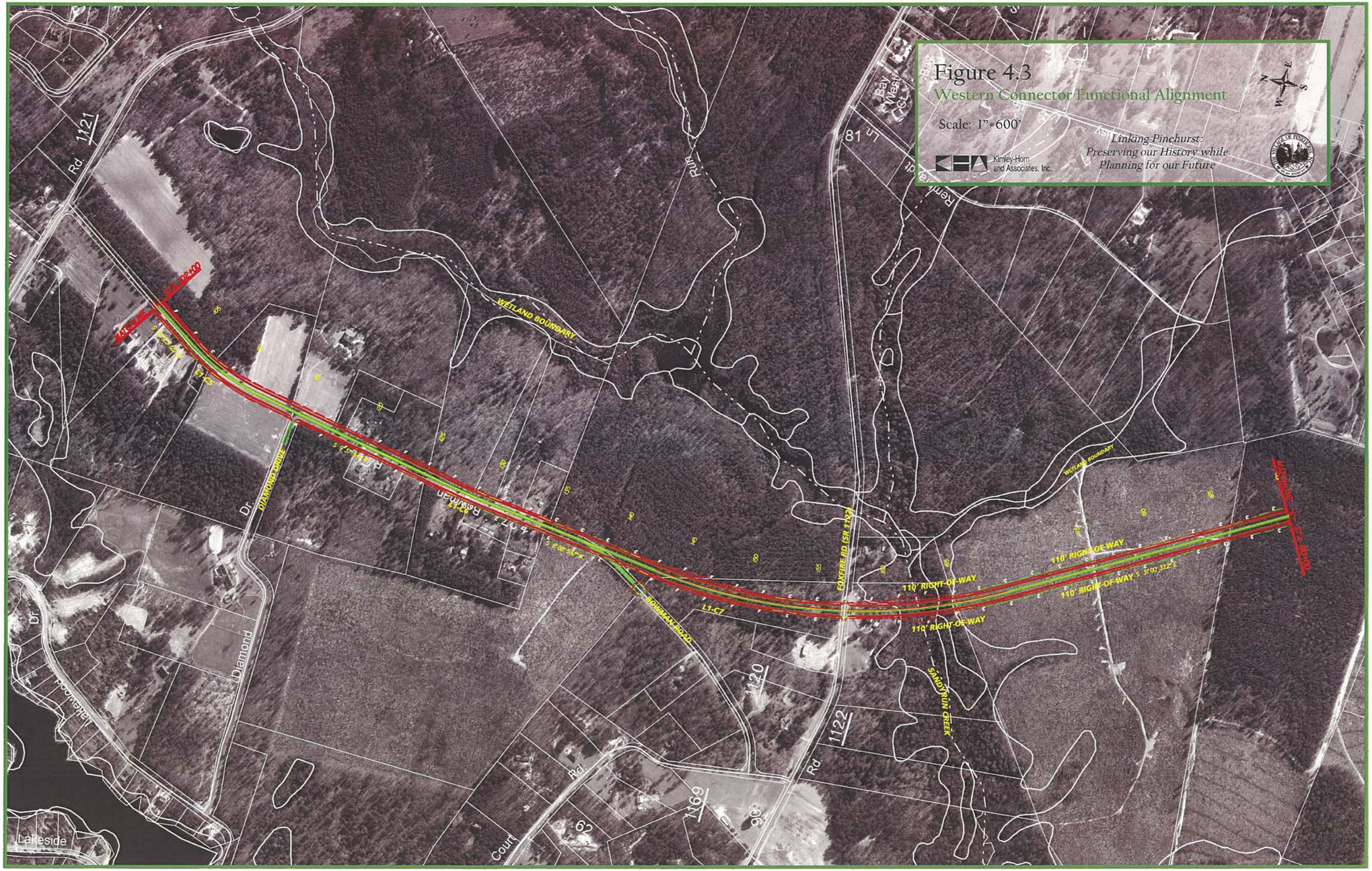

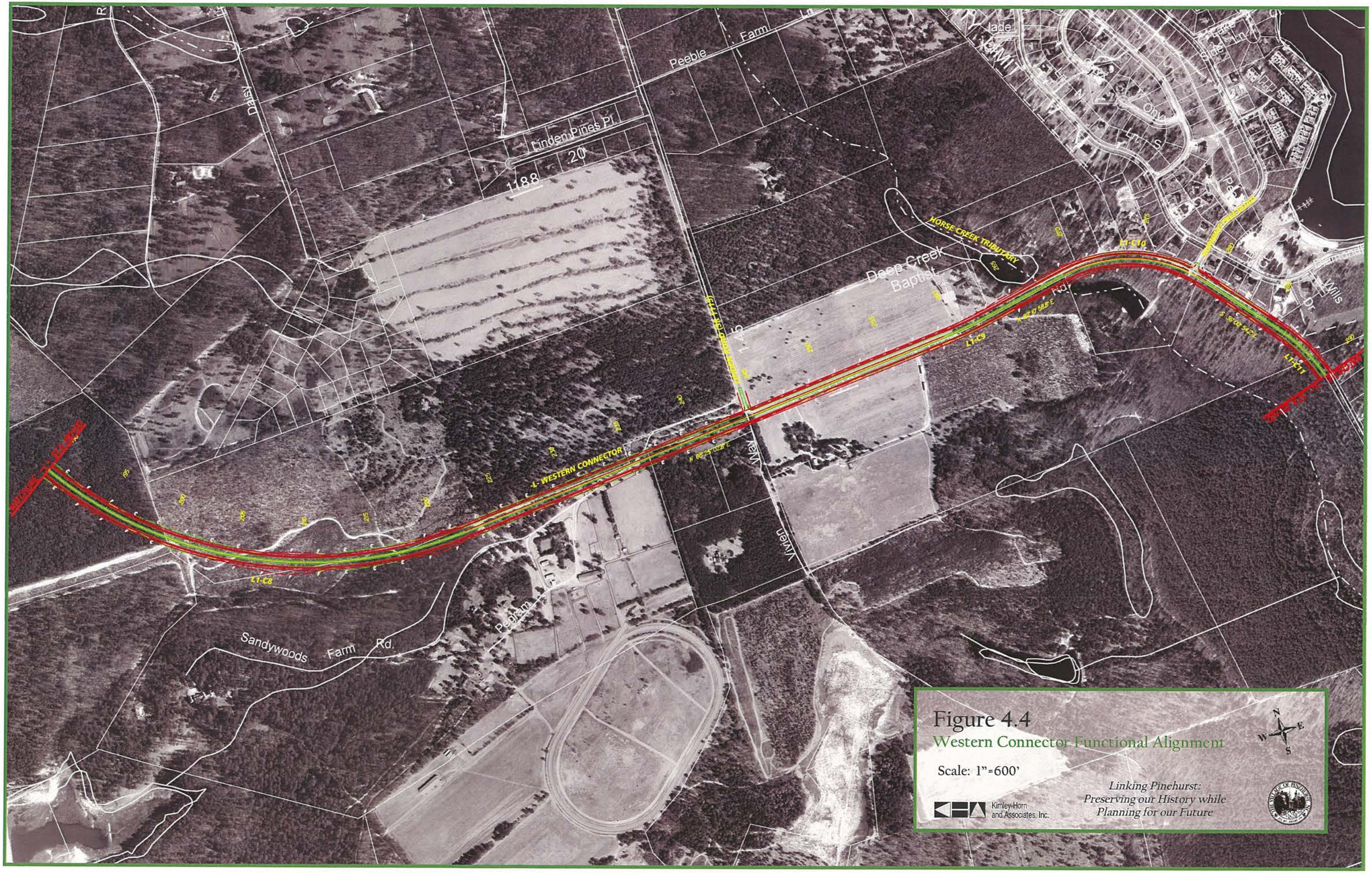
Daisy
Peeble
Farm
Linden Pines Pl
20'
1188
Deep Creek
Baptist
HORSE CREEK TRIBUTARY
L1-C10
L1-C9
L1-C11
L1-WESTERN CONNECTOR
L1-C8
Sandywoods Farm Rd.
Peg Dr
Vwan
Wils
Dr.
Figure 4.4
Western Connector Functional Alignment
Scale: 1"=600'
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Figure 4.5

Western Connector Functional Alignment

Scale: 1"=600'

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Landfill


Pit Golf Course
Aberdeen Golf
L1-C16
WESTERN CONNECTOR
L1-C17
110' RIGHT-OF-WAY
Aberdeen
Aberdeen
CITY LIMIT
Aberdeen
CITY LIMIT
Aberdeen
CITY LIMIT
Jordan Pl.
Allison Pl.
Cedar Ln.
Figure 4.6
Western Connector Functional Alignment
Scale: 1"=600'
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Figure 4.7
Western Connector Functional Alignment

Scale: 1"=600'

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Linking Pinehurst: Preserving our History while Planning for our Future

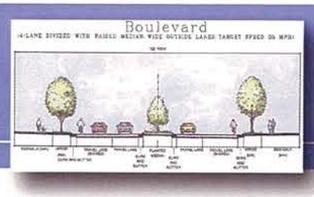
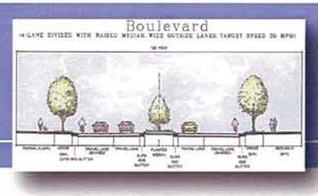


Table 4.1 – Proposed Design Criteria

	Western Connector (NC 211 to NC 5)	Western Connector (NC 5 to US 15-501)	Existing NC 211 Improvements	Various SR Routes	Reference or Note
General					
Classification	Arterial	Arterial	Arterial	Arterial	NCDOT p. 1-1A
Terrain Type	Level	Level	Level	Level	NCDOT p. 1-1D
Design Speed (mph)	50	40	60	50	NCDOT p. 1-1B
Posted Speed (mph)	45	35	55	45	
Proposed Right-of-Way Width	110	110	60	60	May vary
Control of Access (Y/N)	No	No	No	No	
Rumble Strips (Y/N)	No	No	No	No	
Typical Section Type	Curb & Gutter	Curb & Gutter	Shoulder	Shoulder	
Lane Width (ft)	12	12	12	12	
Sidewalks (Y/N)	Yes	Yes	No	No	
Bicycle Lanes	Optional	Optional	No	No	
Median Width (ft)	13 (plus curb & gutter)	13 (plus curb & gutter)	N/A	N/A	Accommodates 12' turn lane with 4' concrete monolithic island
Median Protection (Guardrail/Barrier)	N/A	N/A	N/A	N/A	
Shoulder/Berm Width					
Median (ft)	N/A	N/A	N/A	N/A	
Outside without Guardrail (ft)	10	10	8	8	NCDOT p. 1-4B
Outside with Guardrail (ft)	13	13	11	11	NCDOT p. 1-4B
Paved Shoulder					
Outside Total (ft)	0	0	2	0	
Median Total (ft)	0	0	0	0	
Grade					
Maximum (%)	6	7	5	5	AASHTO p. 382/472
Minimum (%)	0.3	0.3	0.3	0.3	AASHTO p.236
K Value					
Sag	96	64	136	136	AASHTO p. 277/381
Crest	84	44	151	151	AASHTO p. 272/381
Horizontal Alignment					
Maximum Superelevation (%)	6	6	8	8	NCDOT 1-15
Minimum Radius (ft)	833	485	1200	1200	AASHTO p. 147
Spiral (Y/N)	No	No	No	No	
Cross Slopes					
Pavement (%)	2	2	2	2	NCDOT 1-3B
Paved Shoulder (%)	N/A	N/A	2	N/A	
Turf Shoulder/Berm (%)	2	2	8	8	NCDOT Std. Dwg. 560.01
Median Ditch (%)	N/A	N/A	N/A	N/A	



Design Speed

The design speed of a rural arterial such as the Western Connector typically is 40 to 75 mph. The midrange (50 to 60 mph) is normal for the flat terrain found in the study area. The design speed should be at least 5 mph above the anticipated posted speed. For safety, mobility, and efficiency, the highest possible design speed should be used. However, an overly high design speed will create driver comfort levels that promote higher speeds and aggressive driving. Based on the desired posted speed limits and the design speed range suggested by AASHTO and NCDOT, the design speed for the Connector should be 50 mph between NC 211 and NC 5 and 40 mph between NC 5 and US 15-501. Posted speed limits of 45 and 35 mph are desired for the respective segments. These speeds should conform to the natural topography, provide a safe driving environment, and discourage aggressive driving.

Sight Distance

Sight distance relates directly to the design speed of the roadway. Stopping distance is the distance required for a motorist traveling at the design speed to stop before reaching a stationary object in its path. At a design speed of 50 mph, a minimum of 425 feet is needed for stopping sight distance. The section of the Western Connector between NC 211 and NC 5 should have at least this much unobstructed sight distance, especially approaching horizontal curvature and at-grade intersections. At a design speed of 40 mph, a minimum of 305 feet is needed for stopping sight distance. The section of the Western Connector between NC 5 and US 15-501 should have at least this much unobstructed sight distance, especially approaching horizontal curvature and at-grade intersections.

Access Management

Compared to other facility types, arterials are designed to operate more efficiently, which can be obtained through partial control of access. The rate of access directly affects both traffic safety and flow. The Western Connector will support partial control of access, restricting access to select public roadways and few private driveways. The Village staff should review and revise the Pinehurst Development Ordinance and the Engineering Standards Manual on a routine basis to reflect the most appropriate access management techniques.

Grades

The length and steepness of grades on the alignment affect the operational characteristics of the facility and should be carefully considered to maintain uniform operation throughout the facility. Based on a design speed of 50 mph, the maximum grade for an arterial on level terrain should be 6 percent. For a design speed of 40 mph, the maximum grade for an arterial on level terrain should be 7 percent. However, when considering stopping sight distance for vertical curvature, the maximum grade should be used only in situations where absolutely necessary.

On curbed roadways such as the Western Connector, AASHTO recommends minimum grades of 3 percent to 5 percent provided sufficient longitudinal grade allows surface drainage. AASHTO also encourages special attention for the design and spacing of storm water inlets to maintain acceptable spread of water on the roadway. The recommended minimum grade for the Western Connector is 3 percent.

Superelevation

Several factors control maximum superelevation including climate conditions, terrain conditions, area type, and frequency of slow moving vehicles. In general, no single superelevation rate is applicable over the entire facility, because variations in the factors listed above will require a departure from the standard. Each horizontal curve will require unique superelevation rates to satisfy AASHTO recommendations for safety and driver comfort. With this in mind, a 6% maximum superelevation should be used for the design of the Western Connector.

Minimum Radius of Curvature

By considering the design speed and maximum superelevation of the Western Connector, the minimum radius of curvature should be 833 ft between NC 211 and NC 5, and 485 feet between NC 5 and US 15-501. However, like the maximum grade, the minimum radius of curvature should be used only in situations where absolutely necessary. Although a minimum radius of curvature is established, larger radii should be used when possible to ensure the highest level of safety and driver comfort.

Cross Slope

A cross slope of the pavement ensures proper roadway drainage. For a multi-lane facility, the roadway is either crowned at the centerline or sloped in one direction. A cross slope of 2 percent is recommended both for the paved area of the Western Connector and the grass shoulder area.

Lane Widths

The lane width of the Western Connector will influence safety and driver comfort as well as the roadway's level of service. To ensure the Western Connector fulfills its intended purpose of enhancing access and mobility without comprising driver safety, 12-foot-wide travel lanes should be provided.

Horizontal Clearance to Obstructions

A clear, unobstructed roadway is highly desirable to promote a safe driving environment. No trees more than 4 inches in diameter should be within the clear recovery zone. The clear recovery zone is defined as the unobstructed, traversable area provided beyond the edge if the through traveled way for the recovery of errant vehicles.

On curbed sections of roadway, a clear roadside is often impractical. In situations such as these, objects should be set back at least 1.5 feet from the curb face. All utility poles should be placed outside the clear zone as described in the *2002 Roadside Design Guide*.

Medians

The width of the median of a divided facility is dependent upon the terrain and available right-of-way of the section. While medians as narrow as 4 feet may be used, such a narrow median is strongly discouraged. The median should be plantable with street trees having an appropriate diameter based on NCDOT's design standards for clear recovery zones.

In general, a median width of 12 to 30 feet provides adequate separation as well as left turn vehicle storage at intersections. The width of the median may vary along the Western Connector corridor, but when possible it should be consistent. For the purposes of the Western Connector, a 13-foot median with appropriate curb and gutter is recommended.

Shoulder Type

The type of shoulder influences driver behavior and can improve the safety and utility of a roadway. According to AASHTO, curb and gutter controls drainage, delineates the roadway edge, reduces right-of-way requirements, improves aesthetics, enhances pedestrian safety, and lowers maintenance costs. Vertical curbs are recommended for the lateral edge of the Connector, and the combined width of the curb and gutter is expected to be 2 feet. One-foot sloping curbs will transition the landscaped median to the roadway.

Sidewalks

The Western Connector is intended to balance the needs of motorized and non-motorized travel. Sidewalks constructed within the right-of-way at an acceptable distance from travel lanes can serve the dual purpose of calming traffic and enhancing the safety of pedestrians. Five-foot sidewalks on both sides of the Western Connector are recommended. A 3-foot grass verge should separate the sidewalk from the roadway.

Cross-Section and Right-of-Way

The appropriate cross-section should balance all aspects of the typical section while meeting the minimum spacing requirements presented in the previous sections. Based on the projected travel volumes, the Western Connector ultimately should be built as a 4-lane divided boulevard. While the cross section may vary throughout the corridor, a consistent and uniform cross-section should be provided when possible. **Figures 4.8 to 4.10** illustrate the proposed typical sections for the proposed facility, as well as typical sections for the improvements to NC 211 and other adjacent side streets, based on the standards and specifications obtained from the *2004 AASHTO Policy on Geometric Design of Highways and Streets* and the *NCDOT Roadway Design Manual*.

Based on the design elements presented in this section, the total travel way width for the section is 70 feet from curb face to curb face. This width takes into account travel lanes, median, and curb and gutter. Outside of the travel way, the overall roadway right-of-way width is proposed to be 110 feet. This will include the travel way, the shoulder section (which includes verge and sidewalk), and the clear area beyond. 110 feet is proposed in order to meet changing NCDOT median spacing requirements, as well as to leave room for guardrail in locations that will require shielding.

4 lane roadway with sidewalk and median

Figure 4.8: Western Connector Typical Section

Posted Speed Limit = 45 mph (NC 211 to NC 5); 35 mph (NC 5 to US 15-501)

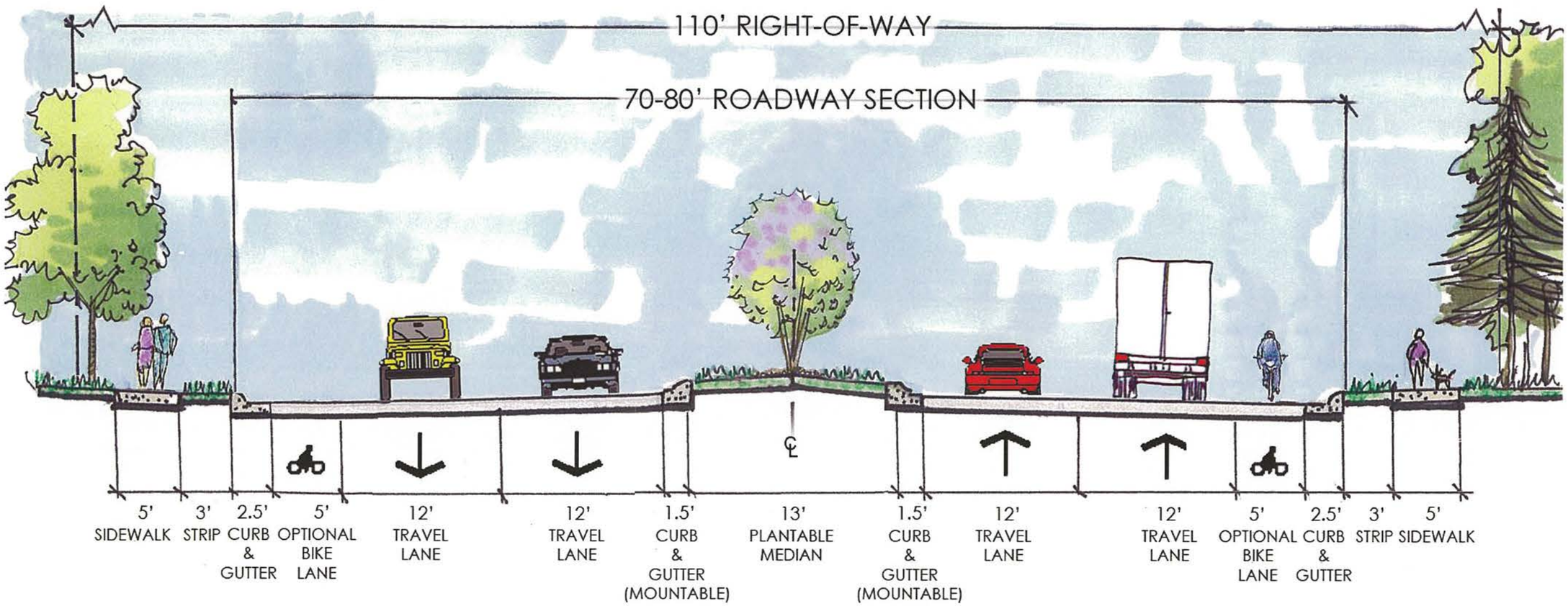


Figure 4.9: Existing NC 211 Improvements Typical Section

Posted Speed Limit = 55 mph

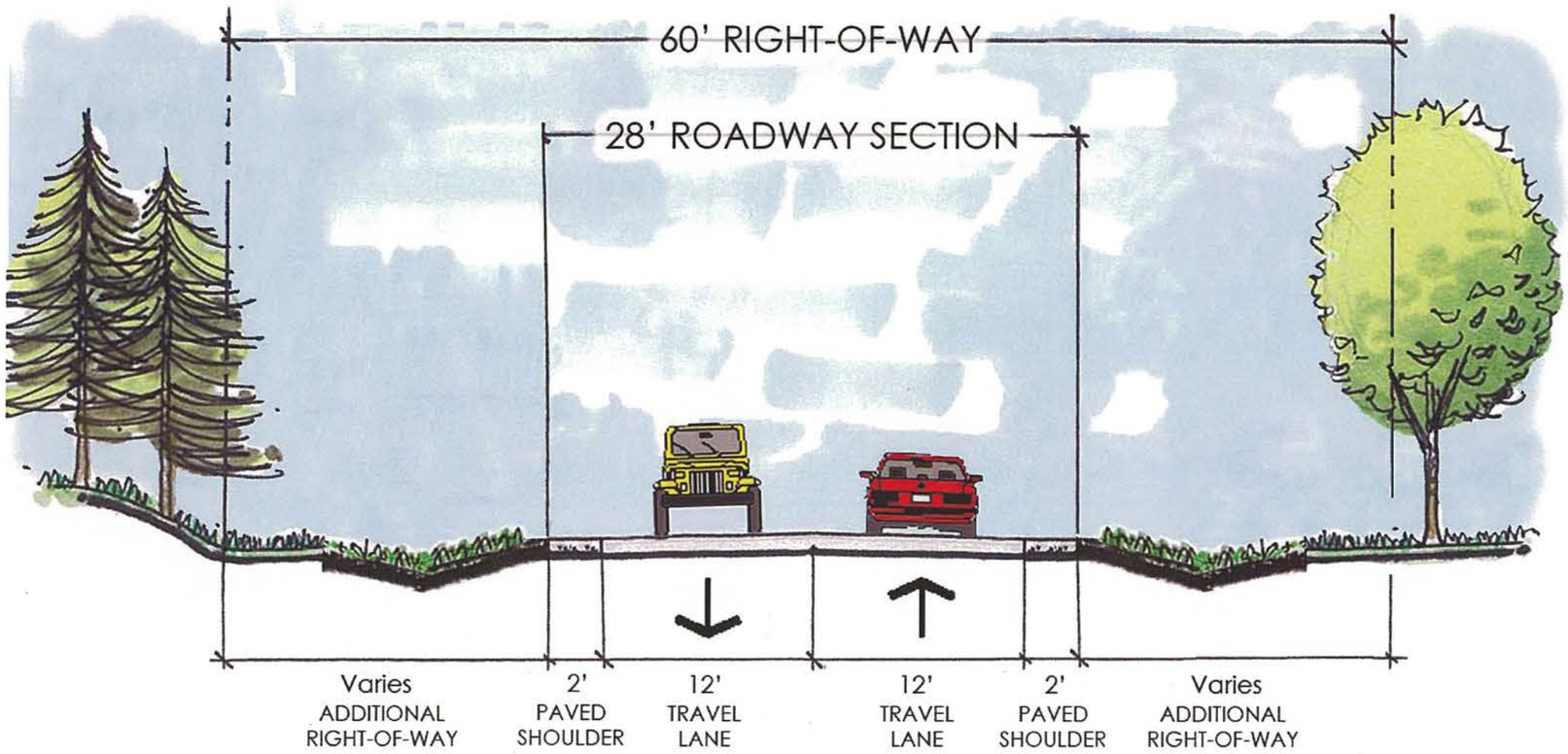
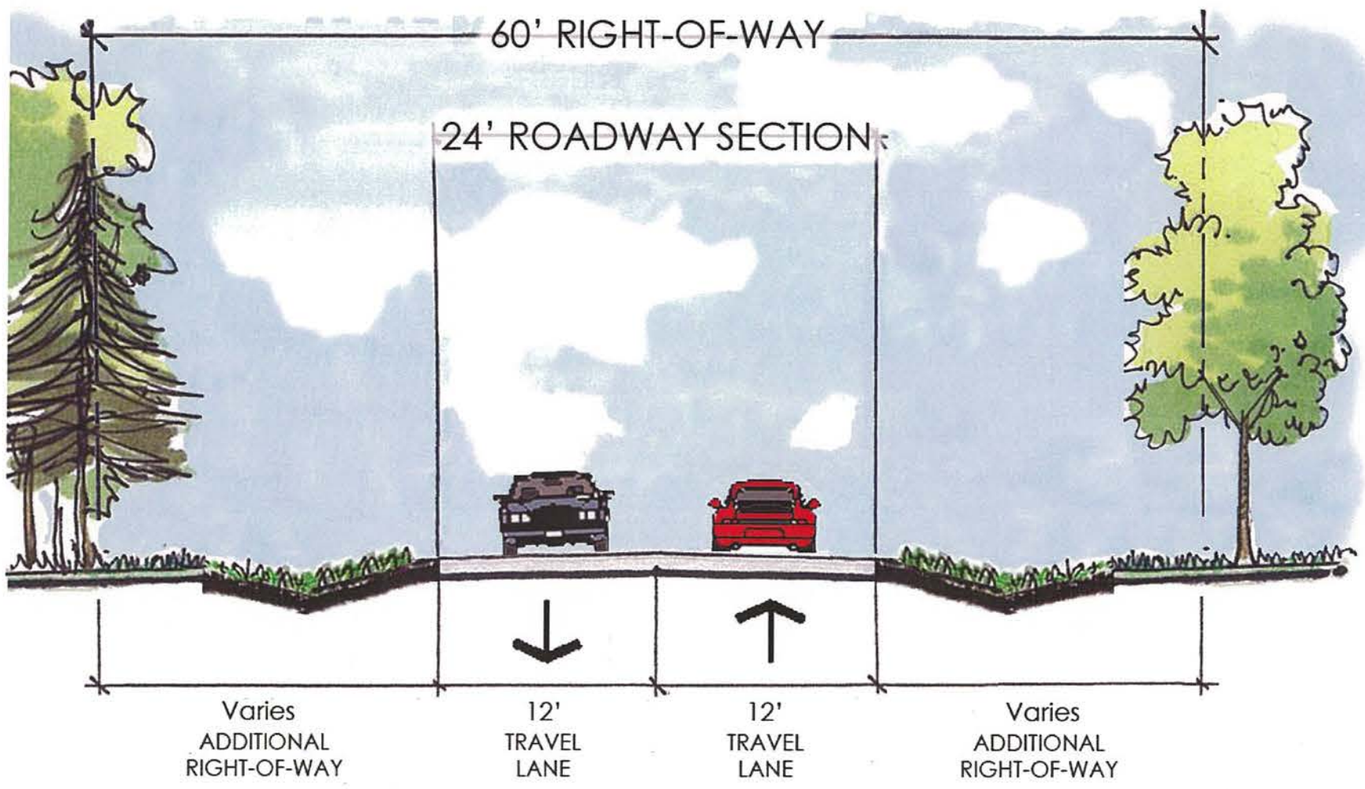
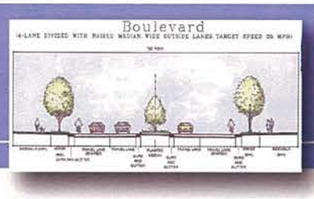


Figure 4.10: Various State Routes Typical Section

Posted Speed Limit = 55 mph





Probable Construction/Right-of-Way Cost Estimate

Based on the conceptual design provided in **Figures 4.2 to 4.7**, the probable construction cost of the facility is approximately $68,700,000. This cost estimate was derived from estimated quantities and 2007 NCDOT average unit costs. This estimated cost does not include the following costs:

- Environmental documentation or mitigation
- Utility installation or relocation costs
- Signal costs

The quantities included in the estimate include clearing and grubbing, excavation, grading, widening existing pavement, pavement on new location, resurfacing existing pavement, subgrade stabilization, curb and gutter, sidewalk, erosion control, modified railroad crossings, traffic control, thermodynamic pavement markings, and structures (including a new grade separation and three culverts). **Table 4.2** provides a breakdown of these items, the quantities estimated, and the overall projected cost.

Right-of-way (ROW) costs for the entire 10.4-mile corridor are estimated to be $8,440,000. *Please Note: The best available information was used to develop this estimate. Right-of-way estimates are based solely on current (2008) Moore County Tax Assessment Values. It is understood that property values could and most likely will increase as development occurs and the cost of land escalates.*

This ROW estimate was calculated using the total acreage of right-of-way acquisition (approximately 124 acres) and the average tax value cost per acre for five segments of the corridor ($68,300 per acre). An additional 100% property impact assessment was included in the average cost to arrive at a figure approaching $8.5 million.

Table 4.2 - Probable Construction Cost Estimate

Description	Quantity	Unit	Unit Price	Amount
Clearing and Grubbing	134	Acres	$12,000	$1,608,000
Unclassified Excavation	1,011,500	Cubic Yards	$10	$10,115,000
Fine Grading	394.000	Square Yards	$3	$1,182,000
Pavement Widening	11,700	Square Yards	$56	$655,200
New Pavement	301,100	Square Yards	$51	$15,356,100
Pavement Resurfacing	16,800	Square Yards	$10	$168,000
6" Average Asphalt Wedging	3,800	Square Yards	$18	$68,400
Subgrade Stabilization	363,400	Square Yards	$7	$2,543,800
1'-6" Concrete Curb and Gutter	111,300	Linear Feet	$15	$1,704,000
2'-6" Concrete Curb and Gutter	115,400	Linear Feet	$19	$2,192,600
4" Concrete Sidewalks (both sides)	33,100	Square Yards	$37	$1,224,700
Erosion Control	78	Acres	$7000	$546,000
New RR Signal with Gates	1	Each	$500,000	$600,000
Rubber Railroad Crossing	1	Each	$80,000	$80,000
Traffic Control	1	Lump Sum	$150,000	$150,000
Thermo and Markers	10.7	Miles	$15,000	$160,500
Structures				
New Grade Separation over NC 5	19,000	Square Feet	$130	$2,850,000
Box Culverts	324	Linear Feet	$2,200	$712,800
Misc. & Mobility (15% Str. and Util.)				$534,420
Misc. & Mobility (45% Functional)				$17,259,435
			Contract Cost	$59,710,955
			Contingency (15%)	$8,956,643
			Construction Cost	$68,700,000

Chapter 5 —Implementation

The successful implementation of the **Western Connector Corridor** improvements will depend to a great extent on the ability for local, private, and multi-jurisdictional governmental entities to collaborate to create a corridor that is functional, safe, and attractive for local citizens and regional mobility. Government agencies will be responsible for making public investments to reserve the necessary right-of-way, to construct the project, and to protect its interests along the corridor. Private investment that is healthy and sustainable is achievable through well-guided land use policies that encourage quality design while maintaining the natural environment and community character.

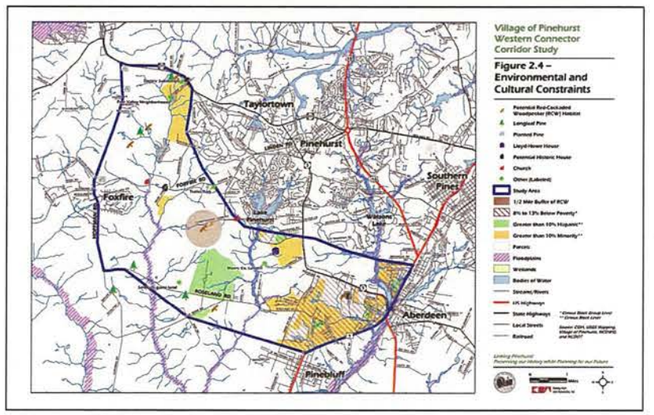
Completion of this study symbolizes an important step toward implementing quality development and aesthetic improvements along the Western Connector corridor. The nature of the recommendations does not require that all improvements are completed simultaneously. This should allow local agencies the flexibility to work in partnership with the development community to implement the vision of the plan in several phases as development occurs and funding sources become available.

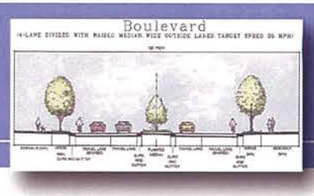
Many citizens expressed frustration during the public outreach process over the lack of funding sources and time for implementation of the proposed improvements. Unfortunately, the planning, design, and construction of publicly-funded transportation projects typically takes ten years in environmentally sensitive areas. Local, State, and private partnerships offer strategic advantages to implementing improvements on a timely basis. The purpose of this implementation plan is to recognize these challenges and suggest strategies to address each challenge. General recommendations and action strategies offered by the consultant follow.

General Recommendations

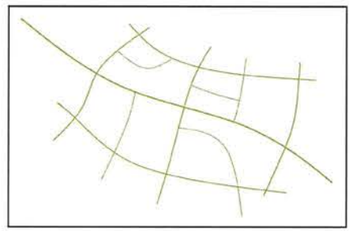
The following recommendations apply to the overall vision for the corridor as expressed by the local residents, business owners, stakeholders, and elected officials. These recommendations can be initiated throughout the planning process and prior to any physical infrastructure improvements.

- Use this plan as a tool to review proposed development projects and plans as they locate and are implemented within the corridor.
- Due to the multiple jurisdictions that the Western Connector traverses, the need exists to identify a mechanism that will allow for the consistent implementation of this proposed boulevard. It is recommended that the Village, with support from NCDOT, initiate the NC Transportation Corridor Official Map Act to allow for the protection of the Western Connector alignment.
- Physical roadway infrastructure improvements (see phased improvements) within the right-of-way will primarily be the responsibility of NCDOT. However, the phasing plan presents the opportunity for private investment towards the implementation of the Western Connector primarily through the development review process.
- Integrate future bikeways, greenway, and trail networks with the Western Connector corridor study to create an interconnected multimodal transportation network.
- Avoid and/or minimize impacts to culturally and environmentally sensitive areas to preserve community character and cultural environment.
- As the transportation corridor is improved and expanded, minimize impacts that negatively affect the character and integrity of adjacent neighborhoods by introducing gateways or traffic calming improvements.

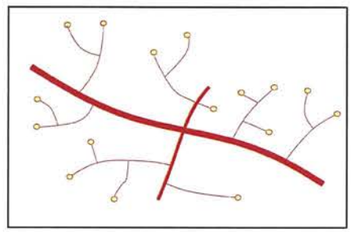




- Promote alternative modes of transportation through better minor/collector street design and developer participation.
- Promote interconnectivity and cross-access between existing and proposed developments.



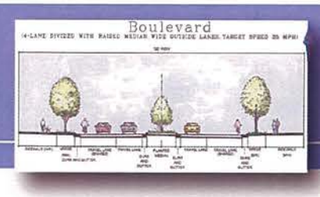
Well-connected system of streets



Limited connectivity resulting in heavy reliance on the Western Connector

- Create and adopt a ***Western Connector Corridor Overlay District Ordinance*** as a tool to help guide future development and redevelopment activities through established development standards to promote consistent development patterns along the corridor. The ordinance will provide a legal framework for the County and local municipalities to administer and enforce consistent design and development standards along the corridor. The ordinance should contain rules and requirements for the "core" components of a comprehensive development strategy, including the following design elements: building type, permitted uses, density and intensity, lot size, building placement, building frontage, signage, parking placement, landscaping, setbacks, buffers, provisions for corner clearance, joint access, and connectivity; and design requirements for building access connections. The ordinance also should require cross access between adjacent properties, shared-use driveways (if applicable), and retrofitting existing site access to the side and rear portions of the site.

Action Item	*Timeframe*	*Responsible Party*
Adopt this Plan: Pursue plan adoption by implementing agencies including Moore County, Village of Pinehurst, Town of Aberdeen, and the North Carolina Department of Transportation (NCDOT).	2008-09	Moore County, Pinehurst, Aberdeen, NCDOT
Integrate the Western Connector Alignment into the Village of Pinehurst, Town of Aberdeen, and Moore County's Transportation Plan, Comprehensive Plan, and Official Land Use Map.	2008-09	Moore County, Pinehurst, Aberdeen
The Village and participating agencies should initiate the NC Transportation Corridor Official Map Act to allow for the protection of the Western Connector alignment. This will require the preparation of a NEPA document or preliminary engineering, and an official filing of the map with NCDOT to begin right-of-way protection measures.	2008-09	Pinehurst, NCDOT
Coordinate with Moore County, Aberdeen, and Pinehurst representatives to work with existing property owners and planned development to protect, reserve, and dedicate the needed right-of-way for the Western Connector corridor.	2008-09	Moore County, Pinehurst, Aberdeen
Lobby NCDOT, Board of Transportation, and members of the State legislature to include partial funding of improvements in the next Transportation Improvement Program (TIP) to design and implement phased improvements.	2008-09	Moore County, Pinehurst
Adopt the Western Connector Corridor Overlay District Ordinance to guide development along the corridor and to promote consistent development patterns. This ordinance could include elements such as access spacing standards, cross access requirements, building type, permitted uses, density and intensity, lot size, building placement, building frontage, signage, and parking placement.	2008-09	Moore County, Pinehurst, Aberdeen
Utilize the Western Connector Advisory Committee to aid in the implementation process as necessary.	2009-10	Pinehurst
As growth occurs along the Western Connector corridor, require new development to adhere to the provisions of shared use driveways, cross-access, and new collector streets (i.e., back-door access to abutting property) ultimately providing an interconnected system of streets. In some cases, stub-outs of the new connections will be constructed to adjoin with adjacent undeveloped property. These stub-outs should be signed as "future street connection" to avoid confusion and ensure future connections.	2009-10	Moore County, Pinehurst, Aberdeen



Phased Improvements

As mentioned previously, some of the improvements will be funded and implemented using State gas tax dollars administered by the North Carolina Department of Transportation (NCDOT), while other improvements most likely will be constructed through private development initiatives. With this in mind, not all of the improvements can be made at one time. However, one thing is certain: history has shown that for every public dollar invested in our communities, the return in private investment is two-to-three-fold.

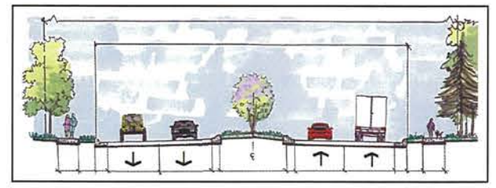
The timeframe needed for implementation was a consideration for the study area improvements. Factors that can affect the timeframe may include:

- Funding availability
- Permitting
- Development/ redevelopment activities
- Right-of-way acquisition
- Public support or opposition

The following two phases provide a timeframe of implementation. Improvements in Phase I are identified for short- to mid-term implementation (3 to 10 years). Phase II improvements are for long-term implementation (10 to 14 years). All phases of construction will require a substantial investment by the public sector (i.e., municipal and/or state governments). However, some sections of the Western Connector can be realized through private investment as a part of development plans.

Phase I – Short- to Mid-Term Improvements
(3– 10 year implementation)

Construct 4-lane section with Plantable Median from NC 211 to Linden Road — This 6.2-mile section of proposed roadway would provide for improved connectivity and mobility while enhancing the economic vitality of the region. In addition, this section would improve east-west connectivity and provide an alternative route for through traffic between NC 211 and US 15-501 (via Foxfire Road and Hoffman Road). This section would require improving the corresponding sections of Linden Road and Bowman Road to a 4-lane divided boulevard. The median should be 16 feet wide with mountable curb and gutter. Median breaks should be spaced approximately 1,200 feet apart in accordance with the NCDOT Driveway and Access manual standards. Adequate left-turn storage bays should be implemented at each median opening location to allow for safe turning vehicles. Driveway access for abutting property could be improved through shared use and cross access improvements as a part of the phased construction improvements. Bridge work will include a culvert over the Sandy Run Creek. In accordance with NC Rail Division guidelines, the proposed at-grade railroad crossing of the Aberdeen Carolina Western Railway line would potentially require the closure of two existing at-grade rail crossings. The probable construction cost is $39,200,000 (2008 dollars).



4-lane section with Plantable Median cross-section

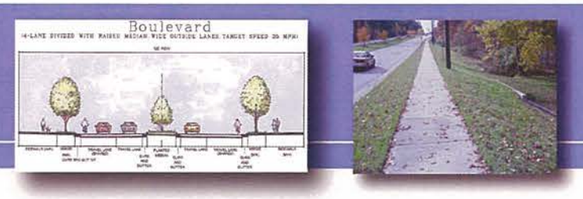
Phase II – Long-Term Improvements
(10– 14 year implementation)

Construct 4-lane section with Plantable Median from Linden Road to Commerce Avenue/US 15-501 — This 4.2-mile section of proposed roadway provides the highest utility and mobility of any section of the Western Connector. The median should be 16 feet wide with mountable curb and gutter. Median breaks should be spaced approximately 1,200 feet apart in accordance with the NCDOT Driveway and Access manual standards. Adequate left-turn storage bays should be implemented at each median opening location to allow for safe turning vehicles. Break of access should be limited to intersections, while curb-cuts should be avoided to the greatest extent possible. Bridge work will include a culvert over the Aberdeen Creek and a grade separation over the Southern Norfolk railroad and NC 5. The probable construction cost is $28,600,000 (2008 dollars).

Phased Construction Considerations

As phased improvements are planned and funding is secured, other options for expediting the construction of improvements or protecting public investment once implemented should be considered. The following considerations should be pursued aggressively to ensure implementation.

- **Private Investment** — Private contributions represent one option for implementing the Western Connector. That is, the partial construction of the Connector could be completed by private development. For major development projects located along the corridor, development requirements could include the construction of a 2-lane divided facility on 4-lane divided



right-of-way (ROW). This action could be facilitated through the site plan review process and may require public agencies to contribute to the cost of the additional ROW necessary for the future 4-lane divided facility.

- **Signal System Improvements** — As phased construction improvements are implemented, warrants for signalization will be determined as needed. To enhance the operation of a proposed signal system, signal spacing and coordination will be important. Future signals may include: Foxfire Road, NC 211, Linden Road, and the NC 5 access ramp. If warranted, new signals should be designed to architectural standards envisioned for the corridor and include mast arm poles. Probable construction cost is $450,000.
- **Collector Street and Back-Door Access** — This plan recognizes the inherent benefits of enhanced connectivity. As phased improvements are implemented and private development continues within the corridor, it will be important to protect this public investment. Local agencies should work with the development community to integrate collector street and back-door access opportunities within the site plan review process. Most of these new connections will be made through development and redevelopment projects. The probable construction costs will be determined on a case-by-case basis.

Land Use Considerations & Recommendations

Transportation systems and land use patterns tend to influence each other in a cyclical pattern. Elements of transportation – including roads, sidewalks, and bicycle facilities – can impact how land is developed in terms of type and density. Further, where land uses fall and how they are distributed inevitably impact decisions regarding where people travel and how transportation facilities are prioritized. Because of this relationship between land use planning and transportation systems, the *Western Connector Corridor Study* must include appropriate strategies that balance the impacts of existing and future land use along the preferred corridor. Existing plans, policies, and programs must be understood, while future plans, policies, and programs must preserve the mobility function of the roadway without undermining the value of adjacent land or degrading the sense of place of the Sandhills region.

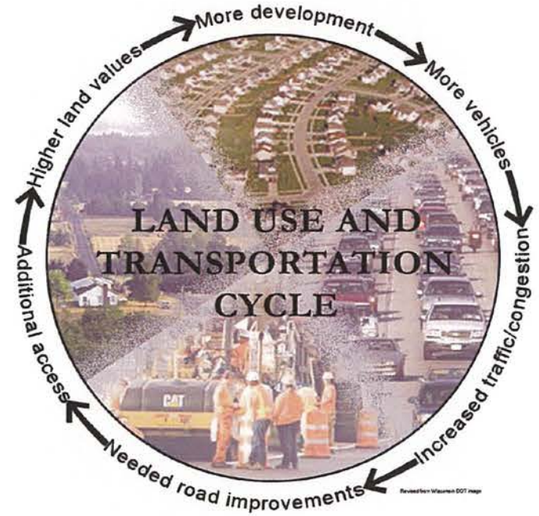
Existing Land Use Framework

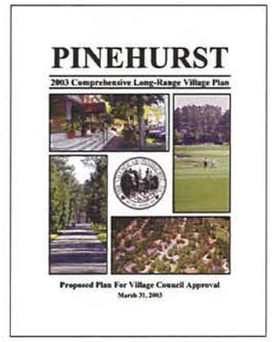
The baseline understanding of the existing land use framework was developed following a review of plans and ordinances for area jurisdictions. These documents included:

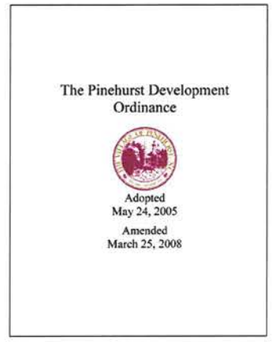
- Pinehurst Comprehensive Long-Range Village Plan
- Pinehurst Development Ordinance
- Pinehurst Engineering Standards
- Moore County Land Use Plan
- Moore County Zoning Ordinance
- Moore County Subdivision Ordinance
- Moore County Small Area Plan 'A'
- Aberdeen Zoning Ordinance
- Aberdeen Subdivision Ordinance

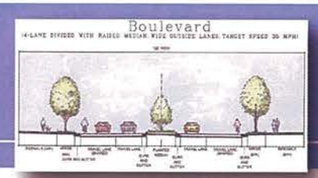
The review of the existing land use framework revealed support for the Western Connector. Likewise, several of the plans and ordinances include stipulations that will support the mobility and access goals of the Connector. For example, both the Pinehurst Comprehensive Long-Range Village Plan and the Moore County Land Use Plan support limits on driveway access to roadways such as the Western Connector. The Moore County Land Use Plan justifies limiting driveways as a way to achieve economic development and transportation goals. *These land use plans should be amended to reflect the Western Connector Alignment and vision outlined in this plan.*

Other plans have the framework in place to establish or have already established similar corridor overlay districts. However, some discrepancies exist among the current framework for corridor overlay districts provided by these local land use plans. For example, the Village of Pinehurst Development Ordinance measures the overlay districts 400 feet from the edge of the right-of-way while the Moore County Zoning Ordinance measures overlay districts 500 feet from the edge of the right-of-way. *The adoption of the Western Connector Overlay Protection Ordinance should standardize the measurement of the overlay district to measure 500 feet from the edge of right-of-way.*









One of the more significant ways the private development community will impact the implementation of the Connector is through connections to the roadway. Not surprisingly, many of the plans and ordinances deal with these connections. As an example, a key provision in the Pinehurst Development Ordinance states, "Streets shall be designed and located with regard to ***existing and proposed streets***...(pg 183)". The inclusion of existing and proposed streets in this clause safeguards the coordination of future streets along the corridor with the Connector regardless if the new streets are constructed before the Connector, provided that the alignment of the Connector exists as an adopted element of local planning documents.

Due to the critical role access provisions will play in maintaining the intended function of the Connector, some of the more significant potential barriers deal with the issues of roadway and driveway connections to the Western Connector.

Land Use Opportunities & Barriers

Various land use regulations in Moore County and local municipalities provide underlying support for the Connector and its mission. However, these regulations also include various barriers to its implementation and proper function. The following section identifies some of the more significant opportunities and barriers.

Opportunities

Several of the plans and ordinances provide measures – in their existing state –to designate or otherwise protect the right-of-way for the Western Connector. In particular, both the Moore County and Pinehurst Zoning Ordinances are clear that existing, as well as streets proposed as part of adopted transportation plans, must be illustrated on the site plan.

- Moore County Subdivision Ordinance – The requirements for applicants include a variety of street data illustrating existing and proposed rights-of-way within and adjacent to property. These requirements should be enough to protect the right-of-way for the Western Connector following its inclusion in the County Transportation/Thoroughfare Plan.
- The private development community will play an important role in the implementation of the Western Connector. The criteria outlined in Section 10.2.15.8 (General Design Standards) of the Pinehurst Development Ordinance should be enough to reserve right-of-way once the alignment is adopted. These standards require developers to dedicate additional right-of-way for streets adjoining the property and to reserve, but not dedicate the right-of-way for highways to which the development is prohibited from having access.

Barriers

The likely barriers to implementing the intended vision of the Western Connector include loose driveway restrictions and general discrepancies in design details. In particular, potential barriers include:

- Moore County Land Use Plan – The Highway Corridor Overlay Districts Dimensional requirements of 1 to 3 driveways per lot (depending on length of frontage) could permit too many direct driveways onto the bypass and compromise the mobility of the corridor.
- Moore County Subdivision Ordinance – Section 154.49 specifies minimum right-of-way widths for major thoroughfares as 90 feet. However, the Western Connector proposed cross section requires 110 feet of right-of-way.
- Aberdeen Subdivision Ordinance – The 5-foot sidewalks proposed as part of the Western Connector typical section exceed the minimum standard of 4 feet outlined in Aberdeen's Subdivision Ordinance.

The Land Use Recommendations that follow, particularly the Corridor Overlay Ordinance, address these barriers.

Land Use Recommendation

The land use review has resulted in the following inventory of potential policy changes and/or additions, modifications to adopted plans, and future tasks intended to stimulate implementation of the Connector's desired vision.

First and foremost, it is important to recognize that due to the likely pressure to upzone parcels along the corridor from the existing low-density residential to more intense residential densities once the alignment is adopted, the time is now to institute effective measures to control access to the facility. Other recommendations include:

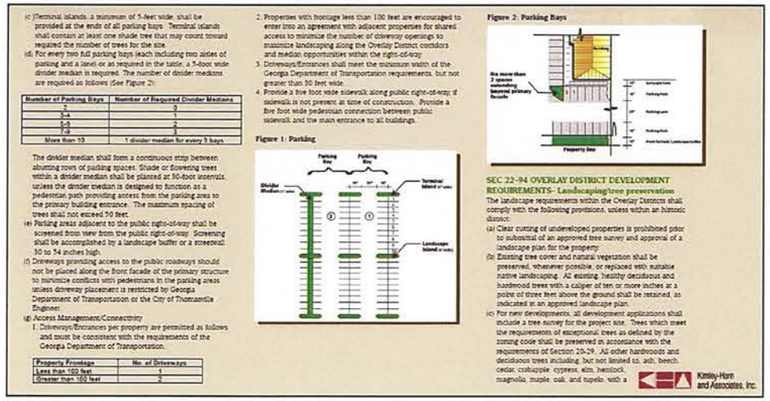
- Add the Western Connector alignment to the list of highway corridor overlay districts detailed in Section 12.1 of the Pinehurst Development Ordinance.

- Add the Western Connector to the list of Highway Corridor Overlay Districts in Section 155.052 of the Aberdeen Zoning Code.
- Amend Section 12.1 of the Pinehurst Development Ordinance with a third overlay category titled "Rural Character Corridor Overlay District" that tightens lot requirements for a roadway such as the Western Connector (i.e. rural context on new alignment). Such a category could be structured to make driveway access more restrictive.
- Adopt a multi-jurisdictional Corridor Overlay Ordinance, which is discussed in slightly more detail hereafter.

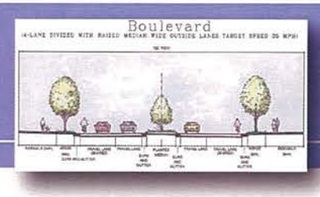
Western Connector Corridor Overlay Ordinance

When designating a potential alignment that traverses multiple jurisdictions, a lack of compatibility for land use control between the land use plans, policies, and programs should be expected. In the case of the Western Connector, this lack of compatibility warrants the need to develop a specific overlay district for the Western Connector to be adopted by all three jurisdictions (Village of Pinehurst, Moore County, and the Town of Aberdeen). The adoption of an ordinance will send a clear message that the local governments will protect the investment of public and private dollars spent on the Connector. General considerations of the ordinance should include the following:

- With the alignment mainly traversing through low density residential and agricultural land uses, the overlay ordinance may need to consider a provision that limits the number of driveways serving residential dwelling units within a neighborhood accessed by the Western Connector.
- The NCDOT Driveway Policy Manual should defer to local standards if they are more restrictive. Likewise, the unified Western Connector Overlay District could forward more consistent, restrictive driveway policies.
- Because even one driveway per lot could create too many access points, the Corridor Overlay Ordinance should call for joint-use driveways to safeguard mobility along the corridor. Subdivision access should be restricted to side streets, thus limiting the amount of driveways and subdivision entrances along the Connector. Gated communities should be limited to the extent possible.
- From an access standpoint in the Pinehurst Development Ordinance, the Western Connector likely would fall under a provision in Section 10.2.14.16 Streets calling for one driveway per lot having less than 500 feet of frontage. The overlay ordinance should move access standards toward "restricted access highways" as supported by the Comprehensive Long-Range Plan.
- The Town of Aberdeen Zoning Code is more vague and less restrictive than the Moore County and Pinehurst ordinances in regard to driveway access. The unified Western Connector Overlay District should create better continuity between the requirements for the three jurisdictions.
- Moore County already has a corridor overlay ordinance designation, referred to as the Rural Highway Corridor Overlay District. This category could serve as a model for amending the Pinehurst Development Ordinance by starting with its description and replacing non-residential land uses with residential and agricultural uses more in line with the RA 5 classification for Moore County and the R210 classification for the Village of Pinehurst.
- The Western Connector Overlay District Ordinance should require the entire 110-foot right-of-way to be dedicated along the corridor.



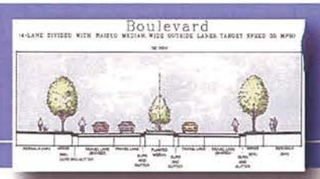
Example of a Corridor Overlay Ordinance



Funding Strategies & Opportunities

The implementation of corridor-wide improvements can occur through adoption of local policies and programs and state programs as well as through direct contributions from the private sector. With this in mind, it will be important for local municipalities and NCDOT to identify funding sources to implement the recommendations of this plan. While some projects and programs will be funded by the local jurisdictions or NCDOT, alternatives are available to provide financial support for implementing corridor recommendations. The following funding opportunities should be considered to implement the recommendations presented in this plan:

- Lobby NCDOT and members of the State Board of Transportation (BOT) to include partial funding of the design and implementation of recommended roadway improvements in the next Transportation Improvement Program (TIP).
- Leverage NCDOT District Office "Spot Safety" improvement monies to implement safety improvements at the eastern terminus of the project as it ties into Commerce Avenue and US 15-501.
- Pursue NCDOT STP-Enhancement Grant funding to install pedestrian and bike provisions along the corridor (including greenway connections) and gateway treatments at key intersection/interchange locations (e.g., NC211, NC 5 and US 15-501). These funds are administered through a grant program with a 20% local match requirement.
- Pursue Economic Development funding through NCDOT Division 8 for recommended improvements within proposed commercial areas.
- Pursue NCDOT Division 8 Small Construction Funds and Contingency Funds. These funding programs are typically requested by NC House or Senate representatives for their local districts.
- Leverage local programs and funding to be used for strategic corridor improvements identified by the plan as being necessary to improve the safety, mobility, and aesthetics of the Western Connector. Usually these projects are most successful when additional funding can be secured to help lessen the burden to the local jurisdiction (Village of Pinehurst, Aberdeen, and Moore County). Local funding sources tend to be flexible and in some communities can include general revenue expenditures, local bond programs, and proceeds from bond programs.
- Apply to the Governor's Highway Safety Program (GHSP) to funds specific safety-related projects. The Governor's Highway Safety Program is committed to enhancing the safety of North Carolina roadways. To achieve this, GHSP funding is provided through an annual program, upon approval of specific project requests, to undertake a variety of safety initiatives. Communities may apply for a GHSP grant to be used as seed money to start a program to enhance highway safety. Once a grant is awarded, funding is provided on a reimbursement basis with evidence of reductions in crashes, injuries, and fatalities required.
- Consider a Real Estate Transfer Tax or Local Option Sales Tax. The NC Legislature in 2007 gave counties the authority to ask voters for permission to levy a 0.4 percent land transfer tax or an additional quarter-cent sales tax. Counties may put both on the ballot, but if both pass, the county may levy only one. A county-wide sales tax could be used to pay for major investment projects. However, a sales tax would require the identification of specific projects and special legislative authority.
- Consider the use of a Rental Car Fee. A rental car fee is a surcharge added to all rental car bills within a defined jurisdiction. The fee, usually a fixed dollar amount, is often levied on both visitors and local residents, who may be renting a car as a replacement for a disabled/damaged personal vehicle. The local agency must request enabling legislation from the NC General Assembly to ask voters for permission to levy such a tax.
- Evaluate the use of a vehicle registration fee. A vehicle registration fee is a surcharge collected within a defined jurisdiction by the Division of Motor Vehicles at vehicle registration and registration renewal. It is usually a fixed dollar amount. The fee can be levied on any combination of vehicle types (private, commercial, etc.). Similar fees are currently levied in Wake, Orange, and Durham counties and the City of Charlotte.



Special Programs & Initiatives

As phased improvements are implemented, special programs and initiatives should be pursued to help protect the integrity and aesthetics of the corridor.

- *Adopt-A-Highway* – NCDOT volunteer program used to maintain and protect the scenic beauty of corridors. www.dot.state.nc.us/adopt-a-highway
- *Wildflower Program* – This program provides funding for the NCDOT Roadside Environmental Unit to seed and maintain flower beds and planting areas for select qualified projects. This program could be applied to the intersections with NC 5 and NC 211. www.dot.state.nc.us/wildflowers
- *Tax Incentive Program* - Consider providing a tax incentive to existing property owners and developers located along the corridor for converting to "shared" driveways and constructing cross-access connections.
- *Adequate Public Facilities Ordinances* (APFOs) – Also referred to as Concurrency Regulations, adequate public facilities ordinances allow local governments to deny or delay new developments if existing government services (water and sewer, roads, schools, fire and police) cannot support it. APFOs place the burden on developers to ensure adequate services are in place for new developments they propose, fund such improvements, or postpone plans until such services are in place. State legislation allows municipalities to enact such regulations.

Conclusion

A variety of funding strategies and programs are available to implement the recommended improvements for the Western Connector. These funding strategies include state and local monies, which are often limited or committed well into the future. Grant funding from the state typically requires a local match, but these monies may be used to cover many of the capital and operating expenses identified in the recommendations for the corridor. To realize the full benefits of the Western Connector, it will most likely come to fruition as a result of a major capital investment through "phased" implementation utilizing state funding. While some of the improvements will be made in partnership with the private sector, the Village of Pinehurst and local agencies should actively pursue funding for full NEPA documentation and protection of the corridor by means of the NC Corridor Map Act. This will allow for the protection of the corridor right-of-way while funding is secured for the construction of the Western Connector.

An incremental funding approach would be possible, but is not as attractive because the full benefit of the collective improvements would not be realized for quite some time. Alternative funding sources for expediting construction include special assessments and/or a locally-adopted sales tax or tax incentives.

One thing is certain, with the current transportation funding shortfall the most critical steps toward implementation will be carried by leaders identified within the community. In collaboration with state and local officials, their collective efforts will lead to a safe, aesthetically-pleasing corridor that enhances access and mobility throughout the Sandhills region.