



WILMINGTON URBAN AREA
Metropolitan Planning Organization

US 17/NC 210 Corridor Study



March 2012



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1 Introduction

The Wilmington Urban Area Metropolitan Planning Organization (WMPO), the North Carolina Department of Transportation (NCDOT), and the North Carolina Board of Transportation commissioned this study to identify near-term strategies to address safety and mobility deficiencies on US 17 and NC 210 in Hampstead. The purpose of this study is to identify practical strategies that are consistent with the vision for Hampstead, that reduce the rate of injuries and fatalities in traffic crashes, reduce travel delay, and improve travel for pedestrians and bicyclists. This study report describes a preferred access plan for US 17 from Washington Acres Road to Sloop Point Loop Road (a distance of 5.54 miles) and for NC 210 from US 17 to Island Creek Road (a distance of 3.65 miles). For this report, US 17 is referred to as a north-south route and NC 210 as east-west.

Public outreach during the study process provided opportunities for the study team to gain knowledge from citizens and business owners that use US 17 and NC 210 on a daily basis. Nearly 400 citizens attended a locally-sponsored meeting in Hampstead in September 2010. Three subsequent public meetings sponsored by the WMPO were held in Hampstead. Public input provided information for making balanced decisions on spot improvements and a vision for the corridor when the Hampstead Bypass is constructed.

Several large roadway construction projects are currently under study and are years from completion. FS-0803 B is a long range feasibility study for the US 17 corridor that will identify the long term transportation needs in this area. This study is expected to be completed in Spring 2012. The Military Cutoff Road Extension on new location from Market Street to the US 17 Wilmington Bypass (STIP Project No. U-4751) is funded and scheduled to begin construction in 2017. The US 17 bypass of Hampstead (STIP Project No. R-3300) is funded for right-of-way acquisition to begin in 2017, but unfunded for construction and not expected to begin until after 2020. Separate but relevant studies are underway; both are led by NCDOT. One is the environmental impact study of the Military Cutoff Road Extension and US 17 bypass of Hampstead and the other is a feasibility study of ultimate roadway configurations for US 17, from I-140/US 17 Bypass to NC 50, with and without the Hampstead Bypass constructed. Current alternatives for the US 17 bypass of Hampstead include an interchange with NC 210 west of Hampstead. It is anticipated that once the construction of the bypass and its interchange with NC 210 is a reality, growth will occur along NC 210 west of Hampstead. Accordingly, this study addresses strategies to minimize growth-induced congestion and crashes on NC 210.

Growth is a driving force in Hampstead. From 2001 to 2009 in North Carolina, Pender County was the:

- 30th fastest growing county, based on total population increase
- 13th fastest growing county, based on percentage increase in population
- 6th fastest growing county with less than 65,000 population
- 4th fastest growing county along the coast in North Carolina

Hampstead is strategically located halfway between Jacksonville and Wilmington with convenient commutes to both cities. Areas to the north and south (Onslow and Brunswick counties specifically) have grown rapidly since 2000. Growth along the US 17 corridor averaged approximately 3 percent per year from 2000 to 2010 (see Figure 1). The combined increases in through traffic and locally-generated traffic in Hampstead contribute to the changing conditions on US 17. The distressed economy has affected Pender County and surrounding areas, impacting traffic growth projections slightly; however, the long term economic outlook is still positive. For the purpose of this study, peak hour traffic volumes on US 17 are forecasted to grow at a 2.5 percent annual average rate through the year 2020, a rate derived from long range forecasts, historic growth trends, and recently collected turning movement data.

US 17 in Hampstead is a heavily traveled highway; carrying 28,000 to 33,000 vehicles per day (vpd) in the heart of the business district (see Table 1). For long range planning purposes (2035), daily traffic volume is still forecasted to increase by an average of 3.1 percent per year due to expected ongoing interest in coastal development in the Wilmington metro area and military-related growth at Camp Lejeune in Jacksonville.

The population in Onslow County is projected to grow by 2.6 percent per year, Brunswick County by 2.2 percent, Pender County by 1.5 percent, and New Hanover County by 1.3 percent.¹ Construction of the long-planned Hampstead Bypass will split traffic into long-distance trips (on the bypass) and locally-oriented traffic (on existing US 17 through Hampstead). The split is estimated to be 55 / 45 with the higher percentage on the bypass. The daily traffic volume on existing US 17 near Dan Owen Drive in Hampstead is forecasted to be 40,000 vpd by the year 2035 with 48,000 vpd on the Hampstead Bypass. A majority of vehicles on existing US 17 would be local trips made within Hampstead.

NC 210 west of US 17 carries 7,100 vpd and is expected to increase to 11,000 vpd in 2035 with the Hampstead Bypass. Without the bypass, the forecasted daily traffic volume on NC 210, by the year 2035, is 17,000 vpd.

The study corridors along US 17 and NC 210 carry a mix of local and through traffic; thus, speeds, turning movements, and driving behavior vary by day of the week and time of day. There are numerous driveways and a center two-way left-turn lane through much of the corridor on US 17 which add significantly to the number of conflict points, safety concerns and risk. One example is the predominant collision type in the area of the intersection of NC 210 and US 17, which is collisions due to turning movements. This can be improved by providing more controlled access to side-streets and driveways.

Figure 1. Growth Along US 17 Corridor

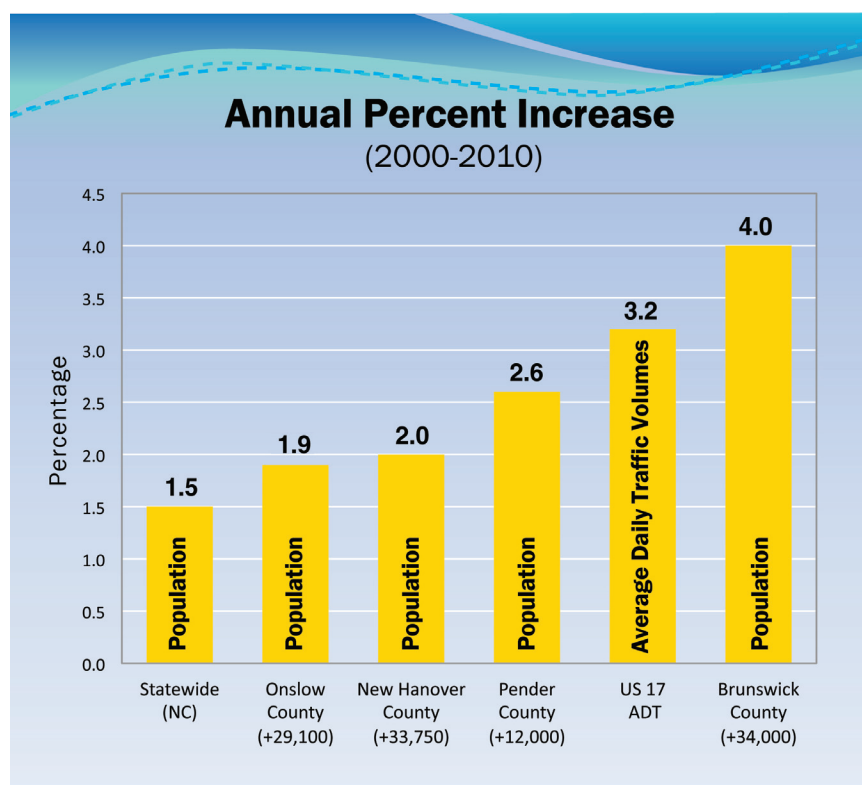


Table 1. Historic Trends in Traffic Counts on US 17

Year of traffic count	US 17 location		
	South of NC 210	North of NC 210	North of Hoover Road
2009	28,000 vpd	33,000 vpd	31,000 vpd
2005	25,000 vpd	34,000 vpd	28,000 vpd
2002	22,000 vpd	28,000 vpd	26,000 vpd
Average Annual Change	3.5%	2.4%	2.5%

¹ State of NC Office of State Budget and Management.

2 Summary

The following vision statement was adopted by the Pender County Board of Commissioners in the *2007 Coastal Pender Collector Street Plan*:

The community voiced a vision for US 17 as it passes through the heart of the Hampstead commercial area. “The commercial area is the stretch of highway between Washington Acres Road and Country Club Drive. Based on the extensive number of comments received at both open houses and via e-mail, fax, mail, and telephone, a ‘village boulevard’ cross-section seems to be the most favored. This cross-section would consist of a landscaped median, landscaped buffers, pedestrian and bicycle facilities and improved access management, which could include ‘superstreet’ intersections, frontage roads, backage roads, shared driveways, and deceleration lanes. The residents and business owners value the creation of a community identity for Hampstead. This identity should include an attractive main street, which can be a source of community pride.”

Suggested updates to the Vision Statement are offered with this study, as a result of: (1) hearings conducted by the Pender County Board of Commissioners considering overlay zoning districts; (2) comments made by land and business owners fronting US 17 in Hampstead; and (3) new wetlands mapping prepared for the Hampstead Bypass alternatives study. Recommended additions to the vision statement are:

The community vision for existing US 17 as it passes through the heart of the Hampstead commercial area between Washington Acres Road and Country Club Drive includes:

- Slower speeds with a new posted speed limit of 40 mph that is routinely enforced
- Right-turn deceleration lanes as needed to avoid injury crashes
- Improved access management
- Landscaped median that does not require widening on either side of the existing edge of pavement
- Landscaped planting areas spaced within the median where the median is at full width
- Cross-access between, and shared driveways by, adjacent commercial sites
- Backage roads that avoid damage to wetland areas, but provide access from US 17 addresses to a network of secondary streets to avoid US 17 travel
- Multi-use path for walking, bicycling and other forms of non-motorized travel

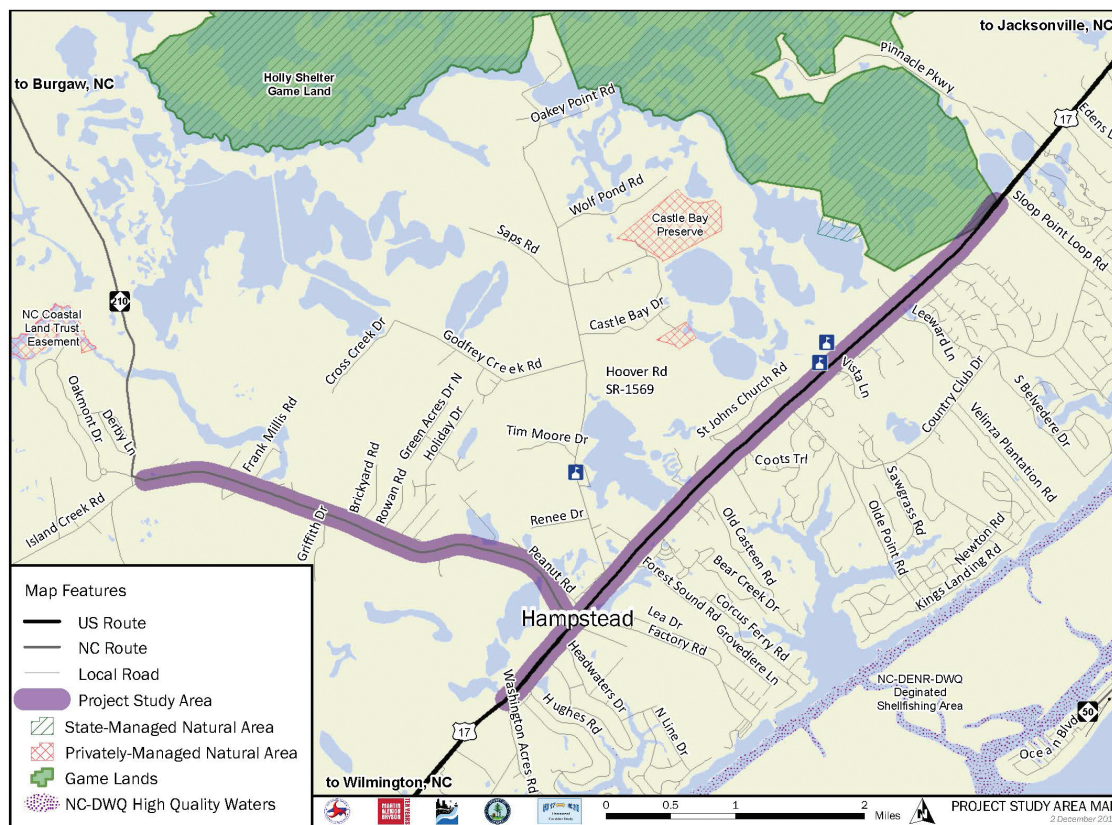
3 Existing Conditions

3.1 Study Area

The study area consists of US 17 from Washington Acres Road to Sloop Point Loop Road and NC 210 from US 17 to Island Creek Road (see Figure 2). A mix of commercial buildings line both sides of US 17 in Hampstead with numerous churches, office buildings, community facilities and some homes as well. Compared with sections of US 17 to the north and south, the section through Hampstead has a distinctively urban character with frequent driveways and a center two-way left turn lane throughout.

NC 210 from US 17 to Island Creek Road is predominately large lot single-family residential land uses with some light industrial businesses such as boat repair and seafood distribution businesses. Each home and business has one or more driveways on NC 210.

Figure 2. US 17/NC 210 Corridor Study



3.2 Roadway Geometry

The typical section does not vary along US 17 in Hampstead. A five-lane curb-and-gutter section exists with additional left- and right-turn lanes at some locations. Sidewalks do not exist on either side of US 17 in the study area. Lane widths are 12-feet-wide. The roadway is unsuitable for bicycling, given the 12-foot lane with adjacent curb and gutter and the high frequency of driveways and turning vehicles.

The typical section does not vary on NC 210 west of Hampstead. A two-lane undivided shoulder section with drainage ditches within a consistent 100 foot right-of-way exists. There are no sidewalks or multi-use paths on NC 210.

3.3 Functional Classifications

The North Carolina Statewide Functional Classification System (NCSFCS) and the Coastal Pender County Collector Street Plan show that US 17 is classified as a Principal Arterial throughout the study area. NC 210 is classified as a major collector.

3.4 Traffic

Existing Conditions

According to the NCDOT, in 2009 the Average Annual Daily Traffic (AADT) along US 17 was 28,000 vehicles per day (vpd) and 33,000 vpd to the south and north of NC 210, respectively; 31,000 vpd to the north of SR 1569 (Hoover Road) and 29,000 vpd to the south of SR 1565 (Country Club Drive). The 2009 AADT along NC 210 west of US 17 was 7,100 vpd.

Existing traffic volumes at major intersections in the study were obtained from NCDOT. These counts were collected in September and October 2010 during AM and PM peak periods. Existing peak hour turning movement volumes are shown in Appendix A, Figure A.2. The following intersections within the study area were analyzed for AM and PM peak hour operations:

- US 17 and SR 1582 (Washington Acres Road)
- US 17 and SR 1618 (Hughes Road)
- US 17 and SR 1673 (Deerfield Drive)
- US 17 and NC 210/Dan Owen Drive
- US 17 and SR 1570 (Peanut Road/Factory Road)
- US 17 and SR 1569 (Hoover Road)/Driveway
- US 17 and Forest Sound Road
- US 17 and SR 1593 (Jenkins Road)/SR 1565 (Country Club Drive)
- US 17 and Topsail School Entrance/Vista Lane
- US 17 and SR 1695 (Transfer Station Road)
- US 17 and SR 1675 (Long Leaf Drive)
- US 17 and SR 1563 (Sloop Point Loop Road)

An intersection capacity analysis was performed for the existing conditions. Traffic level of service (LOS) operations are reported on a letter scale, with “A” being the best operations and “F” being the worst or failing. Typically, operations are considered acceptable if they remain at a LOS D or better during peak travel hours. Sometimes, however, unsignalized

intersections may operate below LOS D during peak hours without warranting specific improvements. The reported operations at intersections describe operations during two peak hours of travel during the day, one in the AM and one in the PM. Table 2 provides a general description of various levels of service categories and delay ranges.

Table 2. Level of Service Descriptions for Intersections

Level of Service	Description	Signalized Intersection Delay	Unsignalized Intersection Delay
A	Little or no delay	<= 10 seconds	<= 10 seconds
B	Short traffic delay	10-20 seconds	10-15 seconds
C	Average traffic delay	20-35 seconds	15-25 seconds
D	Long traffic delay	35-55 seconds	25-35 seconds
E	Very long traffic delay	55-80 seconds	35-50 seconds
F	Unacceptable delay	> 80 seconds	> 50 seconds

Delay is expressed as the average amount of delay for all vehicles entering the intersection in the peak 15 minute period.

Analysis of the existing traffic volumes in the area indicate all the signalized intersections in the study area operate at acceptable levels of service (LOS). Some of the unsignalized intersections in the study area operate at acceptable LOS; intersections operating below acceptable levels during at least one peak hour include:

- SR 1582 (Washington Acres Road)
- SR 1618 (Hughes Road)
- SR 1570 (Peanut Road/Factory Road)
- Forest Sound Road

Future Conditions

Future traffic demand was forecasted to the year 2020 by Martin/Alexiou/Bryson and to the year 2035 by the Transportation Planning Branch of NCDOT. Year 2020 traffic forecasts were prepared by assuming a 2.5 percent per year increase in through-traffic plus additional traffic from specific developments in Hampstead. Year 2035 forecasts were prepared using a blend of historic growth rates, projected population and employment growth along US 17 and NC 210, and the regional travel demand model for the Wilmington region. Without the Hampstead Bypass in place, the traffic volume just south of NC 210 is projected to increase to 70,600 vpd by the year 2035, an average annual increase of 3.62 percent over the 2009 AADT. Assuming the Hampstead Bypass is in place, the traffic volume in this location by 2035 is projected to increase to approximately, 37,000 vpd.

By 2035, the traffic volume on NC 210 west of US 17 is projected to be 17,000 vpd without the Hampstead Bypass and 11,000 vpd with the Hampstead Bypass.

Intersection capacity analysis was performed using the future year volumes. Based on the 2020 analysis which does not assume the Hampstead Bypass is in place, all the signalized intersections in the study area are projected to operate at LOS E or worse during at least one peak hour with the exception of US 17 at SR 1563 (Sloop Point Loop Road). This degradation in LOS is mostly due to the increase in through-traffic volumes along US 17 and operations are expected to improve once the Hampstead Bypass is constructed.

Draft findings of the US 17 Feasibility Study, a long-range look at improvements to this corridor, were available for comparison to the 2020 results. That report examined long-range alternatives for improving traffic along US 17. Improvements included widening to six lanes and implementing superstreet configurations and other conventional improvements as needed. This study is discussed further in Section 4. Based on the draft findings of that report, in 2035 without the Hampstead Bypass in place but other improvements constructed, five out of six intersections studied would operate at LOS F in peak periods. With the construction of the Hampstead Bypass, 2035 conditions are expected to improve; all studied intersections would improve to an acceptable LOS, except at US 17 / Dan Owen Drive, which is projected to improve, but still operate at LOS E.

A summary of the findings of the Existing (2010), Future (2020), and Future (2035) Year LOS analysis can be found in Appendix A.

3.5 Crash History

Crash history data for US 17 and NC 210 was analyzed for a 65-month period from August 1, 2005 through December 31, 2010. A 65-month period was analyzed in order to include the most up-to-date information possible at the time the analysis was conducted. Based on reported crashes compiled by the Pender County Sheriff Department, NC Highway Patrol, and NCDOT there were 628 crashes on US 17 and 92 on NC 210. An additional 20 crashes were recorded at the intersection of US 17 and NC 210. The US 17 total crash rate in the study area, which is a measure of the number

of crashes per vehicle miles traveled, is 186.62 per 100 million vehicle miles traveled (MVMT). This rate is 16 percent higher than the statewide average of 160 per MVMT for roads of similar function, location and configuration.

The NC 210 total crash rate in the study area is 211.30 per 100 MVMT. The statewide average crash rate for roadways of similar function, location and configuration to NC 210 is 177.26 crashes per 100 MVMT. The crash rate is 19 percent higher than the statewide average.

More than 40 percent of crashes on US 17 were rear end crashes. On NC 210, more than 21 percent of crashes were rear end type. Other frequent crash types on US 17 include left-turn crashes, animal-hit crashes, sideswipes and right-turn crashes. On NC 210, the frequent crash types include left-turn crashes, animal-hit crashes, right-turns, and sideswipes. There were no pedestrians or bicyclists involved in reported crashes on NC 210, but there were 2 pedestrians and one cyclist in the reported crashes on US 17.

A number of crashes could be corrected by installing a median, which would naturally preclude some of the crash types, such as left-turn crashes and angle collisions. Appendix A details specific locations where a median could correct these crash types.

The *Critical Crash Rate* is a statistically derived number that can be used as a tool to identify or screen for high accident locations. Locations with a crash rate higher than the critical rate may have a potential highway safety deficiency and may require additional analysis, according to NCDOT.

As listed in Table 3, the total crash rate on US 17 and NC 210 in the study area exceeds the *Critical Crash Rate*. This is one criterion, among others, that is used by NCDOT to prioritize projects for safety funds.

Table 3. Critical crash rates for US 17 and NC 210

County	Route	Length ¹	ADT	Time	Exposure	Crashes	Total Crash Rate			
						Total No. of Accidents	Total Accident Rate	Statewide Accident Rate	Critical Rate ²	Exceeds Critical Rate?
Pender	NC 210	3.72	7,200	5	53.01	112	211.30	177.26	208.28	Yes
Pender	US 17	5.66	31,000	5	347.24	648	186.62	160.79	172.13	Yes

¹ Length is measured in miles

² Rates are expressed in 100 Million Vehicle Miles Traveled (MVMT)

3.6 Speed Surveys

NCDOT conducted radar speed surveys at five locations, between NC 210 and SR 1695 (Transfer Station Road) on US 17 in Hampstead on Wednesday August 31, 2010. The posted speed limit on US 17 in Hampstead at that time was 45 mph at all locations except for one location north of SR 1695 (Transfer Station Road) where the posted speed limit was 55 mph. Over the four sites where the posted speed limit was 45 mph, it was observed that 14 percent of vehicles traveled at or below the 45 mph speed limit. Another 43 percent traveled at 46 to 50 mph. Approximately 36 percent traveled at 51 to 55 mph and the remaining 7 percent traveled in excess of 55 mph.

At the location north of SR 1695 (Transfer Station Road) it was observed that 28 percent of vehicles traveled at or below the 55 mph speed limit, 52 percent traveled at 56 to 60 mph and 19 percent traveled at 61 to 65 mph. The remaining 1 percent traveled in excess of 65 mph.

3.7 Bicycle and Pedestrian Facilities

There are no sidewalks on either side of US 17 or NC 210 through the study area. US 17 received a walk score of 8 (on a scale of 1 to 100, with 100 being the best) according to *www.walkscore.com*, indicating that buildings are too spread-out to serve the needs of travel on foot. The East Coast Greenway will be an off-road multi-use path connecting Maine with Key West, Florida. It is envisioned as the urban parallel to the Appalachian Trail. Wilmington has designated Greenfield Lake Trail and Riverwalk as part of the future East Coast Greenway, and there is a trail route identified between Raleigh and New Bern. In the future, there is potential for a trail route along US 17 between this New Bern termini and Wilmington. However, there is not currently an identified route, meaning that Pender County, specifically along US 17, is considered a gap area for the East Coast Greenway.

North Carolina Bicycle Route #3, Ports of Call Route, runs through the study area. This route follows the coast for approximately 300 miles from South Carolina to Virginia, showcasing major ports of the US colonial era including Southport, Wilmington, New Bern, Bath, and Edenton in North Carolina. The route enters Hampstead along NC 210, turns and follows US 17 north through the study area, and turns off onto NC 210 again north of the project. This bike route also provides connections to NC Bike Routes 2, 4 and 5.

4 Previous Plans and Studies

Cape Fear Commutes 2035 Transportation Plan

The Wilmington Urban Area Metropolitan Planning Organization (WMPO) prepared the Cape Fear Commutes 2035 Transportation Plan, which serves as the long range transportation plan for this area. The plan addresses all modes of transportation needs and solutions coupled with the required financial needs. In particular, the plan stated that the main barriers to bicyclists are a lack of direct, continuous, convenient, and safe system of bicycle facilities. The plan also recognizes the need to improve pedestrian facilities to encourage walking as an alternate mode of transportation.

2007 Coastal Pender County Collector Street Plan

The Hampstead and Scotts Hill areas in unincorporated coastal Pender County were added to the WMPO jurisdiction in August 2006. A collector street plan was prepared by Wilmington MPO staff and adopted by the Pender County Board of Commissioners on May 21, 2007. The goal of the Collector Street Plan is to provide a comprehensive guide for a Coastal Pender County collector street network that would:

- Improve connectivity
- Encourage multi-modal transportation
- Implement access management
- Maintain required traffic speeds
- Promote safety
- Enhance the beauty and environment for the existing and future residents, businesses and visitors

The Plan included a tool box of ordinances and recommendations to improve connectivity and mobility. One of the recommendations was for NCDOT to fast-track a Comprehensive Transportation Plan for Pender County. That study has been launched. Another recommendation was for the Pender County Board of Commissioners to use the Coastal Pender Collector Street Plan as a reference when reviewing all rezoning requests, major subdivisions and appeals. WMPO staff has submitted comments on specific rezoning requests since 2007, but the Board has not always required construction of recommended collector street plans. They cite opposition from neighbors and economic hardship for developers, among other reasons.

The 2007 *Coastal Pender County Collector Street Plan* included the following recommended roadway improvements for US 17 and NC 210:

- Improvements to the intersection of NC 210 and Island Creek Road (SR 1002) including the realignment of NC 210.
- Extend the “superstreet” cross-section (restricted left turns with signalized u-turns) on US Highway 17 to the north as funds become available, while improving the visual appeal of the Hampstead commercial area between Washington Acres Road and Country Club Drive.
- Construct right turn deceleration lanes along US Highway 17 at all intersecting state maintained roadways.

The map adopted with the *Collector Street Plan* identifies new collector streets, as well as recommended extensions of existing roadways. The new connections are categorized as priority new collector and new collector. Priority new collectors were rated highly favorable by the public, business owners, land owners, developers and others. They fulfill one or both of the two objectives cited by many who offered input, which are (1) alternatives to US 17, and (2) better east-west access. A priority new collector labeled “W Backage Road” parallels US 17 on the west side of Topsail High School and extends the length of Hampstead into Scotts Hill. However, a review of updated wetlands mapping prepared for the Hampstead Bypass project show extensive wetlands in the area where the “W Backage Road” was planned.

The new collectors are important as well, as they will provide alternatives to both NC 210 and US Highway 17. Many of these roadways follow existing farm roads and are spaced roughly 3,000 feet apart, the recommended spacing for the medium-intensity mixed suburban development expected to be prevalent in Coastal Pender County. Existing dirt and gravel roads were used when possible to minimize the financial impact on small landowners and also to ensure that required rights-of-way can feasibly be preserved even where large-scale subdivision is not likely to occur (i.e. RA zoning districts). These connections are intended to be constructed or reserved if and when the surrounding tracts of land become developed and/or subdivided. The map is not intended to be used as an engineering document. The connections between adjacent roadways and properties are more important than the exact path of the roadway. It is also recognized that due to certain environmental, legal, and logistical reasons some of the collector streets connections shown on the map may not be possible. However, throughout the development of this plan, significant efforts were made to anticipate any environmental issues which may affect the construction of the recommended roadways. An update of the *Collector Street Plan* is recommended.

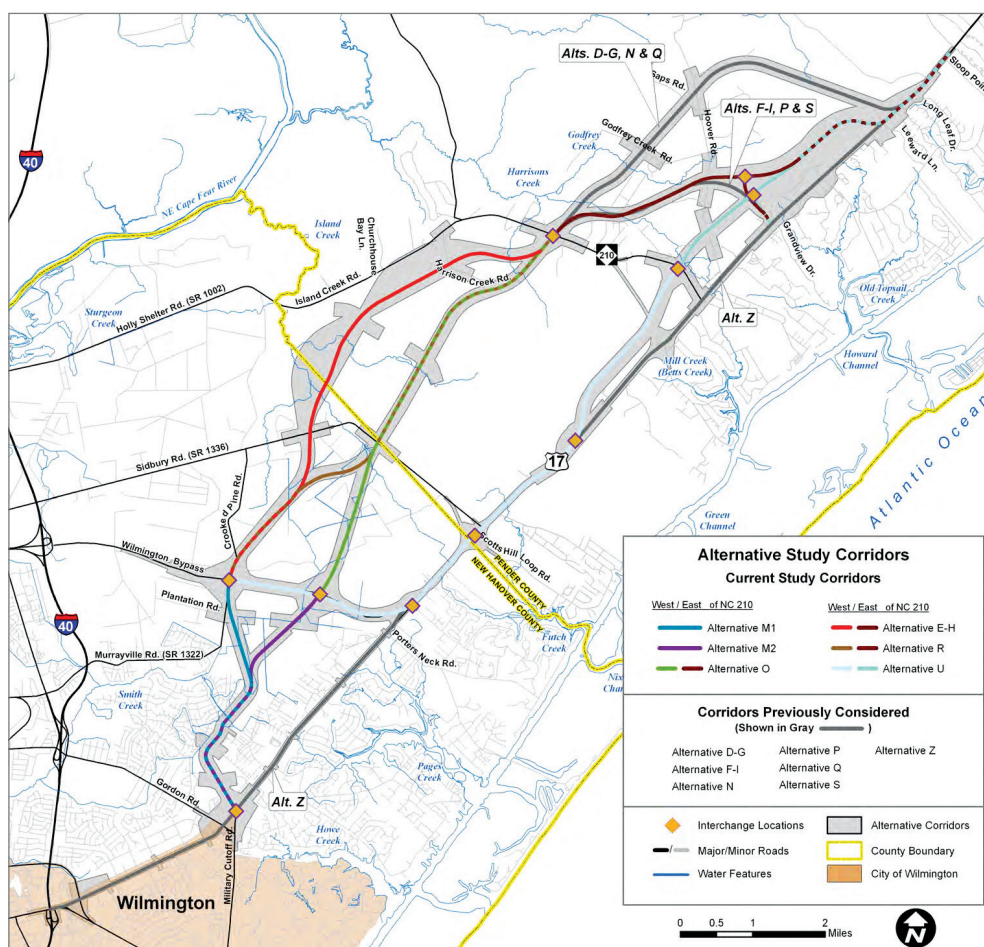
1997 NCDOT Thoroughfare Plan for Pender County

The most current county thoroughfare plan was adopted by the Pender County Board of Commissioners in June 1997 and by the North Carolina Board of Transportation in September 1997. In the plan, NC 210 is classified as a major collector. Both US Highway 17 and the proposed Hampstead Bypass are identified as other principal arterials. The bypass alignment alternatives from this study are shown in Figure 3. Legislation defining projects eligible for Highway Trust Fund priority funding identified the Hampstead Bypass southern terminus and the Military Cutoff Road in New Hanover County.

Comprehensive Transportation Plan

North Carolina Department of Transportation and Pender County are currently developing a *Comprehensive Transportation Plan* (CTP), which is a long-range multi-modal plan, including portions of Pender County that are outside of the Wilmington MPO jurisdiction. The CTP is being developed cooperatively between NCDOT, Pender County, the Cape Fear RPO, and representatives from the county and municipalities. The purpose of this transportation plan is to identify existing and future transportation deficiencies, while incorporating local land use plans and community goals. The primary objectives are to reduce traffic congestion and improve safety. The Pender County CTP can be used as a guide for future development and transportation decisions. The document will be completed by January of 2012.

Figure 3. Preliminary Corridor Build Alternatives for Hampstead Bypass



Source: Pender County Planning Department, March 9th, 2011

NCDOT Feasibility Study of Long Term Measures on Existing US 17 in Hampstead

NCDOT is conducting a long range feasibility study for the US 17 corridor, between I-140/US 17 Bypass north of Wilmington and NC 50 in Holly Ridge. This study is examining long-term solutions for traffic along this corridor including conventional widening, superstreet configurations and freeway alternatives. This study takes into account the possible presence of the proposed Hampstead Bypass, which is also currently being studied by NCDOT. An Environmental Impact Statement (EIS) is being prepared for that bypass in accordance with the National Environmental Policy Act (NEPA) regulations. The US 17 corridor feasibility study is intended to provide insight into long-term solutions to handle projected traffic volumes along this entire corridor and is not intended to address the immediate spot-specific needs of the corridor.

2004 NCDOT Strategic Highway Corridors

US Highway 17, referred to as *Corridor 52* in the *Strategic Highway Corridors Plan*, is envisioned as a future freeway in the Vision Plan for Southeastern North Carolina completed as part of the NCDOT *Strategic Highway Corridors* initiative. Both the Hampstead Bypass and the Wilmington Bypass are also classified as freeways by the plan. A freeway is defined as a high mobility, fully access controlled roadway with a minimum of four lanes and no driveways, traffic signals or at-grade intersections. The goal of the *Strategic Highway Corridors Plan* is to “create a greater consensus towards the development of a genuine vision for each corridor — specifically towards the identification of the desired facility type (freeway, expressway, boulevard, or thoroughfare) for each corridor.” US 17 is on the list of strategic corridors.

2005 Pender County CAMA Land Use Plan Update

The county's required Coastal Area Management Act plan offers several transportation recommendations. Regional transportation planning, regular updates of the thoroughfare plan, protecting highway capacity through land use regulation and transit expansion, and increased public transportation services for elderly and special needs population. The plan also supports the development of a greenway and hiking trail system. In order to preserve the existing highway capacity, the plan suggests that the county encourage cluster development patterns, direct growth into urban and transition areas, and require urban type infrastructure in major new developments. The CAMA plan also emphasizes the importance of locating residential areas near employment and shopping areas and major thoroughfares, and locating large commercial development at the intersections of major thoroughfares. Smaller neighborhood commercial centers are encouraged to be located on the collector street system with appropriate vehicular and pedestrian access. Office, industrial and multifamily residential is encouraged as a transition between single-family residential and commercial. The CAMA plan encourages all new development to meet minimum standards for access, Secondary Road Standards, connectivity requirements to adjacent developments, continuity of streets, trails and utility lines. The plan also recommends pedestrian and bicycle facilities in all new development especially in higher density neighborhoods. The plan recommends implementing a series of incentives to achieve the goals above. Under the draft CAMA plan almost the entire study area is classified as an "urban growth area," which "provides for the continued development of areas provided with water and/or sewer services or where the county is actively engaged in planning these community services."

2012-2018 State Transportation Improvement Program (STIP)

The STIP is a federally mandated statewide funding plan for transportation investments and it includes several projects in Coastal Pender County. The Draft STIP is a preliminary list of projects that NCDOT proposes to undertake. This Draft STIP will be reviewed by Metropolitan and Rural Planning Organizations and projects may change before the final STIP is approved later in 2011.

There are two adopted STIP improvements in the study area that pertain to US 17; they are the Hampstead Bypass (R-3300) and Military Cutoff Road (U-4751). Both projects are part of *North Carolina's Strategic Highway Corridor Initiative*, which is an effort to preserve and maximize the long-term interconnectivity of core transportation corridors in North Carolina.

The proposed US 17 Hampstead Bypass will extend from the intersection of the Wilmington Bypass and the proposed Military Cutoff Extension in New Hanover County to US 17 near Sloop Point Loop Road in Pender County. The Hampstead Bypass will be a four- to six-lane limited access freeway. Access to the proposed freeway would be provided at interchanges. The Hampstead Bypass is currently in the environmental studies phase. Funding for right-of-way acquisition is programmed for fiscal year 2017. Construction is unfunded. The current estimate is more than \$220 million and varies depending on the alternative alignments under study.


Project U-4751 is an extension of Military Cutoff Road on new location from Market Street (US 17 Business) to the US 17 Wilmington Bypass (John Jay Burney Jr. Freeway). Military Cutoff Road Extension is a proposed six-lane roadway on new location. Access to the roadway will be provided at an interchange with US 17 Business (Market Street) and signalized intersections with Putnam Drive, Lendire Road and Torchwood Boulevard. Only right turns will be allowed onto Military Cutoff Road Extension from Market Street at the signalized intersections. Signalized U-turn lanes will be provided.

Thirteen detailed study alternatives were initially developed for R-3300 and U-4751, as shown in the September 2008 project newsletter. Seven of the alternatives were dropped from further consideration because of anticipated impacts to the human and natural environments. Six of the original alternatives for R-3300 and U-4751 are still being considered, and are shown in Figure 3. The six detailed study alternatives being considered at this time include four

alternatives (labeled E-H, O, R, and U) for R-3300 and two alternatives (labeled M1 and M2) for U-4751. To select the six alternatives, the R-3300 and U-4751 team, consisting of federal, state and local agency representatives, reviewed the analysis results for the alternative corridors. Potential environmental, social and economic effects were evaluated to identify alternatives that best meet the purpose and need of the project while minimizing negative impacts. The Study Team also considered input provided by the public. This included comments from the April 2007 Citizens Informational Workshops, the public and agencies involved with the project.

The US 17 Corridor Study Team follows the North Carolina “NEPA/404 Merger Process” to reach concurrence at critical milestones related to project development and permitting. The Study Team reached agreement on the purpose and need for the project in September 2006 and alternatives for detailed study were selected in August 2007. The Study Team met again in April 2010 after preliminary design plans were prepared and environmental field data was collected for the alternatives selected for detailed study. The Study Team reviewed the information and agreed to carry six alternatives forward for additional analysis. In May 2010, the Study Team reached agreement on bridge locations and lengths.

Public Involvement is an important part of the planning process. NCDOT encourages citizen involvement with transportation projects and considers the citizens’ suggestions and concerns. Citizens’ informational workshops for the US 17 Corridor Study were held on April 23, 2007 in Hampstead and on April 24, 2007 in Wilmington. A total of 174 participants signed in at the workshops. A newsletter published in September 2010 describes the six alternatives.



North Carolina Department
of Transportation

US 17
Corridor Study
New Hanover & Pender Counties
107 Mile, 9-1011 and 10-1200

**Notice Of Pre-Hearing Open Houses And Corridor Public Hearings For
The Proposed Military Cutoff Road (State Road 1409) Extension And U.S. 17 Hampstead Bypass**

The North Carolina Department of Transportation (NCDOT) will hold two (2) Pre-Hearing Open Houses and Corridor Public Hearings for the above mentioned highway projects at the following times and locations:

<p>When: October 17, 2011 Where: Noble Middle School 6520 Market Street, Wilmington Pre-Hearing Open House: 4 – 6:30 p.m. Formal Presentation: 7 p.m.</p>	<p>When: October 18, 2011 Where: Topsail High School 245 N. St. Johns Church Road, Hampstead Pre-Hearing Open House: 4 – 6:30 p.m. Formal Presentation: 7 p.m.</p>
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NCDOT representatives will be available at the Pre-Hearing Open Houses to answer questions and receive comments regarding the proposed projects. The opportunity to submit written comments and questions will be provided. Interested citizens may attend at any time during the above hours. The formal presentations will consist of an explanation of the proposed location, design, right of way and relocation requirements and procedures. Citizens will have the opportunity to comment or ask questions. The presentation and comments will be recorded and a transcript will be prepared.

NCDOT will provide auxiliary aids and services under the Americans with Disabilities Act for disabled persons who want to participate in this hearing. Anyone requiring special services should contact Mr. Robbins as early as possible so that arrangements can be made.

FOR ADDITIONAL INFORMATION CONTACT: Jamille Robbins, NCDOT – Human Environment Unit, 1598 Mail Service Center, Raleigh, NC 27699-1598, (919) 707-6085, jrobbins@ncdot.gov

Copies of the map and DEIS are available on the project website at: <http://www.ncdot.org/projects/US17HampsteadBypass>

The US Army Corps of Engineers, Wilmington District, also has the DEIS document available on their website which can be accessed at http://www.saw.usace.army.mil/Wetlands/Notices/Current_notices.html. Contained within this website is a local public notice drafted by the Corps announcing the release of this document as well as the description of the ongoing process in choosing the LEDPA (Least Environmentally Damaging Practicable Alternative) for the subject project.

Next Steps for Hampstead Bypass and Military Cutoff Road Extension — preliminary design and environmental analysis of the alternatives are being finalized and preparation of the Draft Environmental Impact Statement (DEIS) is nearing completion. The DEIS documents the environmental analysis of the project. The DEIS was signed 7/18/11 and a map of the proposed alternatives will be made available for public review at several local locations and presented to the public for comment at a public hearing. An announcement of the public hearing will be sent to individuals on the project mailing list and advertised in the local paper. The North Carolina Department of Transportation expects to conduct the public hearing in October 2011.

4.1 Other Projects in the Adopted STIP

- **R-2405:** Widening of US 17 between I-40 and Holly Ridge, completed in 2007.
- **Interstate 40 projects in Pender, New Hanover, Duplin, and Sampson counties:** Pavement reconstruction. Project funding of \$102 million; construction is underway.
- **B-4929:** replacement of the NC 50/NC 210 bridge over the Intracoastal Waterway. This \$35 million project is funded and scheduled to start construction in fiscal year 2014.
- **B-5304:** The replacement of the Crooked Run Road (SR 1324) bridge over Sill's Creek. Construction funding of \$1.1 million for this project is programmed for fiscal year 2018.
- **B-5312:** The replacement of the Old Maple Hill Road (SR 1520) bridge over Holly Shelter Creek. Construction funding of \$1.1 million for this project is programmed for fiscal year 2019.

Pender County Comprehensive Parks and Recreation Master Plan

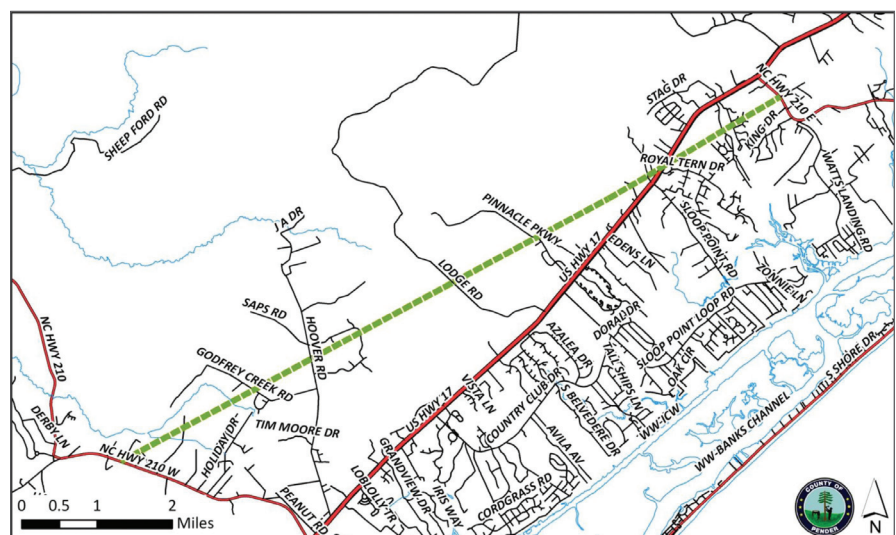
A corridor that is two miles from the US 17 business district (measured along Hoover Road as one connecting option) was identified and adopted in the Pender County Comprehensive Parks and Recreation Master Plan (2010). Closer to US 17 there are portions of the former Wilmington, Onslow and East Carolina Railroad line identified in the Master Plan as having potential to serve as a trail. Some of this was lost when US 17 was widened. Portions of the corridor still remain, although ownership has reverted back to adjacent landowners.

Coastal Pender Greenway

The Coastal Pender Greenway would utilize Progress Energy Company's easement, as shown in Figure 4, from NC Highway 210 near Surf City to NC Highway 210 near Island Creek Drive, although an alternate route would need to be negotiated through or around Castle Bay Golf Course. At the southern end of the Coastal Pender Greenway, trail users would then utilize the existing NC DOT Bicycle Route 3 — Ports of Call, which follows Island Creek Drive to Holly Shelter Road in New Hanover County, and through to Blue Clay Road where users could link with the planned Blue Clay Corridor bicycle facilities. Use of the Progress Energy Company's easement is limited to uses that do not interfere with maintaining power lines, facilities, and rights-of-way. Detailed planning of the Coastal Pender Greenway will require cooperation with Progress Energy Company staff to ensure the project conforms to Progress Energy Company's Transmission Line Right-of-Way Use Guidelines.

An alternate route may be pursued near the R-3300 (Hampstead Highway 17 Bypass) project. The development of a bicycle/pedestrian trail or multi-use path may be feasible adjacent to, but outside of, the bypass right-of-way.

Figure 4. Recommended Coastal Pender Greenway



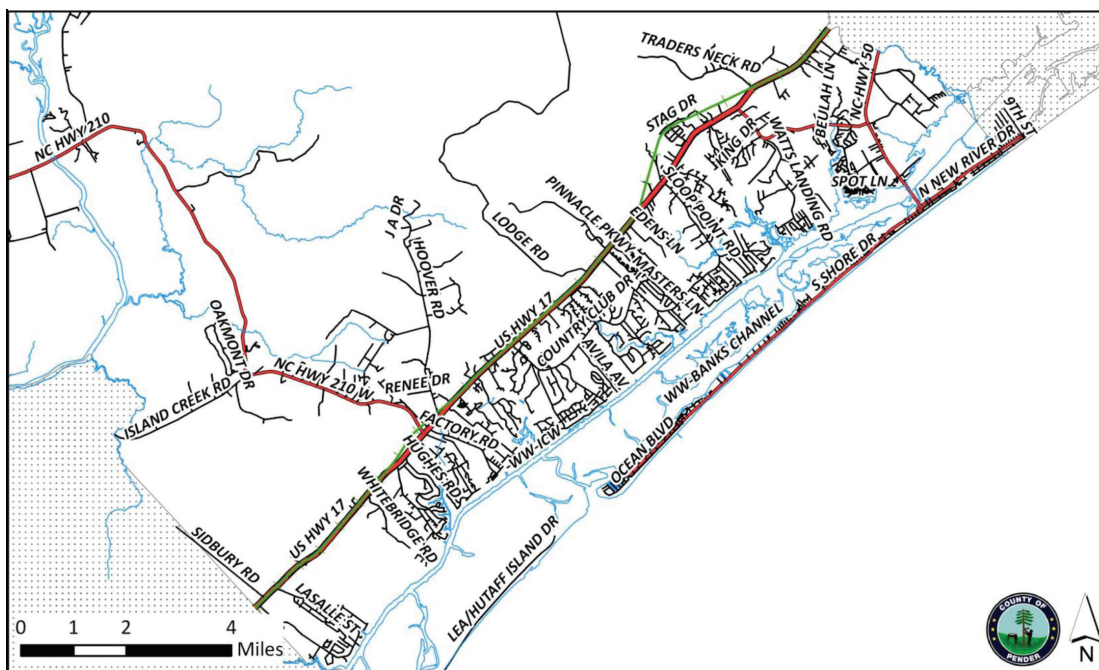
Coastal Pender Rail-Trail

Beginning in the late 1890s, Wilmington once served as an important rail center served by five rail lines, four of them owned by the Atlantic Coast Line Railroad (ACL), and three of them running through Pender County. Over time, mergers of rail and air lines took place and all of the ACL rail lines running to Wilmington were abandoned and the tracks were removed. Under NC state statutes, the ownership of these former rail corridors have reverted back to the adjacent property owners (with the exception of the former Wilmington to Weldon line running through central Pender County, which is now owned by NCDOT and reserved for future rail use), but the former ballasts mostly remain and would serve as ideal trail corridors.

One former ACL line ran 87 miles from Wilmington through Jacksonville to New Bern, and was opened in 1891 as the Wilmington, Onslow, and East Carolina Railroad. Most of the tracks and cross-ties were removed from this corridor in September and October 1985, and all of the trestles, signals, and highway crossings were gone by December 1986. During 2004 and 2005, US Highway 17 was improved along the Hampstead corridor, utilizing the former rail ballast in certain areas. Figure 5 shows in green where some of the remaining sections could be converted to trail use.

The Coastal Pender Rail-Trail would provide a much-needed pedestrian and bicycle route along the busy US Highway 17. This facility would link together residential areas, shopping, schools, libraries, churches, Hampstead Kiwanis Park, and Scotts Hill Community Park. Development along this facility should include a bicycle/pedestrian connection to adjacent properties utilizing the former rail corridor where possible, and subdivisions along this facility should include an easement reserving the use of the former rail corridor or another route where feasible.

Figure 5. Coastal Pender Rail-Trail



5 Public Involvement

Public involvement was a key element in studying the US 17 corridor. A Steering Committee comprised of representatives from Pender County, the Wilmington MPO, NCDOT and local Hampstead residents, business and property owners. A total of four committee meetings were held. Minutes from the each meeting can be found in Appendix B. A summary of comments from each community information workshop can also be found in Appendix B.

Three community information workshops were held; the first on December 16, 2010; the second on March 3, 2011; and the third on May 12, 2011. These were conducted in an informal setting at Topsail High School located on St. Johns Church Road in Hampstead. People listened to a consultant presentation before organizing into small groups for interaction and discussion with several questions prompted by facilitators. Participants were given the opportunity to offer their comments and suggestions. Staff and the consultant attended a community meeting hosted by citizens at the Methodist Church in September 2010.

Focus groups were organized; one for businesses, another for residents and a third for land developers and economic development professionals. Attendance was by invitation only. A summary of comments from each focus group can also be found in Appendix B. The most frequent comments received in writing since mid-December 2010 are as follows:

Public Comment Topic: Washington Acres Road and Hughes Road Traffic Control Measures

Dozens of emails were submitted and many individuals attended the March 3, 2011 public meeting to voice their support to install a traffic signal at Washington Acres Road intersection and some of them voiced their concern about the temporary median installed in November 2010 at Hughes Road. A citizen sent a comment after the May 12, 2011 open house concerning the consultant's proposal to replace the temporary median with a permanent concrete raised median that would continue to prohibit left-turn movements from the Beacon Center to northbound US 17.

The consultant recommends that NCDOT consider Hughes Road/US 17 as a candidate to be signalized instead of Washington Acres Road. The consultant would not support signalizing both intersections as they are so close and they are interconnected via Center Drive. The case to signalize Hughes instead of Washington Acres is supported by the presence of the Beacon Center on the north side of US 17 at Hughes Road. If Hughes Road/US 17 is signalized, then several hundred feet of Hughes Road, between Center Drive and US 17, should be rebuilt to align better with the Beacon Center driveway. The consultant is unable to demonstrate whether or not Hughes Road/US 17 meets signal warrants since the temporary median changes traffic patterns.

Public Comment Topic: Peanut Road/Factory Road Median Impacts on Atlantic Seafood

One of the written comments submitted by a citizen supported verbal discussions the consultant had with the business managers of Atlantic Seafood at the May 12, 2011 open house. The citizen mentioned the difficulty of access for tractor-trailer trucks approaching and leaving Atlantic Seafood.

The consultant acknowledges the difficulty tractor-trailer trucks have accessing Atlantic Seafood very frequently. A median opening at the north end of the Atlantic Seafood property on US 17 was considered, however, that location is only 1,100 feet from adjacent signalized intersections to the north at Hoover Road and to the south at NC 210/Dan Owen Drive. For the same reason a signal at Peanut Road/Factory Road is also not acceptable to NCDOT. This section of US 17 has the highest frequency of crashes over the past 5.5 years so it is a primary safety goal to eliminate conflict points (left turn movements).

Implementation of the 2007 Coastal Pender Collector Street Plan, when the Cypress Station development was approved by Pender County earlier in 2011, would have facilitated construction of a collector street along the old rail line connecting Atlantic Seafood with Hoover Road which may have solved the issue. However, that collector street was not required by Pender County and the Cypress Station developer chose to expand that development to preclude building that collector street. There must be a balance between the intensity of development permitted and the infrastructure needed to adequately and safely support development. A collector street or access easement connecting Atlantic Seafood with NC 210, potentially near the Eastern Outfitters retail store, may be pursued privately by the owners of Atlantic Seafood. This may give them the ability to turn trucks easily through the US 17 / NC 210 signalized intersection.

Public Comment Topic: Landscaping in the proposed US 17 median

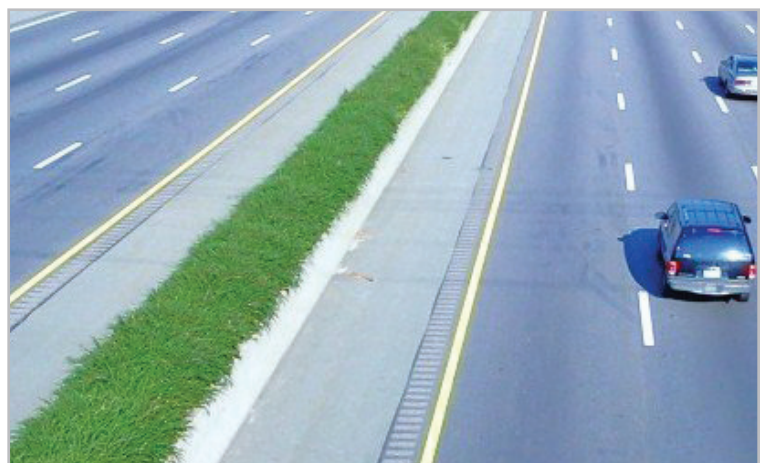
Many comments were received concerning the poor aesthetics of the proposed monolithic concrete median. A citizen summed it up by suggesting the use of a grass median and landscaping in the design. A typical grass median, like the one suggested, is shown in Figure 6.

The consultant considered proposing landscaping the median, but was unable to identify an organization willing to assume responsibility for ongoing maintenance. A 16-foot median is not suitable for NCDOT's typical wildflower program installation nor for a depressed grass median due to concerns for errant vehicles crossing the median and risking head-on collisions. A raised concrete median with grass should be considered by NCDOT, but there may be concerns with mowers damaging adjacent cars with flying rocks, etc. The minimum mowable width is 6 feet. The safety of maintenance workers is a concern and the practicality of closing lanes of traffic during maintenance activity may prove unpopular with likely motorist delays. The consultant considered sporadic installation of twin raised concrete jersey barriers (for crash worthiness) with a sufficient gap between the barriers such that plants or trees could be installed. The elevation above the street level should provide sufficient dirt and mulch so the underlying asphalt would not have to be demolished prior to installation. See Figure 7, for an example of this type of jersey barrier. A landscape architect should be consulted to identify drought and traffic exhaust tolerant plant and tree species that might not need permanent irrigation. The immature plants could be spray-watered for a while by passing water trucks, although that may require closing a lane of

Figure 6. US 17 in Scotts Hill



Figure 7. Example of planted median with jersey barriers



traffic in both directions during spraying. At both ends of the raised planter box, NCDOT will required crash-resistant attenuators (e.g. sand barrels) to minimize or avoid injury if an errant vehicle crashes into the end of the jersey barrier.

Public Comment Topic: Walking and Bicycling in Hampstead

Several comments were submitted asking for safe facilities to serve pedestrians and bicyclists. The following is one of the comments submitted anonymously:

“Don’t forget to consider the safety of bicyclists on Hwy 17. A separate pathway off the highway is a possibility. (I don’t and would not ride a bicycle along Hwy 17 for safety reasons).”

The consultant estimates that additional right-of-way may be required to build a multi-use path along US 17 in Hampstead, in places with exclusive right-turn lanes and in places where bulbs are recommended for U-turn movements. The long-term vision for existing US 17 includes safe facilities for both modes of travel. The anticipated funding sources to be used to build the median depend on working within existing right-of-way.

Presentation to Board of Commissioners 10/3/2011

M/A/B presented the recommended improvements proposed by the US 17/NC 210 Corridor Study to the Board of Commissioners. This presentation also included accident data, traffic volumes, existing and proposed traffic patterns and cost and funding considerations. Board members had questions about cost, access and the need for the NC 210 improvements. This presentation was not open to public comment.

Public Hearings

Multiple public hearings were held toward the end of the study process to solicit public comment on the Corridor Study. Below is a summary of these meetings.

Planning Board Meeting 11/1/2011

M/A/B presented the recommended improvements proposed by the US 17/NC 210 Corridor Study to the Planning Board. This presentation also included accident data, traffic volumes, existing and proposed traffic patterns and cost and funding considerations.

Several members of the Board asked to see studies that had been done previously in a similar situation that would show how much safer the study area would be if the center lane was replaced with a median. The Board also asked if signalization was included in the study and whether these signals would be part of a coordinated system. Seven members of the public gave comments about the project. All seven citizens were against the project, citing concerns about the negative effects on businesses by reduced access and potential safety concerns at U-turns; cost; desire for area-specific treatments, increased enforcement of speeding, or collector streets to reduce traffic on US 17. The Board concluded the meeting by stating that additional information regarding similar studies of safety reductions was needed before a recommendation could be made.

Board of County Commissioners Meeting 11/21/2011

M/A/B presented the recommended improvements proposed by the US 17/NC 210 Corridor Study to the Board of Commissioners. This presentation also included accident data, traffic volumes, existing and proposed traffic patterns and cost and funding considerations. Information requested by the Planning Board about safety studies was also presented.

Five members of the public gave comments about the project. Two citizens spoke for the project, stating that the corridor recommendations benefitted many parties and may not negatively affect local businesses. Three citizens were against the project, citing concerns about harm to local businesses; and increased accidents and speeding along the corridors. The Board concluded the meeting by stating that it will decide whether to support the recommendations, but will only be supporting the general concept of the recommendations for improving and assuring safety along the two corridors.

Planning Board Meeting 12/6/2011

Pender County's Senior Planner presented the Planning Board with the additional information requested at the previous meeting regarding accident types and locations, high crash areas along the project corridor, and how a median would impact safety and local businesses. A Board member made the motion to request that the US 17/NC 210 Corridor Study be taken into account by the Board and voted on such that the Hampstead Corridor would be safer. The vote carried 3-2 in favor of the motion.

Board of County Commissioners Meeting 12/12/2011

Mr. Kozlosky of the MPO stated that if the Board endorses the Corridor Study, DOT will design a median. The Board discussed traffic signals, turn-arounds and the possibility of additional public hearings. A member of the Board expressed concern about the reduced access of emergency vehicles to accidents. Another member of the Board made a motion to approve the resolution with the caveat that the Board holds one more public hearing; the motion died for lack of a second.

Board of County Commissioners Meeting 1/3/2012

Fourteen citizens spoke in the general comment portion of the Board of County Commissioners meeting. Eight spoke in support of passing the study citing safety as a priority for those travelling US 17. Four citizens spoke against the study with concerns about cost and effectiveness of the recommendations. Two citizens expressed concerns about safety but were neither for nor against the study.

The Board members asked NCDOT representatives whether the money for safety improvements could go toward the Hampstead Bypass and were told no. The Board expressed concern over details of the study but passed the resolution to endorse the concepts in the US 17/NC 210 Corridor Study.

6 Alternatives

This study had several constraints that all alternatives had to meet. All alternatives must be able to be implemented on a relatively short- to mid-term time and schedule. They must remain within the existing right of way to minimize costs and environmental impacts and fit funding program criteria. Alternatives must look at combinations of access management concepts. Projects must be phased in order to fit highly constrained budgets. Emergency Management Services (EMS) must not be hampered.

The study looked at strategies to address mobility and safety concerns on US 17 and NC 210 in Hampstead. A Preferred Access Plan was developed by the consulting team that has been forwarded as a recommendation to the Wilmington MPO, Pender County and NCDOT.

7 Recommendations

Continued and increased traffic law enforcement and construction of a network of secondary streets in Hampstead are recommended. A Preferred Access Plan for US 17 and NC 210 in Hampstead is also recommended. Each is discussed in more detail in this section.

7.1 Preferred Access Plan for US 17

The consultant recommends approval and subsequent implementation of the draft Preferred Access Plan (see Appendix C). Appendix B (Section B 9) includes a table describing how motorists would access some businesses in Hampstead with the median as proposed; it is only a partial list of altered access and is intended to be a guide. In addition to the design elements of the Preferred Access Plan, the following items are ideas to help guide the implementation of the Preferred Access Plan:

- NCDOT should use state and federal funding from all applicable funding programs to build a raised median and paved bulb-outs to facilitate U-turns at median openings on US 17 in Hampstead. The purpose of the median is

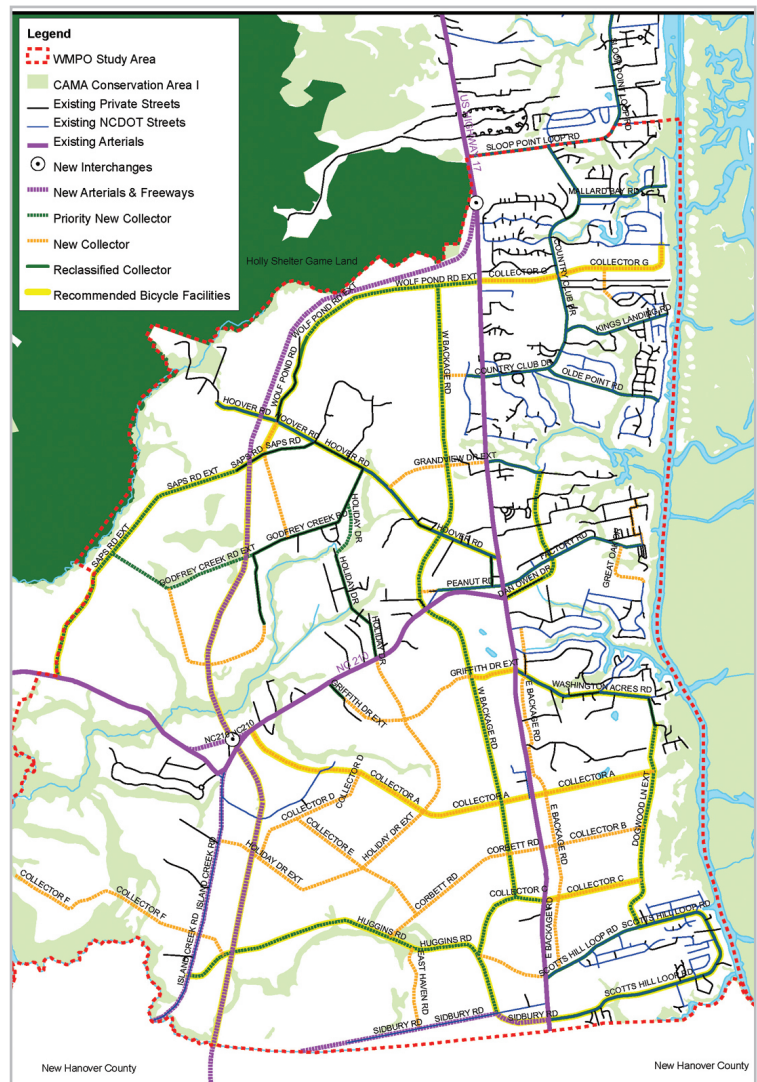
to eliminate unsafe left-turn movements by allowing left-turns and U-turns only at well-designed median opening intersections. The recently reconstructed intersections on US 17 in Scotts Hill and Sloop Point represent a good demonstration of how to implement the proposed access features in Hampstead.

- It is recommended that NCDOT staff determine the location, sequence and details of construction implementation of the median based on factors including, but not limited to, the following:
 - Crash history and severity
 - Volume of left-turn traffic
 - Observation of traffic conflicts and driver confusion or unsafe driving behavior
 - Speed studies
 - Pending new development along US 17
 - Other factors deemed important by NCDOT
- In short sections on US 17, where the median does not conflict with left-turn lanes, NCDOT should consider building a raised median that can be planted and maintained by Pender County, but must meet NCDOT requirements. Specifics of design and maintenance would be determined during the detailed design phase.
- Pender County would fund plant material, installation, water, maintenance, and replacement, as necessary, of irrigation equipment in each median section. Plant material could be selected by a committee of Hampstead residents appointed by the Pender County Board of Commissioners. They may select from a menu of options prepared by Pender County staff that takes into account survivability in a harsh roadway environment, the cost of material, drought tolerance, and maintenance needs. If the median is not maintained to the satisfaction of NCDOT, the planting beds may be removed and replaced with a monolithic concrete median designed by NCDOT.
- NCDOT should remove the dura-curb and raised plastic paddles from the median of US 17 at Hughes Road. These were installed in late 2010 as a temporary measure to preserve safe traffic operations and test this type of installation. NCDOT will replace it with a raised concrete median similar to the typical installation recommended on US 17 throughout Hampstead. The new raised concrete median will prohibit left-turn movements from Hughes Road to southbound US 17 and it will prohibit left-turns from the private driveway for the Beacon Center to northbound US 17. Replacement of the temporary median with a raised concrete median is expected to minimize the issue that surfaced, as an unintended consequence of the dura-curb, when many motorists attempted to maneuver around the dura-curb to make illegal left turns.
- Following a comparative evaluation of superstreets and traffic signals at Washington Acres Road, NCDOT would make the appropriate decision. Prior to installation at Washington Acres Road, it is recommended that NCDOT reconstruct the easternmost section of Washington Acres to create a 90-degree angle of intersection with US 17. The existing angle of intersection is 60-degrees which produces awkward turning movements and sight distance limitations. Although the new traffic signal will greatly enhance the sight distance issues, rebuilding Washington Acres Road to create a 90-degree angle of intersection will improve the ease and safety of turning movements at this location. NCDOT should also consider building a northbound deceleration lane/exclusive right-turn lane in advance of the Washington Acres Road intersection.
- NCDOT should evaluate the feasibility of acquiring ownership of the right-of-way on Dan Owen Drive from US 17 to the future intersection with a proposed connector street near the United States Post Office. The connector street is proposed as a 25 to 35 mph, two-lane complete street (sidewalks and bike lanes) that will connect Dan Owen Drive with Factory Road. There is vacant land that is privately owned; thus NCDOT must approach the land owner with a proposal that offers fair-market value for the land needed for the street plus a concession that provides appropriate access to the remainder of the property.

Collectively, public ownership of Dan Owen Drive and the connector street will create an alternate route for local traffic between homes on Factory Road and retail stores at the Hampstead Crossing shopping center anchored by Food Lion grocery store.

- NCDOT should build a median on US 17 from NC 210 to Hoover Road without a median opening at Factory Road/Peanut Road, and the flashing traffic signal at the Factory Road/Peanut Road intersection should be removed. This intersection is located too close to the signalized intersection of US 17 and NC 210, and the flashing signal creates confusion for some motorists who see signals at both intersections at the same time. Some added pavement on the northwest corner of the intersection of Peanut Road/US 17 (Atlantic Seafood corner) is recommended to provide easier southbound right-turn movements at this location. Three collector streets are recommended that could relieve some of the inconvenience created by the median; these are (1) a connector from Dan Owen Drive to Factory Road, (2) a connector from Peanut Road to NC 210, and (3) a connector from Peanut Road to Hoover Road. The latter would be just west of the Atlantic Seafood business and adjacent to the new Cypress Station development recently approved. Access to the traffic signal at Hoover Road and US 17 would be particularly helpful to Atlantic Seafood which generates substantial truck traffic. A connector street between Peanut Road and NC 210 would also help Atlantic Seafood truck movements.
- Additional collector streets shown in Figure 8, taken from the *2007 Coastal Pender County Collector Street Plan* can be built by the appropriate property owners before or after construction of the US 17 median. A network of secondary streets may aid residents, business owners and their customers in accessing areas in Hampstead more conveniently than the planned system of median openings and U-turns on US 17. There is unlikely to be public funding available to build collector streets; however, planning, design and maintenance assistance may be discussed through contact with regional NCDOT officials or Wilmington MPO staff.
- At each signalized intersection and median opening on US 17, it is recommended that NCDOT install backplates behind each signal head to improve visibility. When the signal head has no backplate, the light and color can get lost in the background. Also, larger cross street-name signs should be posted, or perhaps an advance sign indicating which cross street is next.

Figure 8. 2007 Coastal Pender County Collector Street Plan



7.2 Preferred Access Plan for NC 210 west of US 17

The consultant recommends approval and subsequent implementation of the draft Preferred Access Plan (see Appendix C) which includes all of the following elements.

An average daily traffic (ADT) volume of 11,000 vehicles per day on a four-lane divided road would provide level of service (LOS) A for motorists while a 2- or 3-lane section would provide LOS E. For this reason, it is recommended to reserve a 120-foot wide corridor which is greater than the existing 100 foot right-of-way; thus, any development application fronting on NC 210 would be expected to provide 10 feet for a public right-of-way. Initial construction of a widened NC 210 could be a two-lane median-divided section with paved shoulders, a ditch on both sides and a multi-use path on one side. The multi-use path would be built at the edge of the right-of-way to maximize distance from the travel way and ensure adequate width for a drainage ditch. This section can be widened to a four-lane divided section when the traffic volume exceeds 11,000 vpd and widening is warranted. The paved shoulders will provide an adequate bikeway if debris is swept periodically. It would also serve as a breakdown lane for motor vehicles.

7.3 Opinion of Probable Construction Cost

A conceptual-level opinion of probable construction cost for the preferred access plans are summarized in Table 4. This estimate does not include the implementation of a multi-use path. The opinion of probable construction cost for this level of planning is developed by estimating the quantities of major construction items, applying unit costs to those items, and then adding percentages for miscellaneous items and mobilization, as well as for engineering and contingencies. Quantities for the major items are based on the conceptual plans and typical sections, and unit costs are based on recent NCDOT bid pricing. These are preliminary estimates and will need to be refined as future decisions are made, and further details are known.

Table 4. Opinion of Probable Construction Cost

Segment Description	Distance	Construction Cost
US 17 – add concrete median to convert 5-lane to 4-lane divided with median	5.54 miles	\$7,360,000
NC 210 – reconstruct existing 2-lane highway to 2-lane divided with raised grass median, wide paved shoulders and a 10-foot multi-use path along the right-of-way line	3.65 miles	\$7,880,000

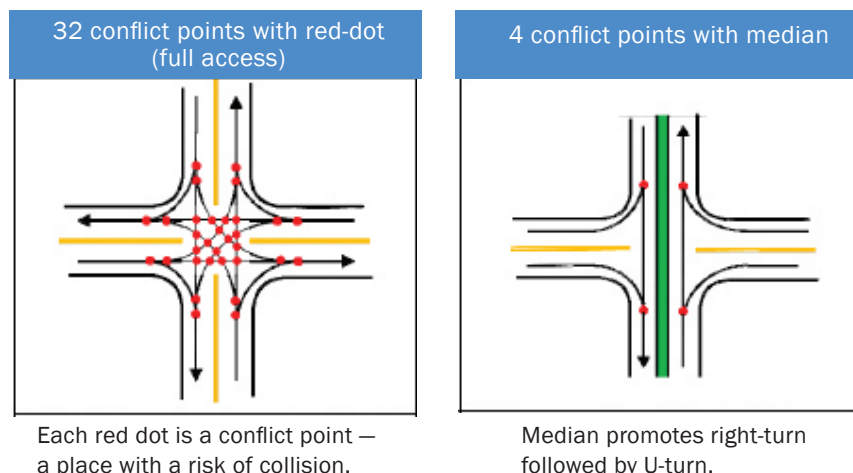
7.4 Access Management Initiatives

Access management refers to controlling ingress and egress along a corridor in order to maintain or enhance the capacity and preserve public safety along the corridor. Access management initiatives include providing full left- and right-turn movements only at major intersections, requiring developers to provide access between adjacent residential neighborhoods or connectivity between parking lots for commercial properties, and limiting the number of driveways within a corridor.

Based on several studies, five-lane sections with center turn lanes have higher crash rates than four-lane median-divided roads. This is due partly to a much greater number of conflict points. Figure 9 shows the conflict points at a full movement intersection as compared to a right-in/right-out intersection resulting from implementing a median.

Recent research suggests that any facility with an Average Annual Daily Traffic (AADT) volume of 28,000 vehicles per day (vpd) or greater in the current year or within the 20 year horizon should be median divided for safety concerns.

Figure 9. Conflict points



As discussed previously, the current daily volumes on US 17 exceed this threshold and will continue to exceed this threshold in future years. According to the *NCHRP Report 420, Impacts of Access Management Techniques- TRB 1999*, indirect left-turns, or U-turns, are increasingly being used as an alternative to direct left-turns. This maneuver has been reported to produce safety, capacity and travel-time benefits. By implementing right-turns followed by U-turns in place of direct left-turns, reductions of 46% in average crash rate and 63% in injury/fatal crash rates have been reported (*Superstreet Benefits and Capacities- NCSU-ITRE for NCDOT 2010*). Specific research has also been done to evaluate the safety impact of replacing an existing center left-turn lane with a median. According to the *Access Management Manual- TRB 2003*, this retro-fit can result in a 15-57% reduction in overall crashes on a 4-lane road. One specific case study resulted in a 37% reduction in overall crash rate and a 48% reduction in injury crash rate.

It can be expected that the implementation of medians along the study corridor will result in improved safety. Due to the nature of vehicle collisions, many variables affect the rate of crashes - some of which cannot be predicted through models. However, a substantial amount of research has been completed to date, resulting in prediction models for typical crash reductions due to certain countermeasures that are put into place. Based on data reported in the *FHWA Desktop Reference for Crash Reduction Factors, FHWA 2007*, the installation of a median can be expected to reduce the overall crash rate by approximately 15% and has been shown to reduce the number of fatal crashes by approximately 65%. The plan also includes other improvements such as exclusive right-turn lanes, signal phasing improvements and realignment of side streets to improve sight distance. These countermeasures, although not directly related to median installation, will also factor into the overall improved safety of the corridor.

Additionally, a frequent response to the implementation of medians is the concern that restricting left-turn movements will hurt businesses in the area. Access management strategies have no impact on the demand for goods and services within an area. Providing a safer, more efficient environment for customers through the use of medians has proven to actually improve businesses in some areas. “Before and After” studies in Florida, Iowa, Minnesota, and Texas have all shown that most businesses (86%) do as well or better after the installation of a median in front of the business. The type of business that medians are most likely to negatively impact are those that rely on pass-by business, such as gas stations or fast food chains. A recent report on the economic effects of access management techniques in North Carolina, completed by NCSU Institute for Transportation Research and Education and the UNC Highway Safety Research Center, summarizes how customers reported median installation to have no effect or a positive effect on their decisions to use certain businesses. At sit-down restaurants, customers’ decisions were affected in this way 83% of the time; at gas stations 50% of the time; and at fast food restaurants 69% of the time. Recommendations from the

Citizens Informational Workshop on this issue were taken into account. Because the area is predominately commercial, there is an expectation that over time individual property owners will work together to develop cross access between adjacent parcels. The existing street network in the study corridor does not provide good secondary connectivity. Installing a raised median on US 17 is likely to encourage more private property owner discussions about building a secondary street network.

7.5 Collector Street Network Recommendation

Limited implementation of the collector street construction recommendations have been accomplished since the 2007 adoption of the Coastal Pender County Collector Street Plan. There are some inherent problems with the plan that could be corrected with an update. Specifically, updates could include:

- Environmental concerns; new and better mapping information showing the extent of wetlands. Some of these wetlands are in the path of proposed collector streets.
- Economic concerns; hardship claimed by developers who may prefer cheaper road construction standards and loss of a few buildable parcels by building through streets instead of cul-de-sacs.

To mitigate these concerns and launch an aggressive program of completing a collector street network, the following is recommended:

- Update the study to identify new road alignments that avoid or minimize wetland damage.
- Create collector street design standards that allow narrow width streets to minimize speeding, incorporate natural traffic calming measures including changes in direction and street name changes, and allow eyebrow type street insets within the development giving developers a slight parcel-bonus to offset their economic hardship claim.
- Pender County could participate in regional discussions and efforts to supplement inadequate state and federal transportation funding. Recommendations in the Cape Fear Commutes 2035 Transportation Plan include the following:
 - Regional Transportation Commission — regional partners should investigate forming a regional transportation commission that would have the authority to generate revenue from taxes and transportation user charges, such as tolls, to pay for future transportation projects of regional importance. Commission membership would be comprised of representatives from the three counties in the region.
 - Tax Increment Financing (TIF)/District Improvement Financing (DIF) — TIFs and DIFs are innovative financing tools that target districts or specific projects for redevelopment through use of tax increments. A tax increment is the difference between the beginning assessed value of the targeted property in its underdeveloped state and the assessed value going forward, as the planned improvements develop.
 - Adequate public facilities requirements — which often address localized deficiencies, the monies can often be pooled to fund larger projects beyond the scope of a single developer. The monies raised from these requirements also have the potential to free up funds for other projects.

The benefits of an efficiently interconnected collector street network are as follows:

- Distributes traffic and potential congestion
- Relieves burden on US 17 by giving local citizens alternate routes
- Creates bicycling and walking routes on low volume, low speed streets
- Improves emergency response time
- Improves public service delivery
- Increases water pressure in homes and businesses

7.6 Land Use and Policy Review

Evaluation of Existing Land Use Patterns and Recommendations

The US 17 Corridor is classified as Mixed Use in the 2010 Comprehensive Plan and is zoned predominantly as General Business, Office & Institutional and Planned Development. No activity nodes or centers have been designated in current or previous plans. Consequently, individual business offices and strip commercial development are the predominant land uses. Many of these establishments were built prior to the NCDOT implementing stricter driveway access regulations in 2003. Consequently, there are numerous driveways too close together resulting in conflicting turning movements and an overabundance of traffic accidents. It is difficult to convert existing strip development into more sustainable development. There are vacant tracts remaining along the US 17 corridor suitable for mixed use development. The construction of a median may induce the assembly of smaller parcels into larger ones to access median openings.

The NC 210 Corridor is classified as Mixed Use in the vicinity of US 17 and as Suburban Growth along the remaining section in the study area. Most of the NC 210 Corridor is zoned as Residential Performance. Much of the NC 210 Corridor is still undeveloped which affords the opportunity to initiate better driveway and access management tools as well as conduct a land use study in preparation for anticipated greater traffic and development pressures once the Hampstead Bypass is built.

The Rocky Point/Topsail Water and Sewer District is currently providing water services to portions of the study area with plans to extend water service along NC 210 within the next three years. Integra is now conducting survey work and designing the proposed sewer system that will serve portions of US 17 and NC 210. These utility improvements will support mixed-use development that may provide better opportunities to implement improved driveway and access designs.

The 2009 Coastal Pender Small Area Plan includes future land use plans for the US 17 corridor. As shown in Figure 10, major portions of US 17 within the study area are planned for future mixed-use development, which will support the planned suburban growth of areas located west of US 17.

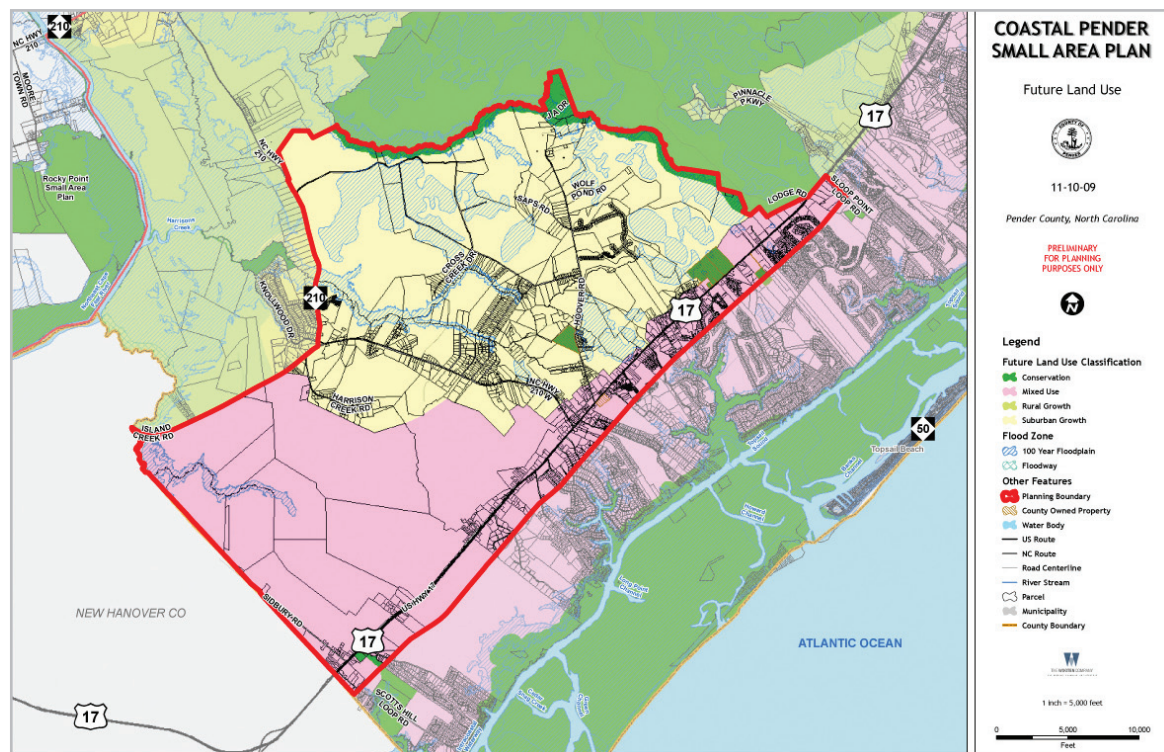
The NC 210/US 17 Bypass interchange provides a special opportunity to create an attractive commercial node at that intersection. A neighborhood planning effort should be undertaken in the near future to create several land use scenarios or even a design charrette for that area.

The Pender County Unified Development Ordinance (UDO) was adopted in June 2010, and has been amended as recently as September 2011. This document is intended to provide specific guidelines for development to ensure safe and efficient development occurs. As new development continues along the Hampstead US 17 and NC 210 corridors, local authorities should ensure adherence to the UDO and take advantage of opportunities that present themselves to make improvements to traffic flow and access management under these guidelines, including the closure or consolidation of driveways along US 17. This usually occurs in the review and approval process for new projects as well as revisions and land use changes for existing development.

Require Traffic Impact Analysis for Major Developments

Even though existing and future traffic counts are required by the Ordinance for some major developments, a Traffic Impact Analysis is not mentioned. A traffic analysis should be required for any project generating more than 100 peak hour trips. These studies enable local governments to mitigate the impacts of additional traffic during the project approval process. Several jurisdictions within the MPO have already adopted guidelines and processes for completing these studies.

Figure 10. 2009 Coastal Pender Small Area Plan – Future Land Use



Special Corridor Zoning Requirements

Zoning maps for the corridors show that most of the land is already zoned for commercial or planned development with residential properties still predominate along the NC 210 corridor. Future land use patterns are already determined by the development regulations within these districts. Any modifications to these land use scenarios will require a zoning change or the addition of new regulations that may be written especially for the corridors. This would be an easy way to provide additional oversight in the development review process with a special emphasis on the transportation issues facing the Hampstead area. Nearby jurisdictions have utilized this approach to improve the functionality and appearance of their corridors.

Following an update of the Plan, incorporate transportation recommendations from the Coastal Pender Collector Street Plan into the UDO including recommendations for improved roadway interconnectivity and shared driveways and parking. Many of the WMPO 2007 Collector Street plan recommendations still need to be incorporated into the latest UDO ordinance.

7.7 Traffic Law Enforcement Recommendation

Currently, Pender County has a mutual enforcement relationship and agreement with the North Carolina Highway Patrol to enforce traffic laws on US 17. Five deputies routinely patrol US 17 in Hampstead. They issue an average of 175 speeding citations each month. Recently, private donations supported the purchase of a digital read-out portable radar speed trailer that is now in use in Hampstead.

According to Pender County Manager Rick Benton's report to the Board of Commissioners on May 2, 2011, priorities for the 2011-2012 budget regarding public safety are to maintain current force levels, offset the cost of new mandatory requirements that increase jail detention costs, and fund a new jail/law enforcement center. The budget shows a

15 percent increase over last year, but with the loss of 4 staff positions (from 91 to 87). One priority for the coming fiscal year is to begin planning for a new jail / law enforcement center. With adoption of the US 17 / NC 210 Corridor Study and Pender County approval, it is recommended that Pender County add traffic law enforcement personnel on US 17 in Hampstead in the ensuing budgets beginning with 2012-2013 through the mutual enforcement relationship with the State Highway Patrol. In addition to speeding citations, the enforcement teams should continue to enforce red-light running violators, tailgating, and reckless driving including using the center turn lane to pass. If necessary, Pender County Sheriff Carson Smith should initiate discussions with the courts and judges in Pender County to increase the percentage of cited motorists whose violations are upheld by the court system. There must be a financial penalty for motorists to take traffic laws seriously. Ultimately, Hampstead should have a reputation similar to that created by the Town of Holly Ridge; that is, “if you speed here, you’ll get a ticket”.

8 Policy Recommendations

8.1 Access Management

Future decisions concerning land use along US 17 should continue to follow the adopted land use plans and the vision the residents want for this area. These land use decisions should take into account best practices for access management such as driveway density (to consolidate or eliminate driveways where possible) and required connectivity between commercial properties.

8.2 Design Elements

Typical Section — the basic typical section for US 17 is proposed to be a raised concrete median with two travel lanes in each direction and left-turn lanes at each median opening. Right turn lanes will be provided at key intersections.

Median — the median should be designed as a raised concrete median for 45 mph operations. However, in areas where the spacing between median openings is long enough, a raised grass median with mountable concrete curb and gutter, along with planting, if desired, that meets NCDOT requirements, may be installed if Pender County agrees to pay for ongoing plant material and maintenance. NCDOT will fund a raised concrete or grass median, but will not fund landscape planting materials other than grass, nor the maintenance of any landscaping.

Median Openings and U-turn Accommodations — median openings are recommended at the following locations in the study corridor:

- **Washington Acres Road** — superstreet, or a full median opening, with traffic signal when warranted and reconstruct Washington Acres Road between Center Drive and US 17 so that the center line of its intersection with US 17 shifts approximately 130 feet south of the existing intersection center line and the angle of intersection approximates 90 degrees.
- **Hughes Road** — leftover type median opening permitting only the northbound left-turn (into Beacon Center). Only right-turn movements would be allowed to and from the side street.
- **Deerfield Drive** — superstreet design with paired leftovers for left-turn movements from US 17. Paved U-turn bulbs would also be built 800 to 1,000 feet to the north (at Headwaters Drive) and south to accommodate U-turn movements.
- **NC 210/Dan Owen Drive** — full median opening maintaining existing traffic signal.

- **Factory Road/Peanut Road** — full median would be constructed restricting all left-turn movements. Only right-turns to and from side streets would be allowed. A paved U-turn bulb would be built 600 feet to the north to accommodate vehicles wishing to go south from Factory Road. A southbound right-turn would be constructed.
- **Atlantic Seafood** — a U-turn bulb is recommended in the vicinity of a platted, but unpaved, road adjacent to the Atlantic Seafood site.
- **Hoover Road** — full median opening maintaining existing traffic signal.
- **Forest Sound Road** — full median would be constructed restricting all left-turn movements. U-turn bulbs are recommended approximately 250 feet north of Forest Sound Road to serve northbound and southbound U-turns from the paired left-turn median opening located just north of this intersection.
- **Hampstead United Methodist Church** — a future collector street is planned just north of Hampstead United Methodist Church. The street could serve one parcel, in which case it would intersect US 17 with a right-in / right-out only configuration. The collector street could however be extended by private property owners to serve multiple parcels; by doing so, sufficient traffic volume may be served such that a traffic signal on US 17 or a superstreet type median opening may be warranted. If approved by NCDOT, then the collector street, median opening and/or traffic signal would be funded by private sources.
- **Loblolly Trail** — U-turn bulbs are recommended approximately 800 to 1,000 feet north of the intersection of US 17 and Loblolly Trail. A bulb would be built on both sides of US 17, to serve northbound and southbound U-turns.
- **Grandview Drive** — a leftover type median opening that provides southbound left-turn movements from US 17, but does not serve left-turns from Grandview Drive onto southbound US 17.
- **William Store Road** — full median would be constructed restricting all left-turn movements. U-turn bulbs are recommended approximately 700 feet north of the intersection of US 17 and William Store Road to serve northbound and southbound U-turns from the paired left-turn median opening located just north of this intersection.
- **Country Club Drive/Jenkins Road** — full median opening maintaining existing traffic signal. No widening for u-turns. U-turn bulbs are recommended approximately 1,300 feet north of the intersection of US 17 and Country Club Drive/Jenkins Road to serve northbound and southbound U-turns from the paired left-turn median opening located north of this intersection.
- **Topsail Middle/Topsail Elementary Schools** — full median opening maintaining existing traffic signal. No widening for U-turns.
- **Transfer Station Road** — a leftover type median opening that provides southbound left-turn movements from US 17. Superstreet or full median opening and traffic signal if warranted and approved by NCDOT, to be funded by private sources.
- **Leeward Lane** — full median would be constructed restricting all left-turn movements. U-turn bulbs are recommended approximately 1,000 feet north of the intersection to serve northbound and southbound U-turns from the paired left-turn median opening located north of this intersection.
- **Long Leaf Drive** — leftover median opening for southbound left turns. Only right-turn movements would be allowed to and from Long Leaf Drive.
- **Sloop Point Loop Road** — full median opening maintaining existing traffic signal. No widening for U-turns.

It should be noted that in addition to the specific median openings listed above, median crossings and openings for emergency services such as fire stations and EMS stations will be considered during the design phase of the project. Coordination with people such as the fire chief will be important during this phase of the process.

8.2.1 Bike Lanes

To create the median, each of the four travel lanes must be narrowed by one foot resulting in 11-foot lanes. A wide outside lane suitable for a shared lane (motor vehicle and bicycle) requires a minimum of 14 feet, but is preferably 15 feet wide. A bicycle lane separated from the travel lane with a solid white stripe would require an additional 4 feet of pavement on each side of the roadway. Both bikeway options would require widening on the outside edges of US 17. Bike lanes are not recommended at this time due to the construction cost (widening of pavement, replacement of curb and gutter, replacement of drainage facilities, etc.,) and the potential cost of acquiring additional right-of-way. This recommendation can be revisited once confirmation of final design details for the construction of the Hampstead Bypass is determined, and the need for long-term improvements for US 17 through Hampstead can be further defined.

8.2.2 Sidewalks

In most places on US 17 in the study area, there is sufficient space within the existing right-of-way to provide a multi-use path on both sides of US 17 in Hampstead. Figures 11 and 12 show the proportion of area of Hampstead within walking distance (one mile) of the Food Lion, Pender County Library, and Topsail Schools. These figures also show the proportion of area within cycling distance (five miles).

Construction of a multi-use path on both sides of US 17 would improve the safety of people walking and cycling. Based on conceptual design layouts on aerial photos, a ten-foot wide multi-use path may fit within the existing right-of-way on both sides of US 17 in Hampstead. The right-of-way width is consistently 100 feet wide. The typical section now ranges from 60 feet up to 90 feet where there are right-turn lanes, with curb and gutter on both sides. In the segments of US 17 without right-turn lanes, it is conceptually feasible to add a ten-foot multi-use path on both sides of the road. One concept for the design is to provide a three-foot wide grass strip behind the back of curb on each side, a ten-foot wide multi-use path, and two feet behind the path/sidewalk for a utility strip. In addition to right-turn lanes, other potential conflicts may arise with one or a combination of the following features:

- Underground or above ground utilities
- Drainage ditches
- Culverts
- Vertical elevation / slopes
- Buildings at the edge of right-of-way
- Parking lots at the edge of right-of-way
- Plans to build paved bulb-outs to handle U-turn movements on US 17

There is a small cemetery which would require narrowing the path along that property. There are some areas where construction limits would be outside of the right of way due to existing fill sections. As one example, the Scotchman Store at Country Club and US 17 would be affected with a ten-foot path built on the east side of US 17.

Figure 11.
Walking and biking to school in Hampstead

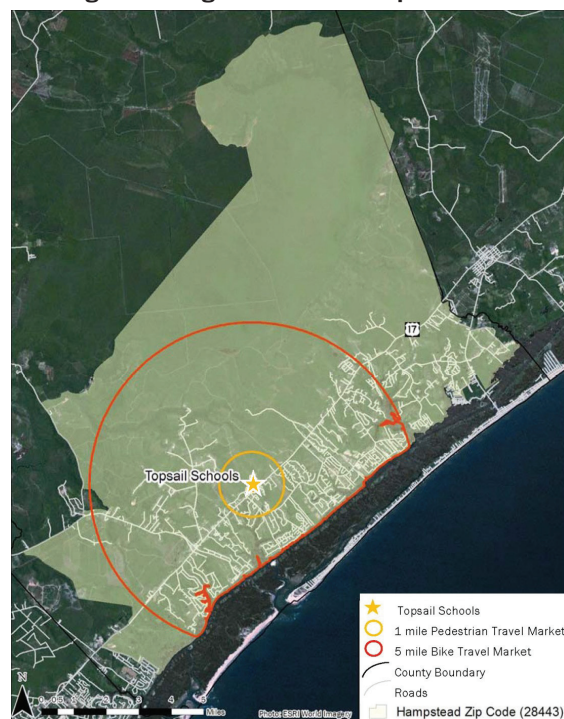
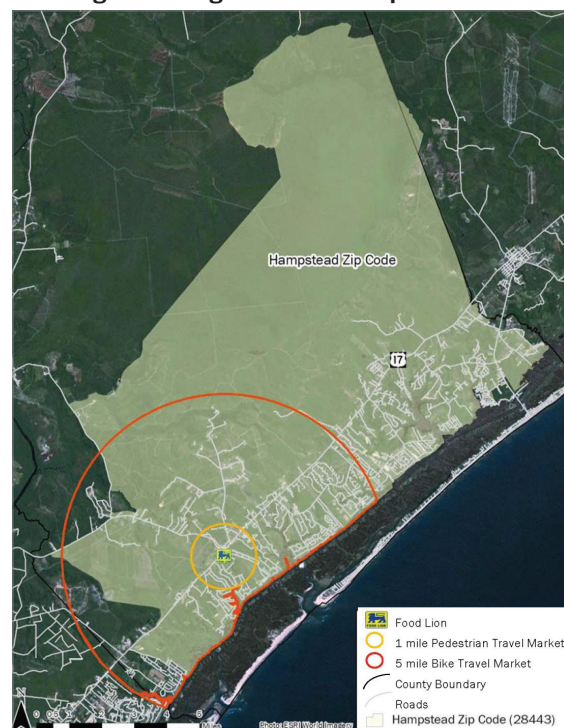


Figure 12.
Walking and biking to store in Hampstead



9 Implementation Plan

9.1 Project Phasing

NCDOT's goal is to obtain funding for the entire project and implement the recommended improvements under one contract. However, if funds are limited they will determine the sequence of project phases based on need and funding amounts. At this point, NCDOT has identified some priority segments for improvement based on efficiency and need for safety at certain locations. Table 5 summarizes the top three (3) priorities for improvement. These improvements would be implemented as funding becomes available, as discussed below.

Table 5. Improvement Implementation Priorities

Priority	Location	Specific Improvement(s) and Comments
1	US 17 at NC 210/Dan Owen Drive	Median implementation and signal improvements
2	US 17 at GoGas/Hardware/Loblolly Drive Commercial Area	Median implementation and driveway consolidation
*	US 17 at Hoover Road	May be implemented as part of Priority 1 or 2; Median implementation and signal improvements
3	US 17 at Washington Acres Road	Intersection realignment and speed enforcement

9.2 Project Funding

A combination of state and federal funding sources to be identified by NCDOT may be used. Funding from the Hazard Elimination Program will be pursued; this program is intended to develop larger improvement projects to address safety and potential safety issues. The program is funded with 90% federal funds and 10% state funds. The cost of Hazard Elimination Program projects typically ranges between \$400,000 and \$1 million. A Safety Oversight Committee (SOC) reviews and recommends Hazard Elimination projects to the Board of Transportation (BOT) for approval and funding. These projects are prioritized for funding according to a safety benefit to cost (B/C) ratio, with the safety benefit being based on crash reduction. Once approved and funded by the BOT, these projects become part of the State Transportation Improvement Program (STIP).

9.3 Conclusion

US 17 in Hampstead is a strategic highway corridor in North Carolina. It serves a wide range of travel needs in the local Hampstead community and it is the key highway link connecting Wilmington with Jacksonville and New Bern. Furthermore, the route is heavily used by people visiting nearby beaches and traveling on long-distance trips. There are many commercial retail businesses fronting both sides of US 17 in Hampstead that depend on access for their customers. The combination of different user groups, length of trip, and drivers' expectation for reasonable travel times are often in direct conflict with local desires for access to businesses. In fact, the crash records reflect numerous auto crashes with one vehicle reported traveling 45 mph or more colliding with another vehicle traveling 5 mph or less. Sight distances from driveways are generally adequate, but motorists departing from businesses sometimes take unnecessary risks or simply don't adequately judge the speed of oncoming traffic. The collision rate on US 17 in Hampstead is 16 percent higher than expected when compared with similar types of 5-lane roads in North Carolina.

Recent access management improvements in nearby Scotts Hill and Sloop Point offer a successful demonstration of what is now recommended in Hampstead. A median is recommended in Hampstead with only limited median

openings. These openings would be spaced at distances that provide opportunity for U-turns without excessive extra travel length, while maintaining adequate distance to achieve the safety benefit of this type of facility. Each median opening will be well-designed with exclusive left turn lanes, tapers and superstreet configurations to accommodate U-turns. Opportunities will be created for large tractor-trailer trucks to make U-turns. Based on examples of this facility type being implemented, it is expected that the crash rate in Hampstead will be reduced after this corridor is converted to a median divided facility with superstreet configurations along its length.