

FEASIBILITY STUDY
Military Cutoff Road Extension
From Existing Military Cutoff Road (SR 1409) in Wilmington
To Proposed T.I.P. Project R-2405A (US 17 Wilmington Bypass)

New Hanover County

Division 3

FS-0303B

Prepared For:

N.C. Department of Transportation



 Derrick W. Lewis, P. E. Feasibility Studies Unit Head	<u>6/22/04</u> Date
 Nicole M. Hackler Feasibility Studies Engineer	<u>6/22/2004</u> Date

Prepared By:



Rummel, Klepper & Kahl, LLP
5800 Faringdon Pl., Suite 105
Raleigh, NC 27609
Ph: 919-878-9560 Fax: 919-790-8382

 J. T. Peacock, Jr., P. E. Senior Associate	 B. Keith Skinner, P. E. Associate	<u>6/21/04</u> Date
--	---	------------------------

**Military Cutoff Road Extension
From Existing Military Cutoff Road (SR 1409) in Wilmington
To Proposed T.I.P. Project R-2405A (US 17 Wilmington Bypass)**

**New Hanover County
Division 3
FS-0303B**

I. General Description

This feasibility study addresses the extension of Military Cutoff Road (SR 1409) on new location from existing Military Cutoff Road (SR1409) in the City of Wilmington northward to proposed T.I.P. project R-2405A (US 17 Wilmington Bypass) in New Hanover County (see Figure 1). This study proposes a four-lane divided roadway with 12' travel lanes, a 23' raised grass median and 4' full-depth paved outside shoulders to be constructed within a state maintained right-of-way of 150'. This roadway will be access controlled, meaning there will be no direct driveways onto the facility and access will only be allowed at a limited number of major street junctions. Additional median openings will be evaluated in future design stages. This study also includes the extension of Murrayville Road (SR 1322) to the proposed Military Cutoff Road Extension. The total length of the project varies from 3.6 miles to 4.4 miles depending upon the alternative selected.

This study is the initial step in the planning and design process for this project and is not the product of exhaustive environmental or design investigations. The purpose of this study is to describe the proposed project, including costs, and to identify potential problems that may require consideration in the planning and design phases.

II. Need for Project

The Greater Wilmington Urban Area MPO currently classifies Military Cutoff Road Extension as a proposed major thoroughfare. This study project begins just inside the Wilmington City limits and is proposed to extend to the future US 17 Wilmington Bypass. When completed, this new facility will provide much needed access to northern parts of New Hanover County. Military Cutoff Road Extension is intended to include multiple access points, which should increase the accessibility and mobility in this region of the county. This project would provide an alternate route to US 17, I-40 and College Street and would also help to eliminate some of the congestion currently occurring on Market Street and Gordon Road. The New Hanover County Board of Commissioners supports this project.

The project area is primarily residential with a few businesses located at the southern portion of the project within the City limits. This study identifies probable impacts to properties within the proposed footprint. More detailed impacts will be identified and evaluated in later design stages.

Two major subdivisions are currently under construction along Torchwood Boulevard, Lendire Road and Putnam Drive. Ogden Park and Eaton Elementary School are located just north of US 17 and Gordon Road along the proposed project. Blair Elementary, Noble Middle and Ogden Elementary Schools are also in the vicinity of the project study area. The area at the northern end of the project, near the proposed US 17 Wilmington Bypass, is mostly wooded with isolated wetlands but has potential for future growth. Commercial establishments are located along US 17 and Military Cutoff Road (SR 1409) in the southern area of the project study.

The population of New Hanover County has increased from approximately 120,300 to 160,300, an increase of 33 percent between 1990 and 2000. In addition to tourism and retirees, some of the major industries in Wilmington include Biotech, Chemical, Construction, Marine, Packaging and Equipment, Retail, and Service industries.

III. Adjacent Projects

There are four proposed NCDOT projects adjacent to this study project; T.I.P. Projects R-2405A, R-3300, U-2734, and U-3831. First, T.I.P. Project R-2405A is a four-lane divided roadway on new location from I-40 in Wilmington to Market Street/US 17 northeast of Porter's Neck Road (SR 1402). R-2405A is under construction and the estimated completion is mid-year 2006. R-2405A is to be designated as the US 17 Wilmington Bypass. Second, T.I.P. Project R-3300 is a multi-lane controlled access facility on new location that will serve to bypass the Hampstead area. Several of the studied alternatives for the R-3300 project would connect to the R-2405 project. Third, T.I.P. Project U-2734 widens Military Cutoff Road (SR 1409) to a four-lane divided curb-and-gutter section north of Eastwood Road/US 74 to Market Street/US 17. U-2734 is projected to begin construction in 2004. Fourth and last, T.I.P. Project U-3831 resurfaces and widens Gordon Road (SR 2048) to a four-lane facility from the NC 132 interchange to west of Market Street/US 17 in 2010. U-3831 is on the NCDOT Division 3 North Carolina Moving Ahead 2005 program list to widen to three lanes in 2005. These projects each could connect to the Military Cutoff Road Extension study project.

IV. Studied Alternatives

This Feasibility Study evaluates four alternatives, each of which extends Military Cutoff Road (SR 1409) to the proposed T.I.P. project R-2405A (US 17 Wilmington Bypass). Refer to Figure 1 for alternative locations and Figure 2 for proposed typical sections. The following section describes each of the four studied alternatives and the proposed improvements associated with each. Please note that additional access to the proposed Military Cutoff Road Extension via median openings will be determined in future design stages.

Alternative A

Military Cutoff Road Extension from Existing Military Cutoff Road (SR 1409) at Station Road (SR 1365) to Proposed T.I.P. Project R-2405A (US 17 Wilmington Bypass)

Alternative A begins at the existing signalized intersection of Military Cutoff Road and Station Road (SR 1365) and continues to the northwest to Market Street/US 17, where a grade separation is proposed eliminating access to Market Street at this location (See Figure 1). The extension then continues in the same direction to Gordon Road (SR 2048) at which an at-grade signalized intersection is proposed, including some widening along Gordon Road. This alternative includes proposed Cul-de-Sacs on Netherland Drive, just south of Gordon Road, preventing direct access to the Extension. In addition, the existing traffic signal at Gordon Road and Eaton Elementary/Netherland Drive will be removed and a new elementary school driveway is proposed at the eastern end of the school parking lot (approximately 225' further away from the proposed Gordon Road/Military Cutoff Road Extension intersection). From the Gordon Road intersection, Alternative A utilizes Ogden Park Drive West as it travels along the west side of the Eaton Elementary School and Ogden Park properties. Eaton Elementary School will also have right-in right-out access onto The Military Cutoff Road Extension from its northern most parking lot. This alternative continues northward, crossing planned and recently constructed subdivision roads: Putnam Drive, Lendire Road and Torchwood Boulevard. Access points to Military Cutoff Road Extension from these developments will be determined in future design stages. Military Cutoff Road Extension utilizes, as much as possible, the existing 80' Right-of-Way offered to the County by the developers. As stated previously, this study also includes extending Murrayville Road (SR 1322) eastward from its current terminal to the proposed Military Cutoff Road Extension just south of Plantation Road. The project continues to the north to the location of the proposed T.I.P. project R-2405A (US 17 Wilmington Bypass), where a conventional diamond interchange with accommodations for loops in the southwestern and northeastern quadrants is proposed. Alternative A proposes a four-lane divided roadway with 12'

travel lanes, a 23' raised grass median and 4' full-depth paved outside shoulders to be constructed. This roadway will be a full control-of-access facility within a state maintained right-of-way of 150'. The total length of Alternative A is approximately 4.40 miles.

It is anticipated that **Alternative A** will require the relocation of 16 residences and 30 businesses. The total cost, including construction and right-of-way, is estimated to be \$42,400,000.

Construction.....	\$ 28,500,000
<u>Right-of-way.....</u>	<u>\$ 13,900,000</u>
Total Cost.....	\$42,400,000

Alternative B1

Military Cutoff Road Extension from Existing Military Cutoff Road (SR 1409) at Market Street/US 17 to Proposed T.I.P. Project R-2405A (US 17 Wilmington Bypass)

Alternative B1 begins at the existing Military Cutoff Road (SR 1409)/ Gordon Road (SR 2048) intersection and travels northwest to Market Street/US 17, where a Single-Point Urban Interchange (SPUI), bridging the Extension over US 17 is proposed. The new interchange ramps will be controlled by one traffic signal on Market Street/US 17. Some additional lanes will be needed on Market Street/US 17 to accommodate dual left-turn lanes and ramp acceleration lanes. As a result of the control-of-access at the interchange, two service roads will be needed for this alternative. A service road in the northeast quadrant of the proposed interchange off of Ogden Park Drive East is needed to provide access to the properties in the immediate vicinity. A service road connection to Prospect Cemetery Road (SR 1408) is needed from the proposed residential road at the eastern corner of the cemetery. From the proposed interchange at Market Street/US 17, Alternative B1 travels on to proposed T.I.P. project R-2405A (US 17 Wilmington Bypass). A grade separation is proposed over Ogden Park Drive to maintain connectivity within the project area. Alternative B1 avoids the power station south of the Ogden Park and crosses the major transmission lines just north of the park. As the alignment leave the park property, Alternative B1 ties into and follows the Alternative A alignment continuing northward, crossing planned and recently constructed subdivision roads: Putnam Drive, Lendire Road and Torchwood Boulevard. Access points to Military Cutoff Road Extension from these developments will be determined in future design stages. Military Cutoff Road Extension utilizes, as much as possible, the existing 80' Right-of-Way offered to the County by the developers. As stated previously, this study also includes extending Murrayville Road (SR 1322) eastward from its current terminal to the proposed Military Cutoff Road Extension south of Plantation Road. The project continues to the north to the location of the proposed T.I.P. project R-2405A (US 17 Wilmington Bypass), where a conventional diamond interchange with accommodations for loops in the southwestern and northeastern quadrants is proposed. Alternative B1 proposes a four-lane divided roadway with 12' travel lanes, a 23' raised grass median and 4' full-depth paved outside shoulders. This roadway will be a full control-of-access facility within a state maintained right-of-way of 150'. The total length of Alternative B1 is approximately 3.83 miles.

It is anticipated that **Alternative B1** improvements will require the relocation of 3 residences and 31 businesses. The total cost, including construction and right-of-way, is estimated to be \$54,800,000.

Construction.....	\$ 31,700,000
<u>Right-of-way.....</u>	<u>\$ 23,100,000</u>
Total Cost.....	\$54,800,000

Alternative B2

Military Cutoff Road Extension from Existing Military Cutoff Road (SR 1409) at Market Street/US 17 to Proposed T.I.P. Project R-2405A (US 17 Wilmington Bypass)

Due to the large cost difference between Alternative B1 and Alternative C, Alternative B1 with modifications was also evaluated in this study. This modified alternative is referred to as Alternative B2. Alternative B2 is the same as Alternative B1 with modifications at the proposed Single Point Urban Interchange. The interchange differs from Alternative B1 in that the proposed free flowing right turn lanes from Military Cutoff Road (SR 1409) to Market Street/US 17 will instead be accommodated under yield or signalized conditions. This modification allows the control-of-access to be reduced by approximately 1,500 feet along the southbound lanes of Market Street/US 17. Alternative B2 begins at the existing Military Cutoff Road (SR 1409)/ Gordon Road (SR 2048) intersection and travels northwest to Market Street/US 17, where a Single-Point Urban Interchange (SPUI), bridging the Extension over US 17 is proposed. The new interchange ramps will be controlled by one traffic signal on Market Street/US 17. Some additional lanes will be needed on Market Street/US 17 to accommodate dual left-turn lanes and ramp acceleration lanes. As a result of the control-of-access at the interchange, two service roads will be needed for this alternative. A service road in the northeast quadrant of the proposed interchange off of Ogden Park Drive East is needed to provide access to the properties in the immediate vicinity. A service road connection to Prospect Cemetery Road (SR 1408) is needed from the proposed residential road at the eastern corner of the cemetery. From the proposed interchange at Market Street/US 17, Alternative B2 travels on to proposed T.I.P. project R-2405A (US 17 Wilmington Bypass). A grade separation is proposed over Ogden Park Drive to maintain connectivity within the project area. Alternative B2 avoids the power station south of the Ogden Park and crosses the major transmission lines just north of the park. As the alignment leaves the park property, Alternative B2 ties into and follows the Alternative A alignment continuing northward, crossing planned and recently constructed subdivision roads: Putnam Drive, Lendire Road and Torchwood Boulevard. Access points to Military Cutoff Road Extension from these developments will be determined in future design stages. Military Cutoff Road Extension utilizes, as much as possible, the existing 80' Right-of-Way offered to the County by the developers. As stated previously, this study also includes extending Murrayville Road (SR 1322) eastward from its current terminal to the proposed Military Cutoff Road Extension just south of Plantation Road. The project continues to the north to the location of the proposed T.I.P. project R-2405A (US 17 Wilmington Bypass), where a conventional diamond interchange with accommodations for loops in the southwestern and northeastern quadrants is proposed. Alternative B2 proposes a four-lane divided roadway with 12' travel lanes, a 23' raised grass median and 4' full-depth paved outside shoulders. This roadway will be a full control-of-access facility within a state maintained right-of-way of 150'. The total length of Alternative B2 is approximately 3.83 miles.

It is anticipated that **Alternative B2** improvements will require the relocation of 3 residences and 25 businesses. The total cost, including construction and right-of-way, is estimated to be \$49,800,000.

Construction.....	\$ 31,700,000
<u>Right-of-way.....</u>	<u>\$ 18,100,000</u>
Total Cost.....	\$49,800,000

Alternative C

Military Cutoff Road Extension from Existing Military Cutoff Road (SR 1409) at Market Street/US 17 to Proposed T.I.P. Project R-2405A (US 17 Wilmington Bypass)

Alternative C begins at the existing Military Cutoff Road (SR 1409)/ Gordon Road (SR 2048) intersection and travels northwest to Market Street/US 17, where an at-grade signalized intersection with Market Street/US 17 is proposed. Improvements, such as exclusive right and double left turning

movements on all approaches, are proposed at this intersection. From approximately 2,000 feet north of the US 17 intersection Alternative C is identical to Alternatives B1 and B2 including a grade separation at Ogden Park Drive to maintain connectivity within the project area. Alternative C proposes a four-lane divided roadway with 12' travel lanes, a 23' raised grass median and 4' full-depth paved outside shoulders. This roadway will be a full control-of-access facility within a state maintained right-of-way of 150'. The total length of Alternative C is approximately 3.61 miles.

It is anticipated that **Alternative C** improvements will require the relocation of 1 residence and 4 businesses. The total cost, including construction and right-of-way, is estimated to be \$31,900,000.

Construction.....	\$ 23,100,000
<u>Right-of-way.....</u>	<u>\$ 8,800,000</u>
Total Cost.....	\$31,900,000

V. Traffic Operations

The base year forecast 2003 Average Daily Traffic (ADT) on Military Cutoff Road Extension ranges from 3,800 to 10,100 vehicles per day (vpd). The estimated design year 2030 ADT projections for Military Cutoff Road Extension range from 9,800 to 24,000 vpd. The percentage of truck traffic is 4% (5% Duals and 3% TTST's) for both 2003 and 2030-year traffic.

Based on an analysis utilizing the HCS software, the mainline, four-lane divided roadway, should operate at a level of service (L.O.S.) of A with the 2003-year traffic volumes and an L.O.S. of B with the 2030-year traffic volumes.

This project will require improvements to the major intersecting roads in order to achieve satisfactory accessibility, mobility and levels of service. The major intersecting roads that will require upgrades, the proposed types of improvements, and the resulting traffic operations measurements are as follows:

TABLE 1 – MAJOR PROJECT INTERECTIONS						
Intersection	Alternative	Type of Improvement	Delay (sec./veh.)		L.O.S.	
			2003-yr	2030-yr	2003-yr	2030-yr
Military Cutoff Rd./Military Cutoff Rd. Ext.	Alt. A	At-Grade, Signalized	65	153	E	F
Military Cutoff Rd. Ext./Gordon Road	Alt. A	At-Grade, Signalized	50	64	D	F
Military Cutoff Rd. Ext./US 17	Alt. B1 and B2	Single Point Urban Interchange	25	144	C	F
Military Cutoff Rd. Ext./US 17	Alt. C	At-Grade, Signalized	88	355	F	F
Military Cutoff Rd. Ext./US 17 Bypass	Alt. A, B1 and B2, C	Conventional. Diamond Interchange	N/A	N/A	N/A	N/A

As shown in Table 1 above, all intersections will operate at levels of service worse than the acceptable level D for signalized intersections by the year 2030. Utilizing straight-line interpolation, we can predict at what year the intersections will operate at what is considered unacceptable levels of service (L.O.S. E, delay greater than 55 seconds). It is important to note that additional

improvements, beyond the scope of this project, are required along US 17 to accommodate the design year traffic volumes in the Single-Point Urban Interchange proposed with Alternatives B1 and B2. Likewise, failing levels of service are anticipated at the at-grade intersection of Military Cutoff Road Extension and US 17 proposed with Alternative C even with additional improvements along US 17.

Intersection	Alternative	Year
Military Cutoff Rd/Military Cutoff Rd. Ext.	Alt. A	2003
Military Cutoff Rd. Ext./Gordon Road	Alt. A	2014
Military Cutoff Rd. Ext./US 17	Alt. B1 and B2	2012
Military Cutoff Rd. Ext./US 17	Alt. C	2003
Military Cutoff Rd. Ext./US 17 Bypass	Alt. A, B1 and B2, C	N/A

VI. Project Costs & Recommendations

The following table shows the total project cost for each of the four alternatives studied in this report.

Alternative	Right-of-Way Cost	Construction Cost	Total Section Cost
Alternative A	\$13,900,000	\$28,500,000	\$42,400,000
Alternative B1	\$23,100,000	\$31,700,000	\$54,800,000
Alternative B2	\$18,100,000	\$31,700,000	\$49,800,000
Alternative C	\$8,800,000	\$23,100,000	\$31,900,000

Alternative A would add to the already disjunct area of closely spaced intersections of Market Street/US 17, Gordon Road (SR 2048), and Military Cutoff Road (SR 1409). Alternative A also traverses an additional mile of developed urban area compared to the other alternatives. Alternatives B1, B2 and C, however, yield a more direct route on less developed land, extending northward from the "T" intersection of existing Military Cutoff Road and Market Street.

The Single Point Urban Interchange (SPUI) design proposed with Alternatives B1 and B2 would operate more safely and efficiently than the at-grade intersection included with Alternative C, which will operate at an LOS of F the day it is opened to traffic (see Table 2 in this report). Right-turning movements with the SPUI would be free-flow or yield conditions at all approaches, reducing their delay. A controlled-access interchange of this type would provide better service to the through moving vehicles as well as reduce the potential for traffic accidents.

Although all four alternatives cross county owned land adjacent to Ogden Park, Alternative A appears to impact more developed areas. Alternatives B1, B2 and C cross county owned land adjacent to the park in an undeveloped area and include a grade separation over Ogden Park Drive. In addition, Alternative A would have affects on Eaton Elementary School and the residences just to the west of the school whereas Alternatives B1, B2 and C steer clear of this area.

From a capacity and safety standpoint, the Single Point Urban Interchange included with Alternative B1 would be the ideal configuration. However, due to the large cost difference between Alternative B1 and Alternative C, this study evaluated and subsequently recommends Alternative B2 as a more reasonable balance between cost, safety, and traffic operations. Alternative B2 includes a four-lane divided roadway with 12' travel lanes, a 23' raised grass median, 4' full-depth paved outside shoulders and a Single-Point Urban Interchange (SPUI) at the intersection of existing Military Cutoff Road Extension and Market Street/US 17. This roadway will be a full control-of-access facility with access at designated major street junctions within a state maintained right-of-way of 150'. The total estimated cost of Alternative B2, including right-of-way and construction, is \$49,800,000.

VII. Additional Comments

A detailed environmental study was not conducted for this feasibility study. However, an environmental screening did result in the following possible occurrences, which will need to be further evaluated in later stages of the development of this project:

- The National Wetland Inventory Mapping indicates that this project (all Alternatives) will impact a significant amount of wetlands.
- Department of Natural Resources – National Heritage Section indicates that there are several occurrences of threatened or endangered species located along existing Military Cutoff Road (SR 1409) just north of Old McCumber Road near where Alternative A begins. These occurrences are as follows:
 - Bog St. John's Wort (*Hypericum Adpressum*),
 - Snowy Orchid (*Platanthera Nivea*),
 - Venus Flytrap (*Dionaea Muscipula*), and
 - Twisted-Leaf Goldenrod (*Solidago Tortifolia*)
- There were no environmental justice issues observed along the project corridor during the development of this study. A more detailed investigation of environmental justice issues will be required in the later planning phases of this project.

On Alternatives B1, B2 and C, construction costs would most likely be less with Ogden Park Drive bridging over the Military Cutoff Extension. However, this study recommends bridging the Extension over Ogden Park Drive at its existing location in the interest of maintaining a connection between the two park facilities for pedestrians and cyclists.

Exact locations of median openings on the controlled-access facility will be determined in future design phases. It should be noted that if median openings are provided at Putnam Drive, Lendire Road, Torchwood Boulevard and Plantation Road that the current policy on Median Opening Spacing for a 45 mph facility would be satisfied.

Utility impacts are expected to be moderate due to the construction of this project. Also, Alternatives B1, B2 and C cross a major transmission line on county owned land adjacent to Ogden Park.

The New Hanover County Board of Commissioners has reviewed this study and recommends Alternative B1, B2 or C for this project. The Board also commented that the use of the Single Point Urban Interchange, included with Alternatives B1 and B2, appears to be more beneficial from a safety and traffic operations standpoint than the at-grade signalized intersection included with Alternative C.

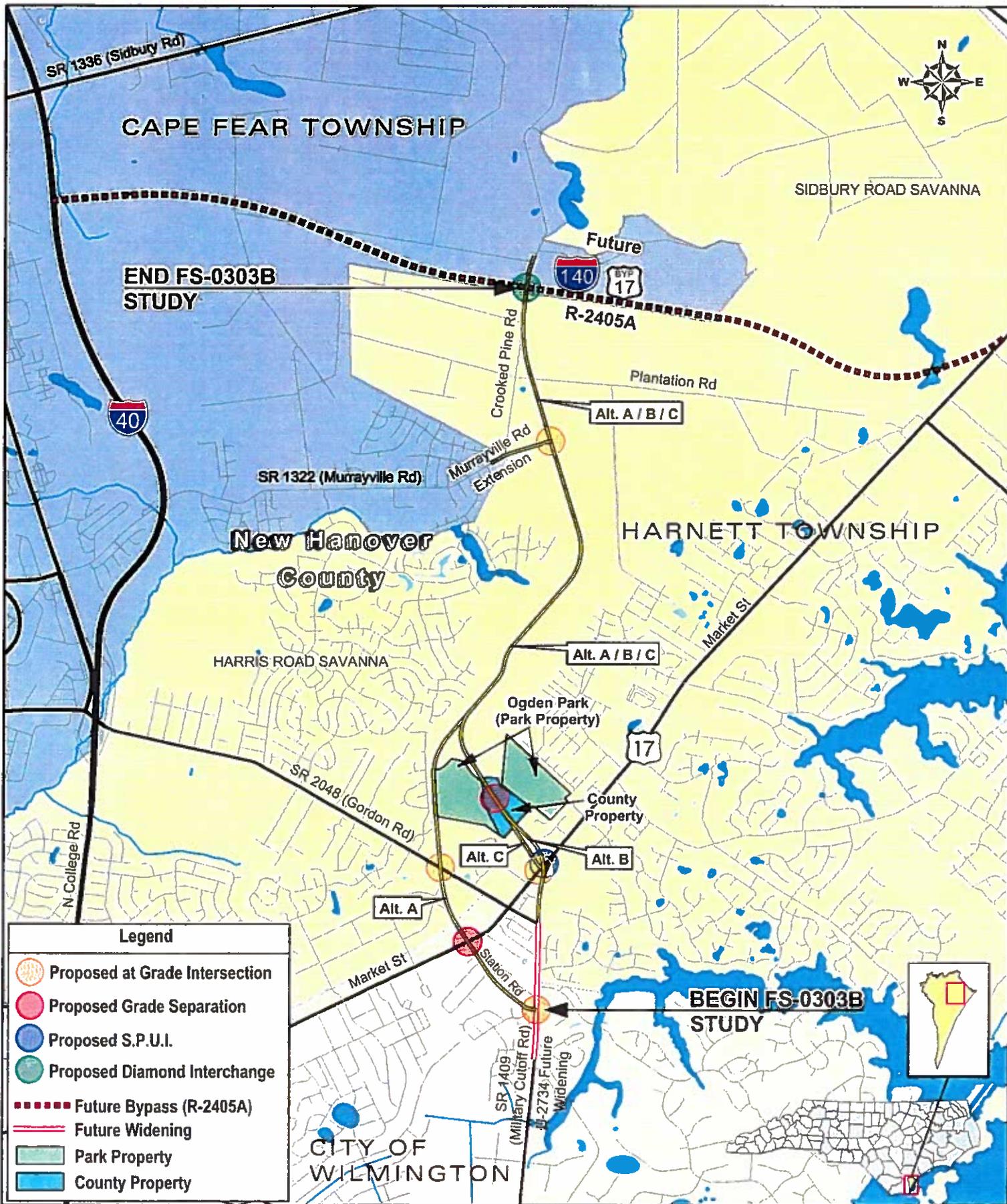


Figure 1

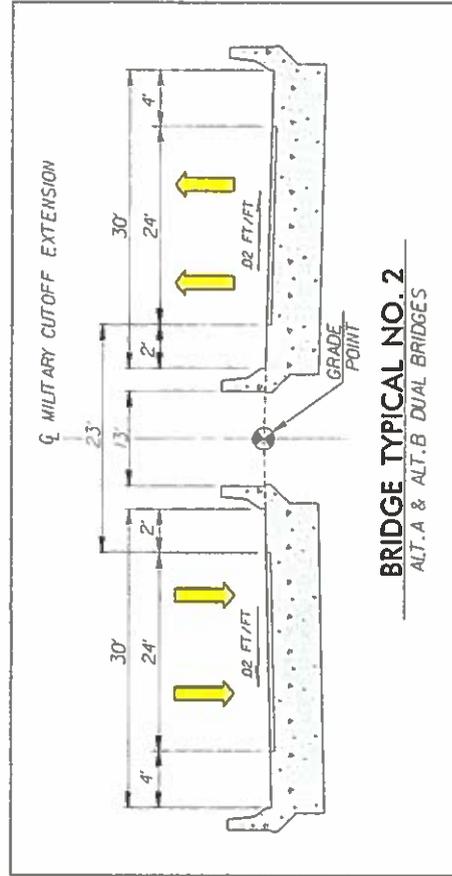
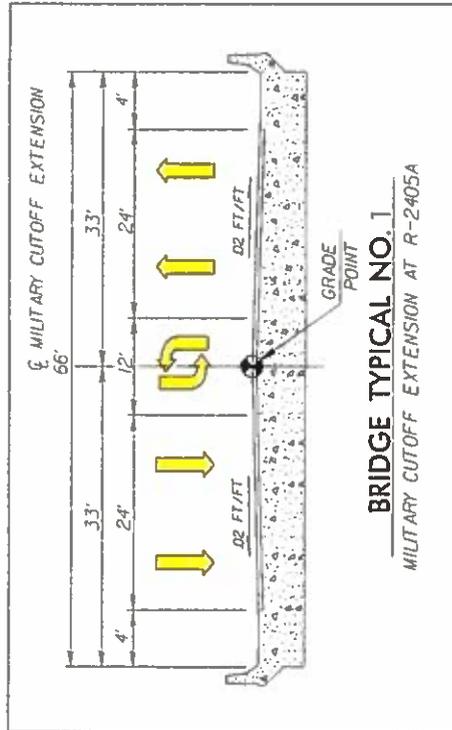
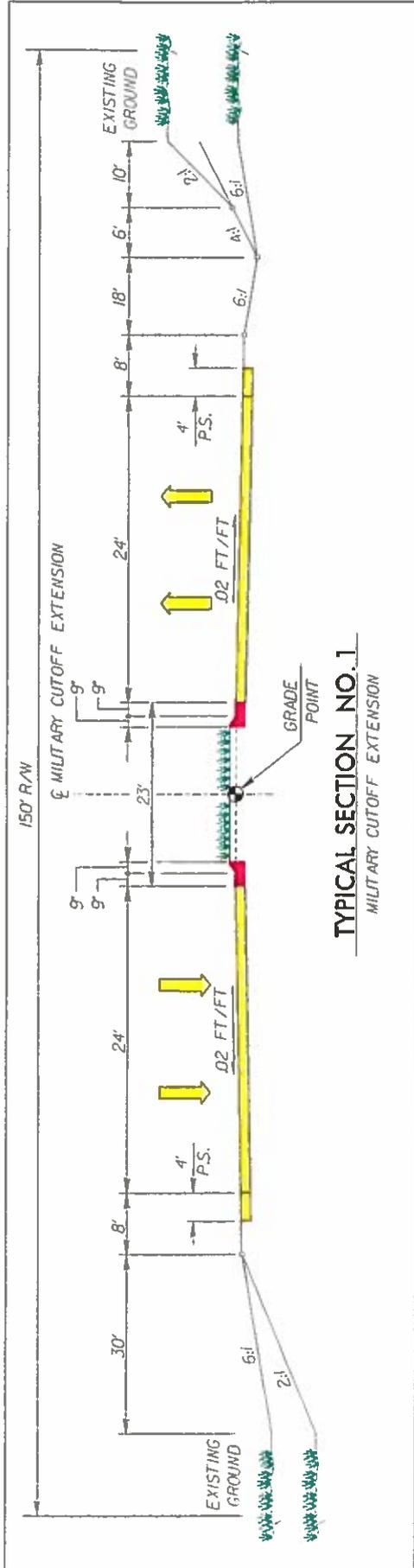


FIGURE 2



RUMMEL, KLEPPER & KAHL, LLP
consulting engineers
RALEIGH, NORTH CAROLINA

NCDOT FEASIBILITY STUDY FS-0303B
MILITARY CUTOFF ROAD EXTENSION
From Existing Military Cutoff Road (SR 1409) in Wilmington
To Future NCDOT Project R-2405A (US 17 Wilmington Bypass)


PROGRAM DEVELOPMENT BRANCH
N.C. DEPARTMENT OF TRANSPORTATION
P.O. BOX 25201
RALEIGH, NC 27611