FEASIBILITY STUDY

Widening of I-40 from NC 42 to NC 210

Johnston County

Division 4

FS-1104B



Prepared by the Program Development Branch N. C. Department of Transportation

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I. General Description

This feasibility study describes the proposed widening of I-40 from NC 42 to NC 210, a distance of approximately 6.8 miles. The project location is shown on Figure 1. As part of the study, the following cross-sections were investigated, the details of which are as follows:

- Eight-lane divided shoulder section on 300 feet of right-of-way.
- Eight-lane divided shoulder section including an additional general purpose lane and one managed lane per direction on 300 feet of right of way.
- Eight-lane divided shoulder section including two managed lanes per direction on 300 feet of right of way.

This 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 cost, and to identify potential problems that may require consideration in the planning and design phases.

II. Background

The purpose of this project is to improve the traffic safety and operations along I-40.

I-40 is designated as an interstate in the North Carolina Statewide Functional Classification. I-40 is designated as a freeway on the July 2011 Johnston County Comprehensive Transportation Plan. I-40 is part of the Knoxville, Tennessee to Wilmington, North Carolina Strategic Highway Corridor. I-40 is currently a four-lane divided shoulder section.

The following State Transportation Improvement Program (STIP) projects are within the proposed study area:

• I-4739: Access improvements along I-40 in the vicinity of existing I-40/NC 42 interchange.

• I-5111: Additional lanes on I-40 from I-440/US 64 to NC 42 and ITS deployment on alternative routes for traffic management.

There are several bridges in the project study area. Please see Table 3 for detailed bridge information.

III. Traffic and Safety

There are existing traffic signals located at the following intersections within the project study area:

- I-40 and NC 42
- I-40 and NC 210

The current year Average Daily Traffic (ADT) along I-40 ranges from 40,900 vehicles per day (vpd) to 60,400 vpd. For the design year 2035 under the no-build scenario, the traffic volume along I-40 is estimated to range from 70,900 vpd to 104,900 vpd. With the proposed improvements along I-40, the design year 2035 traffic volume is estimated to from between 74,500 vpd to 111,000 vpd. Truck traffic is estimated to make up approximately 14 percent of the daily traffic.

The existing segment of I-40 operates at a level of service (LOS) D under current traffic volumes. If no improvements are made in the 2035 design year, it is projected that I-40 will operate at a LOS F. With the proposed improvements, I-40 is projected to operate at a LOS D or better.

Between 2008 and 2011, 233 total crashes were reported along I-40. The crash rate for this section of I-40 is 73.93 crashes per 100 million vehicle miles (crashes/100MVM) traveled. This rate is higher than the statewide rate of 62.77 crashes/100MVM and the critical rate of 70.27 crashes/100MVM for rural interstates with four or more lanes divided with full control access. There was 1 fatal crash, 55 non-fatal injury crashes, and 177 property damage only crashes. The most prevalent types of crashes were Fixed Object (37%), Rear End (21%), Sideswipe (10%), and Animal (9%).

IV. Description of Alternatives

It is proposed to widen I-40 to a multilane facility from NC 42 to NC 210, a distance of approximately 6.8 miles. The project location is shown on Figure 1. Included in the costs shown below is the replacement of existing Bridge No. 500 over I-40, the widening of existing dual Bridges No. 497 and 498 over Middle Creek, and the replacement of existing Bridges No. 496, 495, and 494 over I-40. See Table 1 for the estimated project cost for each alternative.

<u>SECTION 1 – OPTION A</u>: Eight-lane divided shoulder section, 142 feet from edge of pavement to edge of pavement, with eight 12-foot general purpose lanes, 10-foot paved inside shoulders, a concrete median barrier, and 12-foot outside paved shoulders on 300 feet of right-of-way.

With this proposed cross-section, it is anticipated that there will be zero (0) residences and zero (0) businesses relocated due to this project. The total cost of this alternative, including right of way, utility relocation, construction, and Intelligent Transportation Systems (ITS) deployment is estimated to be \$95,400,000.

Right-of-way	\$1,100,000
Utility Relocation	\$400,000
Construction	\$92,800,000
ITS Deployment	\$1,100,000
Total Cost (Section 1- Option A)	\$95,400,000

<u>SECTION 1 – OPTION B</u>: Eight-lane divided shoulder section, 150 feet from edge of pavement to edge of pavement, with six 12-foot general purpose lanes, two 4-foot buffers, two 12-foot managed lanes, 10-foot paved inside shoulders, a concrete median barrier, and 12-foot paved outside shoulders on 300 feet of right-of-way.

With this proposed cross-section, it is anticipated that there will be zero (0) residences and zero (0) businesses relocated due to this project. The total cost of this alternative, including right of way, utility relocation, construction, ITS deployment, and toll equipment is estimated to be \$105,500,000.

Right-of-way	\$1,100,000
Utility Relocation	\$400,000
Construction	\$97,200,000
ITS Deployment	\$1,100,000
Toll Equipment	\$5,700,000
Total Cost (Section 1 – Option B)	\$105,500,000

<u>SECTION 1 – OPTION C</u>: Eight-lane divided shoulder section, 150 feet from edge of pavement to edge of pavement, with four 12-foot general purpose lanes, two 4-foot buffers, four 12-foot managed lanes, 10-foot paved inside shoulders, a concrete median barrier, and 12-foot paved outside shoulders on 300 feet of right-of-way.

With this proposed cross-section, it is anticipated that there will be zero (0) residences and zero (0) businesses relocated due to this project. The total cost of this alternative, including right of way, utility relocation, construction, ITS deployment, and toll equipment is estimated to be \$105,600,000.

Right-of-way	\$1,100,000
Utility Relocation	\$400,000
Construction	\$97,300,000
ITS Deployment	\$1,100,000
Toll Equipment	\$5,700,000
Total Cost (Section 1 – Option C)	\$105,600,000

V. Community Issues

A detailed investigation was not conducted for this feasibility study, however no impacts to schools, parks, recreation areas, or community facilities are anticipated with this project.

The Geographic Information System Service of the North Carolina State Historic Preservation Office were used to determine if any historic properties on the National Register of Historic Places (NRHP) or state study lists exist within the project study area. David H. Holland House and Ben Langdon House were found to be potentially historic properties.

VI. Natural Environment Issues

The following is a preliminary review of environmental issues that might have a potential impact to the project. The information obtained for the environmental screening is from a Geographic Information System (GIS) database. The purpose of the environmental screening is to identify potential environmental issues early in the process.

Stream Classification

The project study area is located in the Neuse River Basin. I-40 crosses three water bodies within the project study area. Mill Branch, Middle Creek, and Beaverdam Branch have a stream classification of C NSW. These water bodies will likely need to be surveyed and have the appropriate coordination with the North Carolina Department of Environment and Natural Resources (NCDENR) and the U.S. Army Corps of Engineers (USACE) during any environmental document study.

Wetlands

I-40 crosses wetlands associated with Mill Branch, Middle Creek, and Beaverdam Branch. Permitting with the U.S. Army Corps of Engineers (USACE) will likely need to be obtained before construction of the project, and appropriate mitigation measures should be taken if deemed necessary. A portion of the project study area is located in a 100 and 500-year floodplains.

Threatened and Endangered Species

The following threatened and endangered species were identified in the project study area:

- Dwarf Wedgemussel
- Triangle Floater
- Atlantic Pigtoe
- Eastern Lampmussel
- Creeper

It is anticipated that Middle Creek Aquatic Habitat, a significant natural heritage area, and Middle Creek Bottomlands Preserve, a natural heritage managed area and a land trust conservation property, may be impacted by this project.

VII. Recommendations

<u>SECTION 1 – OPTIONS A, B, & C (I-40 from NC 42 to NC 210)</u>: It was found that the eight-lane divided shoulder section would be able to accommodate the projected 2035 design year traffic volumes. STIP I-5111 is currently in the NEPA planning stage of project development. The recommendations of I-5111 will guide the ultimate configuration of this project.

Section	Right of way Cost	Utility Relocation Cost	Construction Cost	ITS Deployment	Toll Equipment	Total Cost	Res. Rel.	Bus. Rel.
Section 1 Option A	\$1,100,000	\$400,000	\$92,800,000	\$1,100,000	\$0	\$95,400,000	0	0
Section 1 Option B	\$1,100,000	\$400,000	\$97,200,000	\$1,100,000	\$5,700,000	\$105,500,000	0	0
Section 1 Option C	\$1,100,000	\$400,000	\$97,300,000	\$1,100,000	\$5,700,000	\$105,600,000	0	0

Table 1: Total Estimated Project Cost Section 1

VIII. Other Alternatives Considered

As part of this study, the proposed widening of I-40 from NC 210 to I-95, as distance of approximately 9.2 miles, was also investigated. The project location is shown on Figure 1. The following cross-sections were investigated, the details of which are as follows:

- Section 2 Option A: Eight-lane divided shoulder on 300 feet of right-of-way.
- Section 2 Option B: Eight-lane divided shoulder section including an additional general purpose lane and one managed lane per direction on 300 feet of right of way. (Alternative
- Section 2 Option C: Eight-lane divided shoulder section including two managed lanes per direction on 300' feet of right of way.

Included in the cost shown in Table 2 is the replacement of existing Bridge No. 467 over I-40, the extension of existing culvert 466 at Pole Branch, the replacement of existing Bridge No. 468 over I-40, the widening of existing Bridges No. 469 and 470

over Black Creek, the replacement of existing Bridge No. 471 over I-40, the extension of existing Culvert No. 504 at Pole Branch, the replacement of existing Bridge No. 477 over I-40, the replacement of existing Bridges No. 490 and 491 over CSX Railroad, and the replacement of existing Bridge No. 484 over I-40.

Section	Right of way Cost	Utility Relocation Cost	Construction Cost	ITS Deployment	Toll Equipment	Total Cost	Res. Rel.	Bus. Rel.
Section 2 Option A	\$800,000	\$700,000	\$126,000,000	\$1,300,000	\$0	\$128,800,000	0	0
Section 2 Option B	\$800,000	\$700,000	\$132,000,000	\$1,300,000	\$7,700,000	\$142,500,000	0	0
Section 2 Option C	\$800,000	\$700,000	\$132,000,000	\$1,300,000	\$7,700,000	\$142,500,000	0	0

Table 2: Total Estimated Project Cost Section 2

Structure Number	Facility Carried	Feature Intersected	Structure Description	Structure Length	Vertical Clearance	Horizontal Clearance	Year Constructed	Sufficiency Rating
326	SR 1525	Mill Branch Creek	RC Floor/Timber Joist	38'	N/A	24'	1951	7.0
494	NC 210	I-40	RC Floor & PPC Panels on PPC Girders	206'	16' 9"	52.0'	1987	98.0
495	SR 1521	I-40	RC Floor & PPC Panels on PPC Girders	203'	16' 9"	25.5'	1989	84.5
496	SR 1517	I-40	RC Floor & PPC Panels on PPC Girders	206'	17' 2"	24'	1987	78.1
497	I-40 EB	Middle Creek	RC Floor on Prestressed Concrete Girders	273'	N/A	40.0'	1987	91.7
498	I-40 WB	Middle Creek	RC Floor on Prestressed Concrete Girders	273'	N/A	40.0'	1987	92.0
499	SR 1525	I-40	RC Floor & PPC Panels on PPC Girders	197'	16' 7"	24'	1987	80.0
500	SR 1010	I-40	RC Floor on Prestressed Concrete Girders	207'	N/A	28.1'	1987	76.9
501	NC 42	I-40	RC Floor on Prestressed Concrete Girders	210'	N/A	51.8'	1987	83.9
504	I-40	Pole Branch	Double 9'x6' RCBC	22'	N/A	78.0'	1988	95.2

Table 3: I-40 from NC 42 to NC 210 Existing Bridge Information

Table 4: I-40 from NC 210	to I-95 Existing	g Bridge Information
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Structure Number	Facility Carried	Feature Intersected	Structure Description	Structure Length	Vertical Clearance	Horizontal Clearance	Year Constructed	Sufficiency Rating
466	I-40	Pole Branch	Double 9'x9' RCBC	26'	N/A	80'	1987	70.0
467	SR 1322	I-40	RC Floor on PPC Deck Panels & PPC Girders	180'	16' 9"	24'	1987	87.5
468	SR 1399	I-40	RC Floor on PPC Deck Panels & PPC Girders	179'	16' 9"	23.9'	1987	87.8
469	I-40 WB	Black Creek	RC Floor on PPC Deck Panels & PPC Girders	234'	N/A	40'	1987	95.6
470	I-40 EB	Black Creek	RC Floor on PPC Deck Panels & PPC Girders	234'	N/A	40'	1987	95.6
471	SR 1308	I-40	RC Floor on PPC Deck Panels & PPC Girders	243'	17' 4"	24'	1987	82.5
477	SR 1356	I-40	RC Floor on PPC Deck Panels & PPC Girders	199'	16' 6"	53.6'	1988	96.1
484	US 301	I-40	RC Slab/I-Beams & Steel Plate Girders	305'	16' 10"	29.6'	1988	78.1
486	I-40 WB Ramp	I-40	RC Slab/I-Beams & Steel Plate Girders	296'	N/A	35.7'	1988	94.0
487	I-40 WB Ramp	I-95	RC Floor on Steel Plate Girders	312'	17' 0"	35.7'	1988	96.0

Structure Number	Facility Carried	Feature Intersected	Structure Description	Structure Length	Vertical Clearance	Horizontal Clearance	Year Constructed	Sufficiency Rating
488	I-40 EB	I-95	RC Floor on Steel Plate Girders	209'	16' 8"	61'	1988	82.0
489	I-40 WB	I-95	RC Floor on Steel Plate Girders	209'	17' 3"	47.7'	1988	92.3
490	I-40 WB	Seaboard Coastline Railroad	RC Floor & PPC Panels on PPC Girders	161'	23' 11"	39.8'	1988	88.3
491	I-40 EB	Seaboard Coastline Railroad	RC Floor & PPC Panels on PPC Girders	161'	22' 11"	39.8'	1988	88.3
494	NC 210	I-40	RC Floor & PPC Panels on PPC Girders	206'	16' 9"	52.0'	1987	98.0
495	SR 1521	I-40	RC Floor & PPC Panels on PPC Girders	203'	16' 9"	25.5'	1989	84.5
496	SR 1517	I-40	RC Floor & PPC Panels on PPC Girders	206'	17' 2"	24'	1987	78.1
497	I-40 EB	Middle Creek	RC Floor on Prestressed Concrete Girders	273'	N/A	40.0'	1987	91.7

Table 4: I-40 from NC 210 to I-95 Existing Bridge Information

