

FEASIBILITY STUDY

**Widening of I-40
from NC 109 to NC 68**

Guilford and Forsyth Counties

Divisions 7 and 9

FS-0609A



**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 109 to NC 68, a distance of approximately 14.8 miles. The initial project limits for this study were from US 311 to US 421/I-40 Business. However, the project limits studied were extended to transition back to the existing cross-sections as described under Alternatives A and B. The project location is shown on Figure 1. As part of the study, several different cross-sections were investigated, the details of which are as follows:

- ◆ Six-lane divided freeway on variable width right of way.
- ◆ Eight-lane divided freeway on variable width right of way.
- ◆ Ten-lane divided freeway on variable width 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. Guilford County, High Point Urban Area Metropolitan Organization and Greensboro Urban Area Metropolitan Planning Organization officials support this project.

I-40 is designated as a freeway in the North Carolina Statewide Functional Classification System, the Winston-Salem Urban Area 2030 Long Range Transportation Plan, and the September 2007 Greensboro Urban Area Comprehensive Transportation Plan. I-40 is also part of the Knoxville, Tennessee to Wilmington Strategic Highway Corridor. On the 2004 Strategic Highway Corridor Vision Plan, I-40 is designated as a freeway facility. I-40 currently varies from a four-lane divided freeway, with a 46-foot depressed grass median, east of US 311 to a eight-lane divided freeway, with a 22-foot median with a concrete barrier, east of SR 1850 (Sandy Ridge Road) with pavement widths between 92-114 feet from edge of pavement to edge of pavement.

The following are Transportation Improvement Program (TIP) projects located within the project corridor:

- TIP# I-4717: I-40 resurfacing from the end of Portland Cement Concrete (PCC) pavement to the beginning of PCC pavement in the vicinity of US 311 interchange.
- TIP# R-0952B: I-40 Business/US 421 pavement and bridge rehabilitation from SR 2662 (Linville Road) in Forsyth County to west of SR 1850 (Sandy Ridge Road) in Guilford County.
- TIP# U-2579AB: Winston-Salem Northern Beltway, eastern section (Future I-74) from I-40 to I-40 Business-US 421.
- TIP# U-4909: Widen SR 2643 (Union Cross Road) to multilanes from SR 2691 (Wallburg Road) to SR 2632 (Sedge Garden Road).

There are several bridges in the project corridor. Please see Table 2 for detailed bridge information.

III. Traffic and Safety

There are several existing traffic signals located on the Y-lines within the project study area which may need to be modified to accommodate the proposed improvements. They are located at the following intersections:

- I-40 eastbound ramps and SR 2643 (Union Cross Road)
- I-40 westbound ramps and SR 2643 (Union Cross Road)
- I-40 eastbound ramps and NC 66
- I-40 westbound ramps and NC 66
- I-40 eastbound ramps and SR 1850 (Sandy Ridge Road)
- SR 1850 (Sandy Ridge Road) and SR 1924 (Triad Drive)

The current year Average Daily Traffic (ADT) along I-40 is estimated to range from 77,200 vehicles per day (vpd) to 105,900 vpd. For the design year 2035, the traffic volume along I-40 is estimated to range between 106,200 vpd to 149,400 vpd. Truck traffic is estimated to make up approximately 16 percent of the daily traffic. Please see attached traffic forecast for detail traffic volume information.

The existing segment of I-40 operates at a level of service (LOS) F under current traffic volumes. With the proposed six-lane freeway improvements, I-40 will continue to operate at a LOS F in the 2035 design year. With the ultimate eight-lane improvements, the segments along I-40 between US 311 and US 421/I-40 Business are projected to operate at a LOS D or better in the 2035 design year.

Between 2004 and 2007, 378 crashes were reported within the proposed project study area. The crash rate for I-40 is 54.69 crashes per 100 million vehicle miles (crashes/100MVM) traveled. This rate is lower than the statewide rate of 138.01 crashes/100MVM for four-lane divided with full control access urban interstate

routes. There were 110 non-fatal injury crashes, 266 property damage only crashes, and 2 fatal crashes. The most prevalent types of crashes were Fixed Object (30%), Rear End (29%), Ran Off Road (14%), and Sideswipe (10%).

IV. Description of Alternatives

It is proposed to widen I-40 from NC 109 to NC 68, a distance of approximately 14.8 miles. The original requested project limits for this study were from US 311 to US 421/I-40 Business. However, the project limits studied were extended to transition back to the existing cross-sections. The project location is shown on Figure 1. An additional cost of \$5,300,000 will be added to the total project cost for Intelligent Transportation Systems (ITS) deployment. For evaluation purposes, the project was divided into several segments. The details of each are below:

SECTION 1: This segment along I-40 is from NC 109 ramps to 0.4 miles east of SR 1003 (High Point Road), a distance of approximately 3.5 miles. All alternatives under Section 1 include the replacement of existing bridge (Bridge No. 11) over SR 2700 (Willard Road), the widening of existing bridge (Bridge No. 341) over SR 2700, the widening of existing bridges (Bridge Nos. 432, 433, 434, 435) over US 311, the extension of existing culvert (Bridge No. 478) at Fiddler Creek, and the widening of existing bridges (Bridge Nos. 476 and 477) over SR 1003 (High Point Road), the costs of which are included in the costs below.

Alternative A: Six-lane divided freeway with 12-foot travel lanes, a 46-foot depressed grass median, and 12-foot paved shoulders on variable width right of way, with a minimum of 350 feet.

With this proposed cross-section, it is anticipated that there will be one (1) residence and zero (0) businesses relocated due to this project. The total cost of this alternative, including right of way, utility relocation, and construction, is estimated to be \$43,900,000.

Right-of-way.....	\$1,700,000
Utility Relocation.....	\$200,000
<u>Construction.....</u>	<u>\$42,000,000</u>
Total Cost (Section 1 – Alternative A).....	\$43,900,000

Alternative B: Eight-lane divided freeway with 12-foot travel lanes, a 22-foot median with a concrete barrier, 10-foot paved inside shoulders, and 12-foot paved outside shoulders on variable width right of way, with a minimum of 350 feet.

With this proposed cross-section, it is anticipated that there will be one (1) residence and zero (0) businesses relocated due to this project. The total cost of this alternative, including right of way, utility relocation, and construction, is estimated to be \$61,700,000.

Right-of-way.....	\$1,700,000
Utility Relocation.....	\$200,000
<u>Construction.....</u>	<u>\$59,800,000</u>
Total Cost (Section 1 – Alternative B).....	\$61,700,000

SECTION 2: This segment along I-40 is from 0.4 miles east of SR 1003 (High Point Road) to 0.3 miles west of SR 2643 (Union Cross Road), a distance of approximately 2.3 miles.

Alternative A: Six-lane divided freeway with 12-foot travel lanes, a 46-foot depressed grass median, and 12-foot paved shoulders on variable width right of way, with a minimum of 350 feet.

There are no right of way, utility relocation, and construction costs associated with Alternative A. All costs for this alternative will be included in TIP# U-2579AB.

Alternative B: Eight-lane divided freeway with 12-foot travel lanes, a 22-foot median with a concrete barrier, 10-foot paved inside shoulders, and 12-foot paved outside shoulders on variable width right of way, with a minimum of 350 feet.

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 construction cost of this alternative is estimated to be \$14,400,000.

Right-of-way.....	\$0
Utility Relocation.....	\$0
<u>Construction.....</u>	<u>\$14,400,000</u>
Total Cost (Section 2 – Alternative B).....	\$14,400,000

SECTION 3: This segment along I-40 is from 0.3 miles west of SR 2643 (Union Cross Road) to US 421/I-40 Business, a distance of approximately 6.1 miles. All alternatives under Section 3 include the replacement of existing bridges (Bridge No. 447, 442, 609, 613, and 616) over I-40, the extension of existing culvert (Bridge No. 459) at Abbotts Creek, the extension of existing culvert (Bridge No. 457) at the West Fork Deep Creek, the extension of existing culvert (Bridge No. 630) at Deep Creek, the costs of which are included in the costs below.

Alternative A: Six-lane divided freeway with 12-foot travel lanes, a 46-foot depressed grass median, and 12-foot paved shoulders on variable width right of way, with a minimum of 350 feet.

Option 1: Convert the existing diamond interchange at the junction of I-40 and NC 66 into a single point urban interchange.

With this option, it is anticipated that there will be twenty-six (26) residences and zero (0) businesses relocated due to this project. The total cost of this option, including right of way, utility relocation, and construction, is estimated to be \$116,900,000.

Right-of-way.....	\$13,600,000
Utility Relocation.....	\$300,000
Construction.....	\$103,000,000
Total Cost (Section 3 – Alternative A/Option 1).....	\$116,900,000

Option 2: Modify the existing diamond interchange at the junction of I-40 and NC 66 into a diamond with loops interchange.

With this option, it is anticipated that there will be two hundred fifty (250) residences and fourteen (14) businesses relocated due to this project. The total cost of this option, including right of way, utility relocation, and construction, is estimated to be \$267,200,000.

Right-of-way.....	\$175,900,000
Utility Relocation.....	\$300,000
Construction.....	\$91,000,000
Total Cost (Section 3 – Alternative A/Option 2).....	\$267,900,000

Alternative B: Eight-lane divided freeway with 12-foot travel lanes, a 22-foot median with a concrete barrier, 10-foot paved inside shoulders, and 12-foot paved outside shoulders on variable width right of way, with a minimum of 350 feet.

Option 1: Convert the existing diamond interchange at the junction of I-40 and NC 66 into a single point urban interchange.

With this option, it is anticipated that there will be twenty-six (26) residences and zero (0) businesses relocated due to this project. The total cost of this option, including right of way, utility relocation, and construction, is estimated to be \$133,900,000.

Right-of-way.....	\$13,600,000
Utility Relocation.....	\$300,000
Construction.....	\$120,000,000
Total Cost (Section 3 – Alternative B/Option 1).....	\$133,900,000

Option 2: Modify the existing diamond interchange at the junction of I-40 and NC 66 into a diamond with loops interchange.

With this option, it is anticipated that there will be two hundred fifty (250) residences and fourteen (14) businesses relocated due to this project. The total cost of this option, including right of way, utility relocation, and construction, is estimated to be \$284,200,000.

Right-of-way.....	\$175,900,000
Utility Relocation.....	\$300,000
<u>Construction.....</u>	<u>\$108,000,000</u>
Total Cost (Section 3 – Alternative B/Option 2).....	\$284,200,000

The following roadway realignments are recommended and are included in all of the costs shown above:

- SR 2602 (Twin Creek Road). The new cross-section shall have a two-lane shoulder section with 12-foot travel lanes and 8-foot shoulders (4 feet of which are paved) on 100 feet of right of way for approximately 0.1 miles.
- US 421/I-40 Business off ramp. The new cross-section shall be a two-lane shoulder section with 12-foot travel lanes, a 4-foot paved inside shoulder, and a 12-foot outside paved shoulder for approximately 0.4 miles.
- SR 1976 (Outback Road). The new cross-section shall have a two-lane shoulder section with 12-foot travel lanes and 8-foot shoulders (4 feet of which are paved) on 100 feet of right of way for approximately 0.1 miles.

SECTION 4:

Alternative A: This segment along I-40 is from US 421/I-40 Business to 0.6 miles east of SR 1850 (Sandy Ridge Road), a distance of approximately 1.6 miles.

Cross-section: Eight-lane divided freeway with an additional auxiliary lane (ramp to ramp), 12-foot travel lanes, a 22-foot median with a concrete barrier, 10-foot paved inside shoulders, and 12-foot paved outside shoulders on variable width right of way, with a minimum of 350 feet. This cross-section was proposed to provide a continuous cross-section east of SR 1850 (Sandy Ridge Road) due to the additional lane proposed by this alternative.

Option 1: Convert the existing diamond interchange at the junction of I-40 and SR 1850 into a single point urban interchange.

With this option, it is anticipated that there will be three (3) residences and two (2) businesses relocated due to this project. The total cost of this alternative, including right of way, utility relocation, and construction, is estimated to be \$55,500,000.

Right-of-way.....	\$11,900,000
Utility Relocation.....	\$100,000
<u>Construction.....</u>	<u>\$43,500,000</u>
Total Cost (Section 4 – Alternative A/Option 1).....	\$55,500,000

Option 2: Modify the existing diamond interchange at the junction of I-40 and SR 1850 into a diamond with loops interchange.

With this option, it is anticipated that there will be four (4) residences and fourteen (14) businesses relocated due to this project. The total cost of this option, including right of way, utility relocation, and construction, is estimated to be \$54,800,000.

Right-of-way.....	\$24,300,000
Utility Relocation.....	\$100,000
Construction.....	\$30,400,000
Total Cost (Section 4 – Alternative A/Option 2).....	\$54,800,000

Alternative B: This segment along I-40 is from US 421/I-40 Business to NC 68 a distance of approximately 2.9 miles.

Cross-section: Ten-lane divided freeway with additional auxiliary lanes (ramp to ramp), 12-foot travel lanes, a 22-foot median with a concrete barrier, 10-foot paved inside shoulders, and 12-foot paved outside shoulders on variable width right of way, with a minimum of 350 feet. This cross-section was proposed to provide a continuous cross-section east of NC 68 due to the additional lanes proposed by this alternative.

Option 1: Convert the existing diamond interchange at the junction of I-40 and SR 1850 into a single point urban interchange.

With this option, it is anticipated that there will be three (3) residences and three (3) businesses relocated due to this project. The total cost of this option, including right of way, utility relocation, and construction, is estimated to be \$84,300,000.

Right-of-way.....	\$15,100,000
Utility Relocation.....	\$300,000
Construction.....	\$68,900,000
Total Cost (Section 4 – Alternative B/Option 1).....	\$84,300,000

Option 2: Modify the existing diamond interchange at the junction of I-40 and SR 1850 into a diamond with loops interchange.

With this option, it is anticipated that there will be four (4) residences and fifteen (15) businesses relocated due to this project. The total cost of this option, including right of way, utility relocation, and construction, is estimated to be \$83,800,000.

Right-of-way.....	\$27,500,000
Utility Relocation.....	\$400,000
Construction.....	\$55,900,000
Total Cost (Section 4 – Alternative B/Option 2).....	\$83,800,000

The following roadway improvements are recommended and are included in all of the costs shown above:

- Proposed realignment of SR 1924 (Triad Drive). The new cross-section shall have a two-lane shoulder section with 12-foot travel lanes and 8-foot shoulders (4 feet of which are paved) on 100 feet of right of way for approximately 0.2 miles.
- Proposed connector road from SR 1924 (Triad Drive) to SR 1848 (Farmington Road), a distance approximately 0.2 miles. The cross-section shall be a two-lane shoulder section with 12-foot travel lanes, a 4-foot paved inside shoulder, and a 12-foot outside paved shoulder for approximately 0.4 miles.
- Cul-de-sac SR 1849 (Norcross Road).

US 311 Flyover: Due to numerous crashes on the northbound US 311 ramp, it is proposed to construct the ultimate northbound flyover ramp from US 311 to westbound I-40. The cross-section shall be a two-lane shoulder section with 12-foot travel lanes, 4-foot paved inside shoulder, and 12-foot paved outside shoulder on variable width right of way for approximately 0.6 miles. This proposed flyover is designed to permit a future extension of US 311 north of I-40.

With this improvement, it is anticipated that there will be zero (0) residences and zero (0) businesses relocated due to this improvement. The total construction cost of this improvement is estimated to be \$12,800,000.

Right-of-way.....	\$0
Utility Relocation.....	\$0
<u>Construction.....</u>	<u>\$12,800,000</u>
Total Cost (US 311 Flyover).....	\$12,800,000

If it is determined that a future extension of US 311 north of I-40 is no longer desirable, then a lesser flyover design could be considered at a reduced cost of \$7,500,000.

V. Community Issues

A detailed investigation was not conducted for this feasibility study, however possible impacts to an existing school are anticipated. No impacts to parks, recreation areas, or community facilities are anticipated with this project.

Maps at the Survey and Planning Branch 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 proposed project corridor. The following properties located within the project corridor were found to be potentially historic properties:

- Unnamed property on SR 2678 (Oak Grove Road)
- Unnamed property on SR 2630 (Teadue Lane)
- Ed Crews House
- Friedland Moravian Church

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 proposed project study area is located in the Yadkin-Pee Dee and Cape Fear River Basins. I-40 crosses several water bodies in the project corridor. Fiddlers Creek has a stream classification of C. Abbotts Creek has a stream classification of WS-III. The West Fork Deep River has a stream classification of WS-IV. 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. A portion of the proposed project study area is located in a water supply watershed.

Wetlands

I-40 crosses wetlands associated with Fiddlers Creek, Abbotts Creek, and the West Fork Deep River. 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 proposed project study area is located in a floodplain.

Threatened and Endangered Species

There were no threatened and endangered species identified within the proposed project study area.

VII. Recommendations

SECTION 1 - ALTERNATIVE A: It was found that the six-lane divided freeway would not be able to accommodate the projected 2035 design year traffic volumes.

SECTION 1 - ALTERNATIVE B: It was found that the eight-lane divided freeway (Alternative B) would not be able to accommodate the projected 2035 design year traffic volumes. However, acceptable operations are anticipated through the year 2033. ***Alternative B would be the preferred alternative for Section 1.***

SECTION 2 - ALTERNATIVE A: This alternative is being constructed under TIP# U-2579A, but is not anticipated to be able to accommodate the projected 2035 design year traffic volumes.

SECTION 2 - ALTERNATIVE B: It was found that the eight-lane divided freeway would be able to accommodate the projected 2035 design year traffic volumes with an acceptable level of service. ***Alternative B would be the preferred alternative for Section 2.***

SECTION 3 - ALTERNATIVE A/OPTIONS 1 & 2: It was found that the six-lane divided freeway would not be able to accommodate the projected 2035 design year traffic volumes.

SECTION 3 - ALTERNATIVE B/OPTIONS 1 & 2: It was found that the eight-lane divided freeway with a diamond with loops interchange at the junction of I-40 and NC 66 (Option 2) would be able to accommodate the projected 2035 design year traffic volumes. Our preliminary analysis indicates that the single point urban interchange at NC 66 would not be able to provide acceptable operations during the 2035 design year. However, it is recommended that alternative interchange concepts be evaluated during later planning and design phases to mitigate the anticipated right of way impacts associated with the above mentioned diamond with loops alternative. ***Alternative B/Option 2 would be the preferred alternative for Section 3.***

SECTION 4 – ALTERNATIVE A/OPTIONS 1 & 2: It was found that the eight-lane divided freeway would not be able to accommodate the projected 2035 design year traffic volumes.

SECTION 4 – ALTERNATIVES B/OPTIONS 1 & 2: It was found that the ten-lane divided freeway with a diamond with loops interchange at the junction of I-40 and SR 1850 (Sandy Ridge Road) would be able to accommodate the projected 2035 design year traffic volumes. Our preliminary analysis indicates that the single point urban interchange at NC 66 would not be able to provide acceptable operations during the 2035 design year. However, it is recommended that alternative interchange concepts be evaluated during later planning and design phases to mitigate the anticipated right of way impacts associated with the above mentioned diamond with loops alternative. ***Alternative B/Option 2 would be the preferred alternative for Section 4.***

The total combined estimate for the preferred eight-lane divided freeway alternatives in Section 1 (Alt. B), Section 2 (Alt. B), and Section 3 (Alt. B/Option 2), the preferred ten-lane divided freeway alternative Section 4 (Alt. B/Option 2), US 311 flyover, and ITS deployment is \$462,200,000. It is anticipated that a total of two hundred fifty-five (255) residences and twenty-nine (29) businesses will be relocated due to this project. Please see Table 1 for a comprehensive breakdown of alternatives and costs.

It should be noted that a six-lane divided freeway alternative which concurs with the preferred eight-lane divided freeway alternative options mentioned above could be considered as an interim improvement at a total cost of \$384,000,000. This would permit the widening to be accommodated in phases if determined to be financially and operationally acceptable.

Table 1: Total Project Costs

Section	Alternative	Right of way Cost	Utility Relocation Cost	Construction Cost	Total Cost	Residences Relocated	Businesses Relocated
1	A	\$1,700,000	\$200,000	\$42,000,000	\$43,900,000	1	0
	B	\$1,700,000	\$200,000	\$59,800,000	\$61,700,000	1	0
2	B	\$0	\$0	\$14,400,000	\$14,400,000	0	0
3	A/Option 1	\$13,600,000	\$300,000	\$103,000,000	\$116,900,000	26	0
	A/Option 2	\$175,900,000	\$300,000	\$91,000,000	\$267,200,000	250	14
	B/Option 1	\$13,600,000	\$300,000	\$120,000,000	\$133,900,000	26	0
	B/Option 2	\$175,900,000	\$300,000	\$108,000,000	\$284,200,000	250	14
4	A/Option 1	\$11,900,000	\$100,000	\$43,500,000	\$55,500,000	3	2
	A/Option 2	\$24,300,000	\$100,000	\$30,400,000	\$54,800,000	4	14
	B/Option 1	\$15,100,000	\$300,000	\$68,900,000	\$84,300,000	3	3
	B/Option 2	\$27,500,000	\$400,000	\$55,900,000	\$83,800,000	4	15
US 311 Flyover				\$12,800,000	\$12,800,000		
ITS Deployment				\$5,300,000	\$5,300,000		
Total Project Cost (preferred alternatives) Sect. 1 - Alt. B, Sect. 2 - Alt. B, Sect. 3 - Alt. B/Opt. 2, Sect. 4 - Alt. B/Opt. 2		\$205,100,000	\$800,000	\$256,200,000	\$462,200,000	255	29

Table 2: Existing Bridge Information

Forsyth County

Structure Number	Facility Carried	Feature Intersected	Structure Description	Structure Length	Vertical Clearance	Horizontal Clearance	Year Constructed	Sufficiency Rating
11	I-40 WBL	Willard Road	RC Deck on PPC Girders	178'	27'-8"	60.0'	1980	79.2
29	NC 109	I-40, US 311	RC Deck on Haunched I-Beams & pl. girders	330'	16'-5"	68.8'	1980	98.0
341	I-40 EBL	Willard Road	RC Deck on PPC Girders	176'	27'-6"	52.0'	1980	97.0
432	I-40 WBL	US 311 SBL	RC Deck on I-Beams	146'	16'-10"	48.0'	1989	94.0
433	I-40 EBL	US 311 SBL	RC Deck on I-Beams	147'	18'-7"	50.4'	1989	95.0
434	I-40 WBL	US 311 NBL	RC Deck on I-Beams	140'	17'-2"	40.0'	1989	99.0
435	I-40 EBL	US 311 NBL	RC Deck on I-Beams	137'	16'-7"	48.0'	1989	98.0
437	SR 2678	I-40	RC Deck on PPC Girders	204'	16'-8"	26.0'	1990	87.0
439	NC 66	I-40	RC Deck on PPC Girders	223'	16'-9"	68.0'	1990	84.0
442	SR 2604	I-40	RC Deck on PPC Girders	208'	16'-10"	31.0'	1990	97.0
443	Cole Road	I-40	RC Deck on I-Beams	245'	16'-11"	25.9'	1990	80.6
447	SR 2632	I-40	RC Deck on PPC Girders	242'	16'-6"	32.0'	1991	96.5
457	I-40	West Fork Deep River	Double 11' x 8'-6" RC Box Culvert	287'-6"	N/A	80.0'	1992	74.6
458	SR 2643	I-40	RC Deck on PPC Girders	213'	16'-10"	48.0'	1992	99.0

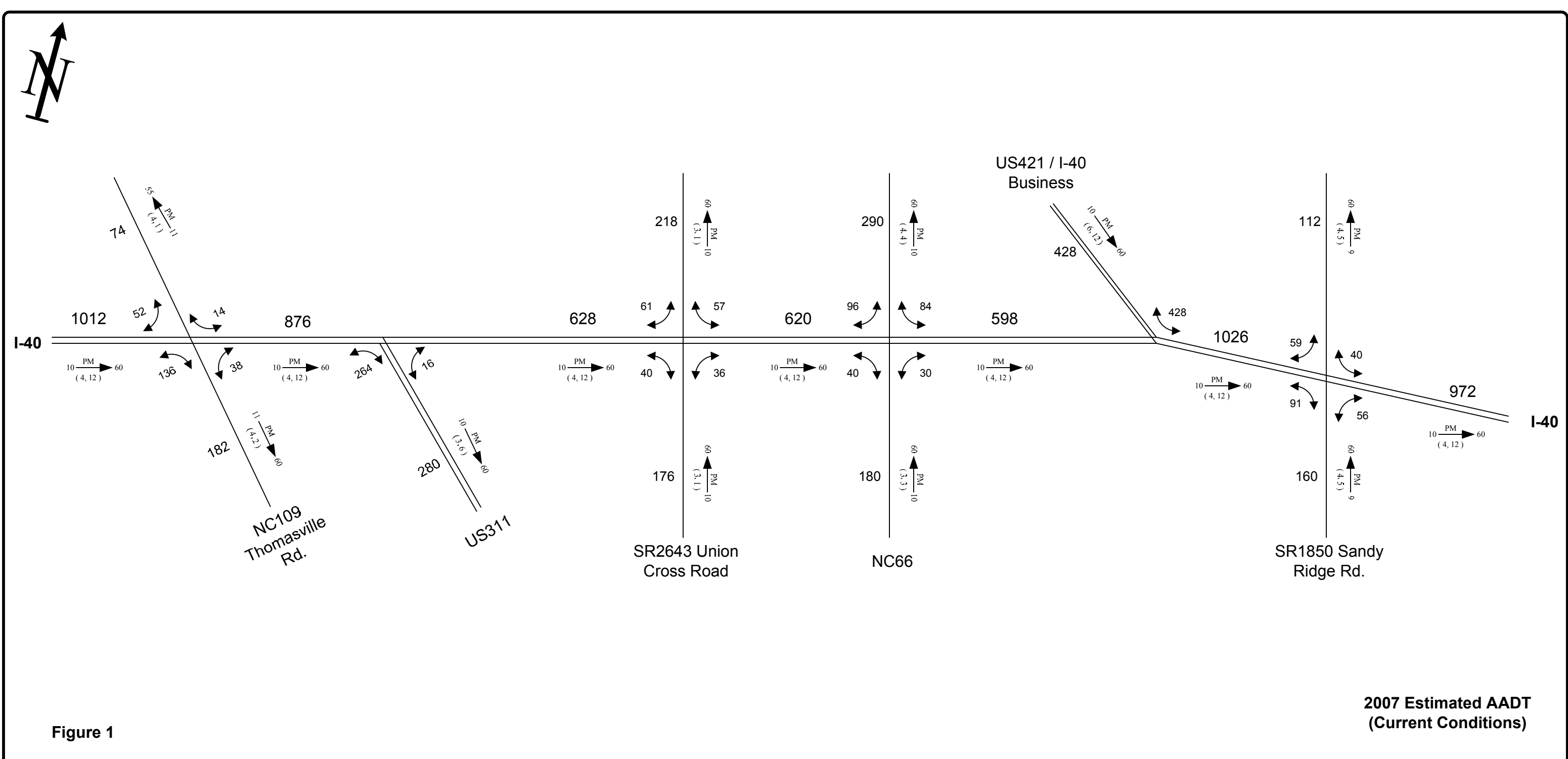
Table 2 (Continued.): Existing Bridge Information

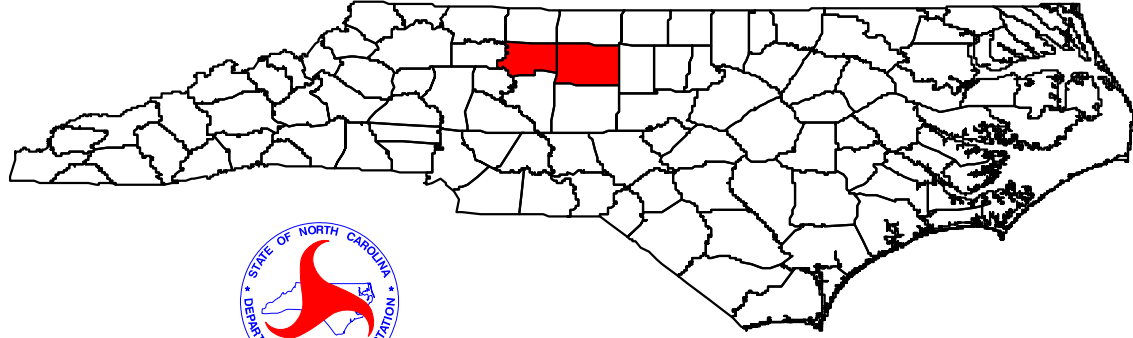

Forsyth County

Structure Number	Facility Carried	Feature Intersected	Structure Description	Structure Length	Vertical Clearance	Horizontal Clearance	Year Constructed	Sufficiency Rating
459	I-40	Abbotts Creek	Triple 12' x 7' RC Box Culvert	261'-3"	N/A	80.0'	1992	77.6
476	I-40 WBL	SR 1003	RC Deck on PPC Girders	143'	17'-3"	40.0'	1992	95.8
477	I-40 EBL	SR 1003	RC Deck on PPC Girders	139'	16'-1"	40.0'	1992	95.8
478	I-40	Fiddlers Creek	Quadruple 9' x 12' RC Box Culvert	271'-9"	N/A	76.0'	1992	70.0

Guilford County

Structure Number	Facility Carried	Feature Intersected	Structure Description	Structure Length	Vertical Clearance	Horizontal Clearance	Year Constructed	Sufficiency Rating
41	SR 2007	I-40 US/US 421	RC Deck on PPC Girders	209'	16'-6"	26.0'	1990	86.7
76	SR 1850	I-40 & US 421	RC Deck on Plate Girders	218'	17'-8"	71.9'	1996	95.8
609	SR 1860	I-40	RC Deck on PPC Girders	219'	16'-11"	26.0'	1990	92.9
613	SR 2007	I-40	RC Deck on PPC Girders	208'	16'-11"	25.9'	1990	83.3
616	I-40 BUS EBL	I-40	RC Deck on Haunched I-Beams & pl. girders	344'	17'-0"	39.9'	1991	98.0
630	I-40	Deep River	Triple 9' x 8' RC Box Culvert	187'	N/A	76.0'	1992	74.5



<p>LEGEND</p> <p>### VPD---# OF VEHICLES PER DAY IN 100'S ### - MUCH LESS THAN ### VPD X MOVEMENT PROHIBITED → ONE-WAY MOVEMENT</p> <p>DHV $\xrightarrow{\text{PM (d,t)}}$ D</p> <p>DHV DESIGN HOURLY VOLUME (%) = K30 K30 = 30TH HIGHEST HOURLY VOLUME PM PM PEAK PERIOD D DIRECTIONAL SPLIT (%) → INDICATES DIRECTION OF D REVERSE FLOW FOR AM PEAK (d,t) DUALS, TT-ST'S (%)</p>	<p>Prepared by Paul S. Schroeder, Ph.D., P.E.</p>  	<p>LOCATION:</p> <p>I-40 from NC109 Thomasville Road in Forsyth County to SR1850 Sandy Ridge Road in Guilford County.</p> <p>PROJECT:</p> <p>Widen I-40 from US311 to US421/I-40 Business.</p> <p>COUNTY: Forsyth & Guildford</p> <p>DIV. : 9 & 7 DATE: June 11, 2007</p> <p>TIP # FS-0609A WBS #34263.1.1</p>
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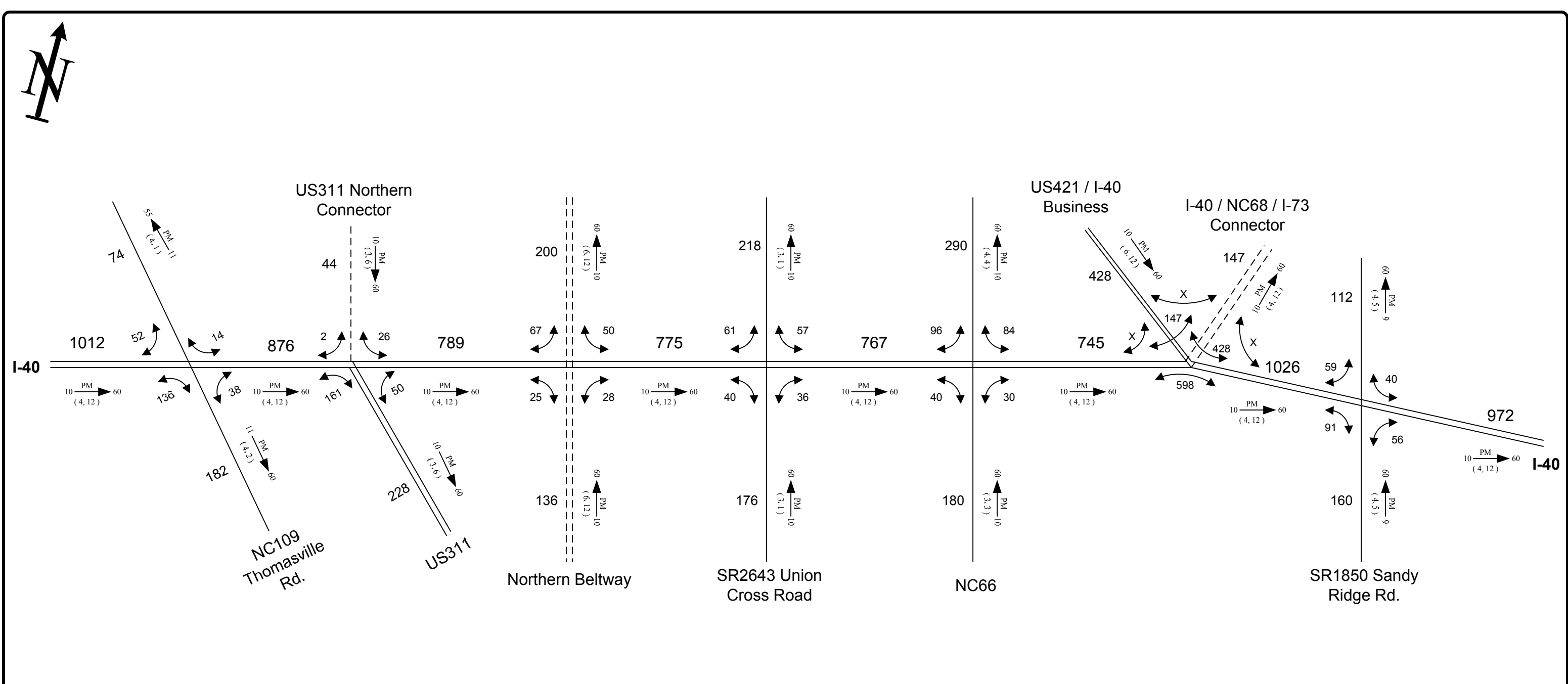


Figure 2

2007 Estimated AADT
(2030 Programmed Improvements)

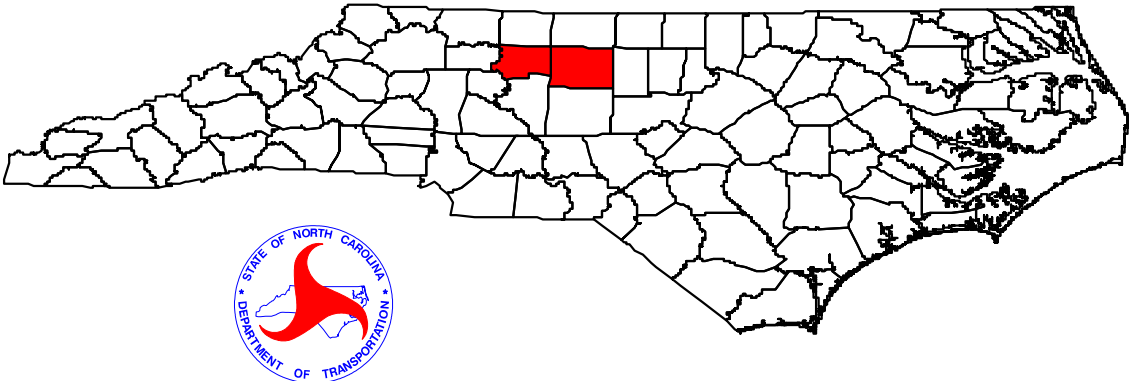
LEGEND

VPD---# OF VEHICLES PER DAY IN 100'S
 ### - MUCH LESS THAN ### VPD
 X MOVEMENT PROHIBITED
 → ONE-WAY MOVEMENT

DHV $\xrightarrow{\text{PM}}$ D
 (d, t)

DHV DESIGN HOURLY VOLUME (%) = K30
 K30 = 30TH HIGHEST HOURLY VOLUME
 PM PM PEAK PERIOD
 D DIRECTIONAL SPLIT (%)
 → INDICATES DIRECTION OF D
 REVERSE FLOW FOR AM PEAK
 (d,t) DUALS, TT-ST'S (%)

Prepared by Paul S. Schroeder, Ph.D., P.E.



LOCATION:

I-40 from NC109 Thomasville Road in Forsyth County to SR1850 Sandy Ridge Road in Guilford County.

PROJECT:

Widen I-40 from US311 to US421/I-40 Business.

COUNTY: Forsyth & Guildford

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TIP # FS-0609A

WBS #34263.1.1

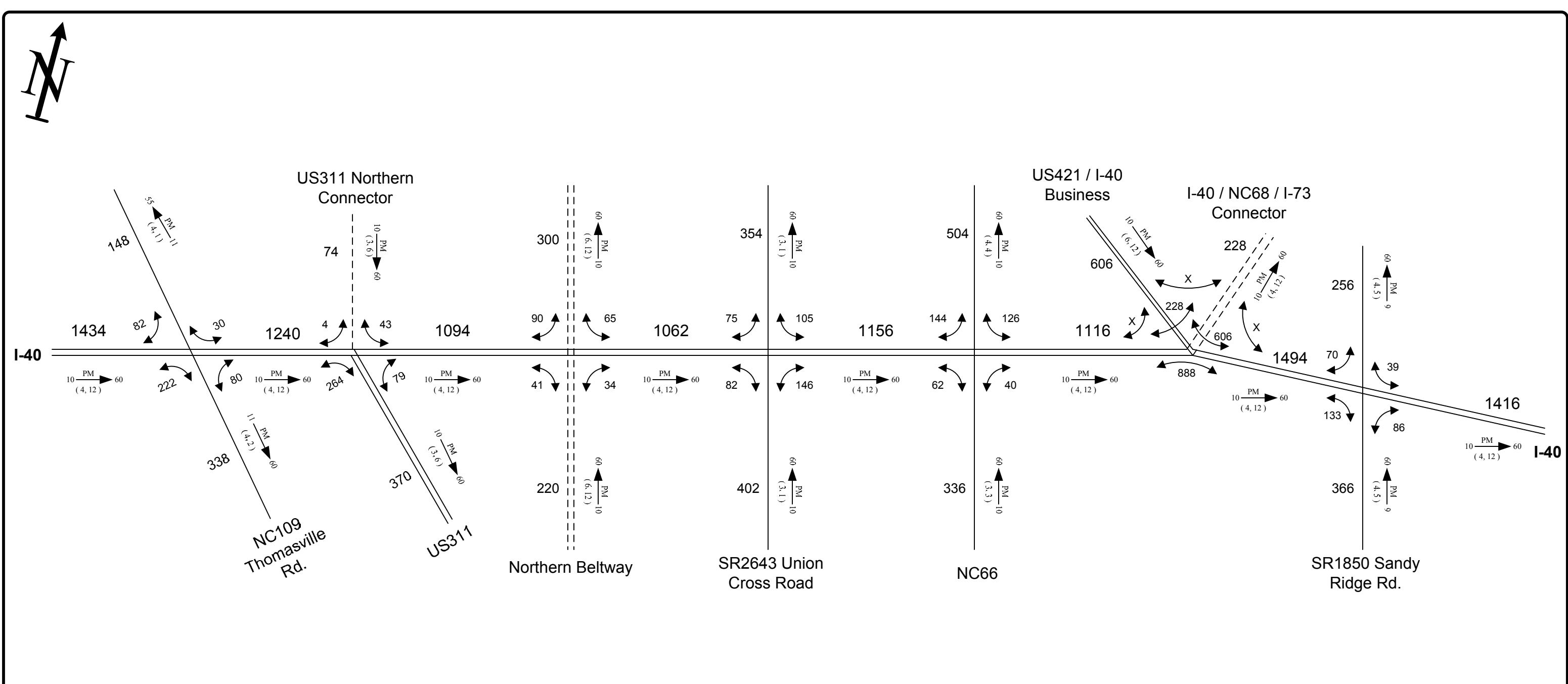


Figure 3 **2035 Estimated AADT
(2030 Programmed Improvements)**

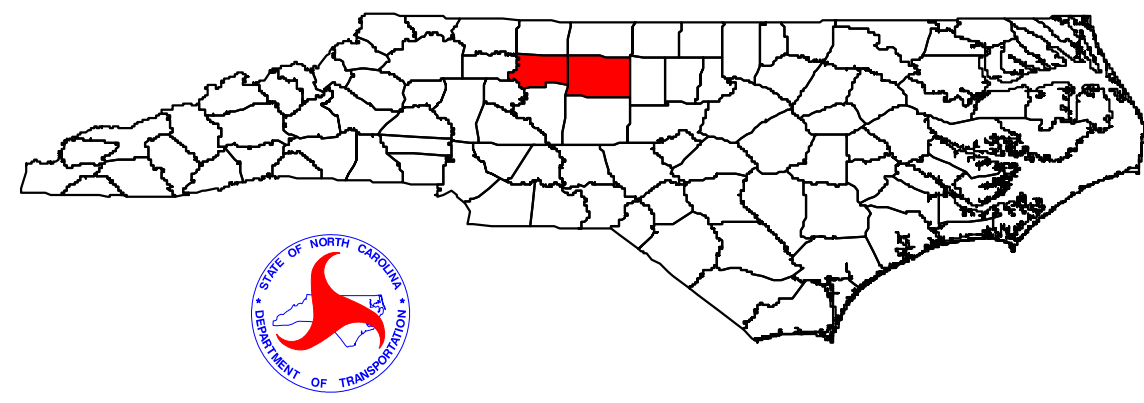
LEGEND

VPD---# OF VEHICLES PER DAY IN 100'S
 ### - MUCH LESS THAN ### VPD
 X MOVEMENT PROHIBITED
 → ONE-WAY MOVEMENT

DHV $\xrightarrow{\text{PM}}$ D
 (d, t)

DHV DESIGN HOURLY VOLUME (%) = K30
 K30 = 30TH HIGHEST HOURLY VOLUME
 PM PM PEAK PERIOD
 D DIRECTIONAL SPLIT (%)
 → INDICATES DIRECTION OF D
 REVERSE FLOW FOR AM PEAK
 (d,t) DUALS, TT-ST'S (%)

Prepared by Paul S. Schroeder, Ph.D., P.E.



LOCATION:

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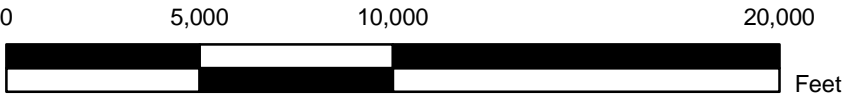
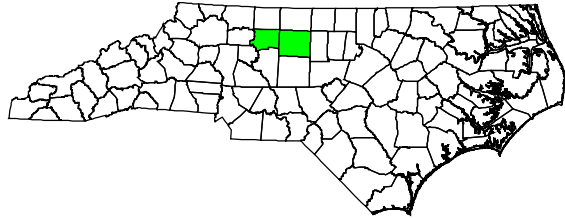
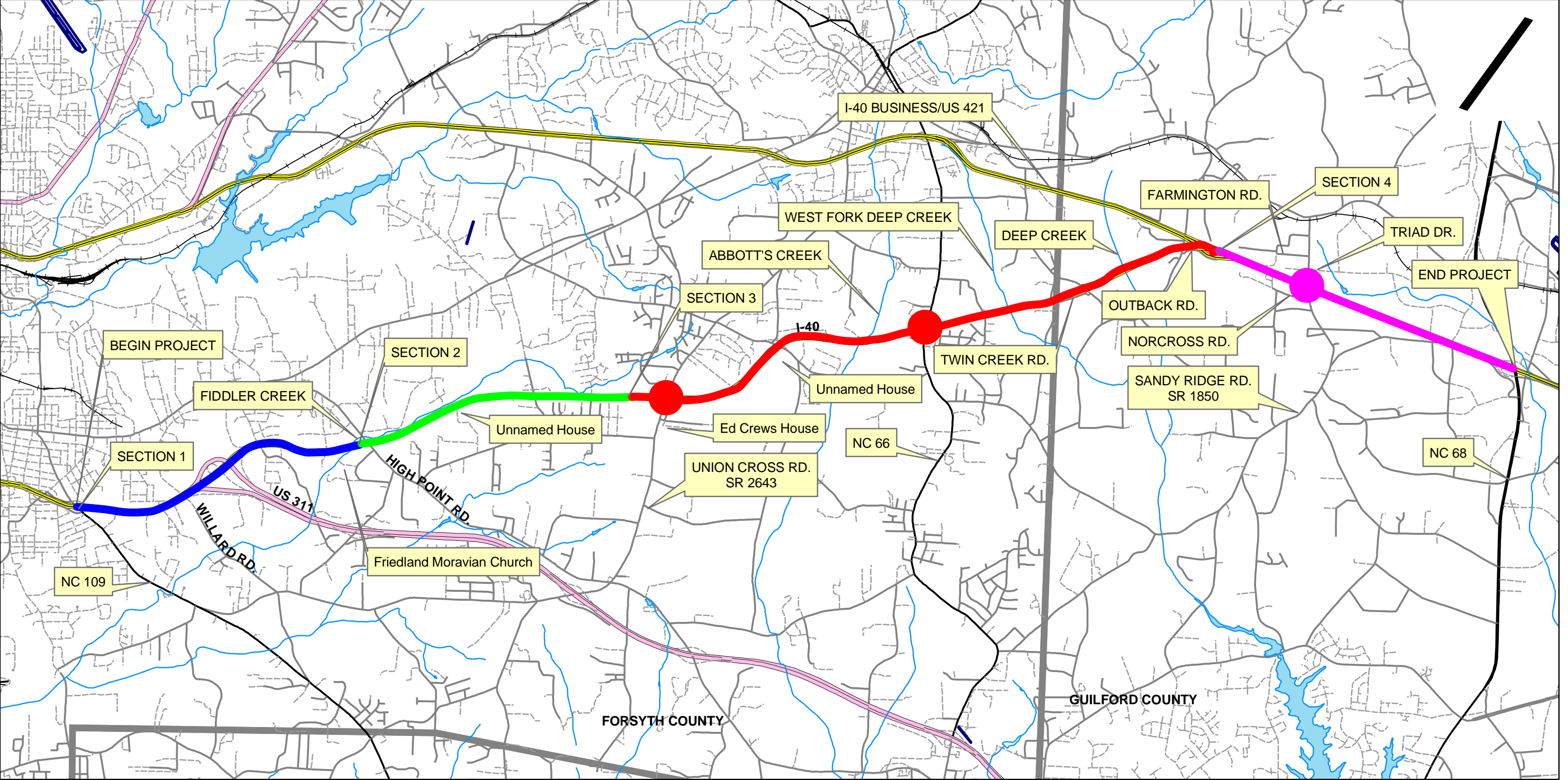
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DIV. : 9 & 7

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TIP # FS-0609A

WBS #34263.1.1



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH

FS-0609A

I-40
FROM NC 109 TO NC 68

GUILFORD AND FORSYTH COUNTIES

DIVISIONS 7 & 9

FIGURE 1