



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

1534 MAIL SERVICE CENTER, RALEIGH, N.C. 27699-1534

W. LYNDO TIPPETT
SECRETARY

July 9, 2001

MEMORANDUM TO: Mr. Samuel L. Erby, Member, Board of Transportation
Mr. Frank L. Johnson, Member, Board of Transportation
Mr. Alan Z. Thornburg, Member, Board of Transportation
Mr. Carl McCann, P.E., Division Engineer, Division 11
Mr. Michael L. Holder, Division Engineer, Division 12
Mr. F. Daniel Martin, Division Engineer, Division 13
Mr. David D. King
Mr. C. W. Leggett, P.E.
Mr. J. M. Lynch, P.E. (3) Attention: Jim Dunlop, P.E.
Mr. J. B. Williamson
Mr. Bill Gilmore, P.E. (2)
Ms. D. M. Barbour, P.E.
Mr. J. E. Alford, P.E.
Mr. Blake Norwood, P.E.
Mr. A. L. Avant (2)
Mr. J. D. Lane
Mr. T. A. Peoples, P.E.
Mr. H. A. Tasaico, P.E.

FROM: Mr. H. Franklin Vick, P.E. 
Feasibility Studies Unit Head

SUBJECT: Feasibility Study # FS-9911C, US 321 from US 70 in Hickory to
Southwest Boulevard (SR 1933) in Lenoir. Hickory, Granite Falls,
Sawmills, Hudson and Lenoir, Catawba, Burke and Caldwell Counties.

Our staff has completed a feasibility study for the subject proposed project. This brief analysis suggests improvements that would be logical if the project were to be funded. A copy of our report is attached for your information.

HFV/dl

Attachment

cc: Mr. R. L. Hill, P.E.
Mr. L. A. Sanderson, P.E.

FEASIBILITY STUDY

Hickory, Granite Falls, Sawmills, Hudson, and Lenoir,

**US 321 From US 70 in Hickory
To Southwest Boulevard (SR 1933) in Lenoir**

Catawba, Burke, and Caldwell Counties

Division 11, 12 and 13

FS-9911C



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

A handwritten signature in black ink, appearing to read "Derrick W. Lewis".

Derrick W. Lewis, P.E.
Feasibility Studies Engineer

A handwritten signature in black ink, appearing to read "H. Franklin Vick".

H. Franklin Vick, P.E.
Head of Feasibility Studies

7/9/01
Date

Hickory, Granite Falls, Sawmills, Hudson, and Lenoir
US 321 From US 70 in Hickory
To Southwest Boulevard (SR 1933) in Lenoir

Catawba, Burke, and Caldwell Counties
FS-9911C

I. General Description

This feasibility study describes upgrading US 321 to a freeway from the US 70 Interchange in Hickory to the Southwest Boulevard (SR 1933) interchange in Lenoir, a distance of approximately 13.6 miles. The project location is shown in Figures 1, 2 and 3. If this facility is upgraded to a freeway, the following improvements will be needed:

- ◆ For the majority of US 321 in the project area, the existing four-lane divided highway should be improved to include two 12-foot travel lanes per direction, 10-foot wide outside shoulders, and 4-foot wide inside shoulders. However, US 321 from Clement Boulevard (SR 1371) to US 321A will need to be widened to provide three 12 foot travel lanes per direction because of the increased traffic volumes in this section.
- ◆ The recommended right of way width south of the Catawba River is 200 feet with full control of access. North of the Catawba River, the recommended right of way width is 250 feet with full control of access.
- ◆ Given the substandard design of the existing partial cloverleaf interchange at SR 1107 (Falls Avenue), this interchange should be reconstructed as a half cloverleaf interchange on the southside of SR 1107.
- ◆ In order to accommodate the proposed improvements to US 321, many of the existing structures along this facility will need to be widened or replaced (See Appendix A for a detailed listing of the structures).
- ◆ New interchanges are recommended at the following intersections (See Appendix B for a cost estimate and relocated residential and business breakdown for each interchange):
 - 2nd Avenue NW (SR 1306)
 - Clement Boulevard (SR 1371)
 - Grace Chapel Road (SR 1751)
 - US 321 A
 - Pinewood Road (SR 1109)
 - Mission Road / Lower Cedar Valley Road (SR 1108)
 - Pine Mountain Road (SR 1952) / Mountain Road (SR 1809)
 - Mt. Herman Road (SR 1160)

- ◆ This study does not include a detailed service road study. However, if this project is funded, the department will evaluate the need for service roads during later planning and design stages if this project is constructed.
- ◆ The existing median width along most of this project is approximately 30 feet. Therefore, we recommend that a 22-foot median with a concrete barrier be provided from US 70 to north of the proposed Clement Boulevard interchange. Then the median widens out north of Catawba River, because of the more rural setting north of the Catawba River. However, because of the narrow depressed median in this area, we evaluated two median widths on this section. Alternative 1 retains the existing 30-foot median, while Alternative 2 widens the median to a standard 46-feet. Regardless of the alternative, we included the cost of median guardrail to enhance the traffic safety of this facility.

With either alternative, it is anticipated that there will be 290 residences and 201 businesses relocated due to this project. The total cost of Alternative 1, including construction and right-of-way, is estimated to be \$327,000,000. The total cost of Alternative 2, including construction and right-of-way, is estimated to be \$360,400,000.

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. Background

The purpose of this study is to evaluate the impacts of converting US 321 from Hickory to Lenoir into a freeway facility. US 321 is designated a major thoroughfare in the Hickory-Newton-Conover Thoroughfare plan, the Caldwell County Urban Area Thoroughfare plan, and the Lenoir-Hudson Thoroughfare Plan. On the North Carolina Statewide Functional Classification System, US 321 is designated a Principal Arterial.

The current year Average Daily Traffic (ADT) along US 321 within the project limits varies from 28,000 to 40,900 vehicles per day (vpd). For the design year 2025, the estimated traffic volumes on US 321 will range between 46,600 and 66,500 vpd. Truck traffic is estimated to make up between seven and nine percent of the daily traffic.

Currently the majority of the intersections along this section of US 321 operate at Level of Service (LOS) "F". If no improvements are made, this section of US 321 will continue to operate at a "F" LOS in the design year 2025. If

US 321 is upgraded into a controlled-access freeway, it should operate at LOS "C" in the current year and at LOS "D" in the design year 2025.

III. Description of Project Segments

Due to the length of the project, diversity of development and variation in urban and rural settings, this project has been divided into two segments.

Segment 1

Segment 1 is from the US 70 / US 321 interchange in Hickory to US 321A in Caldwell County, a distance of 4.6 miles (See Figure 1). The proposed cross section for US 321 from US 70 to Clement Boulevard is a four-lane freeway, including a 22-foot median with a concrete median barrier. From Clement Boulevard to US 321A, the proposed cross-section is a six-lane freeway. The median width for this portion of US 321 transitions from the recommended 22 feet to either the existing 30 feet (*Alternate A*) or the standard 46 feet median (*Alternate B*) near the Catawba River. This segment also includes the proposed interchanges at 2nd Avenue NW (SR 1306), Clement Boulevard (SR 1371), Grace Chapel Road (SR 1751), and US 321A. Individual interchange cost and right-of-way impact estimates are located in Appendix B.

For this segment, it is anticipated that there will be 103 residences and 83 businesses relocated due to this project. The total cost of this segment is as follows:

Alternative A

Construction.....	\$ 90,500,000
Right-of-way.....	\$ 73,900,000
<u>Segment Cost.....</u>	<u>\$ 164,400,000</u>

Alternative B

Construction.....	\$ 94,100,000
Right-of-way.....	\$ 73,900,000
<u>Segment Cost.....</u>	<u>\$ 168,000,000</u>

Segment 2

Segment 2 is from US 321A in Caldwell County to the Southwest Boulevard (SR 1933) interchange in Lenoir, a distance of 9.0 miles (See Figures 2 and 3). The proposed cross section for this segment of US 321 is a four-lane freeway. The median width for this segment of US 321 is either the existing 30-foot median (*Alternative A*) or a standard 46-foot median (*Alternative B*). The existing Falls Avenue (SR 1107) interchange and the proposed interchanges at Pinewood Road (SR 1109), Mission Road / Lower Cedar Valley Road (SR 1108), Pine Mountain Road (SR 1952) / Mountain Road (SR 1809), and Mt. Herman

Road (SR 1160) are also included in this segment. Individual interchange cost and right-of-way impact estimates are located in Appendix B.

For this segment, it is anticipated that there will be 187 residences and 118 businesses relocated due to this project. The total cost of this segment is as follows:

Alternative A	
Construction.....	\$ 62,100,000
Right-of-way	\$ 100,500,000
Segment Cost	\$ 162,600,000

Alternative B	
Construction.....	\$ 91,900,000
Right-of-way	\$ 100,500,000
Segment Cost	\$ 192,400,000

For the entire project, it is anticipated that there will be 290 residences and 201 businesses relocated due to this project. The total cost of each alternative is as follows:

Alternative A	
Construction.....	\$ 152,600,000
Right-of-way	\$ 174,400,000
Segment Cost	\$ 327,000,000

Alternative B	
Construction.....	\$ 186,000,000
Right-of-way	\$ 174,400,000
Segment Cost	\$ 360,400,000

IV. Other Alternates Considered

While converting US 321 into a freeway is considered the best alternative from a traffic safety and operational perspective, it comes at a significant cost in both construction and right of way. Given the anticipated cost of the freeway conversion, we also considered the simple widening of US 321 to a six-lane divided highway, with intersection improvements, to be a logical alternative to the freeway conversion. A simple widening of US 321 with sufficient intersection improvements should provide an acceptable "D" LOS in the 2025-design year, and significantly reduce the construction cost and anticipated right of way impacts. Under this alternative, the existing median is retained and the substandard Falls Avenue (SR 1107) interchange is reconstructed as previously recommended. In addition, most of the structures along this facility will either need replacement or widening in order to accommodate the proposed improvements (See Appendix A for a structure inventory).

It is anticipated that there will be 28 residences and 23 businesses relocated due to this alternative. The total cost of this simple widening alternative is as follows:

Construction.....	\$ 95,100,000
Right-of-way.....	\$ 14,800,000
Segment Cost.....	\$ 109,900,000

IV. Additional Comments

A detailed environmental study was not conducted for this feasibility study. However, we have screened the existing information available for this area for environmental and historic concerns.

Based on maps at the Department of Environment, Health & Natural Resources and Natural Heritage Section, impacts to threatened or endangered species are not anticipated in the project area. In addition, no historic properties are anticipated along this project.

Due to the potential for construction in the area of the Catawba River, Little Gunpowder Creek, and Gunpowder Creek, wetland permits and mitigation may be required. The estimates included in this study do not include any costs for wetland mitigation.

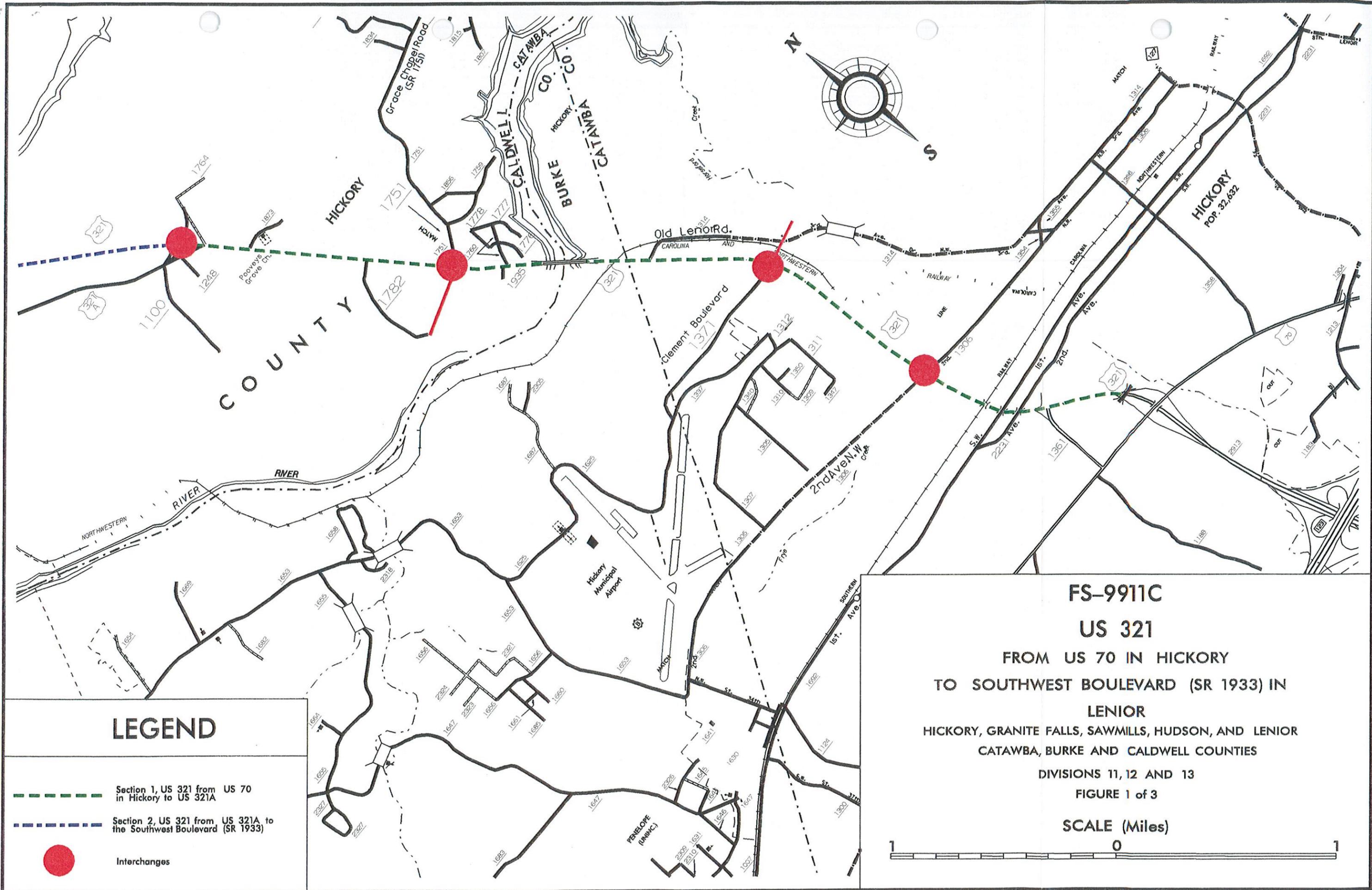
The Congestion Management Section of the Traffic Engineering and Safety Systems Branch has requested that \$8,455,490 in Intelligent Transportation System Devices be included in this project. We have not incorporated these devices into the project scope or cost estimates. However, we recommend the inclusion of ITS measures be evaluated during later planning and design stages.

APPENDIX A - FS-9911C
Existing Structure Inventory

Structure Number	Feature Intersected	Structure Description	Structure Length	Vertical Clearance	Horizontal Clearance	Year Constructed	Sufficiency Rating	Proposed Treatment
Catawba County								
US 70 in Hickory to Burke County Line								
133	14th Street & 2nd Street SW (SR 2231) (over)	Reinforced concrete deck on I-Beams, Y Shaped Abutment Bridge	111'	15' 11"	28'	1955	62	Replace Structure in order to provide for proposed US 321 improvements
142	1st Avenue SW (SR 1692) (over)	Reinforced concrete deck on I-Beams	185'	15' 3"	28'	1955	73	Replace Structure in order to provide for proposed US 321 improvements
R146	Southern Railroad (over)	Reinforced concrete deck on continuous I-beams	159'	16' 2"	35'	1955	N/A	Replace Structure in order to provide for proposed US 321 improvements
C296	Unknown Creek	Double 10' X 10" culvert, 120' 8" along centerline	21	N/A	48'	1957	80.4	Lengthen Structure in order to provide for proposed US 321 improvements
Caldwell & Burke County								
Burke County Line to just South of Southwest Boulevard (SR 1933) in Lenoir								
366	Catawba River	Reinforced concrete deck on I-beams. US 321 NB Lanes	944'	N/A	40'	1983	97.0	Widen structure in order to provide for US 321 improvements
367	Catawba River	Reinforced concrete deck on I-beams. US 321 SB Lanes	825'	N/A	28'	1962	73.8	Replace Structure in order to provide for proposed US 321 improvements
12	Falls Avenue (SR 1107) (Over)	Reinforced concrete deck on concrete girders	172'	15' 3"	38'	1953	78.0	Replace Structure in order to provide for proposed US 321 improvements
13	Dudley Avenue (SR 1002) (Under)	Reinforced Concrete deck on Prestressed concrete girders. US 321 NB	135'	15' 8"	36.7'	1969	96.0	Retain existing structure with freeway alternative. Widen existing structure with widening alternative.
14	Dudley Avenue (SR 1002) (Under)	Reinforced Concrete deck on Prestressed concrete girders. US 321 SB	135'	16'	27.9'	1953	47.7	Replace Structure in order to provide for proposed US 321 improvements
C24	Little Gunpowder Creek	Single 37' 5" X 18' Arch Culvert, 147' 6" along centerline	41'	N/A	64'	1954	80.5	Lengthen Structure in order to provide for proposed US 321 improvements
32	Gunpowder Creek	Reinforced concrete deck on Prestressed Girders. US 321 NB	173'	N/A	36.8'	1969	96.9	Retain existing structure for freeway alternative. Widen existing structure with widening alternative.
33	Gunpowder Creek	Reinforced concrete deck on reinforced concrete deck girders. US 321 SB	158'	N/A	28'	1954	70.1	Replace Structure in order to provide for proposed US 321 improvements

APPENDIX B - FS-9911C
Interchange Inventory

Intersecting Roadway		Proposed Interchange Configuration			ROW Cost	Residential Relocates	Business Relocates
Section 1							
US 321 from US 70 to Hickory to US 321A							
2nd Avenue NW (SR 1306)	Partial Cloverleaf interchange on the south side of 2nd Street NW. Proposed interchange carries 2nd Street NW over US 321	10,500,000	15,500,000	46	13		
Clement Boulevard (SR 1371)	Interchange has a tight diamond ramp configuration on the east side of US 321 with combination ramp & loop in the northwest quadrant. This interchange bridges over US 321, the parallel railroad and Old Lenior Road (SR 1314) before connecting with 12 Avenue NW.	16,000,000	15,500,000	0	19		
Grace Chapel Road (SR 1751)	Standard Diamond Interchange with US 321 over Grace Chapel Road. Includes an extension of Grace Chapel Road to SR 1782 to access property on the west side of US 321. Also includes a short connection between SR 1759 and SR 1778 on east side of US 321.	12,300,000	4,000,000	22	0		
US 321A	Partial cloverleaf interchange on the north side of US 321A with US 321 over. Includes Relocation of SR 1100 to relocate opposite the SB ramp terminal and Alex Lee Boulevard to intersect opposite NB ramp terminal	10,400,000	12,100,000	5	2		
Section 2							
US 321 from US 321A to the Southwest Boulevard (SR 1933) Interchange							
Falls Avenue (SR 1107)	Replace the existing substandard Partial Cloverleaf interchange (SE and NW quadrants) with a partial cloverleaf interchange on the South side of Falls Avenue (Over)	6,100,000	6,200,000	23	13		
Pinewood Road (SR 1109)	Construct a partial cloverleaf interchange on the north side of Pinewood Road with the structure carrying Pinewood Road over US 321.	10,500,000	5,200,000	6	3		
Mission Road / Lower Cedar Valley Road (SR 1108)	Construct a standard diamond interchange with SR 1108 over US 321. Includes a relocation of SR 1108 in the interchange area and a service road connecting Mission Road to SR 1192 on the west side of US 321.	8,600,000	11,900,000	18	12		
Pine Mountain Road (SR 1952) / Mountain Road (SR 1809)	Construct a standard diamond interchange with Pine Mountain Road / Mountain Road over US 321. Includes a relocation of SR 1952 in order to properly intersect SR 1809.	6,700,000	16,400,000	22	16		
Mt. Herman Road (SR 1160)	Construct an interchange which is a standard diamond configuration on the east side of US 321 and a ramp / loop in the northwest quadrant. Includes a new service road in the southwest quadrant across from the ramp terminal to access the Community College. Also includes a service road in the northwest quadrant to provide access to properties up to the Fairgrounds.	11,000,000	4,600,000	3	1		



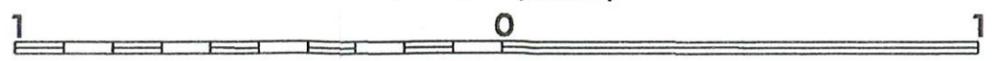
LEGEND

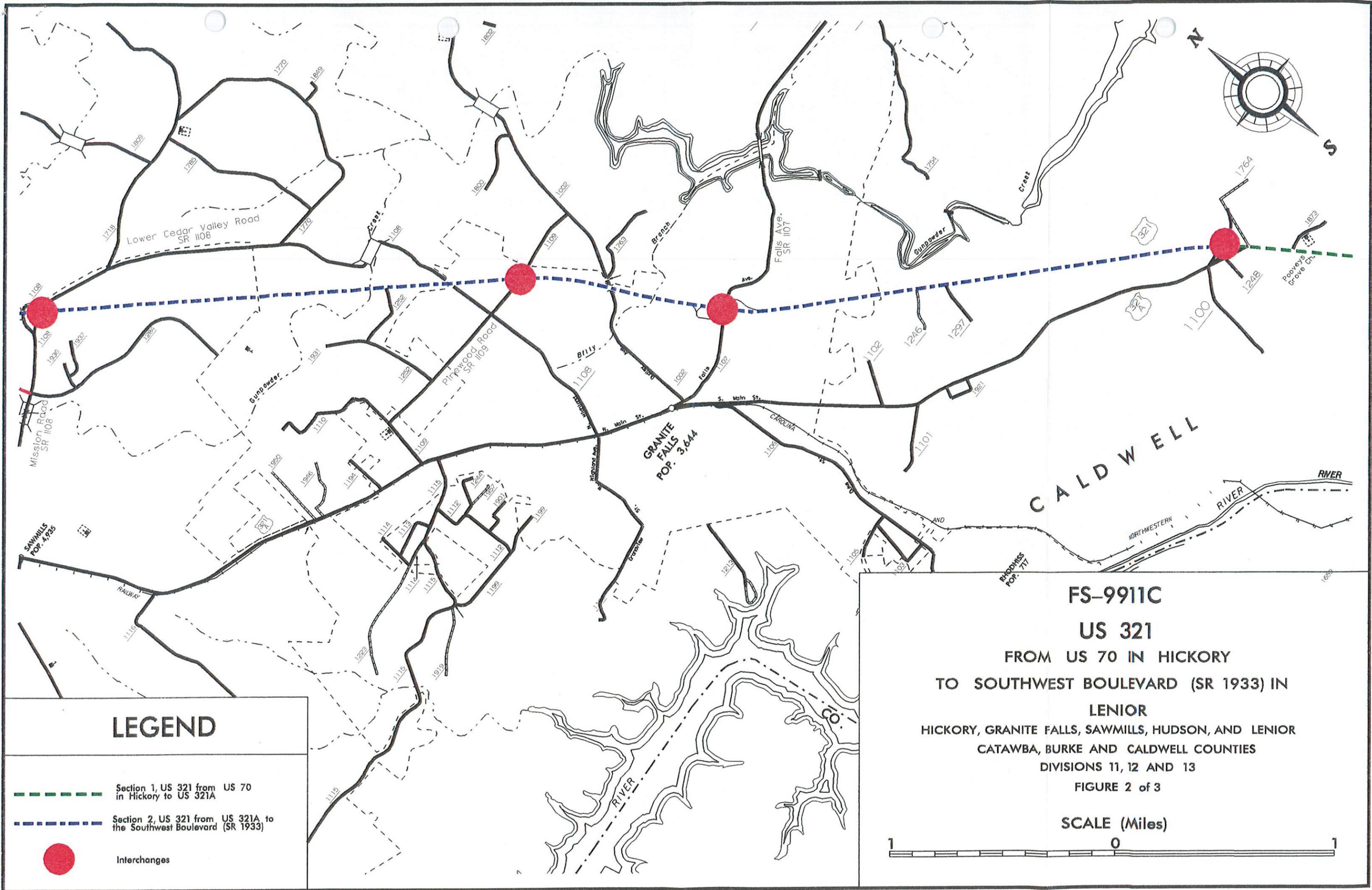
- Section 1, US 321 from US 70 in Hickory to US 321A
- Section 2, US 321 from US 321A to the Southwest Boulevard (SR 1933)
- Interchanges

FS-9911C
US 321
 FROM US 70 IN HICKORY
 TO SOUTHWEST BOULEVARD (SR 1933) IN
 LENIOR
 HICKORY, GRANITE FALLS, SAWMILLS, HUDSON, AND LENIOR
 CATAWBA, BURKE AND CALDWELL COUNTIES

DIVISIONS 11, 12 AND 13
 FIGURE 1 of 3

SCALE (Miles)





LEGEND

-  Section 1, US 321 from US 70 in Hickory to US 321A
-  Section 2, US 321 from US 321A to the Southwest Boulevard (SR 1933)
-  Interchanges

FS-9911C
US 321
 FROM US 70 IN HICKORY
 TO SOUTHWEST BOULEVARD (SR 1933) IN
 LENIOR
 HICKORY, GRANITE FALLS, SAWMILLS, HUDSON, AND LENIOR
 CATAWBA, BURKE AND CALDWELL COUNTIES
 DIVISIONS 11, 12 AND 13

FIGURE 2 of 3

SCALE (Miles)

