

**I-73/I-74 ROCKINGHAM BYPASS
RICHMOND COUNTY
NORTH CAROLINA**

**From US 220 Ellerbe Bypass (R-2231) to
US 74 Rockingham/Hamlet Bypass (R-512)
T.I.P. No. R-3421
State Project No. 8.1580801**

FEASIBILITY STUDY

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1.0 INTRODUCTION

1.1 Project Review

The I-73 and I-74 projects are two new interstate routes designated by federal legislation that will extend from Detroit, Michigan and Rock Island, Illinois to Charleston, South Carolina (See Exhibit 1). Both interstate routes connect at Asheboro, North Carolina and extend south along existing US 220 to Rockingham, North Carolina. However, south of Rockingham the routes split and I-73 extends southwest into South Carolina along US 1, while I-74 continues along existing US 74 through North Carolina (See Exhibit 2). The alignments for both of these interstate routes through North Carolina will follow both existing highways upgraded to interstate standards, and projects on new location.

The project discussed within this document is a segment of the I-73/I-74 route which bypasses the City of Rockingham in Richmond County, North Carolina. This roadway is identified as project number R-3421 within the North Carolina Transportation Improvement Program (TIP). The approximate 10 mile proposed I-73/I-74 Bypass will be a four-lane divided, fully controlled access freeway either completely on new location or on new location and upgrading portions of existing US 220 north of Rockingham. This project will connect the proposed US 220 Ellerbe Bypass (R-2231) north of Rockingham to the proposed US 74 Rockingham/Hamlet Bypass (R-512) south of Rockingham. The study area for the proposed I-73/I-74 Rockingham Bypass is shown on Exhibit 3.

1.2 Purpose of Study

This feasibility study identifies and evaluates four alternatives that will provide the necessary interstate link between the proposed US 220 Freeway near Ellerbe and the proposed US 74 Bypass southwest of Rockingham. The purpose of this study is to describe the proposed project and identify potential environmental concerns that may require additional consideration in the planning and design phase. The study will also determine the estimated cost of the project for inclusion in future TIP updates. This project is presently in the initial stages of planning, therefore, this report does not include an exhaustive environmental or design evaluation. However, at the completion of this study and the subsequent public hearing, the NCDOT and the City of Rockingham, with the cooperation of the environmental agencies, would like to select a "Preferred Alternative" so that the required right-of-way can be protected for future construction.

2.0 PURPOSE AND NEED

2.1 System History

Section 330(a) of the National Highway System Designation Act of 1995 (passed November 28, 1995), has identified I-73/I-74 as a high priority corridor. These north-south interstate highways will extend from Detroit, Michigan and Rock Island, Illinois, through North Carolina, to Charleston, South Carolina. The Act further states that in North Carolina, the I-73 Corridor shall generally follow US 220 from the Virginia State line to NC 68 in the vicinity of Greensboro, on to I-40, and from I-40 to US 220 at Asheboro (See Exhibit 2). The route will then follow US 220 to US 1 near Rockingham and extends along US 1 to the South Carolina State line.

The I-74 corridor shall generally follow I-77 from the Virginia State line to the I-77/US 52 connector west of Mt. Airy and then along US 52 to US 220 at Asheboro. The I-74 route will then follow US 220 to US 74 near Rockingham and then extend southeastward along US 74 to Whiteville where it connects with US 76. The route will then follow US 74/US 76 to the South Carolina State line. However, it is up to each individual state, and the cooperation between adjacent states to determine the final alignment of both of these corridors.

Section 330(b) of the Act designates the I-73/I-74 route as a "future part of the interstate system." Therefore, prior to any portion of the roadway becoming a part of this system, the Secretary of Transportation must determine that each of the segments meet interstate design standards and connects to an existing interstate system. Through North Carolina, the majority of this interstate facility will consist of improving existing state highways to interstate standards and connecting them to form the I-73/I-74 Freeway. There are no additional federal funds available for this project, therefore, individual states must utilize their annual Federal Highway budget for funding. The NCDOT has already appropriated funds for the majority of the I-73/I-74 route through North Carolina in the existing Transportation Improvement Program (TIP). Based on the 1996 TIP, this project (R-3421) is scheduled for Feasibility Study only and no funds have been appropriated for preliminary engineering, right-of-way acquisition, or construction at this time.

2.2 Project Setting

As a result of the federal legislation, NCDOT is conducting this Feasibility Study to assess a portion of the I-73/I-74 corridor. The study area for this segment of the freeway is located within Richmond County, North Carolina and extends from the proposed US 220 Bypass south of Ellerbe (R-2231) to the proposed US 74 Bypass (R-512) west of Rockingham and from the proposed US 220 Bypass south of Ellerbe to US 1 northeast of Rockingham (See Exhibit 3). The I-73/I-74 Freeway would be located east or west of the City of Rockingham depending upon the chosen alternative.

2.3 Project Linkage

Based on current design alternatives, the I-73/I-74 Bypass of Rockingham will connect several proposed TIP projects. All alternatives begin at TIP Project R-2231 (US 220 Ellerbe Bypass) and end at either TIP Project R-512 (US 74 Rockingham/Hamlet Bypass) or R-2501 (US 1 Rockingham Bypass, See Exhibit 3). As mandated by federal legislation, each of the studied alternatives will be designed to interstate standards. The status of these TIP projects are listed below:

- * R-512...Right-of-way acquisition in progress; construction to begin in 1996.
- * R-2231...Right-of-way acquisition to begin in 1997; construction to begin in 1998.
- * R-2501...Right-of-way acquisition to begin in 2002; construction to begin after 2002.

2.4 Traffic Capacity/Volumes

The projected average daily traffic (ADT) for the studied corridors was calculated for 1994 and the design year 2020 (See Exhibits 4a-4d). Estimated traffic volumes for the project were analyzed using the methods presented in the 1994 Highway Capacity Manual. The projected average daily traffic volumes along this segment of I-73/I-74 for the design year (2020) range from 13,260 vehicles per day (vpd) to 28,200 vpd.

The traffic analysis indicates that Alternatives A, B and C will carry more (up to 19,200 vpd) traffic than Alternative D (only 14,160 vpd) and that more traffic will remain on existing US 220 (up to 5,200 vpd) if Alternative D is built. Therefore, Alternative D will result in additional traffic congestion along the local streets in the City of Rockingham.

Traffic analysis also indicates that each of the four interstate alternatives will operate at a LOS C or better in the design year 2020. LOS C is defined as a stable flow of traffic, however, the maneuverability and operating speeds of users are affected by the traffic stream.

2.5 Summary

The overall I-73/I-74 project identified in the National Highway System Designation Act of 1995 will provide improved interstate travel and access from the north-central states of the United States (Michigan, Ohio, etc.) to the southeastern coast of the United States, ending in South Carolina. The portion of the I-73/I-74 project discussed in this Feasibility Study will connect several TIP projects (R-2231, R-512 and R-2501) to meet the intent of this legislation.

3.0 CORRIDOR ALTERNATIVES

3.1 Methods for Establishing Alternatives

Possible corridors were initially identified based on land use mapping and physical constraints. The information considered when determining potential corridors included existing and planned development, community facilities, parks and recreation areas, known historical and archaeological sites, recorded hazardous waste sites, terrain features, floodplains, inventoried wetland locations, endangered species and critical watershed areas. An additional concern was to ensure that the corridors developed were compatible with the cities of Rockingham and Hamlet's Transportation Thoroughfare Plan (See Exhibit 5).

Possible corridors considered for the proposed I-73/I-74 Freeway include three alternatives on new location, and two alternatives with both new location and improvements to portions of existing US 220 (See Exhibit 6). Preliminary Alternatives A through E were identified for initial evaluation.

3.2 Corridors Evaluated

3.2.1 Corridors Eliminated

Alternative E

Alternative E begins at the proposed US 220 Ellerbe Bypass (R-2231) south of SR 1452 and extends on new location southeastward to a proposed interchange with existing US 1 and the proposed US 1 Rockingham Bypass (R-2501) near SR 1489 east of Rockingham (See Exhibit 6). This alternative was eliminated based on the lack of optimal interchange spacing along the proposed US 220 Ellerbe Bypass, the potential impacts on wetlands and the Hitchcock Creek Critical Watershed area, and general opposition from state and federal environmental agencies. This alternative also requires major design modifications to the proposed US 220 Ellerbe Bypass (R-2231), does not utilize the existing US 220 roadway, and does not provide any advantages over Alternative D. Alternative E was, therefore, eliminated from the alternatives selected for further study.

3.2.2 Reasonable and Feasible Alternatives

The following reasonable and feasible alternatives have been selected for further evaluation in this feasibility study:

Alternative A:

Alternative A begins at the proposed US 220 Bypass/existing US 220 interchange (R-2231) south of Ellerbe and extends on new location for 9.1 miles until it connects to the proposed US 74 Bypass/existing US 74 interchange (R-512) west of Rockingham and then extends along the proposed US 74 Bypass (R-512) for approximately 0.9 miles to the proposed SR 1117 interchange (See Exhibit 6). This alternative is approximately 10.0 miles long and does not include improving any portion of existing US 220 to interstate standards (See Table 3.1). The total travel distance around Rockingham from the proposed US 220 Bypass (R-2231) to the future US 74 Bypass/US 1 Bypass interchange is 14.1 miles (See Table 3.2). Alternative A provides interchanges with US 220, SR 1005, existing US 74, and the proposed US 74 Bypass. Grade separations are proposed with SR 1306 and SR 1140. In addition, portions of SR 1448, SR 1304, SR 1303, and SR 1142 will be relocated. Alternative A will require that SR 1305 be terminated with cul-de-sacs.

Alternative B:

Alternative B follows Alternative A for 3.4 miles from the proposed US 220 Bypass/existing US 220 interchange (R-2231) south of Ellerbe to north of SR 1005. From north of SR 1005, Alternative B continues on new location southwestward for 6.1 miles until it connects with the proposed US 74 Bypass (R-512) east of SR 1117 and extends along the proposed US 74 Bypass (R-512) for approximately 1.5 miles to the proposed interchange with existing US 1 (See Exhibit 6). The total length of Alternative B including the portion of Alternative A is 11.0 miles (See Table 3.1). The total travel distance around Rockingham from the proposed US 220 Bypass (R-2331) to the future US 74 Bypass/US 1 Bypass interchange is 12.5 miles (See Table 3.2). Alternative B provides interchanges with US 220, SR 1005, existing US 74, and the proposed US 74 Bypass. Grade separations are proposed with SR 1306, SR 1140 and SR 1117. In addition, portions of SR 1448, SR 1304 and SR 1109 will be relocated. Alternative B will require that SR 1305, SR 1303 and SR 1109 be terminated with cul-de-sacs.

Alternative C:

Alternative C begins at the proposed US 220 Bypass/existing US 220 interchange (R-2231) south of Ellerbe and upgrades approximately 2.3 miles of the existing four-lane US 220 to interstate standards. This alternative then separates from existing US 220 south of SR 1446 and proceeds on new location for 3.5 miles until it connects with Alternative B south of SR 1005 and then utilizes Alternative B for 3.2 miles until it connects with the proposed US 74 Bypass (R-512) east of SR 1117 and extends along the proposed US 74 Bypass (R-512) for approximately 1.5 miles (See Exhibit 6). The total length of this alternative is approximately 10.5 miles (See Table 3.1). The total travel distance around Rockingham from the proposed US 220 Bypass (R-2231) to the future US 74 Bypass/US 1 Bypass interchange is 12.7 miles (See Table 3.2). Alternative C retains the presently proposed US 220 Bypass/existing US 220 (SR 1446) interchange and provides additional interchanges with SR 1446, existing US 220/SR 1304, SR 1005, existing US 74 and the proposed US 74 Bypass. Grade separations are proposed with SR 1140 and SR 1117. In addition, a portion of SR 1109 will be relocated. Alternative C will also require that SR 1305 and SR 1109 be terminated with cul-de-sacs.

Alternative D:

Alternative D begins at the proposed US 220 Bypass/existing US 220 interchange (R-2231) south of Ellerbe and upgrades approximately 1.3 miles of the existing four-lane US 220 to interstate standards. This alternative then separates from existing US 220 north of SR 1446 and proceeds on new location for approximately 6.6 miles southeastward to a proposed interchange with existing US 1 near SR 1489 east of Rockingham (See Exhibit 6). Alternative D ends just south of existing US 1 where it connects to the proposed US 1 Rockingham Bypass (R-2501). The proposed bypass route from south of existing US 1 to the future US 74 Bypass (R-512) will be evaluated in the Environmental Impact Statement for the proposed US 1 Rockingham Bypass project (R-2501) which is presently in progress. The total length of this alternative is 7.9 miles (See Table 3.1). The total travel distance around Rockingham from the proposed US 220 Bypass (R-2231) to the future US 74 Bypass/US 1 Bypass interchange is 17.3 miles (See Table 3.2).

Alternative D retains the presently proposed US 220 Bypass/existing US 220 (SR 1446) interchange and provides additional interchanges with existing US 220/SR 1446, SR 1442, and existing US 1 near SR 1489. A grade separation is proposed with SR 1434 and portions of

SR 1306 and SR 1442 will be relocated. Alternative D will require that SR 1442 and SR 1489 terminate with cul-de-sacs.

Table 3.1 Construction Lengths for the I-73/I-74 Rockingham Bypass Reasonable and Feasible Alternatives				
	Alternative A	Alternative B	Alternative C	Alternative D
Along upgrade of existing US 220	0 miles	0 miles	2.3 miles	1.3 miles
Along new I-73/I-74 corridor	9.1	9.5	6.7	6.6
Along widened US 74 Rockingham Bypass (R-512)	0.9	1.5	1.5	0
TOTAL LENGTHS	10.0 miles	11.0 miles	10.5 miles	7.9 miles

Table 3.2 indicates the total travel distance from the proposed US 220 Bypass (R-2231) south of Ellerbe to the future US 74 Bypass/US 1 Bypass interchange south of Rockingham. This distance includes both construction lengths and additional travel lengths required along other proposed roadways. As indicated, an additional 3.2 miles of travel distance will be required for Alternative D, as compared to Alternative A which is the next longest alternative.

Table 3.2 Travel Distance from US 220 Bypass (R-2231) to Future US 74 Bypass (R-512)/US 1 Bypass (R-2501) Interchange				
	Alternative A	Alternative B	Alternative C	Alternative D
Along proposed US 220 Bypass (R-2231)*	0 miles	0 miles	0.7 miles*	0.7 miles*
Along upgrade of existing US 220	0	0	2.3	1.3
Along new I-73/I-74 corridor	9.1	9.5	6.7	6.6
Along widened US 74 Rockingham Bypass (R-512)	0.9	1.5	1.5	0
Along proposed US 74 Rockingham Bypass (R-512)*	4.1*	1.5*	1.5*	0
Along proposed US 1 Bypass (R-2501)*	0	0	0	8.7*
TOTAL LENGTHS	14.1 miles	12.5 miles	12.7 miles	17.3 miles

* No additional improvements required for I-73/I-74 project.

3.3 Design Features of Alternatives

3.3.1 Road Design Criteria and Typical Sections

I-73/I-74 will be a four-lane divided, fully controlled access freeway with a 70' median width for the portion of the project on new location and a 60' median width for the portions of Alternatives C and D which utilize existing US 220 (See Exhibits 7 and 8). The project will have 10' outside and 4' inside paved shoulders. The proposed right-of-way width will be a minimum of 300' on new location and a minimum of 280' along existing US 220. The upgrade of existing US 220 will require that the existing 184' right-of-way width be increased to a minimum of 280' or approximately 50' of additional right-of-way along each side of the existing roadway. A 70 MPH design speed is proposed for this freeway and the anticipated Level of Service (LOS) is C. Table 3.3 indicates the basic design criteria for the I-73/I-74 freeway facility.

Type of Facility	Freeway
Design Speed	70 mph
Maximum degree of curve	3°-30'
Maximum grade	3%
Median width	70' along new location; 60' along existing US 220
Right-of-way width	300' along new location; 280' along existing US 220
Level of service	C

3.3.2 Construction and Right-Of-Way Costs

The estimated right-of-way and construction costs for each of the four alternatives are depicted in Table 3.4. These figures indicate that Alternative D will cost \$22.9 million less than Alternative B, which has the highest cost. However, it is important to note that the construction length of Alternative D is between 2.1 and 3.1 miles shorter than the other alternatives.

Table 3.4 I-73/I-74 Rockingham Bypass Cost Estimates				
Alternative	Utility Cost (millions \$)	R/W Cost (millions \$)	Construction Cost (millions \$)	Total Cost (millions \$)
A	1.0	8.7	68.2	77.9
B	1.7	11.1	72.4	85.2
C	1.9	15.3	66.4	83.6
D	1.0	11.4	49.9	62.3

3.4 Safety

All of the I-73/I-74 alternatives will result in improved traffic safety due to the freeway design criteria. The estimated number of accidents for each alternative was calculated, based on the I-73/I-74 travel distance for the design year 2020 traffic volumes, to compare the safety of the reasonable and feasible alternatives. The accident rates were computed by multiplying the projected average daily traffic volumes (ADT) by the lengths of the roadway sections, converted into annual 100 million vehicle-miles of travel, and then multiplied by the appropriate accident rate. The accident rates are based on statewide averages for a rural four-lane divided highway with full control of access and were provided by the NCDOT's Traffic Engineering Branch. The 1994 statewide accident rates for this type of facility are:

*Fatal.....0.4 fatalities/100 MVM

*Total Accidents.....58.4 accidents/100 MVM

Based on the traffic data, each of the four alternatives is projected to result in less than one fatal accident per year and the total annual accidents for the year 2020 will vary from 52 to 70. The estimated number of fatalities and accidents for each of the four alternatives are listed in Table 3.5.

Table 3.5 Projected Annual Accidents, Year 2020				
	Alternative A	Alternative B	Alternative C	Alternative D
Fatal Accidents	0.5	0.4	0.5	0.6
Total Accidents	67	52	58	70

If the I-73/I-74 Rockingham Bypass were not built, then the traffic traveling along the proposed interstate route would have to utilize existing US 220 through Rockingham. The majority of this portion of existing US 220 is a four-lane divided, partially controlled access facility. However, south of the existing US 220/US 1 intersection in Rockingham, US 220 is a two-lane undivided facility with no control of access. These types of facilities have higher accident rates than full-controlled access interstate facilities. The projected accident rate utilizing existing US 220 will be approximately 160% higher or 83 total accidents per year as compared to the freeway alternatives. The existing US 220 roadway is also projected to have approximately one fatal accident per year.

4.0 AFFECTED ENVIRONMENT

4.1 Social Setting

4.1.1 Land Use

A review of the Richmond County General Land Use Plan and Maps revealed that the study area contains six different land use classifications. These classifications include: Urban Areas and Towns, Residential, Commercial, Industrial, Public/Cultural/Recreational and Open Space. The maps indicate that the majority of the area impacted by the four alternatives is designated as open space. The remaining area impacted is either urban or residential.

Some minor impacts to urban/residential areas are anticipated for Alternatives A, B and C. Alternatives A and B will impact urban/residential areas in the vicinity of SR 1140 and existing US 74. Alternative C will impact a residential area near the intersection of SR 1305 and US 220. Based on the Land Use Map, Alternative D will only impact areas designated as open space. However, this alternative is located close to Ledbetter Lake which has experienced increased residential development since the land use plan was prepared. Based on information received from Richmond County, the area traversed by Alternative D is where 75% of the residential growth in Richmond County is occurring. The area west of Rockingham, in the areas of Alternatives A, B and C has only 2% of the county's residential growth.

4.1.2 Social Impacts

As discussed above, the proposed alternatives will not result in major impacts to developed areas. Site visits were conducted to determine the impacts on housing, community facilities and utilities. This preliminary assessment revealed that Alternatives A, B and C will impact several small residential areas and property owned or leased by two hunt clubs. These impacts will result in either acquisition of right-of-way resulting in residential relocations or bisecting a tract of property currently used by the hunt clubs. In addition, Alternative D may impact the Ledbetter Manufacturing Company adjacent to Ledbetter Lake. None of the four alternatives are anticipated to impact schools, churches, police or fire protection.

Construction of the proposed I-73/I-74 Rockingham Bypass will require modification of the existing local road network. With each alternative, the termination and/or relocation of local roads will reroute traffic away from certain areas and may result in inconveniences to residents of those areas. However, interchanges provided for each alternative will help to alleviate such impacts by providing local access to the freeway. A listing of the proposed interchanges, grade separations, road relocations, and existing roads to be terminated with cul-de-sacs for each alternative is included in Section 3.2.2. Table 4.1 provides a summary of local road impacts.

Impacts	Alternative A	Alternative B	Alternative C	Alternative D
Terminated	1	3	2	2
Relocated	4	3	1	2
Interchange	4	4	5*	3*
Grade Separations	2	3	2	1
Total Roadway Impacts	11	13	10	8

*Does not include the presently proposed US 220 Bypass/existing US 220 (SR 1446) interchange on project R-2231.

Based on this information, impacts to the local road system will be similar for all alternatives. However, Alternative C provides one additional interchange for local access to the proposed freeway.

Impacts on highly populated minority areas will be minimal since most of the alternatives are located in areas with less than the county's average minority populations. Alternative A crosses two areas with minority populations of 31% to 61%; however, the majority of this alignment is located in areas with 0 to 31% minority population. Alternatives B and C cross three areas with minority populations of 31% to 61% with the remainder of the alignments located in areas containing less than the county's average non-white population. Alternative D crosses one area with a minority population of 31% to 61% (See Exhibit 9).

4.1.3 Relocation Impacts

Table 4.2 indicates the estimated number of residential and business relocations associated with the four alternatives. As this table indicates, Alternative D will require the most residential relocations (61) and Alternative C will require the most business relocations (6). Alternative D is anticipated to result in the most relocations (64) and Alternative A is estimated to have the least number of relocations (29).

	Alternative A	Alternative B	Alternative C	Alternative D
Estimated Residential Relocations	28	37	48	61
Estimated Business Relocations	1	3	6	3
Estimated Total Relocations	29	40	54	64

4.2 Noise Setting

4.2.1 Noise Impacts

Each of the four alternatives were evaluated for potential noise impacts utilizing FHWA's Highway Traffic Noise Prediction Model STAMINA 2.0/OPTIMA, based on FHWA's noise abatement criteria. The STAMINA model was used to predict noise levels adjacent to the proposed roadway and established the 67 dBA contour location at approximately 270' from the centerline of the median for each alternative based on the projected 2020 traffic volumes. Each of the alternatives were evaluated and any receiver located between the proposed right-of-way line and the predicted 67 dBA contour line was identified as a noise impact. The results of this analysis concluded that noise impacts ranged from 20 to 29 for the four alternatives with Alternative C having the highest number of impacts (29). Alternative A had the least number of noise impacts (20) and Alternatives B and D had noise impacts of 25 and 21, respectively.

Based on this preliminary study, no major noise impact areas were identified. Therefore, noise abatement is not recommended, and no abatement measures are proposed.

4.3 Cultural Resources Setting

4.3.1 Historic/Cultural Resources

A preliminary study was conducted which evaluated all properties at least 50 years of age located within the study area (Appendix A). Inventory files at the North Carolina Division of Archives and History were first searched to determine any properties within the study area that are listed on the National Register of Historic Places or on the North Carolina Study list. A site visit was then conducted to identify any other properties that may warrant additional study.

A review of the National Register and State Study list did not identify any cultural resource properties within the study area. However, one National Register property, the Alfred Dockery House, is located just outside the study area approximately 1 mile west of Alternative A along SR 1005. Six other properties were identified during the reconnaissance survey that warrant further study due to their architectural or historic significance. These sites include the Covington House, the Smith House, the Robert Nichols Farm Complex, the McAuley-Ethridge Farm Complex, the Ledbetter Manufacturing Company and a house possibly associated with the Ledbetter Manufacturing Company. The first three sites are located in the vicinity of Alternatives B and C and the last three are located in the vicinity of Alternative D. The historic sites along alternatives B and C can be avoided by shifting the alignment of the proposed roadway. However, the Ledbetter Manufacturing Company site located adjacent to Alternative D may be impacted by the project. Additional studies will be required to determine the specific boundaries of this property.

4.4 Physical Setting

4.4.1 Topography

The study area is located on the boundary of both the piedmont and sandhills physiographic regions of North Carolina. The majority of the area is found within the sandhills region except for the western portion that is located in the vicinity of the Pee Dee River, which is characterized as piedmont. Elevations within the project area range from 480 feet above sea level in the northwestern portion of the study area to 140 feet above sea level along Cartledge Creek and Hitchcock Creek (USGS topographic quadrangles: Rockingham, Hamlet, Ellerbe and Millstone Lake).

4.4.2 Water Resources/Wetlands

The study area is located in the Yadkin/Pee Dee River Basin. Principal streams located within the project area are Cartledge Creek and Hitchcock Creek and their associated tributaries. Hitchcock Creek and several of its tributaries have a water quality best usage classification of WS-II and the portion of Hitchcock Creek from which drinking water is drawn has a best usage classification of WS-III CA. Class WS-III waters are protected as water supply areas and consist of low to moderate development watersheds. Alternative D is the only alignment in the vicinity of this creek and its tributaries. This alternative is also located adjacent to the Hitchcock Creek Critical Watershed area and based on preliminary design could encroach within this area (See Exhibit 6). All other named streams within the study area have water quality best usage classifications of C (aquatic life propagation and survival, fishing, wildlife, recreation and agriculture).

A preliminary wetlands investigation was performed to determine impacts to jurisdictional areas (Wetlands and Waters of the United States) by each of the proposed alternatives (Appendix B). This study indicates that impacts are primarily limited to stream and water course crossings (Waters of the United States). The number of jurisdictional crossings and approximate total wetland areas for each alternative are presented in Table 4.3.

Alternative	Stream/Creek Crossings	Streams/Creeks with Adjacent Wetlands	Ponds	Total Impacted Wetlands Acres*
A	26	8	1	8
B	21	5	2	6.1
C	19	4	2	6.1
D	21	1	1	2.5

* Impacts based on proposed right-of-way widths.

Based on this study, all alignments have numerous stream and pond crossings. The alternatives will impact between 2.5 and 8 acres of wetlands and waters of the United States and farm pond impacts range from 1 to 2. Alternative D has the least amount of wetland impacts.

However, Alternative D is anticipated to impact wetlands associated with the Hitchcock Creek Watershed which provides important pollutant removal functions for that system. Alternative A is expected to impact the most wetland area (8 acres).

4.4.3 Floodplain

All of the I-73/I-74 alternative corridors will involve crossing streams and their associated floodways and floodplains. Alternative A will encroach upon the 100-year floodplain boundary of two tributaries of the Pee Dee River. These tributaries are located north of SR 1121 and south of SR 1142 with impact areas of 0.1 and 0.6 acres, respectively. This alignment will also encroach within the 100-year floodplain boundary of a Cartledge Creek tributary (0.3 acres) just west of SR 1305. Alternative B, which is connected with Alternative A at Cartledge Creek, also will impact the floodplain area (0.3 acres) west of SR 1305. In addition, Alternative B encroaches upon the 100-year floodplain boundary northeast of SR 1140 (0.5 acres) and Hitchcock Creek east of SR 1117 (0.3 acres). Alternative C will only impact the 100-year floodplain of Hitchcock Creek east of SR 1117 (0.3 acres). Alternative D will encroach upon the 100-year floodplain boundary of Hitchcock Creek west of SR 1142 (0.3 acres) and Chock Creek north of SR 1606 (0.2 acres) in the vicinity of Ledbetter Lake. Based on this information, Alternative C will impact the least amount of floodplain area and Alternative B will impact the most area. A summary of floodplain impacts for each alternative is presented in Table 4.4.

	Alternative A	Alternative B	Alternative C	Alternative D
Floodplain Impacts (acres)	1.0	1.1	0.3	0.5

All encroachments are located within areas designated as "Zone A" in which no base flood elevations have been determined. All alternatives were designed so the corridors do not result in any longitudinal floodplain encroachments, therefore, these impacts are considered minimal.

4.4.4 Natural Resources

Plant Communities

The distribution and composition of plant communities are based on topography, position on the landscape and land use practices. Seven plant communities have been identified within

the project area which included pine plantation, pine forest, pine/mixed hardwood forest, hardwood forest, disturbed shrub assemblage, pastoral/agriculture land, and residential/disturbed land.

In this region silviculture (forestry) is a more important land use than pasturage or agriculture. Therefore, the four alternative alignments consist mostly of pine forests and pine/mixed hardwood forest. Only a small portion of each alternative contains pastoral/agricultural or residential disturbed land (See Table 4.5). The primary impact to plant communities for any of the alternatives is the fragmentation of large forested areas. Alternative A is located closer to the Pee Dee River and will divide a large area of undeveloped woodlands resulting in wildlife impacts due to habitat fragmentation. Alternative C will have the least impact on wildlife habitat because it is closer to the city/development and does not contain as many large, continuous tracts of forestland.

Alternative	Plant Community Impacts (acres)				Total Impacts (acres)
	Forestland	Disturbed Areas*	Pastural/Agricultural	Residential/Developed	
A	304	7	22	15	348 acres
B	335	15	21	20	391
C	306	14	18	27	365
D	217	8	27	32	284

* These areas include existing roadways, railways and utility right-of-way.

Unique Natural Areas and Protected Species

Correspondence received from the North Carolina Division of Parks and Recreation, dated February 28, 1996, revealed one documented rare and unique natural area listed for the study area. This area, the Pee Dee River Gabbro Slopes, is located along the slopes above the Pee Dee River in the vicinity of Alternative A. This site contains an outcrop of gabbro, a type of igneous rock formation that often supports unusual natural communities or rare species of plants. One of only two known North Carolina populations of Cumberland spurge (Euphorbia

mercurialina), a candidate for state listing, has been recorded at this site.

Within the study area there are no significant water bodies deserving special attention under the Federal Wild and Scenic Rivers Act of 1968 or under the Natural and Scenic Rivers Act of 1971. However, the Vulcan Materials Company Certified Wildlife Habitat area will be impacted by Alternatives B and C. This property is located adjacent to the Vulcan Materials Quarry northwest of the intersection of SR 1117 and SR 1123. Based on information received from Vulcan Materials Company, this area is privately owned and managed by their company and there are no restrictions prohibiting roadways or any other development through the property. In fact, SR 1117 is currently being relocated through this area. Based on available information, this habitat area is not a concern for this project as it does not fall under state or federal jurisdiction.

Federally listed species (Endangered or Threatened) are protected under the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.). Any federal action which may jeopardize listed species or their habitat requires review and consultation with appropriate federal and state agencies. As of April 19, 1995 the U.S. Fish and Wildlife Service listed five endangered and no threatened species occurring in Richmond County. The endangered status refers to a species "which is in danger of extinction throughout all or a significant portion of its range" (Endangered Species Act, Section 3). The endangered species listed for Richmond County include the following:

Red-cockaded Woodpecker (Picoides borealis)

Bald Eagle (Haliaeetus leucocephalus)

Shortnose Sturgeon (Acipenser brevirostrum)

Michaux's Sumac (Rhus michauxii)

Rough-leaved Loosestrife (Lysimachia asperulaefolia)

Based on preliminary studies the bald eagle and shortnose sturgeon are not expected to be adversely affected by any of the proposed alignments. Although the red-cockaded woodpecker, michaux's sumac and rough-leaved loosestrife have never been documented within the study area, suitable habitat for these species was identified. Therefore, additional field work will be required to evaluate and conclusively determine the presence or absence of these species.

The U.S. Fish and Wildlife Service also list six species that are currently under review as federal candidates for Endangered or Threatened status. However, there are no records of any of these species occurring in the project area and none are expected to be adversely impacted by any of the alternatives. However, the Cumberland spurge discussed above, which is a candidate for state listing may be impacted by Alternative A.

4.4.5 Hazardous Waste Sites

A records search of known hazardous waste sites, generators, and disposers of hazardous waste and actively permitted landfills within the project area was conducted by reviewing records at the N.C. Department of Environment Health and Natural Resources (NCDEHNR), Division of Solid Waste Management (NCDEHNR, 1992; NCDEHNR/DSWM, 1993; USEPA, 1994). These sources indicate one landfill (the Richmond County Landfill, See Exhibit 6) within the study area along Alternatives A and B, north of SR 1306. However, based on the current alignment these alternatives will cross the northeast portion of this landfill site, which is forested and has never been a part of the County's operations. A preliminary site assessment (windshield survey) also did not identify any potential hazardous waste sites within the corridors of the reasonable and feasible alternatives.

Based on a preliminary site investigation, there are no registered underground storage tanks (USTs) along any of the alternatives. However, when a "Preferred Alternative" is chosen, additional field work will be required to make a final determination of the presence or absence of any non-registered USTs.

4.4.6 Construction Impacts

Impacts associated with construction activities are limited to the area in the immediate vicinity of the work and the time required to complete the project. Temporary impacts to noise levels, air quality, water quality, traffic congestion and detours, utilities, public health and safety, and visual impacts are anticipated during construction. However, adherence to proper construction methods, sound erosion and sediment control measures and following best management practices will minimize these impacts.

5.0 AGENCY INVOLVEMENT

5.1 Agency Meetings

An Inter-agency meeting was held on September 26, 1995 to discuss the preliminary alternatives and environmental concerns that would need to be addressed as part of this Feasibility Study. This meeting included representatives from the United States Army Corps of Engineers, the Division of Environmental Management, the Federal Highway Administration, the North Carolina State Historic Preservation Office, the North Carolina Wildlife Resources Commission and the United States Fish and Wildlife Service. During this meeting, the purpose and need of the project was discussed with the attending agencies. It was also stated that the primary objective of this Feasibility Study is to satisfy agency concerns and to obtain their concurrence on a "Preferred Alternative".

Subsequent meetings were held on December 4 and 13, 1995 to review the project and select alternatives for further evaluation. During these meetings it was determined that Alternatives A, B, C and D would be the alignments evaluated in the Feasibility Study. It was also discussed, that at the completion of this study, additional meetings would be held to address any public concerns regarding the preferred alignment.

Another Inter-agency meeting was held on February 27, 1996 to review the preliminary functional designs of the four chosen alternatives and to discuss the findings of the feasibility study to date. The agencies were advised that a public hearing would be held after the feasibility study is completed. Representatives from the agencies discussed their concerns and preferences about each of the four alternatives and it was agreed by all agencies present, that Alternative D was the least preferred alignment. The agencies agreed to meet again after the public hearing to provide comments in selecting a "Preferred Alternative".

After the February 27, 1996 meeting correspondence was received from Don H. Robbins, Staff Forester, North Carolina Division of Forest Resources concerning the four alternatives. This letter states that large amounts of forestland would be affected by all four alignments and that they would prefer the alternative with the least impacts to forestland. Specific concerns

addressed included productivity of forest soils, impacts upon existing greenways, erosion control and minimization of construction impacts.

5.2 Environmental Permits

Since impacts to Jurisdictional Waters of the United States and wetlands are anticipated for all alternatives, a United States Army Corps of Engineers permit will be required under the provisions of Section 404 of the Clean Water Act (33 U.S.C. 1344). A 401 Water Quality Certification from the NCDEHNR, Division of Environmental Management will also be required for the project.

6.0 SUMMARY OF ALTERNATIVES

The four preliminary alternatives under consideration for the proposed I-73/I-74 Rockingham Bypass, as described in Section 3.0, are evaluated based upon the following criteria:

1. satisfies the purpose and need as identified in Section 2.0 of this report, and is consistent with local land use and transportation plans and,
2. does not involve unacceptable community, socioeconomical, and/or environmental impacts.

The purpose of the evaluation is to establish "Reasonable and Feasible" corridor locations and provide sufficient environmental documentation to help establish a "Preferred Alternative" for this future I-73/I-74 highway facility. Four alternatives were evaluated as part of this study. Alternatives A, B and C connect the proposed US 220 Bypass (R-2231) south of Ellerbe with the proposed US 74 Bypass (R-512) west of Rockingham. Alternative D also begins at the proposed US 220 Bypass (R-2231) south of Ellerbe but extends southeastward and ends just south of existing US 1 where it connects to the proposed US 1 Rockingham Bypass (R-2501).

All alternatives will meet the purpose and need for the project by providing a continuous interstate route that bypasses the City of Rockingham and connects with the future US 74 Bypass. These alternatives are also compatible with other proposed T.I.P. projects in the area. All alternatives involve socioeconomic and environmental impacts. An assessment of environmental and socioeconomic impacts and a comparison of design features for each alternative is presented in Table 6.1. Social impacts include residential and business relocations, and neighborhood disruptions. Economic impacts include monetary commitments for right-of-way, utilities, and construction. Environmental impacts involve the alteration of streams, wetlands, farmland and forestland.

Based on the analysis of the data included in this report and summarized in Table 6.1, and the engineering data utilized in the establishment of the preliminary alternatives, the following comparative information and conclusions have been determined.

6.1 Alternative A

Advantages:

- a. Provides a direct connection between the proposed US 220 Bypass (R-2231) south of Ellerbe and the proposed US 74 Rockingham Bypass (R-512).
- b. Has the second shortest construction length.
- c. Has the least number of relocatees.
- d. Does not impact the Hitchcock Creek Critical Watershed area.
- e. Is not located adjacent to any of the six historic properties identified as being worthy of further study.
- f. Has the least noise impacts.
- g. Has the lowest right-of-way cost.
- h. Has the second lowest total cost (right-of-way and construction).

Disadvantages:

- a. Has the second longest I-73/I-74 travel distance.
- b. Has the most number of stream crossings and the most wetland impacts.
- c. Is located closest to the Pee Dee River.
- d. May impact the Pee Dee River Gabbro slopes, a registered Natural Heritage area in which the Cumberland Spurge (state candidate species) has been documented.
- e. Impacts a portion of the Richmond County landfill property; however, impacts will be on the undeveloped part of the property and will cause no adverse effects.

6.2 Alternative B

Advantages:

- a. Has the shortest I-73/I-74 travel distance.
- b. Has the second fewest relocatees.
- c. Does not impact the Hitchcock Creek Critical Watershed area.

Disadvantages:

- a. Has the longest construction length.
- b. Has the greatest forestland impact.
- c. Has the second highest noise impacts.
- d. Has the highest total cost.

- e. Is located in the vicinity of three historic properties identified as being worthy of further study.
- f. Impacts a portion of the Richmond County Landfill property; however, impacts will be on the undeveloped part of the property and will cause no adverse effects.
- g. Has the most floodplain impacts.

6.3 Alternative C

Advantages:

- a. Has the second shortest construction length on new location.
- b. Has the second shortest I-73/I-74 travel distance.
- c. Utilizes existing US 220 roadway more than any other alternative.
- d. Provides the most interchanges for local access.
- e. Has the least impact on wildlife habitat fragmentation.
- f. Does not impact the Hitchcock Creek Critical watershed area.
- g. Is located closest to the City of Rockingham.
- h. Has the least number of stream crossings.
- i. Is supported by the City of Rockingham officials.
- j. Has the least amount of alignment on new location.
- k. Has the second lowest wetland impacts.
- l. Has the least amount of floodplain impacts.

Disadvantages:

- a. Has the second most relocatees.
- b. Has the most business relocatees.
- c. Has the most noise impacts.
- d. Has the highest right-of-way cost.
- e. Has the second highest total cost.
- f. Is located in the vicinity of three historic properties identified as being worthy of further study.

6.4 Alternative D

Advantages:

- a. Has the shortest construction length.
- b. Utilizes a portion of the existing US 220 roadway.

- c. Has the least forestland impacts
- d. Has the least wetland impacts.
- e. Has the lowest total cost.

Disadvantages:

- a. Has the longest I-73/I-74 travel distance therefore, provides the least desirable continuity for an interstate facility.
- b. Has the least number of interchanges for local access.
- c. Has the most relocatees.
- d. Is located adjacent to three of the historic properties identified as being worthy of further study, and will probably impact the Ledbetter Manufacturing Company property which may be the most significant of the six properties.
- e. Is located adjacent to and potentially encroaches within the Hitchcock Creek Critical Watershed area.
- f. Is located adjacent to Ledbetter Lake.
- g. Is located in the fastest growing residential area of the City of Rockingham.
- h. Is the most opposed alternative by the City of Rockingham and agency officials.
- i. Requires the utilization of the future US 1 Rockingham Bypass (R-2501) project which is still in the early planning stages and the preferred corridor has not been selected. All of the western alternatives tie to the proposed US 74 Rockingham Bypass (R-512) which is in the right-of-way acquisition stage and the alignment has been established.

Table 6.1 Summary of Impacts: I-73/I-74 Rockingham Bypass

Impact ¹	Alternatives			
	A	B	C	D
Travel Length (miles)	14.1	12.5	12.7	17.3
Construction Length (miles)	10.0	11.0	10.5	7.9
No. of Interchanges	4	4	5	3
Freeway-to-Freeway	1	1	1	0
Local Access	3	3	4	3
No. of Relocations	29	40	54	64
Residential	28	37	48	61
Business	1	3	6	3
Total Plant Community Impacts (acres)	348	391	365	284
Residential/Developed Land	15	20	27	32
Disturbed Areas	7	15	14	8
Forestland	304	335	306	217
Pastural/Agricultural Land	22	21	18	27
Stream Crossings (no. of crossings)	26	21	19	21
Floodplain Impacts (acres)	1.0	1.1	0.3	0.5
Wetland/Waters of the US ² (acres)	8	6.1	6.1	2.5
Critical Watershed Impacts	0	0	0	1
Threatened and Endangered Species ³	3	3	3	3
Historic Property Impacts	0	0	0	1
Safety ⁴ (projected annual accidents)	67	52	58	70
Noise Impacts	20	25	29	21
Potential Hazardous Material Sites/Landfills (including USTs)	1 ⁵	1 ⁵	0	0
Right-of-Way Cost (millions \$)	8.7	11.1	15.3	11.4
Utility Cost (millions \$)	1.0	1.7	1.9	1.0
Construction Cost (millions \$)	68.2	72.4	66.4	49.9
Total Cost (millions \$)	77.9	85.2	83.6	62.3

1. Impacts based upon a 300' right-of-way for new locations and 280' right-of-way for improvements to existing US 220.
2. Refers to wetlands and waters of the US within the proposed right-of-way for each alternative.
3. Refers to potential Impacts. Additional studies are required to conclusively determine the absence or presence of the species.
4. Refers to total projected annual accidents.
5. Requires portion of Richmond County Landfill property.
6. Impacts based on number of receivers located between proposed R/W and the predicted 67 dBA line.

7.0 LIST OF PREPARERS

This Feasibility Study was prepared by Rummel, Klepper & Kahl Consulting Engineers in cooperation with the North Carolina Department of Transportation and the Federal Highway Administration. The following personnel were instrumental in the preparation of this document.

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APPENDIX A

Cultural Resources Evaluation

1 February 1996

To: Mr. William R. Butler, P.E.
Rummel, Klepper, and Kahl
5800 Faringdon Place, Suite 105
Raleigh, North Carolina 27609

From: Richard L. Mattson, Ph.D.

Re: Summary of Findings
Cultural Resources Evaluations
I-73 Corridor Feasibility Study
Richmond County
TIP No. R-3421

Introduction

This Summary of Findings report is based on an evaluation of all properties at least 50 years of age located within the area of potential effects (APE) of the I-73 project. The inventory files at the North Carolina Division of Archives and History in Raleigh were searched for properties in the APE that are either listed in the National Register of Historic Places or on the North Carolina Study List. A drive-through, reconnaissance-level survey of the APE was subsequently conducted to identify other properties considered worthy of further study. The APE was determined based on the I-73 Feasibility Study Alternatives Map provided by Rummel, Klepper, and Kahl (December 1995).

Findings

No National Register or Study List properties are located within the APE. Six properties considered worthy of further study were identified during the reconnaissance survey of the APE conducted January 13 and 14, 1996. Although the National Register potential of these resources has not been determined, they have sufficient architectural or historical significance to warrant additional analysis. These properties are keyed to the Field Study Map (Figure 1) and are briefly described below. In addition, one National Register property, the Alfred Dockery House (National Register 1986) is located just west of the APE. For planning purposes, the Dockery House is also keyed to the map and briefly described.

National Register Properties

none

Study List Properties

none

Other Properties Considered Worthy of Further Study

1. **Covington House (Plates 1-2)**
Northeast side SR 1140, 0.4 mile northwest junction with US 74, 0.5 mile down unpaved farm lane

Built ca. 1820, the Covington House is a traditional, frame, two-story farmhouse, one room deep. Currently unoccupied, the dwelling has a side-gable roof with flush eaves and stuccoed-brick, double-shoulder end chimneys. The house has a replacement hip-roofed front porch with square posts on brick piers, and modern fenestration. The main elevation has two front doors leading into the principal first-floor rooms, and a later one-bay appendage extends to the rear. The principal investigator did not have access to the interior.

Although the Covington House has undergone significant modern alterations, it appears to be one of the oldest surviving houses in Richmond County. The house is also said to be undergoing renovation, although the remodeling plans are not known. The property is situated in an historic section of the county, beside an early road leading to the Pee Dee River and near the site where court was first held in Richmond County.

2. **Smith House (Plates 3-6)**
East side SR 1109, 0.3 mile south junction with US 74

Built in the mid-nineteenth century, the Smith House is a story-and-a-half, frame, vernacular Greek Revival farmhouse. Although the center roof gable appears to be a later modification, the house retains significant original elements of design. The dwelling has an engaged front porch with paneled, square posts, nine-over-six windows, and single-shoulder, brick end chimneys. The main center entrance has original double-leaf doors capped by a transom. The rear ell, which appears to be contemporary with the main block, has matching nine-over-six windows, brick end chimney, and gable returns. An early board-and-batten well house survives on the property.

3. **Robert Nichols Farm Complex (Plates 7-9)**
East side SR 1109, 1 mile south junction with US 74

Built in 1919, the seat of the Nichols Farm Complex is a substantial, two-story, frame, Colonial Revival residence. The house has recently been vinyl sided, but is otherwise intact, with a broad wraparound porch, high hip roof, and nine-over-nine windows. The property contains several abandoned tenant houses, including a mid-nineteenth century dwelling, which may have been the original house on the tract. In deteriorated but stable condition, this one-story, frame dwelling retains its original engaged front porch with an enclosed end bay, flushboard facade, and nine-over-nine windows.

4. **McAuley-Ethridge Farm Complex** (Plates 10-11)
Southeast side SR 1424, 0.2 mile north of junction with SR 1432

This farm complex features an intact, 1920s, Colonial Revival farmhouse with a deep wraparound porch and broad side-gable roof. The farmstead retains the smokehouse, well house, and an assortment of small barns and corncribs that appear to date between the 1920s and 1950s.

5. **Ledbetter Manufacturing Company** (Plates 12-14)
SR 1442 at junction with SR 1441

Epitomizing the textile mills built in the region during the late nineteenth and early twentieth centuries, this two-story building has a brick exterior, low gable roof, banks of large segmental arched windows, and an entry tower. The factory complex retains a one-story cotton warehouse and several 1920s mill houses.

6. **House** (Plates 15-16)
West side SR 1442, 0.1 mile south of junction with SR 1423

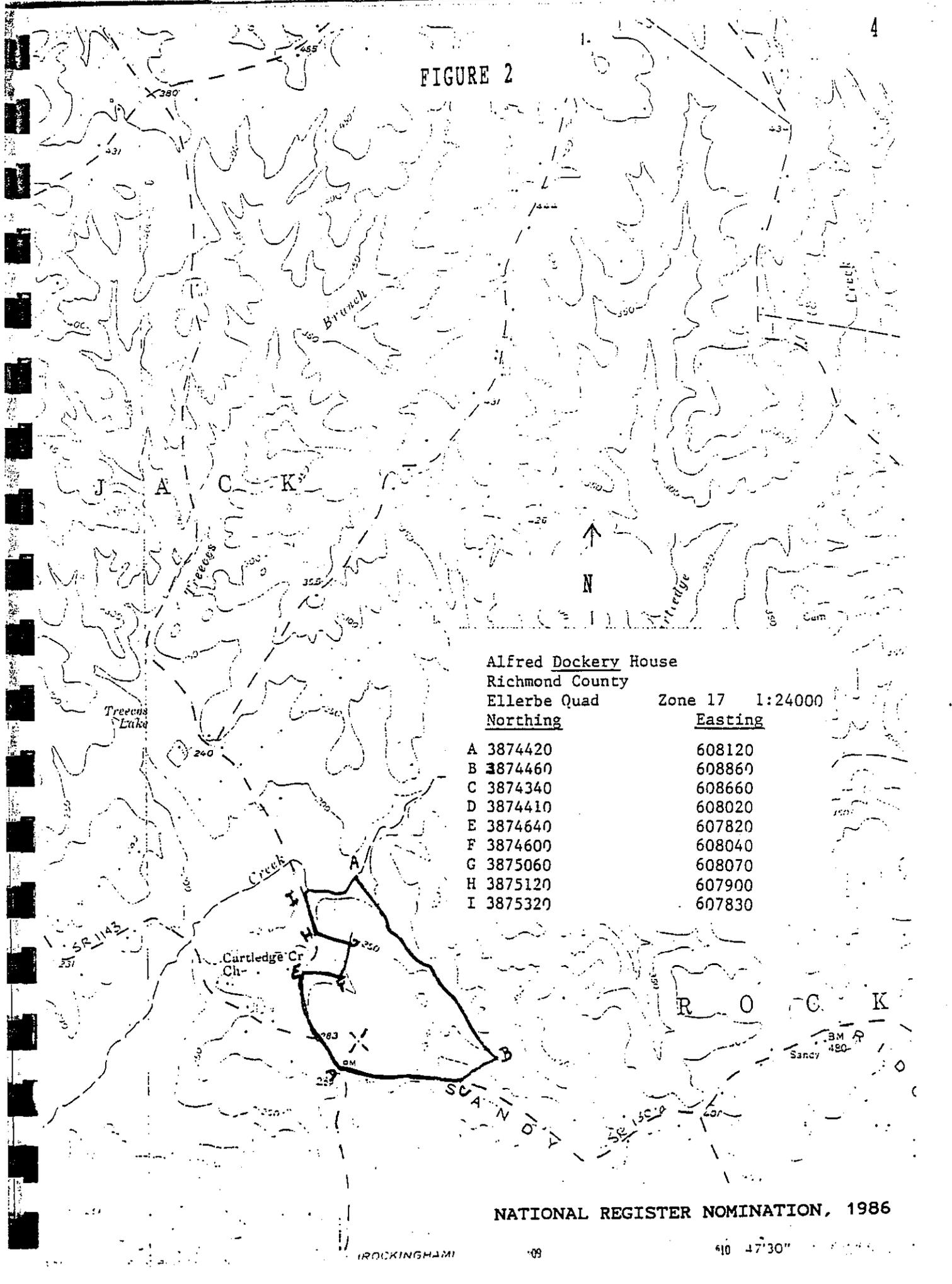
This substantially intact turn-of-the-century dwelling has a traditional one-room-deep main block with a decorative center roof gable. The house retains the original six-over-six windows, brick end chimneys, sidelights and transom, and rear kitchen ell. The property includes several log outbuildings. The house may be historically associated with the nearby Ledbetter textile mill.

National Register Property Situated Outside APE

7. **Alfred Dockery House** (Figure 2) (Plate 17)
East side SR 1005, 0.1 mile south of junction with SR 1143

The ca. 1840 Dockery House is considered to be one of the finest brick antebellum plantation houses in North Carolina. The house is a noteworthy example of early Greek Revival work with outstanding plaster finishes. The overall integrity of the house was preserved in a sensitive restoration in 1951. Alfred Dockery, the original owner, was an important national political figure who also contributed to the founding of Wake Forest College. The property has significance under criteria A, B, and C, and the National Register boundaries encompass approximately 130 acres.

FIGURE 2



Alfred Dockery House
 Richmond County
 Ellerbe Quad Zone 17 1:24000
Northing Easting

A	3874420	608120
B	3874460	608860
C	3874340	608660
D	3874410	608020
E	3874640	607820
F	3874600	608040
G	3875060	608070
H	3875120	607900
I	3875320	607830

NATIONAL REGISTER NOMINATION, 1986

PLATES OF PROPERTIES



Plate 1. Covington House (#1).

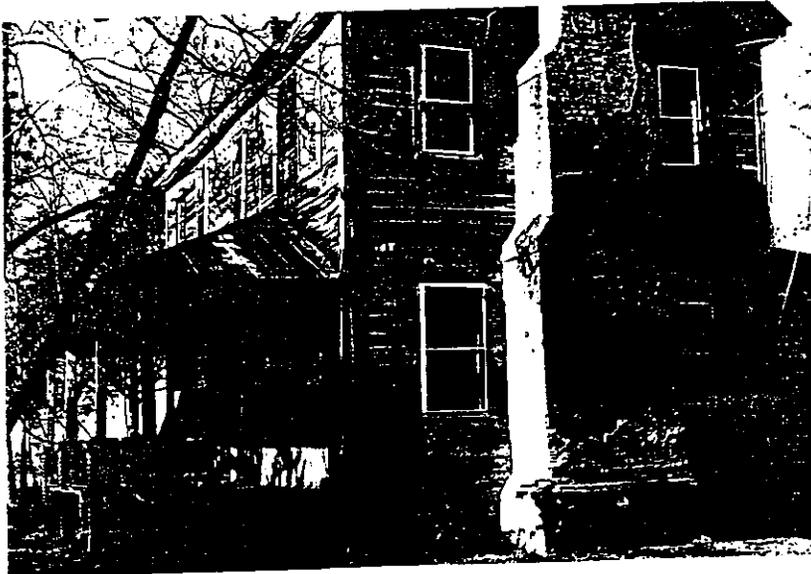


Plate 2. Covington House (#1), East Elevation.



Plate 3. Smith House (#2).



Plate 4. Smith House (#2), Main Entrance.

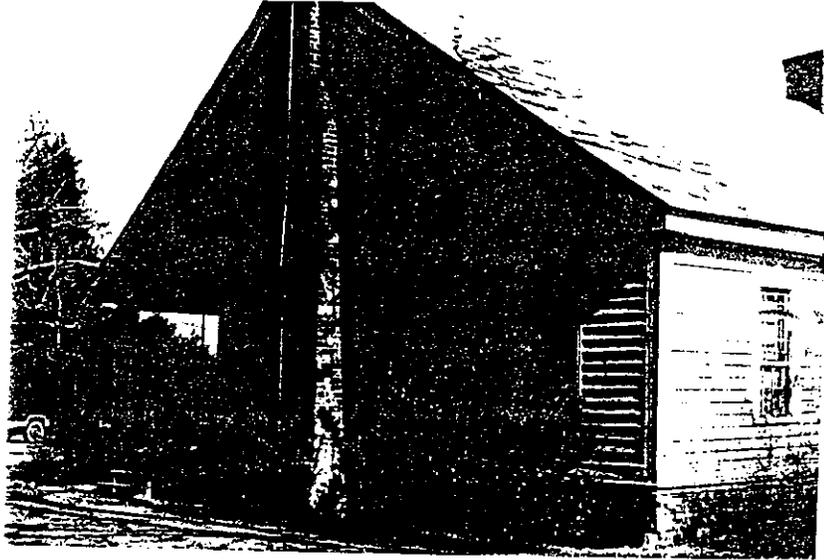


Plate 5. Smith House (#2), South Elevation.



Plate 6. Smith House (#2), Rear Ell and Outbuilding.

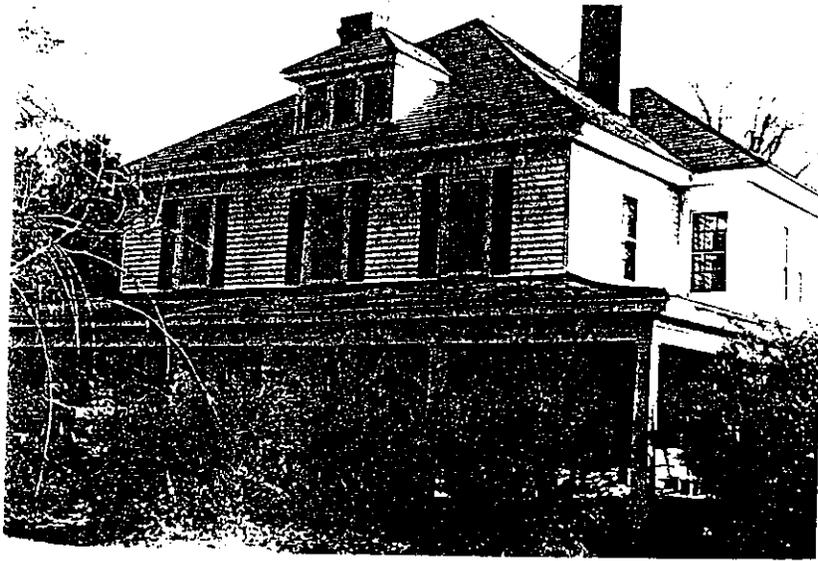


Plate 7. Robert Nichols Farm Complex (#3), Main House.



Plate 8. Robert Nichols Farm Complex (#3), Main House, South Elevation.

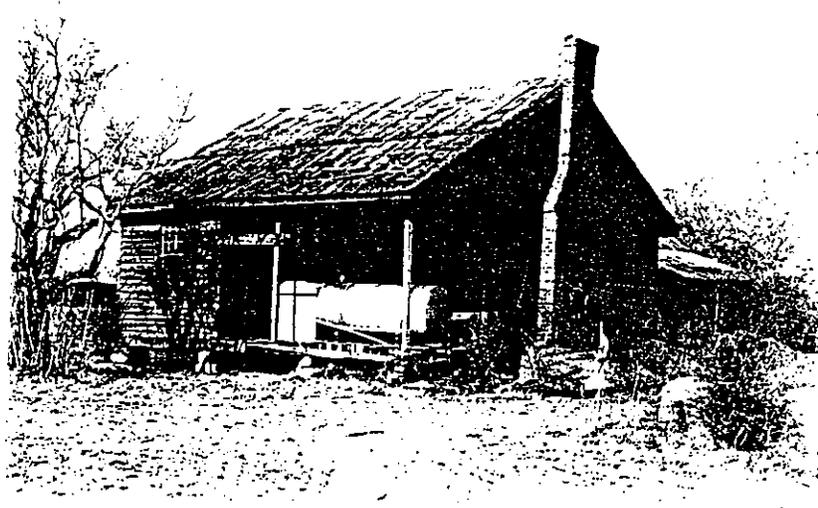


Plate 9. Robert Nichols Farm Complex (#3), Other House.



Plate 10. McAuley-Ethridge Farm Complex (#4), Main House.



Plate 11. McAuley-Ethridge Farm Complex (#4), Outbuildings.

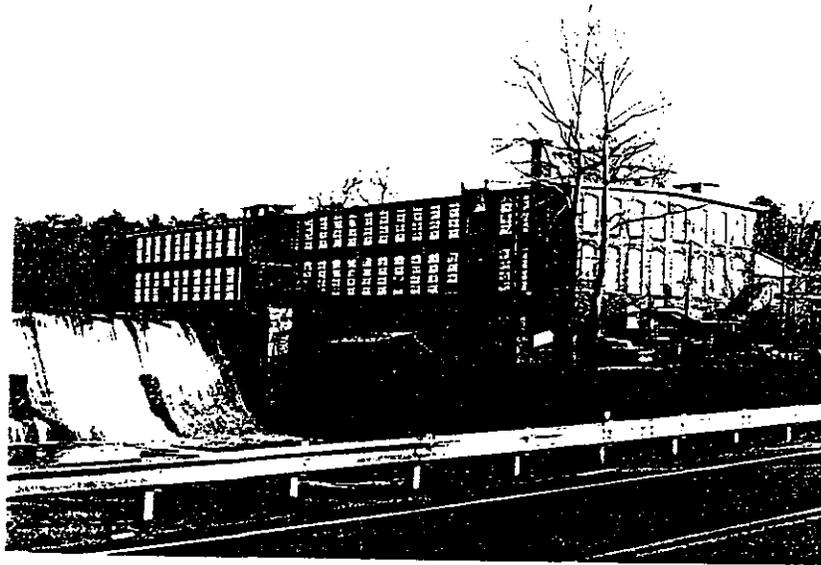


Plate 12. Ledbetter Manufacturing Company (#5), Textile Mill.



Plate 13. Ledbetter Manufacturing Company (#5), Cotton Warehouse.



Plate 14. Ledbetter Manufacturing Company (#5), Mill Worker House.

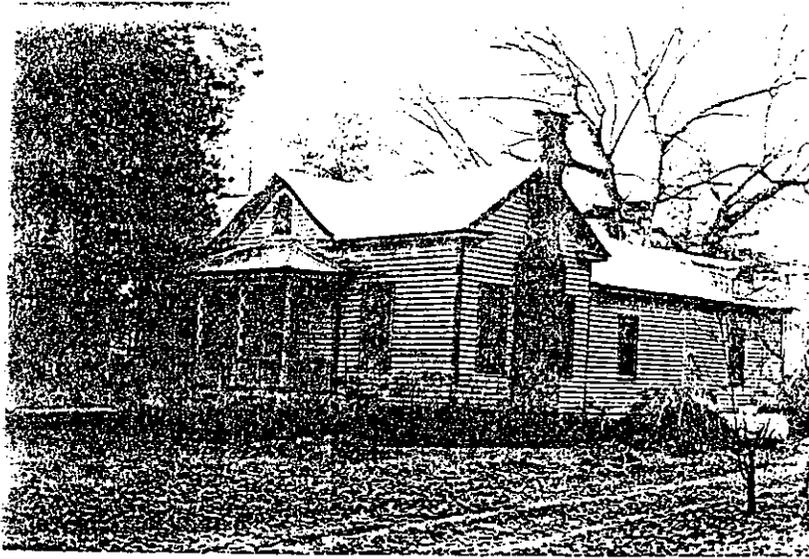


Plate 15. House (=6).

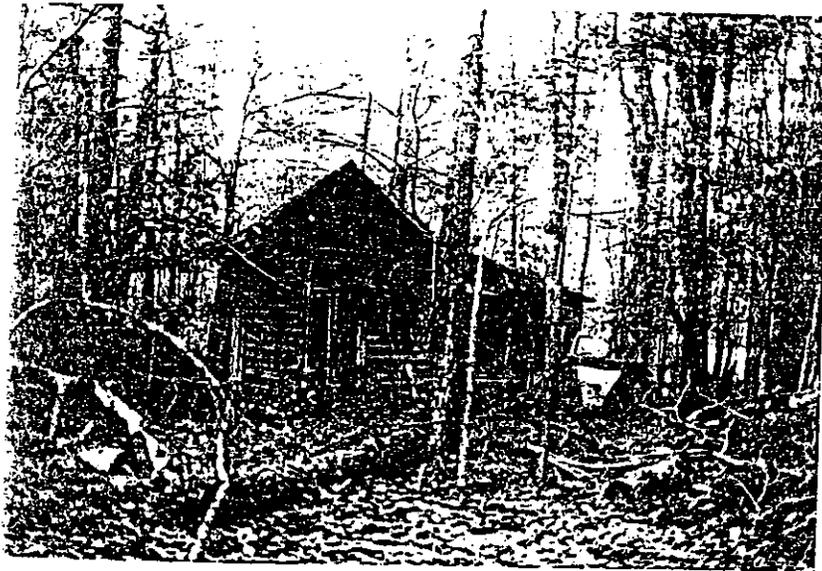


Plate 16. Log Outbuilding (=6).

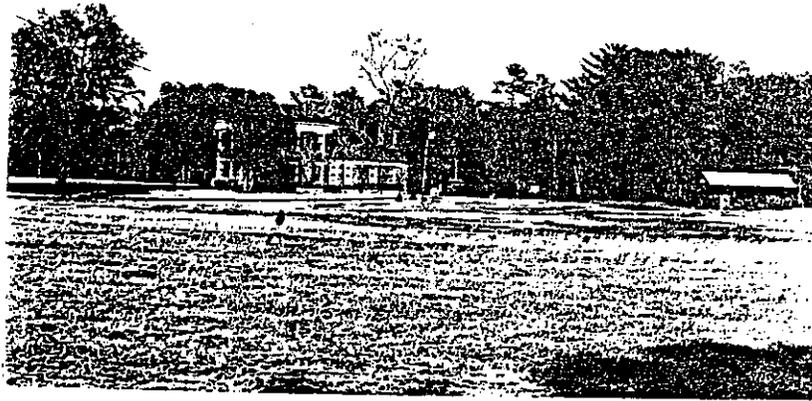


Plate 17. Alfred Dockery House and Setting (=7), situated west of APE.

APPENDIX B

Natural Systems Evaluation

CORRIDOR FEASIBILITY STUDY

**INTERSTATE ROUTE 73
(R-3421)**

Richmond County, North Carolina

for

**Rummel, Klepper & Kahl
Raleigh, North Carolina**



by

**Environmental Services, Inc.
1100 Wake Forest Drive, Suite 200
Raleigh, NC 27604**

February 1996

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I. INTRODUCTION

The North Carolina Department of Transportation (NCDOT) proposes construction on new location of an Interstate Route 73 (I-73) bypass of Rockingham in Richmond County, North Carolina (Figure 1). Four alternative alignments (A, B, C, and D) have been developed and are addressed by this study. Alignments A, B, and C extend from north of Rockingham to the west and south; Alignment D extends from north of Rockingham to the east and south (Figure 2).

Alignment A is approximately 13.4 kilometers (km) (8.3 miles) in length. The northern terminus is located approximately 300 meters (m) (1000 feet (ft)) east of the junction of US 220 and SR 1305. The southern terminus is located on US 74 approximately 3.2 km (2 miles) west of Rockingham.

Alignment B is approximately 16.1 km (10 miles) in length. This alignment has the same northern terminus as Alignment A. The southern terminus is located on US 1 south of Jefferson Park.

Alignment C is approximately 14.3 km (8.9 miles) in length. The northern terminus is located at the junction of US 220 and SR 1306. The southern terminus is the same as Alternate B.

Alignment D is approximately 12.9 km (8 miles) in length, of which 10.5 km (6.5 miles) are on new location and 2.4 km (1.5 mile) is an upgrade of US 220. The northern terminus is on US 220 just south of the junction with SR 1448. The southern terminus is located east of Rockingham, approximately 300 m (1000 ft) south of US 1 in the vicinity of Morgans Pond.

A field reconnaissance was conducted on 18-19 January 1996 to validate published resource inventories, to verify aerial photography interpretations, and to identify areas of particular environmental concern which may affect selection of a preferred alignment. Environmental features evaluated include plant community patterns, water resources, Section 404 jurisdictional areas, unique natural areas, and likely presence or absence of protected species or their habitat.

General sources referenced for background information concerning the existing environment include U.S. Geologic Survey (USGS) topographic mapping, U.S. Fish and Wildlife Service (FWS) National Wetlands Inventory mapping, Natural Resources Conservation Service (NRCS) county soils survey, FWS list of protected species, and protected and rare species records compiled by the N.C. Natural Heritage Program (NHP). Water quality information for the study area were derived from N.C. Division of Environmental Management (DEM) publications (1989, 1992).

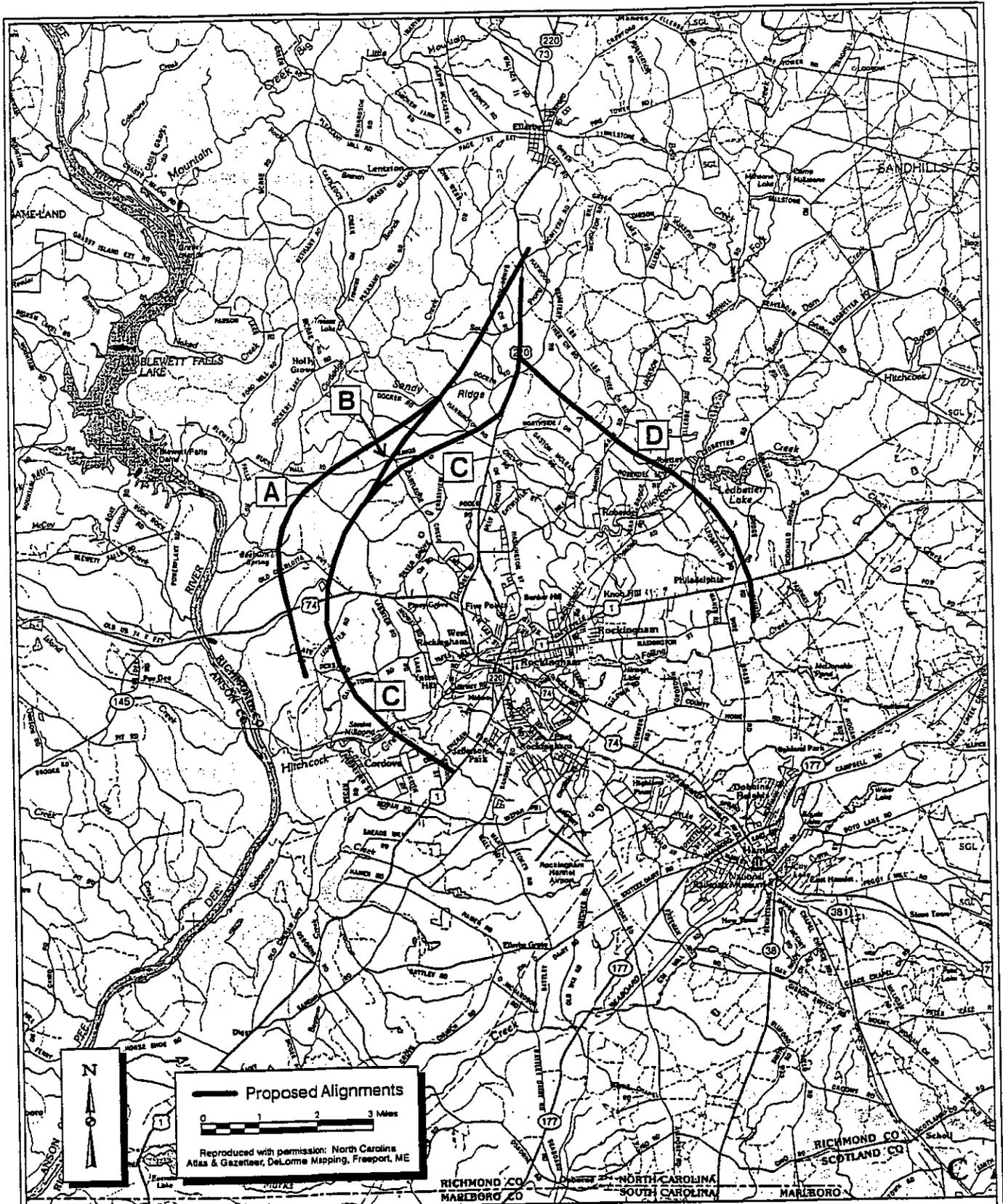


Environmental Services, Inc.
 1100 Wake Forest Road, Suite 200
 Raleigh, NC 27604

I-73 (R-3421)
 Corridor Feasibility Study
 Richmond County, NC

Figure: 1
 Project: ER96001
 Date: Jan 1996





Environmental Services, Inc.
 1100 Wake Forest Road, Suite 200
 Raleigh, NC 27604

I-73 (R-3421)
 Proposed Alignment Locations
 Richmond County, NC

Figure: 2
 Project: ER96001
 Date: Jan 1996



II. PHYSICAL RESOURCES

Topography and Land Use

The study area is situated on the boundary of the Piedmont and Sandhills physiographic provinces of North Carolina. Most of the study area is associated with the sandhills while only the western portion, in the vicinity of the Pee Dee River, is characterized as piedmont. Elevations within the project area range from 145 m (480 ft) above sea level in the northwestern portion of the study area to 43 m (140 ft) in Cartledge Creek and Hitchcock Creek (USGS topographic quadrangles: Rockingham, Hamlet, Ellerbe, and Millstone Lake). The sandhills portion of the region is characterized by broad, sandy ridges and relatively narrow streams. The piedmont portion of the region is characterized by rolling terrain with some steep slopes adjacent to drainages.

Regional land use is primarily rural residential, silvicultural, agricultural, and pastoral. Major products of the region include cotton, corn, peaches, poultry, hogs, livestock, paper, furniture, and lumber.

Soils

The study area extends through three general soil associations: 1) the Ailey-Wakulla-Candor association consisting of sandy, well drained to excessively drained soils on nearly level to moderately steep sandhills uplands; 2) the Badin-Goldston-Uwharrie association consisting of loamy, well drained to excessively drained soils on moderately steep to steep piedmont uplands; and 3) Pacolet-Cullen association consisting of loamy, well drained soils on shallow to steep piedmont upland slopes broken by drainageways (NRCS unpublished). The only series listed as hydric (SCS 1991) are Johnston mucky loams (*Cumulic Humaquepts*), which occur in floodplains and stream channels and are frequently flooded, and Paxville fine sandy loams (*Typic Umbraquults*), which occur on broad flats and depressional areas (NRCS unpublished).

Water Resources

The study area is located in the Yadkin/Pee Dee River Basin. The lower portion of this basin in North Carolina is designated basin subregion #03040200 by the U.S. Geological Survey and Water Resources Council (USGS 1974). Principle streams are Cartledge Creek and its tributaries, including South Prong, in the northwestern portion of the study area and Hitchcock Creek and its tributaries, including Rocky Branch, Jennies Branch, Falling Creek, Steely Branch, South Prong Falling Creek, and Rocky Fork Creek, in the southeastern portion of the study area.

A portion of Hitchcock Creek, Falling Creek, and Rocky Fork Creek have a best usage classification of **WS-III**. The portion of Hitchcock Creek from which drinking water is withdrawn has a best usage classification of **WS-III CA**. All other named streams in the study

area have a best usage classification of C. Class WS-III waters are protected as water supplies which are generally in low to moderately developed watersheds.

Section 404 of the Clean Water Act requires regulation of discharges into "waters of the United States." Rivers, lakes, streams, and isolated wetlands are subject to jurisdictional consideration under the Section 404 program. Jurisdictional areas within the study area are primarily riverine and palustrine in nature as defined by Cowardin *et al.* (1979) and displayed on the NWI maps of the area. The only designated riverine area within the study area is Hitchcock Creek. The palustrine areas are small creeks and forested areas adjacent to creeks and ponds. A large percentage of the jurisdictional systems in the study area consist of surface waters in bank-to-bank streams or in isolated ponds.

Of the wetland types within the study area, streams with adjacent wetlands provide the highest value to the environment. The most significant streams with adjacent wetlands in the study area are the South Prong of Cartledge Creek and Hitchcock Creek. There are no isolated wetlands impacts associated with any of these alignments. Open water systems and wetlands receive similar treatment and consideration with respect to Section 404 review.

Impacts to Physical Resources

Physical resource impacts are primarily limited to stream and water course crossings. Detailed field investigations are beyond the scope of this project. Field work was performed in key areas to validate the type, quality, and general extent of area wetlands. The number of jurisdictional crossings and approximate total wetland areas for each alternative alignment are presented in Table 1.

Table 1. Section 404 jurisdictional crossings attributed to each of four I-73 alternate alignments in Richmond County, NC. See attached blue-line aerial photographs for locations.

Alignment	Bank-to-bank Drainages	Drainages with Adjacent Wetlands	Ponds	Total Area Hectares (Acres)
A	18	8	1	3.2 (8)
B	16	5	2	3.6 (9) 2.4 (6.1) *
C	15	4	2	3.6 (9) 2.4 (6.1) *
D	20	1	1	1.0 (2.5)

* Revised - original Totals included impacts resulting from the US 74 By-Pass Project (R-512).

The locations of jurisdictional crossings are indicated on the attached blue-line aerial photographs. Water course/wetland areas were derived from estimated measurements taken from aerial photographs with limited field verification. Areas and stream counts should be used for alignment comparisons only. Additional field work will be required for detailed quantification.

The alignments all have relatively similar numbers of total crossings (from 15 to 20) and pond crossings (1 or 2). Alignment A crosses the greatest number (8) of streams with adjacent wetlands, and Alignment D crosses the least number (1) of streams with adjacent wetlands. Alignment D also impacts approximately one-third as much total jurisdictional area as each of the other alignments.

III. BIOTIC RESOURCES

Plant Communities

Within the study area, seven plant communities have been identified: pine plantation, pine forest, pine/mixed hardwood forest, hardwood forest, disturbed shrub assemblage, pastoral/agricultural land, and residential/disturbed land. Distribution and composition of plant communities reflect the effects of topographic positioning and land use practices.

Pine Plantation

Much of the land in the study area is in silviculture, consisting primarily of monotypic stands of loblolly (*Pinus taeda*) and long-leaf (*P. palustris*) pine. Within these actively managed plantations windrowing, ditching, bedding, and controlled burning have limited plant species diversity in the understory.

Pine Forest

Isolated blocks of pine forest occur throughout the study area and are primarily the result of past disturbances such as timbering. A mixture of loblolly, long-leaf, and pond (*Pinus serotina*) pine comprise the canopy. This community typically supports a developing hardwood subcanopy/understory.

Pine/Mixed Hardwood Forests

This community is a variant of the pine forest in which hardwood tree species have become established in the canopy and share dominance with pines. Within the study area this community occurs in two landscape positions: 1) low, mesic depressions and 2) ridges and slopes. The more mesic landscape supports a canopy of loblolly and pond pine, sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), tulip tree (*Liriodendron tulipifera*), red cedar (*Juniperus virginiana*), and water oak (*Quercus nigra*).

The higher landscape position supports a canopy of loblolly, long-leaf, and Virginia (*P. echinata*) pine, sweetgum, white oak (*Quercus alba*), American beech (*Fagus grandifolia*), and tulip tree.

Hardwood forests

This community is found on lower slopes, in shaded ravines, and along water courses. This community typically represents a more advanced seral stage of the previous community; the pine component of the canopy has been eliminated by hardwood competition. When this community occurs on low, mesic depressions or on ridges and slopes the canopy composition is similar to the previous community, without the pine component. Where this community occurs in wetland bottoms and adjacent to perennial streams the canopy typically consists of water oak, red maple, tulip tree, sweetgum, black gum (*Nyssa sylvatica*), sycamore (*Platanus occidentalis*), box elder (*Acer negundo*), and river birch (*Betula nigra*).

Disturbed Shrub Assemblage

This community is the result of timbering, clearing, or other disturbance and is characterized by a broken canopy or subcanopy. Generally, these areas support saplings of pine and hardwood species common to the area before the disturbance, as well as pioneer species.

Pastoral/Agricultural Land

Pastoral land includes successional fields that have been left unmanaged but show signs of regular grazing, primarily by cows and horses. These open fields allow for the proliferation of both annual and perennial grasses and herbs. Agriculture is not as important a land use in this part of the state as silviculture, and the land area in row crop production is relatively small. Principle crops include corn (*Zea mays*), soybean (*Glycine max*), and cotton (*Gossypium* spp.).

Residential/Disturbed Land

This community includes areas of lawn and horticultural plantings, housing developments, farm buildings, industrial and commercial sites, and maintained right-of-ways. Some of these areas are dominated by invasive weedy species.

Impacts to Plant Communities

Plant community impacts were not quantified as part of this investigation. However, generalizations can be made with respect to plant community values and subsequent effects on wildlife usage. Silviculture is a more important land use in this region than pasturage or agriculture. The landscape is primarily forested, with pine forests and pine/mixed hardwood forests predominating in all of the alignments. Only a small percentage of the land is in

pastoral/agricultural or residential disturbed use. The primary impact of this project will be fragmentation of existing blocks of forest. Direct impacts will be limited to the specific footprint of the proposed alignment. Construction of the roadway will cause an initial decline of wildlife populations in the immediate area, but this condition can be expected to stabilize after project completion.

Rare and Unique Natural Areas

A survey of NHP records found no documented rare and unique natural areas listed for the study area. There are no water bodies deserving of special attention as denoted under the federal Wild and Scenic Rivers act of 1968 or under the Natural and Scenic Rivers Act of 1971.

Protected Species

Federally-listed species with Endangered or Threatened status are protected under the Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq.*). Any federal action which may jeopardize listed species or their habitat requires review and consultation with appropriate federal and state resource agencies.

As of 19 April 1995, FWS lists five Endangered and no Threatened species that may occur in Richmond County. The Endangered species are:

- Red-cockaded woodpecker (*Picoides borealis*)
- Bald eagle (*Haliaeetus leucocephalus*)
- Shortnose sturgeon (*Acipenser brevirostrum*)
- Michaux's sumac (*Rhus michauxii*)
- Rough-leaved loosestrife (*Lysimachia asperulaefolia*)

The Endangered status refers to a species "which is in danger of extinction throughout all or a significant portion of its range" (Endangered Species Act, Section 3). The species are briefly described below.

Red-cockaded Woodpecker - This small woodpecker 18 to 24 centimeters (7 to 8.5 inches) long has a black head, prominent white cheek patch, and black-and-white barred back. Primary nesting habitat consists of southern pine forests generally older than 70 years. Foraging habitat consists of pine forests older than 30 years.

There is no documentation of cavity trees within 1.6 km (1 mile) of any of the alignments, and no red-cockaded woodpeckers were observed during site visits. However, potential habitat (foraging and nesting) may occur within the study area. Additional field work will be required to age pine stands and to evaluate stands for foraging or nesting potential.

Bald Eagle - The bald eagle occurs throughout North America, primarily in association with large lakes and coastal bays and sounds. Nest sites occur close to open-water feeding grounds in large trees (predominately pine or cypress), either living or dead.

The most likely areas for the bald eagle to occur in the vicinity of the study area are the Pee Dee River and Ledbetter Lake. There is no documentation of this species from either the nearby segment of the river or the lake or within 1.6 km (1 mile) of the alignments. The bald eagle is not expected to be adversely affected by any of the alignments.

Shortnose sturgeon - The shortnose sturgeon is an anadromous, bottom-feeding fish that rarely exceeds 1 m (3 ft) in length. This species occurs in Atlantic seaboard rivers from the St. Johns River, Florida, to eastern Canada, primarily in estuaries and lower sections of large rivers.

This species is listed for Richmond County due to a single record from the nearby Pee Dee River (Menhinick 1991). The Pee Dee River is not expected to be directly impacted by any of these alignments; therefore, this species is not expected to be adversely affected by this project.

Michaux's sumac - Michaux's sumac is a dioecious, densely pubescent, rhizomatous shrub that reaches up to 1 m (3 ft) in height. Michaux's sumac occurs in sandy or rocky substrates, especially in disturbed areas where competition is reduced, such as roadside margins or utility line right-of-ways.

This species has not been previously documented from within the study area, and it was not encountered during site visits. However, potential habitat for Michaux's sumac does occur within the study area. Additional field work will be required to evaluate and quantify appropriate habitats for the presence or absence of this species.

Rough-leaved Loosestrife - The rough-leaved loosestrife is a rhizomatous perennial that reaches a height of 0.6 m (2 ft). This species typically occurs on the ecotone between long-leaf pine savannas and wetter, shrubby areas, where lack of canopy vegetation allows abundant sunlight into the herb layer. The loosestrife is endemic to coastal plain and sandhill regions of the Carolinas.

This species has not been previously documented from within the study area, and was not encountered during site visits. Potential habitat for rough-leaved loosestrife is expected to be rare in the study area. Additional field work will be required to evaluate specific sites for the presence or absence of this species.

The FWS lists six species that are currently under review as candidates for Endangered or Threatened status. The candidate species are:

Bachman's sparrow (*Aimophila aestivalis*)
Northern pine snake (*Pituophis melanoleucus melanoleucus*)
Conferva pondweed (*Potamogeton confervoides*)
Georgia leadplant (*Amorpha georgiana georgiana*)
Pickering's morning glory (*Stylisma pickeringii* var. *pickeringii*)
Sandhills milkvetch (*Astragalus michauxii*)
Smooth bog-asphodel (*Tofieldia glabra*)
White-wicky (*Kalmia cuneata*)

There are no records of any of these species occurring within the study area. None of these species is expected to be adversely impacted by any of the alternative alignments.

Impacts to Protected Species

NHP and FWS records and limited field studies failed to document presence of listed species in the study area. Additional field work will be required for a final impact analysis.

IV. SUMMARY

Water resources within the I-73 study area in Richmond County are primarily limited to streams and water course crossings. Direct impacts will be limited to specific site crossing. Alignment D X crosses the fewest streams with adjacent wetlands and contains the least total impacts to Section 404 jurisdictional areas (1 ha (2.5 acres)).

The I-73 study area is primarily forested, with pine forest and pine/mixed hardwood forest predominating. The four alignments impact relatively similar types and ratios of plant communities. The primary impact to plant communities due to this project will be forest fragmentation. No unique natural areas have been documented from the study area. Alignment D contains the least plant community impacts as it proposes the least amount of new-location construction.

There is no documentation of federally-listed species from within 1.6 km (1 mile) of any of the alignments. Potential habitat for both the red-cockaded woodpecker and Michaux's sumac may occur within the study area and additional field work will be required for a final impact analysis.

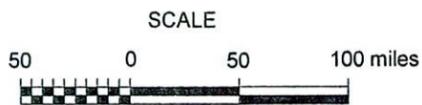
V. REFERENCES

- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. Laroe. 1979. Classification of Wetland and Deepwater Habitats of the United States. Fish and Wildlife Service, U.S. Department of the Interior.
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APPENDIX C

Exhibits

Interstate 73 and 74 Corridors



LEGEND

INTERSTATE 73 CORRIDOR
INTERSTATE 74 CORRIDOR

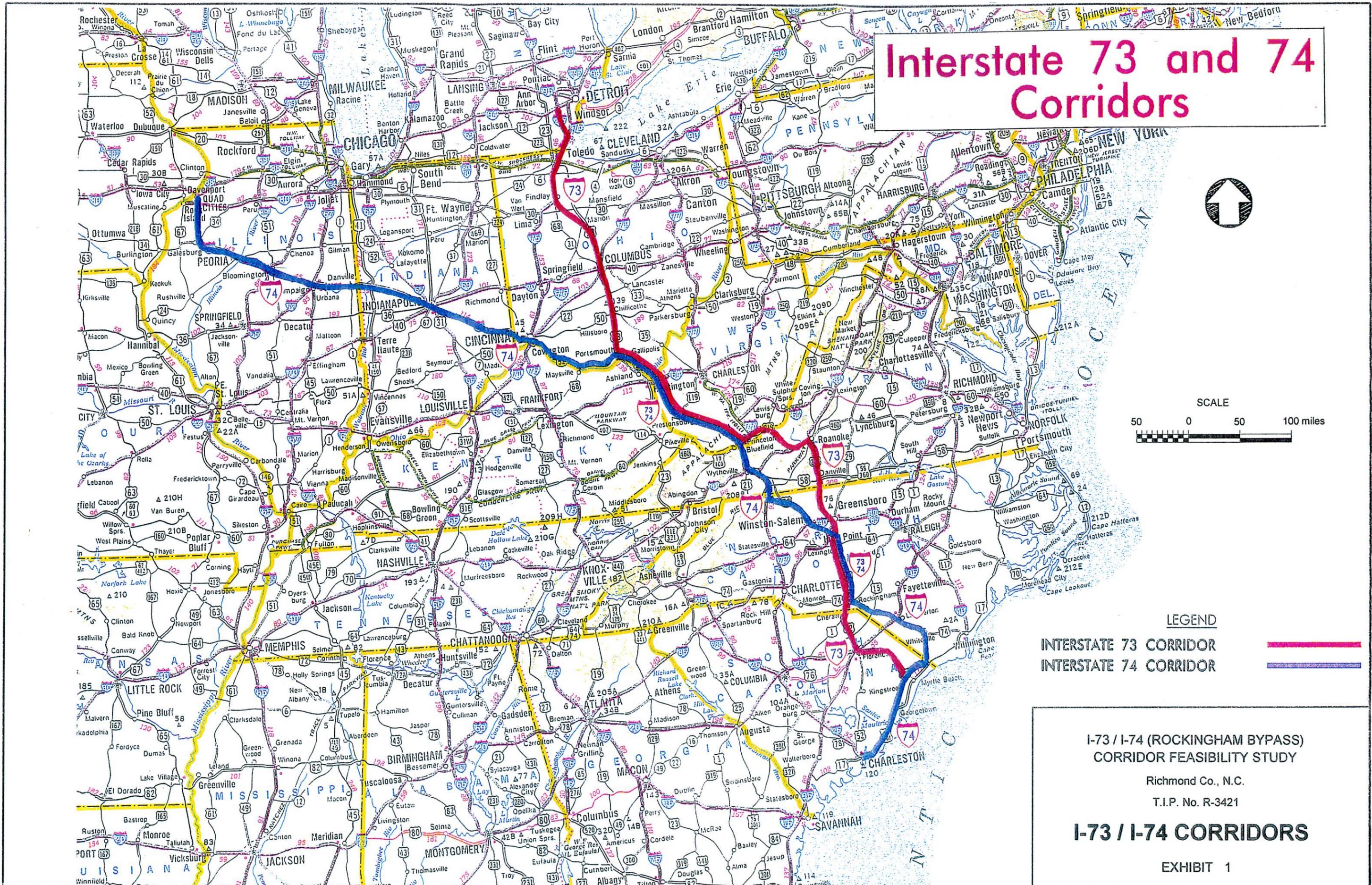
I-73 / I-74 (ROCKINGHAM BYPASS)
CORRIDOR FEASIBILITY STUDY

Richmond Co., N.C.

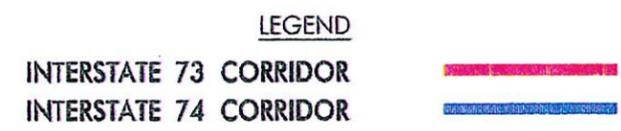
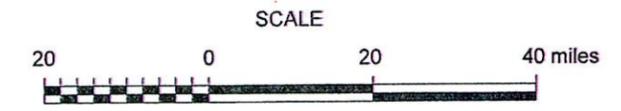
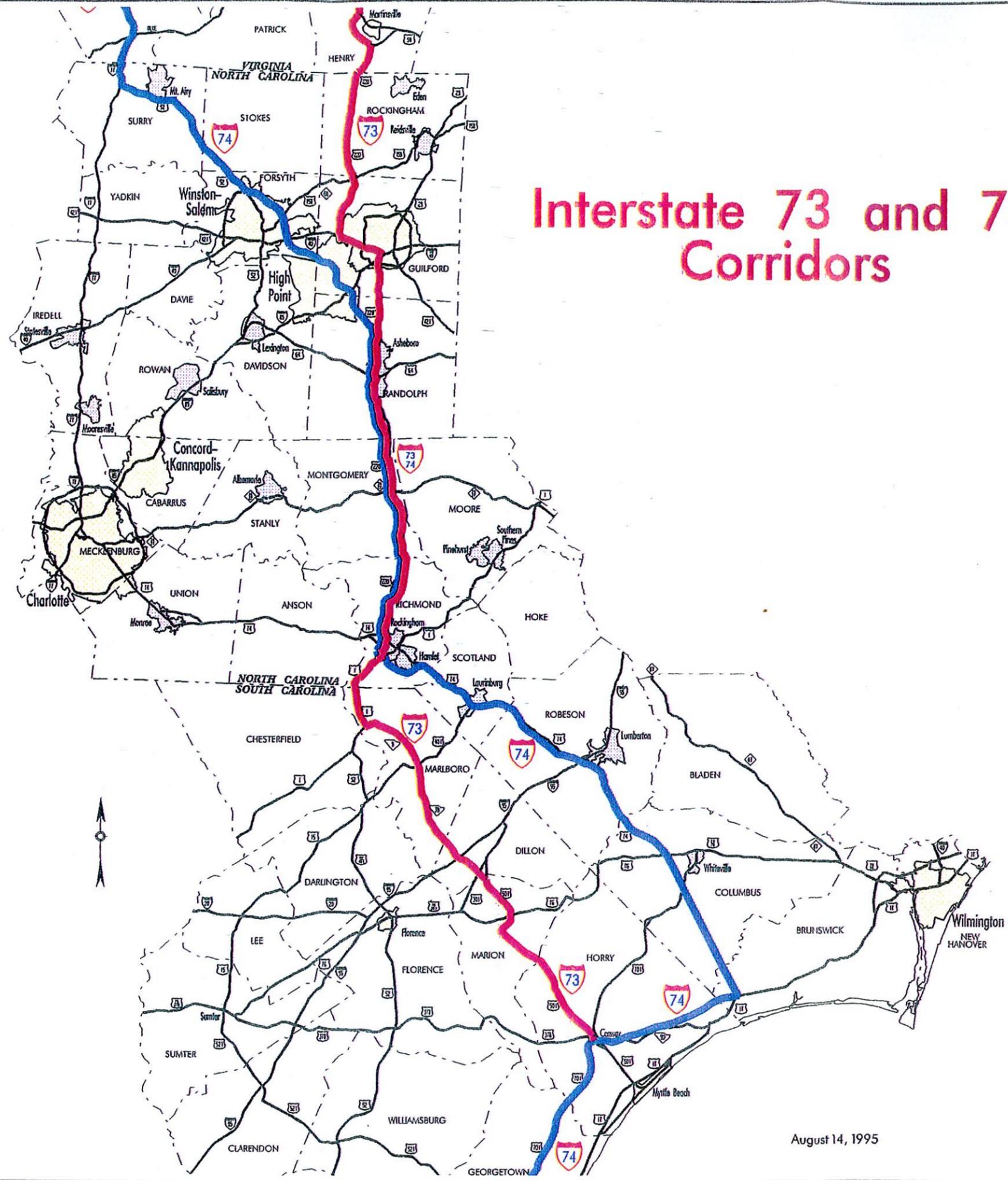
T.I.P. No. R-3421

I-73 / I-74 CORRIDORS

EXHIBIT 1

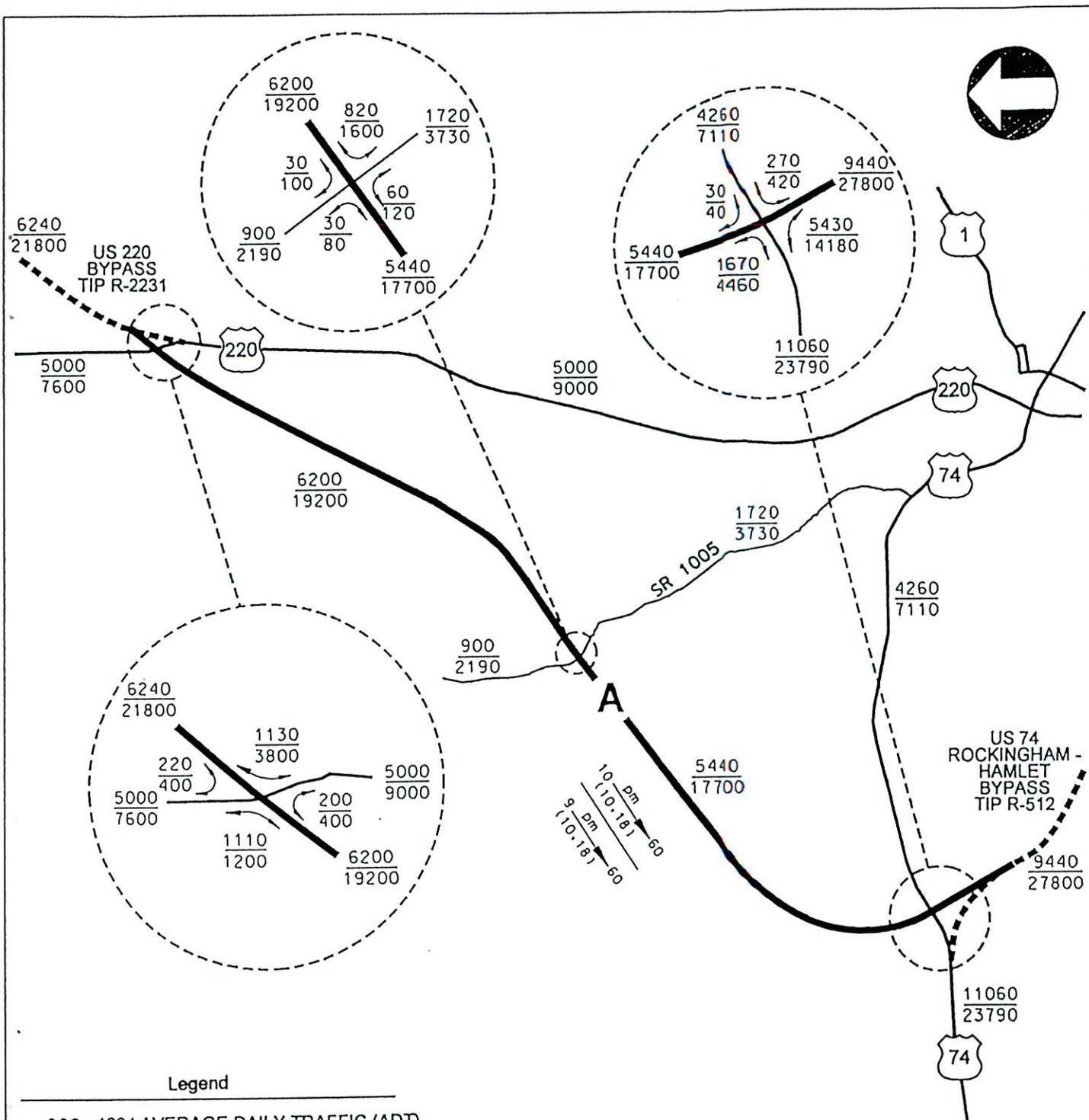


Interstate 73 and 74 Corridors



I-73 / I-74 (ROCKINGHAM BYPASS)
CORRIDOR FEASIBILITY STUDY
Richmond Co., N.C.
T.I.P. No. R-3421
**I-73 / I-74 INTERSTATE CORRIDORS
THROUGH NORTH CAROLINA**
EXHIBIT 2

August 14, 1995



Legend

$\frac{000}{000}$ 1994 AVERAGE DAILY TRAFFIC (ADT)
 $\frac{000}{000}$ 2020 AVERAGE DAILY TRAFFIC (ADT)

DHV Fac = DESIGN HOURLY VOLUME (%) = K30
 K30 = 30th HIGHEST HOURLY VOLUME AS % OF AADT
 D = DIRECTIONAL FLOW (%)

am/pm = AM OR PM PEAK
 → DIRECTION OF D

(10,18) DUAL TRUCKS AND TTST'S AS%

$\frac{10}{9} \frac{pm}{(10.18)} \rightarrow 60$ 1994 (10,18) DUAL TRUCKS AND TTST'S AS%
 $\frac{9}{9} \frac{pm}{(10.18)} \rightarrow 60$ 2020 (10,18) DUAL TRUCKS AND TTST'S AS%

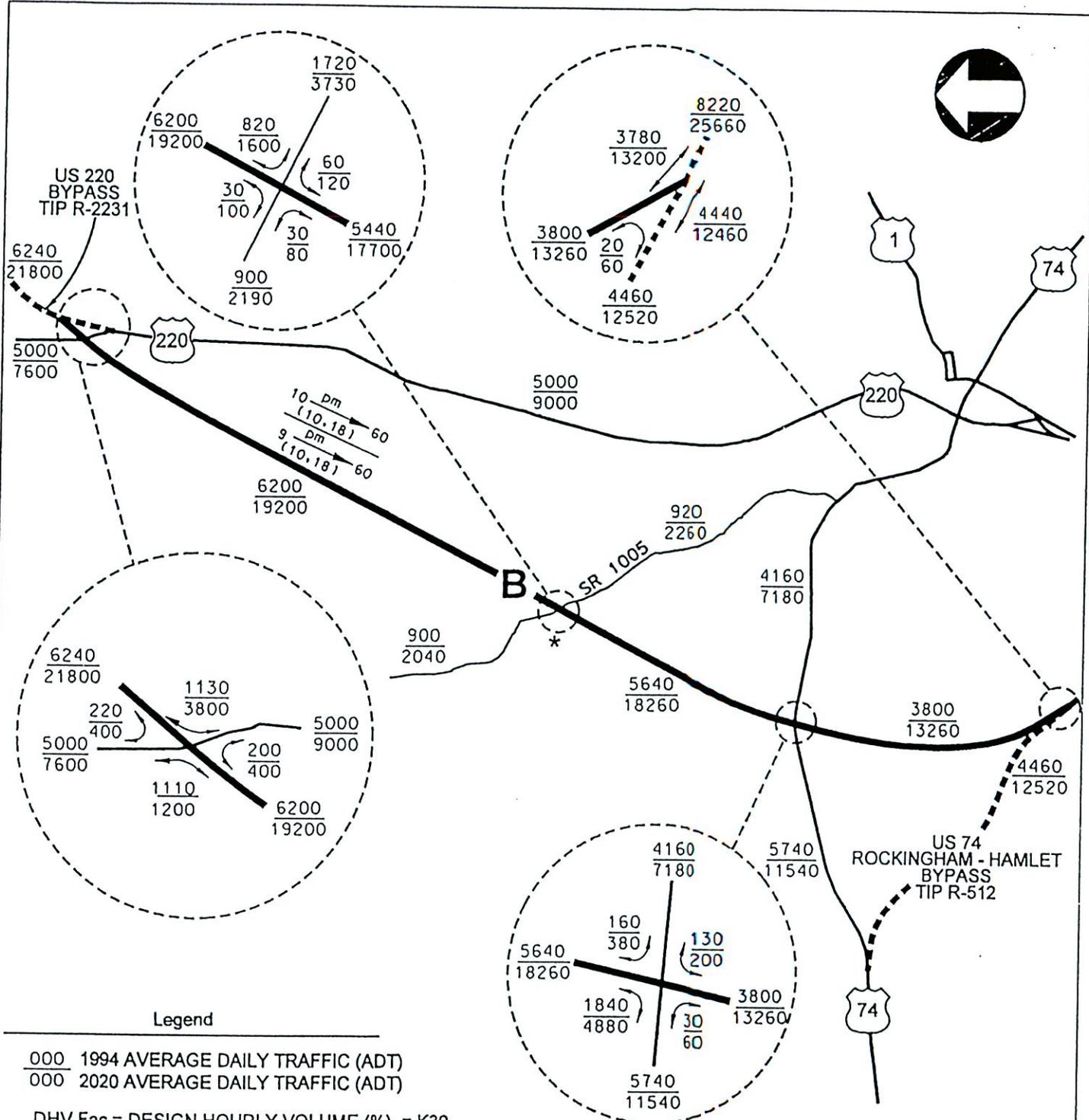
DHV Fac D Trucks

**I-73 / I-74 (ROCKINGHAM BYPASS)
 CORRIDOR FEASIBILITY STUDY**

Richmond Co., N.C.
 T.I.P. No. R-3421

**TRAFFIC VOLUMES
 ALTERNATIVE A**

EXHIBIT 4a



Legend

000 1994 AVERAGE DAILY TRAFFIC (ADT)
000 2020 AVERAGE DAILY TRAFFIC (ADT)

DHV Fac = DESIGN HOURLY VOLUME (%) = K30
 K30 = 30th HIGHEST HOURLY VOLUME AS % OF AADT
 D = DIRECTIONAL FLOW (%)
 am/pm = AM OR PM PEAK
 → DIRECTION OF D

(10,18) DUAL TRUCKS AND TTST'S AS%

$\frac{10 \text{ pm}}{(10,18)} \rightarrow 60$ 1994 (10,18) DUAL TRUCKS AND TTST'S AS%
 $\frac{9 \text{ pm}}{(10,18)} \rightarrow 60$ 2020 (10,18) DUAL TRUCKS AND TTST'S AS%

DHV D
 Fac Trucks

* NO ADT WAS SUBMITTED FROM NCDOT FOR THE INTERCHANGE AT SR 1005. THE VOLUMES SHOWN ARE FOR ALTERNATIVE A.

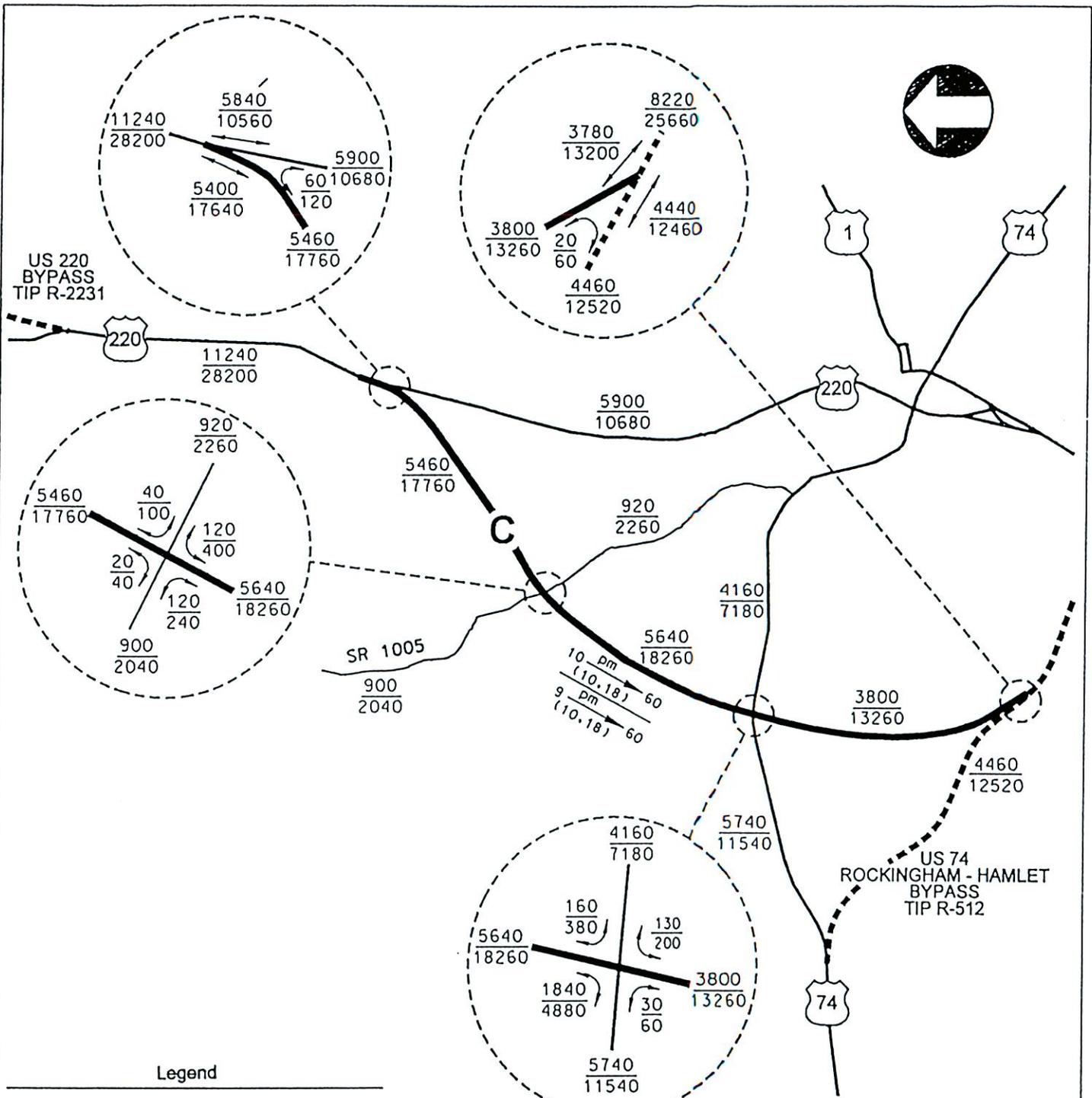
I-73 / I-74 (ROCKINGHAM BYPASS) CORRIDOR FEASIBILITY STUDY

Richmond Co., N.C.

• T.I.P. No. R-3421

TRAFFIC VOLUMES ALTERNATIVE B

EXHIBIT 4b



Legend

000 1994 AVERAGE DAILY TRAFFIC (ADT)
 000 2020 AVERAGE DAILY TRAFFIC (ADT)

DHV Fac = DESIGN HOURLY VOLUME (%) = K30
 K30 = 30th HIGHEST HOURLY VOLUME AS % OF AADT
 D = DIRECTIONAL FLOW (%)

am/pm = AM OR PM PEAK

→ DIRECTION OF D

(10,18) DUAL TRUCKS AND TTST'S AS%

$\frac{10 \text{ pm}}{(10,18)} \rightarrow 60$ 1994 (10,18) DUAL TRUCKS AND TTST'S AS%

$\frac{9 \text{ pm}}{(10,18)} \rightarrow 60$ 2020 (10,18) DUAL TRUCKS AND TTST'S AS%

DHV D
 Fac Trucks

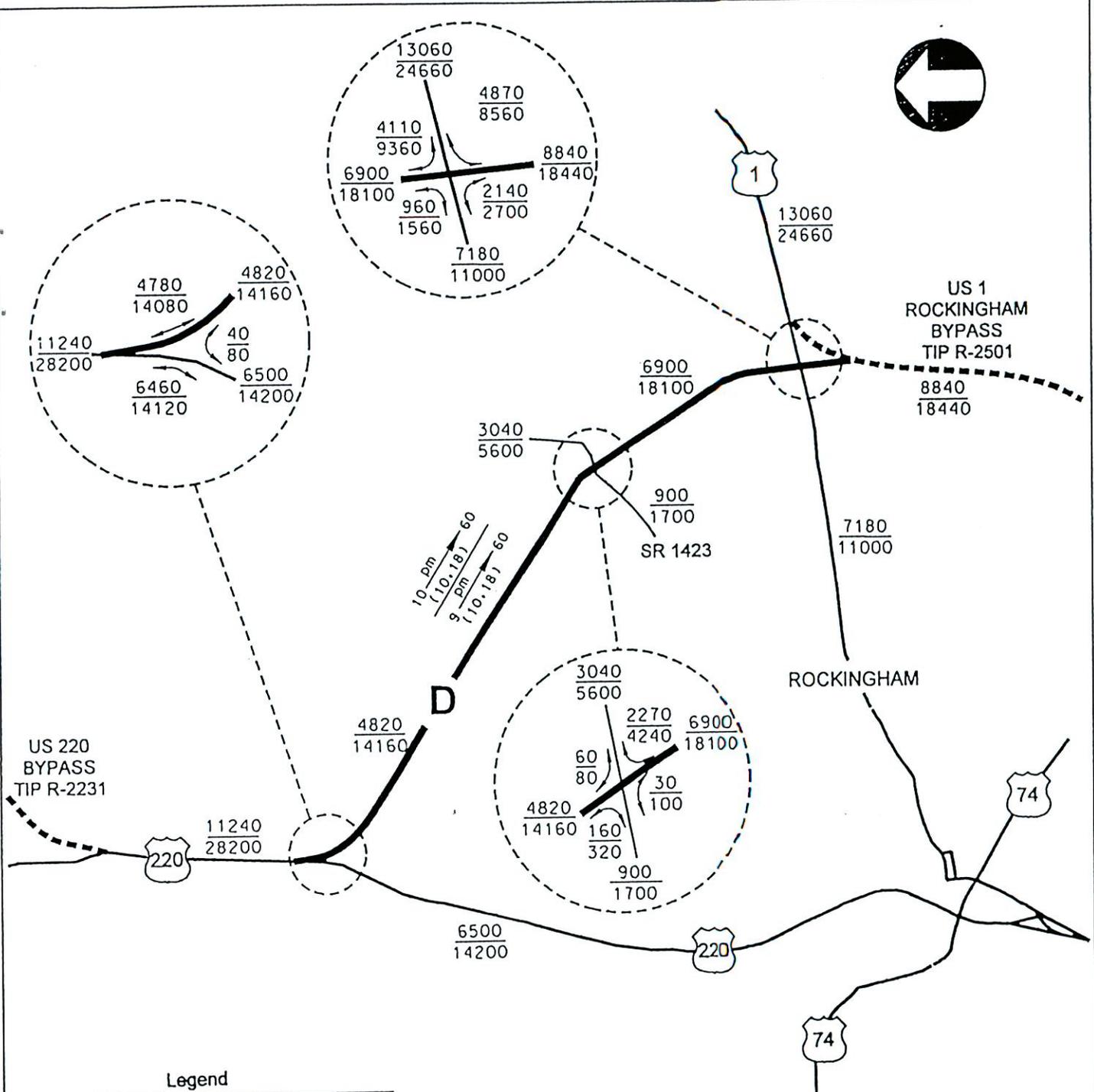
**I-73 / I-74 (ROCKINGHAM BYPASS)
 CORRIDOR FEASIBILITY STUDY**

Richmond Co., N.C.

T.I.P. No. R-3421

**TRAFFIC VOLUMES
 ALTERNATIVE C**

EXHIBIT 4c



Legend

000 1994 AVERAGE DAILY TRAFFIC (ADT)
 000 2020 AVERAGE DAILY TRAFFIC (ADT)

DHV Fac = DESIGN HOURLY VOLUME (%) = K30
 K30 = 30th HIGHEST HOURLY VOLUME AS % OF AADT
 D = DIRECTIONAL FLOW (%)

am/pm = AM OR PM PEAK

→ DIRECTION OF D

(10,18) DUAL TRUCKS AND TTST'S AS%

10 ^{pm} / (10,18) → 60 1994 (10,18) DUAL TRUCKS AND TTST'S AS%

9 ^{pm} / (10,18) → 60 2020 (10,18) DUAL TRUCKS AND TTST'S AS%

DHV D
 Fac Trucks

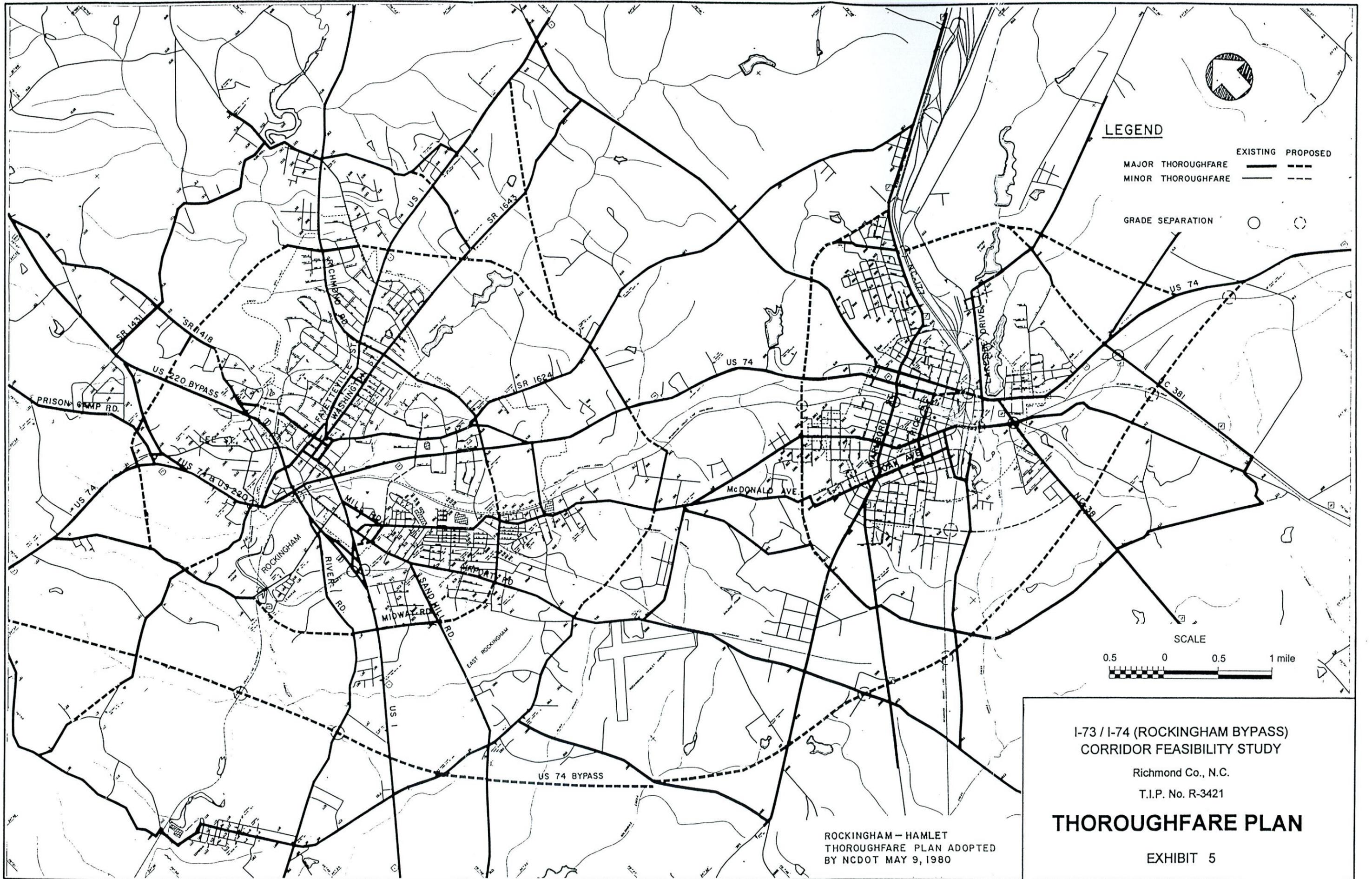
**I-73 / I-74 (ROCKINGHAM BYPASS)
 CORRIDOR FEASIBILITY STUDY**

Richmond Co., N.C.

T.I.P. No. R-3421

**TRAFFIC VOLUMES
 ALTERNATIVE D**

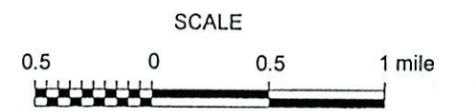
EXHIBIT 4d



LEGEND

	EXISTING	PROPOSED
MAJOR THOROUGHFARE		
MINOR THOROUGHFARE		

GRADE SEPARATION



I-73 / I-74 (ROCKINGHAM BYPASS)
CORRIDOR FEASIBILITY STUDY

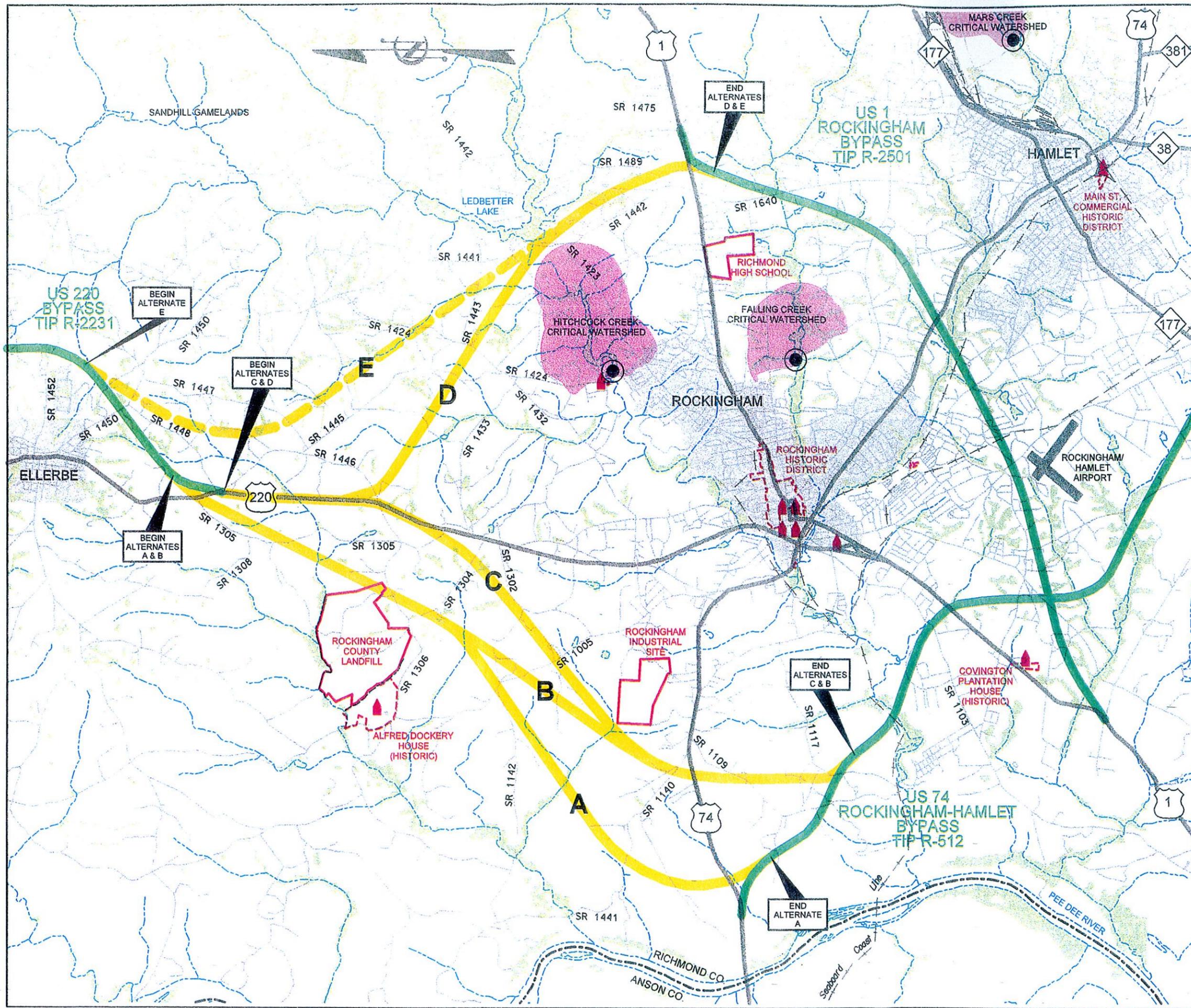
Richmond Co., N.C.

T.I.P. No. R-3421

THOROUGHFARE PLAN

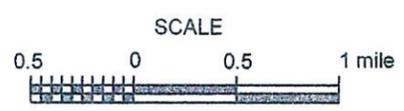
EXHIBIT 5

ROCKINGHAM - HAMLET
THOROUGHFARE PLAN ADOPTED
BY NCDOT MAY 9, 1980



Legend

- U.S. HIGHWAY
- STATE HIGHWAY
- STATE ROUTE
- COUNTY LINE
- CITY LIMITS
- WATERWAYS
- PRELIMINARY ALTERNATIVES
- ELIMINATED ALTERNATIVE
- TIP PROJECTS
- CRITICAL WATER SHED
- WETLANDS
- WATER SURFACE INTAKE
- HISTORIC DISTRICT / SITE
- HISTORIC STRUCTURE
- RAILROAD



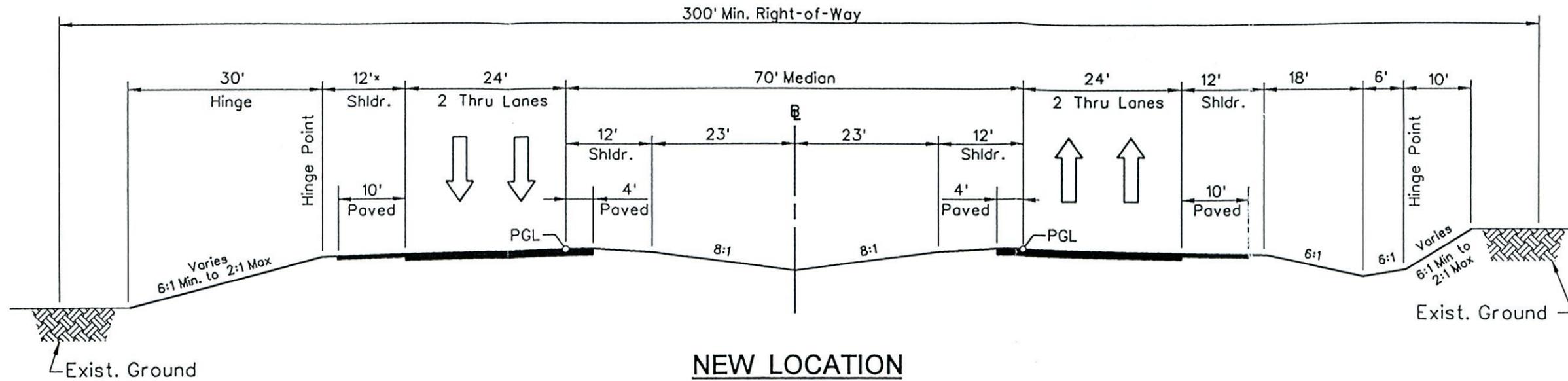
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Richmond Co., N.C.

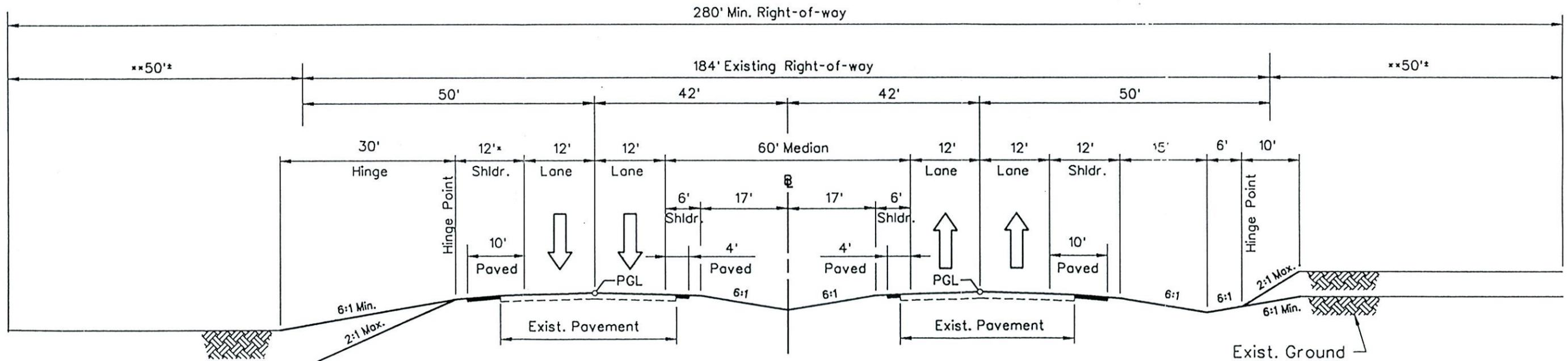
T.I.P. No. R-3421

PRELIMINARY ALTERNATIVES

EXHIBIT 6



NEW LOCATION
 * 15' With Guardrail



EXISTING US 220 UPGRADE
 * 15' With Guardrail

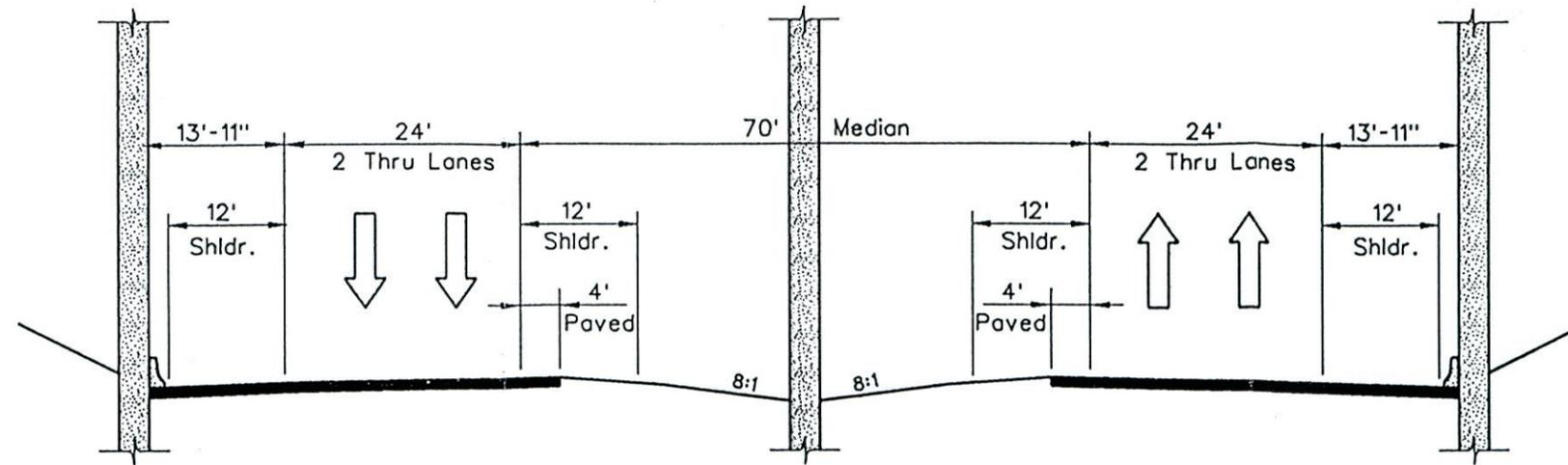
** Approximately 50' of additional R:W required on each side.

I-73 / I-74 (ROCKINGHAM BYPASS)
 CORRIDOR FEASIBILITY STUDY

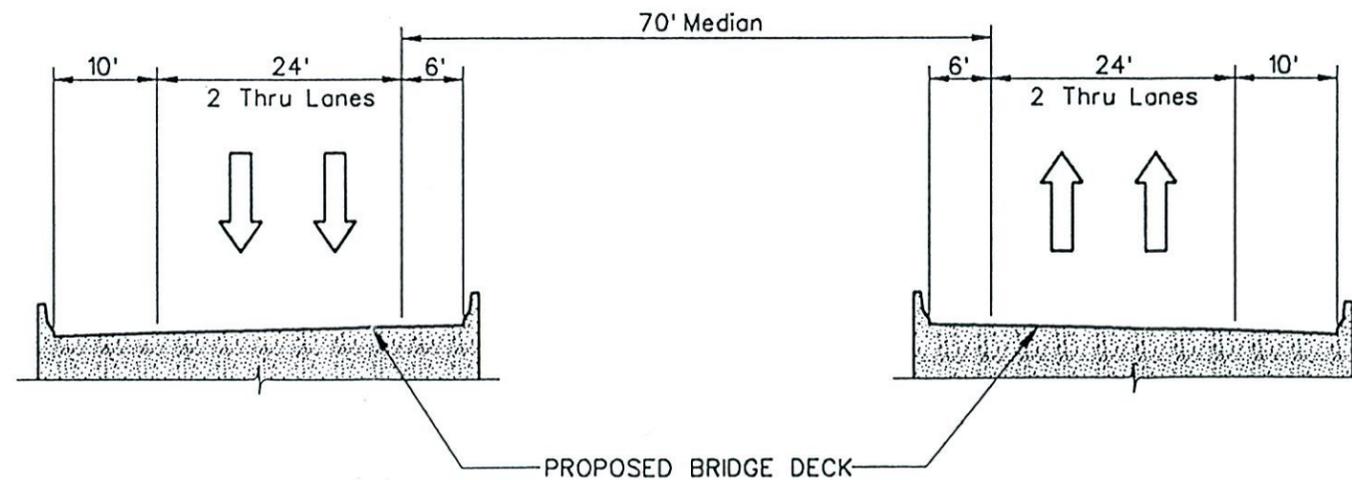
Richmond Co., N.C.
 T.I.P. No. R-3421

TYPICAL SECTIONS

EXHIBIT 7



PROPOSED I-73 / I-74 BYPASS
TYPICAL SECTION THROUGH BRIDGE



PROPOSED I-73 / I-74 BYPASS
TYPICAL BRIDGE SECTION

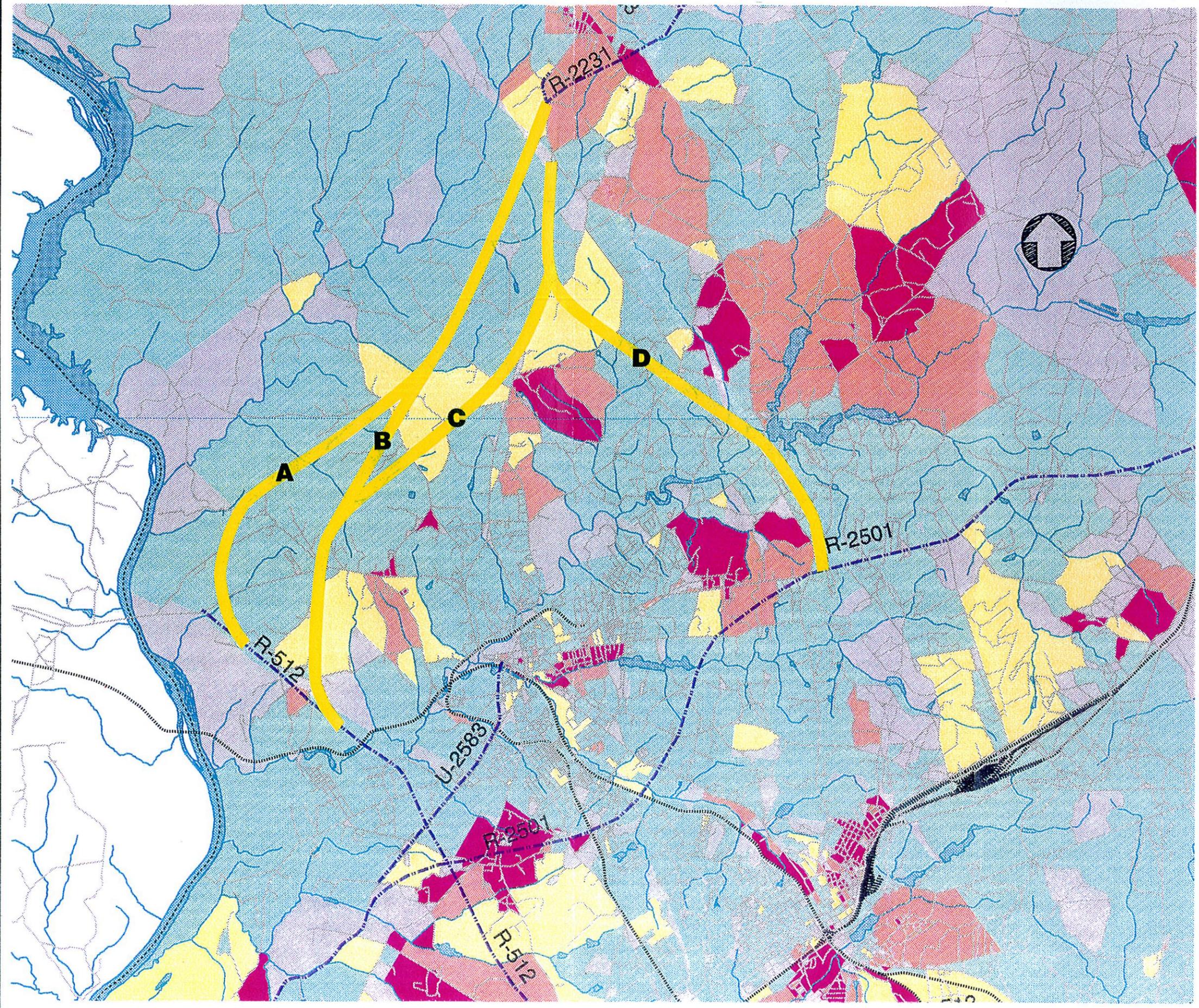
I-73 / I-74 (ROCKINGHAM BYPASS)
 CORRIDOR FEASIBILITY STUDY

Richmond Co., N.C.

T.I.P. No. R-3421

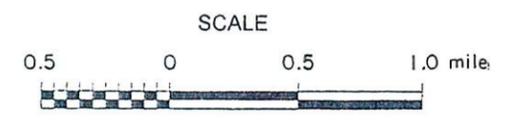
TYPICAL SECTIONS

EXHIBIT 8



I-73 / I-74 Alternatives

- County Boundary
- County Boundary
- State Boundary
- Shore Line
- TIP lin
- Roads (100K TIGER DATA)
- Major Railroads
- 100k DEM Hydrography (Lines)
- 100k DEM Hydrography (Poly)
- Non-White Population by %
 - No Persons in block
 - 0 to 31% (CO.AVG.)
 - 31% to 61%
 - 61% to 92%
 - 92% to 100%



I-73 / I-74 (ROCKINGHAM BYPASS)
 CORRIDOR FEASIBILITY STUDY

Richmond Co., N.C.
 T.I.P. No. R-3421

**NON-WHITE POPULATION
 BY PERCENTAGE**

EXHIBIT 9