K-2538

FEASIBILITY STUDY

NC 54
From I-40/85 in Burlington
to Chapel Hill Bypass
Alamance-Orange Counties
R-2538

Prepared by
Planning and Environmental Branch
Division of Highways
N. C. Department of Transportation

Angela Smith
Project Planning Engineer

R. G. Dawson, Jr., P. E.
Head of Feasibility & Special
Studies Unit

9/28/90
Date

for L. J. Ward, P. E., Manager
Planning and Environmental Branch

NC 54
From I-40/85 in Burlington
to Chapel Hill Bypass
Alamance-Orange Counties
R-2538

I. DESCRIPTION

This report covers a preliminary study of a proposed widening of a 20-mile section of NC 54 from I-40/85 in Burlington to the NC 54 Chapel Hill Bypass (see Figure 1). This project is included in the 1990-1996 Transportation Improvement Program for feasibility study and/or right-of-way protection and is not currently funded.

The project begins just beyond the I-40/85 interchange at the intersection of NC 54 and SR 2106 to the east and SR 2217 to the west. The Y-line improvement for the I-40/85 widening project (I-303K, construction scheduled to begin in 1990) includes a 5-lane curb and gutter section tapering back into the 2-lane section just south of SR 2106.

The project terminates approximately 0.3 mile west of SR 1107, where the proposed widening of the western portion of NC 54 Chapel Hill Bypass ends. This widening project (U-2003AA) is scheduled to start construction in 1991.

II. PURPOSE OF PROJECT

Existing Conditions

NC 54 is classified as a minor arterial on the County Functional Classification Plan. NC 54 acts as an important connector between the Chapel Hill/Carrboro areas and Burlington.

Existing NC 54 is generally a 2-lane, 24-foot paved facility with 12-foot shoulders (4 feet of which is paved). Left turn lanes are provided at all major intersections and along short sections of NC 54 from I-40/85 to SR 2106 and from SR 2136 to NC 119.

The speed limit from the I-40/85 ramps in Burlington to SR 2136 is 45 mph, rising to 55 mph as NC 54 continues to the project terminus in Carrboro. The existing development along the project consists mainly of light density residential and industrial uses.

Existing right-of-way is generally 120 feet throughout most of the project length, except for the section from I-40/85 to SR 2109, where only 100 feet was reserved. The existing alignment of NC 54 is generally good and built through rolling terrain. The maximum degree of curve is 6 degrees (maximum safe speed of 55 mph), and the maximum percent grade is 5%.

Four bridges are located on the project. They are as follows:

Bridge No.	Location	Clear Length (Ft.)	Width (Ft.)	Age (yrs.)	Rating (New=100)
17	Cane Creek	151	44.0	17	92.6
11	Haw River	316	44.0	62	85.6
34	Back Creek	172	44.0	17	96.6
70	Haw Creek	148	44.0	17	97.9

Bridge number 11, originally built in 1928, was reconstructed and widened in 1973. This improvement accounted for the high sufficiency rating.

Traffic Volumes, Capacity, and Accident Record

The volume of traffic that utilizes this route ranges from approximately 6,000 vehicles per day (vpd) near the Alamance-Orange County line, to 13,000 (vpd) near Burlington and also near Carrboro. These volumes are estimated to increase to 12,000 to 17,000 vpd by the year 2010.

The capacity of the existing road is approximately 5,000 vpd. The actual volumes presently using the facility (6,000 to 13,000 vpd) indicate that the capacity is exceeded along the entire studied route.

Accident data for a recent 3-year period shows a total of 282 accidents along the studied section. This yields a total accident rate of 118.1 accidents per hundred million vehicle miles (ACC/100MVM), which is less than the statewide average of 214.2 ACC/100MVM for comparable 2-lane rural NC routes. Rear-end slow or stop (23%), angle (17%), and left turn same road (15%) were predominant accident types.

Need for Project

The improvement of NC 54 from the Chapel Hill Bypass to Burlington is needed to provide adequate capacity for existing and future traffic volumes.

III. RECOMMENDATIONS AND COSTS

For purposes of recommendations and possible staging of construction, the project has been divided into 3 sections: A, B, and C (see Figures 2, 3, 4, and 5).

For Section A, from SR 2106 (south of the I-40/85 interchange) to SR 2138, it is recommended the existing roadway be widened to a 5-lane, 64-foot curb and gutter facility due to the concentration of existing roadside development and lower speeds. This would match the proposed cross section of the Y-line improvement for the I-303K

project. All widening can be accomplished symmetrically within the existing 100-foot right-of-way with possible construction easements required at certain locations. Bridges at Back Creek and at Haw Creek would require widening to accommodate the proposed cross section. It is recommended a new bridge be built to replace Bridge No. 11 at Haw River.

The recommended cross section for Section B, from SR 2138 to SR 1100, where the roadside is lightly developed, is a 4-lane divided section with two, 24-foot pavements and a 46-foot minimum median width on an estimated 200-foot right-of-way. Widening should be accomplished on the north side of the existing road. A new bridge would parallel the existing bridge at Cane Creek.

Section C extends from SR 1100 to the Chapel Hill Bypass project terminus. The recommended cross section is a 4-lane divided section with two, 24-foot pavements and a 46-foot minimum median width on an estimated 200- foot right-of-way, with all widening to be accomplished on the north side. The recommended 4-lane divided section should taper at the project terminus to match the proposed cross section for the Chapel Hill Bypass project (two, 24-foot pavements with curb and gutter, divided by a 21-foot raised median).

These recommendations are consistent with the anticipated traffic volumes, the development in the project area, and the function of the route.

The estimated costs of the recommended improvements are as follows (residential and business relocations are indicated in parentheses for Sections B and C):

	Length (miles)	Construction Cost	Right-of-Way Cost	Total Cost
Section A	4.0	$8,200,000	$ 700,000 (utilities only)	$ 8,900,000
Section B	8.0	$9,000,000	$ 9,500,000 (56 relocatees)	$18,500,000
Section C	8.0	$8,800,000	$12,000,000 (48 relocatees)	$20,800,000

The total cost of the proposed project (including all sections) is $48,200,000. Cost estimates were prepared by the Preliminary Estimate Engineer and the Right-of-Way Branch.

If staging of the total project length is desired for funding reasons, Section A should be the first stage, because no right-of-way costs would be incurred, it connects with an interstate highway, and it serves higher volumes of traffic. Section C should be the second stage, since it would tie into the planned NC 54 Chapel Hill Bypass widening project and also serves higher volumes of traffic. Section B is recommended to be the third stage since it carries the lowest volume of traffic.

IV. OTHER COMMENTS

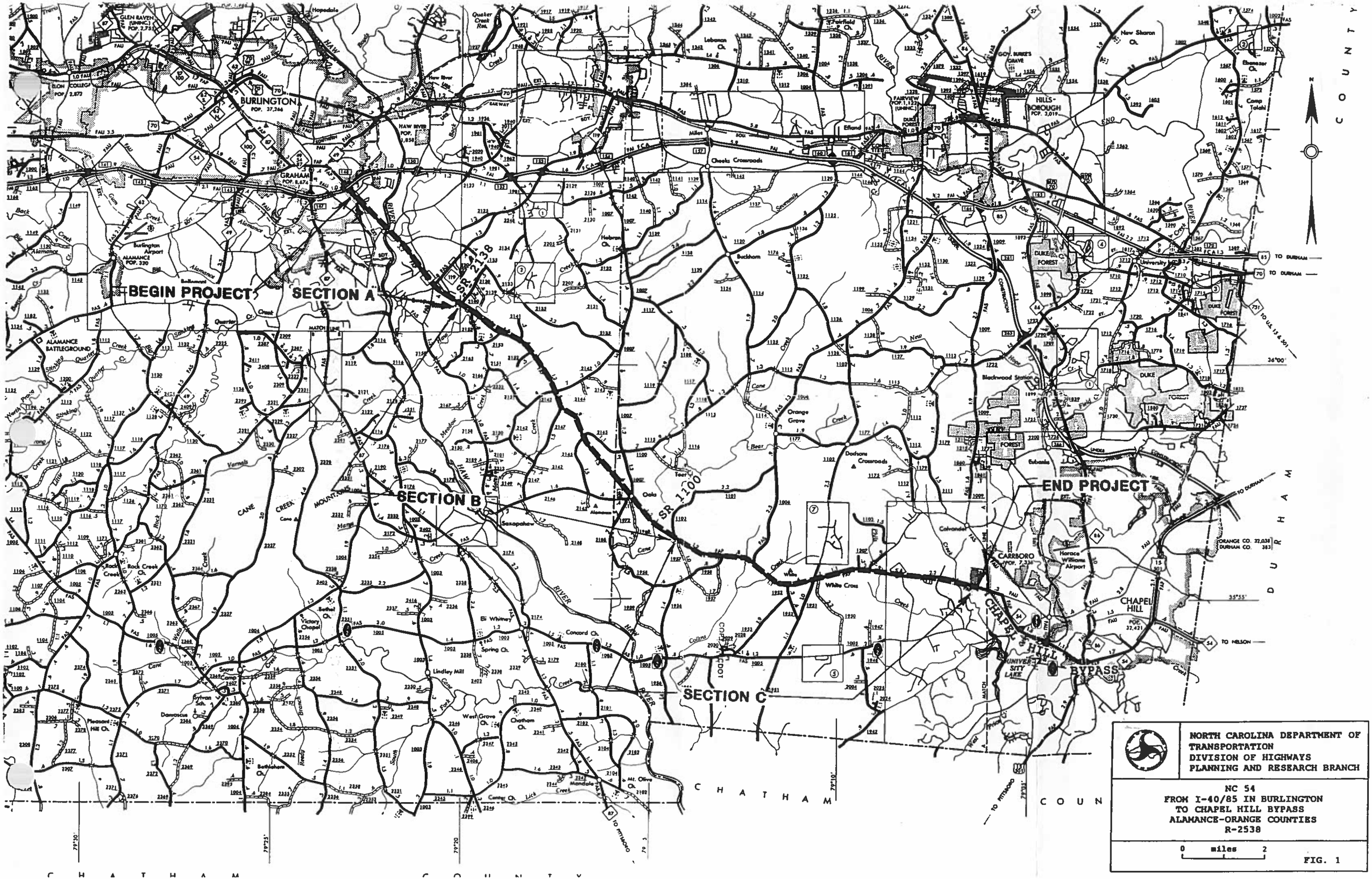
No other alternative locations for the proposed project were found to be more desirable or feasible from overall cost and traffic service considerations. The existing route has adequate alignment for high speed operation with limited roadside interference along most of the project length. Complete relocation of NC 54 was considered, but it is not recommended, because it would require considerably higher expenditure of funds for construction and would serve much less traffic.

Possible negative environmental impacts of the proposed widening of NC 54 are as follows: (1) loss of forested land; (2) relocation of approximately 96 residences and 8 businesses; (3) increased noise levels for adjacent development; and (4) possible impact to two watersheds in Orange County (Cane Creek and University Lake), shown in Figures 4 and 5.

The Nello-Teer Rock Quarry is located near the end of the proposed project, on the north side of NC 54 at SR 1104 (see Figure 5). The Quarry appears to have an adequate setback to allow the proposed improvement. The Carrboro Community Park is located at the end of the project, off of NC 54. Its boundary does not abut NC 54 and thus is not anticipated to present any problems.

If the project is to be implemented in the future, all feasible alternatives and their associated impacts will need to be evaluated in a planning and environmental document prior to that time, and a final decision made as to the most appropriate improvement.

AS/plr

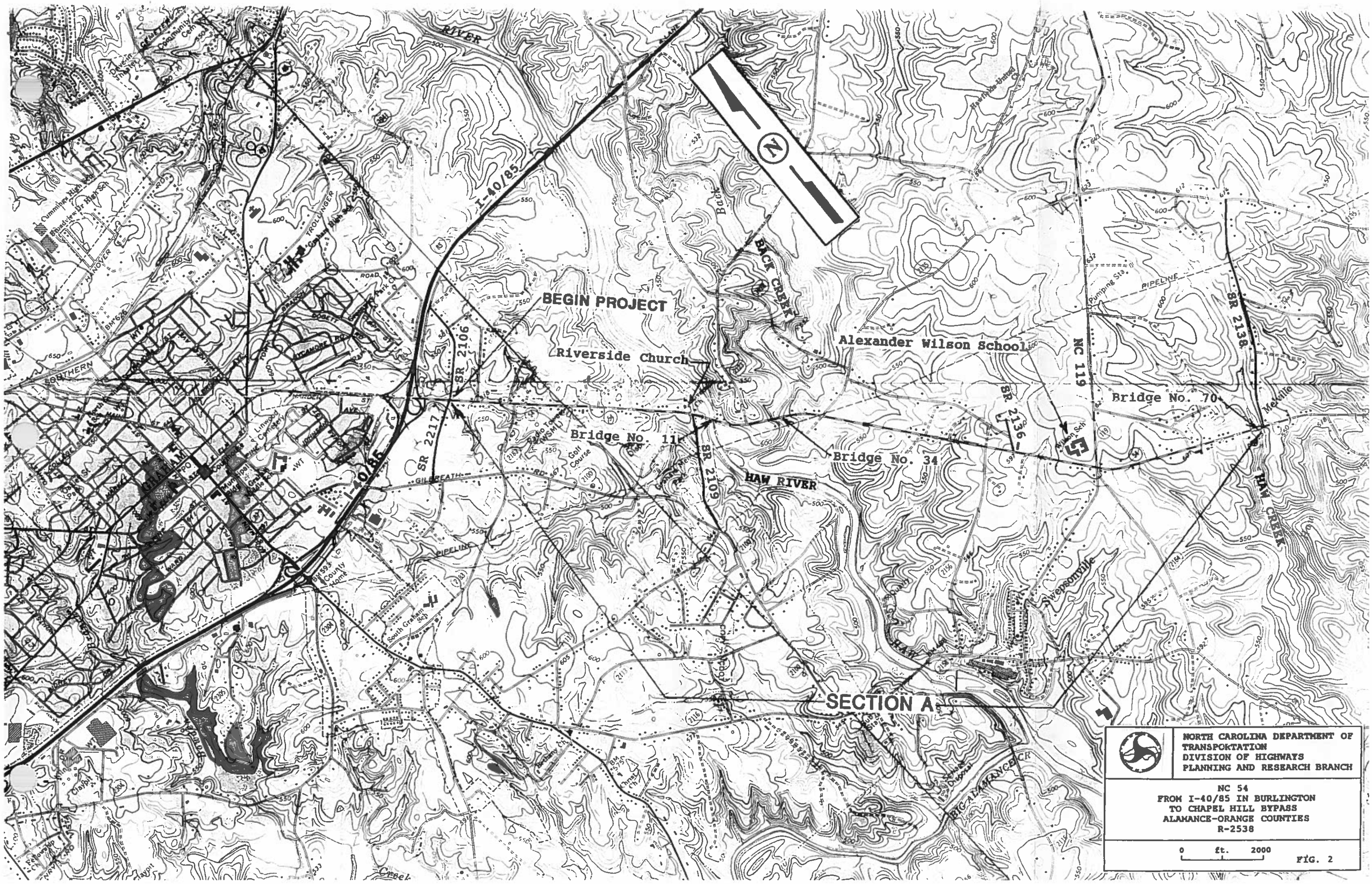


NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
PLANNING AND RESEARCH BRANCH

NC 54
FROM I-40/85 IN BURLINGTON
TO CHAPEL HILL BYPASS
ALAMANCE-ORANGE COUNTIES
R-2538

0 miles 2

FIG. 1

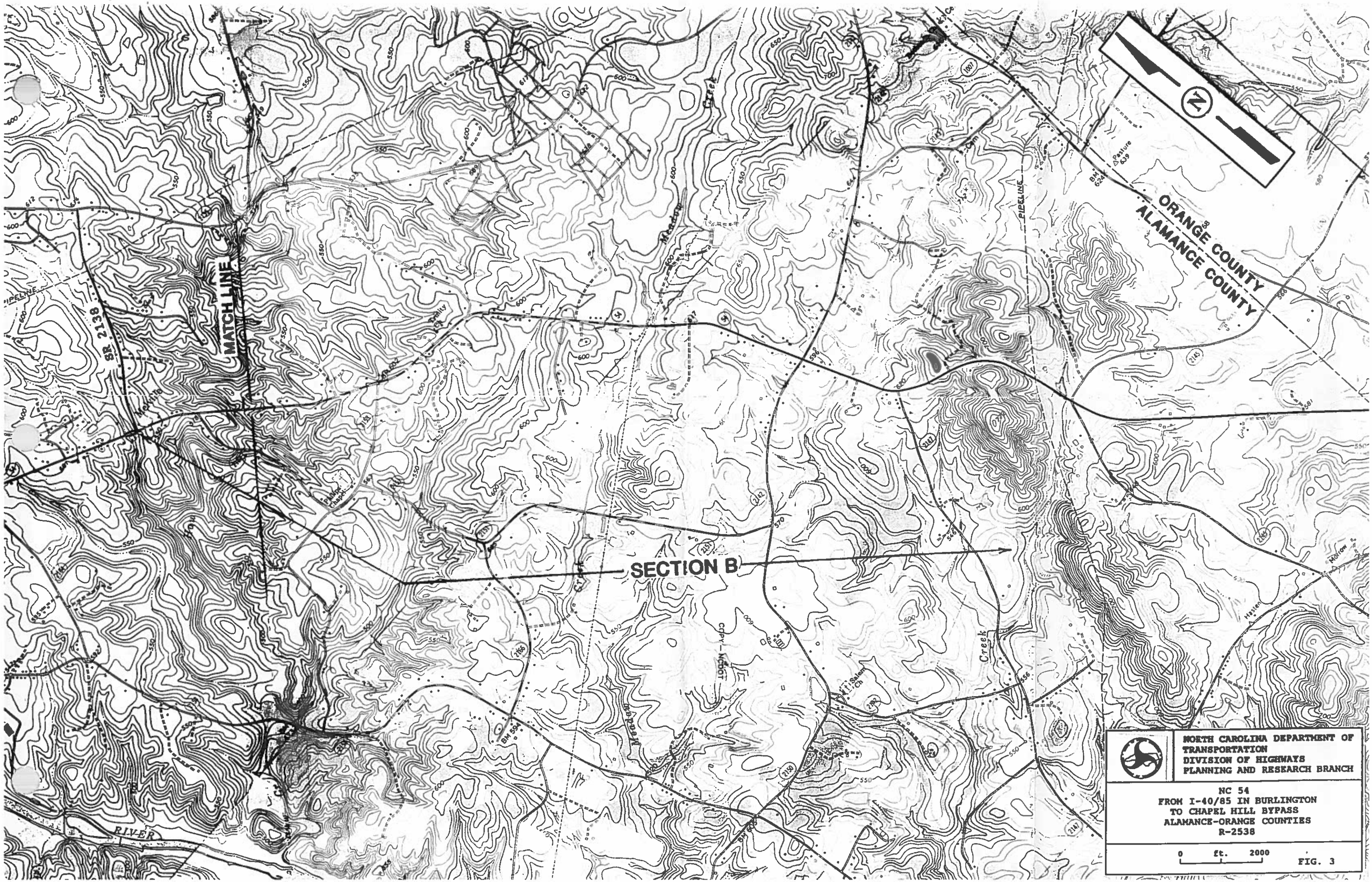


NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
PLANNING AND RESEARCH BRANCH

NC 54
FROM I-40/85 IN BURLINGTON
TO CHAPEL HILL BYPASS
ALAMANCE-ORANGE COUNTIES
R-2538

0 ft. 2000

FIG. 2

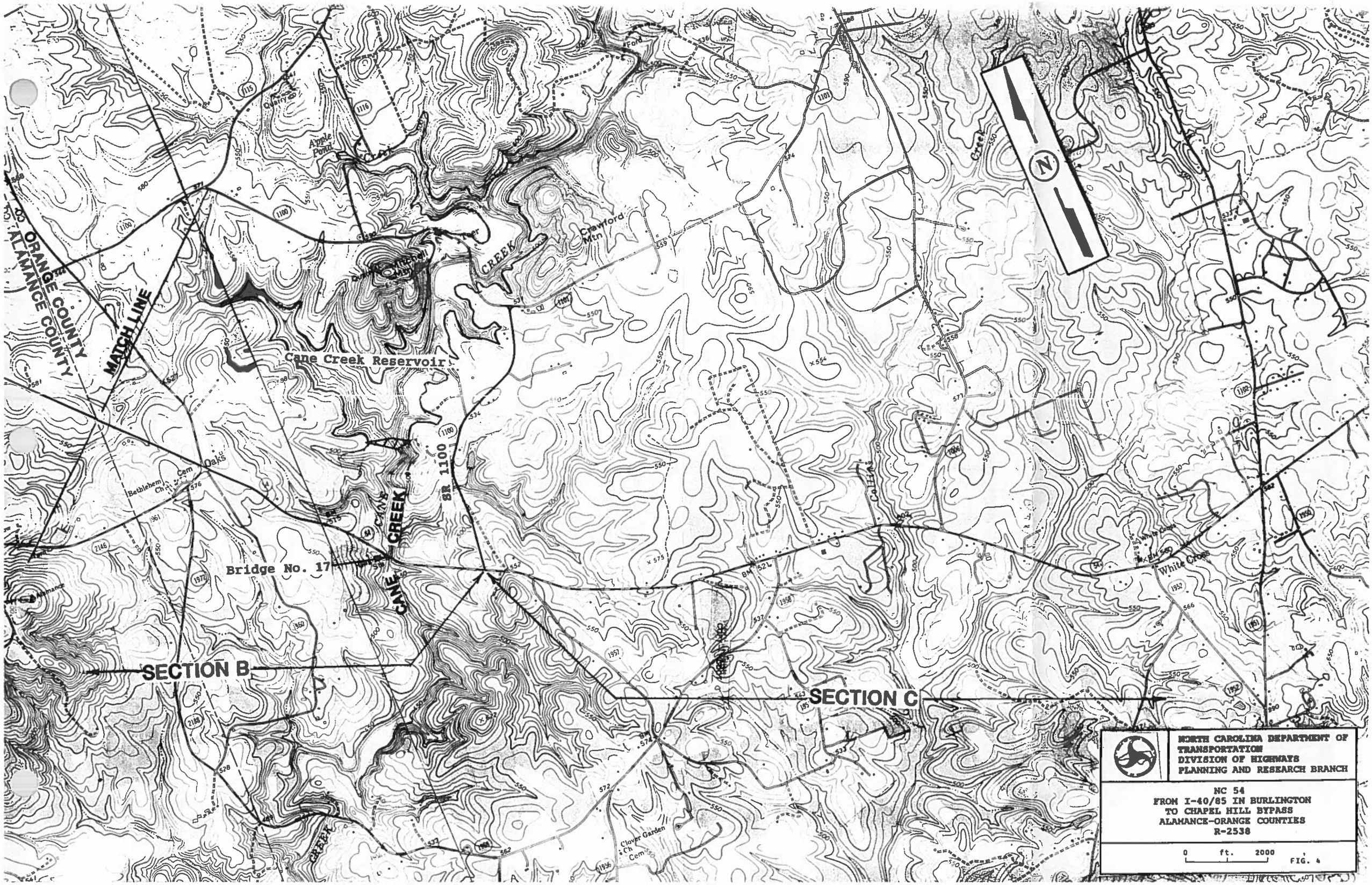


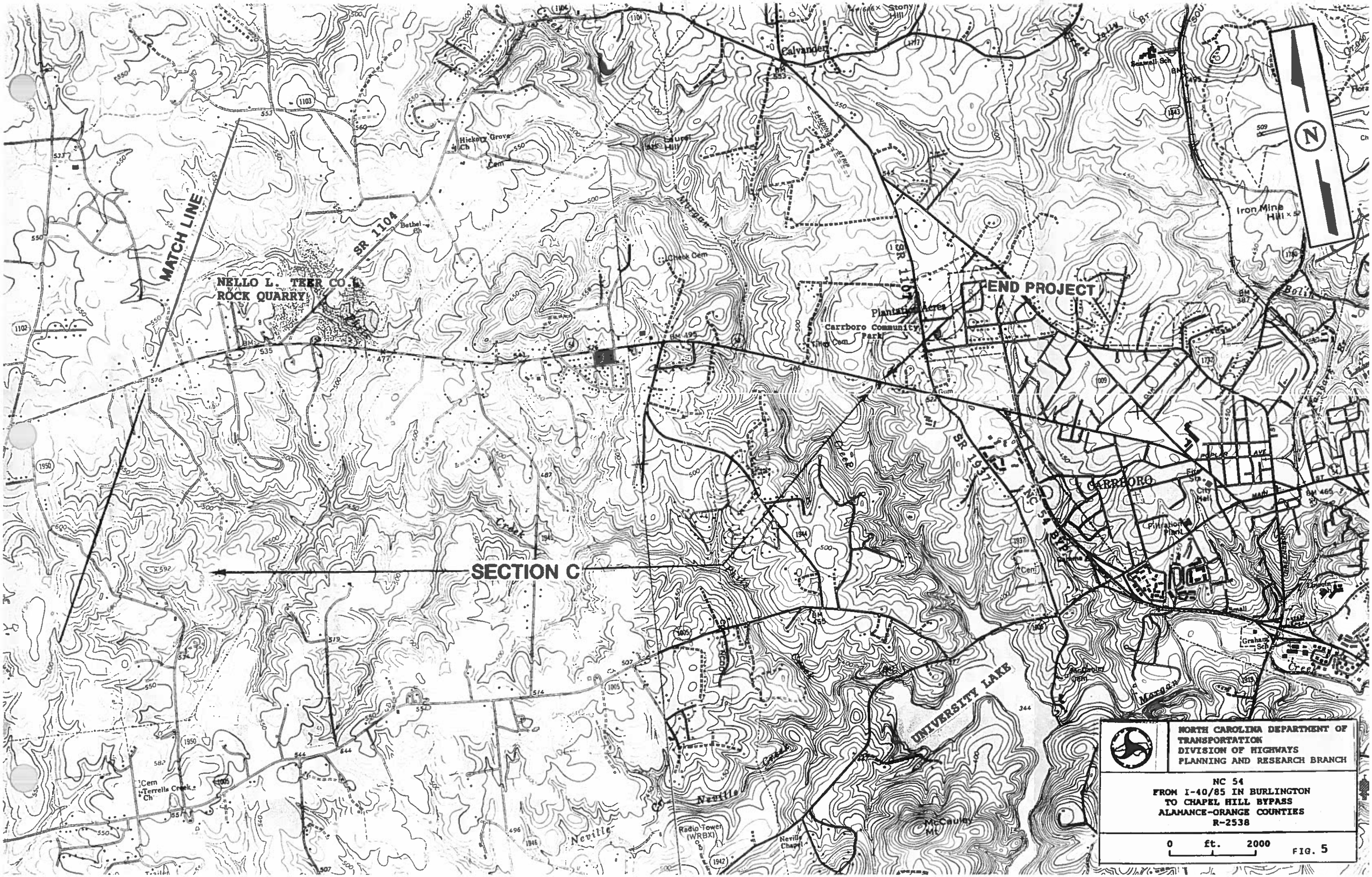
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
PLANNING AND RESEARCH BRANCH

NC 54
FROM I-40/85 IN BURLINGTON
TO CHAPEL HILL BYPASS
ALAMANCE-ORANGE COUNTIES
R-2538

0 ft. 2000

FIG. 3


ORANGE COUNTY
ALAMANCE COUNTY
MATCH LINE
Cane Creek Reservoir
Apple Pond
Quarry
Crawford Mtn
CREEK
SR 1100
CANE CREEK
Bridge No. 17
Oaks
Bethlehem Ch
Cem
Collins
White Cross
Clover Garden Ch
Cem
SECTION B
SECTION C
N
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
PLANNING AND RESEARCH BRANCH
NC 54
FROM I-40/85 IN BURLINGTON
TO CHAPEL HILL BYPASS
ALAMANCE-ORANGE COUNTIES
R-2538
0 ft. 2000
FIG. 4



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
PLANNING AND RESEARCH BRANCH

NC 54
FROM I-40/85 IN BURLINGTON
TO CHAPEL HILL BYPASS
ALAMANCE-ORANGE COUNTIES
R-2538

0 ft. 2000

FIG. 5