FEASIBILITY STUDY

Black Mountain

I-40 / Blue Ridge Road (SR 2500)
Convert the Existing Grade Separation into an Interchange

Buncombe County

Division 13

FS-0013A

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

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I. General Description

This feasibility study describes converting the existing I-40 / Blue Ridge Road (SR 2500) grade separation into an interchange. In order to minimize the impacts to the area, the recommended configuration is a partial cloverleaf interchange with ramps and loops in the northwest and southeast quadrants (See Figure 1). As part of this project, Blue Ridge Road (SR 2500) from US 70 to just south of the proposed interchange should be widened to a three-lane curb and gutter section, 40 feet (12.2 m) wide face to face of curbs, and include a new structure over the Swannanoa River. The existing two-lane shoulder section from the proposed interchange to SR 1713 also needs to be upgraded to include 12-foot (3.7-m) travel lanes and 4-foot (1.2-m) paved shoulders. The recommended right of way width for the Blue Ridge Road improvements is 100 feet (30.5 m).

It is anticipated that there will be 18 residences and 8 businesses relocated due to this project. The total cost of the project, including construction and right-of-way, is estimated to be $10,200,000.00.

Construction	$ 6,200,000
Right-of-way	$ 4,000,000
Total Cost	$ 10,200,000

This study is the initial step in the planning and design process for this project and is not the product of exhaustive environmental or design investigations. The purpose of this study is to describe the proposed project including costs, and to identify potential problems that may require consideration in the planning and design phases.

II. Need for Project

The purpose of this project is to provide an additional interchange on I-40 at Blue Ridge Road (SR 2500) in order to reduce the traffic congestion and truck volumes within the downtown area of Black Mountain. This interchange is also expected to improve the traffic safety and operations of the adjacent I-40 / NC 9 interchange. This project was requested by the Town of Black Mountain.

I-40 is designated as a freeway in the Black Mountain and Montreat Thoroughfare Plan and as an Interstate in the North Carolina Statewide Functional Classification System. US 70, NC 9 and Blue Ridge Road (SR 2500) are all designated as major thoroughfares in the Black Mountain and Montreat Thoroughfare Plan and as minor arterials in the North Carolina Statewide Functional Classification System.

Bridge No. 488 carries I-40 traffic over the Blue Ridge Road (SR 2500). This bridge is 132 feet (40.2 m) long with a deck width of 114.8 feet (35.0 m). Built in 1973, this bridge currently has a sufficiency rating of 92.6.

Bridge No. 41 carries Blue Ridge Road over the Swannanoa River. This bridge is 60 feet (18.3 m) long and has a deck width of 20 feet (6.1 m). Built in 1961, this bridge currently has a sufficiency rating of 76.7.

Bridge No. 492 carries I-40 traffic over NC 9. This bridge is 179 feet (54.6 m) long with a deck width of 120 feet (36.6 m). Built in 1977, this bridge currently has a sufficiency rating of 96.0.

Culvert No. 209 carries NC 9 over the Swannanoa River. This structure is a quadruple 15 feet (4.6 m) by 9 feet (2.7 m) box culvert, which is 146.5 feet (44.7 m) long. Built in 1977, this structure currently has a sufficiency rating of 81.6.

The Norfolk Southern Railroad operates a railway, which crosses Blue Ridge Road in the area of the US 70 intersection. This railway carries approximately 20 trains per day. Based on the Policy and Procedure Manual, the exposure index for this crossing will be 156,000. Given this information, it would be very desirable to provide a railroad grade separation at this location. However, a railway grade separation at this location is not considered practical because of its proximity to US 70. Therefore, we recommend that the existing railroad signal be upgraded to include four quadrant gates with the widening of Blue Ridge Road to a three-lane section.

The current year Average Daily Traffic (ADT), along this section of Blue Ridge Road, is estimated to be approximately 2,700 vehicles per day (vpd). The design year (2025) estimates are 4,500 vpd. With the proposed interchange in place, the current year Average Daily Traffic (ADT) projection increases to range between approximately 4,900 vpd to 6,100 vpd, while the 2025 design year ranges between 7,800 vpd and 9,900 vpd. Truck traffic is estimated to make up six percent of daily traffic.

With the proposed interchange, this section of Blue Ridge Road should operate at an acceptable "C" LOS or better in the 2025 design year. The I-40 / NC 9 interchange is approximately 1.21 miles (2.0 km) east of the existing Blue Ridge Road grade separation. Under the existing condition, we expect that this

interchange will operate at an "F" LOS in the 2025 design year. With the proposed new interchange at Blue Ridge Road, the existing NC 9 interchange is expected to operate at an improved "C" LOS in the 2025 design year without any improvements.

III. Discussion of Alternates / Recommendations

This feasibility study describes converting the existing I-40 / Blue Ridge Road (SR 2500) grade separation into an interchange. Providing an interchange at this location (See Figure 1) presents some unique challenges because the Douglas M. Brock Park is located in the northeast quadrant, while the Wolfpit Branch parallels Blue Ridge Road (SR 2500) to the west and the Swannanoa River parallels I-40 to the north. In addition, the vertical topography of the southwest quadrant includes a bluff with Wolfpit Branch at its base. In order to minimize the impacts on both the environment and community, the recommended configuration is a partial cloverleaf interchange with ramps and loops in the northwest and southeast quadrants. Bridge No. 488 will need to be widened to accommodate the deceleration lanes of the proposed interchange. In order to verify that the recommended interchange configuration is appropriate for the conditions, we recommend that alternative interchange configurations be studied during the later design and planning stages.

If the proposed interchange is constructed, Blue Ridge Road (SR 2500) should be widened to a three lane, curb and gutter section, 40 feet (12.2 m) wide from US 70 to just south of the proposed interchange and include the replacing Bridge No. 41 over the Swannanoa River. At the railroad at-grade crossing just south of US 70, the existing signal and gates should be upgraded when the proposed three lane widening is provided. The adjacent US 70 / SR 2500 traffic signal will also need to be upgraded, as a result of the proposed 3-lane widening and should include railroad preemption. In addition, the existing two-lane shoulder section from the proposed interchange to SR 1713 also needs to be upgraded to include 12-foot (3.7-m) travel lanes and 4-foot (1.2-m) paved shoulders. The recommended right of way width for the Blue Ridge Road improvements is 100 feet (30.5 m).

It is anticipated that there will be 18 residences and 8 businesses relocated due to this project. The total cost of the project, including construction and right-of-way, is estimated to be $10,200,000.00.

Construction	$ 6,200,000
Right-of-way	$ 4,000,000
Total Cost	$ 10,200,000

IV. Other Alternates Considered

Considering the close proximity of the adjacent NC 9 interchange (approximately 1.21 miles (2.0 km)), we also evaluated geometric improvements to this existing NC 9 interchange. Based on our analysis, the existing interchange can adequately accommodate the projected 2025 traffic volumes if the following improvements are provided. However, this alternate will not reduce the traffic congestion or truck volumes in the downtown area of Black Mountain.

1. Widen the eastbound I-40 off-ramp to provide dual left-turn lanes with an exclusive right-turn lane.
2. Widen NC 9 to provide an exclusive left-turn lane onto the eastbound on-ramp and dual left-turn lanes onto the westbound on ramp. The westbound on-ramp will require widening in order to receive the proposed dual left-turn lanes.
3. In order to accommodate the wider NC 9 cross section, Bridge No 492 caring I-40 over NC 9 will need to be replaced, and both NC 9 approaches would require widening to transition to the existing cross section. The widening of NC 9 north of the interchange will require the widening of Culvert No. 209 over the Swannanoa River.

Based on the available information, it appears that the existing right-of-way is sufficient to contain these recommended improvements. Therefore, we do not anticipate any relocates with this alternate. The construction cost of this alternate is estimated to be $6,500,000.

V. Additional Comments

An environmental screening was not conducted for this study. There are no properties on the National Register of Historic Places within the project area. However, impacts to wetlands are expected and a Corps of Engineers Section 404 Permit is anticipated.

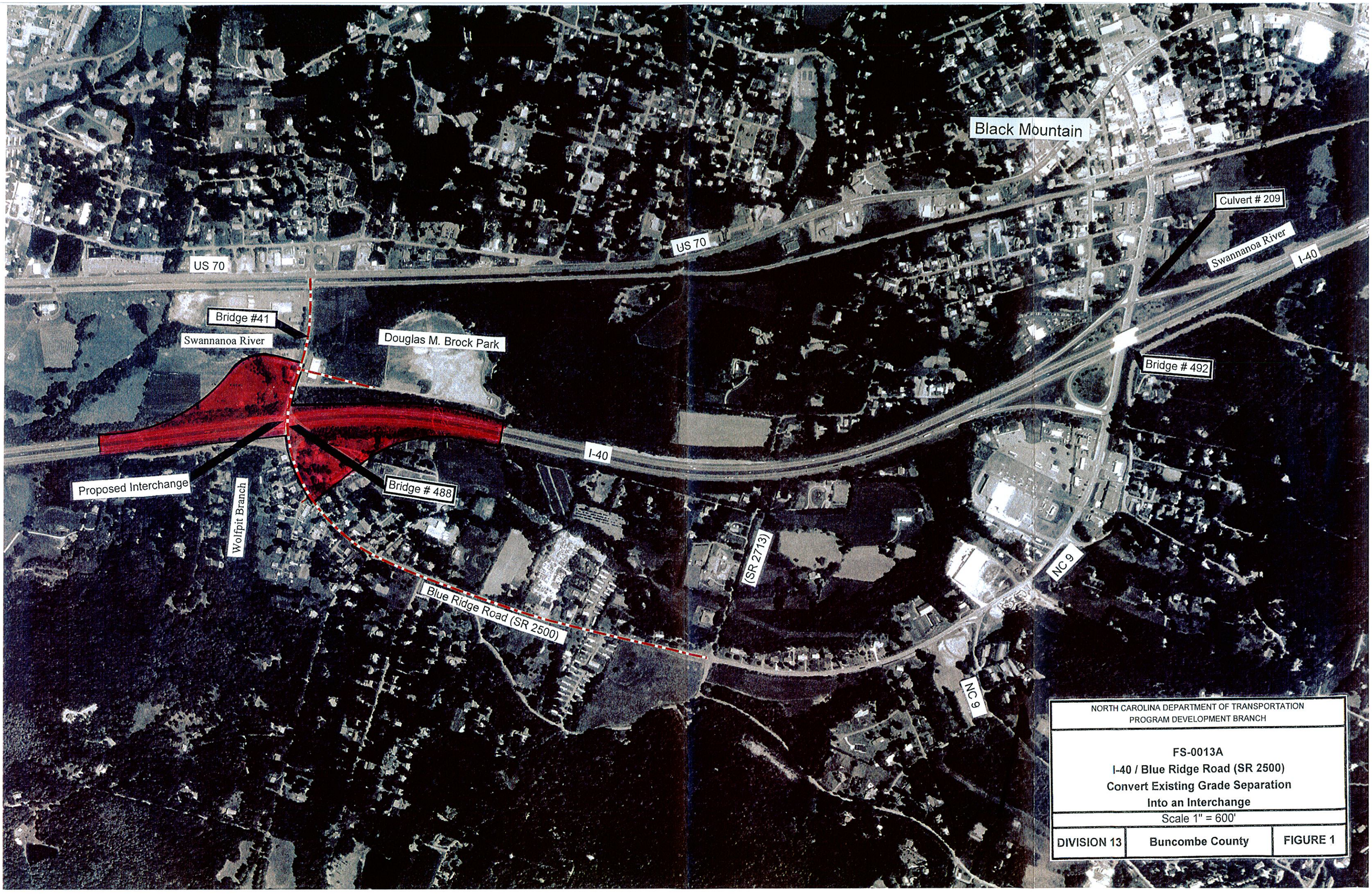
Based on maps at the Department of Environment, Health & Natural Resources - Natural Heritage Section, there has been a sighting of a rare animal within the proposed interchange area.

The Douglas M. Brock Park is located in the northeast quadrant of the proposed interchange and the current interchange configuration minimizes the impacts on this park.

No special accommodation for bicycles is recommended on this project.

The Swannanoa River in the project corridor is classified as a Class C trout stream and part of the French Broad River Basin. The Wolfpit Branch is classified as a Class B waterway and part of the French Broad River Basin.

A transportation benefit analysis was not completed for this project because the proposed improvements are beyond the capabilities of the benefit analysis package developed by the Statewide Planning Branch. An interchange justification study will be required during the later design and planning stages of this project in order to verify the anticipated benefits of this proposed interchange.



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
PROGRAM DEVELOPMENT BRANCH

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Scale 1" = 600'

DIVISION 13	Buncombe County	FIGURE 1