

FEASIBILITY STUDY

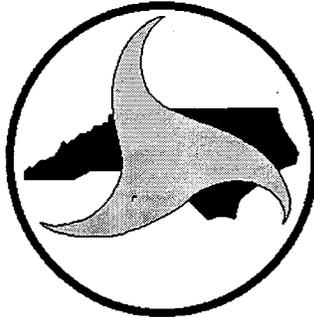
Winston-Salem

**Broad Street
From Wachovia Street to
Second Street**

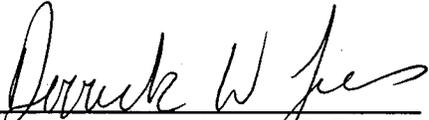
Forsyth County

Division 9

FS-9909D
U-4413



Prepared by the
Programming and TIP Branch
Division of Highways
N. C. Department of Transportation


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1/24/2000
Date

Winston Salem

Broad Street From Wachovia Street To Second Street

Forsyth County

FS-9909D

I. General Description

This feasibility study describes the widening of Broad Street in order to improve the approaches to the US 421 (I-40 Business) interchange (See Figure 1). In the Division Engineer's original feasibility study request, the scope of this project was to widen the bridge over US 421 and improve the Broad Street approaches from Wachovia Street to Brookstown Avenue. However, we do not expect the widening of Broad Street north of the interchange to transition back to the existing cross section until Second Street. It should also be noted that the City of Winston-Salem and Winston-Salem Forsyth Urban Area MPO have expressed concerns with the proposed widening south of the interchange.

Given these conditions, we developed two alternates for the widening of this section of Broad Street. Alternate 1 proposes to widen Broad Street from Wachovia Street to Second Street (See Figure 2). Alternate 2 proposes to widen Broad Street from Cotton Street to Second Street (See Figure 3) and minimize the widening south of the interchange. Regardless of the alternate, the proposed cross section between a five-lane curb and gutter section, 64 feet (19.5 m) wide face to face of curbs, and a six-lane divided section, 80 feet (24.4 m) wide face to face of curbs with a 4 foot raised median. The proposed right-of-way is 100 feet (30.5 m) wide and is asymmetrical to the west in the interchange area and symmetrical elsewhere.

In his original request, the Division Engineer indicated the need to widen the structure over US 421. Considering the tight horizontal and vertical clearances of the existing structure, it is recommended that this structure be replaced instead of widened. The proposed new structure is 81 feet (24.7 m) wide, rail to rail with sidewalks on both sides, and 200 feet (61 m) long. Both alternates below include the cost of this new structure.

Alternate 1
(Recommended)

Alternate 1 widens Broad Street from Wachovia Street to Second Street, a distance of 2300 feet (701 m). The geometric improvements recommended under this alternate are shown in Figure 2. This alternate is preferred from a traffic safety and operational perspective because of the additional weaving distance south of the interchange. It is anticipated that there will be ten residences and five businesses relocated due to this project. The total cost of this project, including construction and right-of-way, is estimated to be \$9,270,000.00.

Construction.....	\$ 4,450,000
Right-of-way.....	\$ 4,820,000
Total Cost	\$ 9,270,000

Alternate 2

Alternate 2 widens Broad Street from Cotton Street to Second Street, a distance of 1900 feet (579.1 m) in order to minimize the widening of Broad Street south of the interchange. This alternate was developed because of the City of Winston-Salem and Winston-Salem Forsyth Urban Area MPO concerns with any widening south of US 421. The geometric improvements included in this alternate are shown in Figure 3. It is anticipated that there will be three residences and five businesses relocated due to this project. The total cost of this project, including construction and right-of-way, is estimated to be \$8,020,000.00.

Construction.....	\$ 4,100,000
Right-of-way.....	\$ 3,920,000
Total Cost	\$ 8,020,000

As currently proposed, Alternate 1 provides approximately 700 feet (213.4 m) for southbound Broad Street traffic to weave before the outside lane drops at Wachovia Street. On the other hand, Alternate 2 only provides 300 feet (91.4 m) for traffic to weave before the outside lane drops onto Cotton Street. From a traffic operational and safety perspective, it is our recommendation that Alternate 1 be implemented under this project.

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 feasibility study is to improve the Broad Street approaches to the US 421 (I-40 Business) interchange. This feasibility study was requested by the Division Engineer in coordination with Mrs Margaret Klutz and Mr. Dalton D. Ruffin, Members of the Board of Transportation. The City of Winston-Salem and Winston-Salem Forsyth Urban Area MPO support this project but they have concerns over the widening south of US 421.

I-40 Business is designated as a freeway/expressway in the Winston-Salem Thoroughfare Plan and as a freeway/expressway in the North Carolina Statewide Functional Classification System.

Broad Street is an existing four-lane undivided curb and gutter facility within and north of the US 421 interchange. In addition, Broad Street quickly transitions to a two-lane curb and gutter facility south of the interchange by dropping the inside through lane as a left turn lane onto the US 421 eastbound ramp. It should be noted that the intersection spacing along Broad Street is less than desirable. For example, the Broad Street / First Street / Shallowford Street intersection is an existing five leg intersection approximately 300 feet (91.4 m) north of the westbound ramp terminal. In all the closely spaced intersections and existing geometry along this section of Broad Street form a very complex traffic condition. The Winston-Salem central business district is along the north side of I-40 Business in the project area.

Currently, there is one existing structure (Bridge Number 178) within the project limits. This structure currently carries Broad Street over US 421 (I-40 Business). Bridge Number 178 has a sufficiency rating of 57.9 out of 100. The existing bridge is approximately 152 feet (43.3 m) long with a deck width of 70.5 feet (21.5 m). The four-lane bridge roadway width is approximately 52 feet (15.8 m). The minimum vertical clearance for US 421 (I-40 Business) at this bridge is 14.8 feet (4.5 m).

TIP Project U-2827 will rehabilitate the pavement and provide safety improvements to I-40 Business within the project area. It is currently scheduled for right-of-way acquisition in October of 1999, and for construction in October of 2000.

The estimated 2000 Average Daily Traffic (ADT) along this section of Broad Street ranges between 13,600 vehicles per day (vpd) to the north of the interchange and 8,800 vpd to the south of the interchange. For the design year 2025, the estimated traffic volumes on Broad Street north of the interchange is 17,300 vpd while an estimated 11,800 vpd is utilizing Broad Street to the south of the interchange. The estimated truck percentage on this section of Broad Street is four percent of daily traffic.

If no improvements are provided, this section of Broad Street operates at a Level of Service (LOS) C for the current year and a LOS E in the 2025 design year. With the proposed widening, this section of Broad Street is expected to function with a LOS C in the current and LOS D in the 2025 design years.

During the three-year period from September 1995 through August 1998, there were 98 accidents reported on this section of Broad Street between Wachovia Street and Brookstown Avenue. There were 73 injuries reported as a result of these accidents, but no fatalities. The accident rate along this section of Broad Street is 1291 accidents per 100 million vehicle miles (acc/100mvm). This compares with the 1995 to 1997 statewide rate of 307 acc/100mvm for Urban Primary Routes.

III. Recommendations / Description of Project

This feasibility study describes the widening of Broad Street in order to improve the approaches to the US 421 (I-40 Business) interchange (See Figure 1). In the Division Engineer's original feasibility study request, the scope of this project was to widen the bridge over US 421 and improve the Broad Street approaches from Wachovia Street to Brookstown Avenue. However, we do not expect the widening of Broad Street north of the interchange to transition back to the existing cross section until Second Street. It should also be noted that the City of Winston-Salem and Winston-Salem Forsyth Urban Area MPO have expressed concerns with the proposed widening south of the interchange.

Given these conditions, we developed two alternates for the widening of this section of Broad Street. Alternate 1 proposes to widen Broad Street from Wachovia Street to Second Street (See Figure 2). In order to minimize the widening south of the interchange, Alternate 2 proposes to widen Broad Street from Cotton Street to Second Street (See Figure 3). Regardless of the alternate, the proposed cross section varies between a five-lane curb and gutter section, 64 feet (19.5 m) wide face to face of curbs, and a six-lane divided section, 80 feet (24.4 m) wide face to face of curbs with a 4 foot raised median. The proposed right-of-way is 100 feet (30.5 m) wide and is asymmetrical to the west in the interchange area and symmetrical elsewhere.

The Division Engineer also requested that the structure over US 421 be widened. Considering the tight horizontal and vertical clearances of the existing structure, it is recommended that this structure be replaced instead of widened. The proposed new structure is 81 feet (24.7 m) wide, rail to rail, with sidewalks on both sides and 200 feet (61.0 m) long. Both alternates below include the cost of this new structure. This new structure should be raised to provide additional vertical clearance on US 421.

The Broad Street/1st Street/Shallowford Street intersection is an existing five-leg intersection. This project proposes to remove the Shallowford Street

approach of this intersection in order to improve this situation. In addition, side by side left turn lanes between 1st Street and the US 421 westbound ramp terminal will be required to adequately accommodate the expected left turning queues within this area.

Alternate 1
(Recommended)

Alternate 1 widens Broad Street from Wachovia Street to Second Street, a distance of 2300 feet (701 m). The geometric improvements recommended under this alternate are shown in Figure 2. This alternate is preferred from a traffic safety and operational perspective because the additional weaving distance south of the interchange. It is anticipated that there will be ten residences and five businesses relocated due to this project. The total cost of this project, including construction and right-of-way, is estimated to be \$9,270,000.00.

Construction.....	\$ 4,450,000
Right-of-way.....	\$ 4,820,000
Total Cost	\$ 9,270,000

Alternate 2

Alternate 2 widens Broad Street from Cotton Street to Second Street, a distance of 1900 feet (579.1 m) in order to minimize the widening of Broad Street south of the interchange. This alternate was developed because of the City of Winston-Salem and Winston-Salem Forsyth Urban Area MPO concerns with any widening south of US 421. The geometric improvements included in this alternate are shown in Figure 3. It is anticipated that there will be three residences and five businesses relocated due to this project. The total cost of this project, including construction and right-of-way, is estimated to be \$8,020,000.00.

Construction.....	\$ 4,100,000
Right-of-way.....	\$ 3,920,000
Total Cost	\$ 8,020,000

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. As it currently exists, this section of Broad Street is a four lane undivided facility with closely spaced intersections and no turn laneage at the interchange ramp terminals. The proposed improvements are expected to provide traffic safety and operational benefits to Broad Street by providing auxiliary turn laneage and minimizing the impacts of the poor intersection spacing.

IV. Additional Alternates Considered

The NCDOT Division of Bicycle and Pedestrian Transportation has indicated that no special bicycle accommodations are required under this project. However, the City of Winston-Salem and Winston-Salem Forsyth Urban Area MPO has requested that bicycle accommodations be provided. Therefore, we studied the two alternates for this project with wide outside lanes to accommodate bicycles. The cost estimates for these alternates are provided below.

Alternate 1A

For Alternate 1A, it is anticipated that there will be ten residences and six businesses relocated due to this project. The total cost of this project, including construction and right-of-way, is estimated to be \$12,600,000.00.

Construction.....	\$ 4,600,000
Right-of-way.....	<u>\$ 8,000,000</u>
Total Cost	\$ 12,600,000

Alternate 2A

For Alternate 2A, it is anticipated that there will be three residences and six businesses relocated due to this project. The total cost of this project, including construction and right-of-way, is estimated to be \$11,360,000.00.

Construction.....	\$ 4,250,000
Right-of-way.....	<u>\$ 7,110,000</u>
Total Cost	\$ 11,360,000

V. Additional Comments

An environmental screening was not conducted for this study. However, no impacts to historic properties or wetlands are anticipated.

Based on maps at the Department of Environment, Health & Natural Resources - Natural Heritage Section, no threatened or endangered species were identified in the project corridor.

BROAD STREET

SECOND STREET

PETERS CREEK PARKWAY

FIRST STREET

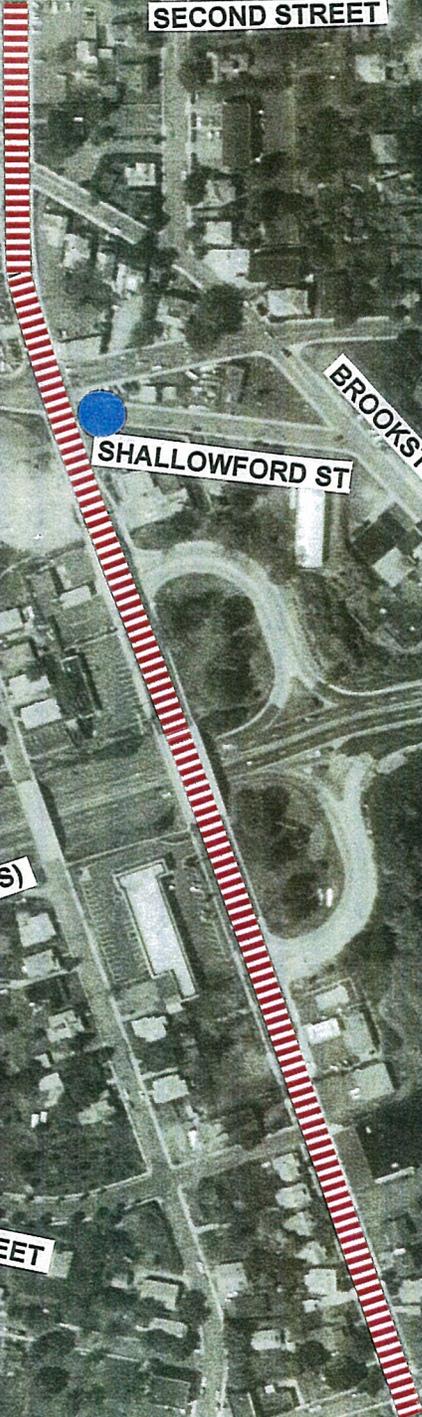
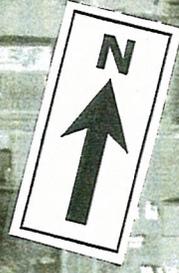
BROOKSTOWN AVENUE

SHALLOWFORD ST

US 421 (I-40 BUSINESS)

COTTON STREET

WACHOVIA STREET



North Carolina Department of Transportation
Program Development Branch

FS-9909D

Broad Street
From Wachovia Avenue
To Second Street
Forsyth County

Div 9

Scale 1"=300'

Figure 1

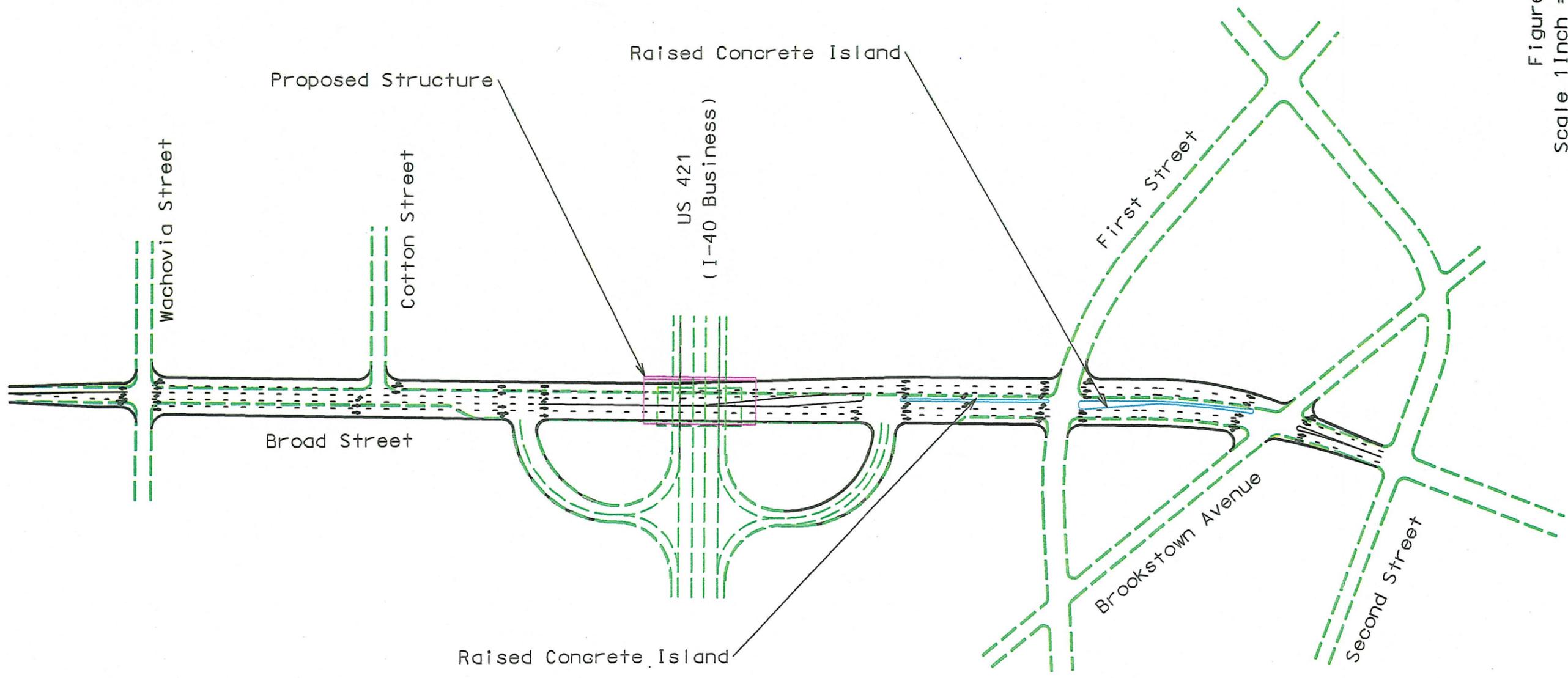
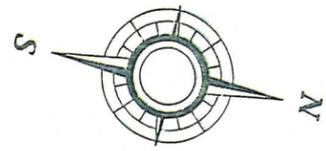


Figure 2
Scale 1 Inch = 200 feet

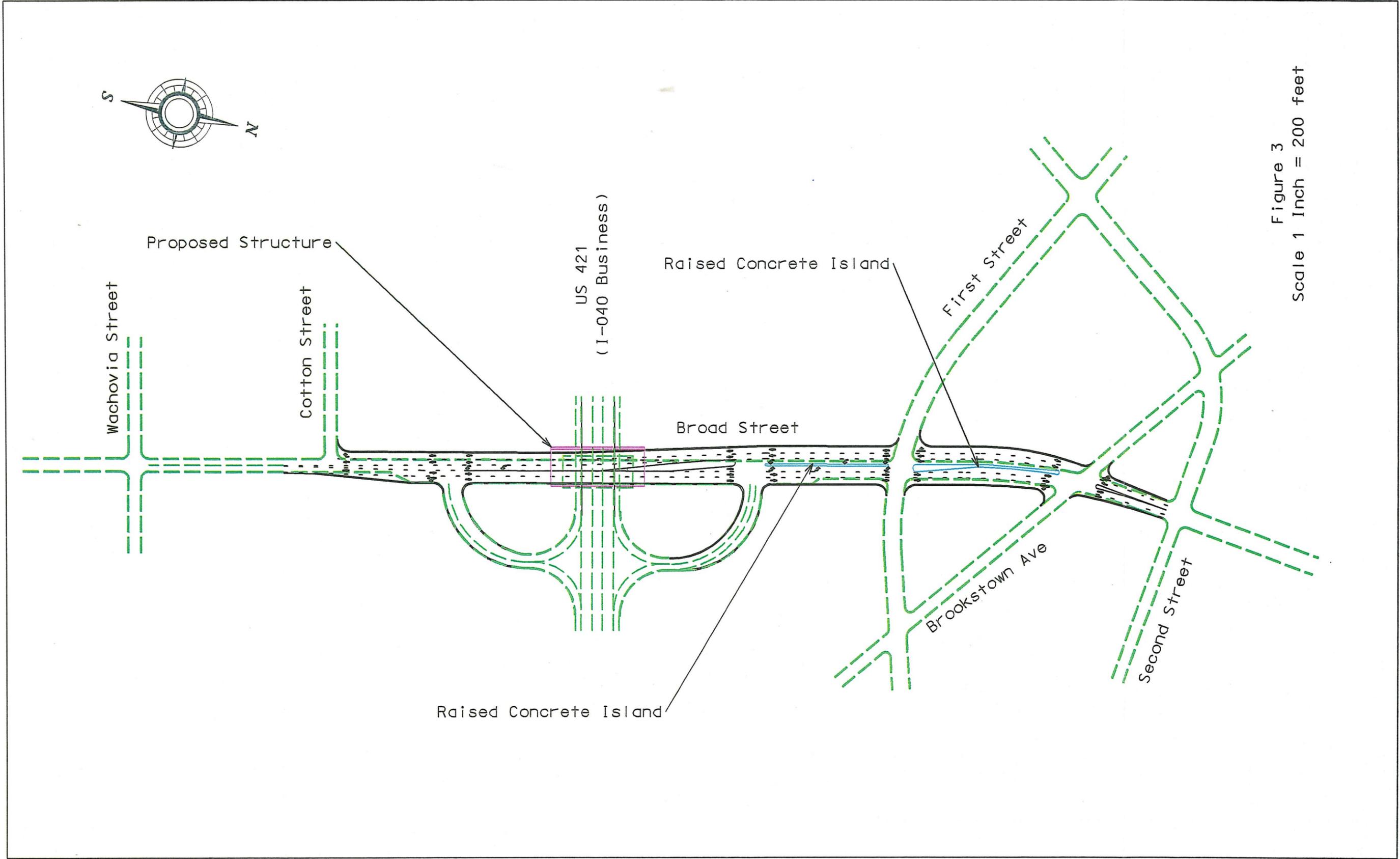


Figure 3
Scale 1 Inch = 200 feet