

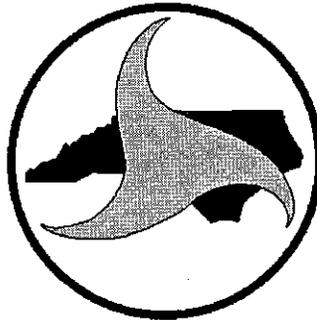
**FEASIBILITY STUDY**

**Cornelius**

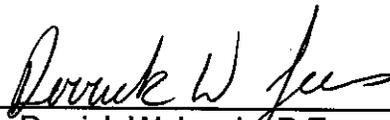
**US 21 / Catawba Avenue / Holiday Lane Intersection  
Mecklenburg County**

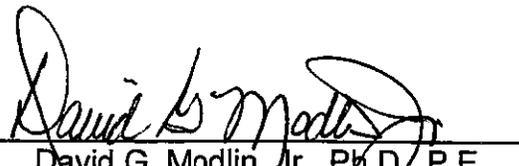
**Division 10**

**FS-9910A**



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

  
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5/7/99  
Date

Cornelius  
US 21 / Catawba Avenue / Holiday Lane Intersection

Mecklenburg County

FS-9910A

**I. General Description**

This feasibility study describes traffic operational and safety improvements to the US 21 / Catawba Avenue / Holiday Lane intersection in Cornelius. The project location is shown on Figure 1. The existing US 21 / Catawba Avenue / Holiday Lane intersection geometry is shown on Figure 2, while the recommended intersection geometry is indicated on Figure 3. It is expected that the recommended improvements to this intersection will impact approximately 750 feet (228.7 m) of Catawba Avenue east of the intersection. It is also estimated that approximately 800 feet (243.9 m) of US 21 south of the intersection will be impacted, while 350 feet (106.7 m) of Catawba Avenue west of the intersection is impacted. It is anticipated that there will be nine residences and no businesses relocated with this project. All the relocations are a result of the 100 feet (30.5 m) of right-of-way estimated on Catawba Avenue east of the intersection. However, no residential or business relocations are anticipated on the other three approaches to this intersection. The total cost of the project, including construction and right-of-way, is estimated to be \$2,700,000.00.

Construction.....	\$ 1,050,000
Right-of-way.....	\$ 1,650,000
Total Cost .....	\$ 2,700,000

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 address traffic safety and operational concerns at the US 21 / Catawba Avenue / Holiday Drive intersection. One of the main concerns with this intersection is the confusion associated with dropping Catawba Avenue's inside eastbound through lane as a left-turn lane at this intersection. The Town of Cornelius has requested this project.

Catawba Avenue (SR 2697) is designated as a major thoroughfare in the Mecklenburg-Union County Thoroughfare Plan and as a principal arterial in the North Carolina Statewide Functional Classification System. US 21 is designated as a minor thoroughfare in the Mecklenburg-Union County Thoroughfare Plan and as a major collector in the North Carolina Statewide Functional Classification System.

The existing intersection geometry is shown in Figure 2. Currently, Catawba Avenue is a four-lane divided shoulder section, with a raised concrete median, on the west side of the US 21 intersection. This section of Catawba Avenue varies from 64 feet (19.5 m) to 74 feet (22.6 m) wide, with 4-foot (1.2-m) paved shoulders. Catawba Avenue transitions to a two-lane shoulder section, approximately 24 feet (7.3 m) wide on the east side of the intersection. This is accomplished by dropping the eastbound inside through lane as a left-turn lane onto Holiday Lane. The westbound Catawba Avenue approach widens at the intersection to provide one left-turn lane and one shared through-right lane. US 21 northbound is a two-lane, 24-foot (7.3-m) wide, shoulder section which widens at the intersection to provide an exclusive left-turn lane and a shared through-right lane. The southbound approach (Holiday Lane) is a 50-foot (15.2-m) wide curb-and-gutter section, which provides an exclusive left and shared through-right lane. The development is residential in the southeast and northeast quadrants and commercial in the two remaining quadrants. It should be noted that the northeast quadrant has some commercial development on the corner of this intersection.

There is an existing traffic signal at the US 21 / Catawba Avenue / Holiday Lane intersection. In addition, there are existing traffic signals at both I-77 / Catawba Avenue ramp terminal intersections as well as the Catawba Avenue / Torrence Chapel Road / Liverpool Parkway intersection.

Catawba Avenue and US 21 do not coincide with any bicycle TIP request, nor are they designated bicycle routes.

The 1998 Average Daily Traffic (ADT) along Catawba Avenue varies from 16,200 to 22,200 vehicles per day (vpd). For the design year 2025, the estimated traffic volumes on Catawba Avenue range between 22,500 and 33,400 vpd. The 1998 ADT for the northbound US 21 approach to this intersection is 10,700 vpd, while the estimated 2025 design year traffic volume is 19,500 vpd. The 1998 ADT for the southbound Holiday Lane approach is 2,500 vpd while the estimated 2025 design year traffic volume is 3,800 vpd. Truck traffic is estimated to make up six percent of daily traffic on the Catawba Avenue and US 21 approaches. Truck traffic for the southbound Holiday Lane approach is estimated to make up three percent of the daily traffic volume.

Currently, the Catawba Avenue / US 21 / Holiday Lane intersection is operating at Level of Service (LOS) F. If no improvements are made, it is

projected that the intersection will continue to operate at LOS F in the design year 2025. If the proposed intersection improvements (See Figure 3) are provided, this intersection should operate at LOS C with existing traffic and at LOS F in the design year 2025. It should be noted that the poor traffic operations of the adjacent signalized intersections will adversely impact this intersection. In fact, the poor traffic operations along this section of Catawba Avenue are primarily a result of the adjacent I-77 interchange and poor intersection spacing within this area. Before an acceptable LOS can be achieved, this area will require major geometric improvements, which include, but are not limited to, reconstructing the adjacent I-77 / Catawba Avenue interchange and providing additional through capacity on Catawba Avenue and US 21. These improvements are well beyond the scope of this study.

During the three-year period from March 1995 through February 1998, there were 183 accidents reported on Catawba Avenue between the Torrence Chapel Road / Liverpool Parkway intersection and the US 21 intersection. There were 64 injuries reported as a result of these accidents, but no fatalities. The accident rate along this section of Catawba Avenue is 1705 accidents per 100 million vehicle miles (acc/100mvm). This compares with the 1995-1997 statewide rate of 278 acc/100mvm for Urban Primary Routes. It should be noted that 31 of these accidents are at or near the US 21 / Catawba Avenue / Holiday Lane intersection. In addition, these accidents accounted for 14 of the 64 injuries reported along this section of Catawba Avenue.

### III. Recommendations / Description of Project

It is recommended to provide traffic operational and safety improvements to the US 21 / Catawba Avenue / Holiday Lane intersection in Cornelius. The recommended intersection geometry is shown on Figure 3. Detailed descriptions of the recommended improvements to each approach are provided below. It is anticipated that there will be nine residences and no businesses relocated due to this project. All the relocations are a result of the 100 feet (30.5 m) of right-of-way estimated on Catawba Avenue east of the intersection. The total cost of the recommended intersection improvements, including construction and right-of-way, is estimated to be \$2,700,000.00.

Construction.....	\$	1,050,000
Right-of-way.....	\$	1,650,000
Total Cost .....	\$	<u>2,700,000</u>

#### Eastbound Catawba Avenue Approach

The eastbound Catawba Avenue approach should be widened to provide an exclusive left turn lane, one through lane, and one right-turn lane. The existing raised concrete median on Catawba Avenue needs to be modified to provide the storage bay for the left-turn lane, while the eastbound outside lane is dropped as the right-turn lane onto US 21. Because of the shifting laneage

within this approach, approximately 500 feet (152.4 m) of Catawba Avenue east of US 21 will need to be widened in order to receive the eastbound through lane. It is anticipated that there will be three residences and no businesses relocated due to these improvements. These relocations are a result of the estimated 100 feet (30.5 m) of right of way on Catawba Avenue east of the intersection. The total cost of these improvements, including construction and right-of-way, is estimated to be \$1,025,000.00.

Construction.....	\$	450,000
Right-of-way.....	\$	575,000
Total Cost .....	\$	<u>1,025,000</u>

**Westbound Catawba Avenue Approach**

The westbound Catawba Avenue approach should be widened to provide one left-turn lane, one through lane, and one shared through-right lane. In addition, a raised concrete island is recommended on this Catawba Avenue approach in order to protect the proposed left turn lane and minimize the conflicts with driveway traffic within the intersection area. An additional 250 feet (76.2 m) of Catawba Avenue beyond the previously indicated 500 feet (152.4) will be impacted to provide these improvements. For the additional 250 feet (76.2 m) of length needed along Catawba Avenue east of the intersection, it is anticipated that there will be six additional residences and no businesses relocated because of the estimated 100 feet (30.5 m) of right-of-way. The additional cost of these improvements, including construction and right-of-way, is estimated to be \$1,175,000.00.

Construction.....	\$	200,000
Right-of-way.....	\$	975,000
Total Cost .....	\$	<u>1,175,000</u>

**Northbound US 21 Approach**

On the northbound US 21 approach, the existing exclusive left-turn lane and shared through-right lane should be extended in order to improve the available left-turn lane storage length. In addition, the existing raised concrete island on this approach needs to be extended in order to protect the left-turn lane and minimize the conflicts with driveway traffic within the intersection area. Approximately 800 feet (243.9 m) of northbound US 21 will be impacted by these improvements. It is anticipated that there will be no residence or business relocations due to these improvements to the northbound US 21 approach. The total cost of the project, including construction and right-of-way, is estimated to be \$500,000.

Construction.....	\$	400,000
Right-of-way.....	\$	100,000
Total Cost .....	\$	<u>500,000</u>

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 intersection is only a small part of the traffic operational and safety problems within this area. However, some of the existing geometric deficiencies at this intersection conflict with driver expectations, resulting in poor traffic operations and an increased risk of traffic accidents. Therefore, spot improvements to this intersection should provide positive benefits to the entire area.

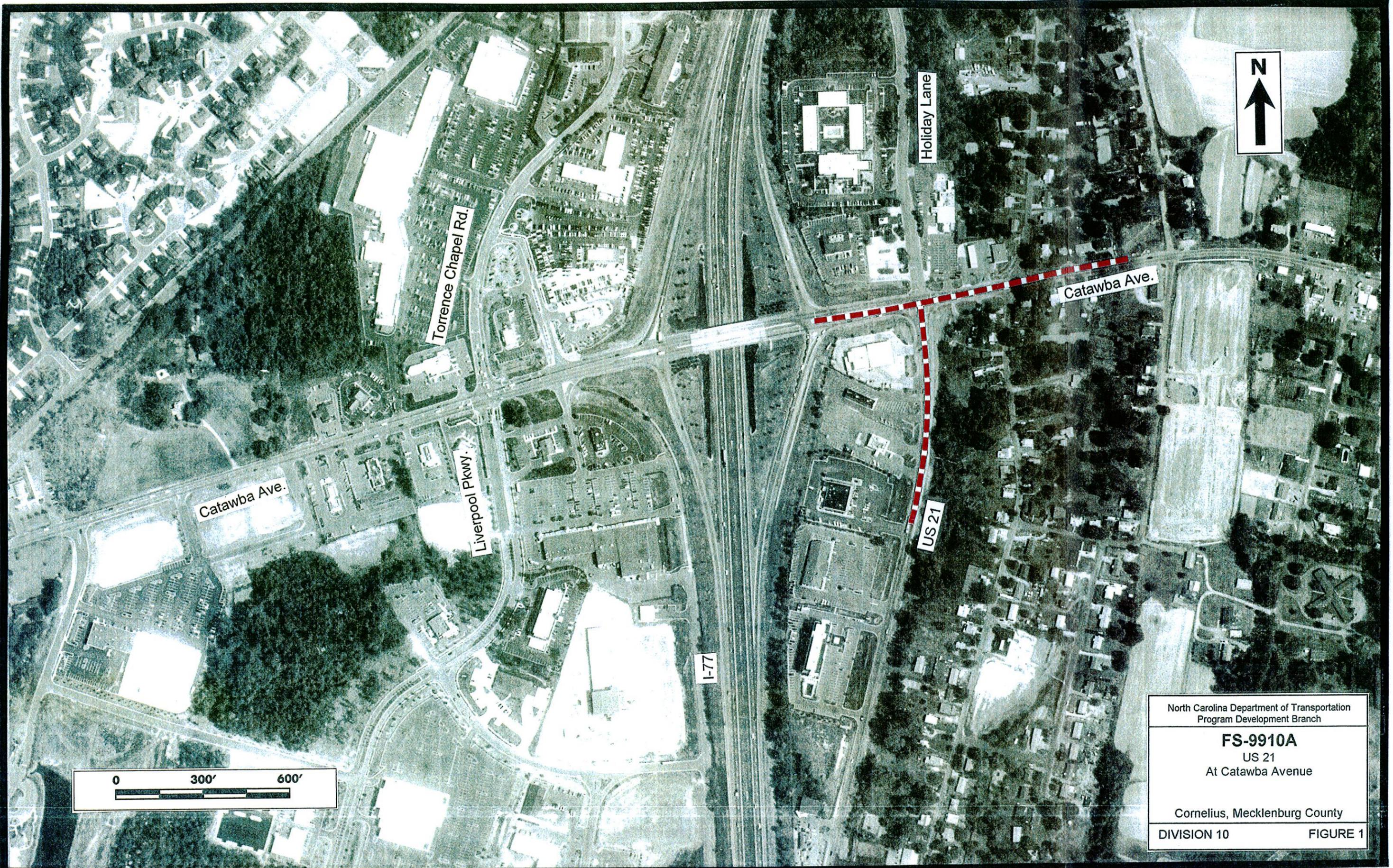
#### **IV. Other Alternates Considered**

During the initial stages of this study, dual left-turn lanes were considered on northbound US 21 at the Catawba Avenue intersection. However, this improvement was not studied in great detail because of the poor intersection spacing between the I-77 northbound ramp terminal/Catawba Avenue intersection and the US 21 / Catawba Avenue / Holiday Lane intersection. Currently, the intersection spacing of these two intersections is only 400 feet (122.0 m) from the center-of-each intersection. Dual left-turn lanes on northbound US 21 would result in a hazardous and undesirable weave condition on Catawba Avenue. Therefore, dual left-turn lane on northbound US 21 were not studied in detail in this report. The recommended extension of the available northbound left-turn lane storage is one alternative until major improvements to the entire area can be provided.

#### **V. Additional Comments**

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

No special accommodation for bicycles is recommended on this project.



North Carolina Department of Transportation  
Program Development Branch

**FS-9910A**  
US 21  
At Catawba Avenue

Cornelius, Mecklenburg County

DIVISION 10      FIGURE 1

Catawba Avenue/US 21/Holiday Lane  
Existing Intersection Geometry

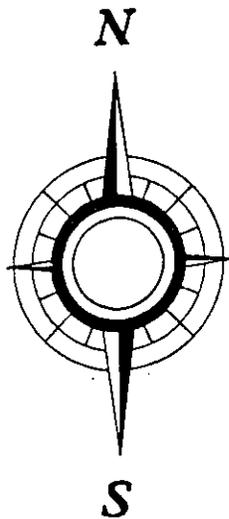
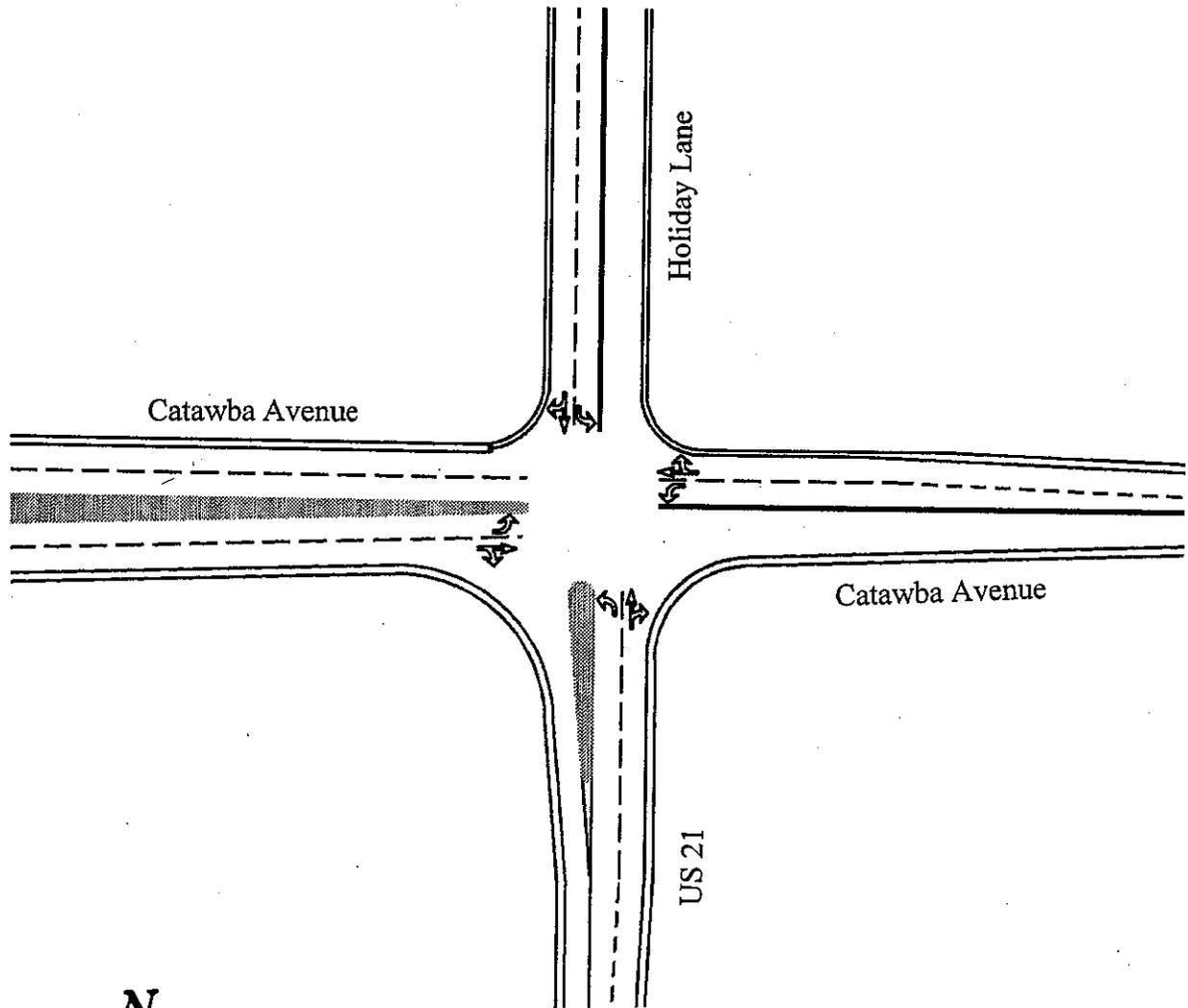


Figure 2  
Not to scale

 Raised Concrete Island

# Catawba Avenue/US 21/Holiday Lane Proposed Intersection Geometry

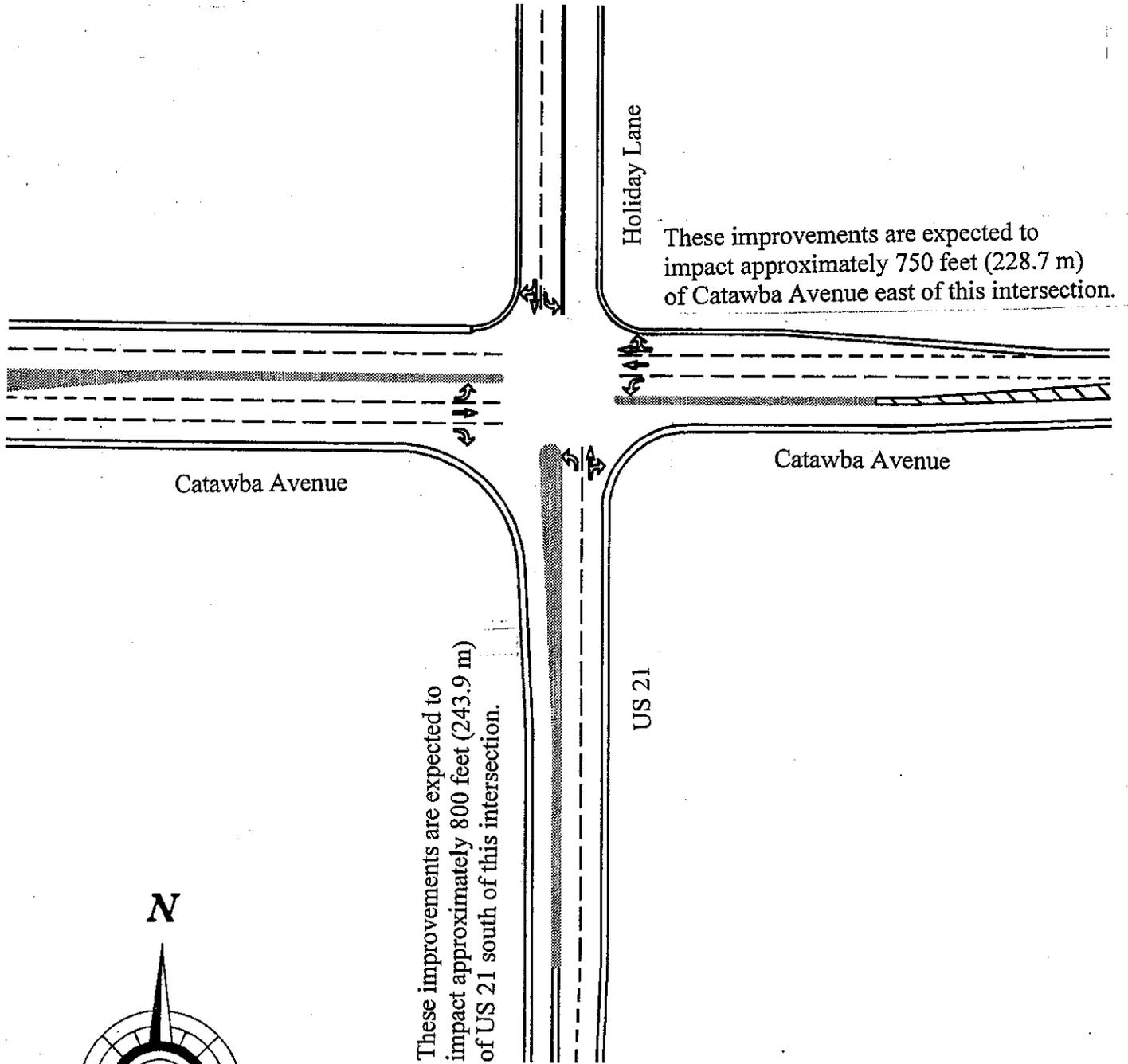


Figure 3  
Not to scale

— Raised Concrete Island

