

**US 21 (Statesville Road) and SR 2136 (Gilead Road)
Intersection Improvements
Town of Huntersville
Mecklenburg County**

Federal Aid Project No. STPDA-0021(18)
W.B.S. No. 42376.1.FR1
S.T.I.P. Project No. U-5114

**ADMINISTRATIVE ACTION
CATEGORICAL EXCLUSION**

SUBMITTED PURSUANT TO
42 USC 4332(2) (C)

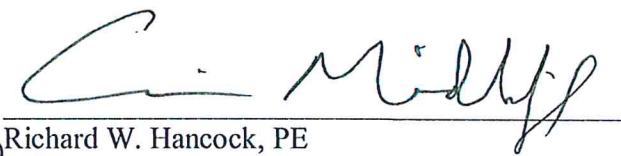
UNITED STATES DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

AND

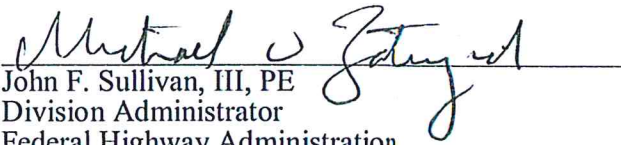
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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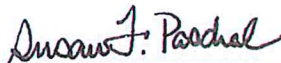
November 2015

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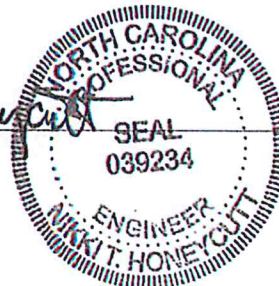
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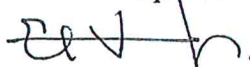


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North Carolina Department of Transportation and Town of Huntersville

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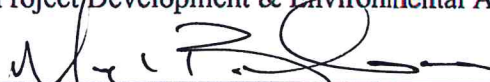
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PROJECT COMMITMENTS

US 21 (Statesville Road) and SR 2136 (Gilead Road) Intersection Improvements Town of Huntersville Mecklenburg County

Federal Aid Project No. STPDA-0021(18)
W.B.S. No. 42376.1.FR1
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Town of Huntersville Commitments

- If the project involves tree clearing (greater than 3 inches in diameter) or structure demolition (bridges or buildings) after April 1, 2015, the Town of Huntersville will coordinate with the North Carolina Department of Transportation's (NCDOT's) Natural Environment Section as soon as possible so that NCDOT can obtain Endangered Species Act (ESA) concurrence regarding the northern long-eared bat from US Fish and Wildlife Service. Construction authorization will not be requested until ESA compliance is satisfied for the northern long-eared bat.
- The Town of Huntersville and/or NCDOT will attempt to avoid and minimize impacts to streams and wetlands to the greatest extent practicable during project design.
- The Town of Huntersville and/or NCDOT will investigate potential on-site stream and wetland mitigation opportunities once a final decision has been rendered on the location of the preferred alternative. If on-site mitigation is not feasible, mitigation will be provided by the North Carolina Department of Environment and Natural Resources Division of Mitigation Services (formerly the Ecosystem Enhancement Program).
- The Town of Huntersville and/or NCDOT will manage invasive plant species as appropriate.
- Preliminary utility relocation information is based on visual observations and review of utility as-builts. A utility survey, conflict plan, and relocation design will be completed during design.
- Census data indicates a Spanish-speaking population within the Demographic Study Area (DSA) that meets or exceeds the United States Department of Justice Limited English Proficiency (LEP) Safe Harbor threshold. Written translations of vital documents will be provided upon request for Spanish-speaking populations, in

addition to other measures, as determined by NCDOT Public Involvement, to assure meaningful language access to satisfy the requirements of Executive Order 13166.

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1. INTRODUCTION

1.1 Proposed Action

The Town of Huntersville proposes to improve the intersection of US 21 (Statesville Road) and SR 2136 (Gilead Road) in Huntersville, North Carolina. This project would include the construction of dual lane, signalized u-turns on US 21 both north and south of Gilead Road. A service road would be constructed, using part of the existing Columbia Drive, between Boulder Park Drive and Commerce Centre Drive, and Dallas Street would be realigned to help mitigate for changes in access proposed on US 21 and Gilead Road. The project length is approximately 0.9 miles on US 21 and 0.4 miles along Gilead Road.

The proposed project is included in the 2016-2025 North Carolina Department of Transportation (NCDOT) Statewide Transportation Improvement Program (STIP) as Project U-5114, which includes intersection improvements and bicycle and pedestrian accommodations. The current cost estimate is \$11,200,200. The project will involve multiple funding sources: Town of Huntersville (\$4,000,000), STP-DA (\$3,600,000) and Bonus Allocation (\$3,500,000) funds. Surface Transportation Direct Attributable funds (STP-DA) are federal funds and Bonus Allocation funds can be federal or state funds. About \$100,000 has already been spent on the project. The estimated project cost shown in the 2016-2025 STIP is \$8,200,000. The project is scheduled for right of way acquisition in 2016 and construction in 2017. This project is included in the 2040 Charlotte Regional Transportation Planning Organization (CRTPO) Metropolitan Transportation Plan in horizon year 2025.

1.2 Project Location

Located within Mecklenburg County, North Carolina, the project vicinity is shown in **Figure 1-1**. The US 21 and Gilead Road intersection is located in an urbanized part of Huntersville between Interstate 77 (I-77) and downtown.

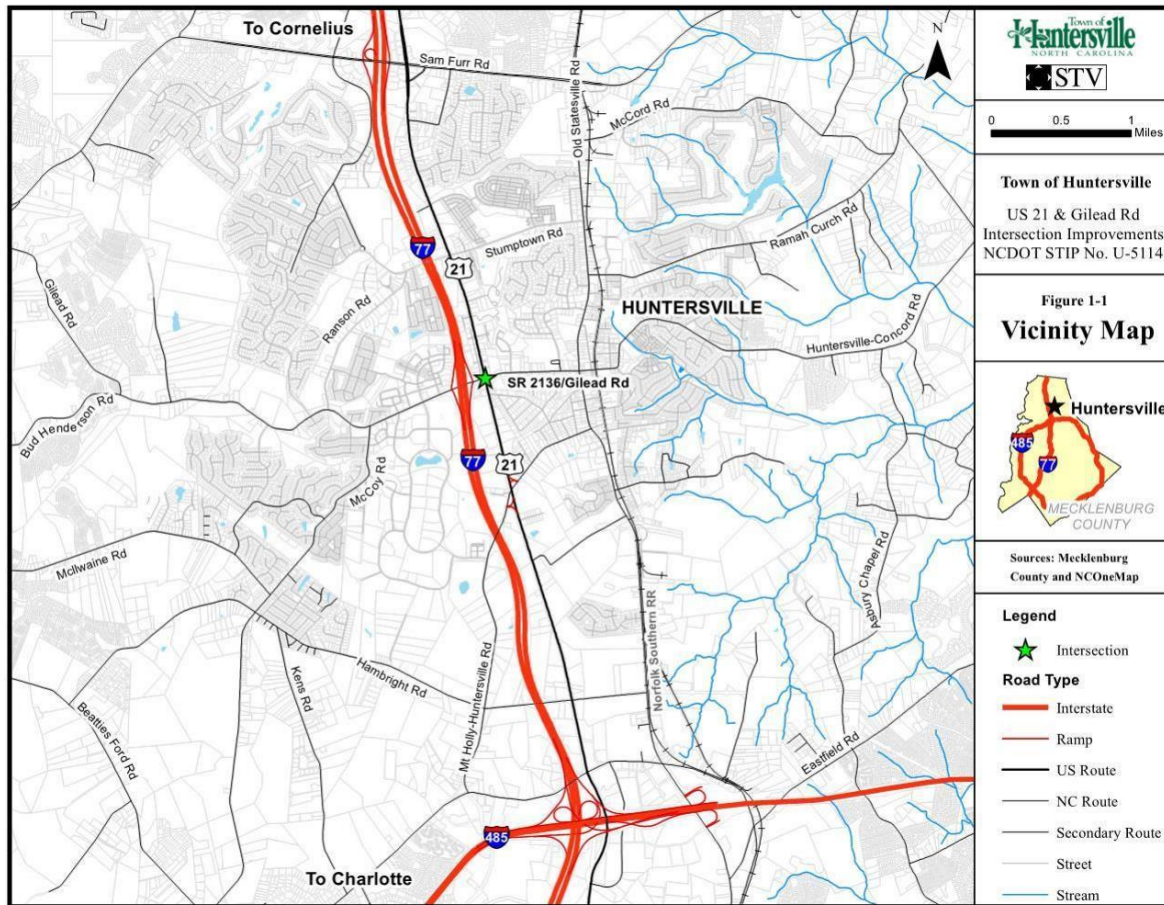


Figure 1-1 Vicinity Map

1.3 Project History

This project was first identified as part of Senate Bill (SB) 1005 (Moving Ahead) in the early 2000s, as project Number 1070R. A feasibility screening was conducted by the study team of Town staff and STV, which evaluated four concepts:

- The SB 1005 Concept – Multiple turn lanes on all four legs of the intersection
- A U-turn Intersection Concept (with two options)
- A Connector Road/Quadrant Left Concept (with two options)
- A Widening of US 21 Concept

The study team evaluated both a single lane, unsignalized u-turn concept and a dual lane, signalized u-turn concept. From a traffic operations perspective, the dual lane, signalized u-turn concept was superior to the other concepts, and this design is being refined and carried forward as the Build Alternative.

1.4 Applicability of Categorical Exclusion

Categorical Exclusions are described in the Code of Federal Regulations (CFR), Title 23, §771.117 as actions which meet the definition contained in 40 CFR 1508.4, and based on past experience with similar actions, do not result in significant impacts to the human or natural environment. On March 6, 2014, the Federal Highway Administration (FHWA) confirmed that a Categorical Exclusion (CE) would be the appropriate environmental document for this project because significant impacts and mitigation measures are not anticipated.

2. PURPOSE AND NEED FOR PROPOSED ACTION

2.1 Existing Conditions

The intersection of study consists of a primary US route (US 21) as well as a secondary roadway (Gilead Road). The north-south route, US 21, is classified as a major thoroughfare on the CRTPO Thoroughfare Plan, and it carries both local and regional traffic. It is a two-lane, undivided roadway in the vicinity of this project, and runs parallel to I-77 from Charlotte to Cornelius. The speed limit on US 21 in the vicinity of the intersection is 45 miles per hour (mph). Presently, there are no exclusive bicycle accommodations. There are noncontiguous sidewalks.

Gilead Road is classified as a major thoroughfare on the CRTPO Thoroughfare Plan west of US 21 and a minor thoroughfare east of US 21. Its cross section varies, but is primarily multi-lane undivided in the project vicinity. It carries local residential and commercial traffic. The speed limit on Gilead Road in the vicinity of the intersection is 35 mph. Like on US 21, there are no exclusive bicycle accommodations; however, there are sidewalks between US 21 and downtown Huntersville. Gilead Road is part of North Carolina Bike Route 6, which is known as the Piedmont Spur, and which can be utilized as an alternate to the piedmont portion of the Mountains to Sea route.

Both US 21 and Gilead Road have no control of access. The US 21 and Gilead Road intersection is located in an urbanized part of Huntersville between Interstate 77 (I-77) and Downtown Huntersville. Land uses surrounding the intersection are predominantly commercial, with some residential uses to the east of Commerce Centre Drive and near Dallas Street. Mixed uses are found along the US 21 and Gilead Road corridors.

Vehicular and pedestrian traffic generators include the I-77 interchange, the commercial centers at the intersection of US 21 and Gilead Road (Huntersville Gateway/Gateway Village, Huntersville Square, and Bayshore Plaza), and the apartment complexes along US 21 and Commerce Centre Drive. The United States Post Office is located on Gilead Road, near Commerce Centre Drive.

The Charlotte Area Transit System (CATS) has a major stop, the Huntersville-Gateway Park and Ride, in the vicinity of the US 21 and Gilead Road intersection. Five bus routes utilize this park and ride facility. Three routes (97, 98, and 99) are part of the Village Rider service, with 1-2 buses per hour between the Huntersville-Gateway Park and Ride and Cornelius/Davidson, the Huntington Green area, and the Northlake Mall area. The remaining two bus routes are the Huntersville Express (48X) and the North Mecklenburg Express (77X). These routes are commuter routes to Charlotte, which run about every 15 minutes during rush hours.

According to the current federally approved 2016-2025 STIP (November 2015), there are several nearby projects.

- STIP Project I-3311 - Addition of lanes on I-77 between I-277 (Brookshire Freeway) in Charlotte and SR 5544 (West Catawba Avenue - Exit 28); right of way and

construction unfunded; planning and design in progress and funding for I-3311C included in I-5405.

- Section A: I-85 to north of I-485 (Charlotte Outer Loop) – complete.
- Section AA: NC 73 (Sam Furr Road), west of I-77 to east of I-77; SR 2136 (Gilead Road), west of I-77 to east of I-77 – complete.
- Section B: I-485 (Charlotte Outer Loop) to SR 5544 (West Catawba Avenue) Exit 28.
- Section C: I-277 to north of I-85. Construct Express Lanes and convert existing High Occupancy Vehicle (HOV) lanes to Express Lanes. I-277 (Brookshire Freeway), I-77 to north Brevard Street. Construct Express Lanes – under construction with project I-5405.
- Section D: I-485 (Charlotte Outer Loop) to SR 2136 (Gilead Road) – complete.
- Section E: North of I-277 / NC 16 (Brookshire Freeway) to north of I-85. Work to be accomplished in I-3311C.
- STIP Projects I-5405, I-3311C & I-4750AA - Construction of Express Lanes and conversion of existing (High Occupancy Vehicle) HOV lanes to Express Lanes between I-277 (Brookshire Freeway) and NC 150 in Mooresville; right of way and construction underway; funding is through National Highway Performance Program Bonus Allocation.
- STIP Project I-5714 - Upgrade of the I-77 / SR 2136 (Gilead Road) interchange; right of way scheduled for fiscal year 2018 and construction scheduled for fiscal year 2019; funding is through the National Highway Performance Program.
- STIP Project U-5771 - Widening of US 21 from SR 2136 (Gilead Road) to Holly Point Drive; right of way is funded for fiscal year 2022 and construction is funded for fiscal year 2024; funding is through State Highway Trust Funds.
- STIP Project U-5807 - Widening of SR 2136 (Gilead Road) from US 21 (Statesville Road) to NC 115; right of way is funded in fiscal year 2022 and construction is partially funded in fiscal years 2024 and 2025; funding is through State Highway Trust Funds.

2.1.1 Socio-Economics

In order to analyze the population characteristics of the Direct Community Impact Area (DCIA), a Demographic Study Area (DSA) was identified, and US Census Tracts and Block Groups were chosen which encompass the DCIA. The DSA is comprised of the following 2010 Census Tracts and Block Groups:

- Census Tract 62.12: Block Group 1
- Census Tract 62.12: Block Group 2
- Census Tract 62.15: Block Group 1
- Census Tract 63.02: Block Group 2
- Census Tract 63.03: Block Group 1

Populations and Growth Trends

As indicated in **Table 2-1**, the population of the DSA increased from 16,805 people to 26,947 people between 2000 and 2010. This represents an annualized growth rate of 5.3%. The Block Group boundaries that made up the 2000 and 2010 study areas were slightly different, so a direct comparison is not precise.

Table 2-1 – Population and Growth Rates

Area	Population		Change (2000-2010)		Annualized Growth Rate
	2000	2010			
Demographic Study Area	16,085	26,947	10,862	67.5%	5.3%
Mecklenburg County	695,454	919,628	224,174	32.2%	2.8%
North Carolina	8,049,313	9,535,483	1,486,170	18.5%	1.7%

Source: US Census Bureau, Census 2010 and Census 2000, Summary File 1 100% Data, Table P1 and P001 "Total Population."

2.1.2 Land Use

The DCIA is urbanized with existing land use comprised of a mixture of residential, office, and retail uses. The DCIA covers the area surrounding the US 21 and Gilead Road intersection; it runs parallel to I-77 from Stumptown Road to north of Mt Holly-Huntersville Road. Land use includes single family residential near Dallas Street with multi-family residential along US 21 and Commerce Centre Drive. Several commercial centers are located adjacent to the intersection of US 21 and Gilead Road.

2.1.3 Operations

Travel demands caused by increased development and growth in northern Mecklenburg County have become too great for the US 21 and Gilead Road intersection to handle regional and local traffic.

The intersection's proximity to the interstate, along with the development that has occurred nearby, has created a high demand for turning movements. Over time, this has created a need for the complex eight-phase traffic signal at this location. The signal phasing, coupled with limited travel lanes, results in long delays and queues, which often extend from US 21 down the I-77 northbound ramp and onto I-77 during peak hours. Due to the time required to serve all traffic at an eight-phase signal and the close proximity to the I-77 off-ramp, vehicle queuing and a short merging distance for eastbound Gilead Road to northbound US 21 prove to be the most difficult vehicular movement for the majority of the day, especially in the PM peak period. During the AM peak period, southbound US 21 to westbound Gilead Road is the primary vehicular movement that experiences the most delay and queuing.

2.2 Purpose and Need

The purpose of this project is to improve traffic operations at the US 21 and Gilead Road intersection. According to the *STIP U-5114 Traffic Estimate Memorandum (June 2014)*, this section of US 21 carries 16,000 to 22,300 vpd (vehicles per day) and between 21,400 to

31,100 vpd on Gilead Road in 2013. This project is intended to provide operational improvements that enhance traffic mobility and conform to goals and objectives in existing adopted state and local transportation plans.

The close proximity of the subject intersection to the I-77 interchange, coupled with the need to accommodate regional and local traffic, and the need to provide access to local businesses, cannot be achieved with a traditional intersection. Without improvements in the area, the congestion will continue to increase, severely impacting vehicular mobility along the US 21 and Gilead Road corridors. Through the inclusion of pedestrian and bicycle amenities on both US 21 and Gilead Road, the project will benefit from enhanced multi-modal connectivity in the vicinity of the intersection.

2.3 Transportation Demand

Existing and Projected Traffic Volumes

In order to understand what improvements would enable the facilities to meet future traffic demand at acceptable levels of service, this study considered existing and projected traffic volumes. Following project scoping meeting discussions with the Town, NCDOT, and FHWA, the study team analyzed 2013 for the existing base year scenario and a 2025 design year scenario. FHWA staff confirmed the 2025 design traffic year on January 16, 2014.

As outlined in the *STIP U-5114 Traffic Estimate Memorandum (June 2014)*, the primary tools to forecast traffic for this study were field-collected traffic data, growth trend analysis using local growth rates, and the Metrolina Regional Demand Model (MRM, version 11v1.1). The MRM includes fiscally-constrained projects contained in the adopted CRTPO long range transportation plan.

Table 2-2 – Existing and Projected Traffic Volumes

Location	2013 Existing ADT	2025 ADT
US 21	22,300	38,900
Gilead Road	31,100	41,500
I-77 NB Ramp	7,900	13,200

Source: *STIP U-5114 Traffic Estimate Memorandum (June 2014)*

Using the daily traffic volumes as shown in **Table 2-2**, 2025 No Build peak hour volumes were developed within the traffic analysis area. The peak hours were then analyzed to determine the projected capacities and level of service for the intersection.

2.4 Level of Service (LOS) Analysis

The Level of Service (LOS) analysis for STIP Project U-5114 was conducted in accordance with NCDOT Congestion Management Guidelines (January 2012).

The Transportation Research Board’s 2010 Highway Capacity Manual (HCM) utilizes a term “level of service” to measure how traffic operates in intersections and on roadway segments. There are currently six levels of service (LOS). The LOS is an important measure of roadway

congestion. The LOS is determined by calculating the delay for the intersection and converting it to a letter grade. The LOS ranges from A (no congestion) to F (severe congestion).

Synchro/SimTraffic 8.0 were used to analyze the intersections in the study for the Build and No Build. The Synchro results give a LOS and delay per vehicle for the unsignalized and signalized intersections. The study intersections are as follows:

- US 21 and Gilead Road
- US 21 and Dallas Street
- US 21 & Wilmington Street
- US 21 & Compass Street/Arahova Drive
- I-77 SB Ramp and Gilead Road
- I-77 NB Ramp and Gilead Road
- Gilead Road & Commerce Centre Drive

SimTraffic was used to simulate the traffic during each peak hour and calculate the queuing throughout the network. Five simulation runs of SimTraffic with sixty minute durations and seed times of fifteen minutes were averaged.

LOS for Existing Conditions (2013)

In the 2013 existing conditions, the intersection of US 21 and Gilead Road operates at an overall LOS D in the AM and PM peak hour. A LOS D is considered acceptable, however, LOS E and F are considered unacceptable. A LOS F is failing. An overall LOS is the average of all of the approaches to an intersection. At the US 21 and Gilead Road intersection, the US 21 approaches perform worse than a LOS D.

On the eastbound (Gilead Road) and northbound (US 21) legs, left turning vehicles experience unacceptable levels of service and delay in both peak hours in existing scenarios. Drivers experience more than a minute of delay in both peak hours.

The intersections of US 21 at Wilmington Street and at Compass Street/Arahova Drive have failing operations in 2013. Both intersections have a high level of delay for drivers. Drivers on the side streets, particularly on Wilmington Street, have difficulty accessing US 21 due to lack of acceptable gaps. This leads to back-ups on Wilmington Street and Compass Street/Arahova Drive.

The SimTraffic model represents the queuing that is currently experienced by drivers throughout the analysis area. In the AM peak hour, the large volume of vehicles traveling westbound on Gilead Road to I-77 southbound causes substantial delay for drivers on US 21 and along westbound Gilead Road. In the PM peak hour, the heavy movement is from the I-77 northbound ramp. These vehicles are traveling along eastbound Gilead Road to northbound US 21. The heavy traffic and weaving movement causes the section of Gilead Road between US 21 and the I-77 northbound ramp to become increasingly congested. **Table 2-3** summarizes the LOS and delay at the main intersection of analysis area as well as additional

intersections in the study area for the 2013 existing conditions. Unacceptable levels of service have been shown in bold in all LOS tables.

Table 2-3 – 2013 Existing Level of Service Results

Intersection	AM		PM	
	LOS	Delay (sec)	LOS	Delay (sec)
US-21 & Gilead Rd	D	42.9	D	52.3
US-21 & Dallas St	C	20.0	B	13.7
US-21 & Wilmington St	F	76.0	F	1033.5
US-21 & Compass St/ Arahova St	F	63.4	F	214.0
Gilead Rd & I-77 SB Ramp	C	27.9	C	24.8
Gilead Rd & I-77 NB Ramp	C	29.8	B	19.1
Gilead Rd & Commerce Centre Dr	C	21.6	F	335.0

Source: STIP U-5114 Capacity Analysis Memorandum (August 2014)

LOS for 2025 No Build Conditions

Based upon the projected 2025 No Build traffic volumes, traffic operations on US 21 and Gilead Road are expected to deteriorate if no improvements are made. The intersection of US 21 and Gilead Road is projected to operate at a LOS F in the AM and PM peak hour. Drivers in the AM peak hour are expected to experience delays of about 90 seconds. In the PM peak hour, it is anticipated drivers will encounter delays of 175 seconds (approximately three minutes).

Volume predictions place a high volume of drivers in the eastbound (Gilead Road) and northbound (US 21) left turn lanes. In 2025, without any improvements made to the intersection, during the AM peak hour the eastbound and northbound left turn movements operations will fail, with drivers experiencing two-and-one-half to three minutes of delay. In the PM peak hour, three of the four left turn movements have failing operations and two to five minutes of delay.

All intersections in the traffic analysis area are expected to have unacceptable operations in 2025 without improvements, with the exception of US 21 and Dallas Street. The side streets and driveways to businesses, such as Wilmington Street, Commerce Centre Drive, and Compass Street/Arahova Drive, are predicted to queue up vehicles and result in several minutes of delay to access US 21 and Gilead Road. Additionally, the I-77 ramps are predicted to have unacceptable operations for drivers in both peak hours.

The SimTraffic model for the 2025 No Build simulation predicts that the existing congestion that drivers experience today during the peak hours will be worse in future years. Extensive queuing is predicted on Gilead Road and US 21.

Table 2-4 summarizes the LOS and delay at the main intersection of study as well as additional intersections in the study area for the 2025 No Build conditions:

Table 2-4 – 2025 No Build Conditions Level of Service Results

Intersection	AM		PM	
	LOS	Delay (sec)	LOS	Delay (sec)
US-21 & Gilead Rd	F	89.4	F	174.8
US-21 & Dallas St	D	29.5	C	24.4
US-21 & Wilmington St	F	616.9	F	***
US-21 & Compass St/ Arahova St	F	101.9	F	710.1
Gilead Rd & I-77 SB Ramp	F	85.5	E	64.4
Gilead Rd & I-77 NB Ramp	F	81.1	E	70.6
Gilead Rd & Commerce Centre Dr	F	***	F	***

*** Volumes greatly exceed capacity and a delay cannot be computed.

Source: STIP U-5114 Capacity Analysis Memorandum (August 2014)

2.5 Benefits to Community

The proposed intersection improvements (shown in **Figures 2-1 to 2-7 in Appendix B**) will reduce congestion and delay along US 21 and Gilead Road in Huntersville. The redirection of left turning movements at the main intersection of US 21 and Gilead Road will increase safety for motorists and other modal users. The proposed service road between Boulder Park Drive and Commerce Centre Drive and the realignment of Dallas Street near the Bayshore Plaza would help mitigate for changes in access to businesses on US 21 and Gilead Road. The proposed signal at US 21 and Compass Street/Arahova Drive will improve accessibility into neighboring businesses and provide better access for the Charlotte Area Transit (CATS) Park and Ride lot. The proposed signal at Gilead Road and Commerce Centre Drive would also improve accessibility to nearby businesses and residences.

Other benefits of the project include enhancing bicycle and pedestrian connectivity and enhancing business access in the vicinity of the intersection. These pedestrian and bicycle improvements will provide safer access to the businesses, local apartments, park and ride lot, and future planned greenway. Additionally, pedestrian signal heads and signal phases are included with the new signals at US 21 and Compass Street/Arahova Drive and Gilead Road at Commerce Centre Drive. The signals, along with crosswalks at the intersection, should improve pedestrian safety. Furthermore, a wide outside lane for bicycles is proposed on US 21 and separate bicycle lanes are proposed on Gilead Road. Sidewalks are proposed on US 21, Gilead Road, along the service road between the Boulder Park Drive area and Parkview apartments, and along the realignment of Dallas Street near the Bayshore Plaza.

3. ALTERNATIVES

3.1 No Build Alternative

The No Build Alternative would mean that no action will be implemented under this project (STIP Project U-5114). The No Build Alternative is not consistent with state and local plans to improve traffic operations at the US 21 and Gilead Road intersection, Therefore, it will not

satisfy the purpose and need for the proposed project. In accordance with the National Environmental Policy Act (NEPA) (40 CFR 1502. 14(d)) and FHWA guidelines, the No-Build Alternative is given full consideration and provides baseline conditions in which to compare the improvements and consequences of the Build Alternative.

3.2 Build Alternative

The 2025 Build Alternative would be the improvement to the intersection of US 21 and Gilead Road in Huntersville which redirects left turning movements at the intersection and includes the following modifications:

- Implementing dual lane signalized u-turns (with bulb-outs), to the north and south of Gilead Road, along US 21
- Providing additional lanes/widening both US 21 and Gilead Road to a four-lane, median-divided curb and gutter section within the vicinity of the intersection
- Installing new traffic signals at the intersections of US 21 and Compass Street/Arahova Drive and at Gilead Road and Commerce Center Drive
- Providing additional lanes at the US 21 intersection with Compass Street/Arahova Drive
- Closing the Wilmington Street entrance to Huntersville Gateway
- Providing an additional northbound right turn lane from the I-77 northbound ramp to eastbound Gilead Road
- Providing an exclusive westbound right turn lane on Gilead Road to the I-77 northbound ramp
- Constructing a service road, using Columbia Street, between Boulder Park Drive and Commerce Centre Drive
- Realigning Dallas Street near its intersection with US 21
- Adjusting traffic signal phasing and implementing various access management improvements, including combining of and/or relocation of driveways along both US 21 and Gilead Road, and modification to right-in/right-out movements, to work in tandem with the main intersection improvements
- Extending three existing culverts for unnamed tributaries to Torrence Creek
- Sidewalks would be added along US 21 and Gilead Road
- Bike lanes are proposed on Gilead Road east of the US 21 intersection
- Bike accommodations (wide outside lanes) along US 21
- Pedestrian signals and crosswalks would be added with the new traffic signals at US 21 and Compass Street/Arahova Drive and at Gilead Road and Commerce Centre Drive

The existing right of way width is 150 feet on US 21 and 60 feet on Gilead Road. Right of way acquisition is not anticipated along US 21 except for near the bulb-out at Wilmington Street (both sides of road), and near the bulb-out and realignment of Dallas Street. Proposed right of way on Gilead Road varies from 110 feet to 135 feet. Right of way acquisition is also expected near the Columbia Street realignment, or proposed service road, between Boulder Park Drive and Commerce Centre Drive and the realignment of Dallas Street.

3.3 Design Year (2025) Traffic Projections

As summarized in the *STIP U-5114 Capacity Analysis Memorandum (August 2014)*, future traffic projections were developed for a design year (2025) Build Alternative. Using 2025 daily traffic volumes, 2025 Build Alternative peak hour volumes were developed. These volumes were then evaluated to determine the projected capacities and levels of service for the intersection and surrounding roads under the Build Alternative.

3.4 Level of Service (LOS) Analysis

Under the 2025 Build Alternative, the intersection of US 21 and Gilead Road is projected to operate at a LOS B in the AM peak hour and a LOS C in the PM peak hour. The delay experienced per driver is calculated at 14 seconds in the AM peak hour compared to 90 seconds of delay in the No Build Alternative. The Build Alternative predicts 20 seconds in the PM peak hour of delay experienced per driver, compared to the 178 seconds in the No Build Alternative. The Build Alternative demonstrates a substantial reduction in delays for drivers. There is a small increase in delay predicted at the I-77 southbound ramp as there are no improvements proposed at this intersection.

As discussed previously, the volumes of the left turn movements on the eastbound (Gilead Road) and northbound legs (US 21) at this intersection would be notable and substantial delays are expected in the future without any improvements. Under the 2025 Build Alternative, the left turn movements at the intersection would be redirected, therefore alleviating the congestion, high delays, and unsafe weave maneuvers. Additionally, the Build Alternative would reduce the number of conflict points within the intersection, thus improving safety. However, this alternative would increase the right turn movements at the intersection.

The introduction of signals at the intersections of US 21 at Compass Street/Arahova Drive and Gilead Road at Commerce Centre Drive would improve operations and delay. In the 2025 No Build Alternative, these intersections are predicted to carry volumes greater than the intersections have capacity to accommodate. These signals would also include pedestrian signal heads and signal phases. Additionally, the reconfiguration of the Wilmington Street intersection from a full movement intersection to a right-in/right-out intersection will improve back-ups that were predicted to occur in the 2025 No Build on Wilmington Street.

In the Build Alternative, two additional intersections would be introduced - dual u-turn signalized intersections to the north and south of Gilead Road on US 21. These u-turn intersections would operate under a two-phase signal. Drivers are expected to experience a LOS B or better during critical peak hours.

The SimTraffic model for the 2025 Build simulation with the Detailed Study Alternative shows improved progression of vehicles along the Gilead Road and US 21 corridors.

Table 3-1 summarizes the LOS and delay at the main intersection of analysis as well as additional intersections in the analysis area for the 2025 Build conditions:

Table 3-1 – 2025 Build Conditions Level of Service Results

Intersection	AM		PM	
	LOS	Delay (sec)	LOS	Delay (sec)
US-21 & Gilead Rd	B	14.2	C	21.1
US-21 & Dallas St (RIRO)	B	10.9	C	15.1
US-21 & South U-Turn	A	8.6	B	18.5
US-21 & Wilmington St (RIRO)	B	13.5	B	11.5
US-21 & North U-Turn/Huntersville	A	7.9	B	11.6
US-21 & Compass St/ Arahova St	A	6.1	B	14.3
Gilead Rd & I-77 SB Ramp	F	87.6	E	64.4
Gilead Rd & I-77 NB Ramp	D	43.4	C	31.0
Gilead Rd & Commerce Centre Dr	A	6.8	C	34.2

Source: STIP U-5114 Capacity Analysis Memorandum (August 2014)

3.5 Anticipated Mobility, Access and Multimodal Impacts

3.5.1 Mobility and Access

Since left turns will be removed from the US 21 / Gilead Road intersection and redirected to u-turns along US 21 (with medians proposed along US 21 and Gilead Road), there will be changes in access within the DCIA. Access will be modified to right-in/right-out throughout much of the DCIA; however, access will not be taken away from businesses (or the CATS Park and Ride), and they may benefit from the improved traffic operations at the intersection of US 21 and Gilead Road.

Internal traffic patterns may change within the commercial centers, but proposed improvements such as connector roads and traffic signals will mitigate potential negative effects of access control measures and improve the overall mobility within the DCIA. Huntersville Gateway access may be improved with the addition of a signal at Compass Street and US 21. In the case of Huntersville Square, access may be improved with the addition of a service road.

Access to the Greenfield Park neighborhood from US 21 will be restricted to a right in/right at Dallas Street. Northbound vehicles on US 21 (coming from the Charlotte area) would directly access the neighborhood via the realigned Dallas Street. Southbound vehicles on US 21 (coming from the Gilead Road area) would not be able to turn left because of a raised median; drivers would have to make a u-turn on US 21 (south of Dallas Street) to access the neighborhood. The reduced vehicular conflict points could reduce crash risk at this intersection.

Road enhancements will occur to the south of the Parkview apartments. Columbia Street will be realigned and will connect to Boulder Park Drive. Columbia Street also has parallel parking; the realignment would eliminate some of these spaces. The noise analysis conducted

for this project (June 2015) did not recommend noise walls for this area. There are recommended pedestrian facilities along the realigned portion.

The realignment of Columbia Street will act as a service road between Commerce Centre Drive and Boulder Park Drive, and will help mitigate for access controls proposed along US 21 and Gilead Road by improving circulation and access through Huntersville Square.

Furthermore, local planners recommend coordination with the nearby STIP Project I-5714, the proposed modification of the I-77 interchange at Gilead Road, in order to minimize disruption to the community.

3.5.2 Multimodal

The inclusion of pedestrian and bicycle facilities on both US 21 and Gilead Road and local connectors to the shopping centers will improve multi-modal connectivity in the vicinity of the intersection. During a site visit on July 13, 2014, several pedestrians were observed walking between Huntersville Square and the Parkview Apartments, as well as along US 21 near Huntersville Commons and the Deer Hill Apartments.

Design plans show proposed sidewalks on both sides of US 21 north of Gilead Road, along Gilead Road east of US 21, between the Boulder Park Drive area and Parkview Apartments, and along the realigned Dallas Street. A new signal is proposed at Compass Street and Arahova Drive, along with a pedestrian crossing (near where a planned greenway would cross) at the Compass Street/Arahova Drive intersection. The intersection improvements, such as the crosswalk and pedestrian signal heads and signal phases proposed as part of STIP Project U-5114 will compliment construction of the proposed greenway and a safe crossing of US 21. A new signal with pedestrian signal heads and signal phases is also proposed at the Gilead Road and Commerce Centre Drive. Pedestrian signal heads are proposed at both turns. Wide outside lanes are proposed for US 21, and separate bicycle lanes are proposed for Gilead Road as part of STIP Project U-5114.

4. NATURAL RESOURCES

4.1 Methodology

All natural systems field work and documentation was conducted in accordance with the NCDOT Natural Environment Section standard operating procedures and the July 2012 Natural Resources Technical Report (NRTR) template. Field work was conducted on October 24, 2013 as well as June 4, June 9, July 14, and September 30, 2014. Jurisdictional areas identified in the NRTR study area have not yet been verified by the U.S. Army Corps of Engineers (USACE) or the North Carolina Division of Water Resources (NCDWR). NCDWR stream rating forms and United States Army Corps of Engineers (USACE) Stream Quality Assessment Worksheets are included in Appendix C, which is included in the *STIP U-5114 Natural Resources Technical Report (October 2014)*.

4.2 Physiography and Soils

The NRTR study area lies in the Southern Outer Piedmont physiographic region of North Carolina. Topography in the project vicinity is comprised of gently rolling hills with narrow, level floodplains along streams. Drainage is generally to the west toward Torrence Creek, which is located approximately 1.75 miles west of the study area. Elevations in the NRTR study area range from approximately 700 to 780 feet above National Geodetic Vertical Datum (NGVD), or sea level. Land use in the project vicinity consists primarily of maintained/disturbed right of way and commercial development, interspersed with residential development along roadways and forestland along stream corridors.

The Mecklenburg County Soil Survey identifies six soil types within the NRTR study area (Table 4-1).

Table 4-1 – Soils in the NRTR Study Area

Soil Series	Mapping Unit	Drainage Class	Hydric Status
Cecil sandy clay loam, 2 to 8 percent slopes, eroded	CeB2	Well Drained	Nonhydric
Cecil sandy clay loam, 8 to 15 percent slopes, eroded	CeD2	Well Drained	Nonhydric
Mecklenburg fine sandy loam, 2 to 8 percent slopes	MeB	Well Drained	Nonhydric
Mecklenburg fine sandy loam, 8 to 15 percent slopes	MeD	Well Drained	Nonhydric
Monacan soils	MO	Somewhat Poorly Drained	Hydric*
Urban land	Ur	--	Nonhydric

* - Soils which are primarily nonhydric, but which may contain hydric inclusions
 Source: STIP U-5114 Natural Resources Technical Report (October 2014)

4.3 Water Resources

Water resources in the NRTR study area are part of the Upper Catawba River basin [U.S. Geological Survey (USGS) Hydrologic Unit 03050101]. Four streams and three wetlands were identified in the NRTR study area. The locations of each water resource are shown in Figures 2-1 to 2-7. The McDowell Creek Watershed Management Plan is currently being developed by the Division of Water Resources. It will eventually be applicable to lands in the NRTR study area.

All four streams within the NRTR study area are unnamed tributaries to Torrence Creek. Torrence Creek has been designated a Water Supply IV Water (WS-IV) by NCDWQ from its source to its confluence with McDowell Creek.

There are no designated trout waters, anadromous fish waters or Primary Nursery Areas (PNA) present in the NRTR study area. There are no designated Outstanding Resource Waters (ORW), High Quality Waters (HQW) or water supply watersheds (WS-I or WS-II) within 1.0 mile downstream of the NRTR study area.

Section 303(d) of the Clean Water Act requires states to develop a list of waters not meeting water quality standards or which have impaired uses. The North Carolina 2014 Final 303(d) list of impaired waters does not identify Torrence Creek or any streams within one mile downstream of the NRTR study area as impaired. No benthic samples or fish surveys have been conducted on the project NRTR study area streams.

4.3.1 Existing Jurisdictional Resources

Jurisdictional areas (i.e., streams, wetlands, and surface or open waters) within the NRTR study area were delineated and located using GPS technology during the time period of October 2013 and September 2014. Four jurisdictional streams were identified in the NRTR study area (**Table 4-2**). The location of these streams is shown on **Figures 2-1 to 2-7** in Appendix B. USACE and NCDWQ stream delineation forms are included in Appendix C. All jurisdictional streams in the NRTR study area have been designated as warm water streams for the purposes of stream mitigation.

Table 4-2 – Jurisdictional Characteristics of Water Resources in the NRTR Study Area

Map ID	Length (ft.)	Classification	Compensatory Mitigation Required*
Stream A	203	Intermittent	Undetermined
Stream B	608	Intermittent	Undetermined
Stream C	311	Perennial	Undetermined
Stream D	418	Perennial	Undetermined
Total	1,540		

*A USACE site visit has not yet been conducted.

Source: STIP U-5114 Natural Resources Technical Report (October 2014)

Three jurisdictional wetlands were identified within the NRTR study area and have been classified according to the the *USFWS Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979) (**Figures 2-1 through 2-7** in Appendix B). Wetland classification and quality rating data are presented in **Table 4-3**. All wetlands in the NRTR study area are within the Upper Catawba River basin (USGS Hydrologic Unit 03050101). USACE wetland delineation forms and NCDWQ wetland rating forms for each site are included in Appendix C. Descriptions of the terrestrial communities at each wetland site are presented in Section 4.4.1. Wetland sites Wetland A, Wetland B and Wetland C are included within the piedmont/mountain headwater forest community and are classified Riparian. USACE wetland determination data forms are included in Appendix C.

Table 4-3 – Jurisdictional Characteristics of Wetlands in the NRTR Study Area

Map ID	NCWAM Classification	Hydrologic Classification	NCDWQ Wetland Rating	Area (ac.)
Wetland A	Headwater Forest	Riparian	70	0.033
Wetland B	Headwater Forest	Riparian	59	0.038
Wetland C	Headwater Forest	Riparian	61	0.031
			Total	0.102

Source: STIP U-5114 Natural Resources Technical Report (October 2014)

4.3.2 Riparian Buffer Rules

All streams in the NRTR study area are within the Upper Catawba River basin (USGS Hydrologic Unit 03050101). The Catawba River Basin Buffer Rules apply only to the main stem of the Catawba River. Therefore, no buffer rules apply to any streams within the NRTR study area and therefore, no streams are subject to buffer rule protection.

4.3.3 Floodplains and Regulated Floodways

The North Carolina Floodplain Mapping Program, in cooperation with the Federal Emergency Management Administration (FEMA) and local governments, developed floodplain boundaries and Flood Insurance Maps (FIRM) for the state of North Carolina. Mecklenburg County is a participant in the National Flood Insurance Program (NFIP). As part of NFIP, the Federal Emergency Management Agency determines floodway boundaries as a tool for floodplain management.

According to the Flood Insurance Rate Maps (March 2, 2009), none of the four streams are in a designated flood hazard zone which is within a limited detailed flood study reach, having a regulated 100-year non-encroachment width regulated as a floodway. Two of the streams (Stream B and D) are shown to be within the future floodplain; however, the project is not anticipated to encroach upon the existing 100-year floodplain. Two of the four streams are within the future proposed roadway.

4.4 Biotic Resources

4.4.1 Terrestrial Communities

Three terrestrial communities were identified in the NRTR study area: 1) maintained/disturbed land, 2) Mesic Mixed Hardwood Forest, and 3) Piedmont Headwater Forest Wetland.

Maintained/disturbed areas are scattered throughout the NRTR study area in places where the vegetation is periodically mowed, such as roadside shoulders and residential lawns. The vegetation in this community is comprised of low growing grasses and herbs, including fescue (*Festuca* sp.), clover (*Trifolium* sp.), kudzu (*Pueria Montana*), and henbit (*Lamium* sp.). The majority of the invasive species found in the NRTR study area are also found within the maintained/disturbed terrestrial community.

The Mesic Mixed Hardwood Forest community exists in five areas of the NRTR study area, the northwest corner, two areas in the east central portion, and two areas in the southern portion of the NRTR study area where mature forest remains and is surrounded by development. Schafale and Weakley (1990) describe this plant community as dominated by mesophytic trees in upland soils found primarily on north-facing slopes, and less commonly on upland flats and islands surrounded by peatland or swamp communities. Dominant species in this community include red maple (*Acer rubrum*), yellow poplar (*Liriodendron tulipifera*), and white oak (*Quercus alba*) in the overstory, with Chinese privet (*Ligustrum sinense*),

saplings of the overstory species, and Japanese honeysuckle (*Lonicera japonica*) in the shrub and ground layers.

Three small communities of Headwater Forest Wetlands occur within the NRTR study area. Headwater Forest wetlands are generally small bowl-shaped wetlands which grade into 1st order streams, and are located in the upper reaches of watersheds in the Coastal Plains, Piedmont, and Mountain regions of North Carolina. Wetland A is located in the northern portion of the NRTR study area adjacent to Stream D. This wetland community is vegetated with black willow (*Salix nigra*) in the sparse overstory, tag alder (*Alnus serrulata*) in the understory, and the groundcover is comprised of cattail (*Typha latifolia*), sedge (*Carex* sp.) and soft rush (*Juncus effusus*).

Wetland B is located in the southeast portion of the NRTR study area adjacent to and abutting Stream C. This wetland community is vegetated with sweetgum (*Liquidambar styraciflua*) and red maple in the overstory, Chinese privet in the understory and groundcover dominated by Japanese honeysuckle and kudzu. Poison ivy (*Toxicodendron radicans*) and Virginia creeper (*Parthenocissus quinquefolia*) are common vines found within the wetland.

Wetland C is located in the southwest portion of the NRTR study area and is located adjacent to and abutting an off-site portion of Stream C. This wetland community is vegetated with black willow and green ash (*Fraxinus pennsylvanica*) in the overstory, tag alder and red maple in the understory, and the groundcover is dominated by jewelweed (*Impatiens capensis*) and ladies thumb smartweed (*Persicaria maculosa*). Trumpet creeper (*Campsis radicans*) is a vine found in this wetland.

Terrestrial communities in the NRTR study area are comprised of both natural and disturbed habitats that may support a diversity of wildlife species (those species actually observed are indicated with *). Mammal species that commonly exploit forested habitats and stream corridors found within the NRTR study area include species such as white-tailed deer (*Odocoileus virginianus*)*(tracks observed), raccoon (*Procyon lotor*)* (tracks observed), opossum (*Didelphis virginiana*)* (tracks observed), eastern chipmunk (*Tamias striatus*)*, gray squirrel (*Sciurus carolinensis*)*, eastern cottontail (*Sylvilagus floridanus*)*, woodchuck (*Marmota monax*), white-footed mouse (*Peromyscus leucopus*), meadow vole (*Microtus pennsylvanicus*), woodland jumping mouse (*Napaeozapus insignis*) and red fox (*Vulpes vulpes*).

Birds that commonly use forest and forest edge habitats include the northern cardinal (*Cardinalis cardinalis*)*, mockingbird (*Mimus polyglottos*)*, house finch (*Carpodacus mexicanus*)*, Carolina wren (*Thryothorus ludovicianus*)*, chipping sparrow (*Spizella passerine*)*, blue jay (*Cyanocitta cristata*)*, red-bellied woodpecker (*Melanerpes carolinus*)*, downy woodpecker (*Picoides pubescens*)*, American crow (*Corvus brachyrhynchos*)*, eastern towhee (*Pipilo erythrophthalmus*)*, American robin (*Turdus migratorius*)*, common grackle (*Quiscalus quiscula*)*, European starling (*Sturnus vulgaris*)*, Carolina chickadee (*Poecile carolinensis*)*, tufted titmouse (*Baeolophus bicolor*)*, turkey vulture (*Cathartes aura*)*, black vulture (*Coragyps atratus*)*, red-tailed hawk (*Buteo jamaicensis*)*, mourning

dove (*Zenaida macroura*)*, pileated woodpecker (*Dryocopus pileatu*), northern flicker (*Colaptes auratus*), killdeer (*Charadrius vociferous*), eastern kingbird (*Tyrannus tyrannus*), brown-headed cowbird (*Molothrus ater*), red-winged blackbird (*Agelaius phoeniceus*), eastern meadowlark (*Sturnella magna*), field sparrow (*Spizella passerine*), barn swallow (*Hirundo rustica*) and eastern bluebird (*Sialia sialis*).

Reptile and amphibian species that may use terrestrial communities located in the NRTR study area include spring peeper (*Hyla crucifer*)*, upland chorus frog (*Pseudacris triseriata*)*, eastern newt (*Notophthalmus viridescens*), spotted salamander (*Ambystoma maculatum*), marbled salamander (*Ambystoma opacum*), red salamander (*Pseudotriton ruber*), five-lined skink (*Eumeces anthracinus*), American toad (*Bufo americanus*), bullfrog (*Rana catesbiana*), green frog (*Rana clamitans*), pickerel frog (*Rana palustris*), yellowbelly slider (*Chrysemys scripta*), eastern box turtle (*Terrapene Carolina*), worm snake (*Carphophis amoenus*), black racer (*Coluber constrictor*), rat snake (*Elaphe obsoleta*), eastern kingsnake (*Lampropeltis getulus*), northern water snake (*Nerodia sipedon*), and copperhead (*Agkistrodon contortix*).

Terrestrial Community Impacts

Terrestrial communities in the NRTR study area may be impacted by project construction as a result of grading and paving of portions of the NRTR study area. The community data are presented in the context of total coverage of each type within the NRTR study area (**Table 4-4**). Actual impacts due to the project may be reduced as more refined designs are completed.

Table 4-4 – Coverage of Terrestrial Communities in the NRTR Study Area

Community	Coverage (ac.)
Maintained/ Disturbed	104.5
Mesic Mixed Hardwood Forest	9.5
Headwater Forest Wetland	0.1
Total	114.1

Source: STIP U-5114 Natural Resources Technical Report (October 2014)

4.4.2 Aquatic Communities

The NRTR identified four unnamed tributaries, two perennial and two intermittent, bounded by natural vegetation. Aquatic communities within the perennial streams located in the NRTR study area (Stream C and Stream D) are expected to support fish populations including golden shiners (*Notemigonus crysoleucas*), spottail shiner (*Notropis hudsonius*), mosquitofish (*Gambusia affinis*), redbreast sunfish (*Lepomis auritus*) and bluegill (*L. macrochirus*). Intermittent streams in the NRTR study area (Stream A and Stream B) are relatively small in size and would support aquatic communities of crayfish, and various benthic macroinvertebrates.

4.4.3 Invasive Species

Eight species from the NCDOT Invasive Exotic Plant List for North Carolina were found to occur throughout the NRTR study area. The species identified were Chinese privet (Threat), kudzu (Threat), multiflora rose (*Rosa multiflora*) (Threat), lespedeza (*Lespedeza cuneata*) (Threat), Johnson grass (*Sorghum halepense*) (Moderate Threat), English ivy (*Hedera helix*)

(Moderate Threat), Japanese honeysuckle (Moderate Threat), and bamboo (*Phyllostachys nigra*) (Moderate Threat). The Town and/or NCDOT will manage invasive plant species as appropriate.

4.5 Anticipated Impacts to Species

Species with the federal classification of Endangered, Threatened, or officially proposed for such listing are protected under the Endangered Species Act (ESA) of 1973 as amended (16 U.S.C. 1531 et seq.). Federal law requires that any action likely to adversely affect a federally protected species be subject to review by the US Fish and Wildlife Service (USFWS). The term “Endangered Species” is defined as “any species which is in danger of extinction throughout all or a significant portion of its range” (16 U.S.C. 1532)

4.5.1 Federally Protected Species

As of July 14, 2014, the United States Fish and Wildlife Service (USFWS) listed four federally protected species for Mecklenburg County (**Table 4-5**). A fifth protected species (northern long-eared bat) was listed as Threatened on April 2, 2015 (**Table 4-5**). A brief description of each species’ habitat requirements follows, along with the Biological Conclusion rendered based on survey results in the NRTR study area. Habitat requirements for each species are based on the current best available information from referenced literature and/or USFWS. If the project involves tree clearing (greater than 3 inches in diameter) or structure demolition (bridges or buildings) after April 1, 2015, the City of Huntersville will coordinate with NCDOT’s Natural Environment Section as soon as possible so that NCDOT can obtain Endangered Species Act concurrence regarding the northern long-eared bat from the USFWS.

Table 4-5 – Federally Protected Species Listed for Mecklenburg County

Scientific Name	Common Name	Federal Status	Habitat Present	Biological Conclusion
<i>Echinacea laevigata</i>	Smooth coneflower	E	Yes	No Effect
<i>Helianthus schweinitzii</i>	Schweinitz’s sunflower	E	Yes	No Effect
<i>Lasmigona decorata</i>	Carolina heelsplitter	E	No	No Effect
<i>Myotis septentrionalis</i>	Northern long-eared bat	T	No	Unresolved
<i>Rhus michauxii</i>	Michaux’s sumac	E	Yes	No Effect

Source: STIP U-5114 Natural Resources Technical Report (October 2014)

E – Endangered, T - Threatened

Smooth coneflower

Endangered

USFWS Optimal Survey Window: late May-October

Habitat Description: Smooth coneflower, a perennial herb, is typically found in meadows, open woodlands, the ecotonal regions between meadows and woodlands, cedar barrens, dry limestone bluffs, clear cuts, and roadside and utility rights-of-way. In North Carolina, the species normally grows in magnesium- and calcium-rich soils associated with gabbro and diabase parent material, and typically occurs in Iredell, Misenheimer, and Picture soil series.

The plant grows best where there is abundant sunlight, little competition in the herbaceous layer, and periodic disturbances (e.g., regular fire regime, well-timed mowing, and careful clearing) that prevents encroachment of shade-producing woody shrubs and trees. On sites where woody succession is held in check, it is characterized by a number of species with prairie affinities.

Biological Conclusion: No Effect

Suitable habitat for smooth coneflower is present in the NRTR study area within the open woodlands, clear cuts, and roadside rights-of-way. Surveys were conducted by STV biologists throughout areas of suitable habitat on October 24, 2013, as well as June 4, 9 and July 14, 2014. No individuals of smooth coneflower were observed. A review of North Carolina Natural Heritage Program (NCNHP) records, updated April 16, 2014, indicates no known occurrences within 1.0 mile of the study area.

Schweinitz's sunflower

Endangered

USFWS Optimal Survey Window: late August-October

Habitat Description: Schweinitz's sunflower is endemic to the Piedmont of North and South Carolina. The few sites where this rhizomatous perennial herb occurs in relatively natural vegetation are found in Xeric Hardpan Forests. The species is also found along roadside rights-of-way, maintained power lines and other utility rights-of-way, edges of thickets and old pastures, clearings and edges of upland oak-pine-hickory woods and Piedmont longleaf pine forests, and other sunny or semi-sunny habitats where disturbances (e.g., mowing, clearing, grazing, blow downs, storms, frequent fire) help create open or partially open areas for sunlight. The plant is intolerant of full shade and excessive competition from other vegetation. Schweinitz's sunflower occurs in a variety of soil series, including Badin, Cecil, Cid, Enon, Gaston, Georgeville, Iredell, Mecklenburg, Misenheimer, Secrest, Tatum, Uwharrie, and Zion, among others. The perennial plant is generally found growing on shallow sandy soils with high gravel content; shallow, poor, clayey hardpans; or shallow rocky soils, especially those derived from mafic rocks.

Biological Conclusion: No Effect

Suitable habitat for Schweinitz's sunflower is present in the NRTR study area along roadside shoulders. Surveys were conducted by STV biologists throughout areas of suitable habitat on October 24, 2013, as well as June 4, June 9, July 14, and September 30, 2014. No individuals of Schweinitz's sunflower were observed. A review of NCNHP records, updated April 16, 2014, indicates a known occurrence within the Cornelius, NC USGS quadrangle.

Carolina heelsplitter

Endangered

USFWS Recommended Survey Window: year round

Habitat Description: The Carolina heelsplitter was historically known from several locations within the Catawba and Pee Dee River systems in North Carolina and the Pee Dee and Savannah River systems, and possibly the Saluda River system in South Carolina. In North Carolina, the species is now known only from a handful of streams in the Pee Dee and Catawba River systems. The species exists in very low abundances, usually within 6 feet of shorelines, throughout its known range. The general habitat requirements for the Carolina heelsplitter are shaded areas in large rivers to small streams, often burrowed into clay banks between the root systems of trees, or in runs along steep banks with moderate current. The more recent habitat where the Carolina heelsplitter has been found is in sections of streams containing bedrock with perpendicular crevices filled with sand and gravel, and with wide riparian buffers.

Biological Conclusion: No Effect

A mussel survey report for the Carolina heelsplitter was prepared and is included in Appendix C.

Northern long-eared bat

Threatened

USFWS Recommended Survey Window: June 1 – August 15

Habitat Description: In North Carolina, the northern long-eared bat (NLEB) occurs in the mountains, with scattered records in the piedmont and coastal plain. In western North Carolina, NLEB spend winter hibernating in caves and mines. Since this species is not known to be a long-distance migrant, and caves and subterranean mines are extremely rare in eastern North Carolina, it is uncertain whether or where NLEB hibernate in eastern North Carolina. During the summer, NLEB roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees (typically ≥ 3 inches dbh). Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat has also been found, rarely, roosting in structures like barns and sheds, under eaves of buildings, behind window shutters, in bridges, and in bat houses. Foraging occurs on forested hillsides and ridges, and occasionally over forest clearings, over water, and along tree-lined corridors. Mature forests may be an important habitat type for foraging.

Biological Conclusion: Unresolved

No caves or mines exist in the NRTR study area. No bat surveys of the culverts under US 21 or structures within the study area have been performed for this project to date. A review of the USFWS records dated October 2015 revealed that this species is current within Mecklenburg County. A bat survey will be completed prior to the start of construction activities if deemed necessary by the USFWS.

If the project involves tree clearing (greater than 3 inches in diameter) or structure demolition (bridges or buildings) after April 1, 2015, the Town of Huntersville will coordinate with the NCDOT's Natural Environment Section as soon as possible so that NCDOT can obtain

Endangered Species Act (ESA) concurrence regarding the northern long-eared bat from US Fish and Wildlife Service. Construction authorization will not be requested until ESA compliance is satisfied for the northern long-eared bat.

Michaux's sumac

Endangered

USFWS optimal survey window: May-October

Habitat Description: Michaux's sumac, endemic to the inner Coastal Plain and lower Piedmont, grows in sandy or rocky, open, upland woods on acidic or circumneutral, well-drained sands or sandy loam soils with low cation exchange capacities. The species is also found on sandy or submesic loamy swales and depressions in the fall line Sandhills region as well as in openings along the rim of Carolina bays; maintained railroad, roadside, power line, and utility rights-of-way; areas where forest canopies have been opened up by blowdowns and/or storm damage; small wildlife food plots; abandoned building sites; under sparse to moderately dense pine or pine/hardwood canopies; and in and along edges of other artificially maintained clearings undergoing natural succession. In the central Piedmont, it occurs on clayey soils derived from mafic rocks. The plant is shade intolerant and, therefore, grows best where disturbance (e.g., mowing, clearing, grazing, periodic fire) maintains its open habitat.

Biological Conclusion: No Effect

Suitable habitat for Michaux's sumac is present in the NRTR study area along roadside shoulders. Surveys were conducted by STV biologists throughout areas of suitable habitat on October 24, 2013, as well as June 4, 9 and July 14, 2014. No individuals of Michaux's sumac were observed. A review of NCNHP records, updated April 16, 2014, indicates no known occurrences within 1.0 mile of the NRTR study area.

4.5.2 Bald Eagle and Golden Eagle Protection Act

Habitat for the bald eagle primarily consists of mature forest in proximity to large bodies of open water for foraging. Large dominant trees are utilized for nesting sites, typically within 1.0 mile of open water.

A desktop-GIS assessment was performed using USGS Topographic maps, Mecklenburg County SID files, and USFWS Wetland Mapper. This assessment was of the NRTR study area, as well as the area within a 1.13-mile radius (1.0 mile plus 660 feet) of the NRTR project limits, and was performed on July 14, 2014 using 2013 color aerials. No water bodies large enough or sufficiently open to be considered potential feeding sources were identified. Since there was no foraging habitat within the review area, a survey of the NRTR study area and the area within 660 feet of the project limits was not conducted. Additionally, a review of the NCNHP database on July 14, 2014 revealed no known occurrences of this species within the Cornelius, NC Topographic Quadrangle. Due to the lack of habitat, known occurrences, and minimal impact anticipated for this project, it has been determined that this project will not affect the bald eagle.

4.5.3 Endangered Species Act Candidate Species

As of July 14, 2014 the USFWS lists one Candidate species for Mecklenburg County (Table 4-6). A review of NCNHP records, updated April 16, 2014, indicates that there is a current known occurrence of Georgia aster within the Cornelius, NC Topographic Quadrangle.

Table 4-6 – Candidate Species Listed for Mecklenburg County

Scientific Name	Common Name	Habitat Present
<i>Symphotrichum georgianum</i>	Georgia aster	Yes

Source: STIP U-5114 Natural Resources Technical Report (October 2014)

4.5.4 Essential Fish Habitat

The National Marine Fisheries Service (NMFS) has not identified any Essential Fish Habitat within the NRTR study area. Therefore, the proposed project will result in a no effect on available Essential Fish Habitat.

4.6 Anticipated Impacts to Water Resources

Wetland and stream impacts resulting from the Build Alternative have been calculated for the proposed intersection improvements at US 21 and Gilead Road. Impacts were calculated using the concept drawing dated July 2015 (included in Appendix B). Table 4-7, shown below, displays the impact calculations with three different buffer areas from the Cut/Fill line- 0 foot buffer, 25 foot buffer, and a 40 foot buffer.

Table 4-7 – Anticipated Impacts to Wetlands and Streams

Feature	40 Ft Cut/Fill Buffer		25 Ft Cut/Fill Buffer		Cut/Fill Boundary	
	Linear ft	Acres	Linear ft	Acres	Linear ft	Acres
Wetland A		<0.1				
Wetland B		<0.1		<0.1		
Stream A (Int.)	47		21		18	
Stream B (Int.)	447		410		18	
Stream C (Per.)	246		205		17	
Stream D (Per.)	81		49		16	

Source: STIP U-5114 Natural Resources Technical Report (October 2014) and Concept Drawing (July 2015)

The Town of Huntersville and/or the NCDOT will attempt to avoid and minimize impacts to streams and wetlands to the greatest extent practicable during project design.

The Town of Huntersville and/or the NCDOT will investigate potential on-site stream and wetland mitigation opportunities once a final decision has been rendered on the location of the preferred alternative. If on-site mitigation is not feasible, mitigation will be provided by the North Carolina Department of Environment and Natural Resources Division of Mitigation Services (formerly the Ecosystem Enhancement Program).

There are two primary outfalls for this project. The high point is near the intersection of US 21 and Gilead Road. Stormwater runoff is conveyed by existing ditches along US 21 flowing both to the north and south. The larger watershed flows to the north approximately 2000 feet from the intersection and outfalls at culvert into Stream D, small tributary to Torrence Creek. The second outfall is approximately 1000 feet to the south and outfalls at a culvert into Stream C, a separate tributary to Torrence Creek. Both watersheds are heavily developed with single and multi-family housing as well as commercial/business development along the US 21 corridor. Torrence Creek ultimately flows into Mountain Island Lake which is approximately 5 miles to the west.

The proposed intersection improvement will require three culvert extensions. It is not anticipated that any permanent structural BMPs will be utilized for the proposed storm water conveyance system. Impacts to water resources may result from activities associated with project construction such as clearing and grubbing, riparian canopy removal, obstruction and redirection of surface groundwater flows and pavement/culvert installation.

The proposed project is located within the Catawba River Basin; the Catawba River Basin Buffer Rules apply only to the main stem of the Catawba River. Therefore, no buffer rules apply to any streams within the NRTR study area and therefore, no streams are subject to buffer rule protection. This project will implement NCDOT's Best Management Practices (BMPs) to minimize impacts to water resources through the design and construction of this project.

It is anticipated that this project will be permitted under the NCDOT's Stormwater Permit and will not be reviewed for compliance with local post-construction storm water control ordinances.

4.7 Permits

The proposed project has been designated as a Categorical Exclusion (CE) for the purposes of National Environmental Policy Act (NEPA) documentation. As a result, a Nationwide Permit (NWP) 23 will likely be applicable. A NWP No. 14 may also be applicable for the discharge of fill material into waters of the U.S. associated with roadway construction activities such as road widening, culvert extensions, and/or intersection improvements. The USACE holds the final discretion as to what permit will be required to authorize project construction. If a Section 404 permit is required then a Section 401 Water Quality Certification (WQC) from the NCDWR will be needed.

The NRTR study area is not located in a state-regulated Coastal Management Act (CAMA) county; therefore, no CAMA wetlands or Areas of Environmental Concern (AEC) were identified in the NRTR study area. No CAMA permits will be required.

No trout, anadromous fish, or primary nursery areas are present within the NRTR study area. No construction moratoria apply to any waters within the NRTR study area.

No waters within the NRTR study area have been designated by the USACE as Navigable Waters under Section 10 of the Rivers and Harbors Act.

5. CULTURAL RESOURCES

This project is subject to compliance with Section 106 of the National Historic Preservation Act of 1996, as amended, implemented by the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106, codified at 36 CFR Part 800. Section 106 requires federal agencies to take into the effect of their undertakings (including funded, licensed, or permitted projects) on properties listed on or eligible for the National Register of Historic Places and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking. This project is also subject to compliance with Section 4(f) of the Department of Transportation Act of 1966, as amended.

5.1 Historic Architecture & Archaeology

A cultural resource screening was conducted and in a memorandum dated August 19, 2015, The North Carolina Department of Cultural Resources (State Historic Preservation Office) confirmed that they are aware of no historic resources which would be affected by the project. Therefore, they have no comment on the project as proposed. A copy of this memorandum can be found in Appendix D.

6. HUMAN ENVIRONMENT

6.1 Land Use

The DCIA is urbanized with existing land use comprised of a mixture of residential, office, and retail uses. Residential developments include single family residential near Dallas Street and with multi-family residential along US 21 and Commerce Centre Drive. There are several multi-family complexes in the DCIA, including Deer Hill, Huntersville Apartments, Huntersville Commons and Parkview. Greenfield Park is a 20th century, single-family neighborhood located in the southeast quadrant of the intersection at US 21 and Gilead Road. This neighborhood is located behind non-residential uses along Gilead Road. The residences that have frontage along Gilead Road are some distance away from the intersection due to the location of the non-residential uses. Several commercial centers are located adjacent to the intersection, including Huntersville Gateway/Gateway Village, Huntersville Square and Bayshore Plaza. According to local planners, a paint store is under construction in Huntersville Gateway Village.

The *Gilead Road/US 21 Transportation and Land Use Vision Small Area Plan (January 2006)* calls for improvements to the US 21/Gilead Road intersection, with additional connectivity and multi-modal accommodations to relieve vehicular pressure at the intersection, facilitate the evolution of land development to a more urban and mixed use pattern, and create a gateway into the historic downtown of Huntersville. Local planners have indicated that the proposed project (U-5114) is essential to accomplish the Town's goal of revitalizing this area into a vibrant gateway.

Mecklenburg County's *Greenway Plan Update 2008* and the Town of Huntersville's *Greenway and Bikeway Master Plan (August 2014)* both call for a continuation of the existing greenway along Torrence Creek Tributary #2, across I-77 and across US 21 near Compass Street and Arahova Drive and into the downtown area. Bonus allocation funds have been allocated by CRTPO to construct the I-77 underpass during the managed lanes project under I-5405. The Town of Huntersville's Capital Improvement Program proposes to construct the greenway trail into downtown between fiscal year 2019 and fiscal year 2021.

6.2 Demographic Analysis

6.2.1 Environmental Justice

According to the US Census Bureau, American Community Survey 5-year Estimates (2007-2011), minority (non-white) populations within the DSA, or individual Block Groups in the DSA, do not meet the criteria for notable Environmental Justice populations because they do not make up 50% or more of the population and they do not exceed the percentage minority in the County by 10 or more percentage points. The total minority percentage in the DSA is 24.0% as compared to 41.8% in Mecklenburg County; therefore, while there are minority populations in the DSA, there is not a notable minority presence.

Census data indicates a notable presence of low income populations meeting the criteria for Environmental Justice within the DSA, and low income communities were observed within the DCIA during the site visit. Subsidized housing, including the Deer Hill apartments, is located northeast of the intersection.

About 13.6% of residents in Mecklenburg County live below poverty. One Block Group in the DSA exceeds the County by more than 5 percentage points. Census Tract 63.03, Block Group 1 is 19.9% below poverty. This Block Group is located in the northeast quadrant of the intersection between US 21 and NC 115, and between Stumptown Road and Gilead Road.

Additionally, 6.0% of Mecklenburg County residents are "very poor" (with incomes less than 50% of poverty level) and 8.7% are "near poor" (with incomes between 100% and 149% of the poverty level). Census Tract 62.15, Block Group 1 exceeds the County by more than 5 percentage points for both categories. About 17.2% of the Block Group is "very poor" and 21.6% is "near poor." This Block Group is located in the southwest quadrant of the intersection between US 21 and SR 2138 (McCoy Road), and between Gilead Road and SR 2116 (Alexandriana Road). The portion of the DCIA in this Block Group is relatively small.

6.2.2 Limited English Proficiency

Census data indicates a Spanish-speaking population within the DSA that meets or exceeds the United States Department of Justice Limited English Proficiency (LEP) Safe Harbor threshold. Local officials indicate that there are Hispanic populations in the apartment complexes northeast of the intersection.

Four hundred eighty-six people (7.5% of the adult population) in the DSA speak Spanish and speak English less than very well. Approximately half of these people (or 14.8% of the adult

population) reside in Census Tract 63.03, Block Group 1 in the northeast quadrant of the intersection. The majority of other Spanish speakers (14.6% of the adult population) reside in Census Tract 62.15, Block Group 1 in the southwest quadrant of the intersection.

Census data also reveals Asian/Pacific LEP populations that exceed 50 persons within the DSA. Fifty-three people (4.1% of the adult population) who speak Asian/Pacific languages and speak English less than very well reside in Census Tract 62.12, Block Group 1. Only a small portion of the DCIA is located in this Block Group, which is predominantly located on the west side of I-77.

Because Census data indicates a Spanish-speaking population within the DSA that meets or exceeds the United States Department of Justice LEP Safe Harbor threshold, written translations of vital documents should be provided for Spanish-speaking populations, in addition to other measures, as determined by NCDOT Public Involvement, to assure meaningful language access to satisfy the requirements of Executive Order 13166.

6.3 Other Notable Community Characteristics

Gilead Road through the DCIA is designated as State Bicycle Route 6 or the Piedmont Spur Route of the North Carolina Bicycling Highway System.

According to Mecklenburg County's Polaris 3G website and the Public Library of Charlotte and Mecklenburg County, there is a cemetery near the Christian Montessori School and Huntersville Apartments. This cemetery may be located within the DCIA, but is outside of the project footprint.

The Town of Huntersville owns a small neighborhood park (Greenway Park) at the corner of Greenway Street and Dallas Street, within the Greenfield Park neighborhood. It is within the DCIA, but not in close proximity to the project footprint.

6.4 Potential Community Impacts

6.4.1 Business Impacts

Exposure of properties and business visibility will not change as a result of the project; however, the redirection of left turns at the US 21 / Gilead Road intersection, along with inclusion of new medians on US 21 and Gilead Road will affect left turn access to businesses in the vicinity of the project (such as the Yadkin Bank, Fifth Third Bank, and BP). Driveways will be converted to right-in/right-out operation or consolidated in certain locations. Destination businesses, such as banks, may benefit from the improved traffic operations (reduced congestion and delay) at the US 21 / Gilead Road intersection. However, convenience businesses, like gas stations, may be affected if other neighboring competitors are not similarly affected.

6.4.2 Environmental Justice

There are minority populations in the DSA; however, there is not a notable EJ/minority population. While notable low income populations are present, no notably adverse community

impacts are anticipated with this project; thus, impacts to minority and/or low income populations do not appear to be disproportionately high and adverse. Benefits and burdens resulting from the project are anticipated to be equitably distributed throughout the community.

6.4.3 Community Cohesion, Services and Facilities

The proposed intersection improvements are predominantly within the existing right of way, and the bicycle and pedestrian facilities and associated connector roads are expected to improve mobility and connectivity within the area. There will be no physical separation of existing neighborhoods or business centers, and the project is not expected to negatively impact stability and cohesion within the community. During the feasibility phase of the project, the Town's Traffic Safety Supervisor voiced a concern about the need for traversable medians for public service vehicles (like police cars).

6.4.4 Right of Way and Relocations

The majority of the project will be constructed within the existing transportation corridors; however, portions of the project would be constructed in areas where there is insufficient right of way. A Relocation Report was conducted by NCDOT (September 2014). This Relocation report is located in the Appendix E. One dry cleaner business within the Bayshore Plaza will be relocated, and a residential relocation is anticipated as a result of the Dallas Street realignment. Neither relocation is low income or minority, and relocations would be conducted in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Act). STV Roadway Design calculated there would be four acres of proposed right of way to be purchased across 22 parcels for the project.

The right of way cost estimate from NCDOT is located in Appendix E. Right of way acquisition is scheduled to begin in October 2016, while construction is scheduled to begin in October 2017.

6.4.5 Utilities

Preliminary utility relocation information is based on visual observations and review of utility as-builts. A utility survey, conflict plan and relocation design will be completed during design. The *Utility Information for Categorical Exclusion Document Memorandum (September 2014)* is in Appendix G. Based on discussions with NCDOT Utilities Unit, there are no planned expansions.

The following existing utilities are within the project limits:

- Duke Energy overhead transmission line, overhead distribution utility pole line and underground lines
- Electricities (management company for municipal utilities) overhead distribution utility pole lines and underground lines
- AT&T overhead utility pole line and underground lines
- Piedmont Natural Gas underground lines and above ground substations (one abandoned and one active)
- Charlotte Mecklenburg Utilities (CMU) underground water and sewer lines

- Time Warner Cable overhead and underground lines
- Making Connections North Carolina (MCNC) underground line
- NCDOT signal poles and loops

Potential utility relocations include:

1. Duke Energy overhead transmission line that spans the US 21/Gilead intersection.
2. Duke Energy overhead distribution utility pole line that parallels US 21 from the southeast quadrant of the intersection to the south end of the project limits on US 21.
3. Electricities overhead distribution utility pole lines that parallel US 21 and Gilead Road.
4. AT&T overhead utility pole line in northeast and southeast quadrant.
5. Abandoned Piedmont Natural Gas substation on Gilead Road.
6. CMU water and sewer facilities will be adjusted according to final grades and cross-sections.

Preliminary utility relocation costs are expected to be around \$772,000, excluding right of way costs, this estimate from NCDOT is included in Appendix G. It is anticipated that the majority of the underground utilities can remain in place. None of the relocations should cause substantial disruptions in utility service or should impact traffic. Discussions with utility companies are ongoing and will continue throughout the design and construction of the project.

6.4.6 Section 4(f) and Section 6(f) Resources

There are no Section 4(f) or 6(f) resources in the project limits.

6.4.7 Air Quality

Air pollution originates from various sources. Emissions from industry and internal combustion engines are the most prevalent sources. The impact resulting from highway construction ranges from intensifying existing air pollution problems to improving the ambient air quality. Changing traffic patterns are a primary concern when determining the impact of a new highway facility or the improvement of an existing highway facility. Motor vehicles emit carbon monoxide (CO), nitrogen oxide (NO), hydrocarbons (HC), particulate matter, sulfur dioxide (SO₂), and lead (Pb) (listed in order of decreasing emission rate).

The Federal Clean Air Act of 1970 established the NAAQS. These were established in order to protect public health, safety, and welfare from known or anticipated effects of air pollutants. The most recent amendments to the NAAQS contain criteria for sulfur dioxide (SO₂), particulate matter (PM₁₀, 10-micron and smaller, PM_{2.5}, 2.5 micron and smaller), carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), and lead (Pb). The National and North Carolina Ambient Air Quality Standards are presented in Table 1 of the full technical report.

The primary pollutants from motor vehicles are unburned hydrocarbons, NO_x, CO, and particulates. Hydrocarbons (HC) and Nitrogen oxides (NO_x) can combine in a complex series

of reactions catalyzed by sunlight to produce photochemical oxidants such as ozone and NO₂. Because these reactions take place over a period of several hours, maximum concentrations of photochemical oxidants are often found far downwind of the precursor sources. These pollutants are regional problems.

A project-level quantitative air quality analysis was prepared for this project. A copy of the unabridged version of the full technical report entitled *US 21 and Gilead Road Intersection Improvements (TIP Project U-5114), Mecklenburg County* dated April 2015 can be viewed at the Project Development & Environmental Analysis Unit, Century Center Building A, 1010 BirchRidge Drive, Raleigh.

Carbon Monoxide Microscale Analysis

Because the project is located within the Mecklenburg County which is within Charlotte nonattainment area for carbon monoxide (CO), a microscale air quality analysis was performed to determine future CO concentrations resulting from the proposed highway improvements. A microscale hot-spot analysis that predicted future carbon monoxide concentrations resulting from the proposed highway improvements indicated that no violations of the applicable NAAQS CO concentrations are anticipated. Carbon monoxide vehicle emission factors were calculated for the years 2013 and 2025 using the EPA publication "Mobile Source Emission Factors", and the MOVES mobile source emissions computer model.

Mobile Source Air Toxics (MSAT)

Background

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the U.S. Environmental Protection Agency (EPA) regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS) (<http://www.epa.gov/iris/>). In addition, EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA) (<http://www.epa.gov/ttn/atw/nata1999/>). These are acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules. The 2007 EPA rule mentioned above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. According to an FHWA analysis using EPA's MOBILE6.2 model, even if vehicle activity (vehicle-miles travelled, VMT) increases by 145 percent as assumed, a combined reduction of 72 percent in the total annual emission rate for the priority MSAT is projected from 1999 to 2050.

MSAT analyses are intended to capture the net change in emissions within an affected environment, defined as the transportation network affected by the project. The affected environment for MSATs may be different than the affected environment defined in the NEPA document for other environmental effects, such as noise or wetlands. Analyzing MSATs only within a geographically-defined “study area” will not capture the emissions effects of changes in traffic on roadways outside of that area, which is particularly important where the project creates an alternative route or diverts traffic from one roadway class to another. At the other extreme, analyzing a metropolitan area’s entire roadway network will result in emissions estimates for many roadway links not affected by the project, diluting the results of the analysis.

Incomplete or Unavailable Information for Project Specific MSAT Health Impact Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, www.epa.gov/iris/). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are; cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI, <http://pubs.healtheffects.org/view.php?id=282>) or in the future as vehicle emissions substantially decrease (HEI, <http://pubs.healtheffects.org/view.php?id=306>).

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts - each step in the

process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupported assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (<http://pubs.healtheffects.org/view.php?id=282>). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA (www.epa.gov/risk/basicinformation.htm#g) and the HEI (<http://pubs.healtheffects.org/getfile.php?u=395>) have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and

fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

Conclusion

The science of mobile source air toxics is still evolving. As the science progresses, FHWA will continue to revise and update this guidance. FHWA is working with stakeholders, EPA and others to better understand the strengths and weaknesses of developing analysis tools and the applicability on the project level decision documentation process.

Summary

Vehicles are a major contributor to decreased air quality because they emit a variety of pollutants into the air. Changing traffic patterns are a primary concern when determining the impact of a new highway facility or the improvement of an existing highway facility. New highways or the widening of existing highways increase localized levels of vehicle emissions, but these increases could be offset due to increases in speeds from reductions in congestion and because vehicle emissions will decrease in areas where traffic shifts to the new roadway. Significant progress has been made in reducing criteria pollutant emissions from motor vehicles and improving air quality, even as vehicle travel has increased rapidly.

After performing a microscale CO analysis, the proposed *TIP Project U-5114* has been found not to exceed the 1-hour or 8-hour standards for this pollutant. The project is located in Mecklenburg County, which complies with the National Ambient Air Quality Standards. This project will not add substantial new capacity or create a facility that is likely to meaningfully increase emissions. Therefore, it is not anticipated to create any adverse effects on the air quality of this maintenance area. This evaluation completes the assessment requirements for air quality of the 1990 Clean Air Act Amendments and the NEPA process, and no additional reports are necessary.

6.4.8 Highway Traffic Noise

Introduction

In accordance with Title 23 Code of Federal Regulations Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise (Title 23 CFR 772) and the North Carolina Department of Transportation Traffic Noise Abatement Policy, each Type I highway project must be analyzed for predicted traffic noise impacts. In general, Type I projects are proposed State or Federal highway projects for construction of a highway or interchange on new location, improvements of an existing highway which substantially changes the horizontal or vertical alignment or increases the vehicle capacity, or projects that involve new construction or substantial alteration of transportation facilities such as weigh stations, rest stops, ride-share lots or toll plazas.

Traffic noise impacts are determined through implementing the current Traffic Noise Model (TNM) approved by the Federal Highway Administration (FHWA) and following procedures

detailed in Title 23 CFR 772, the NCDOT Traffic Noise Abatement Policy and the NCDOT Traffic Noise Analysis and Abatement Manual. When traffic noise impacts are predicted, examination and evaluation of alternative noise abatement measures must be considered for reducing or eliminating these impacts. Temporary and localized noise impacts will likely occur as a result of project construction activities. Construction noise control measures will be incorporated into the project plans and specifications.

A copy of the unabridged version of the full technical report entitled *U-5114 Traffic Noise Analysis - US 21 and Gilead Road Intersection Improvements* can be viewed in the Project Development & Environmental Analysis Unit, Century Center Building A, 1000 Birch Ridge Drive, Raleigh.

Traffic Noise Impacts and Noise Contours

The maximum number of receptors in each project alternative predicted to become impacted by future traffic noise is shown in the table below. The table includes those receptors expected to experience traffic noise impacts by either approaching or exceeding the FHWA Noise Abatement Criteria or by a substantial increase in exterior noise levels.

The maximum extent of the 71- and 66- dB(A) noise level contours measured from the center of the proposed roadway is 48 feet and 97 feet, respectively.

Table 6-1 – Predicted Traffic Noise Impacts by Alternative*

Alternative	Traffic Noise Impacts			Total
	Residential (NAC B)	Places of Worship/Schools, Parks, etc. (NAC C & D)	Businesses (NAC E)	
Existing	8	0	0	8
No-Build	10	6	0	16
Build	10	6	2	18

*Per TNM2.5 and in accordance with 23 CFR Part 772

No Build Alternative

The Traffic Noise Analysis also considered traffic noise impacts for the “no-build” alternative. If the proposed project does not occur, 16 receptors are predicted to experience traffic noise impacts and the future traffic noise levels will minimally increase. Based upon research, humans barely detect noise level changes of 2-3 dBA. A 5-dBA change is more readily noticeable. Therefore, most people working and living near the roadway will not notice this predicted increase.

Traffic Noise Abatement Measures

Measures for reducing or eliminating the traffic noise impacts were considered for all impacted receptors in each alternative. The primary noise abatement measures evaluated for highway projects include highway alignment changes, traffic system management measures,

establishment of buffer zones, noise barriers and noise insulation (NAC D only). For each of these measures, benefits versus costs (reasonableness), engineering feasibility, effectiveness and practicability and other factors were included in the noise abatement considerations.

Substantially changing the highway alignment to minimize noise impacts is not considered to be a viable option for this project due to engineering and/or environmental factors. Traffic system management measures are not considered viable for noise abatement due to the negative impact they would have on the capacity and level of service of the proposed roadway. Costs to acquire buffer zones for impacted receptors will exceed the NCDOT base dollar value of \$37,500 plus an incremental increase of \$525 (as defined in the NCDOT Policy) per benefited receptor, causing this abatement measure to be unreasonable.

Noise Barriers

Noise barriers include two basic types: earthen berms and noise walls. These structures act to diffract, absorb and reflect highway traffic noise. For this project, earthen berms are not found to be a viable abatement measure because the additional right of way, materials and construction costs are estimated to exceed the NCDOT maximum allowable base quantity of 7,000 cubic yards, plus an incremental increase of 100 cubic yards per benefited receptor, as defined in the NCDOT Policy.

A noise barrier evaluation was conducted for this project utilizing the Traffic Noise Model (TNM 2.5) software developed by the FHWA. The following table summarizes the results of the evaluation. The first potential barrier location evaluated with TNM is the east side US 21, between the roadway and the Huntersville Commons apartment complex. Based upon criteria defined in the NCDOT Traffic Noise Abatement Policy, this barrier is not justified and is not recommended for construction.

Table 6-2 – Preliminary Noise Barrier Evaluation Results

Alternative (Noise Barrier Location)	Length / Height (feet)	Square Footage	Number of Benefited Receptors	Square Feet per Benefited Receptor / Allowable Square Feet per Benefited Receptor	Preliminarily Recommended for Construction ¹
Build Alternative (East side US 21, between the roadway and the Huntersville Commons apartment complex)	250 / 17	4,250	6	709 / 2,530	No

¹ Barrier is not feasible due to multiple conflicts with existing utilities. Thus no barriers are recommended at this time for the US 21 (Statesville Road) and SR 2136 (Gilead Road) Intersection Improvements project.

Summary

Based on this preliminary study, traffic noise abatement is not recommended and no noise abatement measures are proposed. This evaluation completes the highway traffic noise requirements of Title 23 CFR Part 772. No additional noise analysis will be performed for this project unless warranted by a substantial change in the project's design concept or scope.

In accordance with NCDOT Traffic Noise Abatement Policy, the Federal/State governments are not responsible for providing noise abatement measures for new development for which building permits are issued after the Date of Public Knowledge. The Date of Public Knowledge of the proposed highway project will be the approval date of the Categorical Exclusion (CE). For development occurring after this date, local governing bodies are responsible to insure that noise compatible designs are utilized along the proposed facility.

6.4.9 Hazardous Materials

A *Limited Hazardous Materials and Waste Assessment (May 14, 2014)*, was prepared which revealed that two North Carolina Department of Environment and Natural Resources (NCDENR) documented Leaking Underground Storage Tank (LUST) incidents where the groundwater was impacted have occurred on properties abutting the project corridor. Additionally, the NCDOT GeoEnvironmental Unit provided a memo on October 30, 2014 (located in Appendix E) for right of way recommendations that investigates three potentially contaminated sites. Summarized recommendations are included below.

- The Fast Track #129 at 502 Gilead Road is presently undergoing groundwater remediation due to gasoline contamination. Laboratory results indicated that no petroleum contaminated soil exists within the area tested. Acquisition of the right of way along this property should be acquired through fee simple with no money withheld.
- Kim's Amoco at 101 S. Statesville Road has had a reported LUST. Petroleum contamination was detected but was below the NCDENR action level of 10mg/Kg. Acquisition of the right of way along this property should be acquired through fee simple with no money withheld.
- The Valvoline Oil at 14114 Statesville Road was investigated as a potentially contaminated site in the right of way recommendations memo provided by the NCDOT GeoEnvironmental Unit. Petroleum contamination was detected but was below the NCDENR action level of 10mg/Kg. Acquisition of the right of way along this property should be acquired through permanent easement with no money withheld.

Adverse environmental impacts are not expected during construction, and other incidents (because of distance, status, topographic relationships and materials involved) have a low potential to impact the project corridor. Based on research of the public record and site

reconnaissance, there is not a high risk of current contamination within the project corridor and no further environmental testing is deemed warranted at this time.

6.4.10 Farmland

The Farmland Protection Policy Act requires all federal agencies or their representatives to consider the potential impact to farmland of land acquisition and construction projects. However, if a project is located in an urbanized area as defined by the US Census Bureau maps, the FPPA does not apply. The Direct Community Impact Area (DCIA) created for this project is located within a US Census Bureau urbanized area.

According to the North Carolina Department of Agriculture and Consumer Services (2010 data), Mecklenburg County does not have a Voluntary Agriculture District Ordinance, an Enhanced Voluntary Agriculture District Ordinance, or a Farmland Protection Plan. Additionally, the only agricultural activities observed in the area are located near Stumptown Road, on the west side of US 21. This property is zoned as neighborhood residential.

6.4.11 Indirect and Cumulative

As part of the *U-5114 Mecklenburg County Community Impact Assessment (dated July 2015)*, an Indirect Land Use Effects Screening Tool matrix was prepared. It revealed that further analysis in the form of a Land Use Scenario Assessment is not warranted (reference **Table 6-3**).

Table 6-3 – Indirect Land Use Effects Screening Tool Matrix

Rating	Scope of Project	Travel Time Savings	Forecasted Population Growth	Forecasted Employment Growth	Available Land	Water/ Sewer Availability	Market for Development	Public Policy	Notable Environmental Features	Result
More Concern	Major New Location	> 10 minute travel time savings	> 3% annual population growth	Substantial # of New Jobs Expected	5000+ Acres of Land	All services existing / available	Development activity abundant	Less stringent; no growth management	Abundant Features Present	
↑						X				
↑			X				X			
↔								X		
↓	X	X		X	X				X	Land Use Scenario Assessment Not Likely
↓										
Less Concern	Very Limited Scope	No travel time savings	No population growth or decline	No new Jobs or Job Losses	Limited Land Available	No service available now or in future	Development activity lacking	More stringent; growth management	Minimal Features Present	

The improvements are being made to an existing intersection and therefore limit the scope of the project. As these are improvements for an intersection rather than a network, they do reduce congestion, but do not greatly reduce travel times.

Huntersville is outside of Charlotte, in a high growth area but with limited anticipated employment growth in the DCIA, despite the Town being an attractive place for development. The US 21 and Gilead Road intersection is located in an already developed part of Huntersville between I-77 and downtown. Land uses surrounding the intersection are

predominantly commercial, with some residential uses to the east of Commerce Centre Drive and near Dallas Street. Mixed uses are found along the US 21 and Gilead Road corridors, and water and sewer are available in the DCIA.

Local planners have indicated that the proposed project (U-5114) is essential to accomplish the Town's goal of revitalizing this area into a vibrant gateway, and the project is consistent with local land use and transportation plans. The local land use plans manage growth but do not necessarily restrict growth in the DCIA. There are few natural resources present in the DCIA; however, there are jurisdictional waters. These water resources in the area are protected by permit requirements (for the discharge of fill material into waters of the U.S.) The US Army Corps holds the final discretion as to what permit will be required to authorize project construction. If a Section 404 permit is required then a Section 401 Water Quality Certification (WQC) from the NC Department of Water Resources will be needed.

6.4.12 Estimated Cost

The latest cost estimate was made in July 2015. This estimated cost was calculated using unit costs per roadway items. Additional roadway width, relocations, acquisitions, and impacts were calculated for the project and applied to unit costs. Total project cost is estimated to be \$11,156,400. Approximately \$5,913,200 would be construction-related, and approximately \$3,350,000 would be in right of way acquisitions. The Cost Estimate Calculations are included in Appendix F.

6.5 Preferred Alternative

The preferred alternative includes improvements to the US 21/ Gilead Road intersection and modifications to a couple adjacent roads (Columbia Street and Dallas Street) to support operations at the main intersection. The proposed modifications would help to alleviate congestion in the area. The left turn movements that currently result in substantial delay would be redirected from the main intersection to double lane u-turns along US 21. In 2025, if this project is not built, the US 21/Gilead Road intersection is anticipated to operate at a LOS F during both peak hours, along with extensive queuing along both the US 21 and Gilead Road corridors. The 2025 Build Alternative will improve LOS and prevent substantial queuing.

7. PUBLIC INVOLVEMENT

7.1 Agency and NCDOT Coordination

The following section summarizes the agency and NCDOT coordination during the NEPA phase of the project. The minutes for a pre-merger meeting and scoping meeting can be found in Appendix A. Meetings with other stakeholders (including business owners) and the public were held during the feasibility phase of project, and the Town plans to hold an additional public workshop prior to right of way acquisition.

7.1.1 Pre-Merger Meeting

A pre-merger meeting was held via conference call on June 16, 2014. The purpose of the meeting was to determine whether or not STIP Project U-5114 must enter the NCDOT

Merger process. The Merger Team is comprised of agency representatives with authority to determine whether or not a project has to follow this process. The meeting was attended by representatives of the following agencies:

- Federal Highway Administration (FHWA)
- North Carolina Department of Environment and Natural Resources – Division of Water Resources (NCDENR DWR)
- United States Army Corp of Engineers (USACE)
- North Carolina Department of Transportation Project Development and Environmental Analysis (NCDOT PDEA)
- NCDOT Division 10
- Town of Huntersville

Based on discussions held in the meeting, the representatives determined that the project would be exempt from the NCDOT Merger process.

7.1.2 Scoping Meeting

An NCDOT internal scoping meeting regarding the intersection improvements at US 21 and Gilead Road was held on June 19, 2014. The purpose of the meeting was to share information regarding the project, to identify constraints and red flags, and to discuss next steps in the planning process. Representatives from the following organizations and agencies were in attendance:

- Town of Huntersville
- NCDOT Division 10
- NCDOT Project Development and Environmental Analysis
- NCDOT Community Studies
- NCDOT Hydraulics
- NCDOT Natural Environment Section
- NCDOT Right of Way
- NCDOT Utilities

Appendix

- A. Meeting Minutes
 - A1. Pre-Merger Meeting – June 16, 2014
 - A2. Scoping Meeting – June 19, 2014
- B. Build Alternative Plans
 - B1. Figures 2-1 to 2-7, Document Sheets
 - B2. Figure 2-8, Typical Sections
 - B3. Design Criteria
- C. Natural Resources Documents
 - C1. USACE and NCDWQ Stream and Wetland Forms
 - C2. Mussel Survey Report
- D. Historic Architecture & Archaeology
 - D1. NC Department of Cultural Resources Memorandum
- E. Relocations
 - E1. NCDOT Relocation Report
 - E2. NCDOT GeoEnvironmental Right of Way Recommendations Memorandum
 - E3. NCDOT Right of Way Cost Estimate
- F. Cost Estimate
 - F1. Cost Estimate Calculations
- G. Utilities Memo
 - G1. Jarrett Engineering Utilities Memorandum
 - G2. NCDOT Utility Estimate Worksheet

Appendix A - Meeting Minutes
A1. Pre-Merger Meeting – June 16, 2014
A2. Scoping Meeting – June 19, 2014

**US 21/Gilead Road Intersection Improvements
Town of Huntersville
Mecklenburg County**

NCDOT STIP Project No. U-5114

June 16, 2014

Final Pre-Merger Meeting Minutes

This meeting regarding the intersection improvements at US 21 / Gilead Road was held at 10:00 am on 6/16/14 via conference call. The purpose of the meeting was determine whether or not STIP Project No. U-5114 must enter the Merger process.

Meeting attendees are listed below, and a summary of the meeting follows.

Attendees

Mitch Batuzich	FHWA	michael.batuzich@dot.gov
Alan Johnson	NCDENR DWR	alan.johnson@ncdenr.gov
Crystal Amschler	USACE	crystal.c.amschler@usace.army.mil
Elmo Vance	NCDOT PDEA	eevance@ncdot.gov
Jeff Hemphill	NCDOT NES	jlhemphill@ncdot.gov
Brandon Fulton	STV Environmental	brandon.fulton@stvinc.com
Anne Lenart-Redmond	STV Planning	anne.lenart-redmond@stvinc.com
Susan Paschal	STV Planning	susan.paschal@stvinc.com
Bill Coxe	Town of Huntersville	bcoxe@huntersville.org
Stuart Basham	NCDOT Division 10	slbasham@ncdot.gov

Summary

Mr. Vance introduced this municipal project and reiterated the purpose of the meeting. Ms. Paschal then provided the following project overview:

- This is an intersection improvement project located in Huntersville, NC.
- The US 21/Gilead Road intersection is located in an urbanized part of Huntersville, in between I-77 and downtown.
- Land uses surrounding the intersection are predominantly commercial, with some residential uses to the east of Commerce Centre Boulevard and near Dallas Street. Mixed uses are found along the US 21 and Gilead Road corridors.
- US 21 and Gilead Road are currently two-lane undivided facilities with turn lanes at the intersection.
- There is currently severe traffic congestion in the area, and left turn movements are of high concern; there are delays of 60-90 seconds per vehicle and people

avoid the intersection.

- 2013 ADTs:
 - 13,400-17,500 (US 21);
 - 15,400-24,200 (Gilead).
- 2025 ADTs:
 - 16,100-20,200 (US 21);
 - 21,700-31,900 (Gilead).
- Existing (2013) LOS at intersection is D in both AM and PM peak hour.
- Without improvements, future (2025) LOS at intersection expected to be F in both AM and PM peak hour; there would be delays of two to five minutes per vehicle.
- This project was first identified as a project as part of SB 1005. In the feasibility phase (Fall 2013/Winter 2014), STV and the Town of Huntersville re-evaluated the SB 1005 concept along with three additional conceptual alternatives. The other concepts were a U-turn intersection concept, a connector roads/quadrant left concept (with two design options) and a widening of US 21 concept. These concepts were screened from a traffic operations perspective, and one concept was superior.
- This locally preferred concept is the Build Alternative to be carried forward through the NEPA process. It is a “Michigan U-turn” type improvement and all lefts would be removed/redirected to dual signalized lefts with bulb outs. The bulb-outs would be located on US 21 approximately 550 feet from intersection (north) and 750 feet from the intersection (south).
- We would be forced to close and move or modify some driveways because of the U-turn locations – Huntersville Gateway, Huntersville Square, Dallas/Hillcrest.
- Because of this, we added the connection between Commerce Centre Drive and Boulder Park Drive.
- We also channelized the right turn from NB I-77 ramps in order to help the weaving issues between there and the intersection.
- About 4.5 acres of right of way is needed to implement the project.
- A residential relocation is anticipated near the intersection of Dallas and Hillcrest Streets.
- There was some discussion regarding the coordination of this project with I-5714.

Funding

- US 21/Gilead Road intersection improvements are included in the CRTPO’s 2040 MTP (2015 Horizon Year), the CRTPO’s TIP and the STIP.
- The STIP shows ~\$3.6M in STPDA funds, with the remainder of funds coming from Town (bonds). Total cost estimate \$8.5M.
- NCDOT is providing services related to right of way acquisition. There was discussion regarding the municipal agreement (being drafted).

Purpose and Need

- The purpose and need for the project is to improve traffic operations at the US 21/Gilead Road intersection.

Existing Conditions

- Based on GIS data, there are three stream crossings (unnamed tributaries). Estimated impacts from potential culvert extensions is approximately 250 linear feet.
- Mr. Fulton clarified that the stream impacts are expected to be much less than reported (that estimate was based on GIS data). Mr. Johnson agreed.
- These streams are in the Mountain Island Lake/Catawba River watershed. Buffers are required in the critical and protected areas of this water supply watershed (WS-IV), and local buffers may apply.
- According to the USFWS IPaC System and the NCNHP, the Carolina heelsplitter, Michaux's sumac, Smooth coneflower, and Schweinitz's sunflower are found in Mecklenburg County. Although habitat is present, no individuals were identified during a field review in October 2013. No known populations of any of the aforementioned species are near to the project.
- Additional field reviews for protected species/habitat will take place over the next few months.

Input/Recommendation

- FHWA – No Merger
- NCDENR DWR – No Merger
- USACE – No Merger
- NCDOT PDEA – No Merger

Schedule/Next Steps

- Target date for signed CE – September 2014
- Target date for right-of-way acquisition – October 2014
- Target date for letting – October 2015

**US 21/Gilead Road Intersection Improvements
Town of Huntersville
Mecklenburg County**

NCDOT STIP Project No. U-5114

June 19, 2014

Scoping Meeting Minutes

This meeting regarding the intersection improvements at US 21 / Gilead Road was held at 10:00am on 6/19/14 in the PDEA Large Conference Room in Raleigh, NC. The purpose of the meeting was to share information regarding the project, to identify constraints and red flags, and to discuss next steps in the planning process. A Categorical Exclusion (CE) is being prepared.

Meeting attendees are listed below, and a summary of the meeting follows.

Attendees

John Conforti	NCDOT PDEA	jgconforti@ncdot.gov
Elmo Vance	NCDOT PDEA	eevance@ncdot.gov
Harrison Marshall	NCDOT Comm. Studies	hmarshall@ncdot.gov
Paul Fisher	NCDOT Hydraulics	pfisher@ncdot.gov
Jeff Hemphill	NCDOT NES	jlhemphill@ncdot.gov
Michael Turchy	NCDOT NES	maturchy@ncdot.gov
Diane Wilson	NCDOT Public Inv.	pdwilson1@ncdot.gov
Robert Woodard	NCDOT R/W	rwoodard@ncdot.gov
Laura Sutton	NCDOT Structures	lsutton@ncdot.gov
Steve Trexler	NCDOT Utilities	strexler@ncdot.gov
Brandon Fulton	STV Environmental	brandon.fulton@stvinc.com
Nikki Honeycutt	STV PM	nikki.honeycutt@stvinc.com
Anne Lenart-Redmond	STV Planning	anne.lenart-redmond@stvinc.com
Susan Paschal	STV Planning	susan.paschal@stvinc.com
Max Buchanan	Town of Huntersville	mbuchanan@huntersville.org
Bill Coxe	Town of Huntersville	bcoxe@huntersville.org
Stuart Basham (via phone)	NCDOT Division 10	slbasham@ncdot.gov
Scott Cole (via phone)	NCDOT Division 10	scole@ncdot.gov

Summary

Susan Paschal provided a brief overview of this Town of Huntersville project to alleviate congestion at the intersection at US 21 and Gilead Road. She presented the locally preferred alternative, which is the Build Alternative for the NEPA study. Ms. Paschal also indicated that the project is included in the CRTPO's 2040 MTP, the CRTPO's TIP and the STIP. The STIP shows approximately \$3.6 million in STPDA funds, with the remainder of funds coming from

Town bonds. Total cost is estimated to be \$8.5 million. Ms. Paschal indicated that the signed CE is anticipated in September 2014; right of way acquisition is anticipated in October 2014 with a targeted let date of October 2015. The Pre-Merger meeting was held on 06/16/14 with the regulatory agencies; the project will not go through the Merger process.

Nikki Honeycutt then provided the following project description:

- The US 21/Gilead Road intersection is located in an urbanized part of Huntersville, in between I-77 and downtown.
- Land uses surrounding the intersection are predominantly commercial, with some residential uses to the east of Commerce Centre Boulevard and near Dallas Street. Mixed uses are found along the US 21 and Gilead Road corridors.
- The purpose and need for the project is to improve traffic operations at the US 21/Gilead Road intersection.
- This project was first identified as a project as part of Moving Ahead/SB 1005. In the feasibility phase (Fall 2013/Winter 2014), STV and the Town of Huntersville re-evaluated the SB 1005 concept along with three additional conceptual alternatives. The other concepts were a U-turn intersection concept, a connector roads/quadrant left concept (with two design options) and a widening of US 21 concept. These concepts were screened from a traffic operations perspective, and one concept was superior.
- This concept is the Build Alternative to be carried forward through the NEPA process. It is a “Michigan U-turn” type improvement and all lefts would be removed/redirected to dual signalized lefts with bulb outs.
- Several driveways/access points would need to be closed or modified because of the U-turn locations – Huntersville Gateway, Huntersville Square, Dallas/Hillcrest.
- Therefore, the connection between Commerce Centre Drive and Boulder Park Drive was added.

Ms. Paschal provided the following information regarding existing conditions:

- Based on GIS data, there are three stream crossings. These are unnamed tributaries that cross under US 21 in culverts. Estimated impacts from potential culvert extensions is approximately 250 linear feet. Field reviews that have been conducted since the scoping package was prepared reveal impacts are expected to be less.
- These streams are in the Mountain Island Lake/Catawba River watershed.
- According to the USFWS IPaC System and the NCNHP, several protected species are found in Mecklenburg County. Although habitat is present, no individuals were identified during a field review in October 2013.
- Additional field reviews for protected species/habitat will take place over the next few months.
- A high level demographic screening reveals that there may be larger percentages of minorities and LEP populations in the Block Group in the northeast quadrant of the intersection. Anecdotal evidence suggests these populations may be located in the apartments north of Arahova Drive and east of Columbia Drive. STV

distributed bilingual flyers and recommended citizens contact us for translation services if needed, but there has been no request during previous two public workshops. (Bill Coxe added that the project would likely improve access – pedestrian, bicycle and vehicular – for these sensitive populations.)

- Based on a search of Mecklenburg County’s Polaris website and SHPO’s GIS service, there are no historic resources in the study area.

Input from NCDOT groups:

- Per NCDOT HES (Harrison Marshall), the project would require a CIA short form, including the standard ICE matrix; however, they are amenable to having STV incorporate the CIA directly into the CE (for one review by NCDOT), as opposed to having stand-alone documents. STV will coordinate with HES directly.
- Per NCDOT NES (Jeff Hemphill), a Natural Resource Technical Report (NRTR) is required. There’s a tight survey window for T&E flowering plants. NES will review to see if there is a need for mussel surveys. If required, they can be done in house or under the NES on-call contracts. Given the current schedule and if amenable with FHWA, it’s possible to have a commitment in the CE to do surveys in the appropriate survey window after the document has been signed (assuming biologists have completed a field visit and it was off season for those particular flowering plants).
- NCDOT Public Involvement (Diane Wilson) is concerned about the level of outreach done for the Limited English Proficiency (LEP) population located primarily in the northeastern quadrant.
- Per NCDOT Right of Way (Robert Woodard), they will require 60-90 days to produce relocation report/cost estimates. If the Town wants NCDOT to acquire the R/W, they could work with Division staff or through the on-call contracts. NCDOT can provide a planning level relocation report for the CE, and then provide a more detailed relocation report when in design and utility easement information is available.
- Per NCDOT Utilities (Steve Trexler), they prefer that the same firm handle the right of way as well as utility estimates. Although there is the same distribution overhead, transmission lines in the area have changed since SB 1005. Duke Energy may have issues with raised medians (unless they are mountable).

Action Items:

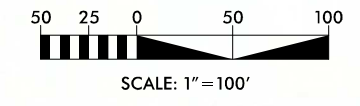
- STV to provide design plans to start the Right of Way, Utilities and Relocation Reporting process.
- STV to provide Robert Woodard (NCDOT R/W) the geotechnical report.
- STV to provide project timeline/schedule with milestones.
- NCDOT (Scott Cole) will get Preliminary Engineering (PE) funding activated for NCDOT use. The municipal agreement is pending due to the need for \$750,000 in W funds; it could proceed without the W funds, and the agreement could be amended later. Mr. Buchanan and Mr. Coxe reassured the group that the Town and Division are committed to this project. Contract Administration to be run through the Division, but the Town is not opposed to having NCDOT Raleigh administer.

Appendix B - Build Alternative Plans
B1. Figures 2-1 to 2-7, Document Sheets
B2. Figure 2-8, Typical Sections
B3. Design Criteria

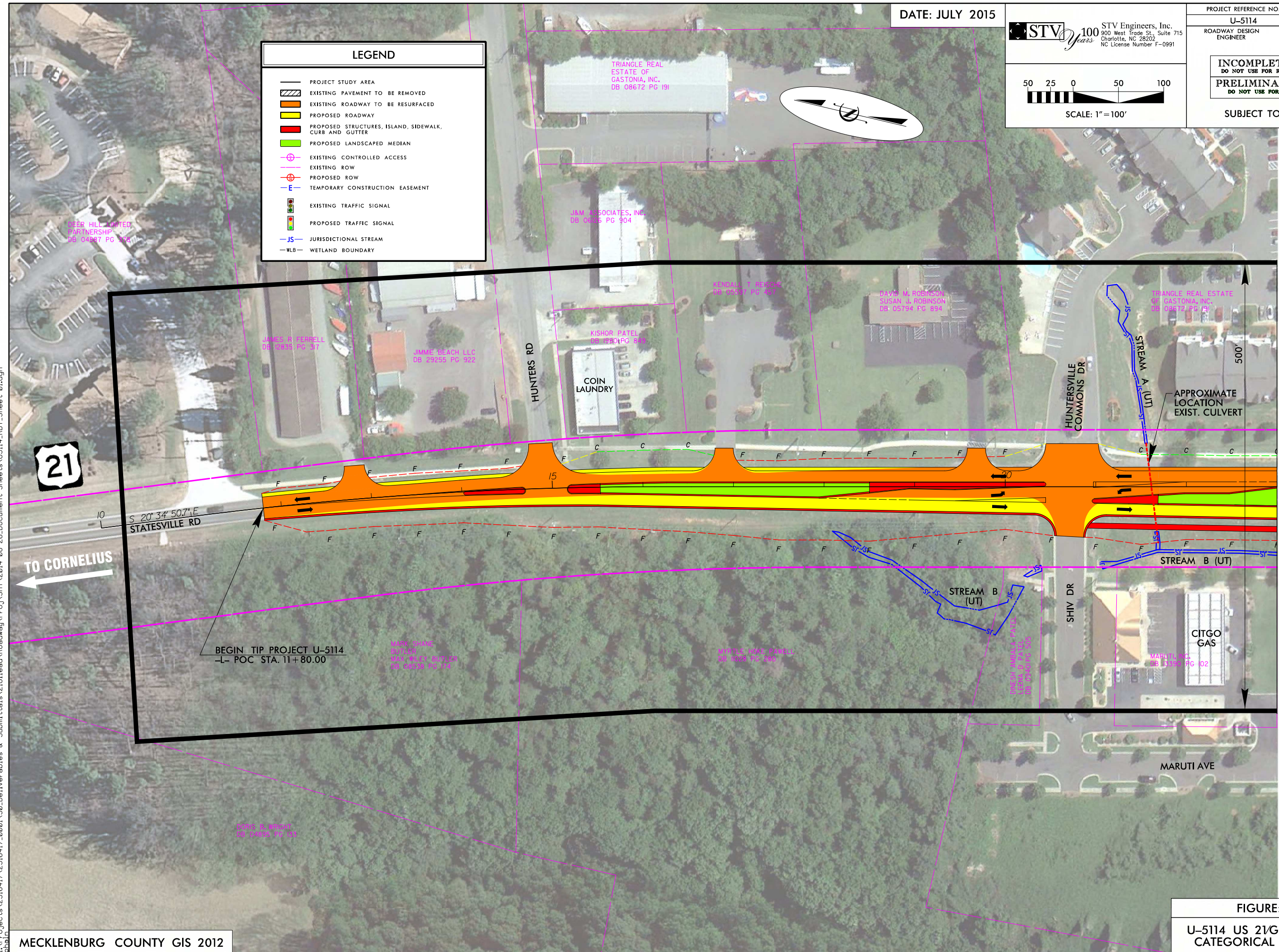
DATE: JULY 2015

STV 100 Years STV Engineers, Inc.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

PROJECT REFERENCE NO.	SHEET NO.
U-5114	1
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
SUBJECT TO CHANGE	



LEGEND	
	PROJECT STUDY AREA
	EXISTING PAVEMENT TO BE REMOVED
	EXISTING ROADWAY TO BE RESURFACED
	PROPOSED ROADWAY
	PROPOSED STRUCTURES, ISLAND, SIDEWALK, CURB AND GUTTER
	PROPOSED LANDSCAPED MEDIAN
	EXISTING CONTROLLED ACCESS
	EXISTING ROW
	PROPOSED ROW
	TEMPORARY CONSTRUCTION EASEMENT
	EXISTING TRAFFIC SIGNAL
	PROPOSED TRAFFIC SIGNAL
	JURISDICTIONAL STREAM
	WETLAND BOUNDARY



TO CORNELIUS
←

S 20° 34' 50.7" E
STATESVILLE RD

BEGIN TIP PROJECT U-5114
-L- POC STA. 11+80.00

MATCHLINE -L- STA: 23+00 (SHEET 2)

FIGURE: 2-1
U-5114 US 21/GILEAD ROAD
CATEGORICAL EXCLUSION

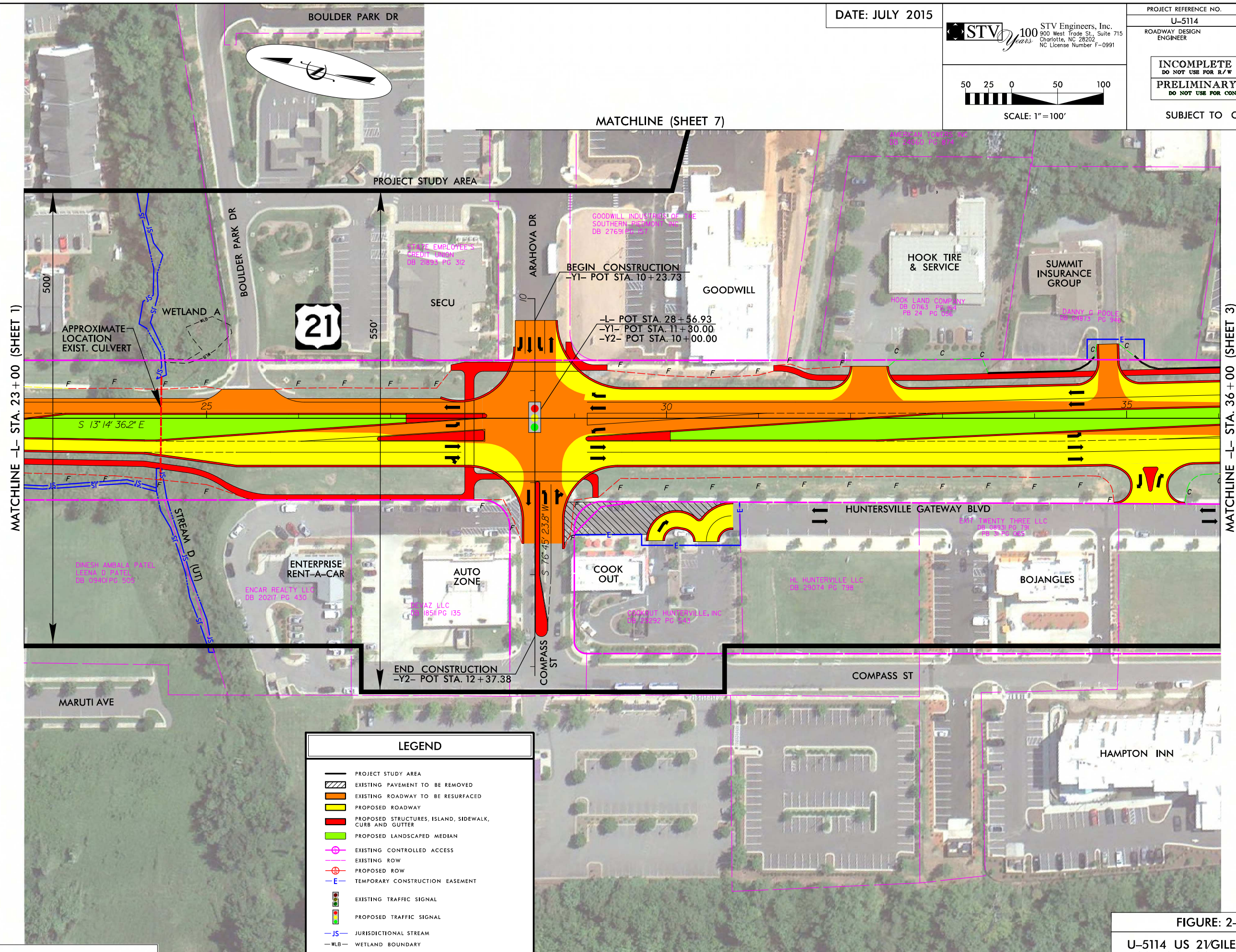
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DATE: JULY 2015

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 Charlotte, NC 28202
 NC License Number F-0991

50 25 0 50 100
 SCALE: 1" = 100'

PROJECT REFERENCE NO.	SHEET NO.
U-5114	2
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
SUBJECT TO CHANGE	



MATCHLINE -L- STA. 23+00 (SHEET 1)

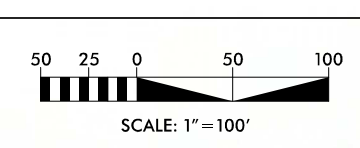
MATCHLINE -L- STA. 36+00 (SHEET 3)

LEGEND	
	PROJECT STUDY AREA
	EXISTING PAVEMENT TO BE REMOVED
	EXISTING ROADWAY TO BE RESURFACED
	PROPOSED ROADWAY
	PROPOSED STRUCTURES, ISLAND, SIDEWALK, CURB AND GUTTER
	PROPOSED LANDSCAPED MEDIAN
	EXISTING CONTROLLED ACCESS
	EXISTING ROW
	PROPOSED ROW
	TEMPORARY CONSTRUCTION EASEMENT
	EXISTING TRAFFIC SIGNAL
	PROPOSED TRAFFIC SIGNAL
	JURISDICTIONAL STREAM
	WETLAND BOUNDARY

FIGURE: 2-2

U-5114 US 21/GILEAD ROAD CATEGORICAL EXCLUSION

I:\2015\Projects\2516417_2516417_0001\50_Deliverables & Submittals\21GileadRoadway\Proj\SH1\2014-08-26-Document Sheets\U5114-RDY_Sheet 02.dgn

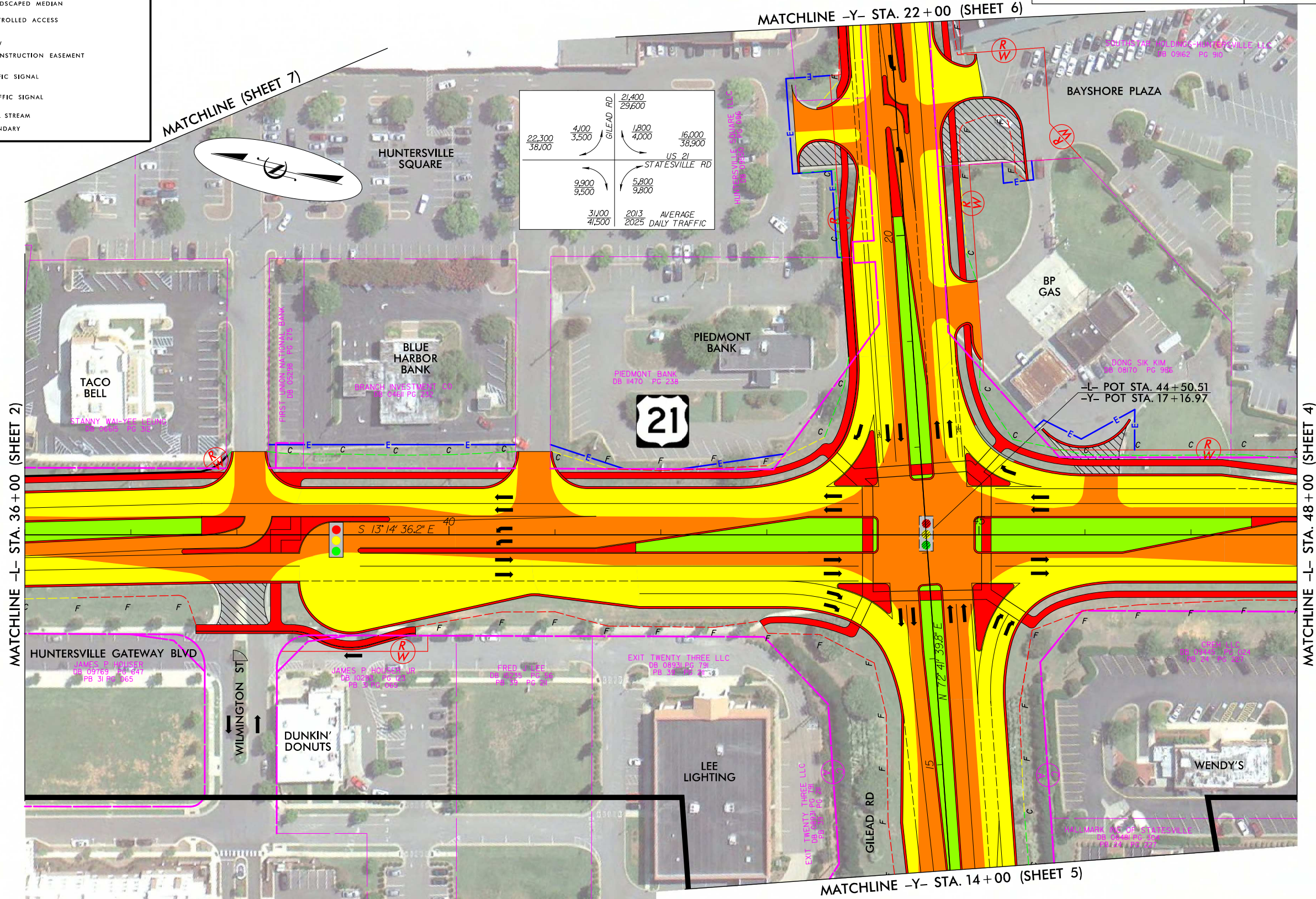


INCOMPLETE PLANS
 DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
 DO NOT USE FOR CONSTRUCTION

SUBJECT TO CHANGE

LEGEND	
	PROJECT STUDY AREA
	EXISTING PAVEMENT TO BE REMOVED
	EXISTING ROADWAY TO BE RESURFACED
	PROPOSED ROADWAY
	PROPOSED STRUCTURES, ISLAND, SIDEWALK, CURB AND GUTTER
	PROPOSED LANDSCAPED MEDIAN
	EXISTING CONTROLLED ACCESS
	EXISTING ROW
	PROPOSED ROW
	TEMPORARY CONSTRUCTION EASEMENT
	EXISTING TRAFFIC SIGNAL
	PROPOSED TRAFFIC SIGNAL
	JURISDICTIONAL STREAM
	WETLAND BOUNDARY



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FIGURE: 2-3
 U-5114 US 21/GILEAD ROAD
 CATEGORICAL EXCLUSION

DATE: JULY 2015

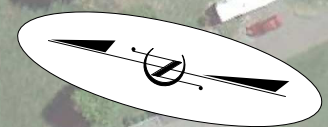
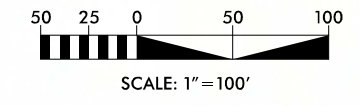
STV 100 Years STV Engineers, Inc.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

PROJECT REFERENCE NO.	SHEET NO.
U-5114	4
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

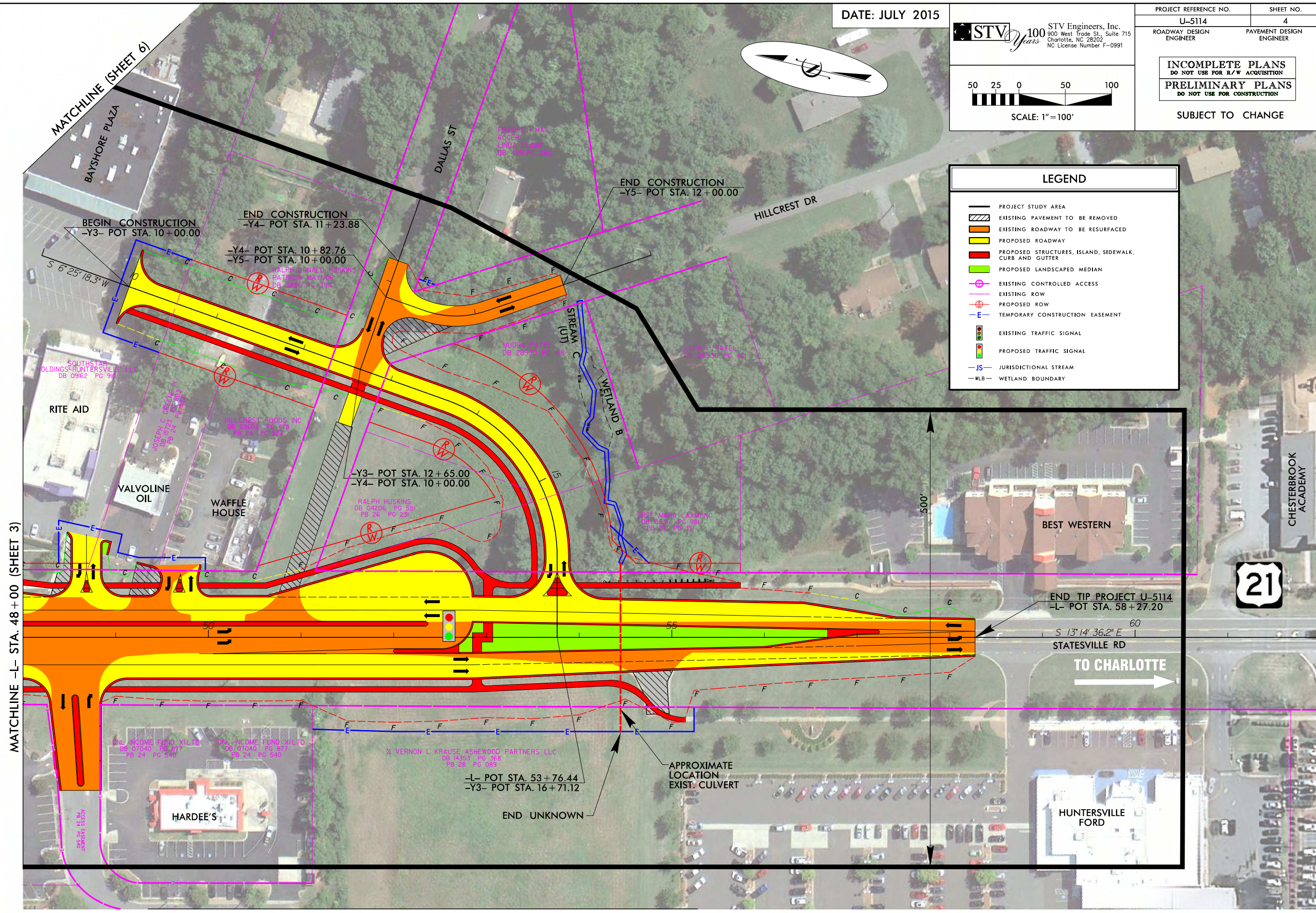
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SUBJECT TO CHANGE



LEGEND	
	PROJECT STUDY AREA
	EXISTING PAVEMENT TO BE REMOVED
	EXISTING ROADWAY TO BE RESURFACED
	PROPOSED ROADWAY
	PROPOSED STRUCTURES, ISLAND, SIDEWALK, CURB AND GUTTER
	PROPOSED LANDSCAPED MEDIAN
	EXISTING CONTROLLED ACCESS
	EXISTING ROW
	PROPOSED ROW
	TEMPORARY CONSTRUCTION EASEMENT
	EXISTING TRAFFIC SIGNAL
	PROPOSED TRAFFIC SIGNAL
	JURISDICTIONAL STREAM
	WETLAND BOUNDARY



MATCHLINE -L- STA. 48 + 00 (SHEET 3)

MATCHLINE (SHEET 6)

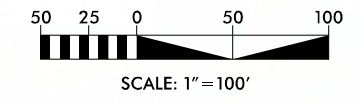
MATCHLINE (SHEET 5)



TO CHARLOTTE

FIGURE: 2-4
U-5114 US 21/GILEAD ROAD
CATEGORICAL EXCLUSION

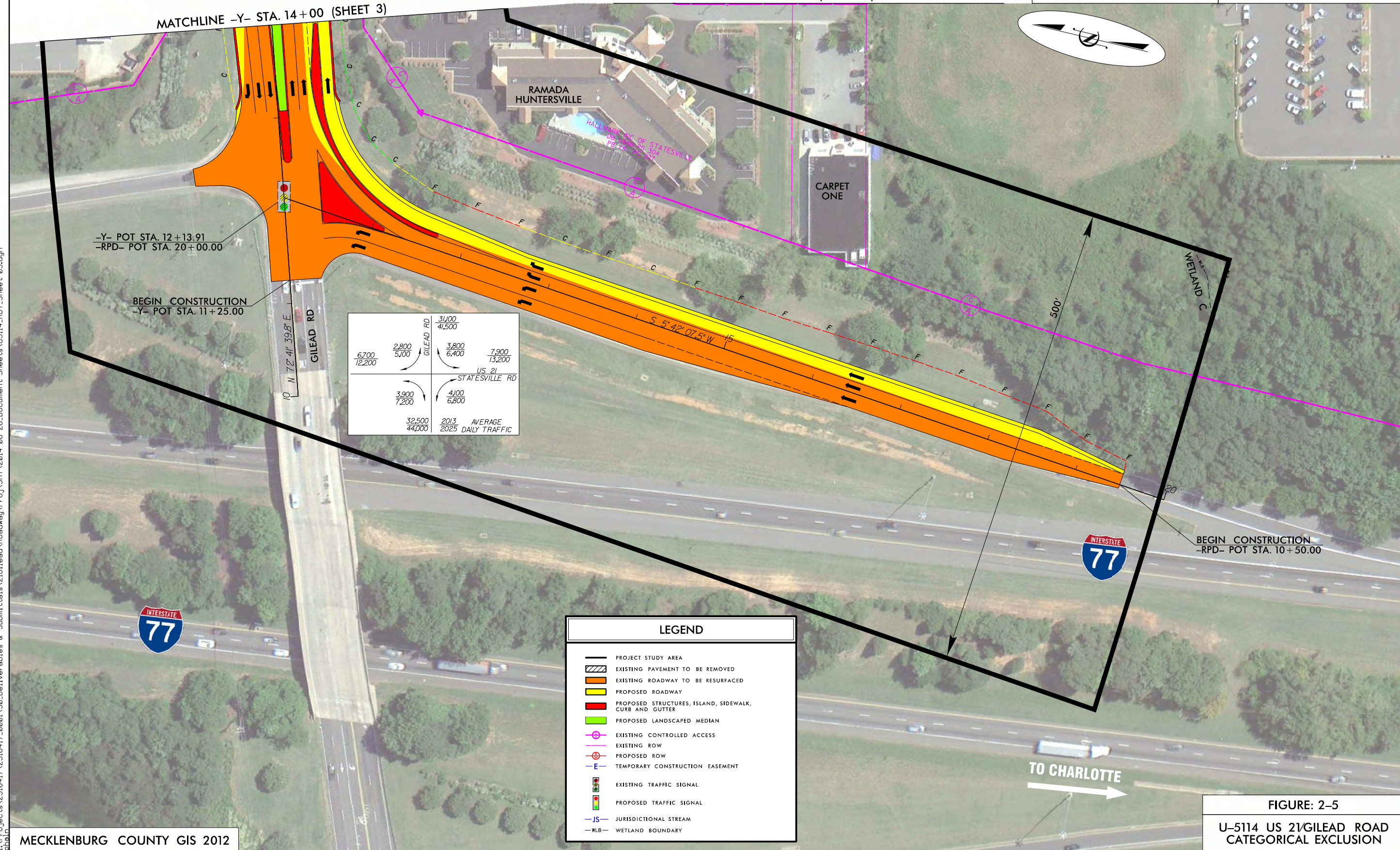
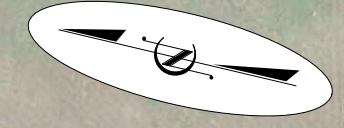
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 7/21/2015 11:41:00 AM



INCOMPLETE PLANS
 DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
 DO NOT USE FOR CONSTRUCTION
 SUBJECT TO CHANGE

MATCHLINE -Y- STA. 14+00 (SHEET 3)

MATCHLINE (SHEET 4)



-Y- POT STA. 12+13.91
 -RPD- POT STA. 20+00.00

BEGIN CONSTRUCTION
 -Y- POT STA. 11+25.00

10 N 72° 41' 39.8" E
 GILEAD RD

6,700 12,200	2,800 5,100	GILEAD RD	3,100 41,500	3,800 6,400	7,900 13,200
US 21 STATESVILLE RD					
3,900 7,200			4,100 6,800		
32,500 44,000		2013 2025 AVERAGE		DAILY TRAFFIC	

LEGEND	
	PROJECT STUDY AREA
	EXISTING PAVEMENT TO BE REMOVED
	EXISTING ROADWAY TO BE RESURFACED
	PROPOSED ROADWAY
	PROPOSED STRUCTURES, ISLAND, SIDEWALK, CURB AND GUTTER
	PROPOSED LANDSCAPED MEDIAN
	EXISTING CONTROLLED ACCESS
	EXISTING ROW
	PROPOSED ROW
	TEMPORARY CONSTRUCTION EASEMENT
	EXISTING TRAFFIC SIGNAL
	PROPOSED TRAFFIC SIGNAL
	JURISDICTIONAL STREAM
	WETLAND BOUNDARY

BEGIN CONSTRUCTION
 -RPD- POT STA. 10+50.00

TO CHARLOTTE

FIGURE: 2-5
 U-5114 US 21/GILEAD ROAD
 CATEGORICAL EXCLUSION

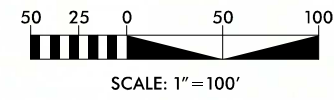
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DATE: JULY 2015

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Charlotte, NC 28202
NC License Number F-0991

PROJECT REFERENCE NO. U-5114 SHEET NO. 6
ROADWAY DESIGN ENGINEER PAVEMENT DESIGN ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
SUBJECT TO CHANGE



MATCHLINE (SHEET 7)

FOOD LION

SHELL GAS

FIFTH THIRD BANK

POST OFFICE

LITTLE CAESARS PIZZA

MATCHLINE -Y- STA. 22+00 (SHEET 3)

END CONSTRUCTION
-Y- POT STA. 32+05.00

GILEAD RD
N 88° 08' 57.1" E

AUTOBELL

O'REILLY AUTO PARTS

FAITH ORTHOPEDIC SERVICES

NORTH MECK PLASTIC SURGERY

FIRST COMM. BANK

CAROLINA RECYCLE

PINEWOOD DRIVE

MATCHLINE (SHEET 4)

LEGEND	
	PROJECT STUDY AREA
	EXISTING PAVEMENT TO BE REMOVED
	EXISTING ROADWAY TO BE RESURFACED
	PROPOSED ROADWAY
	PROPOSED STRUCTURES, ISLAND, SIDEWALK, CURB AND GUTTER
	PROPOSED LANDSCAPED MEDIAN
	EXISTING CONTROLLED ACCESS
	EXISTING ROW
	PROPOSED ROW
	TEMPORARY CONSTRUCTION EASEMENT
	EXISTING TRAFFIC SIGNAL
	PROPOSED TRAFFIC SIGNAL
	JURISDICTIONAL STREAM
	WETLAND BOUNDARY

FIGURE: 2-6

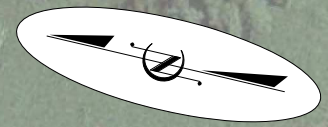
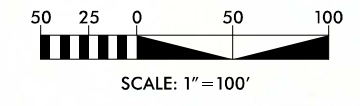
U-5114 US 21/GILEAD ROAD CATEGORICAL EXCLUSION

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DATE: JULY 2015

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STV Engineers, Inc.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

PROJECT REFERENCE NO.	SHEET NO.
U-5114	7
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
SUBJECT TO CHANGE	



LEGEND	
	PROJECT STUDY AREA
	EXISTING PAVEMENT TO BE REMOVED
	EXISTING ROADWAY TO BE RESURFACED
	PROPOSED ROADWAY
	PROPOSED STRUCTURES, ISLAND, SIDEWALK, CURB AND GUTTER
	PROPOSED LANDSCAPED MEDIAN
	EXISTING CONTROLLED ACCESS
	EXISTING ROW
	PROPOSED ROW
	TEMPORARY CONSTRUCTION EASEMENT
	EXISTING TRAFFIC SIGNAL
	PROPOSED TRAFFIC SIGNAL
	JURISDICTIONAL STREAM
	WETLAND BOUNDARY

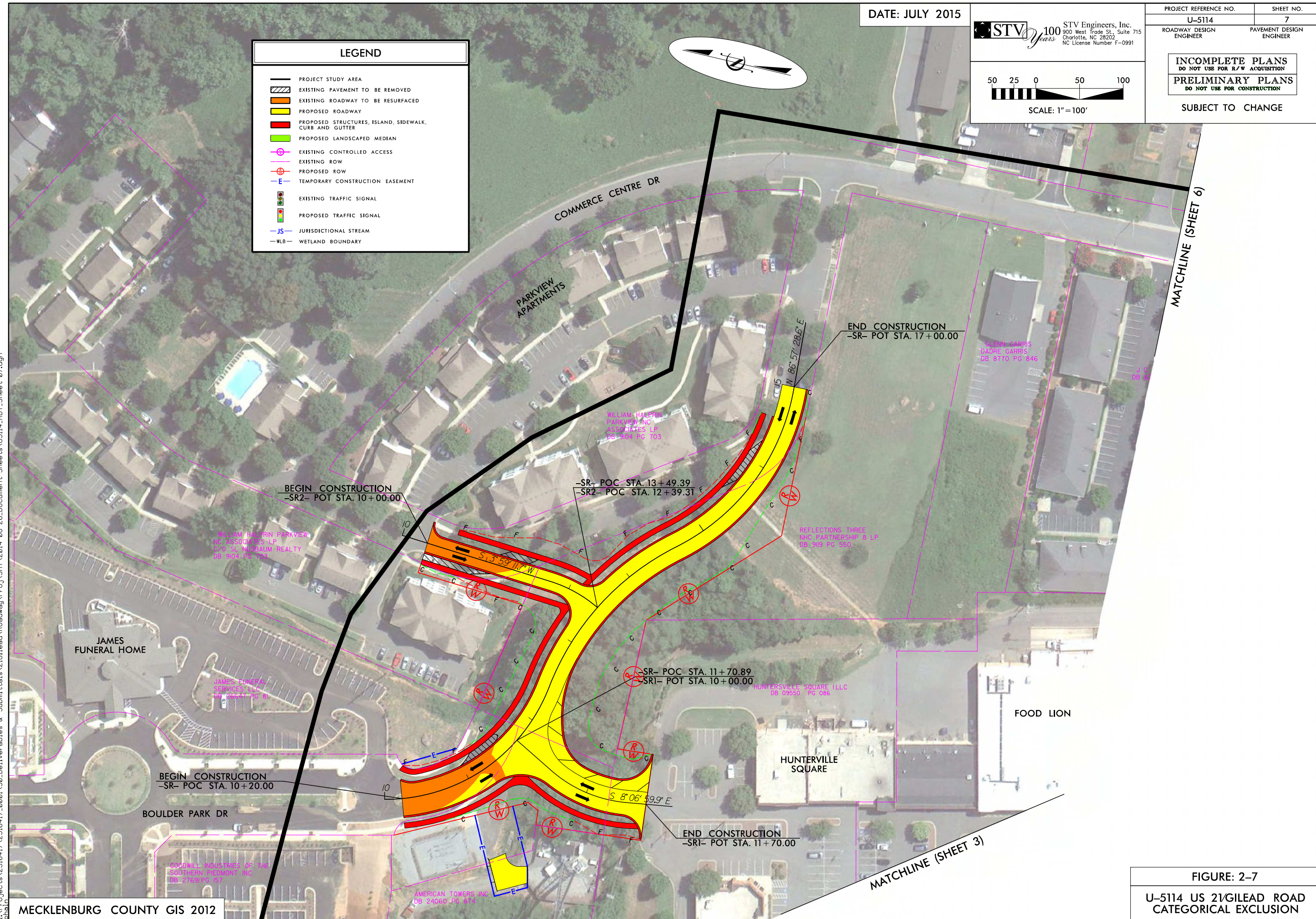
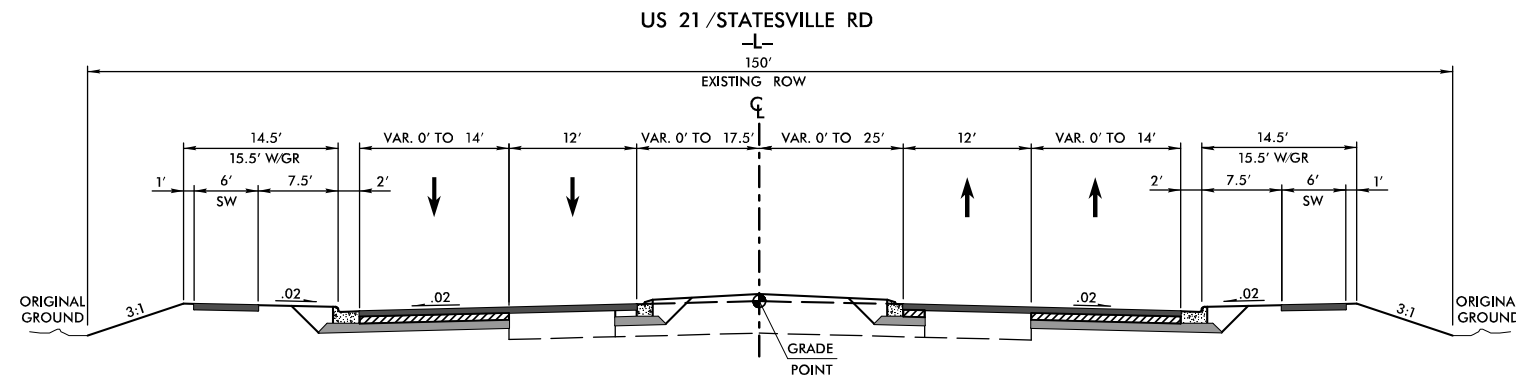


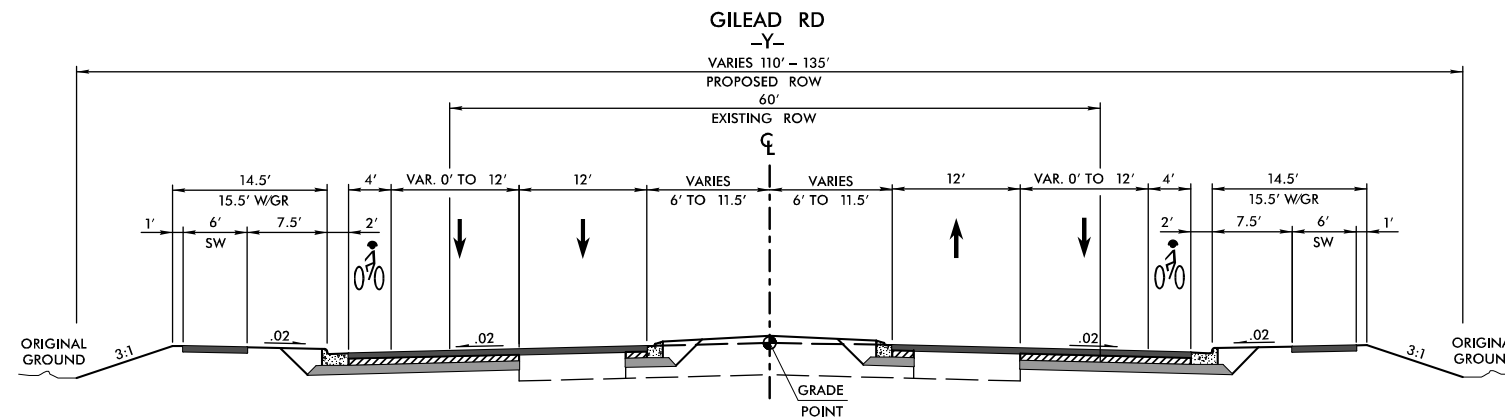
FIGURE: 2-7
U-5114 US 21/GILEAD ROAD
CATEGORICAL EXCLUSION

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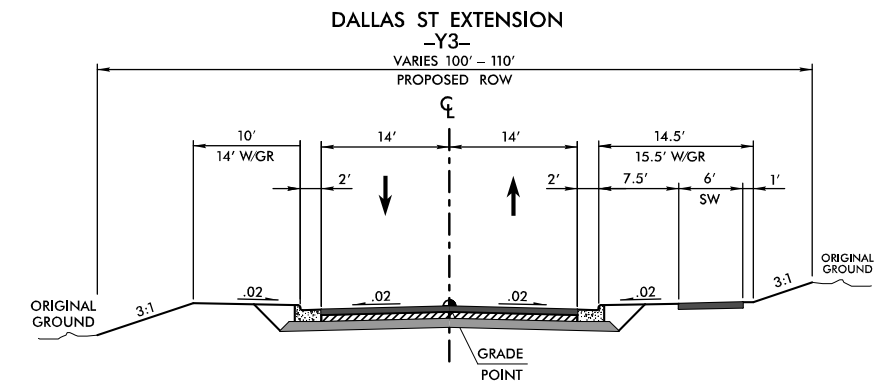
TYPICAL SECTION NO. 1
 -L- STA. 11+80.00 TO 58+27.20

NOTE:
 NO SIDEWALK FROM 11+80.00 TO 21+00.00 RT
 RETAIN EXIST. SIDEWALK FROM 11+80.00 TO 27+50.00 LT

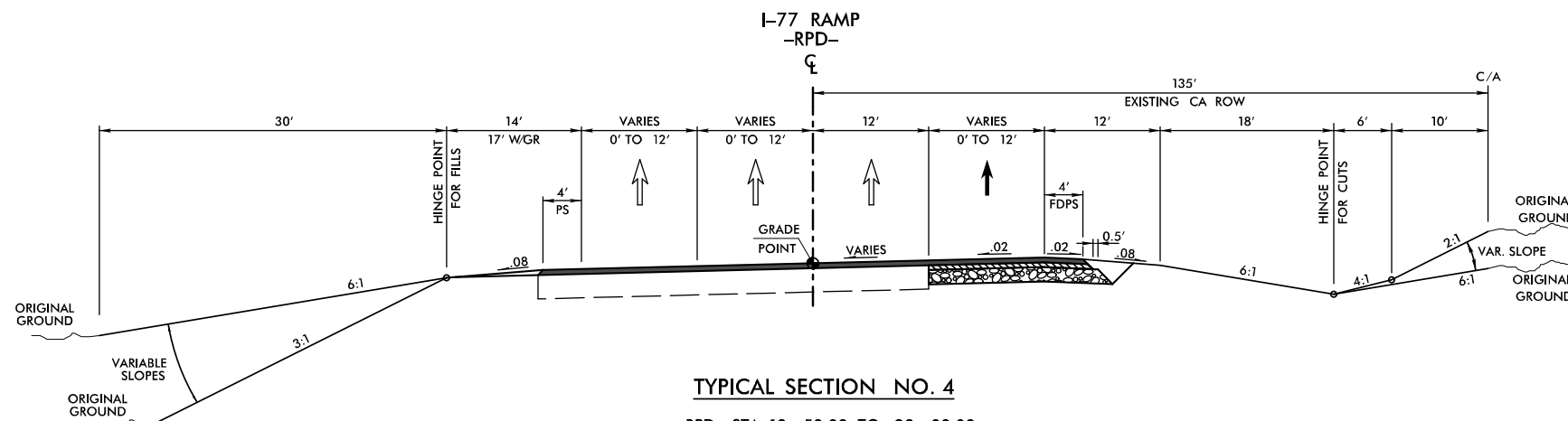


TYPICAL SECTION NO. 2
 -Y- STA. 11+25.00 TO 32+05.00

NOTE:
 NO SIDEWALK OR BIKE LANES FROM
 11+25.00 TO 16+50.00 LT & RT



TYPICAL SECTION NO. 3
 -Y3- STA. 10+00.00 TO 16+70.00



TYPICAL SECTION NO. 4
 -RPD- STA. 10+50.00 TO 20+00.00

PROPOSED DESIGN CRITERIA

TIP: U-5114

STATE PROJECT: U-5114
 F. A. PROJECT: TBD
 COUNTY: MECKLENBURG DIVISION: 10
 PROJECT DESCRIPTION: US 21 & GILEAD RD INTERSECTION IMPROVEMENTS

PAGE: 1 of 2

DATE: 8/3/2015

PREPARED BY: STV ENGINEERS, INC.

ROUTE	US 21/ STATESVILLE RD		GILEAD RD		I-77 NB EXIT RAMP	REFERENCE
LINE	-L-		-Y-		-RPD-	OR REMARKS
TRAFFIC DATA	N	S	E	W		
ADT YR = 2013	22,300	16,000	21,400	31,100	7900	Capacity Analysis Memo dated 8-2014
ADT DESIGN YR = 2025	38,100	38,900	29,600	41,500	13200	
TTST	1	1	2	2	3	
DUALS	4	4	5	5	6	
DHV	2,000	1,600	2,200	3,200	1,000	
DIR	1,200	1,000	1,800	1,200	1,000	
CLASSIFICATION	MINOR ARTERIAL		MAJOR COLLECTOR		INTERSTATE	NCDOT FUNCTIONAL CLASSIFICATION MAPS
TERRAIN TYPE	ROLLING		ROLLING		ROLLING	
DESIGN SPEED mph	50		40		50	
POSTED SPEED mph	45		35		45	
PROP. R/W WIDTH ft	150		VARIES		VARIES	
CONTROL OF ACCESS	N		N		FULL	
RUMBLE STRIPS (Y/N)	N		N		N	
TYPICAL SECTION TYPE	4 LN DIVIDED		4 LN DIVIDED		2-4 LN RAMP	
LANE WIDTH ft	12/14		12		12	
SIDEWALKS (Y/N)	Y		Y		N	
BICYCLE LANES (Y/N)	N		VARIES		N	
MEDIAN WIDTH ft	30.5-35 RAISED		23 RAISED		N/A	
MED. PROTECT. (GR/BARRIER)	N/A		N/A		N/A	
SHOULDER WIDTH (total)						
MEDIAN ft	N/A		N/A		N/A	
OUTSIDE w/o GR ft	14.5 BERM		14.5 BERM		14	NCDOT DM 1-7D & SEE TYPICALS
OUTSIDE w/ GR ft	15.5 BERM		15.5 BERM		17	NCDOT DM 1-7D & SEE TYPICALS
PAVED SHOULDER						
OUTSIDE TOTAL/FDPSft	N/A		N/A		4 ft	NCDOT DM 1-40 FIG - 1
MEDIAN TOTAL/FDPS ft	N/A		N/A		4 ft	NCDOT DM 1-40 FIG - 1
GRADE						
MAX.	7%		10%		5%	2011 AASHTO TABLE 7-4, NCDOT DM 8-4 & TOH ESPM PG. 7
MIN.	0.3%		0.3%		0.3%	
K VALUE						
SAG	96		64		96	2011 AASHTO TABLE 3-36, TOH ESPM
CREST	84		44		84	2011 AASHTO TABLE 3-34, TOH ESPM
HORIZ. ALIGN.						
MAX. SUPER.	4%		4%		8%	NCDOT DM 1-15
MIN. RADIUS ft	926		533		758	2011 AASHTO TABLES 3-8 & 3-10
SPIRAL (Y/N)	N		N		Y	
CROSS SLOPES						
PAVEMENT	2%		2%		2%	NCDOT DM 1-40
PAVED SHOULDER	N/A		N/A		2%	NCDOT DM 1-40 FIG - 1B
TURF SHOULDER	N/A		N/A		8%	NCDOT DM 1-40 FIG - 1B
MEDIAN DITCH	N/A		N/A		N/A	
DITCH TYPICAL (A,B,C)	N/A		N/A		A	NCDOT DM 1-2A, F-1
CLEAR ZONE ft	20-22		14-16		24-28	NCDOT DM 1-4N
TYPICAL SECTION NO.	1		2		3	

NOTES:

TOH ESPM - Town of Huntersville-Engineering Standards and Procedures Manual.

PROPOSED DESIGN CRITERIA

TIP: U -5114

PAGE: 2 of 2

REFERENCE
OR REMARKS

SCALE:

PLANS	1"=50'			
PROFILES	1"=50'	<i>horiz.</i>	1"=10'	<i>vert.</i>
INTERCH. DETAIL	1"=50'			
CROSS-SECTIONS	1"=10'	<i>horiz.</i>	1"=10'	<i>vert.</i>

SHEET SIZE:

PLANS	22" x 34"
INTERCH. DETAIL	34" x 68"
CROSS-SECTIONS	11" x 17"

BRIDGES and/or CULVERTS:

TYPE (*SINGLE/DUAL/RCBC*)
SIZE (*LENGTH X WIDTH X HT*)
LOCATION
SKETCH #
HORIZ. CLEARANCE
VERT. CLEARANCE

DESIGN EXCEPTIONS:

NOTES: (SPECIAL CONSIDERATIONS)

Appendix C - Natural Resources Documents
C1. USACE and NCDWQ Stream and Wetland Forms
C2. Mussel Survey Report

Seasonal RPW Stream A



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: NCDOT (STIP U-5114) 2. Evaluator's Name: Brandon Fulton
3. Date of Evaluation: 6-9-14 4. Time of Evaluation: 11 am
5. Name of Stream: UT to Torrence Creek 6. River Basin: Catawba
7. Approximate Drainage Area: ~60 acres 8. Stream Order: 1st
9. Length of Reach Evaluated: ~100 ft. 10. County: Mecklenburg
11. Location of reach under evaluation (include nearby roads and landmarks): North of US 21 and Gilead Road Intersection
12. Site Coordinates (if known): 35.416054 N W -80.856463
13. Proposed Channel Work (if any): Road widening
14. Recent Weather Conditions: Thunderstorms
15. Site conditions at time of visit: Warm, dry
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
 Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: acre
18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: 40 % Residential 40% Commercial % Industrial % Agricultural
20 % Forested % Cleared / Logged % Other ()
21. Bankfull Width: ~3 22. Bank Height (from bed to top of bank): 1
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 43Comments Seasonal RPW

Evaluator's Signature

Date

6-9-14

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change - version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

Seasonal RPW Stream A

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0-5	0-4	0-5	4
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0-6	0-5	0-5	1
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0-6	0-4	0-5	0
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0-5	0-4	0-4	3
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0-3	0-4	0-4	2
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0-4	0-4	0-2	0
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0-5	0-4	0-2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0-6	0-4	0-2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0-5	0-4	0-3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0-5	0-4	0-4	3
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0-4	0-5	1
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0-5	0-4	0-5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0-5	0-5	0-5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0-3	0-4	0-5	1
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0-5	0-4	0-5	4
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0-3	0-5	0-6	2
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0-6	0-6	0-6	1
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0-5	0-5	0-5	0
BIOLOGY	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0-4	0-4	2
	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0-4	0-5	0-5	3
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	3
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0-6	0-5	0-5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						43

* These characteristics are not assessed in coastal streams.

NC DWQ Stream Identification Form Version 4.11

Date: 06-09-14	Project/Site: US 21 and Gilead	Latitude: 35.416054
Evaluator: Brandon Fulton	County: Mecklenburg	Longitude: -80.856463
Total Points: Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$ 26.5	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other e.g. Quad Name: Cornelius

A. Geomorphology (Subtotal = 7)

	Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	0	1	(2)	3
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	(1)	2	3
4. Particle size of stream substrate	0	(1)	2	3
5. Active/relict floodplain	(0)	1	2	3
6. Depositional bars or benches	(0)	1	2	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	(0)	1	2	3
9. Grade control	(0)	0.5	1	1.5
10. Natural valley	0	0.5	(1)	1.5
11. Second or greater order channel	No = (0)		Yes = 3	

^aartificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 6.5)

12. Presence of Baseflow	0	1	(2)	3
13. Iron oxidizing bacteria	(0)	1	2	3
14. Leaf litter	1.5	1	(0.5)	0
15. Sediment on plants or debris	0	0.5	(1)	1.5
16. Organic debris lines or piles	(0)	0.5	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = (3)	

C. Biology (Subtotal = 13)

18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	1	(2)	3
21. Aquatic Mollusks	0	1	(2)	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	0	0.5	1	(1.5)
24. Amphibians	0	0.5	1	(1.5)
25. Algae	(0)	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = (0)			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

Seasonal RPW Stream B



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: NCDOT (STIP U-5114) 2. Evaluator's Name: Brandon Fulton
3. Date of Evaluation: 6-9-14 4. Time of Evaluation: 11:30 am
5. Name of Stream: UT to Torrence Creek 6. River Basin: Catawba
7. Approximate Drainage Area: ~60 acres 8. Stream Order: 1st
9. Length of Reach Evaluated: ~100 ft. 10. County: Mecklenburg
11. Location of reach under evaluation (include nearby roads and landmarks): North of US 21 and Gilead Road Intersection
12. Site Coordinates (if known): 35.416381 N W -80.857328
13. Proposed Channel Work (if any): Road widening
14. Recent Weather Conditions: Thunderstorms
15. Site conditions at time of visit: Warm, dry
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
 Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed _____ (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: acre
18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: 40 % Residential 40 % Commercial % Industrial % Agricultural
20 % Forested % Cleared / Logged % Other (_____)
21. Bankfull Width: ~4 22. Bank Height (from bed to top of bank): 1
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 65 Comments Seasonal RPW

Evaluator's Signature Brandon Fulton Date 6-9-14

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

Seasonal RPW Stream B

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0-5	0-4	0-5	4
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0-6	0-5	0-5	3
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0-6	0-4	0-5	4
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0-5	0-4	0-4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0-3	0-4	0-4	3
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0-4	0-4	0-2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0-5	0-4	0-2	3
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0-6	0-4	0-2	2
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0-5	0-4	0-3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0-5	0-4	0-4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0-4	0-5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0-5	0-4	0-5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0-5	0-5	0-5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0-3	0-4	0-5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0-5	0-4	0-5	4
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0-3	0-5	0-6	3
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0-6	0-6	0-6	5
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0-5	0-5	0-5	5
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0-4	0-4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0-4	0-5	0-5	3
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0-6	0-5	0-5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)					65	

* These characteristics are not assessed in coastal streams.

NC DWQ Stream Identification Form Version 4.11

Date: 06-09-14	Project/Site: US 21 and Gilead	Latitude: 35.416381
Evaluator: Brandon Fulton	County: Mecklenburg	Longitude: -80.857328
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 28	Stream Determination (circle one) Ephemeral <u>Intermittent</u> Perennial	Other e.g. Quad Name: Cornelius

A. Geomorphology (Subtotal = 9)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	(2)	3
2. Sinuosity of channel along thalweg	0	(1)	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	(1)	2	3
4. Particle size of stream substrate	0	(1)	2	3
5. Active/relict floodplain	(0)	1	2	3
6. Depositional bars or benches	0	(1)	2	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	0	(1)	2	3
9. Grade control	(0)	0.5	1	1.5
10. Natural valley	0	0.5	(1)	1.5
11. Second or greater order channel	No = (0)		Yes = 3	

^aartificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	(2)	3
13. Iron oxidizing bacteria	0	(1)	2	3
14. Leaf litter	1.5	1	(0.5)	0
15. Sediment on plants or debris	0	0.5	(1)	1.5
16. Organic debris lines or piles	0	(0.5)	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = (3)	

C. Biology (Subtotal = 11)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	(1)	2	3
21. Aquatic Mollusks	0	(1)	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	0	0.5	(1)	1.5
24. Amphibians	0	0.5	1	(1.5)
25. Algae	0	(0.5)	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = (0)			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

RPW Stream C



STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: NCDOT (STIP U-5114) 2. Evaluator's Name: Brandon Fulton
3. Date of Evaluation: 6-9-14 4. Time of Evaluation: 3:30 pm
5. Name of Stream: LT to Torrence Creek 6. River Basin: Catawba
7. Approximate Drainage Area: ~350 acres 8. Stream Order: 1st
9. Length of Reach Evaluated: ~100 ft. 10. County: Mecklenburg
11. Location of reach under evaluation (include nearby roads and landmarks): North of US 21 and Gilead Road Intersection
12. Site Coordinates (if known): 35.407466N W -80.853798
13. Proposed Channel Work (if any): Road widening
14. Recent Weather Conditions: Thunderstorms
15. Site conditions at time of visit: Warm, dry
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
 Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: _____ acre
18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: 40 % Residential 40 % Commercial _____ % Industrial _____ % Agricultural
20 % Forested _____ % Cleared / Logged _____ % Other (_____)
21. Bankfull Width: ~4 22. Bank Height (from bed to top of bank): 1
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 65

Comments RPW concluded to have perennial hydrology

Evaluator's Signature *Brandon Fulton*

Date 6-9-14

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STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream C

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0-5	0-4	0-5	3
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0-6	0-5	0-5	3
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0-6	0-4	0-5	4
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0-5	0-4	0-4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0-3	0-4	0-4	3
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0-4	0-4	0-2	2
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0-5	0-4	0-2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0-6	0-4	0-2	3
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0-5	0-4	0-3	3
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0-5	0-4	0-4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0-4	0-5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0-5	0-4	0-5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0-5	0-5	0-5	3
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0-3	0-4	0-5	3
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0-5	0-4	0-5	4
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0-3	0-5	0-6	3
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0-6	0-6	0-6	5
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0-5	0-5	0-5	5
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0-4	0-4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0-4	0-5	0-5	3
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	0
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0-6	0-5	0-5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)						65

* These characteristics are not assessed in coastal streams.

NC DWQ Stream Identification Form Version 4.11

Date: 06-09-14	Project/Site: US 21 and Gilead	Latitude: 35.407466
Evaluator: Brandon Fulton	County: Mecklenburg	Longitude: -80.853798
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 30	Stream Determination (circle one) Ephemeral Intermittent <u>Perennial</u>	Other e.g. Quad Name: Cornelius

A. Geomorphology (Subtotal = 12.5)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	(2)	3
2. Sinuosity of channel along thalweg	0	1	(2)	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	(2)	3
4. Particle size of stream substrate	0	(1)	2	3
5. Active/relict floodplain	0	(1)	2	3
6. Depositional bars or benches	0	(1)	2	3
7. Recent alluvial deposits	0	(1)	2	3
8. Headcuts	0	(1)	2	3
9. Grade control	0	(0.5)	1	1.5
10. Natural valley	0	0.5	(1)	1.5
11. Second or greater order channel	No = (0)		Yes = 3	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	(2)	3
13. Iron oxidizing bacteria	0	(1)	2	3
14. Leaf litter	1.5	1	(0.5)	0
15. Sediment on plants or debris	0	0.5	(1)	1.5
16. Organic debris lines or piles	0	(0.5)	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = (3)	

C. Biology (Subtotal = 9.5)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	(1)	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	(0)	0.5	1	1.5
23. Crayfish	0	0.5	(1)	1.5
24. Amphibians	0	0.5	(1)	1.5
25. Algae	0	(0.5)	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = (0)			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

RPW Stream D

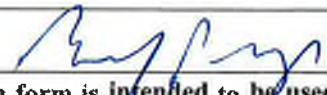


STREAM QUALITY ASSESSMENT WORKSHEET



1. Applicant's Name: NCDOT (STIP U-5114) 2. Evaluator's Name: Brandon Fulton
3. Date of Evaluation: 6-9-14 4. Time of Evaluation: 1 pm
5. Name of Stream: UT to Torrence Creek 6. River Basin: Catawba
7. Approximate Drainage Area: ~900 acres 8. Stream Order: 2nd
9. Length of Reach Evaluated: ~100 ft. 10. County: Mecklenburg
11. Location of reach under evaluation (include nearby roads and landmarks): North of US 21 and Gilead Road Intersection
12. Site Coordinates (if known): 35.414997 N W -80.857097
13. Proposed Channel Work (if any): Road widening
14. Recent Weather Conditions: Thunderstorms
15. Site conditions at time of visit: Warm, dry
16. Identify any special waterway classifications known: Section 10 Tidal Waters Essential Fisheries Habitat
 Trout Waters Outstanding Resource Waters Nutrient Sensitive Waters Water Supply Watershed (I-IV)
17. Is there a pond or lake located upstream of the evaluation point? YES NO If yes, estimate the water surface area: 1 acre
18. Does channel appear on USGS quad map? YES NO 19. Does channel appear on USDA Soil Survey? YES NO
20. Estimated Watershed Land Use: 40 % Residential 40% Commercial % Industrial % Agricultural
20 % Forested % Cleared / Logged % Other ()
21. Bankfull Width: ~8 22. Bank Height (from bed to top of bank): 3
23. Channel slope down center of stream: Flat (0 to 2%) Gentle (2 to 4%) Moderate (4 to 10%) Steep (>10%)
24. Channel Sinuosity: Straight Occasional Bends Frequent Meander Very Sinuous Braided Channel

Instructions for completion of worksheet (located on page 2): Begin by determining the most appropriate ecoregion based on location, terrain, vegetation, stream classification, etc. Every characteristic must be scored using the same ecoregion. Assign points to each characteristic within the range shown for the ecoregion. Page 3 provides a brief description of how to review the characteristics identified in the worksheet. Scores should reflect an overall assessment of the stream reach under evaluation. If a characteristic cannot be evaluated due to site or weather conditions, enter 0 in the scoring box and provide an explanation in the comment section. Where there are obvious changes in the character of a stream under review (e.g., the stream flows from a pasture into a forest), the stream may be divided into smaller reaches that display more continuity, and a separate form used to evaluate each reach. The total score assigned to a stream reach must range between 0 and 100, with a score of 100 representing a stream of the highest quality.

Total Score (from reverse): 54Comments RPW concluded to have perennial hydrologyEvaluator's Signature Date 6-9-14

This channel evaluation form is intended to be used only as a guide to assist landowners and environmental professionals in gathering the data required by the United States Army Corps of Engineers in order to make a preliminary assessment of stream quality. The total score resulting from the completion of this form is subject to USACE approval and does not imply a particular mitigation ratio or requirement. Form subject to change – version 05/03. To Comment, please call 919-876-8441 x 26.

STREAM QUALITY ASSESSMENT WORKSHEET

RPW Stream D

	#	CHARACTERISTICS	ECOREGION POINT RANGE			SCORE
			Coastal	Piedmont	Mountain	
PHYSICAL	1	Presence of flow / persistent pools in stream (no flow or saturation = 0; strong flow = max points)	0-5	0-4	0-5	4
	2	Evidence of past human alteration (extensive alteration = 0; no alteration = max points)	0-6	0-5	0-5	3
	3	Riparian zone (no buffer = 0; contiguous, wide buffer = max points)	0-6	0-4	0-5	2
	4	Evidence of nutrient or chemical discharges (extensive discharges = 0; no discharges = max points)	0-5	0-4	0-4	2
	5	Groundwater discharge (no discharge = 0; springs, seeps, wetlands, etc. = max points)	0-3	0-4	0-4	1
	6	Presence of adjacent floodplain (no floodplain = 0; extensive floodplain = max points)	0-4	0-4	0-2	0
	7	Entrenchment / floodplain access (deeply entrenched = 0; frequent flooding = max points)	0-5	0-4	0-2	2
	8	Presence of adjacent wetlands (no wetlands = 0; large adjacent wetlands = max points)	0-6	0-4	0-2	0
	9	Channel sinuosity (extensive channelization = 0; natural meander = max points)	0-5	0-4	0-3	2
	10	Sediment input (extensive deposition = 0; little or no sediment = max points)	0-5	0-4	0-4	2
	11	Size & diversity of channel bed substrate (fine, homogenous = 0; large, diverse sizes = max points)	NA*	0-4	0-5	2
STABILITY	12	Evidence of channel incision or widening (deeply incised = 0; stable bed & banks = max points)	0-5	0-4	0-5	2
	13	Presence of major bank failures (severe erosion = 0; no erosion, stable banks = max points)	0-5	0-5	0-5	2
	14	Root depth and density on banks (no visible roots = 0; dense roots throughout = max points)	0-3	0-4	0-5	2
	15	Impact by agriculture or livestock production (substantial impact = 0; no evidence = max points)	0-5	0-4	0-5	4
HABITAT	16	Presence of riffle-pool/ripple-pool complexes (no riffles/ripples or pools = 0; well-developed = max points)	0-3	0-5	0-6	4
	17	Habitat complexity (little or no habitat = 0; frequent, varied habitats = max points)	0-6	0-6	0-6	4
	18	Canopy coverage over streambed (no shading vegetation = 0; continuous canopy = max points)	0-5	0-5	0-5	3
	19	Substrate embeddedness (deeply embedded = 0; loose structure = max)	NA*	0-4	0-4	2
BIOLOGY	20	Presence of stream invertebrates (no evidence = 0; common, numerous types = max points)	0-4	0-5	0-5	3
	21	Presence of amphibians (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	2
	22	Presence of fish (no evidence = 0; common, numerous types = max points)	0-4	0-4	0-4	2
	23	Evidence of wildlife use (no evidence = 0; abundant evidence = max points)	0-6	0-5	0-5	4
Total Points Possible			100	100	100	
TOTAL SCORE (also enter on first page)					54	

* These characteristics are not assessed in coastal streams.

NC DWQ Stream Identification Form Version 4.11

Date: 06-09-14	Project/Site: US 21 and Gilead	Latitude: 35.414997
Evaluator: Brandon Fulton	County: Mecklenburg	Longitude: -80.857097
Total Points: Stream is at least intermittent if ≥ 19 or perennial if $\geq 30^*$ 40	Stream Determination (circle one) Ephemeral Intermittent Perennial	Other e.g. Quad Name: Cornelius

A. Geomorphology (Subtotal = 18)	Absent	Weak	Moderate	Strong
1 ^a Continuity of channel bed and bank	0	1	2	(3)
2. Sinuosity of channel along thalweg	0	1	(2)	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2	(3)
4. Particle size of stream substrate	0	1	(2)	3
5. Active/relict floodplain	0	(1)	2	3
6. Depositional bars or benches	0	1	(2)	3
7. Recent alluvial deposits	0	1	(2)	3
8. Headcuts	0	(1)	2	3
9. Grade control	0	(0.5)	1	1.5
10. Natural valley	0	0.5	1	(1.5)
11. Second or greater order channel	No = 0		Yes = (3)	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8.5)	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	(2)	3
13. Iron oxidizing bacteria	0	(1)	2	3
14. Leaf litter	1.5	1	(0.5)	0
15. Sediment on plants or debris	0	0.5	(1)	1.5
16. Organic debris lines or piles	0	0.5	(1)	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = (3)	

C. Biology (Subtotal = 10.5)	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	(3)	2	1	0
19. Rooted upland plants in streambed	(3)	2	1	0
20. Macroinvertebrates (note diversity and abundance)	0	(1)	2	3
21. Aquatic Mollusks	(0)	1	2	3
22. Fish	0	0.5	(1)	1.5
23. Crayfish	0	0.5	(1)	1.5
24. Amphibians	0	0.5	(1)	1.5
25. Algae	0	(0.5)	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = (0)			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: US 21 and Gilead Road Intersection Improvements City/County: Mecklenburg Sampling Date: 06-09-14
 Applicant/Owner: NCDOT (STIP U-5114) State: NC Sampling Point: Wetland A - DP#1
 Investigator(s): Brandon Fulton, PWS Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): -2
 Subregion (LRR or MLRA): LRR P Lat: 35.415190 Long: -80.856241 Datum: NAD 83
 Soil Map Unit Name: Monacan soils NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: <u>DP#1 (Wetland A) is representative of a Wetland; see Approximate Waters of the U.S and Wetlands Boundary map Exhibit for Location of Wetland A.</u>	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input checked="" type="checkbox"/> Surface Water (A1) _____ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) _____ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3) _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4) _____ Other (Explain in Remarks) _____ Iron Deposits (B5) _____ _____ Inundation Visible on Aerial Imagery (B7) _____ <input checked="" type="checkbox"/> Water-Stained Leaves (B9) _____ _____ Aquatic Fauna (B13) _____	<u>Secondary Indicators (minimum of two required)</u> _____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) _____ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>1"</u> Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland A.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland A - DP#1

Tree Stratum (Plot size: 30')

	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Salix nigra</i>	30	Yes	OBL
2. _____			
3. _____			
4. _____			
5. _____			
6. _____			
7. _____			

_____ = Total Cover
50% of total cover: 15 20% of total cover: 6

Sapling/Shrub Stratum (Plot size: 10')

	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Alnus serrulata</i>	30	Yes	OBL
2. _____			
3. _____			
4. _____			
5. _____			
6. _____			
7. _____			
8. _____			
9. _____			

_____ = Total Cover
50% of total cover: 15 20% of total cover: 6

Herb Stratum (Plot size: 1.5 m)

	Absolute % Cover	Dominant Species?	Indicator Status
1. <i>Typha latifolia</i>	50	Yes	OBL
2. <i>Juncus effusus</i>	25	Yes	FACW
3. <i>Carex sp.</i>	25	Yes	V
4. _____			
5. _____			
6. _____			
7. _____			
8. _____			
9. _____			
10. _____			
11. _____			

_____ = Total Cover
50% of total cover: 50 20% of total cover: 20

Woody Vine Stratum (Plot size: 1 m)

	Absolute % Cover	Dominant Species?	Indicator Status
1. _____			
2. _____			
3. _____			
4. _____			
5. _____			

_____ = Total Cover
50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:
 Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)
 Total Number of Dominant Species Across All Strata: _____ (B)
 Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:
 Total % Cover of: _____ Multiply by:
 OBL species _____ x 1 = _____
 FACW species _____ x 2 = _____
 FAC species _____ x 3 = _____
 FACU species _____ x 4 = _____
 UPL species _____ x 5 = _____
 Column Totals: _____ (A) _____ (B)
 Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:
 1 - Rapid Test for Hydrophytic Vegetation
 2 - Dominance Test is >50%
 3 - Prevalence Index is $\leq 3.0^1$
 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:
Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.
Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No _____

Remarks: (Include photo numbers here or on a separate sheet.)
 Hydrophytic vegetation identified within Wetland A. A "V" indicator is for the unidentified species and indicates a variable indicator status.

SOIL

Sampling Point: Wetland A - DP#1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-18	7.5 YR 6/1	100					CL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (LRR N)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) (MLRA 147, 148)
- Thin Dark Surface (S9) (MLRA 147, 148)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (LRR N, MLRA 138)
- Umbric Surface (F13) (MLRA 136, 122)
- Piedmont Floodplain Soils (F19) (MLRA 148)
- Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (MLRA 147)
- Coast Prairie Redox (A16) (MLRA 147, 148)
- Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____
Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

Hydric soils identified within Wetland A.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: US 21 and Gilead Road Intersection Improvements City/County: Mecklenburg Sampling Date: 06-09-14
 Applicant/Owner: NCDOT STIP U-5114 State: NC Sampling Point: Wetland B - DP#2
 Investigator(s): Brandon Fulton, PWS Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): -2
 Subregion (LRR or MLRA): LRR P Lat: 35.407212 Long: -80.853465 Datum: NAD 83
 Soil Map Unit Name: Mecklenburg fine sandy loam, 8-15 percent slopes NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____ Hydric Soil Present? Yes <input checked="" type="checkbox"/> No _____ Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Remarks: <u>DP#2 (Wetland B) is representative of a Wetland; see Approximate Waters of the U.S and Wetlands Boundary map Exhibit for Location of Wetland B.</u>	

HYDROLOGY

Wetland Hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input checked="" type="checkbox"/> Surface Water (A1) _____ True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) _____ Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) _____ Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) _____ Presence of Reduced Iron (C4) _____ Sediment Deposits (B2) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Drift Deposits (B3) _____ Thin Muck Surface (C7) _____ Algal Mat or Crust (B4) _____ Other (Explain in Remarks) _____ Iron Deposits (B5) _____ _____ Inundation Visible on Aerial Imagery (B7) _____ <input checked="" type="checkbox"/> Water-Stained Leaves (B9) _____ _____ Aquatic Fauna (B13) _____	<u>Secondary Indicators (minimum of two required)</u> _____ Surface Soil Cracks (B6) _____ Sparsely Vegetated Concave Surface (B8) _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) _____ FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>1"</u> Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland B.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland B - DP#2

Tree Stratum (Plot size: 30')		Absolute % Cover	Dominant Species?	Indicator Status
1.	<i>Liquidambar styraciflua</i>	60	Yes	FAC
2.	<i>Acer rubrum</i>	40	Yes	FAC
3.				
4.				
5.				
6.				
7.				
		100 = Total Cover		
50% of total cover:		50	20% of total cover:	20

Sapling/Shrub Stratum (Plot size: 10')		Absolute % Cover	Dominant Species?	Indicator Status
1.	<i>Ligustrum sinense</i>	30	Yes	FACU
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
		30 = Total Cover		
50% of total cover:		15	20% of total cover:	6

Herb Stratum (Plot size: 1.5 m)		Absolute % Cover	Dominant Species?	Indicator Status
1.	<i>Lonicera japonica</i>	50	Yes	FAC
2.	<i>Pueraria montana</i>	25	Yes	UPL
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
		75 = Total Cover		
50% of total cover:		37.5	20% of total cover:	15

Woody Vine Stratum (Plot size: 1 m)		Absolute % Cover	Dominant Species?	Indicator Status
1.	<i>Toxicodendron radicans</i>	25	Yes	FAC
2.	<i>Parthenocissus quinquefolia</i>	25	Yes	FACU
3.				
4.				
5.				
		50 = Total Cover		
50% of total cover:		25	20% of total cover:	10

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 57 (A/B)

Prevalence Index worksheet:

Total % Cover of	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals:	(A) (B)

Prevalence Index = B/A =

- Hydrophytic Vegetation Indicators:**
- 1 - Rapid Test for Hydrophytic Vegetation
 - 2 - Dominance Test is >50%
 - 3 - Prevalence Index is ≤3.0¹
 - 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation identified within Wetland B.

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicator.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-18	7.5 YR 6/2	95	7.5 YR 6/1	5	D	M	CL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

- | | | |
|--|--|---|
| Hydric Soil Indicators: | | Indicators for Problematic Hydric Soils³: |
| <input type="checkbox"/> Histosol (A1) | <input type="checkbox"/> Dark Surface (S7) | <input type="checkbox"/> 2 cm Muck (A10) (MLRA 147) |
| <input type="checkbox"/> Histic Epipedon (A2) | <input type="checkbox"/> Polyvalue Below Surface (S8) (MLRA 147, 148) | <input type="checkbox"/> Coast Prairie Redox (A16) |
| <input type="checkbox"/> Black Histic (A3) | <input type="checkbox"/> Thin Dark Surface (S9) (MLRA 147, 148) | <input type="checkbox"/> (MLRA 147, 148) |
| <input type="checkbox"/> Hydrogen Sulfide (A4) | <input type="checkbox"/> Loamy Gleyed Matrix (F2) | <input type="checkbox"/> Piedmont Floodplain Soils (F19) |
| <input type="checkbox"/> Stratified Layers (A5) | <input checked="" type="checkbox"/> Depleted Matrix (F3) | <input type="checkbox"/> (MLRA 136, 147) |
| <input type="checkbox"/> 2 cm Muck (A10) (LRR N) | <input type="checkbox"/> Redox Dark Surface (F6) | <input type="checkbox"/> Very Shallow Dark Surface (TF12) |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Depleted Dark Surface (F7) | <input type="checkbox"/> Other (Explain in Remarks) |
| <input type="checkbox"/> Thick Dark Surface (A12) | <input type="checkbox"/> Redox Depressions (F8) | |
| <input type="checkbox"/> Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148) | <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR N, MLRA 136) | |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4) | <input type="checkbox"/> Umbric Surface (F13) (MLRA 136, 122) | |
| <input type="checkbox"/> Sandy Redox (S5) | <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 148) | |
| <input type="checkbox"/> Stripped Matrix (S6) | <input type="checkbox"/> Red Parent Material (F21) (MLRA 127, 147) | |

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

Hydric soils identified within Wetland B.

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: US 21 and Gilead Road Intersection Improvements City/County: Mecklenburg Sampling Date: 06-09-14
 Applicant/Owner: NCDOT STIP U-5114 State: NC Sampling Point: Wetland C - DP#3
 Investigator(s): Brandon Fullon, PWS Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): -2
 Subregion (LRR or MLRA): LRR P Lat: 35.406761 Long: -80.855976 Datum: NAD 83
 Soil Map Unit Name: Cecil sandy clay loam, 8-15 percent slopes, eroded NWI classification: PF01

Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____ or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes No _____
 Are Vegetation _____, Soil _____ or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/> No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present?	Yes <input checked="" type="checkbox"/> No _____	
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/> No _____	
Remarks: <u>DP#3 (Wetland C) is representative of a Wetland; see Approximate Waters of the U.S and Wetlands Boundary map Exhibit for Location of Wetland C.</u>		

HYDROLOGY

Wetland Hydrology Indicators:	Secondary Indicators (minimum of two required)
<u>Primary Indicators (minimum of one is required; check all that apply)</u>	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Surface Soil Cracks (D6)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Moss Trim Lines (B16)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Crayfish Burrows (C6)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Stunted or Stressed Plants (D1)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Geomorphic Position (D2)
<input checked="" type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> Microtopographic Relief (D4)
	<input type="checkbox"/> FAC-Neutral Test (D5)

Field Observations: Surface Water Present? Yes _____ No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>-6"</u> Saturation Present? Yes <input checked="" type="checkbox"/> No _____ Depth (inches): <u>0"</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No _____
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Water-stained leaves and other indicators of surface water influence were observed within Wetland C.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: Wetland C - DP#3

	Absolute % Cover	Dominant Species?	Indicator Status		
Tree Stratum (Plot size: <u>30'</u>)					
1. <u>Salix nigra</u>	<u>70</u>	<u>Yes</u>	<u>OBL</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>7</u> (A) Total Number of Dominant Species Across All Strata: <u>8</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>88</u> (A/B)	
2. <u>Fraxinus pennsylvanica</u>	<u>30</u>	<u>Yes</u>	<u>FACW</u>		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
_____ = Total Cover 50% of total cover: <u>50</u> 20% of total cover: <u>20</u>				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____	
Sapling/Shrub Stratum (Plot size: <u>10'</u>)					
1. <u>Alnus serrulata</u>	<u>30</u>	<u>Yes</u>	<u>OBL</u>		
2. <u>Acer rubrum</u>	<u>15</u>	<u>Yes</u>	<u>FAC</u>		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
_____ = Total Cover 50% of total cover: <u>22.5</u> 20% of total cover: <u>9</u>				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is $\geq 3.0^*$ <input type="checkbox"/> 4 - Morphological Adaptations [†] (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation [†] (Explain)	
Herb Stratum (Plot size: <u>1.5 m</u>)					
1. <u>Impatiens canensis</u>	<u>50</u>	<u>Yes</u>	<u>OBL</u>		
2. <u>Persicaria maculosa</u>	<u>30</u>	<u>Yes</u>	<u>FACW</u>		
3. <u>Polygonum cuspidatum</u>	<u>5</u>	<u>No</u>	<u>NL</u>		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
10. _____	_____	_____	_____		
11. _____	_____	_____	_____		
_____ = Total Cover 50% of total cover: <u>42.5</u> 20% of total cover: <u>17</u>				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.	
Woody Vine Stratum (Plot size: <u>1 m</u>)					
1. <u>Campsis radicans</u>	<u>5</u>	<u>Yes</u>	<u>FAC</u>		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
_____ = Total Cover 50% of total cover: <u>2.5</u> 20% of total cover: <u>1</u>				Hydrophytic Vegetation Present? Yes <u>X</u> No _____	

Remarks: (Include photo numbers here or on a separate sheet.)

Hydrophytic vegetation identified within Wetland C.

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-8	5 YR 3/3	50	10 YR 2/1	50	D	M	SCL	
8-20	10 YR 2/1	100					SCL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

- Hydric Soil Indicators:**
- Histosol (A1)
 - Histic Epipedon (A2)
 - Black Histic (A3)
 - Hydrogen Sulfide (A4)
 - Stratified Layers (A5)
 - 2 cm Muck (A10) (LRR N)
 - Depleted Below Dark Surface (A11)
 - Thick Dark Surface (A12)
 - Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)
 - Sandy Gleyed Matrix (S4)
 - Sandy Redox (S5)
 - Stripped Matrix (S6)
 - Dark Surface (S7)
 - Polyvalue Below Surface (S8) (MLRA 147, 148)
 - Thin Dark Surface (S9) (MLRA 147, 148)
 - Loamy Gleyed Matrix (F2)
 - Depleted Matrix (F3)
 - Redox Dark Surface (F6)
 - Depleted Dark Surface (F7)
 - Redox Depressions (F8)
 - Iron-Manganese Masses (F12) (LRR N, MLRA 136)
 - Umbric Surface (F13) (MLRA 136, 122)
 - Piedmont Floodplain Soils (F19) (MLRA 148)
 - Red Parent Material (F21) (MLRA 127, 147)
- Indicators for Problematic Hydric Soils³:**
- 2 cm Muck (A10) (MLRA 147)
 - Coast Prairie Redox (A16) (MLRA 147, 148)
 - Piedmont Floodplain Soils (F19) (MLRA 136, 147)
 - Very Shallow Dark Surface (TF12)
 - Other (Explain in Remarks)
- ³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes No _____

Remarks:

Hydric soils identified within Wetland C.

WETLAND RATING WORKSHEET Fourth Version

Project Name US 21/Gilead Road; STIP No. U-5114 Nearest Road US 21
 County Mecklenburg Wetland area -0.033 acres Wetland width 50 feet
 Name of evaluator Brandon Phillips Date 6-9-14

Wetland A

Wetland location

- on pond or lake
- on perennial stream
- on intermittent stream
- within interstream divide
- other: _____

Adjacent land use

- (within 1/2 mile upstream, upslope, or radius)
- forested/natural vegetation 20 %
 - agriculture, urban/suburban 20 %
 - impervious surface 60 %

Soil series: Monacan soils

- predominantly organic - humus, muck, or peat
- predominantly mineral - non-sandy
- predominantly sandy

Dominant vegetation

- (1) Alnus serrulata
- (2) Salix nigra
- (3) Typha latifolia

Hydraulic factors

- steep topography
- ditched or channelized
- total wetland width ≥ 100 feet

Flooding and wetness

- semipermanently to permanently flooded or inundated
- seasonally flooded or inundated
- intermittently flooded or temporary surface water
- no evidence of flooding or surface water

Wetland type (select one)*

- | | |
|--|--|
| <input type="checkbox"/> Bottomland hardwood forest | <input type="checkbox"/> Pine savanna |
| <input checked="" type="checkbox"/> Headwater forest | <input type="checkbox"/> Freshwater marsh |
| <input type="checkbox"/> Swamp forest | <input type="checkbox"/> Bog/fen |
| <input type="checkbox"/> Wet flat | <input type="checkbox"/> Ephemeral wetland |
| <input type="checkbox"/> Pocosin | <input type="checkbox"/> Carolina bay |
| <input type="checkbox"/> Bog forest | <input type="checkbox"/> Other: _____ |

* The rating system cannot be applied to salt or brackish marshes or stream channels

R	Water storage	<u>1</u>	x 4.00 =	<u>4</u>
A	Bank/Shoreline stabilization	<u>5</u>	x 4.00 =	<u>20</u>
T	Pollutant removal	<u>5</u>	** x 5.00 =	<u>25</u>
I	Wildlife habitat	<u>4</u>	x 2.00 =	<u>8</u>
N	Aquatic life value	<u>3</u>	x 4.00 =	<u>12</u>
G	Recreation/Education	<u>1</u>	x 1.00 =	<u>1</u>

Wetland rating

70

** Add 1 point if in sensitive watershed and >10% nonpoint source disturbance within 1/2 mile upstream, upslope, or radius

WETLAND RATING WORKSHEET Fourth Version

Project Name US 21/Gilead Road; STIP No. U-5114 Nearest Road US 21
 County Mecklenburg Wetland area ~0.038 acres Wetland width 20 feet
 Name of evaluator Brandon Phillips Date 6-9-14

<u>Wetland B</u>	
Wetland location <input type="checkbox"/> on pond or lake <input checked="" type="checkbox"/> on perennial stream <input type="checkbox"/> on intermittent stream <input type="checkbox"/> within interstream divide <input type="checkbox"/> other: _____	Adjacent land use (within 1/2 mile upstream, upslope, or radius) <input checked="" type="checkbox"/> forested/natural vegetation <u>50</u> % <input checked="" type="checkbox"/> agriculture, urban/suburban <u>30</u> % <input checked="" type="checkbox"/> impervious surface <u>20</u> %
Soil series: <u>Mecklenburg</u> <input type="checkbox"/> predominantly organic - humus, muck, or peat <input type="checkbox"/> predominantly mineral - non-sandy <input checked="" type="checkbox"/> predominantly sandy	Dominant vegetation (1) <u>Liquidambar styraciflua</u> (2) <u>Acer rubrum</u> (3) <u>Ligustrum sinense</u>
Hydraulic factors <input type="checkbox"/> steep topography <input checked="" type="checkbox"/> ditched or channelized <input type="checkbox"/> total wetland width ≥ 100 feet	Flooding and wetness <input type="checkbox"/> semipermanently to permanently flooded or inundated <input type="checkbox"/> seasonally flooded or inundated <input checked="" type="checkbox"/> intermittently flooded or temporary surface water <input type="checkbox"/> no evidence of flooding or surface water

- Wetland type (select one)***
- | | |
|--|--|
| <input type="checkbox"/> Bottomland hardwood forest | <input type="checkbox"/> Pine savanna |
| <input checked="" type="checkbox"/> Headwater forest | <input type="checkbox"/> Freshwater marsh |
| <input type="checkbox"/> Swamp forest | <input type="checkbox"/> Bog/fen |
| <input type="checkbox"/> Wet flat | <input type="checkbox"/> Ephemeral wetland |
| <input type="checkbox"/> Pocosin | <input type="checkbox"/> Carolina bay |
| <input type="checkbox"/> Bog forest | <input type="checkbox"/> Other: _____ |

* The rating system cannot be applied to salt or brackish marshes or stream channels

R	Water storage	<u>1</u>	x 4.00 =	<u>4</u>	Wetland rating <div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">59</div>
A	Bank/Shoreline stabilization	<u>2</u>	x 4.00 =	<u>8</u>	
T	Pollutant removal	<u>4</u>	** x 5.00 =	<u>20</u>	
I	Wildlife habitat	<u>3</u>	x 2.00 =	<u>6</u>	
N	Aquatic life value	<u>5</u>	x 4.00 =	<u>20</u>	
G	Recreation/Education	<u>1</u>	x 1.00 =	<u>1</u>	

** Add 1 point if in sensitive watershed and >10% nonpoint source disturbance within 1/2 mile upstream, upslope, or radius

WETLAND RATING WORKSHEET Fourth Version

Project Name US 21/Gilead Road, STIP No. U-5114 Nearest Road US 21
 County Mecklenburg Wetland area -0.031 acres Wetland width 50 feet
 Name of evaluator Brandon Phillips Date 6-9-14

Wetland C

Wetland location

- on pond or lake
- on perennial stream
- on intermittent stream
- within interstream divide
- other: _____

Adjacent land use

- (within 1/2 mile upstream, upslope, or radius)
- forested/natural vegetation 20 %
 - agriculture, urban/suburban 50 %
 - impervious surface 30 %

Soil series: Cecil

- predominantly organic - humus, muck, or peat
- predominantly mineral - non-sandy
- predominantly sandy

Dominant vegetation

- (1) *Alnus serrulata*
- (2) *Salix nigra*
- (3) *Fraxinus pennsylvanica*

Hydraulic factors

- steep topography
- ditched or channelized
- total wetland width \geq 100 feet

Flooding and wetness

- semipermanently to permanently flooded or inundated
- seasonally flooded or inundated
- intermittently flooded or temporary surface water
- no evidence of flooding or surface water

Wetland type (select one)*

- | | |
|--|--|
| <input type="checkbox"/> Bottomland hardwood forest | <input type="checkbox"/> Pine savanna |
| <input checked="" type="checkbox"/> Headwater forest | <input type="checkbox"/> Freshwater marsh |
| <input type="checkbox"/> Swamp forest | <input type="checkbox"/> Bog/fen |
| <input type="checkbox"/> Wet flat | <input type="checkbox"/> Ephemeral wetland |
| <input type="checkbox"/> Pocosin | <input type="checkbox"/> Carolina bay |
| <input type="checkbox"/> Bog forest | <input type="checkbox"/> Other: _____ |

* The rating system cannot be applied to salt or brackish marshes or stream channels

R	Water storage	<u>1</u>	x 4.00 =	<u>4</u>
A	Bank/Shoreline stabilization	<u>5</u>	x 4.00 =	<u>20</u>
T	Pollutant removal	<u>4</u>	** x 5.00 =	<u>20</u>
I	Wildlife habitat	<u>2</u>	x 2.00 =	<u>4</u>
N	Aquatic life value	<u>3</u>	x 4.00 =	<u>12</u>
G	Recreation/Education	<u>1</u>	x 1.00 =	<u>1</u>

Wetland rating

61

** Add 1 point if in sensitive watershed and >10% nonpoint source disturbance within 1/2 mile upstream, upslope, or radius



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAT MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

August 8, 2014

Memorandum To: Jeff Hemphill, Western Environmental Senior Specialist, Natural Environment Section, Project Management Group

From: Jared Gray, Environmental Program Supervisor
Natural Environment Section, Biological Surveys Group

Subject: Protected species survey report for the Carolina heelsplitter (*Lasmigona decorata*) for the proposed improvements to US 21 and SR 2136 (Gilead Road) Interchange; Mecklenburg County: WBS Element 42376.1.R2; TIP Project No.U-5114.

Proposed Project U-5114

The proposed project calls for the improvements to the interchange of US 21 and SR 2136 (Gilead Road) in Mecklenburg County. Two Unnamed tributaries to Torrence Creek (UT1 and UT2) would be crossed and could potentially be impacted by the project. The two UT's Torrence Creek are located in the Catawba River Basin. From the project site, UT1 Torrence Creek flows 1.9 mile before entering Torrence Creek and UT2 flows 0.6 mile before entering Torrence Creek. A map of the project site is attached. The federally endangered Carolina heelsplitter is listed by the U.S. Fish and Wildlife Service for Mecklenburg County.

Background

The Carolina heelsplitter was historically known from several locations within the Catawba and Pee Dee River systems in North Carolina and the Pee Dee and Savannah River systems, and possibly the Saluda River system, in South Carolina. In North Carolina, the species is now known only from a handful of streams in the Rocky and Catawba River systems.

The species exists in very low abundances, usually within 6 feet of shorelines, throughout its known range. The general habitat requirements for the Carolina heelsplitter are shaded areas in large rivers to small streams, often burrowed into clay banks between the root systems of trees, or in runs along steep banks with moderate current. The more recent habitat where the Carolina heelsplitter has been found is in sections of streams containing bedrock with perpendicular crevices filled with sand and gravel, and with wide riparian buffers.

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT & ENVIRONMENTAL ANALYSIS UNIT
1598 MAIL SERVICE CENTER
RALEIGH NC 27699-1548

TELEPHONE: 919-707-6100
FAX: 919-212-5787
WEBSITE: WWW.NCDOT.GOV/

LOCATION:
CENTURY CENTER, BUILDING B
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

Prior to conducting in-stream surveys, a review of the North Carolina Natural Heritage Program (NHP) database was conducted (July 29, 2014) to determine if there were any records of rare mussels within the proposed project study area or receiving waters. **This review indicated that there are no known occurrences of the federally protected Carolina heelsplitter within the project area. The closest population is in Six Mile Creek in South Carolina which is over 30 miles away from this project.**

Habitat Assessment Results

A habitat assessment was performed by NCDOT staff members Neil Medlin (Permit No. 14-ES00030) and Jared Gray (Permit No. 14-ES00314) on July 30, 2014 for UT1 and UT2 Torrence Creek. UT1 Torrence Creek is located to the North of the US 21 and Gilead Road interchange. UT1 Torrence Creek at the time of the assessment was 2 meters wide and bank height was 1 meters high. On the day of the site visit, the overall water depth was shallow with 100% of the stream reach less than 2 feet in depth. The creek contained runs, riffles, and pool areas with normal substrate compactness. The substrate around the crossing of US 21 was generally dominated by sand, with silt, and trace amounts of gravel. The stream has little to no cover and no buffer. The channel was incised and had some erosion along the banks. . The stream is in a developed area with runoff entering the stream. Because the potential project impacts would be at the head waters of UT1 Torrence Creek and there is no habitat, this project will have no effect on the Carolina Heelsplitter.

UT2 Torrence Creek is located south of the US 21 and Gilead Road interchange. UT2 was piped under US 21 through a vacant lot within the study corridor. UT2 Torrence Creek on the day of the site visit was 1 meter wide and bank height was 0.5 meter high. The overall water depth was shallow with 100% of the stream reach less than 6 inches in depth. UT2 Torrence Creek contained runs, riffles and pool areas with normal substrate compactness. The substrate was generally dominated by sand, with silt, and trace amounts of gravel. The stream banks have some erosion. The stream is in a developed area with runoff entering the stream. The channel is only open for a couple hundred yards before being piped under I-77. Because the potential project impacts would be at the head waters of UT2 Torrence Creek and there is no habitat, this project will have no effect on the Carolina Heelsplitter.

Carolina Heelsplitter

As a result of this habitat assessment, as well as the review of GIS and NHP data, it appears that the Carolina heelsplitter does not exist in the project vicinity. Habitat for the Carolina heelsplitter does not occur at either UT1 or UT2 Torrence Creek assessment sites. The project crosses UT1 and UT2 Torrence Creek, but is over 30 miles upstream from the nearest population of Carolina heelsplitter in Sixmile Creek. **This project will have no effect on the Carolina heelsplitter.**

Biological Conclusion

No Effect

References

NatureServe. 2007. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed 07/29/14)

NC Natural Heritage Program. 2014. North Carolina Natural Heritage Program database (Accessed 07/29/14). Raleigh, N.C.

[NCWRC] North Carolina Wildlife Resources Commission. North Carolina Mussel Atlas: http://www.ncwildlife.org/pg07_WildlifeSpeciesCon/pg7b1a1.htm. (Accessed 07/29/14)

[USFWS] United States Fish and Wildlife Service. Carolina heelsplitter in North Carolina. <http://www.fws.gov/nc-es/mussel/carolheel.html>. (Accessed 07/29/14)

CC: Elmo Vance, Western Region Project Development Engineer
File: U-5114

Appendix D - Historic Architecture & Archaeology
D1. NC Department of Cultural Resources Memorandum



North Carolina Department of Cultural Resources
State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Pat McCrory
Secretary Susan Kluttz

Office of Archives and History
Deputy Secretary Kevin Cherry

August 19, 2014

Susan Paschal
STV/Ralph Whitehead Associates
900 West Trade Street, Suite 715
Charlotte, NC 28202-1144

Re: Intersection of US 21 and SR 2136 Improvements, Huntersville, U-5114, Mecklenburg County,
ER 14-1632

Dear Ms. Paschal:

Thank you for your email of July 16, 2014, concerning the above project.

We have conducted a review of the project and are aware of no historic resources which would be affected by the project. Therefore, we have no comment on the project as proposed.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-807-6579 or renee.gledhill-earley@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

A handwritten signature in blue ink that reads "Renee Gledhill-Earley".

for Ramona M. Bartos

Appendix E - Relocations
E1. NCDOT Relocation Report
E2. NCDOT GeoEnvironmental Right of Way Recommendations Memorandum
E3. NCDOT Right of Way Cost Estimate

EIS RELOCATION REPORT

North Carolina Department of Transportation
RELOCATION ASSISTANCE PROGRAM

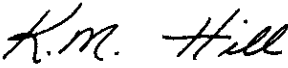
E.I.S. CORRIDOR DESIGN

WBS ELEMENT:	42176.1.1	COUNTY	Mecklenburg	Alternate	1	of	1	Alternate
T.I.P. No.:	U-5114							
DESCRIPTION OF PROJECT:	US 21/Gilead Rd. U-Turn Intersection in Town of Huntersville							

ESTIMATED DISPLACEDS					INCOME LEVEL					
Type of Displacees	Owners	Tenants	Total	Minorities	0-15M	15-25M	25-35M	35-50M	50 UP	
Residential	1	0	1	0	0	0	0	0	1	
Businesses	0	1	1	0	VALUE OF DWELLING			DSS DWELLING AVAILABLE		
Farms	0	0	0	0	Owners		Tenants		For Sale	
Non-Profit	0	0	0	0	0-20M	0	\$ 0-150	0	0-20M	\$ 0-150
ANSWER ALL QUESTIONS					20-40M	0	150-250	0	20-40M	150-250
Yes	No	<i>Explain all "YES" answers.</i>			40-70M	0	250-400	0	40-70M	250-400
	X	1. Will special relocation services be necessary?			70-100M	0	400-600	0	70-100M	400-600
	X	2. Will schools or churches be affected by displacement?			100 UP	1	600 UP	0	100 UP	10
X		3. Will business services still be available after project?			TOTAL	1	0	0	10	6
X		4. Will any business be displaced? If so, indicate size, type, estimated number of employees, minorities, etc.			REMARKS (Respond by number)					
	X	5. Will relocation cause a housing shortage?			<p>#3) There will still be business services in the area.</p> <p>#4 (1) Dry Cleaners (tenant) located in the Bayshore Plaza at the northernmost end of building. Cost to Cure would be considered by shoring corning of building, thus creating one displacee at this location. This is a brick building with 8 to 10 employees.</p> <p>#6 MLS, Newspaper, Realtors and publications.</p> <p>#8 Will be administered according to State and Federal law.</p> <p>#11 Public Housing available in Mecklenburg County</p> <p>#12. If current trends continue and given adequate lead Time , housing should be available.</p> <p>#14 Yes, same as number #6.</p> <p style="color: red;">continue to second page.</p>					
		6. Source for available housing (list).								
	X	7. Will additional housing programs be needed?								
X		8. Should Last Resort Housing be considered?								
	X	9. Are there large, disabled, elderly, etc. families?								
	X	10. Will public housing be needed for project?								
X		11. Is public housing available?								
X		12. Is it felt there will be adequate DSS housing housing available during relocation period?								
	X	13. Will there be a problem of housing within financial means?								
X		14. Are suitable business sites available (list source).								
		15. Number months estimated to complete RELOCATION?								
		24								

Note: It is the understanding that retaining walls will be constructed to avoid entering parking areas of businesses along the subject project.

According to plans submitted by STV/Ralph Whitehead Associates Inc. the coin laundry, SECU, and Goodwill structures are in the existing eastern right of way along of US 21. **Per conversations with STV, this is NOT accurate of what the existing right of way actually is, and thus the the coin laundry, SECU, and Goodwill structures are NOT in existing right of way, and will not be considered as displaced.**

	9/4/14			9/4/14
K.M. Hill Division Right of Way Agent	Date		Relocation Coordinator	Date



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION


PAT MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

October 30, 2014

TIP: U-5114
WBS Element: 42376.1.R2
County: Mecklenburg
Description: Huntersville- Intersection of US 21 (Statesville Road) and Gilead Road, Construct intersection improvements including bicycle and pedestrian accommodations

MEMORANDUM TO: Steve Grimes
Right of Way Unit
State Negotiator

FROM: 
Cyrus F Parker, LG, PE
GeoEnvironmental Supervisor
GeoEnvironmental Section
Geotechnical Engineering Unit

SUBJECT: Right of Way Recommendations

Per the request of Robert Woodard, enclosed for your review are copies of the assessment reports prepared by AMEC Environmental and Infrastructure, Inc. for the GeoEnvironmental Section. The Department or its Contractor will remove and properly dispose any contaminated material disturbed during construction. Any contaminated material that is not disturbed by construction will remain in place and undisturbed. Three potentially contaminated parcel located along the above described project corridor were investigated. Upon reviewing the enclosed reports, the GeoEnvironmental Section offers the following Right of Way recommendation:

QAS II Inc. Property (Not Contaminated)

Valvoline Oil
14114 Statesville Rd

A geophysical investigation found evidence of a possible UST located within the proposed right of way at this site. Five soil borings were advanced to determine if petroleum contaminated soil was present at this site. Petroleum contamination was

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
GEOENVIRONMENTAL SECTION
1589 MAIL SERVICE CENTER
RALEIGH NC 27699-1589

TELEPHONE: 919-707-6850
FAX: 919-250-4237

www.ncdot.gov/doh/preconstruct/highway/geotech

LOCATION:
CENTURY CENTER COMPLEX
BUILDING B
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

detected in four of the borings but was below the NCDENR action level of 10mg/Kg. Acquisition of the right of way along this property should be acquired through permanent easement with no money withheld.

Kim Dong Sik Property (Not Contaminated)

Kim's BP

101 Gilead Rd

Facility ID: 0-013713

A geophysical survey found no evidence of USTs located within the proposed right of way/easement ant this site. There are three 10,000 gallon USTs located outside the proposed right of way. Twenty soil borings were advanced to determine if petroleum contaminated soil was present at the site. Petroleum contamination was detected in six of the borings but was below the NCDENR action level of 10mg/Kg. Acquisition of the right of way along this property should be acquired through fee simple with no money withheld.

J.C. Faw Property (Not Contaminated)

Fast Track Convenience Store

502 Gilead Rd

Facility ID: 0-032366

A geophysical investigation found no evidence of USTs located within the proposed right of way/easement at this site. There are two 8,000 gallon and one 10,000 gallon UST located outside the proposed right of way. Five soil borings were advanced to determine if petroleum contamination was present at the site. Laboratory results indicated that no petroleum contaminated soil exists within the area tested. Acquisition of the right of way along this property should be acquired through fee simple with no money withheld.

If acquisition of an uneconomic remnant attached to the above-described property is desired by the Department, this office should be contacted so supplemental assessment work can be performed.

Information relating to these contaminated areas, sample locations, and laboratory results are available the Project Store Server at:

\\TIPProjects-U\U5114\Geotech\GeoEnvironmental\U5114_GEO_GEOENV

Please contact me at (919) 707-6868 if you have any questions or comments concerning these sites or our assessment work on them.

CFP/ceh

cc

Ritchie Hearne, PE, Division Project Engineer

Scott Allen, PE, Division Construction Engineer

Kenneth Hill, Division 10 Right of Way Agent Division Right of Way Office

Row-notify@ncdot.gov

Terry Niles, Right of Way Unit, Real Property Coordinator

Lois Little, Area Negotiator Divisions 7, 9 & 10

File

REQUEST FOR R/W COST ESTIMATE / RELOCATION EIS

COST ESTIMATE REQUEST

RELOCATION EIS REPORT

DATE RECEIVED: 06/09/15 DATE ASSIGNED: 06/09/15 DATE DUE: _____

NEW REQUEST:

UPDATE REQUEST:

REVISION REQUEST:

TIP NUMBER	DESCRIPTION: <u>US 21 / Gilead Rd Intersection Improvements R/W Response to Comments, Revision to the 2015 Update</u>
<u>U-5114</u>	

WBS ELEMENT: 42176.1.1 COUNTY: Mecklenburg DIV: 10 APPRAISAL OFFICE: 4

REQUESTOR: Nikki Honeycutt ^{STV, INC} DEPT: _____ TYPE OF PLANS PROVIDED: AERIAL PHOTO STRIP MAPS

BASED ON PAST PROJECT HISTORICAL DATA, THE LAND AND DAMAGE FIGURES HAVE BEEN ADJUSTED TO INCLUDE CONDEMNATION AND ADMINISTRATIVE INCREASES THAT OCCUR DURING SETTLEMENT OF ALL PARCELS.

APPRAISER: F. Barkley COMPLETION DATE: 7-6-15 TRANSMITTED: _____

TYPE OF ACCESS:	NONE: <input type="checkbox"/> LIMITED: <input type="checkbox"/>		NONE: <input type="checkbox"/> LIMITED: <input type="checkbox"/>		NONE: <input type="checkbox"/> LIMITED: <input type="checkbox"/>	
	PARTIAL: <input type="checkbox"/> FULL: <input type="checkbox"/>		PARTIAL: <input type="checkbox"/> FULL: <input type="checkbox"/>		PARTIAL: <input type="checkbox"/> FULL: <input type="checkbox"/>	
ESTIMATED NO. OF PARCELS:	<u>28± Tax Parcels</u>					
RESIDENTIAL RELOCATEES: <u>510 Dallas St</u>	<u>1</u>	<u>\$ 35,000±</u>		\$		\$
BUSINESS RELOCATEES: <u>DRY CLEANERS</u>	<u>1</u>	<u>\$ 75,000±</u>		\$		\$
GRAVES: <u>NONE OBSERVED NOR INDICATED</u>		\$ —		\$		\$
CHURCH / NON - PROFIT:	—	\$ —		\$		\$
FARMS:	—	\$ —		\$		\$
MISC: _____	—	\$ —		\$		\$
SIGNS:	—	\$ —		\$		\$
LAND, IMPROVEMENTS, AND DAMAGES:		<u>\$ 2,775,000±</u>		\$		\$
ACQUISITION:		<u>\$ 465,000±</u>		\$		\$
TOTAL ESTIMATED R/W COST:		<u>\$ 3,350,000±</u>		\$		\$

THE ESTIMATED NUMBER OF ABOVE RELOCATEES INCLUDES THOSE PARCELS WHERE THE PROPOSED ACQUISITION AREAS INVOLVE RELOCATION OF LIVABLE OR BUSINESS UNITS ONLY.

THERE ARE NO FIGURES FOR UTILITY INVOLVEMENT ON THIS ESTIMATE / RELOCATION EIS REPORT AND NO PUE's, AUE's NOR DUE's UNLESS DEPICTED ON PLANS FURNISHED.

NOTES: _____ THE DRY CLEANERS PORTION OF THE "BAYSHORE PLAZA" STRIP SHOPPING CENTER AND THE "BP CONVENIENCE GAS STORE" AS WELL AS THE "SHELL CONVENIENCE GAS STORE" ARE TREATED AS "CLEAN" AND FREE OF ANY HAZARDOUS MATERIALS OR CONTAMINATED LAND AREA FOR THIS REVISED ESTIMATE. ALSO THE "VALVOLINE LUBE AND OIL" ADJOINING THE "WAFFLE HOUSE."

Appendix F - Cost Estimate
F1. Cost Estimate Calculations

FUNCTIONAL COST ESTIMATE (STIP # U-5114)

Estimate By: STV Engineers, Inc.
Prepared For: Town of Huntersville

Date: 08/11/15

U-Turn Intersection Concept	
Section	Construction
Gilead Rd.	\$ 1,236,400.00
Ramp	\$ 294,300.00
US 21	\$ 2,992,400.00
Boulder Park Extension	\$ 425,000.00
Dallas St Extension	\$ 371,500.00
Pavement Markings	\$ 56,000.00

Construction	\$ 5,375,600.00
Contingency (10%)	\$ 537,600.00
Utility Relocation	\$ 772,224.00
Right of Way	\$ 3,350,000.00
Environmental Impact Remediation	\$ 321,000.00
Design Fee	\$ 800,000.00
TOTAL	\$ 11,156,424.00

FUNCTIONAL COST ESTIMATE

Project: STIP #U-5114

Limits: Gilead Rd.

EST. BY: STV

DATE:

08/11/15

Item Description Roadway Items	Unit	Unit Cost	Quantity		Amount	
			Quantity	Amount	Quantity	Amount
Mobilization	LS		1			\$58,900
Grading	LS		1			\$118,100
Storm Drainage	LS		1			\$124,800
Asphalt Concrete Base Course, Type B25.0	TON	\$50.00	2,400			\$120,000
Asphalt Concrete Binder Course, Type I19.0	TON	\$50.00	1,400			\$70,000
Asphalt Concrete Surface Course, Type S9.5	TON	\$50.00	2,800			\$140,000
Asphalt Binder for Plant Mix	TON	\$570.00	350			\$199,500
2'-6" Concrete Curb & Gutter	LF	\$17.00	4,200			\$71,400
1'-6" Concrete Curb & Gutter	LF	\$15.00	2,100			\$31,500
4" Concrete Sidewalk	SY	\$30.00	2,800			\$84,000
Misc Items	LS		1			\$107,500
Erosion Control	LS		1			\$35,800
Water/Sewer Utilities	LS		0			\$0
Landscaping	LS		1			\$74,900
Subtotal						\$1,236,400

PROJECT DATA FOR PRELIMINARY ESTIMATE (Existing Road)

Project: STIP # U5114 Section: Gilead Rd.

Project Length(feet)	<u>2080</u>
widening	<u>2080</u>
resurfacing	<u>2080</u>
Existing Pavement Width	<u>40</u>
Proposed Pavement Width	77
no. of lanes	<u>4</u>
bike lanes (0-no bike lanes, 1-one side or 2-bothsides)	<u>0</u>
parking? (0-no parking, 1-one side or 2-bothsides)	<u>0</u>
Pavement Area for Widening(sy)	6015
Pavement Area for Resurfacing(sy)	9100
Pavement Area Under Curb & Gutter(sy)	<u>1100</u>
Textured Turn Lane (0-no or 1-yes)?	<u>0</u>
Landscaped Median (0-no or 1-yes)?	<u>1</u>
Sidewalk	
(enter 0-no sidewalk, 1-one side or 2-two sides)	<u>2</u>
average width	<u>6</u>
Curb & Gutter	
(enter 0-no curb & gutter, 1-one side or 2-two sides)	<u>2</u>
Valley gutter separator for parking	
(enter 0-no valley gutter, 1-one side or 2-two sides)	<u>0</u>
Storm Drainage System	
most or all new system needed (enter 2)	<u>2</u>
supplemental new system needed (enter 1)	
incidental or no new system needed (enter 0)	
Planting Strip	
(enter 0-no planting strip, 1-one side or 2-two sides)	<u>2</u>
Utility Relocation	
overhead lines(enter length in feet)	<u>0</u>
underground(enter length in feet)	<u>0</u>
Right of Way Acquisition	
construction easement area(sf)	<u> </u>
right of way area(sf)	<u> </u>
number of parcels	<u> </u>
Environmental Impact	
(linear ft. of contamination, enter 0 if none)	<u>0</u>

Enter data for items highlighted in red

FUNCTIONAL COST ESTIMATE

Project: STIP # U-5114

Limits: Ramp

EST. BY: STV

DATE:

08/11/15

Item Description Roadway Items	Unit	Unit Cost	Quantity		Amount	
			Quantity	Amount	Quantity	Amount
Mobilization	LS		1		1	\$14,000
Grading	LS		1		1	\$30,000
Storm Drainage	LS		1		1	\$10,500
Asphalt Concrete Base Course, Type B25.0	TON	\$50.00	600		600	\$30,000
Asphalt Concrete Binder Course, Type I19.0	TON	\$50.00	400		400	\$20,000
Asphalt Concrete Surface Course, Type S9.5	TON	\$50.00	1,400		1,400	\$70,000
Asphalt Binder for Plant Mix	TON	\$570.00	140		140	\$79,800
2'-6" Concrete Curb & Gutter	LF	\$17.00	0		0	\$0
1'-6" Concrete Curb & Gutter	LF	\$15.00	0		0	\$0
4" Concrete Sidewalk	SY	\$30.00	0		0	\$0
Misc Items	LS		1		1	\$30,000
Erosion Control	LS		1		1	\$10,000
Water/Sewer Utilities	LS		0		0	\$0
Pavement Markings/Traffic Control	LS		1		1	\$0
Landscaping	LS		1		1	\$0
Subtotal						\$294,300

PROJECT DATA FOR PRELIMINARY ESTIMATE (Existing Road)

Project: STIP # U5114 Section: Gilead Rd.

Project Length(feet)	<u>1050</u>
widening	<u>1050</u>
resurfacing	<u>1050</u>
Existing Pavement Width	<u>40</u>
Proposed Pavement Width	48
no. of lanes	<u>3</u>
bike lanes (0-no bike lanes, 1-one side or 2-bothsides)	<u>0</u>
parking? (0-no parking, 1-one side or 2-bothsides)	<u>0</u>
Pavement Area for Widening(sy)	1727
Pavement Area for Resurfacing(sy)	5650
Pavement Area Under Curb & Gutter(sy)	<u>0</u>
Textured Turn Lane (0-no or 1-yes)?	<u>0</u>
Landscaped Median (0-no or 1-yes)?	<u>0</u>
Sidewalk	
(enter 0-no sidewalk, 1-one side or 2-two sides)	<u>0</u>
average width	<u>0</u>
Curb & Gutter	
(enter 0-no curb & gutter, 1-one side or 2-two sides)	<u>0</u>
Valley gutter separator for parking	
(enter 0-no valley gutter, 1-one side or 2-two sides)	<u>0</u>
Storm Drainage System	
most or all new system needed (enter 2)	<u>0</u>
supplemental new system needed (enter 1)	
incidental or no new system needed (enter 0)	
Planting Strip	
(enter 0-no planting strip, 1-one side or 2-two sides)	<u>0</u>
Utility Relocation	
overhead lines(enter length in feet)	<u>0</u>
underground(enter length in feet)	<u>0</u>
Right of Way Acquisition	
construction easement area(sf)	<u>0</u>
right of way area(sf)	<u>0</u>
number of parcels	<u>0</u>
Environmental Impact	
(linear ft. of contamination, enter 0 if none)	<u>0</u>

Enter data for items highlighted in red

FUNCTIONAL COST ESTIMATE

Project: STIP # U-5114

Limits: US 21

EST. BY: STV Engineers, Inc.

DATE:

08/11/15

Item Description Roadway Items	Unit	Unit Cost	Quantity		Amount	
			Quantity	Amount	Quantity	Amount
Mobilization	LS		1		1	\$142,500
Grading	LS		1		1	\$287,400
Storm Drainage	LS		1		1	\$278,800
Asphalt Concrete Base Course, Type B25.0	TON	\$50.00	6,500		6,500	\$325,000
Asphalt Concrete Binder Course, Type I19.0	TON	\$50.00	4,000		4,000	\$200,000
Asphalt Concrete Surface Course, Type S9.5	TON	\$50.00	6,700		6,700	\$335,000
Asphalt Binder for Plant Mix	TON	\$570.00	900		900	\$513,000
2'-6" Concrete Curb & Gutter	LF	\$17.00	9,300		9,300	\$158,100
1'-6" Concrete Curb & Gutter	LF	\$15.00	4,600		4,600	\$69,000
4" Concrete Sidewalk	SY	\$30.00	3,100		3,100	\$93,000
Misc Items	LS		1		1	\$338,600
Erosion Control	LS		1		1	\$84,700
Water/Sewer Utilities	LS		0		0	\$0
Pavement Markings/Traffic Control	LS		0		0	\$0
Landscaping	LS		1		1	\$167,300
Subtotal						\$2,992,400

PROJECT DATA FOR PRELIMINARY ESTIMATE (Existing Road)

Project: US 21/Gilead Rd. Intersection Improvements

Project Length(feet)	<u>4647</u>
widening	<u>4647</u>
resurfacing	<u>4647</u>
Existing Pavement Width	<u>46</u>
Proposed Pavement Width	82
no. of lanes	<u>5</u>
bike lanes (0-no bike lanes, 1-one side or 2-bothsides)	<u>0</u>
parking? (0-no parking, 1-one side or 2-bothsides)	<u>0</u>
Pavement Area for Widening(sy)	17502
Pavement Area for Resurfacing(sy)	18457
Pavement Area Under Curb & Gutter(sy)	<u>1500</u>
Textured Turn Lane (0-no or 1-yes)?	<u>0</u>
Landscaped Median (0-no or 1-yes)?	<u>1</u>
Sidewalk	
(enter 0-no sidewalk, 1-one side or 2-two sides)	<u>1</u>
average width	<u>6</u>
Curb & Gutter	
(enter 0-no curb & gutter, 1-one side or 2-two sides)	<u>2</u>
Valley gutter separator for parking	
(enter 0-no valley gutter, 1-one side or 2-two sides)	<u>0</u>
Storm Drainage System	
most or all new system needed (enter 2)	<u>2</u>
supplemental new system needed (enter 1)	
incidental or no new system needed (enter 0)	
Planting Strip	
(enter 0-no planting strip, 1-one side or 2-two sides)	<u>2</u>
Utility Relocation	
overhead lines(enter length in feet)	<u>1000</u>
underground(enter length in feet)	<u>0</u>
Right of Way Acquisition	
construction easement area(sf)	<u> </u>
right of way area(sf)	<u> </u>
number of parcels	<u> </u>
Environmental Impact	
(linear ft. of contamination, enter 0 if none)	<u>50</u>

Enter data for items highlighted in red

FUNCTIONAL COST ESTIMATE

Project: STIP # U-5114
Limits: Boulder Park Extension

EST. BY: STV Engineers, Inc.

DATE:

08/11/15

Item Description Roadway Items	Unit	Unit Cost	Quantity		Amount
			Quantity	Amount	
Mobilization	LS		1		\$20,200
Grading	LS		1		\$43,400
Storm Drainage	LS		1		\$63,000
Asphalt Concrete Base Course, Type B25.0	TON	\$50.00	1,300		\$65,000
Asphalt Concrete Binder Course, Type I19.0	TON	\$50.00	800		\$40,000
Asphalt Concrete Surface Course, Type S9.5	TON	\$50.00	600		\$30,000
Asphalt Binder for Plant Mix	TON	\$570.00	100		\$57,000
2'-6" Concrete Curb & Gutter	LF	\$17.00	2,100		\$35,700
1'-6" Concrete Curb & Gutter	LF	\$15.00	0		\$0
4" Concrete Sidewalk	SY	\$30.00	700		\$21,000
Misc Items	LS		1		\$37,300
Erosion Control	LS		1		\$12,400
Water/Sewer Utilities	LS		0		\$0
Pavement Markings/Traffic Control	LS		1		\$0
Landscaping	LS		1		\$0
Subtotal					\$425,000

PROJECT DATA FOR PRELIMINARY ESTIMATE (Existing Road)

Project: STIP # U5114 Section: Gilead Rd.

Project Length(feet)	<u>1050</u>
widening	<u>1050</u>
resurfacing	<u>0</u>
Existing Pavement Width	<u>0</u>
Proposed Pavement Width	24
no. of lanes	<u>2</u>
bike lanes (0-no bike lanes, 1-one side or 2-bothsides)	<u>0</u>
parking? (0-no parking, 1-one side or 2-bothsides)	<u>0</u>
Pavement Area for Widening(sy)	3337
Pavement Area for Resurfacing(sy)	0
Pavement Area Under Curb & Gutter(sy)	<u>400</u>
Textured Turn Lane (0-no or 1-yes)?	<u>0</u>
Landscaped Median (0-no or 1-yes)?	<u>0</u>
Sidewalk	
(enter 0-no sidewalk, 1-one side or 2-two sides)	<u>1</u>
average width	<u>6</u>
Curb & Gutter	
(enter 0-no curb & gutter, 1-one side or 2-two sides)	<u>2</u>
Valley gutter separator for parking	
(enter 0-no valley gutter, 1-one side or 2-two sides)	<u>0</u>
Storm Drainage System	
most or all new system needed (enter 2)	<u>2</u>
supplemental new system needed (enter 1)	
incidental or no new system needed (enter 0)	
Planting Strip	
(enter 0-no planting strip, 1-one side or 2-two sides)	<u>0</u>
Utility Relocation	
overhead lines(enter length in feet)	<u>0</u>
underground(enter length in feet)	<u>0</u>
Right of Way Acquisition	
construction easement area(sf)	<u> </u>
right of way area(sf)	<u> </u>
number of parcels	<u> </u>
Environmental Impact	
(linear ft. of contamination, enter 0 if none)	<u>0</u>

Enter data for items highlighted in red

FUNCTIONAL COST ESTIMATE

Project:STIP # U-5114
Limits: Dallas St Extension

EST. BY: STV Engineers, Inc.

DATE:

08/11/15

Item Description Roadway Items	Unit	Unit Cost		
			Quantity	Amount
Mobilization	LS		1	\$17,700
Grading	LS		1	\$37,900
Storm Drainage	LS		1	\$67,200
Asphalt Concrete Base Course, Type B25.0	TON	\$50.00	1,000	\$50,000
Asphalt Concrete Binder Course, Type I19.0	TON	\$50.00	500	\$25,000
Asphalt Concrete Surface Course, Type S9.5	TON	\$50.00	500	\$25,000
Asphalt Binder for Plant Mix	TON	\$570.00	100	\$57,000
2'-6" Concrete Curb & Gutter	LF	\$17.00	2,200	\$37,400
4" Concrete Sidewalk	SY	\$30.00	700	\$21,000
Misc Items	LS		1	\$21,500
Erosion Control	LS		1	\$11,800
Water/Sewer Utilities	LS		0	\$0
Pavement Markings/Traffic Control	LS		1	\$0
Landscaping	LS		1	\$0
Subtotal				\$371,500

PROJECT DATA FOR PRELIMINARY ESTIMATE (Existing Road)

Project: STIP # U5114 Section: Gilead Rd.

Project Length(feet)	<u>1120</u>
widening	<u>1030</u>
resurfacing	<u>90</u>
Existing Pavement Width	<u>22</u>
Proposed Pavement Width	24
no. of lanes	<u>2</u>
bike lanes (0-no bike lanes, 1-one side or 2-bothsides)	<u>0</u>
parking? (0-no parking, 1-one side or 2-bothsides)	<u>0</u>
Pavement Area for Widening(sy)	2350
Pavement Area for Resurfacing(sy)	267
Pavement Area Under Curb & Gutter(sy)	<u>500</u>
Textured Turn Lane (0-no or 1-yes)?	<u>0</u>
Landscaped Median (0-no or 1-yes)?	<u>0</u>
Sidewalk	
(enter 0-no sidewalk, 1-one side or 2-two sides)	<u>1</u>
average width	<u>6</u>
Curb & Gutter	
(enter 0-no curb & gutter, 1-one side or 2-two sides)	<u>2</u>
Valley gutter separator for parking	
(enter 0-no valley gutter, 1-one side or 2-two sides)	<u>0</u>
Storm Drainage System	
most or all new system needed (enter 2)	<u>2</u>
supplemental new system needed (enter 1)	
incidental or no new system needed (enter 0)	
Planting Strip	
(enter 0-no planting strip, 1-one side or 2-two sides)	<u>1</u>
Utility Relocation	
overhead lines(enter length in feet)	<u>0</u>
underground(enter length in feet)	<u>0</u>
Right of Way Acquisition	
construction easement area(sf)	<u> </u>
right of way area(sf)	<u> </u>
number of parcels	<u> </u>
Environmental Impact	
(linear ft. of contamination, enter 0 if none)	<u>0</u>

Enter data for items highlighted in red

Pavement Markings				
Location	Length (LF)	# of Lane Lines	Cost (LF)	Total
US 21	4650	7	\$ 1.00	\$ 32,550.00
Gilead Rd	1950	9	\$ 1.00	\$ 17,550.00
Connector Roads	1968	3	\$ 1.00	\$ 5,900.00
				\$ 56,000.00

Appendix G – Utilities Memo
G1. Jarrett Engineering Utilities Memorandum
G2. NCDOT Utility Estimate Worksheet

Utility Information for Categorical Exclusion Document

September 10, 2014

Project: 21 & Gilead Rd, Huntersville, NC
Owner: The Town of Huntersville
STV Project No.: 2516417

Preliminary utility relocation information is based on visual observations and utility as-builts. A utility survey, conflict plan and relocation design will be completed during design.

The following existing utilities are within the project limits:

- Duke Energy overhead transmission line
- Duke Energy overhead distribution utility pole line and underground lines
- Electricities overhead distribution utility pole lines and underground lines
- AT&T overhead utility pole line and underground lines
- Piedmont Natural Gas underground lines and above ground substations (1 abandoned and 1 active)
- Charlotte Mecklenburg Utilities (CMU) Water– 6”, 8”, 10”, 12”, 16” and 24” underground lines
- Charlotte Mecklenburg Utilities (CMU) Sewer – 4”, 8” and 12” underground lines
- Time Warner Cable overhead and underground lines
- Making Connections North Carolina (MCNC) underground line
- NCDOT signal poles and loops

The following utility relocations will likely be necessary:

1. Duke Energy overhead transmission line that spans the intersection from the southwest quadrant to the northeast quadrant.
2. Duke Energy overhead distribution utility pole line that parallels US 21 from the southeast quadrant of the intersection to the south end of the project limits on US 21.
3. Electricities overhead distribution utility pole line that parallels US 21 from the northwest quadrant of the intersection to the north end of the project limits on US 21.
4. Electricities overhead utility pole line that parallels Gilead Road from the northeast quadrant of the intersection to the east end of the project limits on Gilead Road.
5. AT&T overhead utility pole line in the northeast and southeast quadrant of the intersection.
6. Piedmont Natural Gas substation on the northeast side of Gilead Road is abandoned and will be removed.
7. CMU water and sewer facilities will be adjusted according to final grades and cross-sections.

Jarrett Engineering, PLLC

The potential project costs range from \$475,000.00 to \$750,000.00 and are as follows:

- It is expected that the existing wood poles in Item Number 1 will be replaced with single metal poles in both quadrants and the anticipated cost will be between \$200,000 and \$300,000.00.
- It is expected that a portion of the existing wood poles on the northeast and southeast side of US 21 in Item Number 2 will be relocated and the anticipated cost will be between \$100,000 and \$150,000.00.
- It is expected that the existing wood poles in Item Number 5 will be relocated and the anticipated cost will be between \$50,000 and \$100,000.00.
- It is expected that the existing CMU fire hydrants, water valves, water meters and sewer manholes will be adjusted according to final grades and the anticipated cost will be between \$25,000 and \$75,000.00.
- If CMU water line conflicts occur that require relocation of the lines the anticipated cost will be between \$100,000 and \$125,000.00.

This does not take into account any right of way of costs that may be needed depending on the final design of the project.

It is anticipated that the majority of the underground utilities can remain in place. There is a potential for some relocation based on the storm drainage design. Those conflicts will be addressed once the design is completed. None of the relocations should cause substantial disruptions in utility service or should impact traffic. There are no indications that any of these utilities have a planned expansion that would impact this project.



David Jarrett, PE
Jarrett Engineering, PLLC

UTILITY ESTIMATE WORKSHEET

TIP No: U-5114
 WBS Element No: 42376.1.R2
 State Project No:
 Fed. Project No: STPDA-0021 (
 County: Mecklenburg
 Description: Intersection of US 21 Gilead Rd. Construct intersection improvements,including bicycle & pedestrian

Field Inspection - Evidence of Utilities

Gas: Yes Electric: Yes Telephone: Yes CATV: Yes
 Water: Yes Sewer: Yes Drainage: No Other: No

Anticipated Relocation

Gas: Yes Electric: Yes Telephone: Yes CATV: Yes
 Water: Yes Sewer: Yes Drainage: No Other: No

Summary:	Single Alternate
Requesting Party:	Elmo Vance/PDEA
Estimate Date:	July 18, 2014

Relocation Totals		Construction Total		Alternate Totals	
Power Poles:	\$490,266.00	Power Poles:		Relocation Total	\$490,266.00
Power Items:		Power Items:		Construction Total	\$281,958.00
Telephone Poles	\$0.00	Telephone Poles		Alternate Total	\$772,224.00
Telephone Items		Telephone Items			
Gas Line:	\$0.00	Gas Line:			
Gas Items:	\$0.00	Gas Items:			
Water Line:		Water Line:	\$156,750.00		
Water Items:		Water Items:	\$91,160.00		
Sewer Line:		Sewer Line:			
Sewer Items:		Sewer Items:	\$34,048.00		
Misc.Items:		Misc.Items:			

Detail: Single Alternate**Power Poles**

Type	Location	Number	Cost / Pole	Total Cost
			\$0.00	\$0.00
			\$0.00	\$0.00
		0		\$0.00
Distribution Pole Three Phase		42	\$11,673.00	\$490,266.00
		Total:	42	\$490,266.00

Telephone Poles

Type	Location	Number	Cost / Pole	Total Cost
				\$0.00
				\$0.00
		Total:		\$0.00

Gas Lines

Line Type	Location	Length	Cost per Ft.	Total Cost
		0		\$0.00
		Total:		\$0.00

Gas Items

Item	Location	Number	Unit Cost	Total Cost
				\$0.00
		Total:		\$0.00

Water Lines

Line Type	Location	Length	Cost per Ft.	Total Cost
6" PVC Water Line Per Linear Foot		0	\$80.00	\$0.00
16" PVC Water Line Per Linear Foot		500	\$159.00	\$79,500.00
10" PVC Water Line Per Linear Foot		750	\$103.00	\$77,250.00
		Total:		\$156,750.00

Water Items

Item	Location	Number	Unit Cost	Total Cost
Water Meter Relocation		50	\$972.00	\$48,600.00
Fire Hydrant New		10	\$4,256.00	\$42,560.00
		Total:		\$91,160.00

Sewer Items

Item	Location	Number	Unit Cost	Total Cost
Manhole		8	\$4,256.00	\$34,048.00
		Total:		\$34,048.00

Alternate Total \$772,224.00