

ANTIQUITY WOODS TIA

CORNELIUS, MECKLENBURG COUNTY, NC

Traffic Impact Analysis

December 12, 2016

APPLICANT:

Abraham J. Lehman
Meeting Street Homes and Communities
1930 Abbott Street, Suite 400
Charlotte, NC 28203

PREPARED BY:

Matthew Peach, PE, PTOE
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Raleigh, NC 27609
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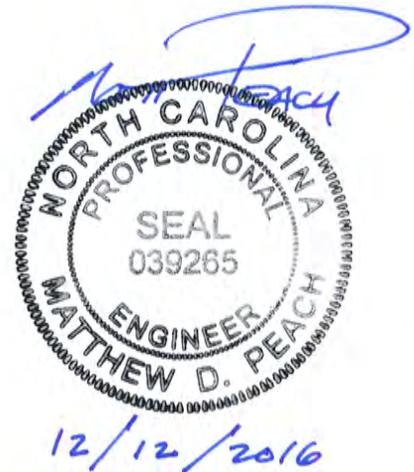


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EXECUTIVE SUMMARY

The proposed Antiquity Woods Development is located along South Street in Cornelius, Mecklenburg County, North Carolina. The proposed development will be built-out by 2021.

Traffic analysis will consider future build conditions at the build-out year. This report summarizes the analyses of 2016 existing conditions, 2021 no-build conditions (without proposed development), 2021 build conditions (with the proposed development in place), and 2021 build - improved conditions (with proposed development and recommended improvements in place) during the AM and PM peak hours. Furthermore, the Town of Cornelius' Land Development Code requires that developments traffic impacts be analyzed five (5) years after the development is completed. As such, this report also contains the analyses of the 2026 no-build conditions, 2026 build conditions and the 2026 build-improved conditions during the AM and PM peak hours.

The proposed site will be a residential development consisting of single-family homes, a hotel and a restaurant. The full build-out of the development is 103 single family homes, a 4 room hotel and a 2,500 square foot (SF) restaurant. Trip generation results in a total of 81 trips (21 in, 60 out) generated from the proposed development in the AM peak hour and 124 trips (79 in, 45 out) generated in the PM peak hour. Trip generation was submitted to the Town for review on June 21st, 2016. The Town approved of the trip generation on June 29th, 2016.

Access to the site is proposed to be provided by one full-movement intersection. This is located on South Street approximately 125 feet to the north of the covered bridge that provides access to the Antiquity development.

AMT (A. Morton Thomas and Associates, Inc.) was retained to determine the potential traffic impacts of this development in accordance with the Transportation Impact Analysis requirements outlined in Chapter 13 of the Town of Cornelius' Land Development Code and the policies of the North Carolina Department of Transportation (NCDOT) and to recommend the transportation improvements that may be required to accommodate these impacts. This report presents trip generation, distribution, capacity analyses, and recommendations for transportation improvements required to meet anticipated traffic demands. A scoping meeting was held on June 15th, 2016. In attendance were representatives for the Town of Cornelius, the Town of Davidson, AMT, and the applicant (i.e. developer).

As included in the MOU (Memorandum of Understanding), the following two (2) existing intersections are included as part of the area of influence for the development.

- NC 115 (S. Main Street) at South Street / Chairman Blake Lane (*Signalized, four-legged intersection*)
- NC 115 (S. Main Street) at Catawba Avenue (*Signalized, four-legged intersection*)

Below is a detailed description of the existing study area roadway network. All Average Annual Daily Traffic (AADT) information provided in this description was obtained from NCDOT via the www.ncdot.gov website.

NC 115 (S. Main Street) is a two-lane undivided roadway facility that travels north-south through Cornelius. The land use along NC 115 is residential and commercial near the project site. A Norfolk Southern Railway line parallels NC 115 to the east. As a result, the signalized intersection of NC 115 at Catawba Avenue has an at-grade highway-rail crossing less than fifty (50) feet from the stop line on the westbound approach. Therefore, the traffic signal is equipped with railroad preemption. The posted speed on this section of NC 115 is 35 miles per hour (mph). NCDOT indicates that NC 115 in the study area is a minor arterial. The AADT on this segment of NC 115 is 14,000 vehicles per day (vpd) within the study area in 2012.

South Street (SR 2411) is a two-lane undivided roadway facility that travels north-south through Cornelius and Davidson. It provides connectivity between The Antiquity development and downtown Davidson. The land use along South Street is primarily residential. The posted speed limit on this facility is 25 mph and no AADT data was available.

Catawba Avenue is a two-lane undivided roadway facility that travels east-west through Cornelius, providing connectivity between NC 115 and Interstate 77. The land use is a mix of office, residential and commercial land uses. The posted speed limit is 25 mph through the study area. According to NCDOT, the AADT on Catawba Avenue in the study area was 14,000 in 2012. Catawba Avenue is classified as a local road. An at-grade railroad crossing (Crossing ID # 925479B), maintained by Norfolk Southern Railway, is located approximately 40 feet east of the intersection of NC 115 at Catawba Avenue. This crossing

is equipped with flashing lights and gates. As a result, the traffic signal controlling the intersection of NC 115 at Catawba Avenue is equipped with railroad preemption.

Chairman Blake Lane is a two-lane undivided local facility that provides connectivity between NC 115 and Lorimer Road in Davidson. It is approximately one-tenth (0.1) of a mile long, has no posted speed limit, and no AADT information was available.

2016 Existing Conditions

Traffic counts were performed by National Data & Surveying Services on Thursday September 15th, 2016. All existing study intersections are signalized.

The results of this analysis indicate that all study area intersections and approaches operate with acceptable levels of service in the 2016 existing AM and PM peak hours.

2021 No-Build Conditions

The site is proposed to be completed by year 2021. Per the MOU and Town of Cornelius TIA Policy, existing traffic volumes were increased by two percent (2%) per year to reflect 2021 background traffic volumes. Traffic generated by the remaining portions of the Antiquity development were included in the analysis. As such, the 2021 background traffic consists of 2016 existing traffic with the addition of the historic growth traffic and traffic from the unbuilt portions of the Antiquity development.

The results of this analysis indicate that both study intersections and their approaches operate at an acceptable LOS; with one exception. NC 115 at Catawba Avenue operates at LOS E in the PM peak hour. It however, is operating under its mitigation threshold based upon its zoning district.

Site Trip Generation and Trip Distribution

The proposed site will be a residential development consisting of single-family homes, a hotel and a restaurant. The full build-out of the development is 103 single family homes, a 4 room hotel and a 2,500 square foot (SF) restaurant. Trip generation results in a total of 81 trips (21 in, 60 out) generated from the proposed development in the AM peak hour and 124 trips (79 in, 45 out) generated in the PM peak hour. Trip generation was submitted to the Town for review on June 21st, 2016. The Town approved of the trip generation on June 29th, 2016.

The site generated trips to and from the proposed site were distributed in accordance with the apparent traffic patterns by the users of the proposed facility and the existing traffic patterns and land uses in the vicinity as follows:

- 50% to/from the North on NC 115 (i.e. downtown Davidson to points north and I-77)
- 25% to/from the South on NC 115 (i.e. downtown Cornelius toward Huntersville)
- 25% to/from the West on Catawba Avenue (i.e. toward I-77)

The overall trip distribution was submitted to the Town for review in the memorandum of understanding. The Town and applicant approved the trip distribution on June 29th, 2016.

2021 Build Conditions

The total Build traffic volumes include both the site traffic and traffic volumes from the No-Build Analysis. The Build Analysis evaluates the traffic conditions before any improvements are implemented. Access to the site is proposed to be provided by one full-movement intersection. This is located on South Street approximately 125 feet to the north of the covered bridge that provides access to the Antiquity development.

The results of this analysis indicate that both study intersections and their approaches operate at an acceptable LOS; with one exception. NC 115 at Catawba Avenue operates at LOS E in the PM peak hour. It however, is operating under its mitigation threshold based upon its zoning district.

2021 Build Improved Conditions

The Warrant for Left and Right-Turn Lanes nomograph for at-grade unsignalized intersections contained within NCDOT's *Policy on Street and Driveway Access to North Carolina Highways* manual was reviewed against the traffic volumes at the site access point. As both of the existing study intersections are operating below their LOS thresholds and the proposed site access

operates at LOS B in the build analysis scenario, the improvements analyzed in this scenario result from reviewing the projected traffic volumes at the site access against the NCDOT nomograph.

The results of this analysis indicate that with turn lanes required by the NCDOT nomograph, the proposed unsignalized intersection of South Street at Site Access operates at an acceptable LOS for all minor-street approaches and left-turn movements. All other study intersections were indicated to operate at or better-than their mitigation threshold.

Conclusions – 2021 Horizon Year

The following tables summarize the results of the various analyses in the existing (2016) and build-year (2021) horizon years.

Table ES-1: 2021 Analysis Summary

Intersection / Approach Measure of Effectiveness	2016 Existing		2021 No-Build		2021 Build		2021 Build Improved	
	AM	PM	AM	PM	AM	PM	AM	PM
INTERSECTION 1 – NC 115 & South Street / Chairman Blake Lane (SIGNALIZED)								
Overall LOS (sec. delay/veh.)	B (19.6)	B (15.5)	C (25.9)	C (24.9)	C (27.9)	C (28.0)		
WB App. LOS (sec. delay/veh.)	A (7.7)	A (2.6)	B (11.3)	A (5.3)	B (11.3)	A (5.3)		
NWB App. LOS (sec. delay/veh.)	D (41.8)	D (39.8)	D (47.7)	D (40.9)	D (52.9)	D (40.8)		
NB App. LOS (sec. delay/veh.)	C (22.4)	C (20.8)	C (31.8)	D (36.8)	C (33.3)	D (43.0)		
SB App. LOS (sec. delay/veh.)	B (13.2)	A (9.6)	B (16.0)	B (13.8)	B (16.4)	B (15.6)		
INTERSECTION 2 – NC 115 & Catawba Avenue (SIGNALIZED)								
Overall LOS (sec. delay/veh.)	C (25.7)	C (30.8)	D (36.6)	E (58.9)	D (38.2)	E (62.5)		
EB App. LOS (sec. delay/veh.)	C (24.9)	C (28.8)	D (36.0)	E (56.2)	D (37.1)	E (65.3)		
WB App. LOS (sec. delay/veh.)	C (27.8)	C (31.2)	D (43.0)	E (69.3)	D (48.5)	E (76.8)		
NB App. LOS (sec. delay/veh.)	C (22.7)	C (28.1)	C (31.5)	E (55.3)	C (31.9)	D (54.1)		
SB App. LOS (sec. delay/veh.)	C (28.9)	C (34.9)	D (39.3)	E (57.0)	D (40.1)	E (57.0)		
INTERSECTION 3 – South Street & Site Access (UNSIGNALIZED)								
EB App. LOS (sec. delay/veh.)					B (10.8)	B (11.8)	B (10.7)	B (11.5)
NB App. LOS (sec. delay/veh.)					A (7.6)	A (7.9)	A (7.6)	A (7.8)

The results of the analysis indicate that the proposed development contributes minimal delay to the existing study intersections and approaches. Furthermore, these existing intersections and approaches operate at or below their mitigation thresholds. At the proposed site access, the traffic volumes are projected meet the thresholds to warrant both a northbound left-turn lane as well as a southbound right-turn lane.

2026 No-Build Conditions

According to the Town of Cornelius' Land Development Code, developments must be analyzed five (5) years after the development is completed. As the Antiquity Woods development is currently envisioned to be completed in 2021, the remaining capacity analyses focus on the traffic conditions and analysis projected for 2026. Per the MOU and Town of Cornelius TIA Policy, existing traffic volumes were increased by two percent (2%) per year to reflect 2026 background traffic volumes. Traffic generated by the remaining portions of the Antiquity development were included in the analysis. As such, the 2026 background traffic consists of 2016 existing traffic with the addition of the historic growth traffic and traffic from the unbuilt portions of the Antiquity development.

The results of this analysis indicate that both study intersections and their approaches operate at an acceptable LOS; with one exception. NC 115 at Catawba Avenue operates at LOS E in the PM peak hour. It however, is operating under its mitigation threshold based upon its zoning district.

2026 Build Conditions

The total future build traffic volumes include both the site traffic and the traffic volumes from the no-build analysis. The build analysis evaluates the traffic conditions before any improvements are implemented in response to traffic generated by the proposed development. Access to the site is proposed to be provided by one full-movement intersection. This is located on South Street approximately 125 feet to the north of the covered bridge that provides access to the Antiquity development.

The results of this analysis indicate that both study intersections and their approaches operate at an acceptable LOS; with one exception. NC 115 at Catawba Avenue operates at LOS E in the PM peak hour. It however, is operating under its mitigation threshold based upon its zoning district.

2026 Build Improved Conditions

Geometric improvements such as the installation of turn-lanes are recommended and therefore analyzed in this scenario. The specific items are listed in the Recommendations section. The Warrant for Left and Right-Turn Lanes nomograph for at-grade unsignalized intersections contained within NCDOT's *Policy on Street and Driveway Access to North Carolina Highways* manual was reviewed against the traffic volumes at the site access point. As the intersection of NC 115 at South Street / Chairman Blake Lane operates below its LOS threshold, the improvements analyzed in this scenario are limited to the intersections of NC 115 at Catawba Avenue and South Street at Site Access. The improvements analyzed at the intersection of South Street at Site Access result from reviewing the projected traffic volumes at the site access against the NCDOT nomograph.

The results of this analysis indicate that with the recommended improvements in place, all study area intersections operate below their LOS threshold. The intersection and all approaches to NC 115 at Catawba Avenue does operate near the LOS threshold.

Conclusions – 2026 Horizon Year

The following table summarizes the results of the various analyses in the five years beyond the build-year (2026) horizon years.

Table ES-2: 2026 Analysis Summary

Intersection / Approach Measure of Effectiveness	2026 No-Build		2026 Build		2026 Build Improved	
	AM	PM	AM	PM	AM	PM
INTERSECTION 1 – NC 115 & South Street / Chairman Blake Lane (SIGNALIZED)						
Overall LOS (sec. delay/veh.)	C (28.7)	C (29.4)	C (31.0)	C (34.9)		
WB App. LOS (sec. delay/veh.)	B (13.2)	A (6.3)	B (13.2)	A (6.3)		
NWB App. LOS (sec. delay/veh.)	D (50.6)	D (40.9)	E (57.4)	D (41.4)		
NB App. LOS (sec. delay/veh.)	D (36.2)	D (46.1)	D (37.8)	E (57.8)		
SB App. LOS (sec. delay/veh.)	B (17.8)	B (15.4)	B (18.2)	B (18.5)		
INTERSECTION 2 – NC 115 & Catawba Avenue (SIGNALIZED)						
Overall LOS (sec. delay/veh.)	D (47.1)	E (74.8)	D (49.6)	E (78.7)	D (49.6)	E (76.2)
EB App. LOS (sec. delay/veh.)	E (61.6)	E (71.5)	E (64.6)	F (83.5)	E (64.6)	E (73.1)
WB App. LOS (sec. delay/veh.)	E (57.2)	E (72.9)	E (66.5)	E (79.7)	E (66.5)	E (79.7)
NB App. LOS (sec. delay/veh.)	C (34.3)	E (78.2)	C (34.3)	E (76.7)	C (34.3)	E (76.7)
SB App. LOS (sec. delay/veh.)	D (42.3)	E (75.7)	D (42.5)	E (75.7)	D (42.5)	E (75.7)
INTERSECTION 3 – South Street & Site Access (UNSIGNALIZED)						
EB App. LOS (sec. delay/veh.)			B (10.8)	B (11.8)	B (10.7)	B (11.5)
NB App. LOS (sec. delay/veh.)			A (7.6)	A (7.9)	A (7.6)	A (7.8)

Recommended Improvements

Based on the analysis of the 2026 year analyses and the other findings of this study, specific improvements have been identified and should be completed as part of the proposed development. The NCDOT *Policy on Street and Driveway Access to North Carolina Highways* manual was consulted to determine the appropriate storage for the recommended auxiliary lanes if warranted.

NC 115 at South Street / Chairman Blake Lane

There are no recommended improvements at this intersection.

NC 115 at Catawba Avenue

- Construct a channelization island, revise the signage and modify the traffic signal to allow the eastbound right-turn lane to operate under yield control.

South Street at Site Access (Existing South Street Alignment)

- Construct Site Access #1 with one ingress and one egress lane.
- Construct a left-turn lane with 50 feet of full-width storage and appropriate taper on northbound South Street.
- Construct a right-turn lane with 50 feet of full width storage and appropriate taper on southbound South Street.
- Relocate Site Access approximately 100 feet to the north along South Street in-order to provide adequate space along South Street from the covered bridge to incorporate the taper, deceleration and storage areas for the northbound left-turn lane on South Street.

South Street at Site Access (Potential South Street Alignment)

It is possible that the NC 115 corridor study will result in the recommendation to construct a parallel route to Old Canal Street. This would allow traffic traveling on South Street to reach the intersection of NC 115 at Catawba Avenue without entering the Antiquity development. This would require a different site access configuration than what was presented above under the “Existing South Street Alignment” section. The recommendations for site access and related improvements in the case that a facility parallel to Old Canal Street is constructed are as follows:

- Construct Site Access #1 with one ingress and one egress lane.
- Construct a left-turn lane with 50 feet of full-width storage and appropriate taper on northbound South Street.
- Construct a right-turn lane with 50 feet of full width storage and appropriate taper on southbound South Street.
- Locate the site access such that it is across from the roadway exiting the Antiquity development and the covered bridge. This four-legged intersection should be constructed as two-way stop controlled with traffic along South Street having priority and the traffic exiting Antiquity Woods (traveling eastbound) and traffic exiting Antiquity (traveling westbound) be required to stop.

Fee-in-Lieu

As discussed in the Conclusions – 2026 Horizon Year section, the right-of-way necessary to construct the improvement at the intersection of NC 115 at Catawba Avenue is limited and may negatively impact the gas station in the southwestern quadrant of the intersection. It is recommended that a fee-in-lieu of constructing this improvement be considered. This fee may be used toward constructing the improvements in the area contained in the on-going NC 115 Corridor Study from Washam Potts Road to Potts Street.

INTRODUCTION

The proposed Antiquity Woods Development is located along South Street in Cornelius, Mecklenburg County, North Carolina. The proposed development will be built-out by 2021.

Traffic analysis will consider future build conditions at the build-out year. This report summarizes the analyses of 2016 existing conditions, 2021 no-build conditions (without proposed development), 2021 build conditions (with the proposed development in place), and 2021 build - improved conditions (with proposed development and recommended improvements in place) during the AM and PM peak hours. Furthermore, the Town of Cornelius' Land Development Code requires that developments traffic impacts be analyzed five (5) years after the development is completed. As such, this report also contains the analyses of the 2026 no-build conditions, 2026 build conditions and the 2026 build-improved conditions during the AM and PM peak hours.

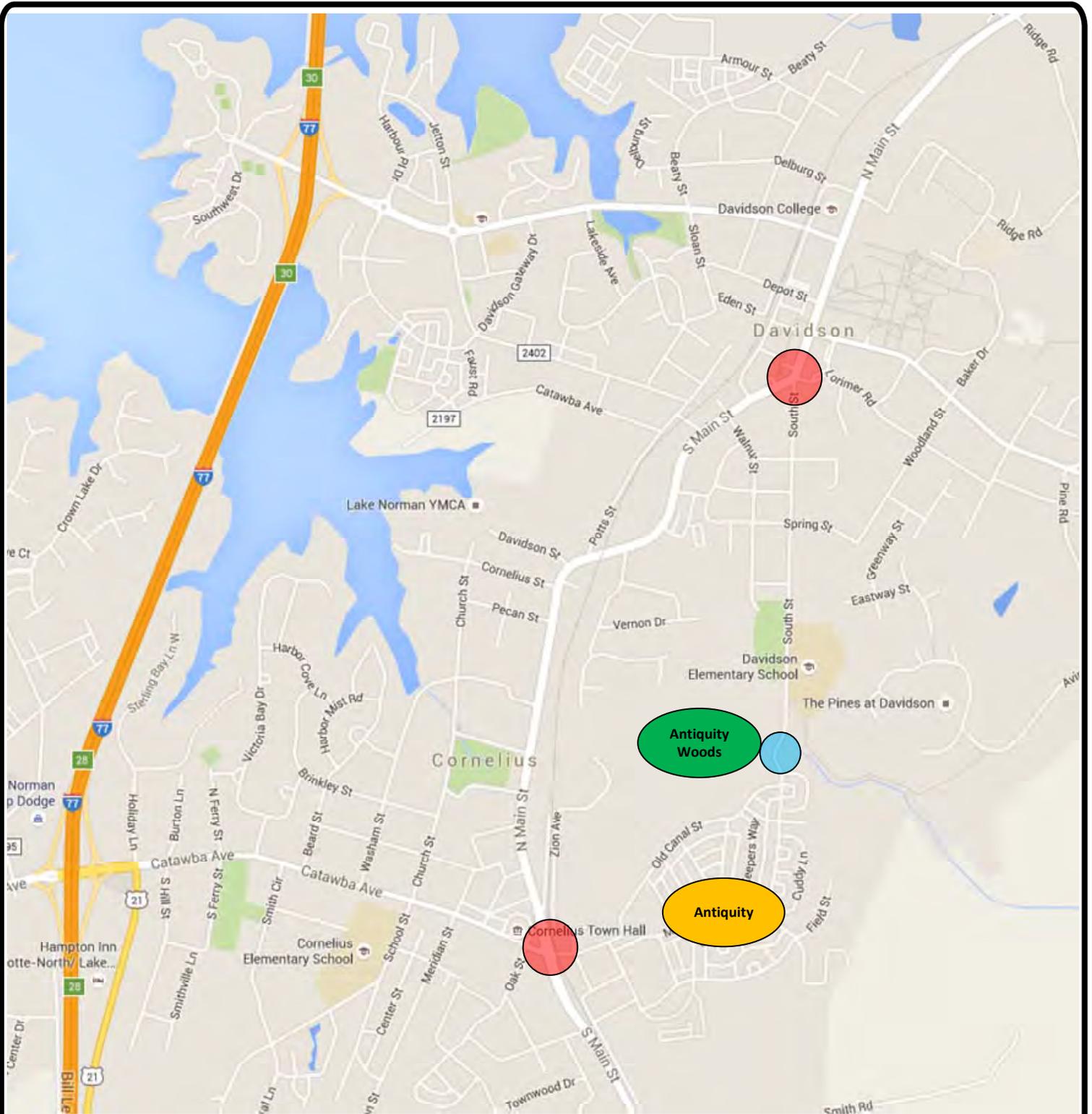
A scoping meeting was held on June 15th, 2016. In attendance were representatives for the Town of Cornelius, the Town of Davidson, AMT, and the applicant (i.e. developer). Please refer to **Appendix A** for a copy of the Memorandum of Understanding signed by all parties in attendance.

STUDY AREA DESCRIPTION

As included in the MOU (Memorandum of Understanding), the following two (2) existing intersections are included as part of the area of influence for the development (**Figure 1**).

- NC 115 (S. Main Street) at South Street / Chairman Blake Lane (*Signalized, four-legged intersection*)
- NC 115 (S. Main Street) at Catawba Avenue (*Signalized, four-legged intersection*)

The proposed site plan is shown in **Figure 2**. Access to the site is proposed to be provided by one full-movement intersection. This is located on South Street approximately 125 feet to the north of the covered bridge that provides access to the Antiquity development. The site plan in **Figure 2** is for illustrative purposes only for this traffic study.



LEGEND

-  = External Intersections
-  = Antiquity Woods Development
-  = Site Access
-  = Notable Land Uses



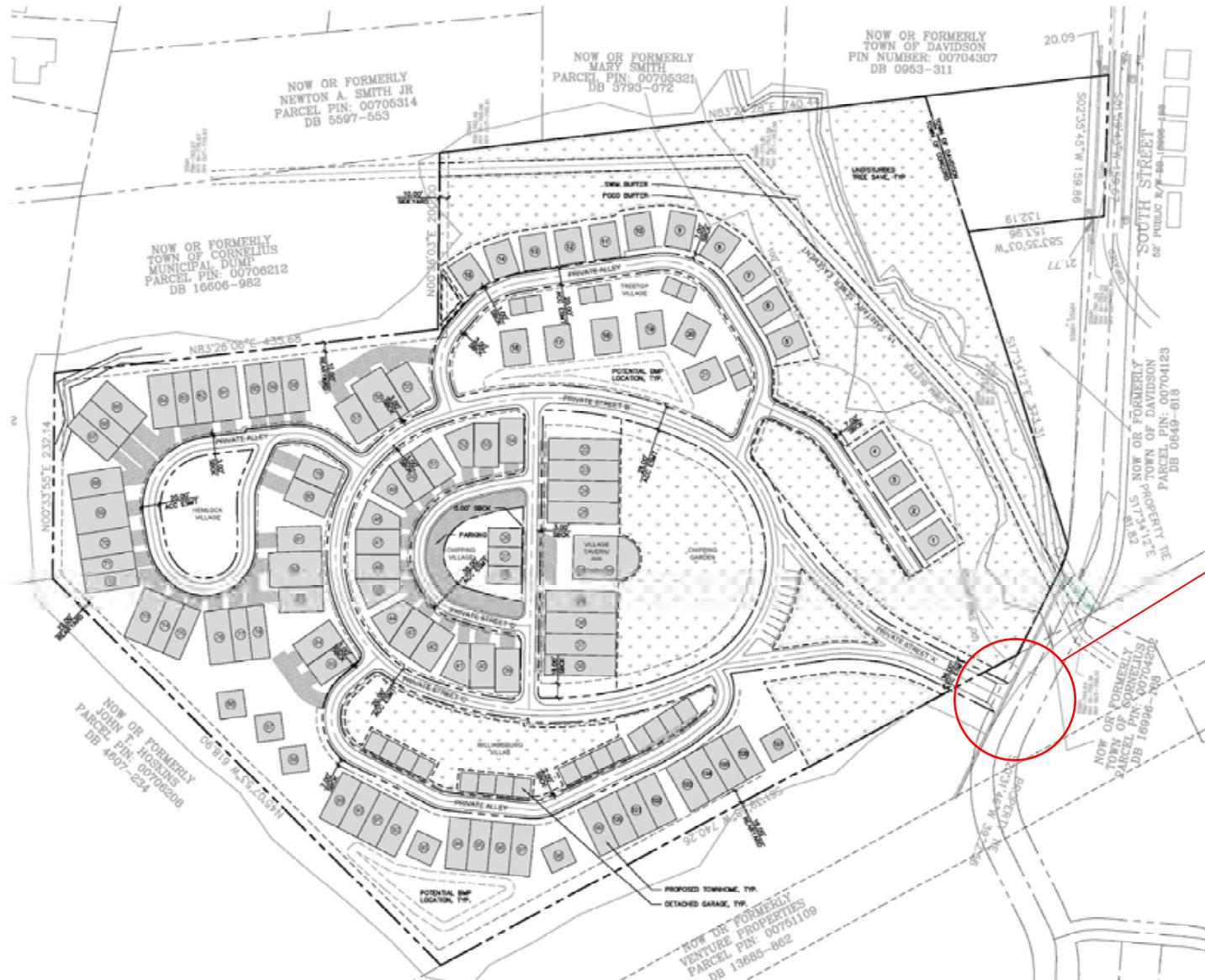
NOT TO SCALE

**Antiquity Woods
Traffic Impact Study**

Site Location Map

DATE: November 2016

FIGURE 1



Site Access:
- Full Movement



NOT TO SCALE

**Antiquity Woods
Traffic Impact Study**

Site Plan

DATE: November 2016

FIGURE 2

EXISTING ROADWAY CONDITIONS

Below is a detailed description of the existing study area roadway network. All Average Annual Daily Traffic (AADT) information provided in this description was obtained from NCDOT via the www.ncdot.gov website.

NC 115 (S. Main Street) is a two-lane undivided roadway facility that travels north-south through Cornelius. The land use along NC 115 is residential and commercial near the project site. A Norfolk Southern Railway line parallels NC 115 to the east. As a result, the signalized intersection of NC 115 at Catawba Avenue has an at-grade highway-rail crossing less than fifty (50) feet from the stop line on the westbound approach. Therefore, the traffic signal is equipped with railroad preemption. The posted speed on this section of NC 115 is 35 miles per hour (mph). NCDOT indicates that NC 115 in the study area is a minor arterial. The AADT on this segment of NC 115 is 14,000 vehicles per day (vpd) within the study area in 2012.

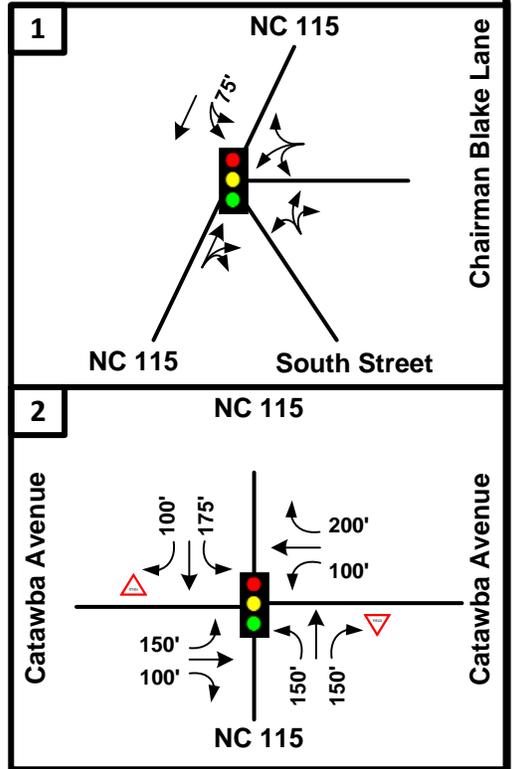
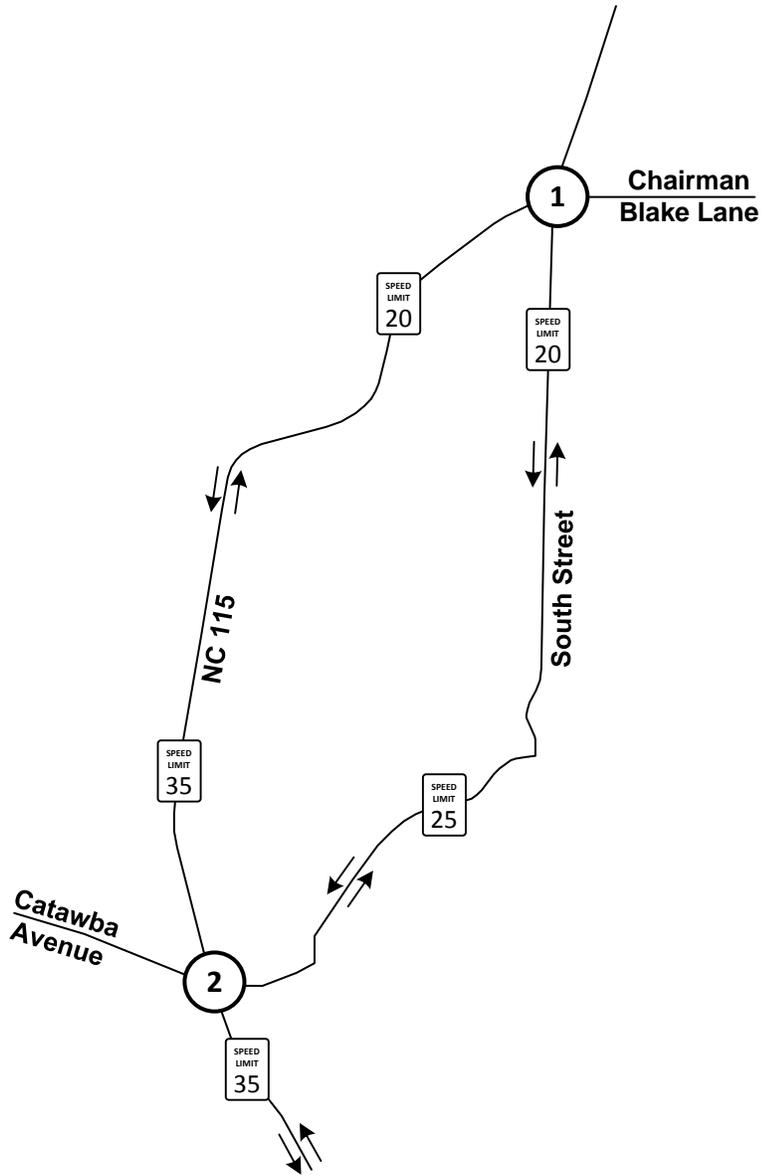
South Street (SR 2411) is a two-lane undivided roadway facility that travels north-south through Cornelius and Davidson. It provides connectivity between The Antiquity development and downtown Davidson. The land use along South Street is primarily residential. The posted speed limit on this facility is 25 mph and no AADT data was available.

Catawba Avenue is a two-lane undivided roadway facility that travels east-west through Cornelius, providing connectivity between NC 115 and Interstate 77. The land use is a mix of office, residential and commercial land uses. The posted speed limit is 25 mph through the study area. According to NCDOT, the AADT on Catawba Avenue in the study area was 14,000 in 2012. Catawba Avenue is classified as a local road. An at-grade railroad crossing (Crossing ID # 925479B), maintained by Norfolk Southern Railway, is located approximately 40 feet east of the intersection of NC 115 at Catawba Avenue. This crossing is equipped with flashing lights and gates. As a result, the traffic signal controlling the intersection of NC 115 at Catawba Avenue is equipped with railroad preemption.

Chairman Blake Lane is a two-lane undivided local facility that provides connectivity between NC 115 and Lorimer Road in Davidson. It is approximately one-tenth (0.1) of a mile long, has no posted speed limit, and no AADT information was available.

All of the existing study intersections analyzed in this report are signalized. The existing intersection geometrics are shown in **Figure 3**.

The purpose of this Traffic Impact Analysis Report is to assess the traffic carrying capacity of the surrounding roadway network. There are a total of seven (7) types of analyses for the intersections affected by the proposed development. The "Existing Conditions" analysis uses the traffic counts available to evaluate the current intersection operational performance. Traffic counts were provided the town and located in **Appendix B**.



LEGEND

-  Existing Traffic Control
-  Existing Roadway
-  Existing Laneage
- XXX'** Storage Bay Length
-  Existing Posted Speed



NOT TO SCALE

**Antiquity Woods
Traffic Impact Study**

Existing Lane Configurations

DATE: November 2016

FIGURE 3

TRIP GENERATION

The proposed site will be a residential development consisting of single-family homes, a hotel and a restaurant. Trip generation equations for this land use type is provided in the ITE Trip Generation Manual, 9th Edition. The full build-out of the development is 103 single family homes, a 4 room hotel and a 2,500 square foot (SF) restaurant.

When performing trip generation for the three land uses, it was estimated that a total of 81 trips (21 in, 60 out) generated from the proposed development in the AM peak hour and 124 trips (79 in, 45 out) generated in the PM peak hour. Trip generation was submitted to the Town for review on June 21st, 2016. The Town approved of the trip generation on June 29th, 2016.

TRIP DISTRIBUTION

The site generated trips to and from the proposed site were distributed in accordance with the apparent traffic patterns by the users of the proposed facility and the existing traffic patterns and land uses in the vicinity as follows:

- 50% to/from the North on NC 115 (i.e. downtown Davidson to points north and I-77)
- 25% to/from the South on NC 115 (i.e. downtown Cornelius toward Huntersville)
- 25% to/from the West on Catawba Avenue (i.e. toward I-77)

The overall trip distribution was submitted to the Town for review in the memorandum of understanding. The Town and applicant approved the trip distribution on June 29th, 2016.

The trip distribution is shown on **Figure 11** and the site trip assignment is shown on **Figure 12**.

PROJECT TRAFFIC VOLUMES – 2021 HORIZON YEAR

Existing Traffic Volumes

Traffic counts were performed by National Data & Surveying Services on Thursday September 15th, 2016. It should be noted that traditional calendar schools were in session when the counts were performed. Due to the distance and multiple access points between study area intersections, the traffic counts were not balanced between study intersections. The existing traffic volumes are shown in **Figure 4**. The count data is located in **Appendix B**.

Historical Growth Traffic (2021 Background Traffic)

Historical growth traffic is the increase in existing traffic volumes due to general usage increases and non-specific growth throughout the area. As specified by Town staff, existing traffic volumes were increased by two percent (2%) per year to reflect background traffic at the buildout year in which construction of the development will be completed. The historical growth traffic volumes for the 2021 horizon year are shown in **Figure 5**.

It should be noted that no growth was applied to the traffic traveling in and out of the Antiquity development. As any growth on the turning movements into and out of the development would be due to the continued construction and opening of the remaining land uses within the development.

Approved Development Traffic

There is one (1) approved development within the study area. Antiquity is a mixed-use development located on the east side of the Main Street at Catawba Avenue intersection. The development is partially constructed and contains retail and residential land uses. Trip generation was performed for both the full buildout of the Antiquity development as well as what is currently constructed. The difference between the two trip generation scenarios is considered the approved development traffic. These trip generation numbers were presented to Town staff and was approved on November 1, 2016. The memorandum documenting this trip generation is located in **Appendix C**.

Both the site trips and pass-by trips were distributed and assigned to the study intersections based upon the existing traffic volumes. It should be noted that as the retail land uses are located toward the Main Street at Catawba Avenue intersection, pass-by trips were isolated to this intersection.

Trip distribution for the remaining trips to be generated by the Antiquity development is shown on **Figure 6**. Additionally, **Figure 7** shows the site trip assignment. **Figures 8 and 9** feature the pass-by trip distribution and assignment for the remaining trips to be generated by the Antiquity development; respectively.

2021 No-Build Traffic Volumes

The historical growth traffic and approved development traffic volumes were then added to the existing volumes to determine the 2021 No-Build Traffic Volumes. The 2021 no-Build Traffic Volumes are shown in **Figure 10**.

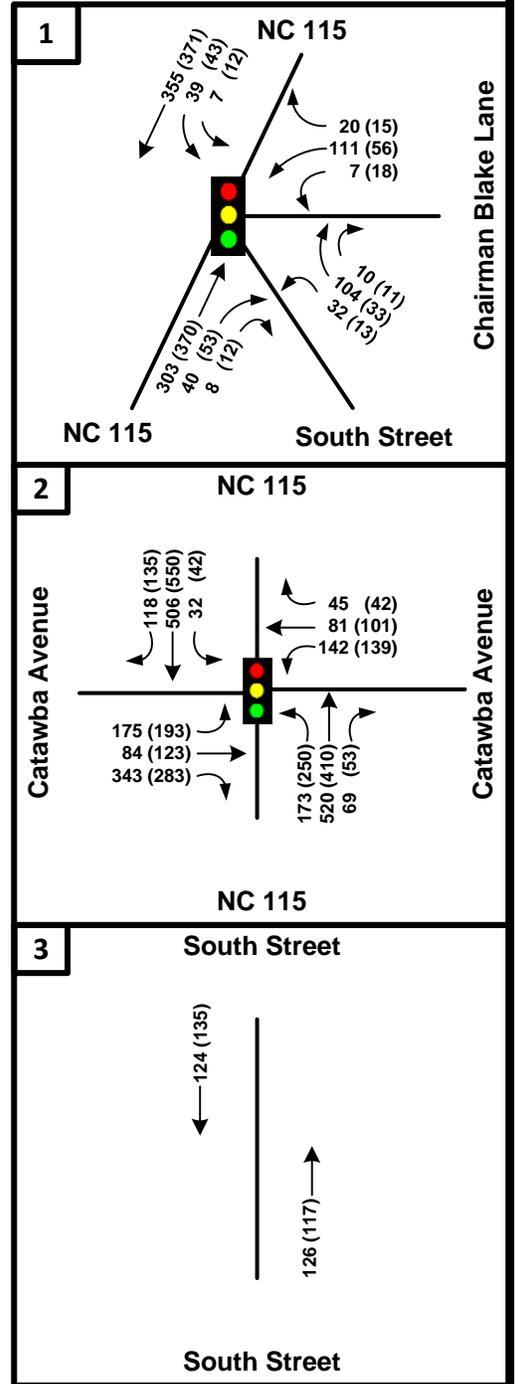
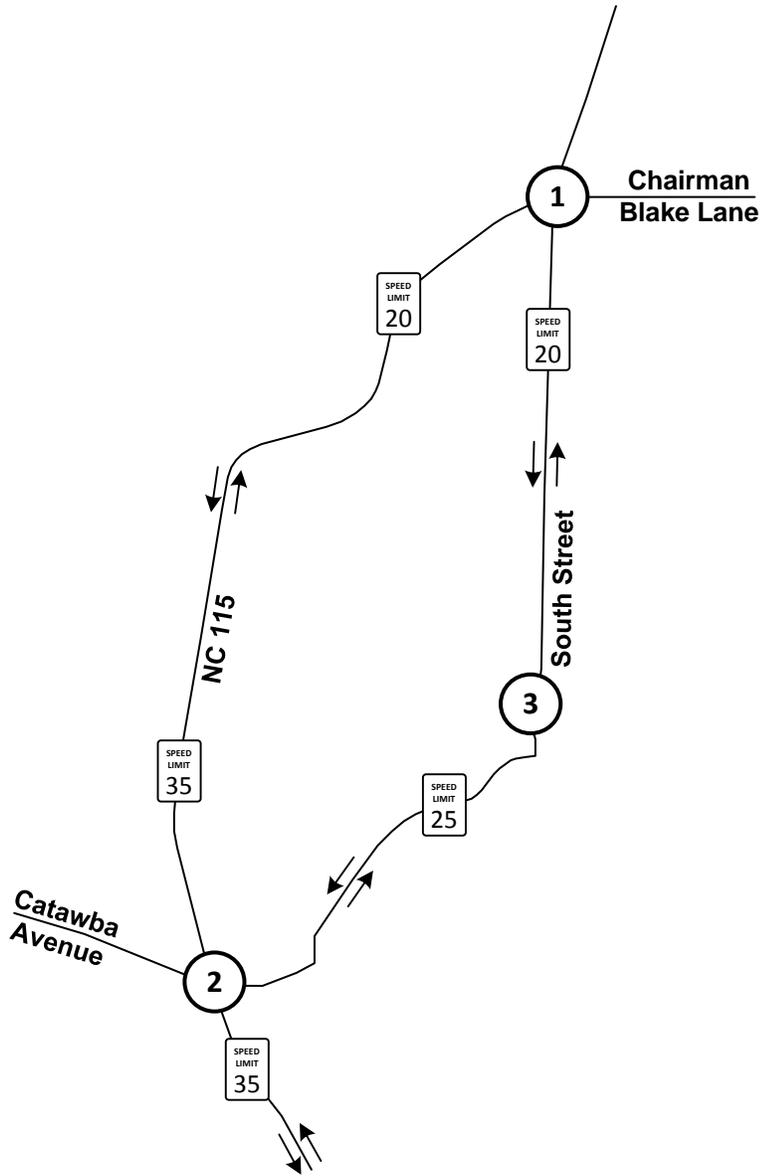
Proposed Development Traffic

For the proposed development, it was estimated that a total of 81 trips (21 in, 60 out) generated in the AM peak hour and 124 trips (79 in, 45 out) generated in the PM peak hour.

Site trip distribution for the site is shown on **Figure 11** and the site trip assignment is shown on **Figure 12**. The traffic calculations are shown in **Appendix B**.

2021 Build-Out Traffic Volumes

The 2021 build-out traffic volumes include the 2021 No-Build traffic and the proposed development traffic. The AM and PM peak-hour 2021 Build Traffic Volumes are shown in **Figure 13**.



LEGEND

- Existing Traffic Control
- Existing Roadway
- XX**
(XX) AM (PM) Peak Hour Volumes
- Existing Posted Speed



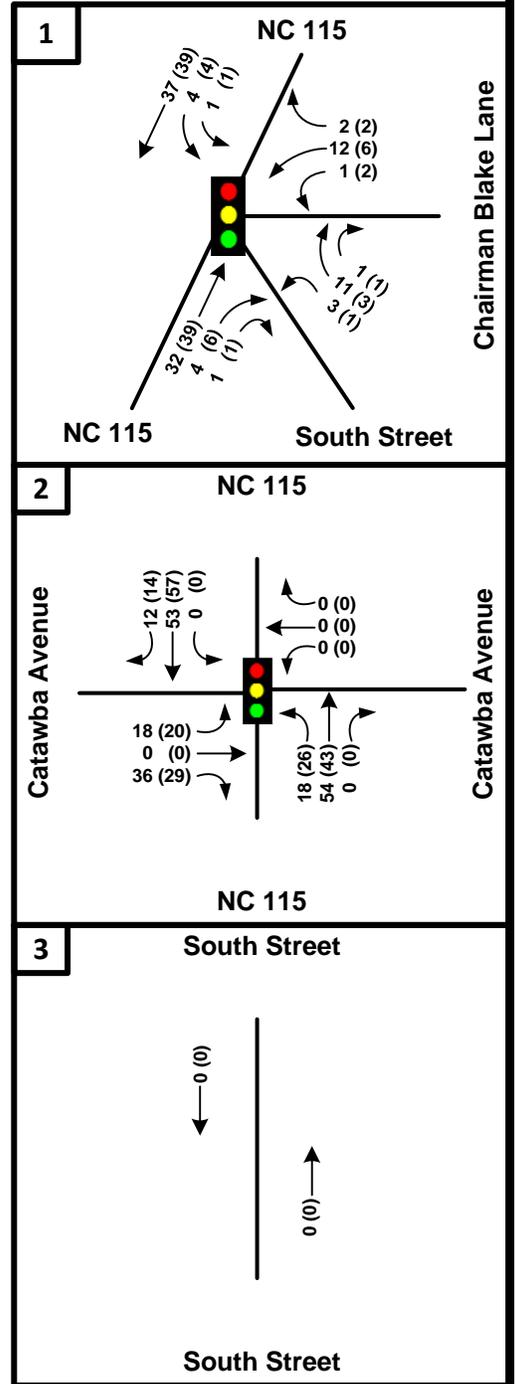
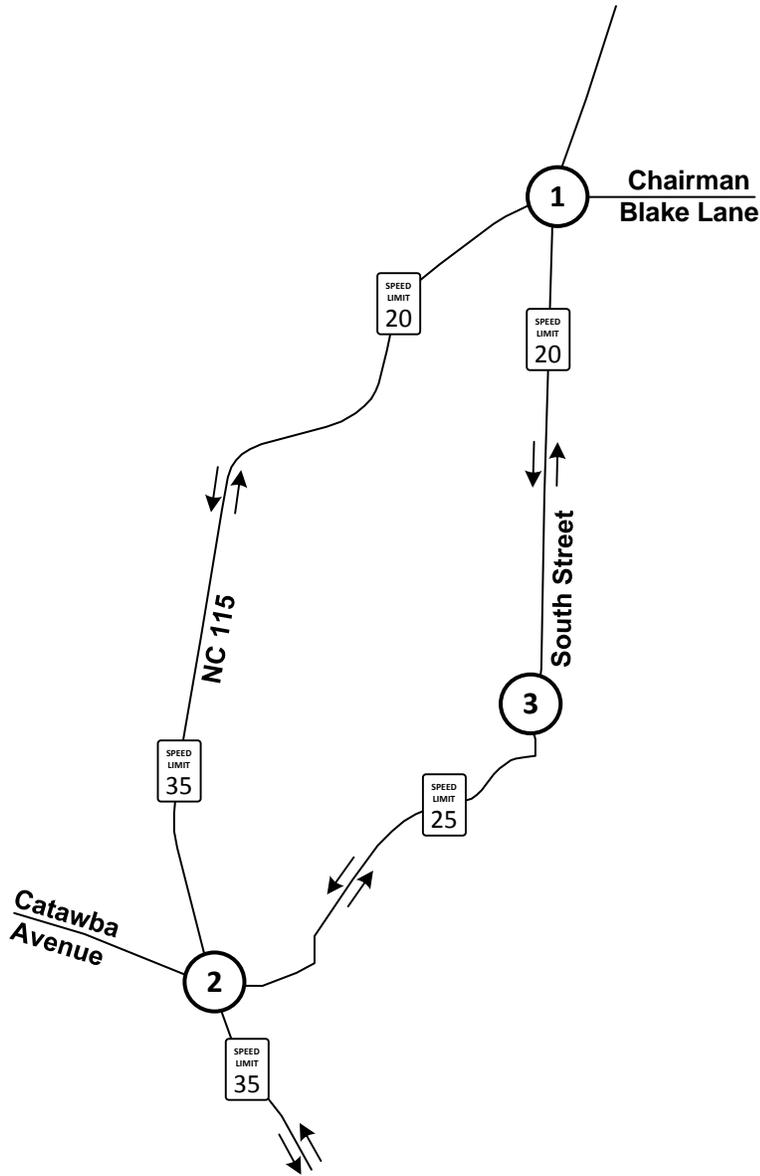
NOT TO SCALE

**Antiquity Woods
Traffic Impact Study**

2016 Existing Traffic Volumes

DATE: November 2016

FIGURE 4



LEGEND

-   Existing Traffic Control
-  Existing Roadway
- XX**
(XX) AM (PM) Peak Hour Volumes
-  Existing Posted Speed



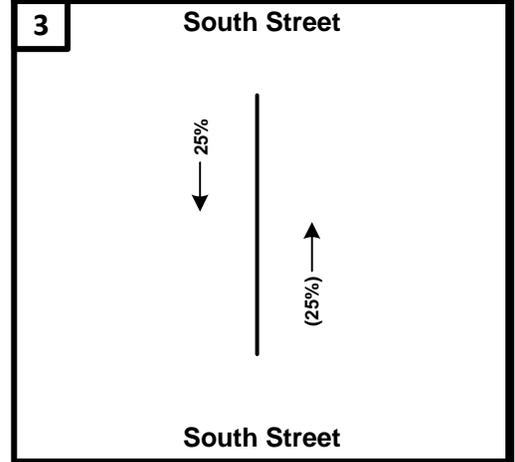
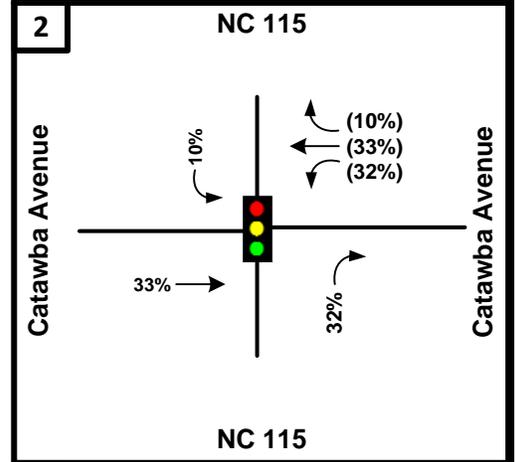
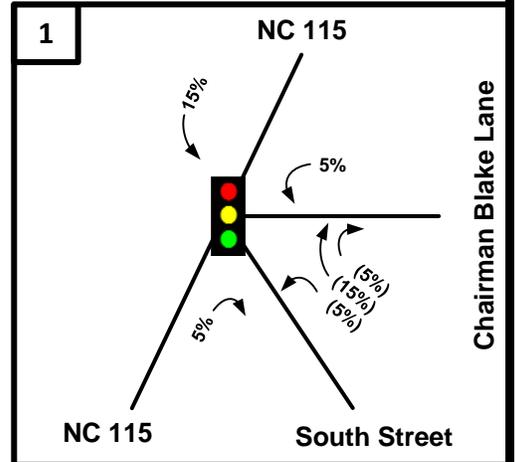
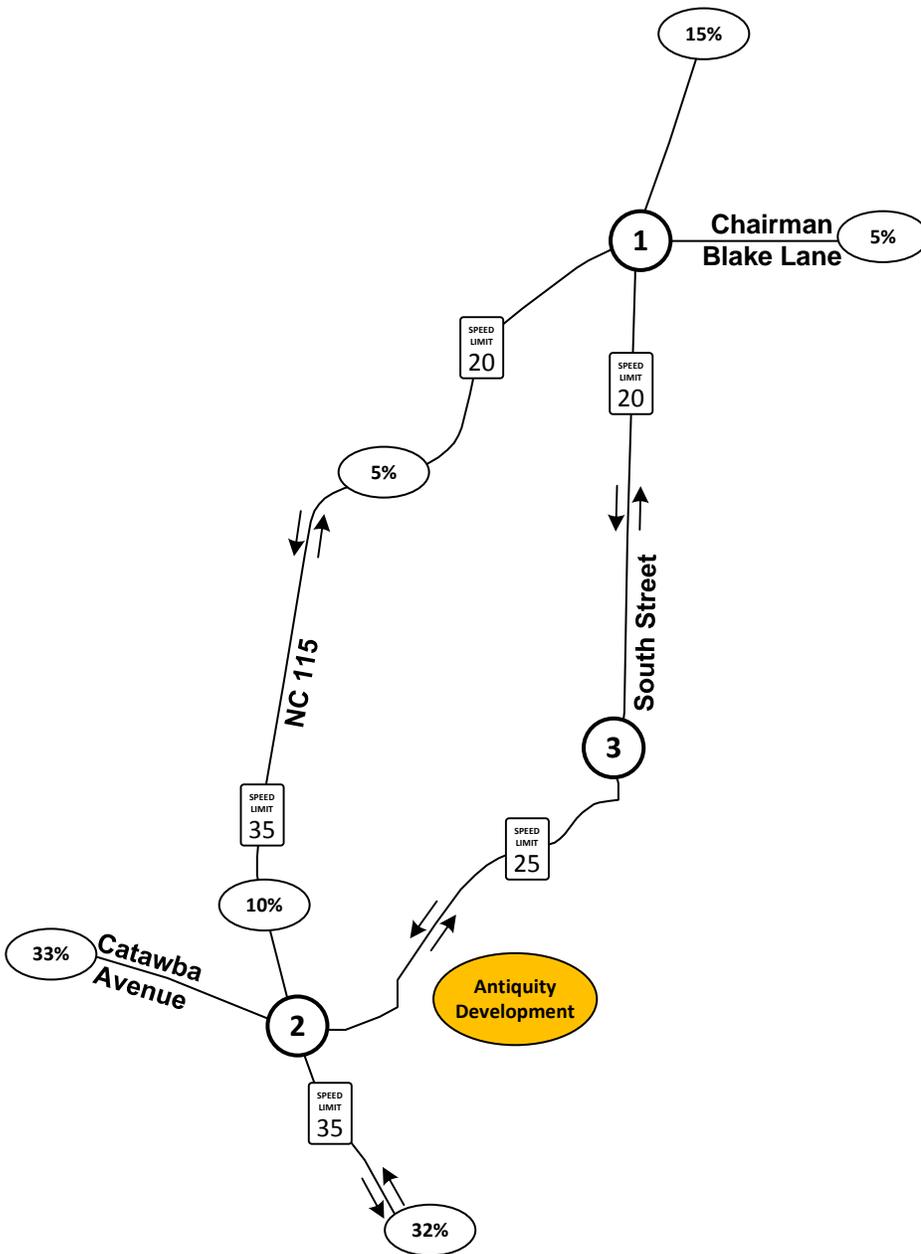
NOT TO SCALE

**Antiquity Woods
Traffic Impact Study**

2021 Historic Growth Traffic Volumes

DATE: November 2016

FIGURE 5



LEGEND

-   Existing Traffic Control
- Existing Roadway
-  Trip Distribution Percentage
- XX% Entering Trip Percentage
- (XX%) Exiting Trip Percentage



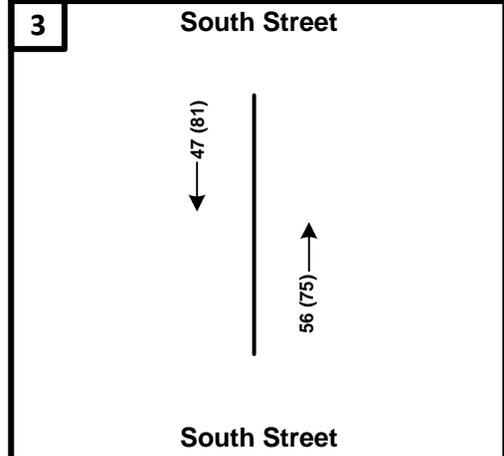
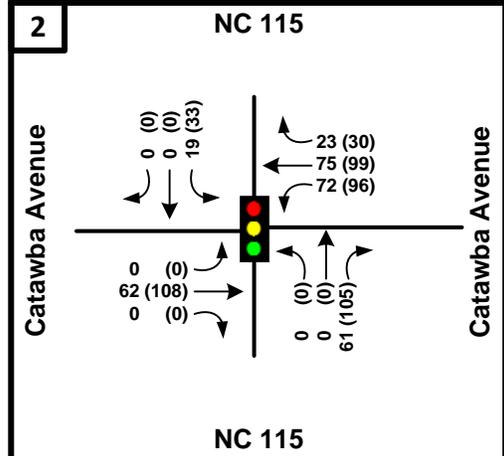
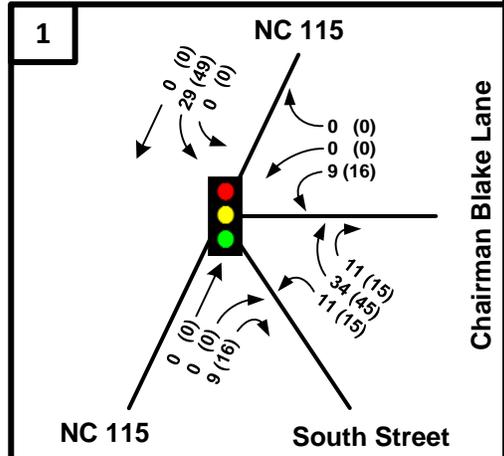
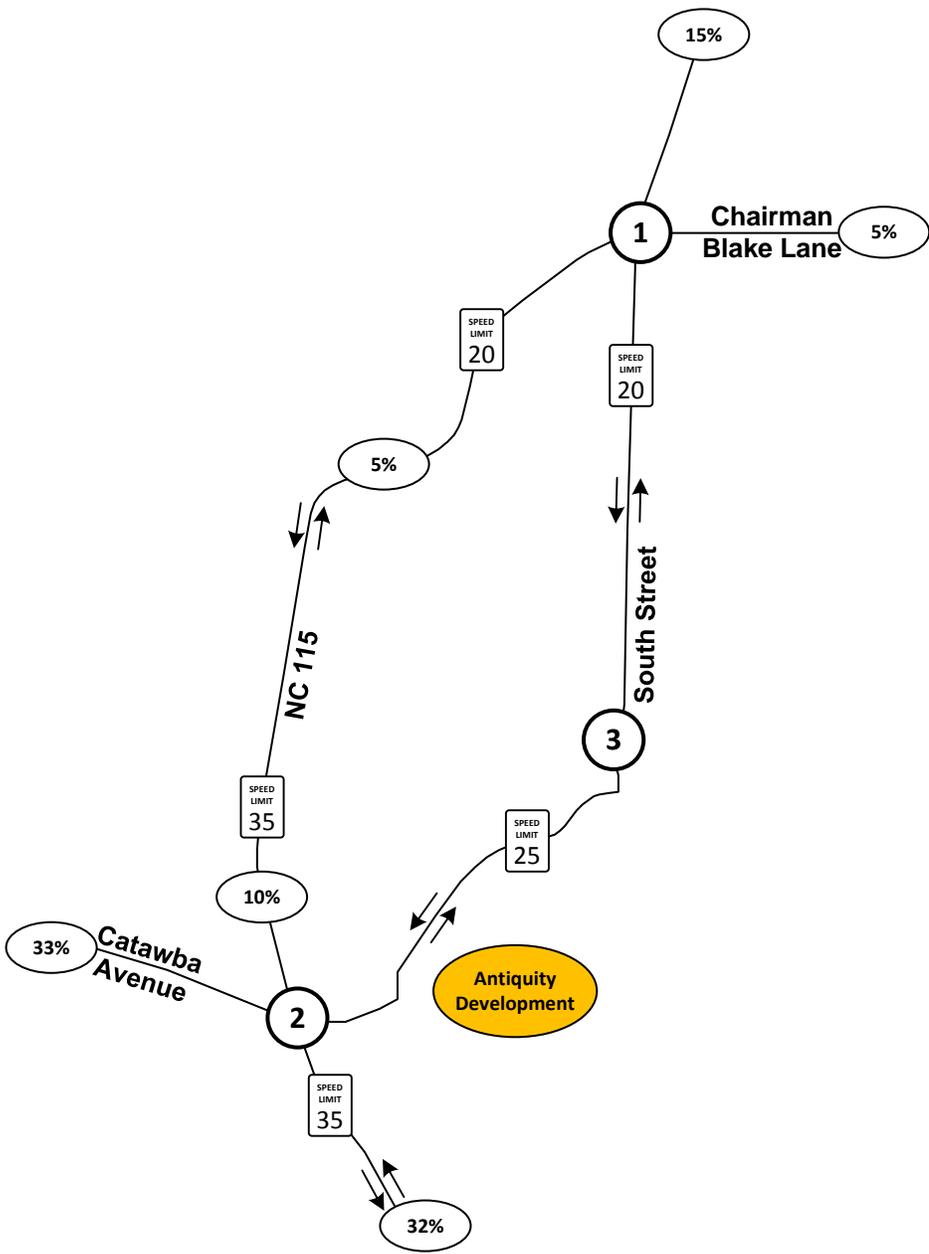
NOT TO SCALE

**Antiquity Woods
Traffic Impact Study**

Antiquity Trip Distribution

DATE: November 2016

FIGURE 6



LEGEND

- Existing Traffic Control
- Existing Roadway
- Trip Distribution Percentage
- XX**
(XX) AM (PM) Peak Hour Volumes
- Existing Posted Speed



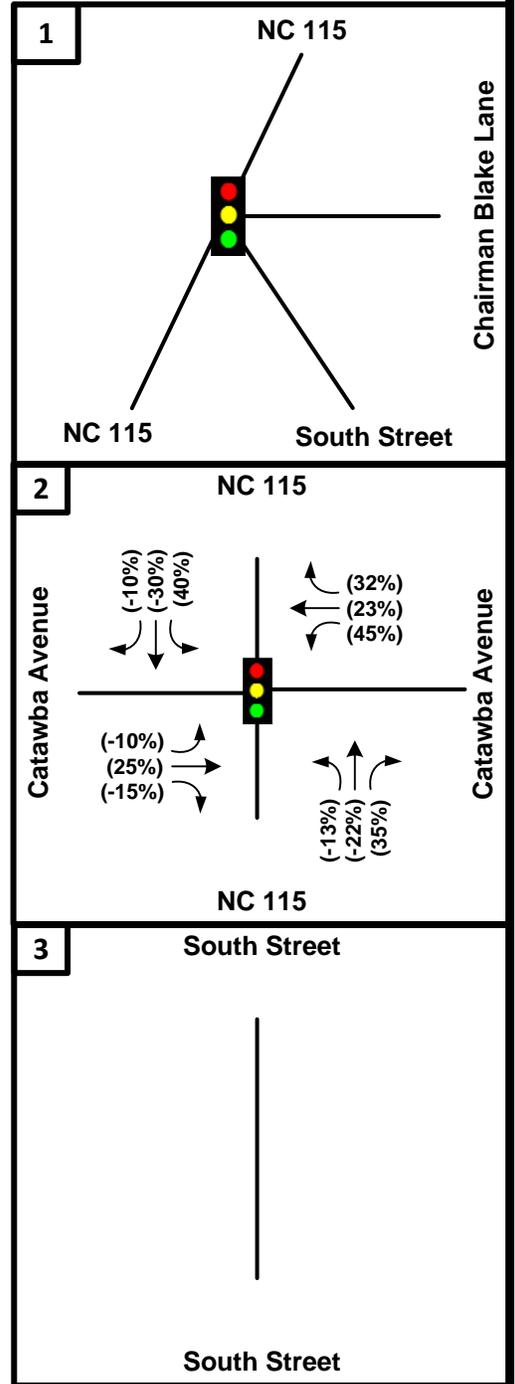
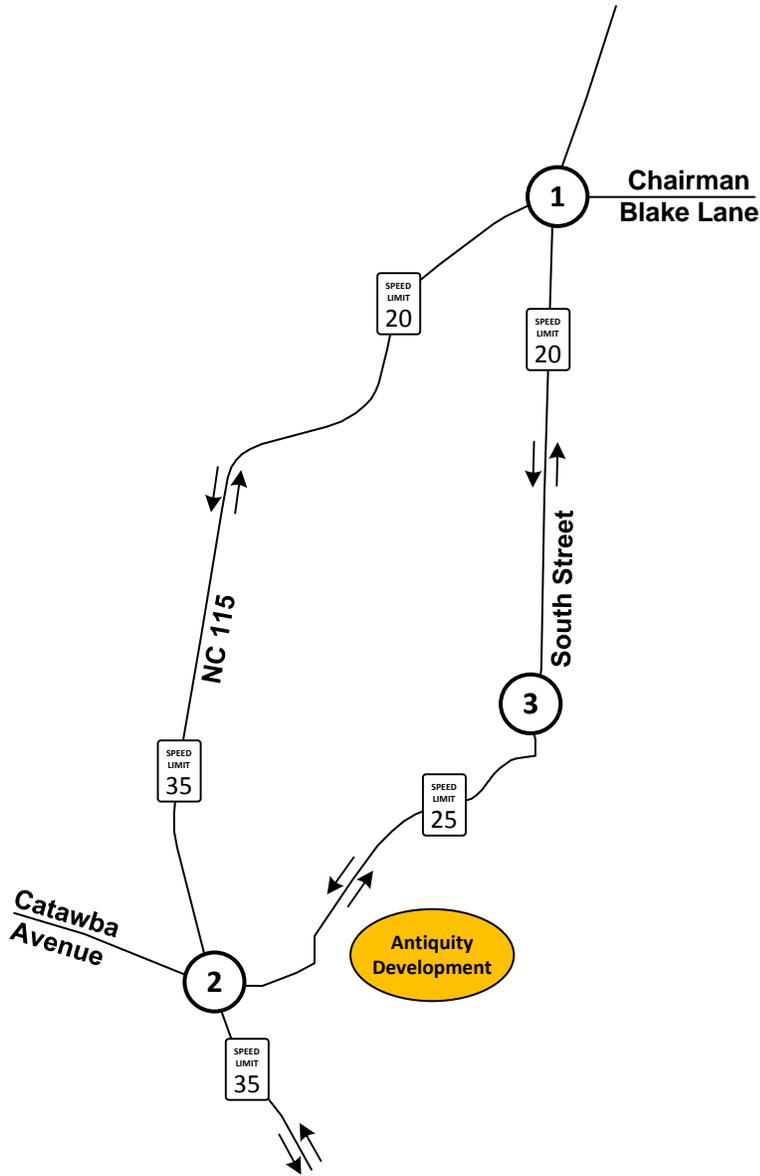
NOT TO SCALE

**Antiquity Woods
Traffic Impact Study**

Antiquity Trip Assignment

DATE: November 2016

FIGURE 7



LEGEND

-   Existing Traffic Control
-  Existing Roadway
-  Trip Distribution Percentage
- XX%** Entering Trip Percentage
- (XX%)** Exiting Trip Percentage



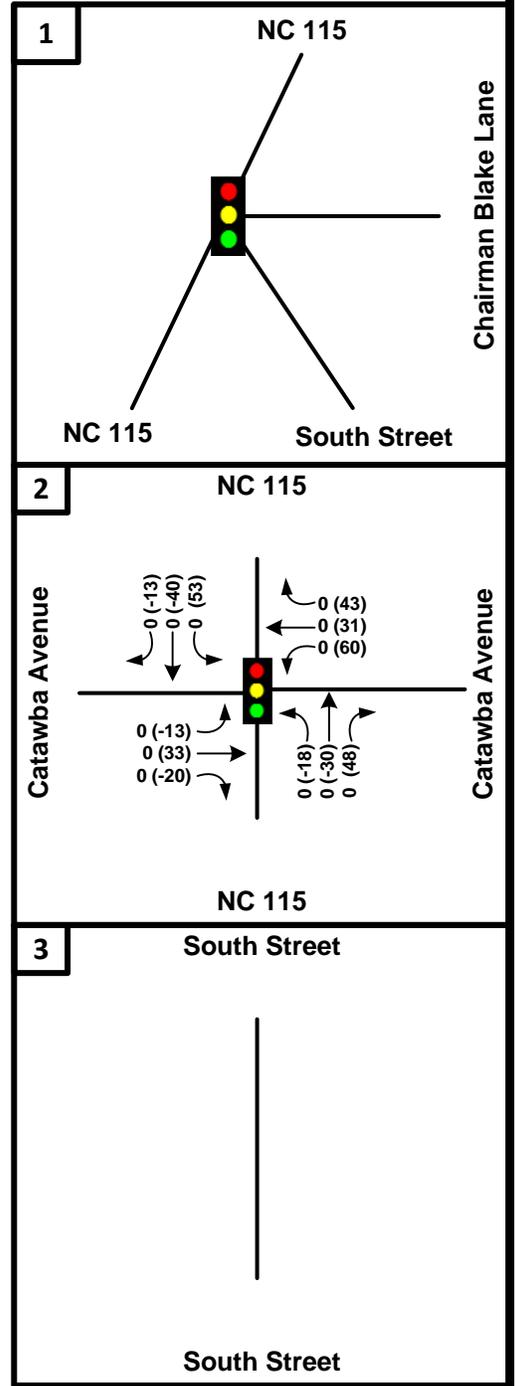
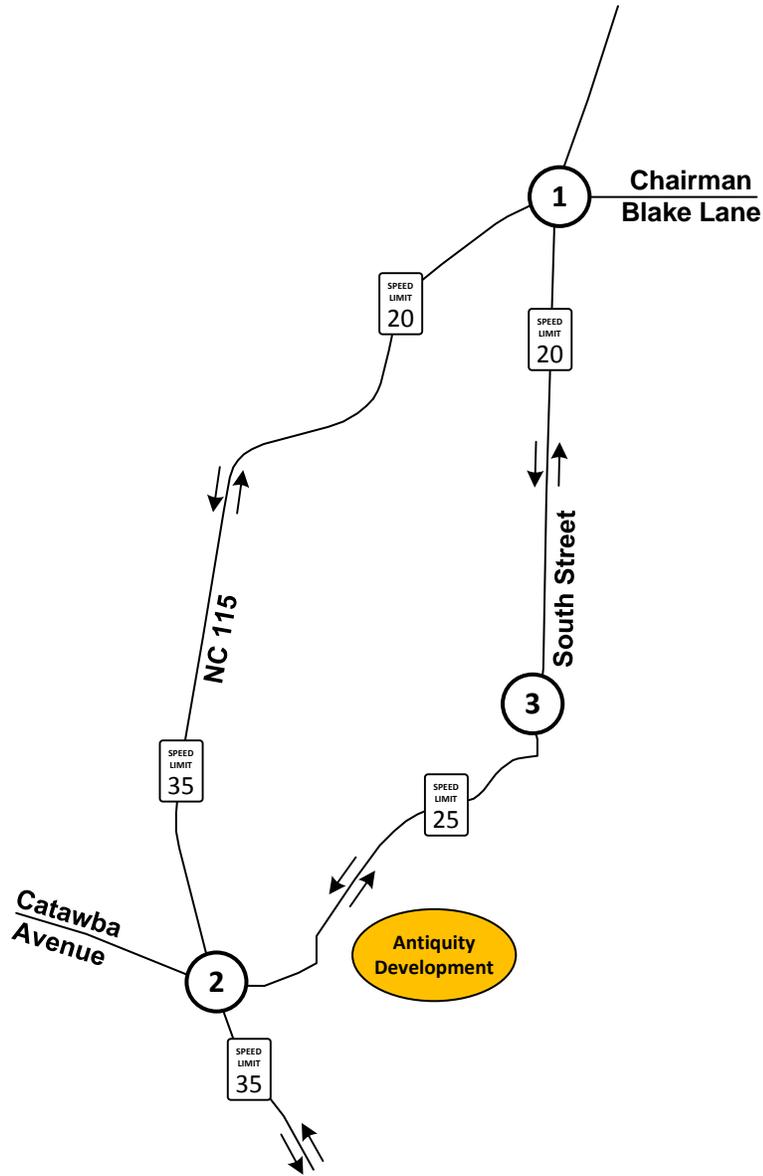
NOT TO SCALE

**Antiquity Woods
Traffic Impact Study**

Antiquity Pass-By Trip Distribution

DATE: November 2016

FIGURE 8



LEGEND

-   Existing Traffic Control
-  Existing Roadway
- XX**
(XX) AM (PM) Peak Hour Volumes
-  Existing Posted Speed



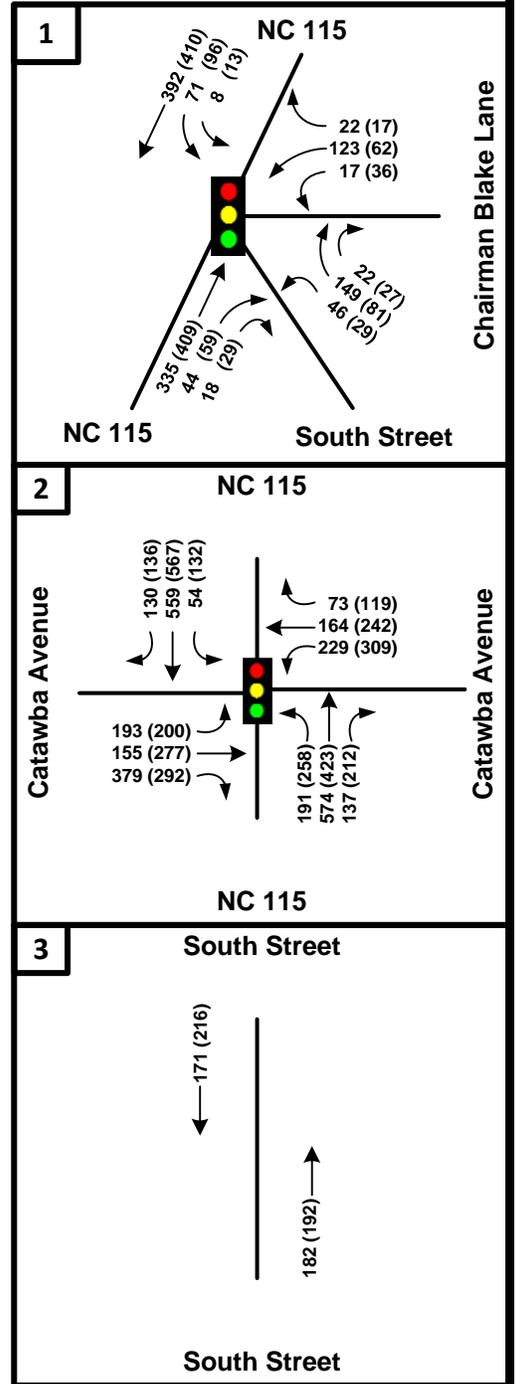
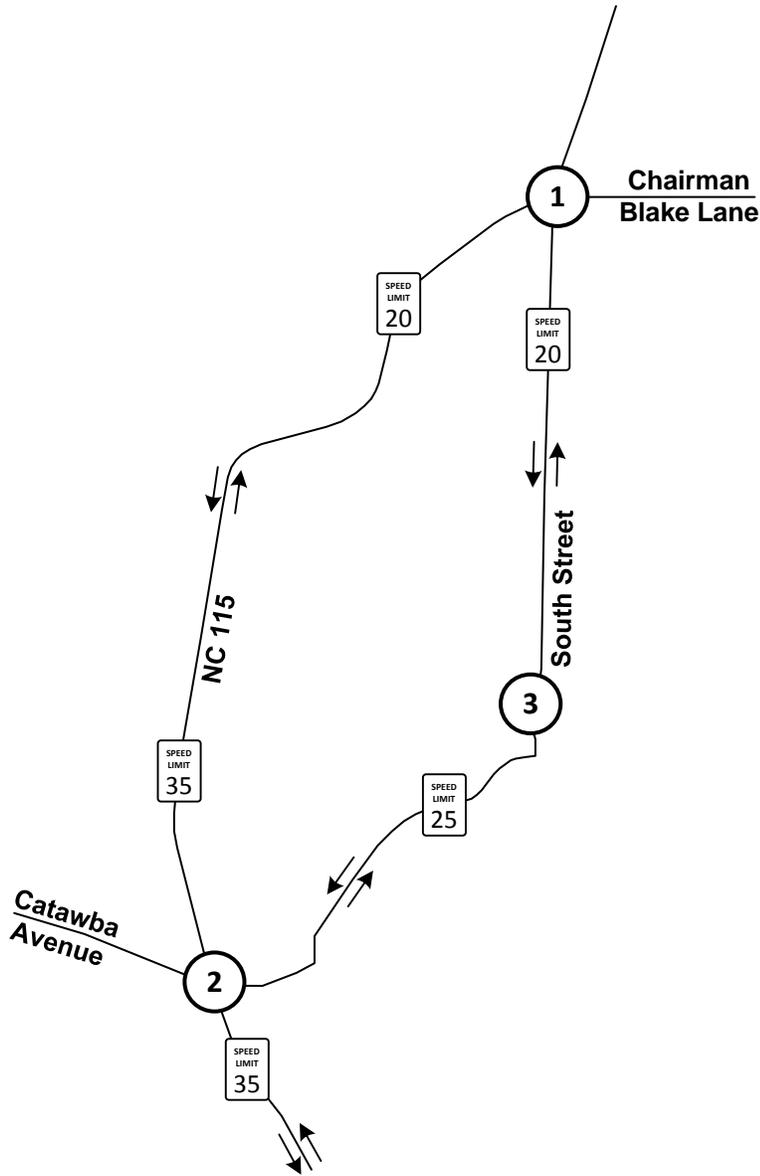
NOT TO SCALE

Antiquity Woods Traffic Impact Study

Antiquity Pass-By Trip Assignment

DATE: November 2016

FIGURE 9



LEGEND

- Existing Traffic Control
- Existing Roadway
- Existing Roadway
- XX** AM (PM) Peak Hour Volumes
- (XX)** AM (PM) Peak Hour Volumes
- Existing Posted Speed
- XX** Existing Posted Speed



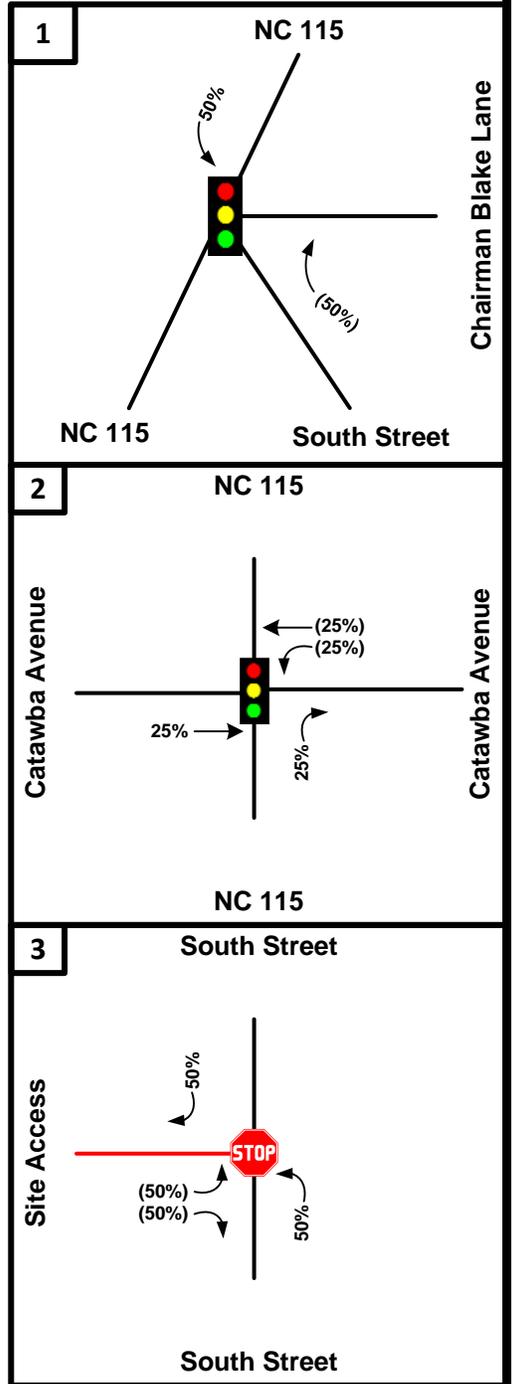
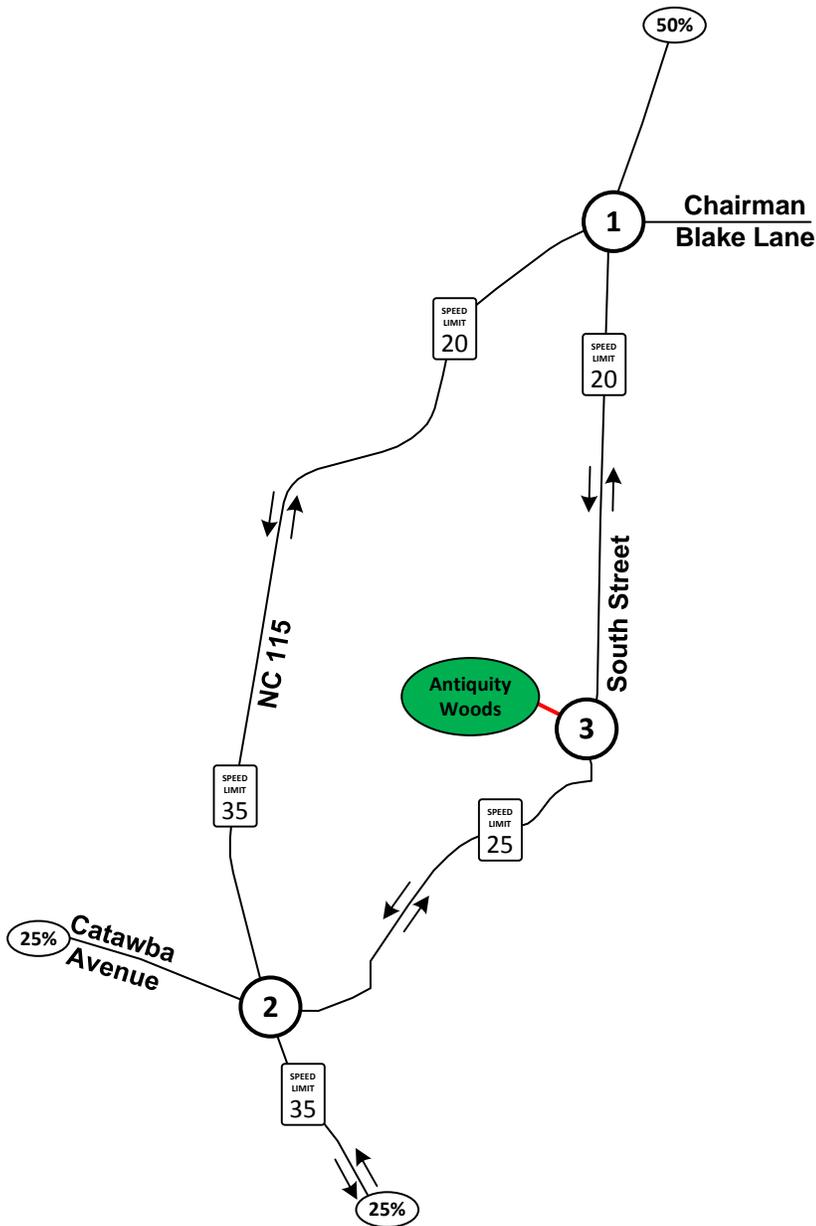
NOT TO SCALE

Antiquity Woods Traffic Impact Study

2021 No-Build Traffic Volumes

DATE: November 2016

FIGURE 10



LEGEND

- Existing Traffic Control
- Existing Roadway
- Trip Distribution Percentage
- XX%** Entering Trip Percentage
- (XX%)** Exiting Trip Percentage



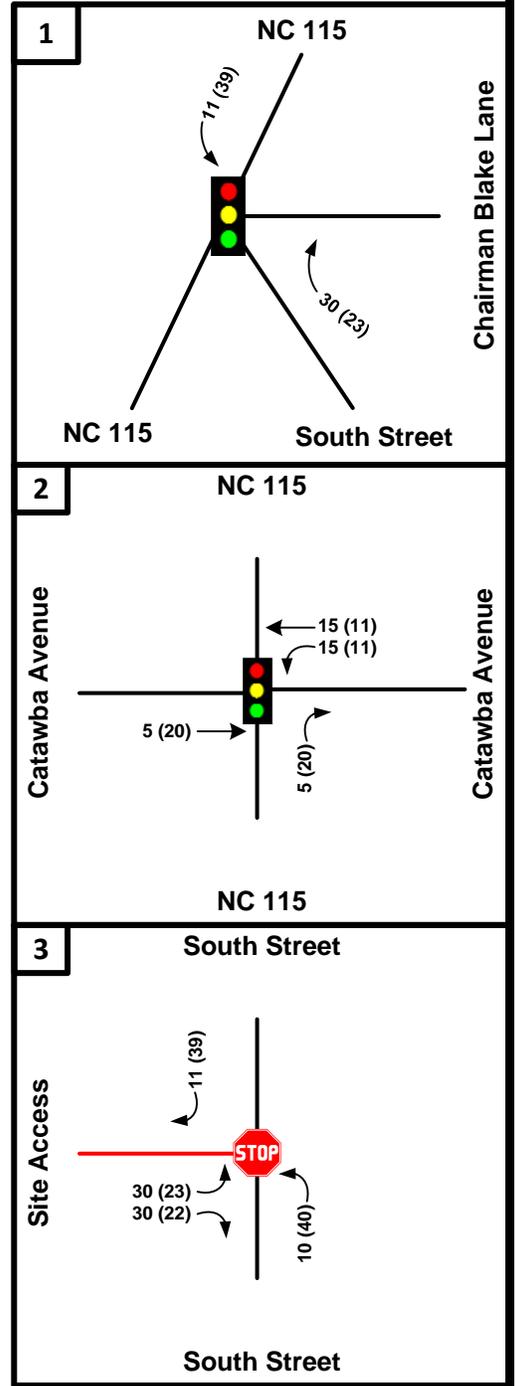
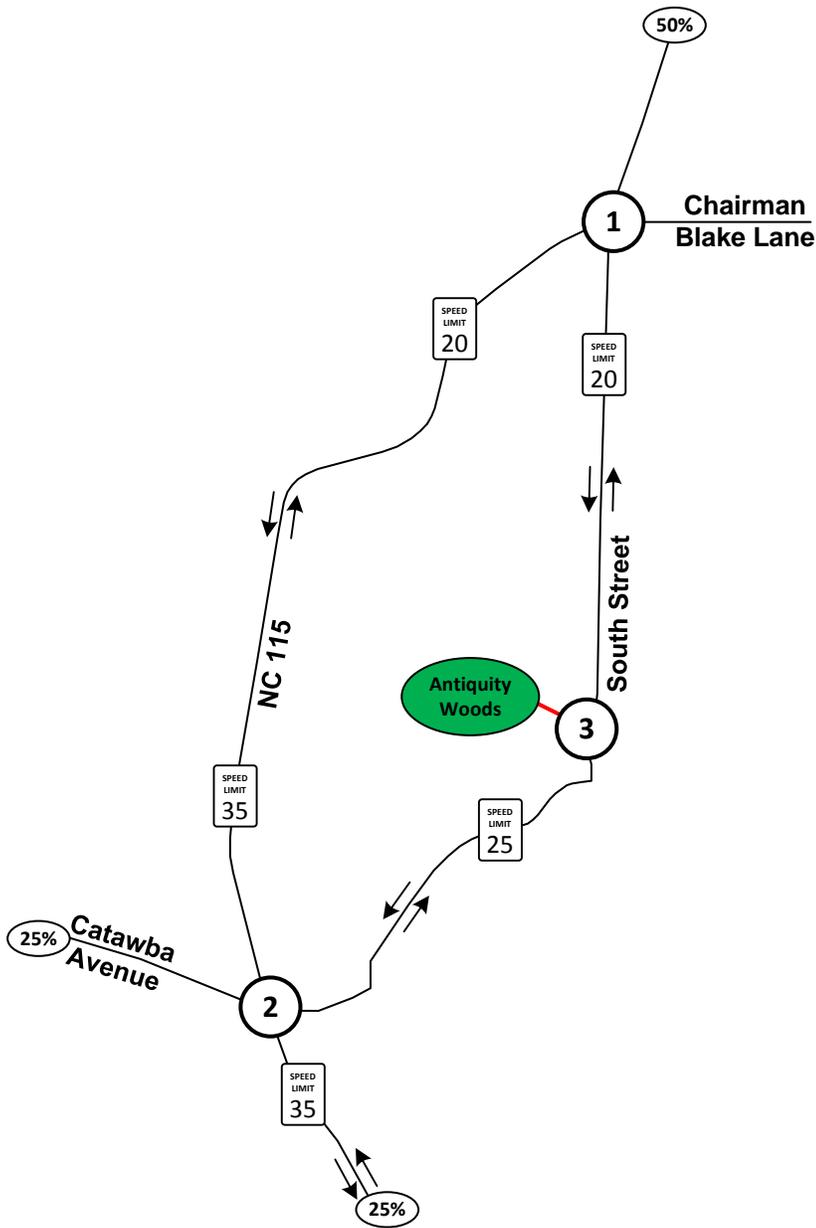
NOT TO SCALE

**Antiquity Woods
Traffic Impact Study**

Trip Distribution

DATE: November 2016

FIGURE 11



LEGEND

-   Existing Traffic Control
-  Existing Roadway
- XX**
(XX) AM (PM) Peak Hour Volumes
-  Existing Posted Speed



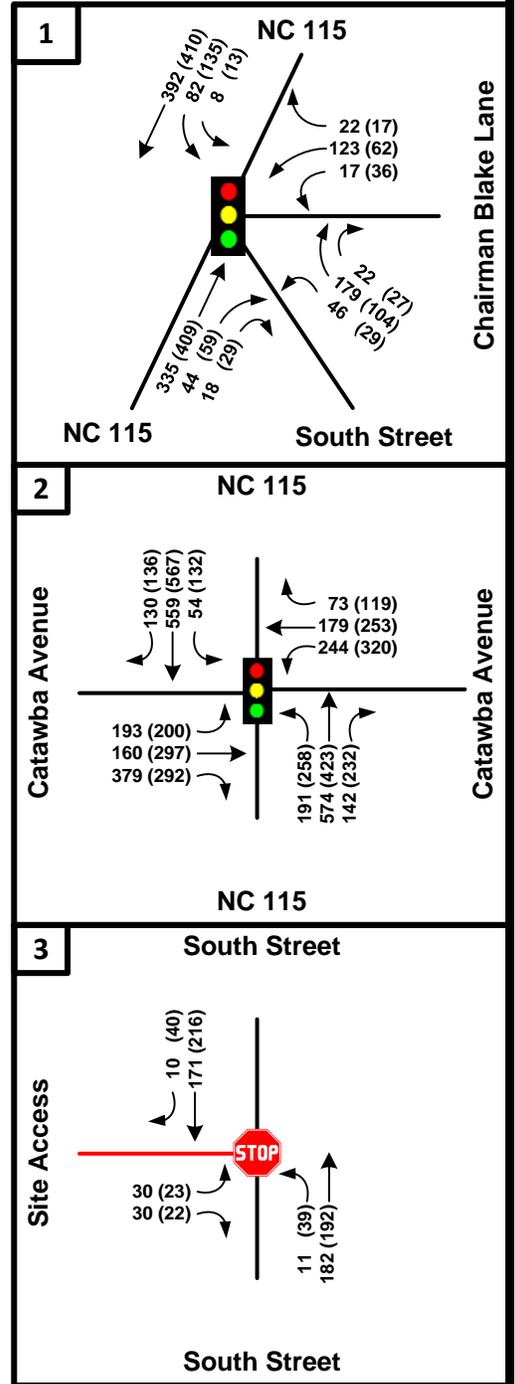
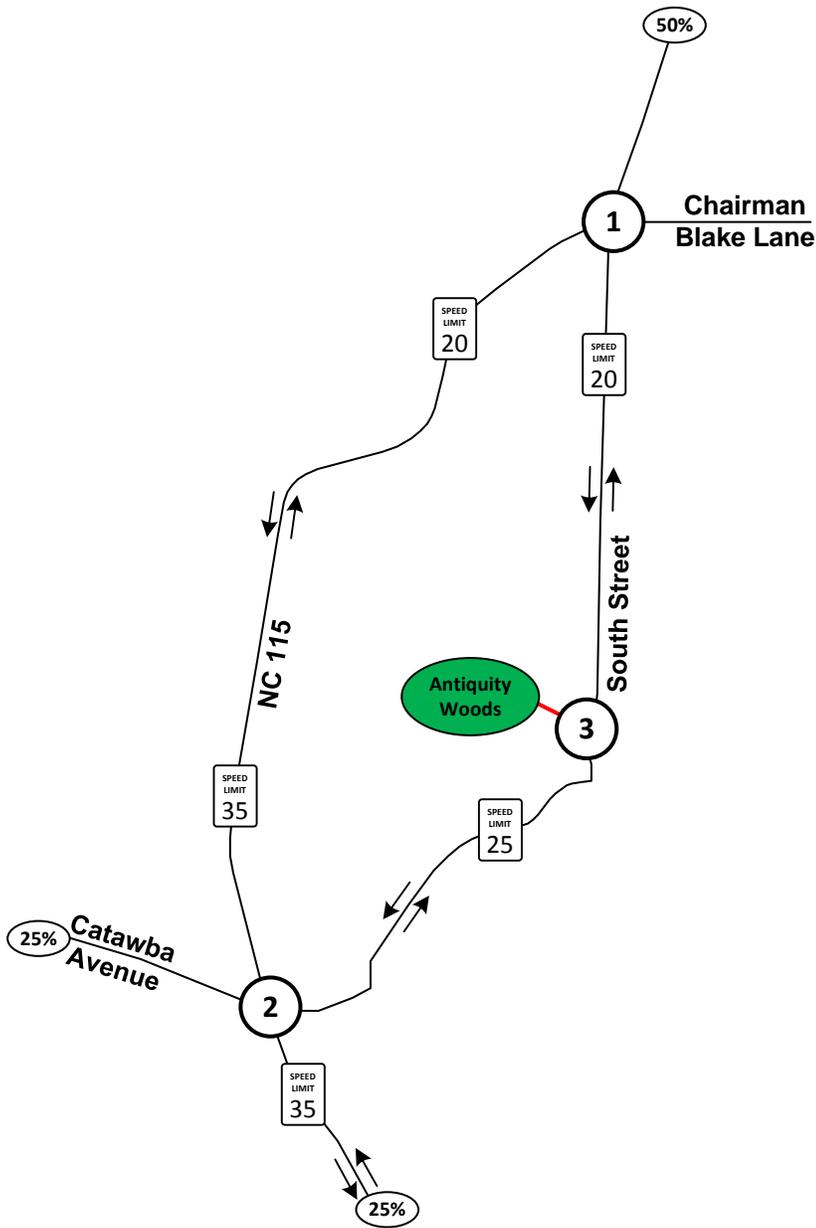
NOT TO SCALE

**Antiquity Woods
Traffic Impact Study**

Trip Assignment

DATE: November 2016

FIGURE 12



LEGEND

-   Existing Traffic Control
-  Existing Roadway
- XX**
(XX) AM (PM) Peak Hour Volumes
-  Existing Posted Speed



NOT TO SCALE

**Antiquity Woods
Traffic Impact Study**

2021 Build Traffic Volumes

DATE: November 2016

FIGURE 13

CAPACITY ANALYSIS – 2021 HORIZON YEAR

2016 Existing Analysis

The *Highway Capacity Manual* defines capacity as the maximum suitable flow rate at which vehicles reasonably can be expected to traverse a point during a specified time period. Capacity uses the measure of efficiency, *Level-of-Service* (LOS), to describe the traffic performance at intersections. LOS is defined for the overall intersection delay for signalized intersections. An acceptable LOS for a signalized intersection is considered to be LOS D or better (i.e. A, B, C or D).

At unsignalized intersections, the LOS is defined by the control delay for the movement that must yield right-of-way. It may be typical for stop-controlled minor streets to experience long delays during peak periods, while the majority of the traffic flows through the intersection on the major street experiencing little or no delay.

The procedures outlined in the *Highway Capacity Manual*, 2010 Update were used as guidelines for the analysis of the study area intersections. This manual provides procedures for the analysis of both signalized and unsignalized intersections. LOS categories range from LOS “A” (best) to “F” (worst) as shown in **Table 1**.

Table 1: Level of Service Criteria

LEVEL OF SERVICE	SIGNALIZED INTERSECTION CONTROL DELAY (SEC/VEH)	UNSIGNALIZED INTERSECTION CONTROL DELAY (SEC/VEH)	INTERSECTION LEVEL-OF-SERVICE DESCRIPTION
A	≤ 10.0	≤ 10.0	Free flow, insignificant delays.
B	10.1 – 20.0	10.1 – 15.0	Stable operation, minimal delays
C	20.1 – 35.0	15.1 – 25.0	Stable operation, acceptable delays
D	35.1 – 55.0	25.1 - 35.0	Restricted flow, common delays.
E	55.1 -80.0	35.1 – 50.0	Maximum capacity, extended delays. Volumes at or near capacity. Long queues form upstream from intersection.
F	> 80	> 50.0	Forced flow, excessive delays. Represents jammed conditions. Intersection operates below capacity with low volumes. Queues may block upstream intersections.

The Town of Cornelius requires intersection-level LOS to be maintained based upon the thresholds presented in **Table 2**. The Town of Cornelius Land Development Code (page 13-10) states the following:

If the existing level of service (intersection or approach) is inadequate (i.e. “D”, “E”, or “F” dependent on the governing zoning district shown in the table [below]), or the existing plus the background growth (not including the site) causes an inadequate level of service, then the developer will be expected to mitigate only the traffic to be generated by the proposed project.

Table 2: LOS Mitigation Thresholds

ZONING DISTRICT	LOS THRESHOLD
RP, GR, NC	C
NMX, VC, HC	D
BC, IC	D
TC, TRD-O, TD-O, TND	E

Both existing study intersections are designated within the Town Center (TC) zoning district. Therefore, their LOS thresholds are both LOS E for the overall intersection and each approach.

The LOS analysis was completed through the use of Synchro, version 9.1. The software package categorizes the LOS based on HCM methodology and criteria. According to industry standards, any signalized intersection or any approach of an unsignalized intersection is considered acceptable if the average delay is at LOS D or better with the LOS A representing little or no delay. Any signalized intersection or approach with a LOS of E or F is considered substandard and may need solutions to improve the operational performance. Signal plans were obtained from NCDOT. These plans can be found in **Appendix D**.

Table 3 lists the LOS results from the Synchro capacity analysis for the 2016 Existing Traffic Conditions.

Table 3: Level of Service Analysis – 2016 Existing Traffic Conditions

LOCATION	2016 EXISTING TRAFFIC CONDITIONS	
	AM PEAK LOS (delay/veh)	PM PEAK LOS (delay/veh)
INTERSECTION 1 – NC 115 & South Street / Chairman Blake Lane (SIGNALIZED)		
OVERALL	B (19.6)	B (15.5)
Westbound	A (7.7)	A (2.6)
North-Westbound	D (41.8)	D (39.8)
Northbound	C (22.4)	C (20.8)
Southbound	B (13.2)	A (9.6)
INTERSECTION 2 – NC 115 & Catawba Avenue (SIGNALIZED)		
OVERALL	C (25.7)	C (30.8)
Eastbound	C (24.9)	C (28.8)
Westbound	C (27.8)	C (31.2)
Northbound	C (22.7)	C (28.1)
Southbound	C (28.9)	C (34.9)

The results of this analysis indicate that all study area intersections and approaches operate with acceptable levels of service in the 2016 existing AM and PM peak hours.

An additional operational concern is queuing. Excessive queues can negatively impact operations at nearby intersections as well as cause safety concerns if the queues exceed the available storage of turn lanes. As such, the 95th percentile queues are reported for each traffic scenario. **Table 4** lists the 95th percentile queues from the Synchro capacity analysis for the 2016 Existing Traffic Conditions.

Table 4: Synchro 95th Percentile Queue Analysis – 2016 Existing Traffic Conditions

LOCATION	2016 EXISTING TRAFFIC CONDITIONS		
	EXISTING STORAGE LENGTH (ft.)	AM PEAK 95 th Percentile Queue (ft.)	PM PEAK 95 th Percentile Queue (ft.)
INTERSECTION 1 – NC 115 & South Street / Chairman Blake Lane (SIGNALIZED)			
Westbound Approach	-	32	0
North-Westbound Approach	-	141	69
Northbound Approach	-	297	328
Southbound Left-Turn	75	33	30
Southbound Through	-	217	179
INTERSECTION 2 – NC 115 & Catawba Avenue (SIGNALIZED)			
Eastbound Left-Turn	150	143	171
Eastbound Through	-	94	150
Eastbound Right-Turn	100	162	128
Westbound Left-Turn	100	117	124
Westbound Through	-	90	117
Westbound Right-Turn	200	1	5
Northbound Left-Turn	150	87	280
Northbound Through	-	474	375
Northbound Right-Turn	150	0	0
Southbound Left-Turn	175	22	34
Southbound Through	-	469	658
Southbound Right-Turn	100	0	0

The highlighted cells in the table above indicate storage lanes where the 95th percentile queues reported by Synchro exceed the existing storage length. The Synchro output pages are located in **Appendix E**.

2021 No-Build Analysis

The site is proposed to be completed by year 2021. Per the MOU and Town of Cornelius TIA Policy, existing traffic volumes were increased by two percent (2%) per year to reflect 2021 background traffic volumes. Traffic generated by the remaining portions of the Antiquity development were included in the analysis. As such, the 2021 background traffic consists of 2016 existing traffic with the addition of the historic growth traffic and traffic from the unbuilt portions of the Antiquity development. A discussion of the trip generation calculations performed for the remaining portions of the Antiquity development can be found in **Appendix C**.

The LOS results from the 2021 No-Build Analysis are displayed in **Table 5**.

Table 5: Level of Service Analysis – 2021 No-Build Traffic Conditions

LOCATION	2021 NO-BUILD TRAFFIC CONDITIONS	
	AM PEAK LOS (delay/veh)	PM PEAK LOS (delay/veh)
INTERSECTION 1 – NC 115 & South Street / Chairman Blake Lane (SIGNALIZED)		
OVERALL	C (25.9)	C (24.9)
Westbound	B (11.3)	A (5.3)
North-Westbound	D (47.7)	D (40.9)
Northbound	C (31.8)	D (36.8)
Southbound	B (16.0)	B (13.8)
INTERSECTION 2 – NC 115 & Catawba Avenue (SIGNALIZED)		
OVERALL	D (36.6)	E (58.9)
Eastbound	D (36.0)	E (56.2)
Westbound	D (43.0)	E (69.3)
Northbound	C (31.5)	E (55.3)
Southbound	D (39.3)	E (57.0)

The results of this analysis indicate that both study intersections and their approaches operate at an acceptable LOS; with one exception. NC 115 at Catawba Avenue operates at LOS E in the PM peak hour. This is highlighted in the above table as the overall intersection and its approaches are operating near capacity. It however, is operating under its mitigation threshold based upon its zoning district.

An additional operational concern is queuing. Excessive queues can negatively impact operations at nearby intersections as well as cause safety concerns if the queues exceed the available storage of turn lane. As such, the 95th percentile queues are reported for the auxiliary storage lanes across each traffic scenario. **Table 6** lists the 95th percentile queues from the Synchro capacity analysis for the 2021 No-Build Traffic Conditions.

The Synchro output pages are located in **Appendix E**.

Table 6: Synchro 95th Percentile Queue Analysis – 2021 No-Build Traffic Conditions

LOCATION	2021 NO-BUILD TRAFFIC CONDITIONS		
	EXISTING STORAGE LENGTH (ft.)	AM PEAK 95 th Percentile Queue (ft.)	PM PEAK 95 th Percentile Queue (ft.)
INTERSECTION 1 – NC 115 & South Street / Chairman Blake Lane (SIGNALIZED)			
Westbound Approach	-	50	15
North-Westbound Approach	-	213	131
Northbound Approach	-	426	525
Southbound Left-Turn	75	53	64
Southbound Through	-	260	251
INTERSECTION 2 – NC 115 & Catawba Avenue (SIGNALIZED)			
Eastbound Left-Turn	150	171	197
Eastbound Through	-	160	405
Eastbound Right-Turn	100	259	196
Westbound Left-Turn	100	181	411
Westbound Through	-	178	266
Westbound Right-Turn	200	19	40
Northbound Left-Turn	150	174	366
Northbound Through	-	571	398
Northbound Right-Turn	150	0	0
Southbound Left-Turn	175	33	88
Southbound Through	-	555	696
Southbound Right-Turn	100	0	0

The highlighted cells in the table above indicate storage lanes where the 95th percentile queues reported by Synchro exceed the existing storage length. The Synchro output pages are located in **Appendix E**.

2021 Build Analysis

The total future build traffic volumes include both the site traffic and traffic volumes from the No-Build Analysis. The Build Analysis evaluates the traffic conditions before any improvements are implemented. **Table 7** shows the LOS results for the intersections within the study area.

Table 7: Level of Service Analysis – 2021 Build Traffic Conditions

LOCATION	2021 BUILD TRAFFIC CONDITIONS	
	AM PEAK LOS (delay/veh)	PM PEAK LOS (delay/veh)
INTERSECTION 1 – NC 115 & South Street / Chairman Blake Lane (SIGNALIZED)		
OVERALL	C (27.9)	C (28.0)
Westbound	B (11.3)	A (5.3)
North-Westbound	D (52.9)	D (40.8)
Northbound	C (33.3)	D (43.0)
Southbound	B (16.4)	B (15.6)
INTERSECTION 2 – NC 115 & Catawba Avenue (SIGNALIZED)		
OVERALL	D (38.2)	E (62.5)
Eastbound	D (37.1)	E (65.3)
Westbound	D (48.5)	E (76.8)
Northbound	C (31.9)	D (54.1)
Southbound	D (40.1)	E (57.0)
INTERSECTION 3 – South Street & Site Access (UNSIGNALIZED)		
Eastbound Approach	B (10.8)	B (11.8)
Northbound Left-Turn	A (7.6)	A (7.9)

The results of this analysis indicate that both study intersections and their approaches operate at an acceptable LOS; with one exception. NC 115 at Catawba Avenue operates at LOS E in the PM peak hour. This is highlighted in the above table as the overall intersection and its approaches are operating near capacity. It however, is operating under its mitigation threshold based upon its zoning district. It should be noted that the northbound approach decreases in delay in the build analysis scenario when compared to the no-build analysis scenario. This can be attributed to the proposed development adding traffic volume to the northbound right-turn movement. This movement operates with very little delay; which causes the approaches' average delay per vehicle to reduce between the no-build and build analysis scenarios.

An additional operational concern is queuing. Excessive queues can negatively impact operations at nearby intersections as well as cause safety concerns if the queues exceed the available storage of turn lanes. As such, the 95th percentile queues are reported for each traffic scenario. **Table 8** lists the 95th percentile queues from the Synchro capacity analysis for the 2021 Build Traffic Conditions.

Table 8: Synchro 95th Percentile Queue Analysis – 2021 Build Traffic Conditions

LOCATION	2021 BUILD TRAFFIC CONDITIONS		
	EXISTING STORAGE LENGTH (ft.)	AM PEAK 95 th Percentile Queue (ft.)	PM PEAK 95 th Percentile Queue (ft.)
INTERSECTION 1 – NC 115 & South Street / Chairman Blake Lane (SIGNALIZED)			
Westbound Approach	-	50	15
North-Westbound Approach	-	267	149
Northbound Approach	-	432	525
Southbound Left-Turn	75	59	87
Southbound Through	-	260	261
INTERSECTION 2 – NC 115 & Catawba Avenue (SIGNALIZED)			
Eastbound Left-Turn	150	181	204
Eastbound Through	-	175	442
Eastbound Right-Turn	100	267	196
Westbound Left-Turn	100	207	435
Westbound Through	-	203	279
Westbound Right-Turn	200	19	40
Northbound Left-Turn	150	176	366
Northbound Through	-	571	398
Northbound Right-Turn	150	0	0
Southbound Left-Turn	175	33	88
Southbound Through	-	555	696
Southbound Right-Turn	100	0	0
INTERSECTION 3 – South Street & Site Access (UNSIGNALIZED)			
Eastbound Approach	-	7.5	7.5
Northbound Left-Turn	-	0	2.5

The highlighted cells in the table above indicate storage lanes where the 95th percentile queues reported by Synchro exceed the existing storage length. The Synchro output pages are located in **Appendix E**.

2021 Build Improved Analysis

The Warrant for Left and Right-Turn Lanes nomograph for at-grade unsignalized intersections contained within NCDOT's *Policy on Street and Driveway Access to North Carolina Highways* manual was reviewed against the traffic volumes at the site access point. As both of the existing study intersections are operating below their LOS thresholds and the proposed site access operates at LOS B in the build analysis scenario, the improvements analyzed in this scenario result from reviewing the projected traffic volumes at the site access against the NCDOT nomograph. The result of that review can be found in **Appendix F**.

Table 9 shows the analysis results at the intersections within the study area with the recommended improvements. The specific geometric recommendations analyzed in this scenario are listed in the Recommendations section.

Table 9: Level of Service Analysis – 2021 Build-Improved Traffic Conditions

LOCATION	2021 BUILD-IMPROVED TRAFFIC CONDITIONS	
	AM PEAK LOS (delay/veh)	PM PEAK LOS (delay/veh)
INTERSECTION 3 – South Street & Site Access (UNSIGNALIZED)		
Eastbound Approach	B (10.7)	B (11.5)
Northbound Left-Turn	A (7.6)	A (7.8)

The results of this analysis indicate that with turn lanes required by the NCDOT nomograph, the proposed unsignalized intersection of South Street at Site Access operates at an acceptable LOS for all minor-street approaches and left-turn movements. All other study intersections were indicated to operate at or better-than their mitigation threshold. **Table 10** lists the 95th percentile queues from the Synchro capacity analysis for the 2021 Build-Improved Traffic Conditions.

Table 10: Synchro 95th Percentile Queue Analysis – 2021 Build-Improved Traffic Conditions

LOCATION	2021 BUILD-IMPROVED TRAFFIC CONDITIONS		
	EXISTING STORAGE LENGTH (ft.)	AM PEAK 95 th Percentile Queue (ft.)	PM PEAK 95 th Percentile Queue (ft.)
INTERSECTION 3 – South Street & Site Access (UNSIGNALIZED)			
Eastbound Approach	-	7.5	7.5
Northbound Left-Turn	50 (Recommended)	0	2.5

The Synchro output pages are located in **Appendix E**.

CONCLUSIONS – 2021 HORIZON YEAR

The proposed Antiquity Woods Development is located along South Street in Cornelius, Mecklenburg County, North Carolina. The proposed development will be built-out by 2021.

The proposed site will be a residential development consisting of single-family homes, a hotel and a restaurant. The full build-out of the development is 103 single family homes, a 4 room hotel and a 2,500 square foot (SF) restaurant. Trip generation results in a total of 81 trips (21 in, 60 out) generated from the proposed development in the AM peak hour and 124 trips (79 in, 45 out) generated in the PM peak hour. Trip generation was submitted to the Town for review on June 21st, 2016. The Town approved of the trip generation on June 29th, 2016.

Access to the site is proposed to be provided by one full-movement intersection. This is located on South Street approximately 125 feet to the north of the covered bridge that provides access to the Antiquity development.

The results of the analysis indicate that the proposed development contributes minimal delay to the existing study intersections and approaches. Furthermore, these existing intersections and approaches operate at or below their mitigation thresholds. At the proposed site access, the traffic volumes are projected meet the thresholds to warrant both a northbound left-turn lane as well as a southbound right-turn lane. The specifics of these lanes can be found in the Recommendations section. The nomograph used for the auxiliary lanes at the site access is included in **Appendix F**.

RECOMMENDATIONS – 2021 HORIZON YEAR

Based on the findings of this study, specific improvements have been identified and should be completed as part of the proposed development. The NCDOT *Policy on Street and Driveway Access to North Carolina Highways* manual was consulted to determine the appropriate storage for the recommended auxiliary lanes if warranted. The nomograph used for the auxiliary lanes at the site access points is included in **Appendix F**.

NC 115 at South Street / Chairman Blake Lane

There are no recommended improvements at this intersection.

NC 115 at Catawba Avenue

There are no recommended improvements at this intersection.

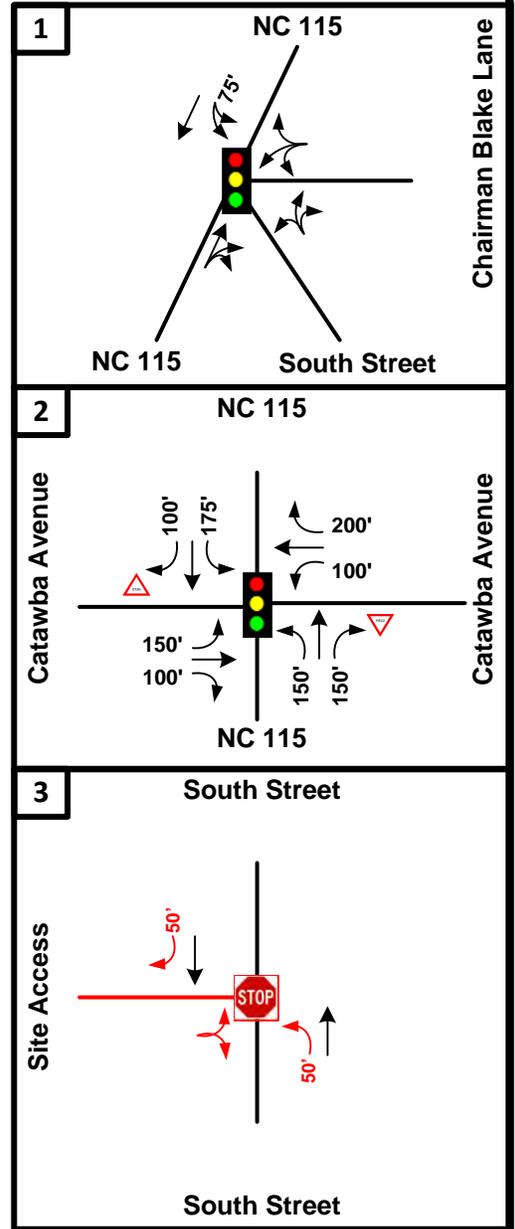
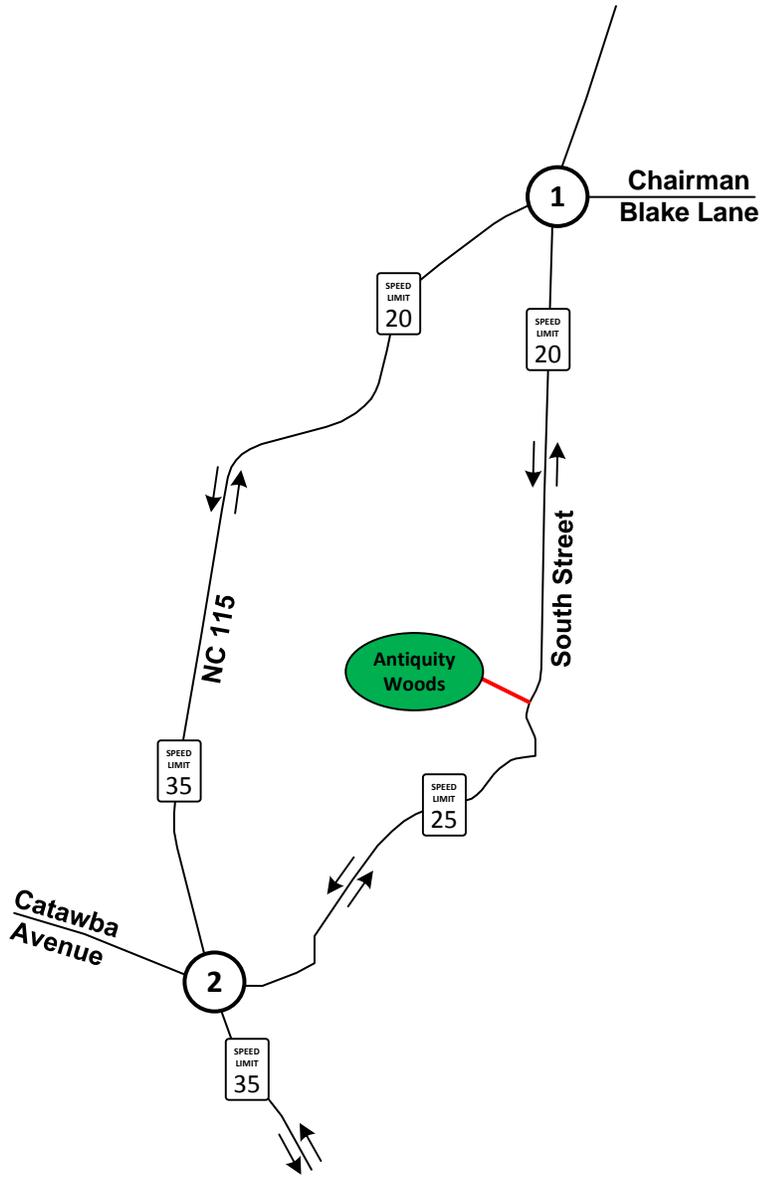
South Street at Site Access (Existing South Street Alignment)

- Construct Site Access #1 with one ingress and one egress lane.
- Construct a left-turn lane with 50 feet of full-width storage and appropriate taper on northbound South Street.
- Construct a right-turn lane with 50 feet of full width storage and appropriate taper on southbound South Street.
- Relocate Site Access approximately 100 feet to the north along South Street in-order to provide adequate space along South Street from the covered bridge to incorporate the taper, deceleration and storage areas for the northbound left-turn lane on South Street.

South Street at Site Access (Potential South Street Alignment)

It is possible that the NC 115 corridor study will result in the recommendation to construct a parallel route to Old Canal Street. This would allow traffic traveling on South Street to reach the intersection of NC 115 at Catawba Avenue without entering the Antiquity development. This would require a different site access configuration than what was presented above under the “Existing South Street Alignment” section. The recommendations for site access and related improvements in the case that a facility parallel to Old Canal Street is constructed are as follows:

- Construct Site Access #1 with one ingress and one egress lane.
- Construct a left-turn lane with 50 feet of full-width storage and appropriate taper on northbound South Street.
- Construct a right-turn lane with 50 feet of full width storage and appropriate taper on southbound South Street.
- Locate the site access such that it is across from the roadway exiting the Antiquity development and the covered bridge. This four-legged intersection should be constructed as two-way stop controlled with traffic along South Street having priority and the traffic exiting Antiquity Woods (traveling eastbound) and traffic exiting Antiquity (traveling westbound) be required to stop.



LEGEND

- | | | | | | |
|------|--|--------------------------|------|--|--------------------------------|
| | | Existing Traffic Control | | | Proposed Traffic Control |
| — | | Existing Roadway | — | | Recommended Access |
| → | | Existing Laneage | → | | Existing Laneage |
| XXX' | | Storage Bay Length | XXX' | | Recommended Storage Bay Length |
| | | Existing Posted Speed | | | |



NOT TO SCALE

Antiquity Woods Traffic Impact Study

2021 Recommended Improvements

DATE: November 2016

FIGURE 14

PROJECT TRAFFIC VOLUMES – 2026 HORIZON YEAR

According to the Town of Cornelius' Land Development Code, developments must be analyzed five (5) years after the development is completed. As the Antiquity Woods development is currently envisioned to be completed in 2021, the remaining capacity analyses focus on the traffic conditions and analysis projected for 2026.

Historical Growth Traffic (2026 Background Traffic)

Historical growth traffic is the increase in existing traffic volumes due to general usage increases and non-specific growth throughout the area. As specified by Town staff, existing traffic volumes were increased by two percent (2%) per year to reflect background traffic at five (5) years beyond the buildout year in which construction of the development will be completed. The historical growth traffic volumes for the 2026 horizon year are shown in **Figure 15**.

It should be noted that no growth was applied to the traffic traveling in and out of the Antiquity development. As any growth on the turning movements into and out of the development would be due to the continued construction and opening of the remaining land uses within the development.

Approved development traffic remains constant between both the 2021 and 2026 traffic conditions. Traffic related to the Antiquity development is discussed previously in this report. These volumes are shown in **Figures 6-9**. Additionally, the traffic calculations can be found in **Appendix B**.

2026 No-Build Traffic Volumes

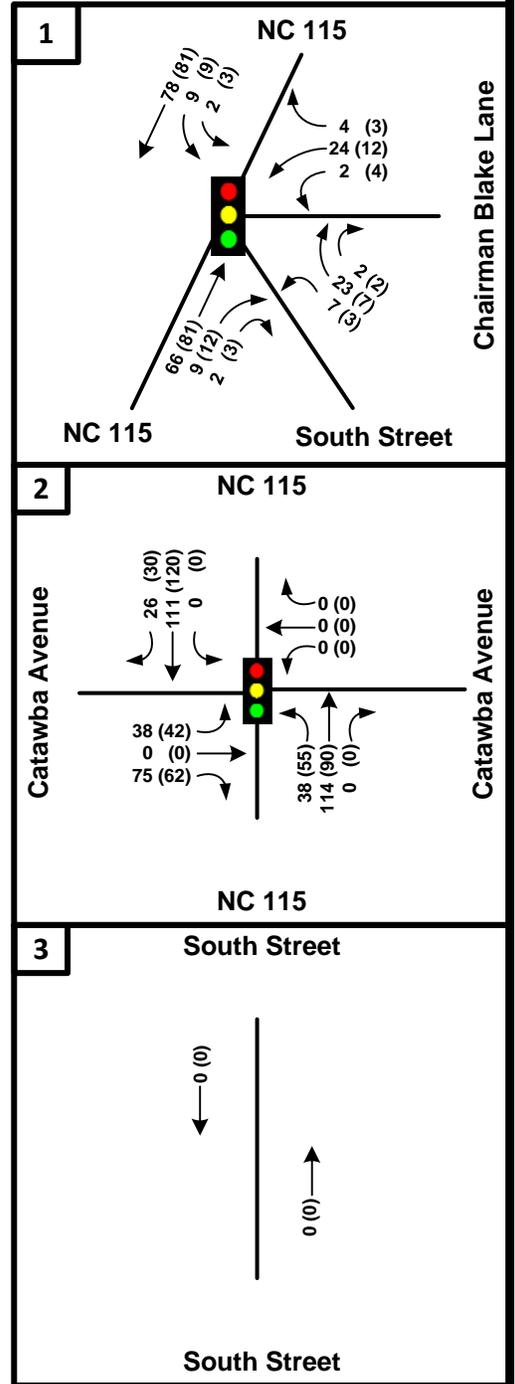
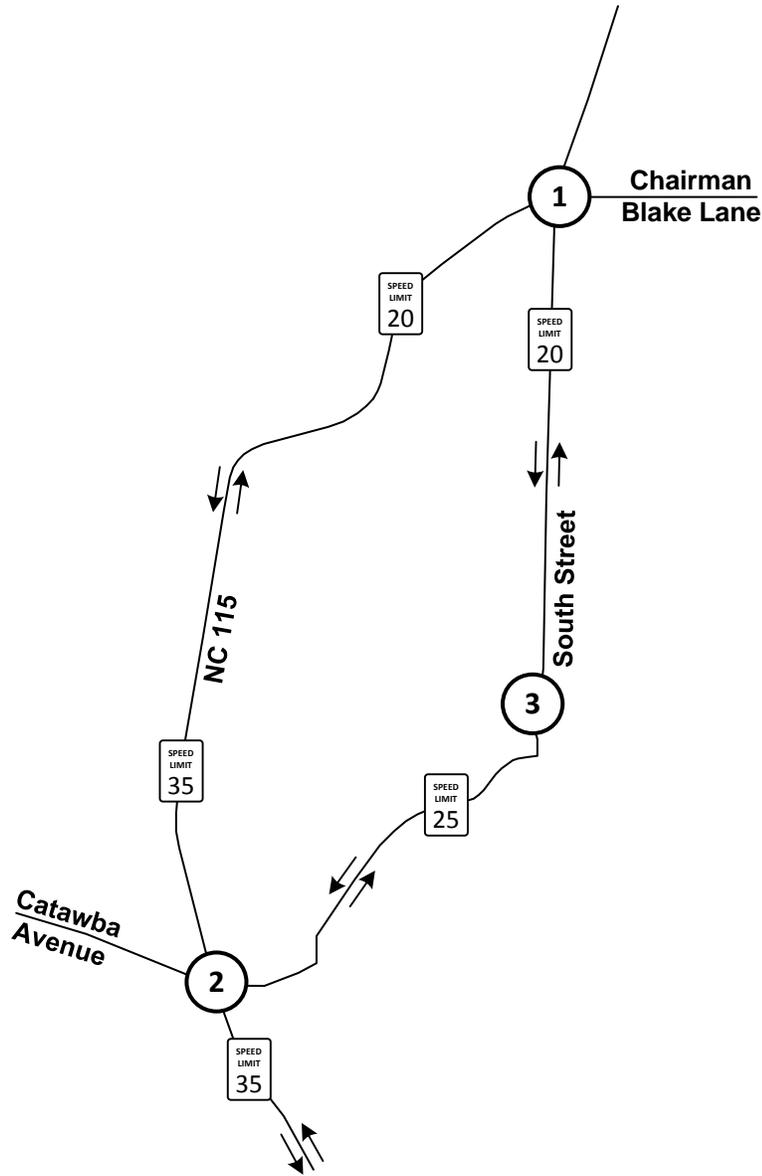
The historical growth traffic and approved development traffic volumes were then added to the existing volumes to determine the 2026 No-Build Traffic Volumes. The 2026 no-Build Traffic Volumes are shown in **Figure 16**.

Proposed Development Traffic

The proposed development traffic was generated, distributed, and assigned to the adjacent roadway network as discussed previously. The site trip distribution percentages are shown in **Figure 11** and the site trip assignment is shown on **Figure 12**. The traffic calculations are shown in **Appendix B**.

2026 Build-Out Traffic Volumes

The 2026 build-out traffic volumes include the 2026 No-Build traffic and the proposed development traffic. The AM and PM peak-hour 2026 Build Traffic Volumes are shown in **Figure 17**.



LEGEND

- Existing Traffic Control
- Existing Roadway
- XX**
(XX) AM (PM) Peak Hour Volumes
- Existing Posted Speed



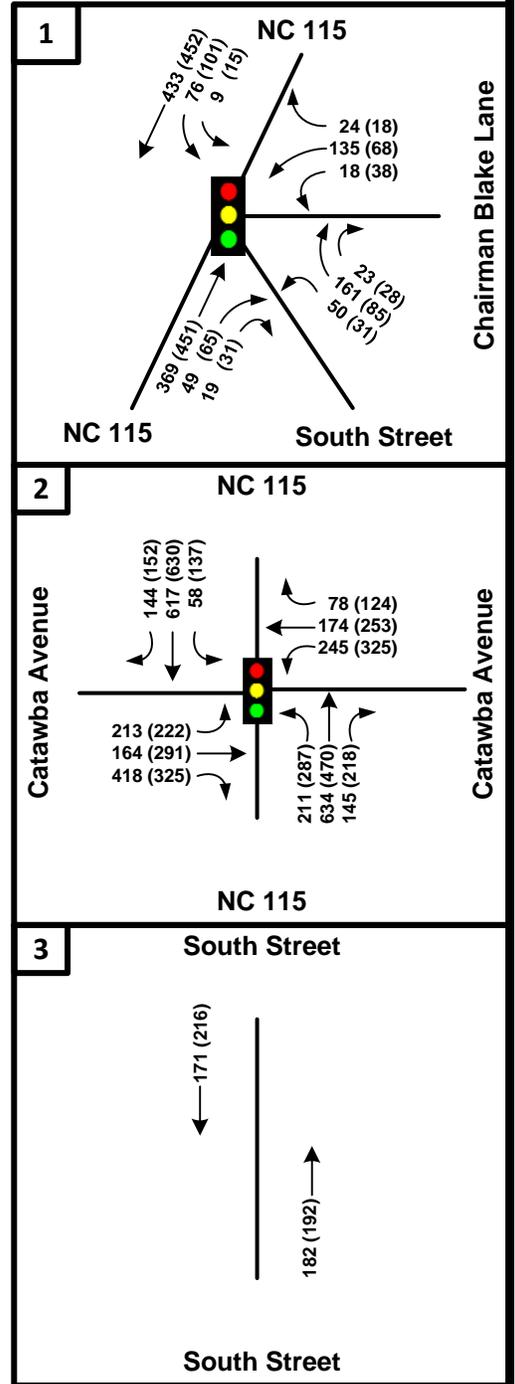
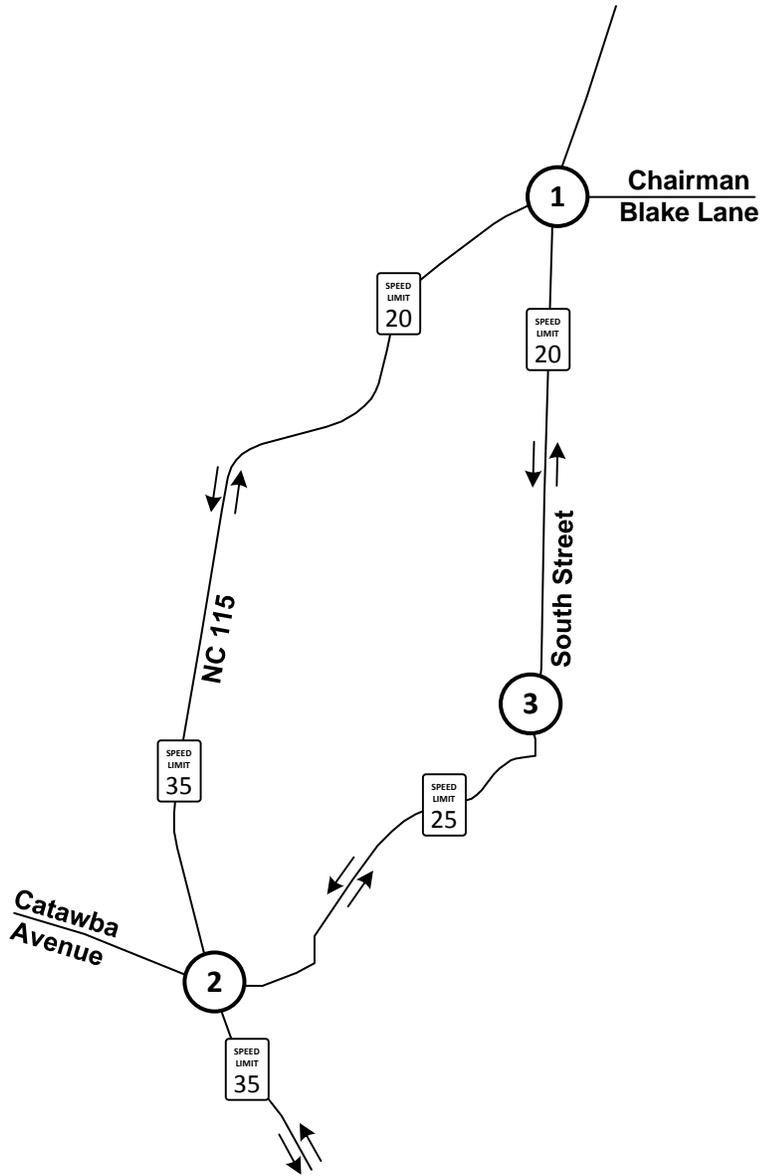
NOT TO SCALE

**Antiquity Woods
Traffic Impact Study**

2026 Historic Growth Traffic Volumes

DATE: November 2016

FIGURE 15



LEGEND

- Existing Traffic Control
- Existing Roadway
- Existing Roadway
- XX**
(XX) AM (PM) Peak Hour Volumes
- Existing Posted Speed



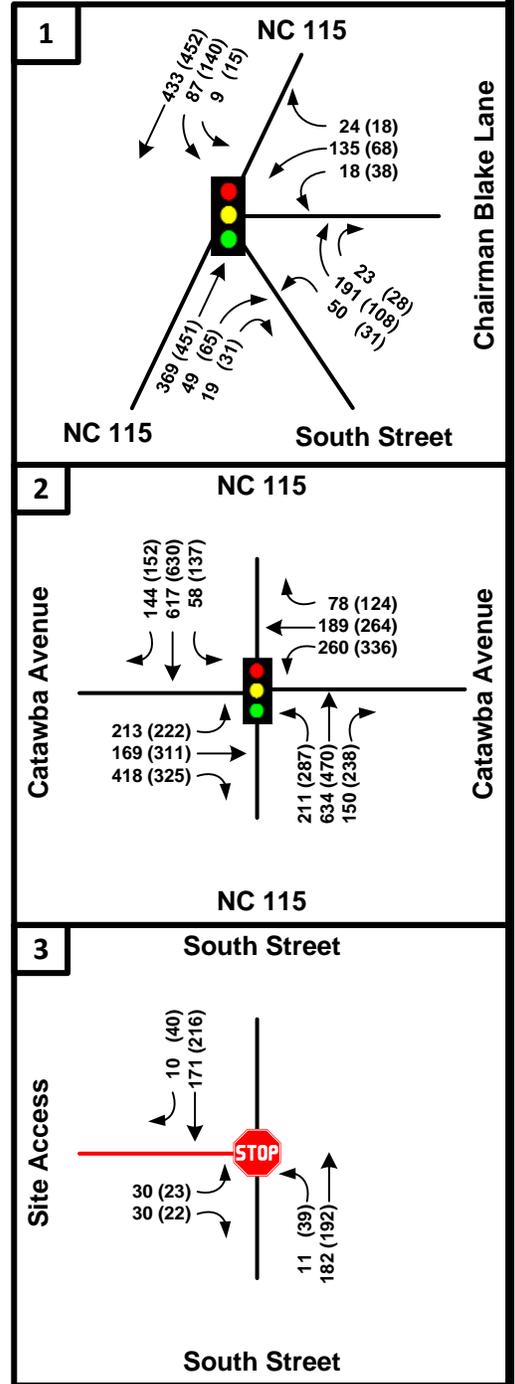
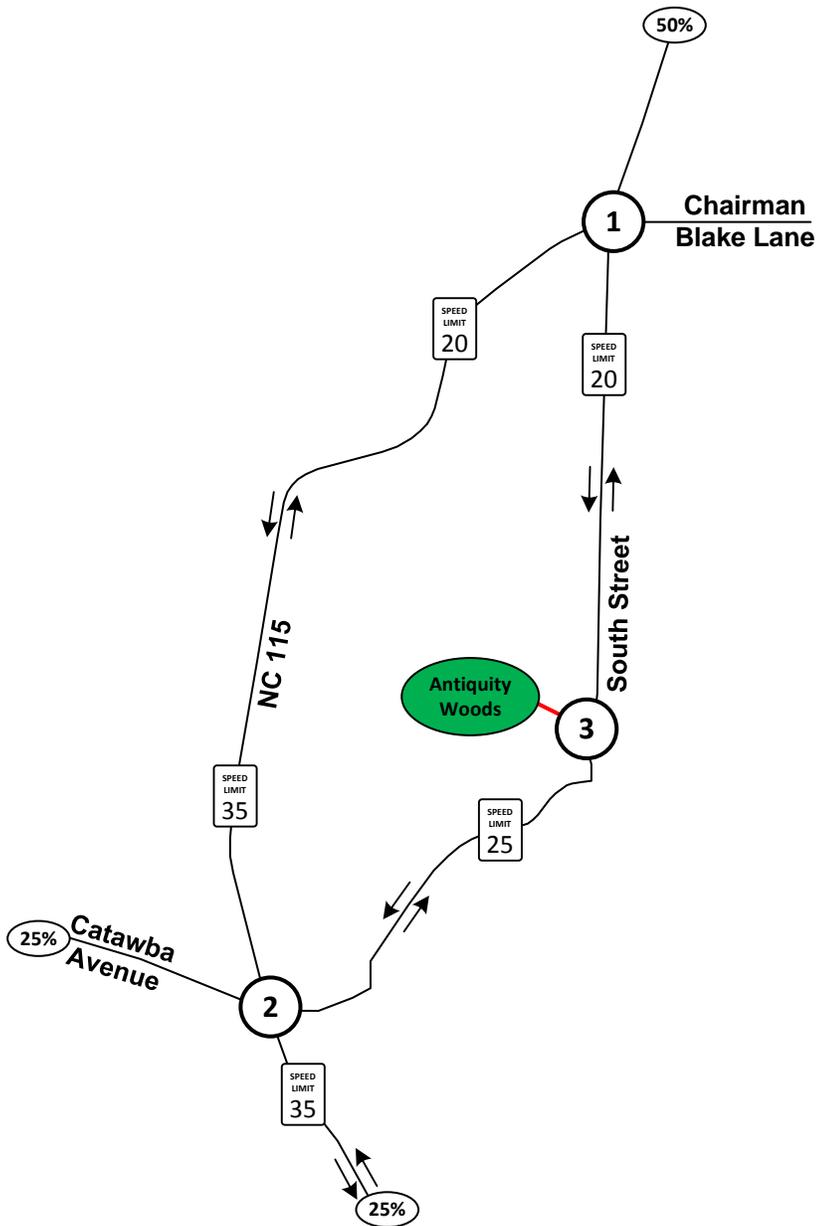
NOT TO SCALE

**Antiquity Woods
Traffic Impact Study**

2026 No-Build Traffic Volumes

DATE: November 2016

FIGURE 16



LEGEND

- Existing Traffic Control
- Existing Roadway
- XX**
(XX) AM (PM) Peak Hour Volumes
- Existing Posted Speed



NOT TO SCALE

**Antiquity Woods
Traffic Impact Study**

2026 Build Traffic Volumes

DATE: November 2016

FIGURE 17

CAPACITY ANALYSIS – 2026 HORIZON YEAR

2026 No-Build Analysis

According to the Town of Cornelius' Land Development Code, developments must be analyzed five (5) years after the development is completed. As the Antiquity Woods development is currently envisioned to be completed in 2021, the remaining capacity analyses focus on the traffic conditions and analysis projected for 2026. Per the MOU and Town of Cornelius TIA Policy, existing traffic volumes were increased by two percent (2%) per year to reflect 2026 background traffic volumes. Traffic generated by the remaining portions of the Antiquity development were included in the analysis. As such, the 2026 background traffic consists of 2016 existing traffic with the addition of the historic growth traffic and traffic from the unbuilt portions of the Antiquity development. A discussion of the trip generation calculations performed for the remaining portions of the Antiquity development can be found in **Appendix C**.

The LOS results from the 2026 No-Build Analysis are displayed in **Table 11**.

Table 11: Level of Service Analysis – 2026 No-Build Traffic Conditions

LOCATION	2026 NO-BUILD TRAFFIC CONDITIONS	
	AM PEAK LOS (delay/veh)	PM PEAK LOS (delay/veh)
INTERSECTION 1 – NC 115 & South Street / Chairman Blake Lane (SIGNALIZED)		
OVERALL	C (28.7)	C (29.4)
Westbound	B (13.2)	A (6.3)
North-Westbound	D (50.6)	D (40.9)
Northbound	D (36.2)	D (46.1)
Southbound	B (17.8)	B (15.4)
INTERSECTION 2 – NC 115 & Catawba Avenue (SIGNALIZED)		
OVERALL	D (47.1)	E (74.8)
Eastbound	E (61.6)	E (71.5)
Westbound	E (57.2)	E (72.9)
Northbound	C (34.3)	E (78.2)
Southbound	D (42.3)	E (75.7)

The results of this analysis indicate that both study intersections and their approaches operate at an acceptable LOS; with one exception. NC 115 at Catawba Avenue operates at LOS E in the PM peak hour. This is highlighted in the above table as the overall intersection and its approaches are operating near capacity. It however, is operating under its mitigation threshold based upon its zoning district.

An additional operational concern is queuing. Excessive queues can negatively impact operations at nearby intersections as well as cause safety concerns if the queues exceed the available storage of turn lanes. As such, the 95th percentile queues are reported for each traffic scenario. **Table 12** lists the 95th percentile queues from the Synchro capacity analysis for the 2026 no-build traffic conditions.

Table 12: Synchro 95th Percentile Queue Analysis – 2026 No-Build Traffic Conditions

LOCATION	2026 NO-BUILD TRAFFIC CONDITIONS		
	EXISTING STORAGE LENGTH (ft.)	AM PEAK 95 th Percentile Queue (ft.)	PM PEAK 95 th Percentile Queue (ft.)
INTERSECTION 1 – NC 115 & South Street / Chairman Blake Lane (SIGNALIZED)			
Westbound Approach	-	61	21
North-Westbound Approach	-	249	135
Northbound Approach	-	492	598
Southbound Left-Turn	75	59	70
Southbound Through	-	306	298
INTERSECTION 2 – NC 115 & Catawba Avenue (SIGNALIZED)			
Eastbound Left-Turn	150	243	211
Eastbound Through	-	274	470
Eastbound Right-Turn	100	452	266
Westbound Left-Turn	100	319	466
Westbound Through	-	245	298
Westbound Right-Turn	200	5	43
Northbound Left-Turn	150	232	462
Northbound Through	-	673	480
Northbound Right-Turn	150	0	0
Southbound Left-Turn	175	37	97
Southbound Through	-	738	851
Southbound Right-Turn	100	0	0

2026 Build Analysis

The total future build traffic volumes include both the site traffic and the traffic volumes from the no-build analysis. The build analysis evaluates the traffic conditions before any improvements are implemented in response to traffic generated by the proposed development. **Table 13** shows the LOS results for the intersections within the study area. Synchro output pages can be found in **Appendix C**.

Table 13: Level of Service Analysis – 2026 Build Traffic Conditions

LOCATION	2026 BUILD TRAFFIC CONDITIONS	
	AM PEAK LOS (delay/veh)	PM PEAK LOS (delay/veh)
INTERSECTION 1 – NC 115 & South Street / Chairman Blake Lane (SIGNALIZED)		
OVERALL	C (31.0)	C (34.9)
Westbound	B (13.2)	A (6.3)
North-Westbound	E (57.4)	D (41.4)
Northbound	D (37.8)	E (57.8)
Southbound	B (18.2)	B (18.5)
INTERSECTION 2 – NC 115 & Catawba Avenue (SIGNALIZED)		
OVERALL	D (49.6)	E (78.7)
Eastbound	E (64.6)	F (83.5)
Westbound	E (66.5)	E (79.7)
Northbound	C (34.3)	E (76.7)
Southbound	D (42.5)	E (75.7)
INTERSECTION 3 – South Street & Site Access (UNSIGNALIZED)		
Eastbound Approach	B (10.8)	B (11.8)
Northbound Left-Turn	A (7.6)	A (7.9)

The results of this analysis indicate that both study intersections and their approaches operate at an acceptable LOS; with one exception. NC 115 at Catawba Avenue operates at LOS E in the PM peak hour. This is highlighted in the above table as the overall intersection and its approaches are operating near capacity. It however, is operating under its mitigation threshold based upon its zoning district. It should be noted that the northbound approach decreases in delay in the build analysis scenario when compared to the no-build analysis scenario. This can be attributed to the proposed development adding traffic volume to the northbound right-turn movement. This movement operates with very little delay; which causes the approaches' average delay per vehicle to reduce between the no-build and build analysis scenarios.

An additional operational concern is queuing. Excessive queues can negatively impact operations at nearby intersections as well as cause safety concerns if the queues exceed the available storage of turn lanes. As such, the 95th percentile queues are reported for each traffic scenario. **Table 14** lists the 95th percentile queues from the Synchro capacity analysis for the 2026 build traffic conditions.

Table 14: Synchro 95th Percentile Queue Analysis – 2026 Build Traffic Conditions

LOCATION	2026 BUILD TRAFFIC CONDITIONS		
	EXISTING STORAGE LENGTH (ft.)	AM PEAK 95 th Percentile Queue (ft.)	PM PEAK 95 th Percentile Queue (ft.)
INTERSECTION 1 – NC 115 & South Street / Chairman Blake Lane (SIGNALIZED)			
Westbound Approach	-	61	21
North-Westbound Approach	-	295	156
Northbound Approach	-	492	598
Southbound Left-Turn	75	65	133
Southbound Through	-	306	298
INTERSECTION 2 – NC 115 & Catawba Avenue (SIGNALIZED)			
Eastbound Left-Turn	150	262	224
Eastbound Through	-	286	512
Eastbound Right-Turn	100	457	266
Westbound Left-Turn	100	354	487
Westbound Through	-	279	311
Westbound Right-Turn	200	5	43
Northbound Left-Turn	150	234	462
Northbound Through	-	673	480
Northbound Right-Turn	150	0	0
Southbound Left-Turn	175	37	97
Southbound Through	-	738	851
Southbound Right-Turn	100	0	0
INTERSECTION 3 – South Street & Site Access (UNSIGNALIZED)			
Eastbound Approach	-	7.5	7.5
Northbound Left-Turn	-	0	2.5

2026 Build-Improved Analysis

Geometric improvements such as the installation of turn-lanes are recommended and therefore analyzed in this scenario. The specific items are listed in the Recommendations section. The Warrant for Left and Right-Turn Lanes nomograph for at-grade unsignalized intersections contained within NCDOT's *Policy on Street and Driveway Access to North Carolina Highways* manual was reviewed against the traffic volumes at the site access point. As the intersection of NC 115 at South Street / Chairman Blake Lane operates below its LOS threshold, the improvements analyzed in this scenario are limited to the intersections of NC 115 at Catawba Avenue and South Street at Site Access. The improvements analyzed at the intersection of South Street at Site Access result from reviewing the projected traffic volumes at the site access against the NCDOT nomograph. The result of that review can be found in **Appendix F**.

Table 15: Level of Service Analysis – 2026 Build-Improved Traffic Conditions

LOCATION	2026 BUILD-IMPROVED TRAFFIC CONDITIONS	
	AM PEAK LOS (delay/veh)	PM PEAK LOS (delay/veh)
INTERSECTION 2 – NC 115 & Catawba Avenue (SIGNALIZED)		
OVERALL	D (49.6)	E (76.2)
Eastbound	E (64.6)	E (73.1)
Westbound	E (66.5)	E (79.7)
Northbound	C (34.3)	E (76.7)
Southbound	D (42.5)	E (75.7)
INTERSECTION 3 – South Street & Site Access (UNSIGNALIZED)		
Eastbound Approach	B (10.7)	B (11.5)
Northbound Left-Turn	A (7.6)	A (7.8)

The results of this analysis indicate that with the recommended improvements in place, all study area intersections operate below their LOS threshold. The intersection and all approaches to NC 115 at Catawba Avenue does operate near the LOS threshold. **Table 16** lists the 95th percentile queues from the Synchro capacity analysis for the 2026 build-improved traffic conditions.

Table 16: Synchro 95th Percentile Queue Analysis – 2026 Build-Improved Traffic Conditions

LOCATION	2026 BUILD-IMPROVED TRAFFIC CONDITIONS		
	EXISTING STORAGE LENGTH (ft.)	AM PEAK 95 th Percentile Queue (ft.)	PM PEAK 95 th Percentile Queue (ft.)
INTERSECTION 2 – NC 115 & Catawba Avenue (SIGNALIZED)			
Eastbound Left-Turn	150	262	224
Eastbound Through	-	286	512
Eastbound Right-Turn	100	457	0
Westbound Left-Turn	100	354	487
Westbound Through		279	311
Westbound Right-Turn	200	5	43
Northbound Left-Turn	150	234	462
Northbound Through	-	673	480
Northbound Right-Turn	150	0	0
Southbound Left-Turn	175	37	97
Southbound Through	-	738	851
Southbound Right-Turn	100	0	0
INTERSECTION 3 – South Street & Site Access (UNSIGNALIZED)			
Eastbound Approach	-	7.5	7.5
Northbound Left-Turn	-	0	2.5

Section Analysis

Previously presented discussions regarding capacity analysis have focused on specific intersections and hourly volumes. However, sections of roadway can often be evaluated against their daily traffic volumes as well. The NCDOT Transportation Planning Branch in 2011 published Level of Service D Standards for Systems Level Planning. This provides the user with daily traffic in vehicles per day (vpd) thresholds for which a facility would transition from LOS D to LOS E. In many areas, this threshold is the line between a facility operating at an acceptable or unacceptable level. It should be noted that the mitigation thresholds for the intersections of NC 115 at South Street / Chairman Blake Lane and NC 115 at Catawba Avenue are the LOS E/F threshold based on their zoning district. Projected traffic volumes from three sections will be evaluated against these published thresholds from NCDOT. Specifically, South Street north of the covered bridge (i.e. near the proposed development's access), Old Canal Street / Catawba Avenue near NC 115 and South Street near NC 115 in Davidson.

A 24-hour volume count was performed along South Street near the planned location of the proposed development's Access. The ratio of the peak hour traffic to the daily traffic was used to develop estimates of daily traffic from the 2026 peak hour traffic volume projections. The full traffic calculations can be found in **Appendix B**. The results are presented in **Table 17**.

Table 17: Section Analysis Results

LOCATION	2026 Section Analysis		
	2026 Projected Traffic (vpd)	LOS D/E Threshold (vpd)	Percent of LOS D/E Threshold
South Street North of Covered Bridge	4,066	9,000	45%
Old Canal Street / Catawba Avenue	10,902	9,700	112%
South Street near NC 115 in Davidson	3,599	10,000	36%

The results of this analysis show that traffic volumes along South Street north of the covered bridge and into Davidson are well below the LOS D/E threshold. Traffic volumes along Old Canal Street / Catawba Avenue are above the LOS D / E threshold. This is consistent with the intersection capacity analysis results in which this intersection and approach operates or in close proximity to LOS E in the 2026 with development analysis scenarios.

CRASH SUMMARY

Crash data was provided by NCDOT for the intersections and the South Street roadway section. Specifically, the intersections of NC 115 at South Street / Chairman Blake Lane as well as NC 115 at Catawba Avenue. The study section for South Street runs from the covered bridge to 700 feet north of the covered bridge. This strip contains the potential location for the site access point. All crash data cover the period from July 1, 2013 to June 30, 2016.

The Intersection and Strip Analysis reports are located in **Appendix G**.

South Street Section

No crashes were reported along the strip during the aforementioned time period.

NC 115 at South Street / Chairman Blake Lane

Fifteen (15) crashes were reported overall during the study duration at this intersection. Of these crashes, one (1) fatal crash was reported, one (1) crash resulted in an injury or injuries, and thirteen (13) were property damage only (PDO) collisions. The fatal crash occurred on April 1, 2016 when a pedestrian was struck by a single-axle truck while in the crosswalk at the intersection. A signal upgrade was performed in May of 2016 which included the installation of advanced pedestrian walk intervals in addition to “All Turning Vehicles Yield to Pedestrians” signs. The one (1) injury crash was classified as a C type injury, which is the least severe of the three injury classifications. This can be attributed to the low posted speed limits at the intersection leading to low-speed crashes. These low-speed crashes typically yield low rates of severe crashes.

The two most common crash types were shown to be rear end crashes and crashes involving parked vehicles. Three (3) crashes for each of the aforementioned crash types occurred during the study duration. These crash types represent forty percent (40%) of the total crashes at the intersection. The total crash rate at this intersection is 82.95 per 100 million vehicles entered.

Figure 18: NC 115 at South Street / Chairman Blake Lane Crash Severity

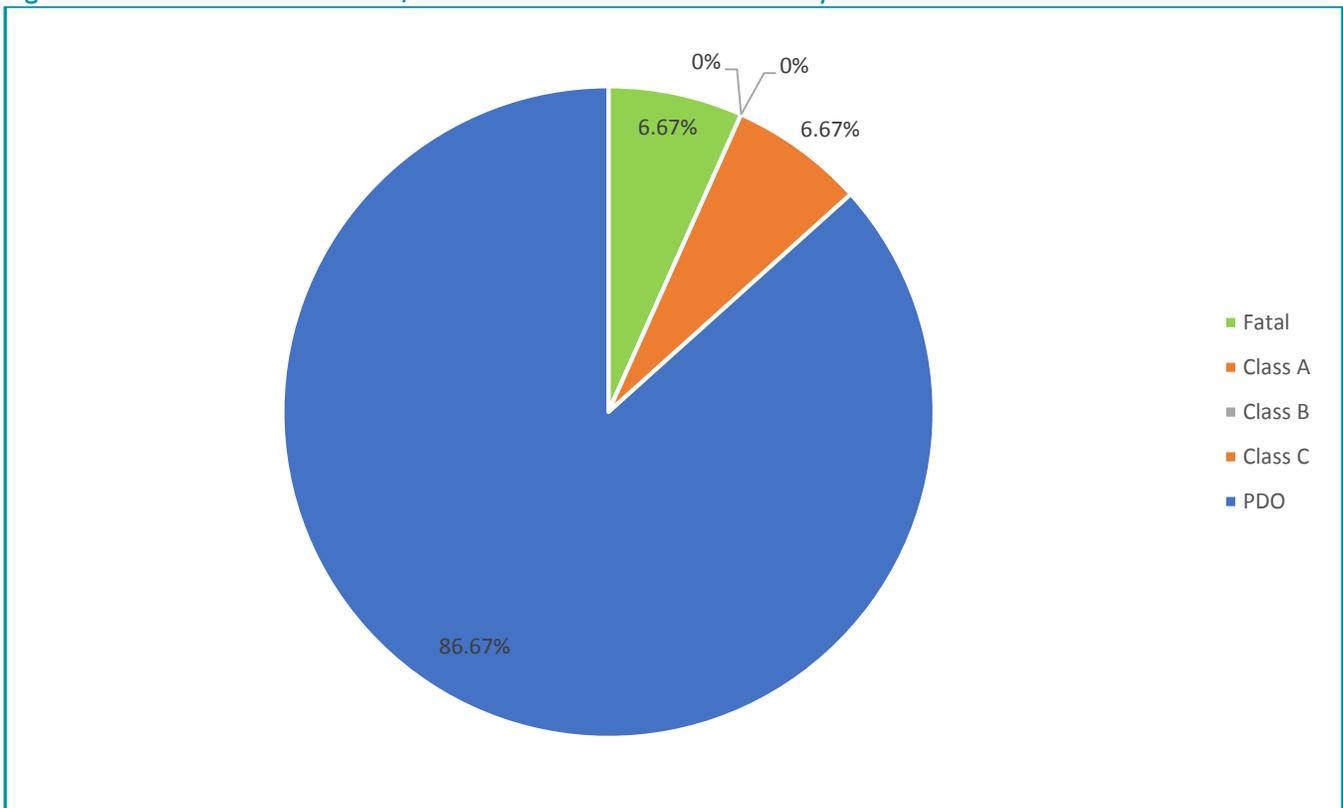
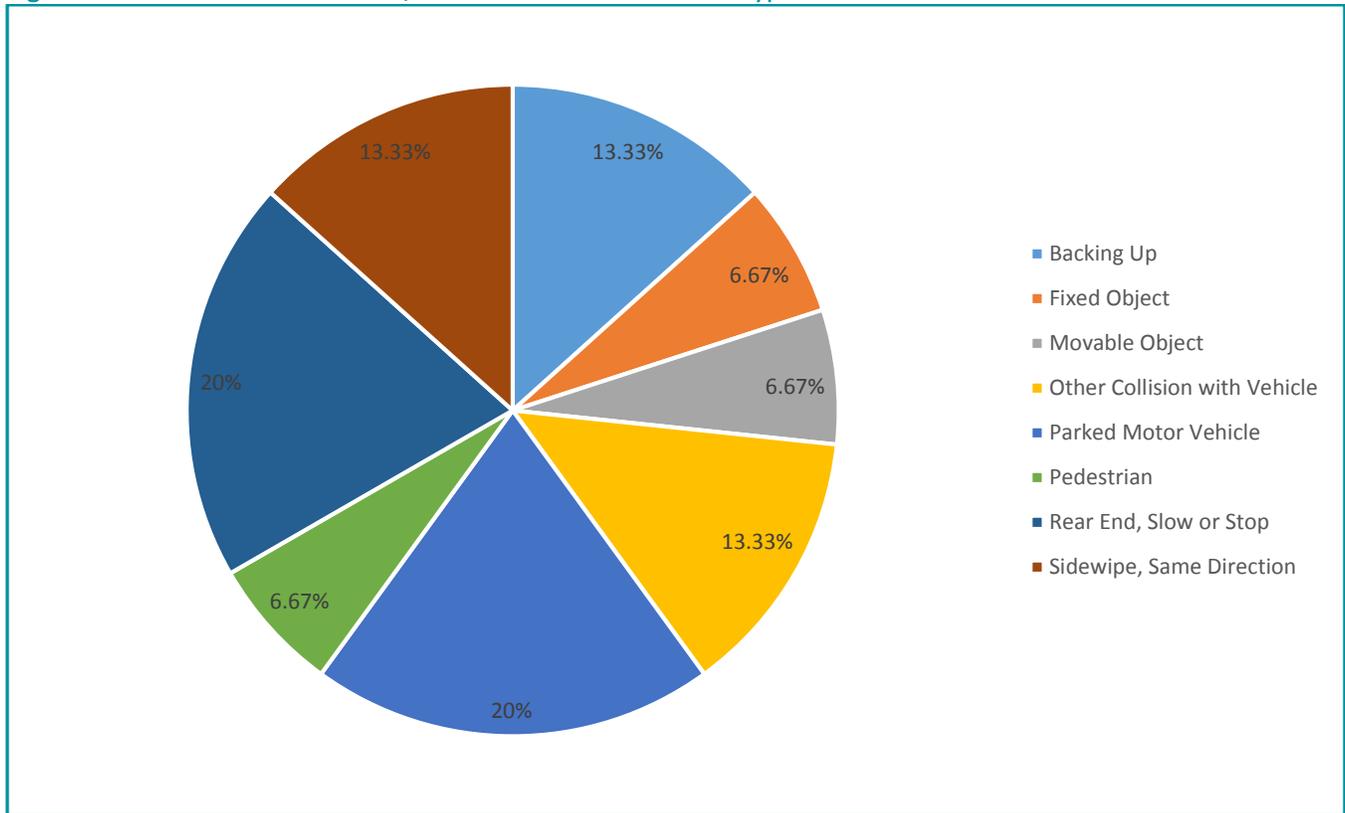


Figure 19: NC 115 at South Street / Chairman Blake Lane Crash Type



NC 115 at Catawba Avenue

Fourteen (14) crashes were reported overall during the study duration at this intersection. No fatal crashes were reported. Five (5) crashes were non-fatal injury crashes. Of these injury crashes, one (1) was classified as a B type injury and the remaining four (4) were classified as a C type injury. Class B injury crashes occur where the most severe injury can be described as “non-fatal or disabling injuries that are evident at the scene such as bruises, swelling, limping, etc.” It should be noted that the one (1) class B injury crash involved a motorcycle. Class C injury crashes occur where the most severe injury can be described as “no visible injury but there are complaints of pain or momentary unconsciousness.”

Left turn, same roadway accounted for a majority of crashes at this intersection with eight (8) crashes, which is equivalent to 57.14 percent of the total crashes. The total crash rate at this intersection is 54.13 per 100 million vehicles entered.

While there is an at-grade railroad crossing (Crossing ID # 925479B) located approximately 40 feet east of the intersection, no train/vehicle crashes have been reported at this crossing.

Figure 20: NC 115 at Catawba Avenue Crash Severity

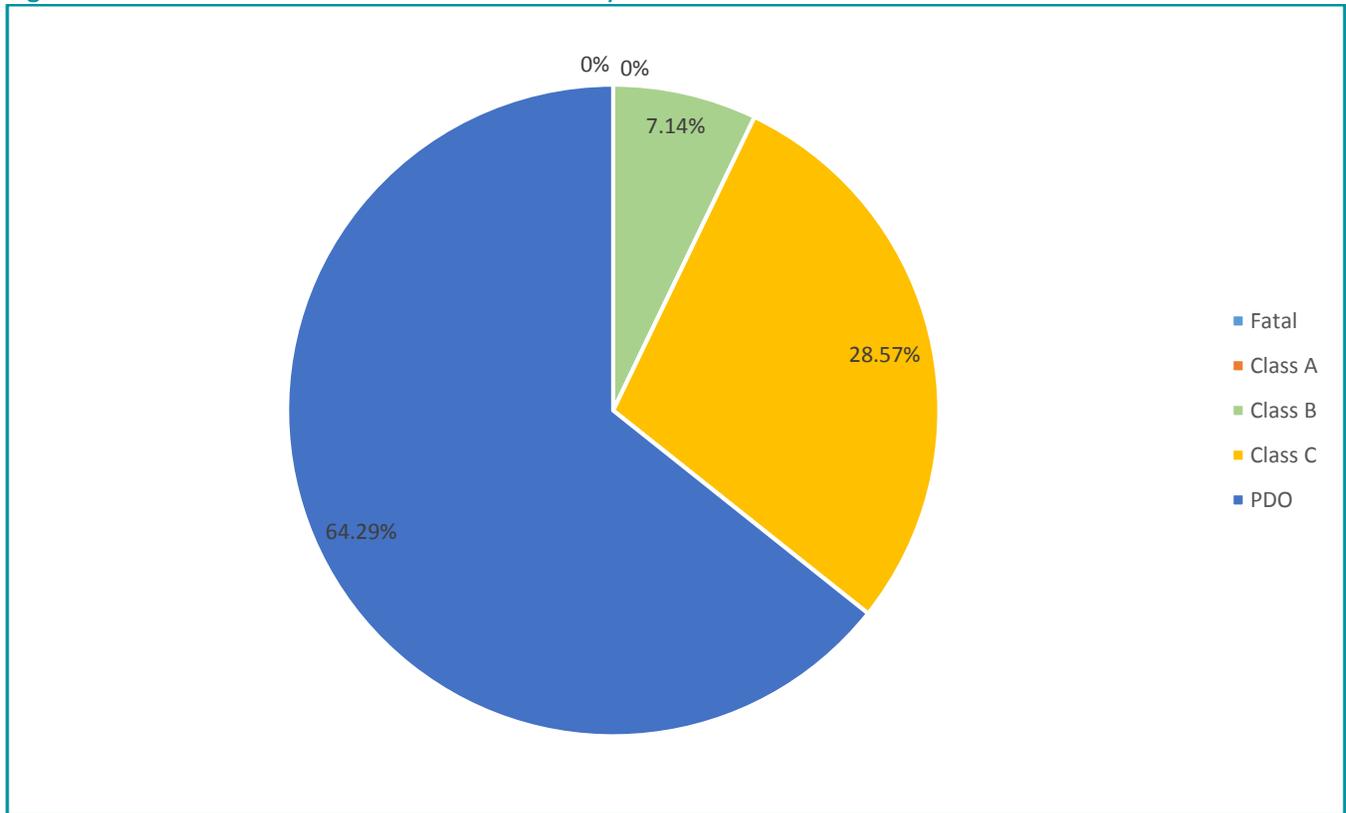
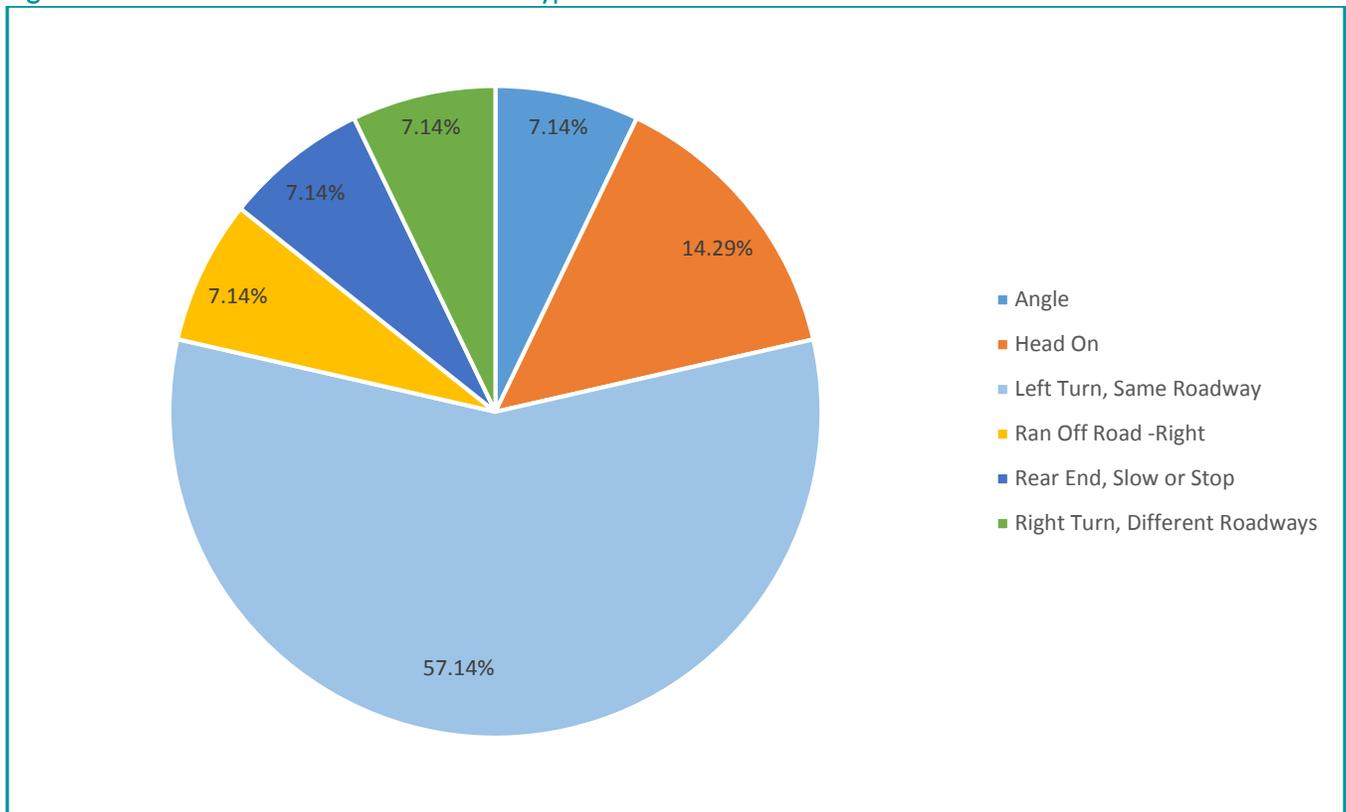


Figure 21: NC 115 at Catawba Avenue Crash Type



COMPLIANCE WITH ADOPTED PLANS

The below three sections discuss the proposed development within the context of the Town's adopted transportation plan, land use plan and NC 115 corridor study. In brief, the proposed development as shown in this report is found to be consistent with both the Centennial Transportation Plan and the 2014 Land Use Plan Update. The results of the NC 115 corridor study may require modifications to the proposed site access.

Cornelius Centennial Transportation Plan

In the most recent Transportation Plan cites the need for additional capacity along NC 115. However, it continues to discuss the limited right-of-way and other challenges associated with the widening NC 115 north of Bailey Road. As such, it provides the following recommendations to improve capacity:

- Consolidate driveways to ease congestion and improve safety;
- Provide auxiliary turn lanes at the intersection to remove turning movements from the through traffic; and
- Widen NC 115 to a multi-lane facility with additional through lane capacity between Bailey Road and Washam Potts Road.

Catawba Avenue between NC 115 and US 21 is designed two travel lanes with bike lanes and on-street parking. To preserve capacity and operations of Catawba Avenue, the Transportation Plan makes the following recommendations to preserve capacity:

- Install a closed loop traffic signal system on Catawba Avenue, interconnecting the signalized intersections and optimizing corridor timings;
- Monitor traffic volumes on Catawba Avenue periodically to evaluate capacity;
- Concentrate major driveway connections on side streets to minimize the number of conflict points; and
- Continue to require additional right-of-way on the north side of Catawba Avenue per the Board of Commissioners policy to allow for potential future widening.

2014 Land Use Plan Update

The 2014 Land Use Plan Update, adopted on January 6, 2014, includes desired land uses and intensities. The area of the proposed development is cited for medium density residential development.

NC 115 Corridor Study

The Town of Cornelius has engaged a private consultant to perform a corridor study along NC 115. This effort is currently underway and a completion date along with a construction date are unknown.

Among other items, the corridor study will recommend improvements to the intersection of NC 115 at Catawba Avenue as well as the construction of a facility that would parallel Old Canal Street. The items currently being evaluated consist of the following:

- Extension of the eastbound left-turn lane on Catawba Avenue at NC 115.
- Possibly restricting left-turns at the intersection and redistributing them elsewhere on the adjacent roadway network.
- Access management measures such as driveway consolidation.
- Traffic signal timing modifications.
- Complete street improvements along NC 115.
- Construction of a facility to parallel Old Canal Street connecting South Street to Catawba Avenue.

The last improvement in the above list would allow traffic traveling on South Street to reach the intersection of NC 115 at Catawba Avenue without entering the Antiquity development. This alternative would require modifications to the proposed site access for the Antiquity Woods development. These modifications are discussed in the recommendations section.

CONCLUSIONS – 2026 HORIZON YEAR

The proposed Antiquity Woods Development is located along South Street in Cornelius, Mecklenburg County, North Carolina. The proposed development will be built-out by 2021. According to the Town of Cornelius' Land Development Code, developments must be analyzed five (5) years after the development is completed. The following discussion focuses on the traffic conditions and analysis projected for 2026.

The proposed site will be a residential development consisting of single-family homes, a hotel and a restaurant. The full build-out of the development is 103 single family homes, a 4 room hotel and a 2,500 square foot (SF) restaurant. Trip generation results in a total of 81 trips (21 in, 60 out) generated from the proposed development in the AM peak hour and 124 trips (79 in, 45 out) generated in the PM peak hour. Trip generation was submitted to the Town for review on June 21st, 2016. The Town approved of the trip generation on June 29th, 2016.

Access to the site is proposed to be provided by one full-movement intersection. This is located on South Street approximately 125 feet to the north of the covered bridge that provides access to the Antiquity development.

The results of the analysis indicate that the proposed development contributes minimal delay to the existing study intersections. However, this minimal amount causes the eastbound approach of Catawba Avenue at NC 115 to operate beyond its mitigation threshold as determined by the zoning district. To mitigate this impact, the eastbound right-turn lane can be channelized and modified to operate under yield control as opposed to its current operation being controlled by the traffic signal. This change to geometry, the traffic signal, and signage at the intersection is shown to mitigate the proposed development's impact to operation at the intersection and allow the intersection to operate below its mitigation threshold. As available right-of-way to construct this improvement is limited and may negatively impact the gas station in the southwestern quadrant of the intersection, it is recommended that a fee in-lieu of this improvement be considered. This fee may be used toward constructing the improvements in the area contained in the on-going NC 115 Corridor Study from Washam Potts Road to Potts Street.

At the proposed site access, the traffic volumes are projected meet the thresholds to warrant both a northbound left-turn lane as well as a southbound right-turn lane. The specifics of these lanes can be found in the Recommendations section. The nomograph used for the auxiliary lanes at the site access is included in **Appendix F**.

RECOMMENDATIONS – 2026 HORIZON YEAR

Based on the findings of this study, specific improvements have been identified and should be completed as part of the proposed development. The NCDOT *Policy on Street and Driveway Access to North Carolina Highways* manual was consulted to determine the appropriate storage for the recommended auxiliary lanes if warranted. The nomograph used for the auxiliary lanes at the site access points is included in **Appendix F**.

NC 115 at South Street / Chairman Blake Lane

There are no recommended improvements at this intersection.

NC 115 at Catawba Avenue

- Construct a channelization island, revise the signage and modify the traffic signal to allow the eastbound right-turn lane to operate under yield control.

South Street at Site Access (Existing South Street Alignment)

- Construct Site Access #1 with one ingress and one egress lane.
- Construct a left-turn lane with 50 feet of full-width storage and appropriate taper on northbound South Street.
- Construct a right-turn lane with 50 feet of full width storage and appropriate taper on southbound South Street.
- Relocate Site Access approximately 100 feet to the north along South Street in-order to provide adequate space along South Street from the covered bridge to incorporate the taper, deceleration and storage areas for the northbound left-turn lane on South Street.

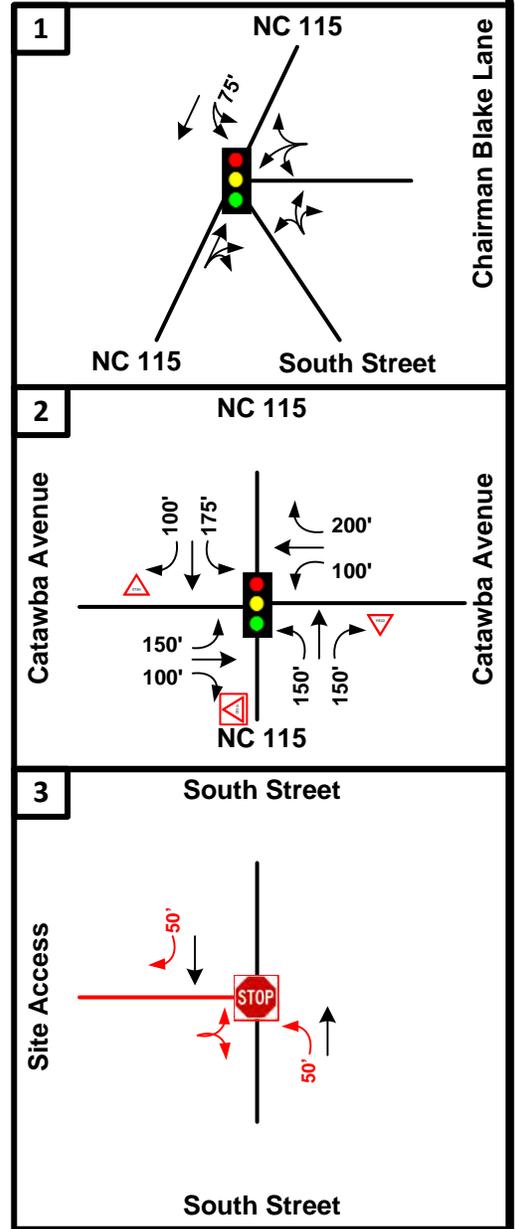
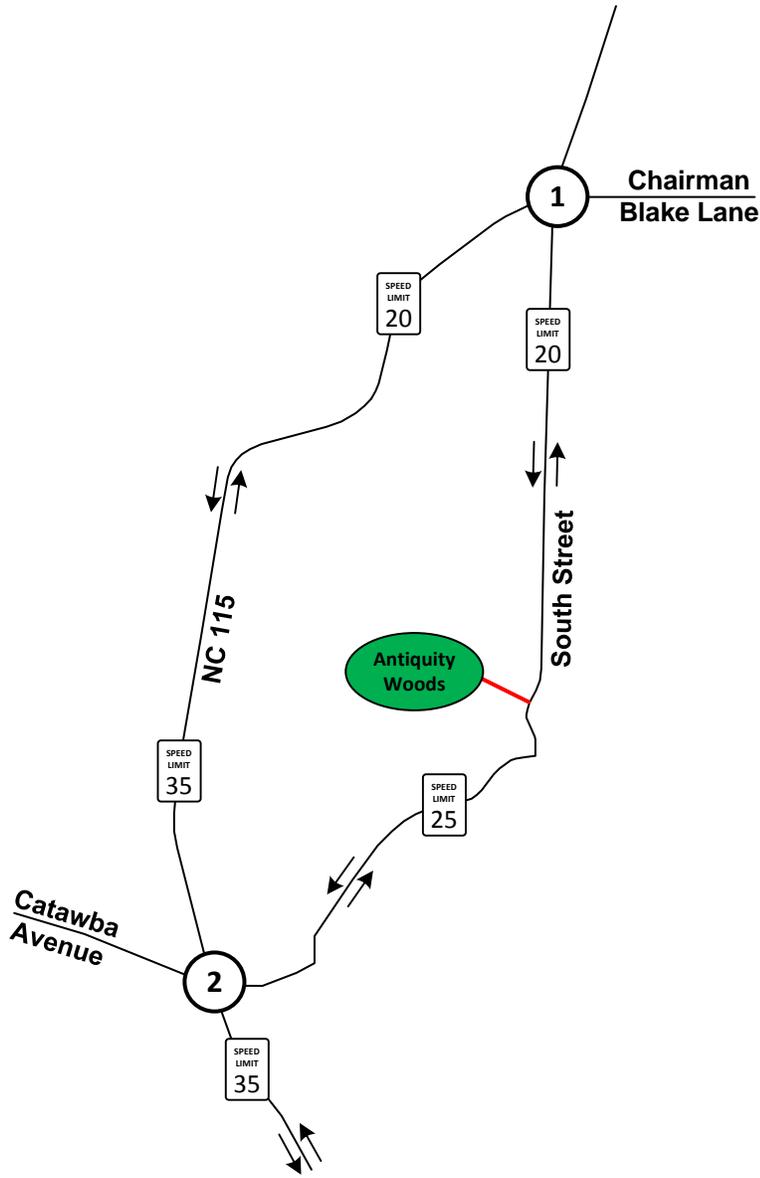
South Street at Site Access (Potential South Street Alignment)

It is possible that the NC 115 corridor study will result in the recommendation to construct a parallel route to Old Canal Street. This would allow traffic traveling on South Street to reach the intersection of NC 115 at Catawba Avenue without entering the Antiquity development. This would require a different site access configuration than what was presented above under the “Existing South Street Alignment” section. The recommendations for site access and related improvements in the case that a facility parallel to Old Canal Street is constructed are as follows:

- Construct Site Access #1 with one ingress and one egress lane.
- Construct a left-turn lane with 50 feet of full-width storage and appropriate taper on northbound South Street.
- Construct a right-turn lane with 50 feet of full width storage and appropriate taper on southbound South Street.
- Locate the site access such that it is across from the roadway exiting the Antiquity development and the covered bridge. This four-legged intersection should be constructed as two-way stop controlled with traffic along South Street having priority and the traffic exiting Antiquity Woods (traveling eastbound) and traffic exiting Antiquity (traveling westbound) be required to stop.

Fee-in-Lieu

As discussed in the Conclusions – 2026 Horizon Year section, the right-of-way necessary to construct the improvement at the intersection of NC 115 at Catawba Avenue is limited and may negatively impact the gas station in the southwestern quadrant of the intersection. It is recommended that a fee-in-lieu of constructing this improvement be considered. This fee may be used toward constructing the improvements in the area contained in the on-going NC 115 Corridor Study.



LEGEND

- | | | | |
|-------------|--------------------------|-------------|--------------------------------|
| | Existing Traffic Control | | Proposed Traffic Control |
| | Existing Roadway | | Recommended Access |
| | Existing Laneage | | Existing Laneage |
| XXX' | Storage Bay Length | XXX' | Recommended Storage Bay Length |
| | Existing Posted Speed | | |



NOT TO SCALE

Antiquity Woods Traffic Impact Study

2026 Recommended Improvements

DATE: November 2016

FIGURE 22



APPENDIX A: MEMORANDUM OF UNDERSTANDING



TOWN OF CORNELIUS, NORTH CAROLINA | TIA MEMORANDUM OF UNDERSTANDING

Project Information

Project Name: Antiquity Woods

Project Location: South Street

Project Owner: Antiquity Woods, LLC

Case Number: _____

Applicant Information

Applicant Name: Meeting Street Homes
and Communities

Applicant Telephone: 704-714-3077

Applicant Address: 1930 Abbott St., Ste. 400
Charlotte, NC 28203

Applicant Email: royjt@meetingstreet.net

The Town of Cornelius and the applicant hereby agree that the transportation consultant selected for the Transportation Impact Analysis (TIA) will submit sufficient information, as determined by the Town in the TIA report for applicable sections of the report outline required by Chapter 13 of the Town of Cornelius Land Development Code that are specified as required in the following agreement.

I. COVER/SIGNATURE PAGE

Includes the project name, location, name of the applicant, contact information for the applicant, and date of the study. The name, contact information, registration number, signature, and seal of a duly qualified and registered professional engineer in the State of North Carolina are also required to appear on this page.

II. TABLE OF CONTENTS

Include a list of all section headings, figures, and tables included in the TIA report. Page numbers will denote the location of all information in the TIA report

III. EXECUTIVE SUMMARY

Include a clear, concise description of the study findings. It should include a general description of the project scope, study horizon years, existing conditions, probable impacts of the project, capacity analysis and conclusions, mitigation measures, and recommendations. Technical publications, calculations, documentation, data reporting, and detailed design should not be included in this section. The executive summary should not be longer than two pages and not be dependent on supplementary data.

IV. PROJECT DESCRIPTION

Identify the requested project and provide a brief description of the location of the site within the Town's planning jurisdiction. Also provide a detailed description of the project, including size of the parcel(s), anticipated completion dates (including phasing), and existing and



proposed uses for the site. This information should include the square footage of each use or the number and size of dwelling units proposed.

V. STUDY AREA

A narrative describing the study area will identify the location of the proposed project within the planning jurisdiction, existing and future land uses in the immediate area, and any unique transportation plans or policies applicable to the area. As part of the description, a vicinity map will be provided, which should show the boundary of the study area, include natural features and major and minor roadways within the study area, and show existing intersections and type of control, as well as linear distances between major roadways.

Scope: This study will include the following existing and proposed intersections:

- NC 115 (S. Moin Street) at South Street / Chairman Blake Lane (signalized)
- NC 115 (Main Street) at Catawba Avenue (signalized)
- South Street at Site Access (proposed)

VI. SITE DESCRIPTION

Include a brief summary for key physical characteristics of the site, including general terrain, development size, existing zoning and use(s), proposed use(s), internal streets, parking, sidewalks and bicycle facilities, driveway locations, and designated loading and unloading areas. Similar information for adjoining properties will also be provided to evaluate opportunities for connectivity. A half-size (11"x17") site plan to scale illustrating the project as proposed at full build out will be included with the TIA report. Information presented in the TIA report will be identical in every respect to the site plan submitted for approval.

Scope: This study will be performed in accordance with the following land uses and intensities:

- Single-Family Homes 103 Dwelling Units (ITE LUC 210)
- Hotel 4 Rooms (ITE LUC 310)
- Quality Restaurant 2,500 Square Feet (ITE LUC 931)

During the scoping meeting on June 15th, the applicant indicated that the total units of the development would be 107. Between four (4) and six (6) of that 107 would be contained within a hotel or bed and breakfast style business. As the hotel land use generates trips at a lesser rate than single-family homes, it is assumed that only four (4) of the 107 total units will be contained within the hotel land use.



VII. EXISTING CONDITIONS

Provide a description of the existing transportation system within the study area. A narrative and map will be prepared that presents peak hour turning movement volumes for all intersection (signalized and unsignalized) identified for study by the Town. A separate narrative and map will be prepared to describe the characteristics of surrounding major roadways, including functional classification, number of lanes, posted speed limit, existing average daily traffic volumes, and typical cross sections.

Scope: *This study will include an analysis of the existing study intersections under existing (2016) conditions. This will be based upon traffic count data to be collected by the transportation consultant. As these counts will be collected while traditional calendar schools are out-of-session, the collected data at the intersection of NC 115 at Catawba Avenue will be compared to historical counts. Additionally, traffic will be generated and assigned to the study area intersections to account for traffic generated by both Davidson Elementary School and Lake Norman Christian School.*

VIII. FUTURE CONDITIONS

Provide a description of the future year(s) transportation system within the study area. A narrative and map will be prepared that presents peak hour turning movement volumes for all intersections (signalized and unsignalized) identified for study by the Town. Future year traffic volumes will be forecasted using historical growth rate information and transportation impact analysis reports for development approved by the town but not yet built. Turning movement volume development sheets will be included in the appendix of the TIA report. Town staff will provide both annual growth rate information, and a list of approved developments to include in the analysis to the transportation consultant at the mandatory scoping meeting.

Transportation improvements assumed in the future conditions analysis will include those with an expected completion date concurrent with that of the development and funded through either the Town's Capital Improvements Plan (CIP), NCDOT's Transportation Improvement Program (TIP), or indicated as a condition of approval from another nearby application. Prior approval from the Town must be obtained before including other transportation improvements in this study.

Scope: *This study will include descriptions and analysis of the study intersections using ITE and Highway Capacity Manual methodologies across the following scenarios:*

- *2021 Build without development*
- *2021 Build with development*
- *2021 Build with development - improved*



TOWN OF CORNELIUS, NORTH CAROLINA | TIA MEMORANDUM OF UNDERSTANDING

Town staff will provide the annual growth rate as discussed above. All future year analysis will include traffic attributed to the portions yet to be built and/or occupied in the Antiquity mixed-use development. No other approved developments or funded TIP/CIP projects will be included in this analysis.

IX. PROJECT TRAFFIC

Project traffic will be generated for the proposed development using the traditional three step process of trip generation, distribution, and assignment.

- A. Trip Generation – A trip generation table summarizing all trip generation calculations for the project must be included. The ITE trip generation rate used for the TIA must be described, including choice of peak hour or adjacent street traffic, choice of independent variable, and choice of average rate versus equation. If local trip generation rates are used, provide documentation to the satisfaction of Town and NCDOT staff for supporting such rates. Must also indicate any trip reductions that could be incorporated into the calculations such as pass by trips, mode split, etc. and the methodology and supporting documentation used for making such trip reductions.

Scope: Using the land uses and intensities developed in the Site Description section, the following trip generation is presented:

Table with 10 columns: Land Use Code, Land Use Description, Intensity, Daily Trips, AM Peak Hour Trips (Total, In, Out), PM Peak Hour Trips (Total, In, Out). Rows include Single-Family Homes, Hotel, Quality Restaurant, and a Net New External Trips summary row.

It should be noted that due to the dimunitive scale of supplementary land uses (i.e. hotel and quality restaurant), internal capture was not calculated for this development. Furthermore, due to the local nature of traffic along South Street, pass-by trips was not calculated for this development.



TOWN OF CORNELIUS, NORTH CAROLINA | TIA MEMORANDUM OF UNDERSTANDING

- B. Trip Distribution – Estimates of percentage distribution for trips to and from the development site will be clearly summarized in the TIA report using north, south, east and west cardinal directions. Trip distribution percentages proposed for the surrounding transportation network should be discussed and approved by the Town and NCDOT during the mandatory scoping meeting. A map showing the percentage of site traffic on each street included in the study area will be included in the TIA report. Must also describe the methodology and resulting trip distribution percentages that will be used in the TIA.

Scope: Through discussions occurring during the scoping meeting on June 15th, it was anticipated that traffic would enter/exit the site equally from the north and the south on South Street. The resultant trip distribution is as follows:

- 50% to/from the North on NC 115 (i.e. downtown Davidson to points north and I-77)
- 25% to/from the South on NC 115 (i.e. downtown Cornelius toward Huntersville)
- 25% to/from the West on Catawba Avenue (i.e. toward I-77)

- C. Trip Assignment – Project traffic will be distributed to the surrounding transportation system based on the site's trip generation estimates and trip distribution percentages. Traffic forecasts will be presented in both tabular and graphic formats for all peak hour conditions at all intersections included in the study area. If project will be built in phases, traffic assignments will be reported for each phase. Pass by traffic will be included at the driveways and access points for evaluating driveway volumes.

X. CAPACITY ANALYSIS

Level of Service (LOS) is the primary measurement for impacts to the transportation system, and is defined by the most current edition of the Highway Capacity Manual. LOS for signalized intersections shall be determined using existing signal timing plans provided by either the Town or NCDOT. Existing signal timing plans should be included in the appendix of the TIA report. If a traffic signal is part of a coordinated system it must be analyzed as such under all conditions. Other standard practices and default input values for evaluating signalized intersections should be consistent with the most recent guidelines published by the NCDOT, Traffic Engineering and Safety Systems Branch, Congestion Management Unit ("Capacity Analysis Guidelines"). The Town may also require safety, traffic simulation, gap and/or other analyses appropriate for evaluating a development application. Additional analyses and/or traffic capacity or simulation tools (such as VISSIM) required for the TIA shall be identified during the scoping meeting. Capacity analyses shall be conducted to determine levels of service in each peak hour for all intersections, and their approaches, identified for study using methodologies contained in the most current edition of the Highway Capacity Manual. Capacity calculations should be included for the existing and all future year scenarios. Impacts from the proposed project shall be measured by comparing the Future year build year and the Future year no-build year conditions. All TIA reports submitted to the Town shall use SYNCHRO, SimTraffic or VISSIM Software, for signalized and unsignalized intersections,



or Sidra Software, for roundabouts, consistent with policies released by the NCDOT. A narrative, table, and map shall be prepared that summarizes the methodology and measured conditions at the intersections reported in level of service (LOS A – F), approach delay for unsignalized intersections or intersection signal delay for signalized intersections, and 95th percentile queue lengths for all intersections Capacity analysis worksheets and turn lane warrants should be included in the appendix of the TIA report.

Scope: Capacity analysis will be performed for both the typical AM and PM peak hours. The AM peak hour occurring between 7:00 and 9:00am whereas the PM peak hour occurring between 4:00 and 6:00pm. Capacity analysis will follow the requirements outlined in this section as well as the NCDOT Congestion Management Capacity Analysis Guidelines.

XI. QUEUING ANALYSIS

A queuing analysis will be required by the Town for projects that include drive-through facilities of entrance gates to ensure that vehicle stacking will not adversely impact the public transportation system. 95th percentile and simulation analysis of future year queues shall be consistent with NCDOT's Traffic Engineering and Safety Systems Branch, Congestion Management Unit current practices and published Capacity Analysis Guidelines. Turn lanes for unsignalized driveways serving the site shall be identified using volume thresholds published in the NCDOT's Policy on Street and Driveway Access to North Carolina Highways (see Warrant for Left- and Right-Turn Lanes Nomograph, pg. 80). Recommendations for left and right turn lanes serving the site shall be designed to meet future year capacity needs identified in the TIA report. For projects that include drive-through facilities or entrance gates, a queuing analysis may be required by the Town to ensure that vehicle stacking will not adversely impact the public transportation system. The queuing analysis must be performed using accepted transportation engineering procedures approved by the Town. This analysis shall be required for all drive-through facilities. If a TIA is required for a new school site, the consultant must model the internal circulation and ingress/egress of the site using a "dummy signal" in the SYNCHRO software as prescribed by NCDOT Municipal School Transportation Assistance (MSTA) department.

Scope: The proposed development does not include a school or drive-thru facilities. As such, no queuing analysis will be provided.



XII. COLLISION ANALYSIS

A summary of crash data (type, number, and severity) for the most recent 3-year period at each study location is required. Traffic Engineering Accident Analysis System reports will be provided by the Town and should be included in the appendix of the TIA report. For locations with prevalent crash types and/or frequency, a discussion shall be included describing factors that may be contributing to the incidents. At a minimum, the proposed development features shall not contribute to factors potentially involved in collision rates. If contributing factors are identified, recommendations to eliminate these features shall be included.

Scope: With the crash data provided by the Town, AMT will provide a summary of crash data (i.e. type, number and severity of crash) for the most recent 3-year period at each study intersection. If locations are determined to have prevalent crash patterns and/or crash frequency, a discussion describing possible contributory factors will be included.

XIII. TRAFFIC SIGNAL WARRANTS

The need for installing a traffic signal or signals at a new location will be based on the application of warrants criteria contained in the most current edition of the Manual on Uniform Traffic Control Devices (MUTCD) and engineering judgment. Traffic signal warrants should be included in the appendix of the TIA report. Additionally, spacing of traffic signals within the Town must adhere to NCDOT requirements. Pedestrian movements must be considered in the evaluation and adequate pedestrian clearance provided in the signal cycle split assumptions. If a signal warrant analysis is recommended in the TIA, the Town and/or NCDOT may decide to defer a signal warrant analysis until after the development has opened in order to use actual turning movement counts at an intersection. The TIA recommendations must clearly state that this analysis shall occur at a specified date following the opening of the development. The applicant must issue a bond or letter of credit in the name of the Town for the estimated cost of the signal warrant analysis and resulting signal prior to final approval of the TIA. The cost shall be established based on an engineer's estimate provided by the engineer of record for the applicant, however final approval of the dollar amount rests with the Town.

Scope: No traffic signal warrants will be reviewed in conjunction with this traffic study.



XIV. SITE ACCESS

Inventory and describe the number and type of driveways, their locations, distances between driveways and intersections, types of driveways, and traffic controls at driveways. The design, number and location of access points to thoroughfares immediately adjacent to the site will be fully analyzed. The number of access points will be kept to a minimum and be designed to be consistent with the type of road facility. Left and right turns serving the site will be recommended and designed to meet future year capacity needs identified in the TIA report. Driveways serving the site from state roads should be designed in accordance with the NCDOT’s Policy on Street and Driveway Access when to North Carolina Highways, and/or the Town or Mecklenburg County’s standards, as applicable

XV. MITIGATION MEASURES

Describe the location, nature, extent, and phasing of all transportation improvements required of the applicant by the Town and NCDOT to improve and/or maintain minimum level of service (LOS) conditions through phasing and build-out of the project. Attach additional pages if needed.

The expectation for the TIA is to maintain intersection LOS measurements based on the thresholds in the following table:

ZONING DISTRICT	LOS Threshold
RP, GR, NC	C
NMX, VC, HC	D
BC, IC	D
TC, TRD-O, TD-O, TND	E

A narrative and table shall be prepared that summarizes the methodology and measured conditions at the intersections reported in level of service (LOS A–F) and seconds of stop delay for the intersection and approach. If the existing level of service (intersection or approach) is inadequate (i.e., "E" or "F"), or the existing plus the background growth (not including the site) causes an inadequate level of service, then the developer will be expected to mitigate only the traffic to be generated by the proposed project. Town staff and NCDOT will review the recommendations in the final version of the TIA and will have the ultimate determination in the scope of the required mitigation measures.

For multi-phase developments, the capacity analyses scenarios shall address the phasing of improvements for a build out plus 5 year scenario. A narrative and map shall also be prepared that describes and illustrates recommended mitigations, by phase if necessary, for maintaining the integrity of the transportation system.



XVI. COMPLIANCE WITH ADOPTED TRANSPORTATION PLANS

Include a statement of compliance with plans, programs, and policies adopted by the Town of Cornelius for maintaining a safe and efficient multimodal transportation system. The Town will provide the applicant and the consultant with a copy of all relevant plans and studies.

XVII. RECOMMENDATIONS

Provide a clear, concise description of the study's findings regarding impacts of the proposed project on the existing and proposed transportation system, and provide a list of required improvements and a phasing plan (if appropriate) to maintain minimum future year conditions through the build out of the proposed project. The recommendation will end with a statement by the qualified traffic engineer responsible for the TIA that indicates whether or not the proposed project will meet minimum standards described herein through build out of the project.

XVIII. SUBMITTAL REQUIREMENTS

The applicant will submit a digital copy of the TIA report for concurrent review by the Town and NCDOT. The TIA report is anticipated from the transportation consultant for initial review by the Town at least two weeks prior to the anticipated Planning Board hearing, if the project requires conditional review, or within 30 days if the project only requires standard land development review.



TOWN OF CORNELIUS, NORTH CAROLINA | TIA MEMORANDUM OF UNDERSTANDING

AGREEMENT BY ALL PARTIES

The undersigned hereby agree to the methodology described in the Memorandum of Understanding (MOU) for completing the required transportation impact analysis (TIA) supportive of the development application identified herein. Any changes to the above methodology contemplated by the applicant must be submitted to the Town in writing, and a revised MOU executed before such changes will be accepted for the TIA report. Any additional services incurred by the consultant in addition to the MOU must be approved by the Town, and process between the applicant and the transportation consultant.

Agreed to the 22nd Day of June, 2016

APPLICANT

TOWN OF CORNELIUS


(signature)


(signature)

Abraham J. Lehman
(Print Name)

Wayne Herron
(Print Name)

*See Attached Scope and Fees
dated June 21, 2016*



**APPENDIX B:
TRAFFIC COUNTS & TRAFFIC VOLUMES
WORKSHEET**

VOLUME

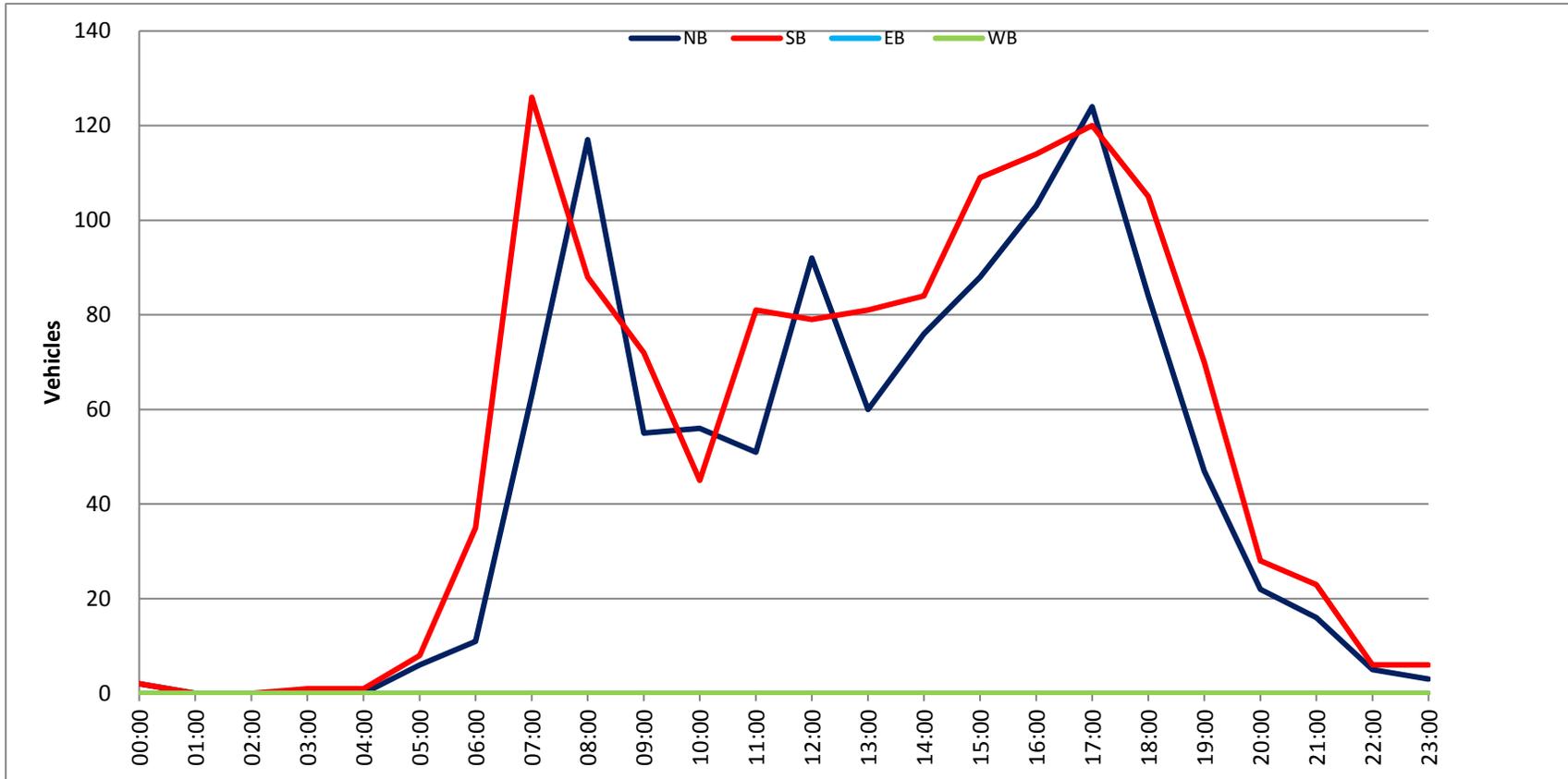
South St N/O Point of View Ln

Day: Thursday
Date: 9/15/2016

City: Cornelius
Project #: NC16_9385_001

DAILY TOTALS					NB	SB	EB	WB	Total		
					1,081	1,284	0	0	2,365		
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL
00:00	0	0			0	12:00	25	14			39
00:15	2	1			3	12:15	21	26			47
00:30	0	0			0	12:30	19	15			34
00:45	0	2	1	2	1	12:45	27	92	24	79	51
01:00	0	0			0	13:00	10	22			32
01:15	0	0			0	13:15	14	21			35
01:30	0	0			0	13:30	18	22			40
01:45	0	0			0	13:45	18	60	16	81	34
02:00	0	0			0	14:00	19	21			40
02:15	0	0			0	14:15	9	20			29
02:30	0	0			0	14:30	20	23			43
02:45	0	0			0	14:45	28	76	20	84	48
03:00	0	0			0	15:00	17	24			41
03:15	0	0			0	15:15	24	29			53
03:30	0	1			1	15:30	19	32			51
03:45	0	0	1		0	15:45	28	88	24	109	52
04:00	0	0			0	16:00	32	16			48
04:15	0	0			0	16:15	22	26			48
04:30	0	0			0	16:30	27	38			65
04:45	0	1	1		1	16:45	22	103	34	114	56
05:00	0	2			2	17:00	31	20			51
05:15	1	1			2	17:15	24	31			55
05:30	1	3			4	17:30	34	34			68
05:45	4	6	2	8	6	17:45	35	124	35	120	70
06:00	1	2			3	18:00	23	28			51
06:15	1	6			7	18:15	25	38			63
06:30	4	18			22	18:30	18	18			36
06:45	5	11	9	35	14	18:45	18	84	21	105	39
07:00	9	23			32	19:00	14	21			35
07:15	13	12			25	19:15	15	18			33
07:30	13	37			50	19:30	8	13			21
07:45	28	63	54	126	82	19:45	10	47	18	70	28
08:00	29	27			56	20:00	7	12			19
08:15	32	27			59	20:15	4	7			11
08:30	37	16			53	20:30	6	4			10
08:45	19	117	18	88	37	20:45	5	22	5	28	10
09:00	22	20			42	21:00	3	3			6
09:15	11	18			29	21:15	6	6			12
09:30	12	13			25	21:30	2	7			9
09:45	10	55	21	72	31	21:45	5	16	7	23	12
10:00	11	10			21	22:00	2	2			4
10:15	19	9			28	22:15	0	1			1
10:30	12	12			24	22:30	2	1			3
10:45	14	56	14	45	28	22:45	1	5	2	6	3
11:00	11	17			28	23:00	2	4			6
11:15	12	21			33	23:15	0	0			0
11:30	11	17			28	23:30	1	2			3
11:45	17	51	26	81	43	23:45	0	3	0	6	0
TOTALS	361	459			820	TOTALS	720	825			1545
SPLIT %	44.0%	56.0%			34.7%	SPLIT %	46.6%	53.4%			65.3%

DAILY TOTALS					NB	SB	EB	WB	Total
					1,081	1,284	0	0	2,365
AM Peak Hour	07:45	07:30			07:45	PM Peak Hour	17:00	17:30	17:30
AM Pk Volume	126	145			250	PM Pk Volume	124	135	252
Pk Hr Factor	0.851	0.671			0.762	Pk Hr Factor	0.886	0.888	0.900
7 - 9 Volume	180	214	0	0	394	4 - 6 Volume	227	234	0
7 - 9 Peak Hour	07:45	07:30			07:45	4 - 6 Peak Hour	17:00	16:30	17:00
7 - 9 Pk Volume	126	145	0	0	250	4 - 6 Pk Volume	124	123	0
Pk Hr Factor	0.851	0.671	0.000	0.000	0.762	Pk Hr Factor	0.886	0.809	0.000



Antiquity Woods TIA (Cornelius, NC)

	Counted Volumes (2016)		Existing (2016)		Background (2021)		Historical Growth		Antiquity Trip Distribution		Antiquity Trip Assignment		Antiquity Pass-By Trip Distribution		Antiquity Pass-By Trip Assignment		No Build (2021)		Site Trip Distribution		Site Trip Assignment		Build (2021)	
	AM	PM	AM	PM	AM	PM	AM	PM	Enter	Exit	AM	PM	Enter	Exit	AM	PM	AM	PM	Enter	Exit	AM	PM	AM	PM
Intersection 1 - NC 115 (S. Main Street) at South Street / Chairman Blake Lane																								
NB to NB	303	370	303	370	335	409	32	39			0	0			0	0	335	409			0	0	335	409
NB to EB	40	53	40	53	44	59	4	6			0	0			0	0	44	59			0	0	44	59
NB to SEB	8	12	8	12	9	13	1	1	5%		9	16			0	0	18	29			0	0	18	29
SB to EB	7	12	7	12	8	13	1	1			0	0			0	0	8	13			0	0	8	13
SB to SEB	39	43	39	43	43	47	4	4	15%		28	49			0	0	71	96	50%		11	39	82	135
SB to SB	355	371	355	371	392	410	37	39			0	0			0	0	392	410			0	0	392	410
NWB to SB	32	13	32	13	35	14	3	1		5%	11	15			0	0	46	29			0	0	46	29
NWB to NB	104	33	104	33	115	36	11	3		15%	34	45			0	0	149	81		50%	30	23	179	104
NWB to EB	10	11	10	11	11	12	1	1		5%	11	15			0	0	22	27			0	0	22	27
WB to SEB	7	18	7	18	8	20	1	2	5%		9	16			0	0	17	36			0	0	17	36
WB to SB	111	56	111	56	123	62	12	6			0	0			0	0	123	62			0	0	123	62
WB to NB	20	15	20	15	22	17	2	2			0	0			0	0	22	17			0	0	22	17

Intersection 2 - NC 115 (Main Street) at Catawba Avenue

EBL	175	193	175	193	193	213	18	20			0	0	-10%		0	-13	193	200			0	0	193	200
EBT	84	123	84	123	93	136	0	0	33%		62	108	25%		0	33	155	277	25%		5	20	160	297
EBR	343	283	343	283	379	312	36	29			0	0	-15%		0	-20	379	292			0	0	379	292
WBL	142	139	142	139	157	153	0	0		32%	72	96		45%	0	60	229	309		25%	15	11	244	320
WBT	81	101	81	101	89	112	0	0		33%	75	99		23%	0	31	164	242		25%	15	11	179	253
WBR	45	42	45	42	50	46	0	0		10%	23	30		32%	0	43	73	119			0	0	73	119
NBL	173	250	173	250	191	276	18	26			0	0	-13%		0	-18	191	258			0	0	191	258
NBT	520	410	520	410	574	453	54	43			0	0	-22%		0	-30	574	423			0	0	574	423
NBR	69	53	69	53	76	59	0	0	32%		61	105	35%		0	48	137	212	25%		5	20	142	232
SBL	32	42	32	42	35	46	0	0	10%		19	33	40%		0	53	54	132			0	0	54	132
SBT	506	550	506	550	559	607	53	57			0	0	-30%		0	-40	559	567			0	0	559	567
SBR	118	135	118	135	130	149	12	14			0	0	-10%		0	-13	130	136			0	0	130	136

Intersection 3 - South Street at Site Access

EBL			0	0	0	0	0	0			0	0			0	0	0	0		50%	30	23	30	23
EBT			0	0	0	0	0	0			0	0			0	0	0	0			0	0	0	0
EBR			0	0	0	0	0	0			0	0			0	0	0	0		50%	30	22	30	22
WBL			0	0	0	0	0	0			0	0			0	0	0	0			0	0	0	0
WBT			0	0	0	0	0	0			0	0			0	0	0	0			0	0	0	0
WBR			0	0	0	0	0	0			0	0			0	0	0	0			0	0	0	0
NBL			0	0	0	0	0	0			0	0			0	0	0	0		50%	11	39	11	39
NBT	126	117	126	117	126	117	0	0		25%	56	75			0	0	182	192			0	0	182	192
NBR			0	0	0	0	0	0			0	0			0	0	0	0			0	0	0	0
SBL			0	0	0	0	0	0			0	0			0	0	0	0			0	0	0	0
SBT	124	135	124	135	124	135	0	0		25%	47	81			0	0	171	216			0	0	171	216
SBR			0	0	0	0	0	0			0	0			0	0	0	0		50%	10	40	10	40

Antiquity Woods TIA (Cornelius, NC)

	Counted Volumes (2016)		Existing (2016)		Background (2026)		Historical Growth		Antiquity Trip Distribution		Antiquity Trip Assignment		Antiquity Pass-By Trip Distribution		Antiquity Pass-By Trip Assignment		No Build (2026)		Site Trip Distribution		Site Trip Assignment		Build (2026)	
	AM	PM	AM	PM	AM	PM	AM	PM	Enter	Exit	AM	PM	Enter	Exit	AM	PM	AM	PM	Enter	Exit	AM	PM	AM	PM
Intersection 1 - NC 115 (S. Main Street) at South Street / Chairman Blake Lane																								
NB to NB	303	370	303	370	369	451	66	81			0	0			0	0	369	451			0	0	369	451
NB to EB	40	53	40	53	49	65	9	12			0	0			0	0	49	65			0	0	49	65
NB to SEB	8	12	8	12	10	15	2	3	5%		9	16			0	0	19	31			0	0	19	31
SB to EB	7	12	7	12	9	15	2	3			0	0			0	0	9	15			0	0	9	15
SB to SEB	39	43	39	43	48	52	9	9	15%		28	49			0	0	76	101	50%		11	39	87	140
SB to SB	355	371	355	371	433	452	78	81			0	0			0	0	433	452			0	0	433	452
NWB to SB	32	13	32	13	39	16	7	3		5%	11	15			0	0	50	31			0	0	50	31
NWB to NB	104	33	104	33	127	40	23	7		15%	34	45			0	0	161	85		50%	30	23	191	108
NWB to EB	10	11	10	11	12	13	2	2		5%	11	15			0	0	23	28			0	0	23	28
WB to SEB	7	18	7	18	9	22	2	4	5%		9	16			0	0	18	38			0	0	18	38
WB to SB	111	56	111	56	135	68	24	12			0	0			0	0	135	68			0	0	135	68
WB to NB	20	15	20	15	24	18	4	3			0	0			0	0	24	18			0	0	24	18

Intersection 2 - NC 115 (Main Street) at Catawba Avenue

EBL	175	193	175	193	213	235	38	42			0	0	-10%		0	-13	213	222			0	0	213	222
EBT	84	123	84	123	102	150	0	0	33%		62	108	25%		0	33	164	291	25%		5	20	169	311
EBR	343	283	343	283	418	345	75	62			0	0	-15%		0	-20	418	325			0	0	418	325
WBL	142	139	142	139	173	169	0	0		32%	72	96		45%	0	60	245	325		25%	15	11	260	336
WBT	81	101	81	101	99	123	0	0		33%	75	99		23%	0	31	174	253		25%	15	11	189	264
WBR	45	42	45	42	55	51	0	0		10%	23	30		32%	0	43	78	124			0	0	78	124
NBL	173	250	173	250	211	305	38	55			0	0	-13%		0	-18	211	287			0	0	211	287
NBT	520	410	520	410	634	500	114	90			0	0	-22%		0	-30	634	470			0	0	634	470
NBR	69	53	69	53	84	65	0	0	32%		61	105	35%		0	48	145	218	25%		5	20	150	238
SBL	32	42	32	42	39	51	0	0	10%		19	33	40%		0	53	58	137			0	0	58	137
SBT	506	550	506	550	617	670	111	120			0	0	-30%		0	-40	617	630			0	0	617	630
SBR	118	135	118	135	144	165	26	30			0	0	-10%		0	-13	144	152			0	0	144	152

Intersection 3 - South Street at Site Access

EBL			0	0	0	0	0	0			0	0			0	0	0	0		50%	30	23	30	23
EBT			0	0	0	0	0	0			0	0			0	0	0	0			0	0	0	0
EBR			0	0	0	0	0	0			0	0			0	0	0	0		50%	30	22	30	22
WBL			0	0	0	0	0	0			0	0			0	0	0	0			0	0	0	0
WBT			0	0	0	0	0	0			0	0			0	0	0	0			0	0	0	0
WBR			0	0	0	0	0	0			0	0			0	0	0	0			0	0	0	0
NBL			0	0	0	0	0	0			0	0			0	0	0	0		50%	11	39	11	39
NBT	126	117	126	117	126	117	0	0		25%	56	75			0	0	182	192			0	0	182	192
NBR			0	0	0	0	0	0			0	0			0	0	0	0			0	0	0	0
SBL			0	0	0	0	0	0			0	0			0	0	0	0			0	0	0	0
SBT	124	135	124	135	124	135	0	0		25%	47	81			0	0	171	216			0	0	171	216
SBR			0	0	0	0	0	0			0	0			0	0	0	0		50%	10	40	10	40



	South Street North of Covered Bridge	Old Canal / Catawba Avenue Near NC 115	South Street near NC 115 in Davidson
Traffic Volume Calculations / Estimations			
2016 Recorded Daily Traffic (vpd)	2,365	-	-
2016 Recorded AM and PM Peak Hour Traffic (vph)	502	953	330
Ratio	21.23%	-	-
Estimated 2016 Daily Traffic (vpd)	-	4,490	1,555
Projected 2026 AM and PM Peak Hour Traffic (vph)	863	2,314	764
Projected 2026 Daily Traffic (vpd)	4,066	10,902	3,599
LOS D Comparison			
Approx. Lane Width (feet)	9.5	11	12
Posted Speed Limit (mph)	25	25	20
LOS D Standard (vpd)*	9,000	9,700	10,000
2026 Percent of LOS D Standard	45.17%	112.39%	35.99%

*Level of Service Standards for Systems Level Planning , NCDOT Transportation Planning Branch, 2011



APPENDIX C: APPROVED DEVELOPMENT TRAFFIC INFORMATION



Memorandum

Project: Antiquity Development Trip Generation
AMT File No. 15-1074.001
Date October 31, 2016
To: Wayne Herron (Cornelius)
Jason Pauling (Cornelius)
Will Washam (Cornelius)
CC:
From: Brett Canipe (A. Morton Thomas & Associates)
Matthew Peach (A. Morton Thomas & Associates)

Background and Introduction

The purpose of this memorandum is to document the trip generation methodology and results for the remaining portion of the Antiquity development in Cornelius, Mecklenburg County, NC. This information will be incorporated in the traffic study for the Antiquity Woods development as an “approved development.” This is so the traffic study properly estimates the remaining traffic to be generated by the Antiquity development.

Full Build-out

The Antiquity development consists of several land uses such as single family homes, town homes, apartments, commercial uses and retail land uses. Full build-out of the development is envisioned to be the following:

- 230 Single Family Homes
- 237 Townhomes
- 423 Apartments
- 86 unit Attached Senior Adult Housing
- 61,000 SF supermarket
- Retail (i.e. shopping center) uses:
 - Building A (7 units): 9,108 SF
 - Building B (3 units): 5,803 SF
 - Building C (4 units): 4,884 SF
 - Building D (5 units): 6,277 SF
 - Building E (3 units): 3,700 SF
 - Building F (unknown): 6,486 SF
 - Building G (unknown): 6,486 SF
 - Building H (unknown): 6,486 SF
 - Building I (unknown): 6,486 SF

2016 Estimated Land Uses

At this time, the following land uses have been constructed and are occupied:

- 230 Single Family Homes
- 237 Townhomes
- 94 Apartments
- 86 unit Attached Senior Adult Housing
- 53,000 SF supermarket
- Retail (i.e. shopping center) uses:
 - Building A (7 units): 5,500 SF

Trip Generation Methodology

Trip generation is performed using the latest version of ITE’s Trip Generation (9th Edition) along with NCDOT’s Rate versus Equation spreadsheet. Internal capture calculations were performed using the NCHRP 684 Internal Capture Estimation Tool. By generating trips, internal capture, and pass-by trips for both the existing (2016) and ultimate build-out of Antiquity, we are able to determine the remaining trips to be generated by the development.

Trip Generation Results

Application of the aforementioned methodology resulted in the remaining trips to be generated by the Antiquity development as 11,750 daily, 415 AM peak hour (189 in, 226 out) and 703 PM peak hour (363 in, 340 out) net new external trips are yet to be generated by the Antiquity development. Additionally, 268 pass-by trips (134 in, 134 out) are yet to be generated. Note that the land uses in the Antiquity development only generate pass-by trips in the PM peak hour. Daily, AM peak hour and PM peak hour summary tables are provided below. Full trip generation and internal capture calculations are attached to this memorandum.

Table 1: Daily Trip Generation Results

Land Use Scenario	Daily Trips		
	Total	In	Out
Full Buildout External Trips	22,760	11,380	11,380
2016 Land Uses External Trips	11,010	5,505	5,505
Future External Trips	11,750	5,875	5,875

Table 2: AM Peak Hour Trip Generation Results

Land Use Scenario	AM Peak Hour Trips		
	Total	In	Out
Full Buildout External Trips	956	390	566
2016 Land Uses External Trips	541	201	340
Future External Trips	415	189	226

Table 3: PM Peak Hour Trip Generation Results

Land Use Scenario	PM Peak Hour Trips		
	Total	In	Out
Full Buildout External Trips	1,404	781	623
<i>Full Buildout Pass-By Trips</i>	448	225	223
2016 Land Uses External Trips	701	454	412
<i>2016 Land Uses Pass-By Trips</i>	180	91	89
<i>Remaining Pass-By Trips</i>	268	134	134
Future External Trips	703	327	300

Trip Distribution

These trips will be assigned to the study area intersections using the collected traffic count data.

Antiquity Trip Generation



2016 ESTIMATED TRIP GENERATION										
Land Use	Size	Units	Daily Trips Generated	AM Peak Hour			PM Peak Hour			
				Total	In	Out	Total	In	Out	
Single Family Homes (LU 210)	230	DU	2,190	173	43	130	230	145	85	
Multi-Family (LU 220)	94	DU	694	50	10	40	69	45	24	
Residential Condo/Townhouse (LU 230)	237	DU	1,378	104	18	86	123	82	41	
Senior Adult Housing - Attached (LU 252)	86	DU	296	16	6	10	20	12	8	
Supermarket (LU 850)	53,000	SF	5,420	180	112	68	502	256	246	
			<i>pass-by trip reduction (0% AM / 36% PM)</i>				-155	-78	-77	
Shopping Center (LU 820) - Outparcel A	5,500	SF	1,032	27	17	10	86	41	45	
			<i>pass-by trip reduction (0% AM / 34% PM)</i>				-25	-13	-12	
Shopping Center (LU 820) - Outparcel B	0	SF	0	0	0	0	0	0	0	
			<i>pass-by trip reduction (0% AM / 34% PM)</i>							
Shopping Center (LU 820) - Outparcel C	0	SF	0	0	0	0	0	0	0	
			<i>pass-by trip reduction (0% AM / 34% PM)</i>							
Shopping Center (LU 820) - Outparcel D	0	SF	0	0	0	0	0	0	0	
			<i>pass-by trip reduction (0% AM / 34% PM)</i>							
Shopping Center (LU 820) - Outparcel E	0	SF	0	0	0	0	0	0	0	
			<i>pass-by trip reduction (0% AM / 34% PM)</i>							
Shopping Center (LU 820) - Outparcel F	0	SF	0	0	0	0	0	0	0	
			<i>pass-by trip reduction (0% AM / 34% PM)</i>							
Shopping Center (LU 820) - Outparcel G	0	SF	0	0	0	0	0	0	0	
			<i>pass-by trip reduction (0% AM / 34% PM)</i>							
Shopping Center (LU 820) - Outparcel H	0	SF	0	0	0	0	0	0	0	
			<i>pass-by trip reduction (0% AM / 34% PM)</i>							
Shopping Center (LU 820) - Outparcel I	0	SF	0	0	0	0	0	0	0	
			<i>pass-by trip reduction (0% AM / 34% PM)</i>							
			<i>Net Unadjusted Trips</i>	550	206	344	1,030	581	449	
			<i>Internal Capture Reduction</i>	-9	-5	-4	-149	-36	-37	
			<i>Subtotal</i>	541	201	340	881	545	412	
			<i>Pass-By Trip Reduction</i>				-180	-91	-89	
			<i>Net New External Trips</i>	541	201	340	701	454	323	

FULL BUILDOUT TRIP GENERATION										
Land Use	Size	Units	Daily Trips Generated	AM Peak Hour			PM Peak Hour			
				Total	In	Out	Total	In	Out	
Single Family Homes (LU 210)	230	DU	2,190	173	43	130	230	145	85	
Multi-Family (LU 220)	423	DU	2,688	211	42	169	250	163	87	
Residential Condo/Townhouse (LU 230)	237	DU	1,378	104	18	86	123	82	41	
Senior Adult Housing - Attached (LU 252)	86	DU	296	16	6	10	20	12	8	
Supermarket (LU 850)	61,000	SF	6,238	207	128	79	578	295	283	
			<i>pass-by trip reduction (0% AM / 36% PM)</i>				-190	-95	-95	
Shopping Center (LU 820) - Outparcel A	9,108	SF	1,432	36	22	14	120	58	62	
			<i>pass-by trip reduction (0% AM / 34% PM)</i>				-37	-19	-18	
Shopping Center (LU 820) - Outparcel B	5,803	SF	1,068	27	17	10	89	43	46	
			<i>pass-by trip reduction (0% AM / 34% PM)</i>				-28	-14	-14	
Shopping Center (LU 820) - Outparcel C	4,884	SF	956	25	16	9	79	38	41	
			<i>pass-by trip reduction (0% AM / 34% PM)</i>				-24	-12	-12	
Shopping Center (LU 820) - Outparcel D	6,277	SF	1,124	29	18	11	94	45	49	
			<i>pass-by trip reduction (0% AM / 34% PM)</i>				-29	-15	-14	
Shopping Center (LU 820) - Outparcel E	3,700	SF	798	21	13	8	66	32	34	
			<i>pass-by trip reduction (0% AM / 34% PM)</i>				-20	-10	-10	
Shopping Center (LU 820) - Outparcel F	6,486	SF	1,148	29	18	11	96	46	50	
			<i>pass-by trip reduction (0% AM / 34% PM)</i>				-30	-15	-15	
Shopping Center (LU 820) - Outparcel G	6,486	SF	1,148	29	18	11	96	46	50	
			<i>pass-by trip reduction (0% AM / 34% PM)</i>				-30	-15	-15	
Shopping Center (LU 820) - Outparcel H	6,486	SF	1,148	29	18	11	96	46	50	
			<i>pass-by trip reduction (0% AM / 34% PM)</i>				-30	-15	-15	
Shopping Center (LU 820) - Outparcel I	6,486	SF	1,148	29	18	11	96	46	50	
			<i>pass-by trip reduction (0% AM / 34% PM)</i>				-30	-15	-15	
			<i>Net Unadjusted Trips</i>	965	395	570	2,033	1,097	936	
			<i>Internal Capture Reduction</i>	-9	-5	-4	-181	-91	-90	
			<i>Subtotal</i>	956	390	566	1,852	1,006	846	
			<i>Pass-By Trip Reduction</i>				-448	-225	-223	
			<i>Net New External Trips</i>	956	390	566	1,404	781	623	

Antiquity Trip Generation



FUTURE TRIPS TO BE ATTRIBUTED TO ANTIQUITY								
		Daily Trips	AM Peak Hour			PM Peak Hour		
		Generated	Total	In	Out	Total	In	Out
2016 Net New External Trips		11,010	541	201	340	701	454	323
	<i>Pass-By Trips</i>		0	0	0	180	91	89
Full Buildout Net New External Trips		22,760	956	390	566	1,404	781	623
	<i>Pass-By Trips</i>		0	0	0	448	225	223
	<i>remaining pass-by trips</i>		0	0	0	268	134	134
	<i>Remaining Antiquity Net New External Trips</i>	11,750	415	189	226	703	327	300

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Antiquity	Organization:	AMT
Project Location:	Cornelius, NC	Performed By:	M. Peach
Scenario Description:	Estimated Trip Generation	Date:	10/10/2016
Analysis Year:	Existing (2016) Buildout	Checked By:	
Analysis Period:	AM Street Peak Hour	Date:	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	820, 850	58,500	SF	207	129	78
Restaurant				0		
Cinema/Entertainment				0		
Residential	0, 220, 230, 2	647	DU	343	77	266
Hotel				0		
All Other Land Uses ²				0		
				550	206	344

Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.10	0%	0%	1.10	0%	0%
Retail	1.10	0%	0%	1.10	0%	0%
Restaurant	1.10	0%	0%	1.10	0%	0%
Cinema/Entertainment	1.10	0%	0%	1.10	0%	0%
Residential	1.10	0%	0%	1.10	0%	0%
Hotel	1.10	0%	0%	1.10	0%	0%
All Other Land Uses ²	1.10	0%	0%	1.10	0%	0%

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	2	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	3	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	606	227	379
Internal Capture Percentage	2%	2%	1%
External Vehicle-Trips ⁵	541	201	340
External Transit-Trips ⁵	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	2%	2%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	1%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

⁴Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

⁶Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Project Name:	Antiquity
Analysis Period:	AM Street Peak Hour

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.10	0	0	1.10	0	0
Retail	1.10	129	142	1.10	78	86
Restaurant	1.10	0	0	1.10	0	0
Cinema/Entertainment	1.10	0	0	1.10	0	0
Residential	1.10	77	85	1.10	266	293
Hotel	1.10	0	0	1.10	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	25		11	0	12	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	6	3	59	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		45	0	0	0	0
Retail	0		0	0	2	0
Restaurant	0	11		0	4	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	24	0	0		0
Hotel	0	6	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	3	139	142	126	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	2	83	85	75	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	2	84	86	76	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	3	290	293	264	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A
²Person-Trips
³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator
*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Antiquity	Organization:	AMT
Project Location:	Cornelius, NC	Performed By:	M. Peach
Scenario Description:	Estimated Trip Generation	Date:	10/10/2016
Analysis Year:	Existing (2016) Buildout	Checked By:	
Analysis Period:	PM Street Peak Hour	Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	820, 850	58,500	SF	588	297	291
Restaurant				0		
Cinema/Entertainment				0		
Residential	0, 220, 230, 2	647	DU	442	284	158
Hotel				0		
All Other Land Uses ²				0		
				1,030	581	449

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.10	0%	0%	1.10	0%	0%
Retail	1.10	0%	0%	1.10	0%	0%
Restaurant	1.10	0%	0%	1.10	0%	0%
Cinema/Entertainment	1.10	0%	0%	1.10	0%	0%
Residential	1.10	0%	0%	1.10	0%	0%
Hotel	1.10	0%	0%	1.10	0%	0%
All Other Land Uses ²	1.10	0%	0%	1.10	0%	0%

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		2600	2600		2600	
Retail					2600	
Restaurant					2600	
Cinema/Entertainment					2600	
Residential		2600	2600			
Hotel					2600	

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	37	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	3	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	1,133	639	494
Internal Capture Percentage	7%	6%	8%
External Vehicle-Trips ⁵	957	545	412
External Transit-Trips ⁵	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	1%	12%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	12%	2%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

⁴Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made.

⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

⁶Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Antiquity
Analysis Period:	PM Street Peak Hour

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.10	0	0	1.10	0	0
Retail	1.10	297	327	1.10	291	320
Restaurant	1.10	0	0	1.10	0	0
Cinema/Entertainment	1.10	0	0	1.10	0	0
Residential	1.10	284	312	1.10	158	174
Hotel	1.10	0	0	1.10	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	6		93	13	37	16
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	7	7	4	0		5
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		3	0	0	12	0
Retail	0		0	0	144	0
Restaurant	0	164		0	50	0
Cinema/Entertainment	0	13	0		12	0
Residential	0	3	0	0		0
Hotel	0	7	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	3	324	327	295	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	37	275	312	250	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	37	283	320	257	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	3	171	174	155	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P
²Person-Trips
³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator
*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Antiquity	Organization:	AMT
Project Location:	Cornelius, NC	Performed By:	M. Peach
Scenario Description:	Estimated Trip Generation	Date:	10/10/2016
Analysis Year:	Full Buildout	Checked By:	
Analysis Period:	AM Street Peak Hour	Date:	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	820, 850	116,716	SF	461	286	175
Restaurant				0		
Cinema/Entertainment				0		
Residential	0, 220, 230, 2	976	DU	504	109	395
Hotel				0		
All Other Land Uses ²				0		
				965	395	570

Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.10	0%	0%	1.10	0%	0%
Retail	1.10	0%	0%	1.10	0%	0%
Restaurant	1.10	0%	0%	1.10	0%	0%
Cinema/Entertainment	1.10	0%	0%	1.10	0%	0%
Residential	1.10	0%	0%	1.10	0%	0%
Hotel	1.10	0%	0%	1.10	0%	0%
All Other Land Uses ²	1.10	0%	0%	1.10	0%	0%

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	2	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	4	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	1,063	435	628
Internal Capture Percentage	1%	1%	1%
External Vehicle-Trips ⁵	956	390	566
External Transit-Trips ⁵	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	1%	1%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	1%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

⁴Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

⁶Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Project Name:	Antiquity
Analysis Period:	AM Street Peak Hour

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.10	0	0	1.10	0	0
Retail	1.10	286	315	1.10	175	193
Restaurant	1.10	0	0	1.10	0	0
Cinema/Entertainment	1.10	0	0	1.10	0	0
Residential	1.10	109	120	1.10	395	435
Hotel	1.10	0	0	1.10	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	56		25	0	27	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	9	4	87	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		101	0	0	0	0
Retail	0		0	0	2	0
Restaurant	0	25		0	6	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	54	0	0		0
Hotel	0	13	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	4	311	315	283	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	2	118	120	107	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	2	191	193	174	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	4	431	435	392	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A
²Person-Trips
³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator
*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Antiquity	Organization:	AMT
Project Location:	Cornelius, NC	Performed By:	M. Peach
Scenario Description:	Estimated Trip Generation	Date:	10/10/2016
Analysis Year:	Full Buildout	Checked By:	
Analysis Period:	PM Street Peak Hour	Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	820, 850	116,716	SF	1,410	695	715
Restaurant				0		
Cinema/Entertainment				0		
Residential	0, 220, 230, 2	976	DU	623	402	221
Hotel				0		
All Other Land Uses ²				0		
				2,033	1,097	936

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.10	0%	0%	1.10	0%	0%
Retail	1.10	0%	0%	1.10	0%	0%
Restaurant	1.10	0%	0%	1.10	0%	0%
Cinema/Entertainment	1.10	0%	0%	1.10	0%	0%
Residential	1.10	0%	0%	1.10	0%	0%
Hotel	1.10	0%	0%	1.10	0%	0%
All Other Land Uses ²	1.10	0%	0%	1.10	0%	0%

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		2600	2600		2600	
Retail					2600	
Restaurant					2600	
Cinema/Entertainment					2600	
Residential		2600	2600			
Hotel					2600	

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	92	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	8	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	2,237	1,207	1,030
Internal Capture Percentage	9%	8%	10%
External Vehicle-Trips ⁵	1,852	1,006	846
External Transit-Trips ⁵	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	1%	12%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	21%	3%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

⁴Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made.

⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

⁶Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Antiquity
Analysis Period:	PM Street Peak Hour

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.10	0	0	1.10	0	0
Retail	1.10	695	765	1.10	715	787
Restaurant	1.10	0	0	1.10	0	0
Cinema/Entertainment	1.10	0	0	1.10	0	0
Residential	1.10	402	442	1.10	221	243
Hotel	1.10	0	0	1.10	0	0

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	16		228	31	92	39
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	10	10	5	0		7
Hotel	0	0	0	0	0	

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		6	0	0	18	0
Retail	0		0	0	203	0
Restaurant	0	383		0	71	0
Cinema/Entertainment	0	31	0		18	0
Residential	0	8	0	0		0
Hotel	0	15	0	0	0	

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
	Office	0	0	0	0	0
Retail	8	757	765	688	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	92	350	442	318	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
	Office	0	0	0	0	0
Retail	92	695	787	632	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	8	235	243	214	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P
²Person-Trips
³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator
*Indicates computation that has been rounded to the nearest whole number.

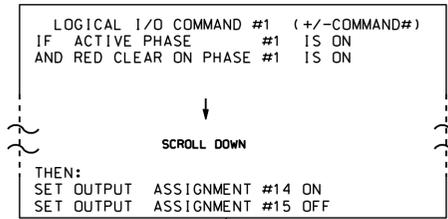


APPENDIX D: TRAFFIC SIGNAL PLANS

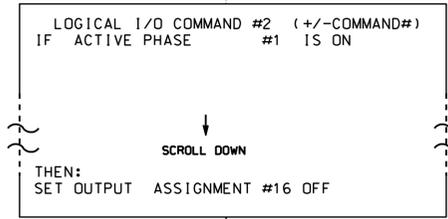
LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

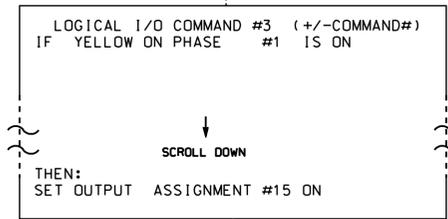
1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, 3, 4, 5, 6, 7 AND 8.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



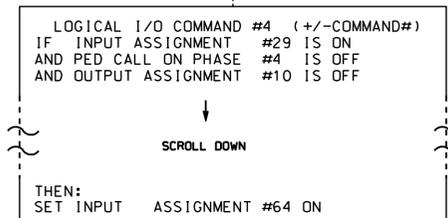
NOTE: LOGIC FOR PHASE 1 RED CLEAR WHEN TRANSITIONING FROM PHASE 1 TO PHASE 2 (HEAD 11).



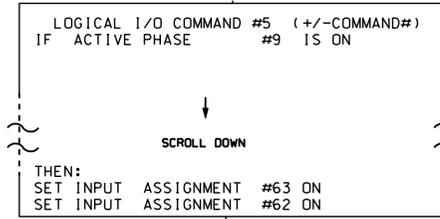
NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 1 (HEAD 11).



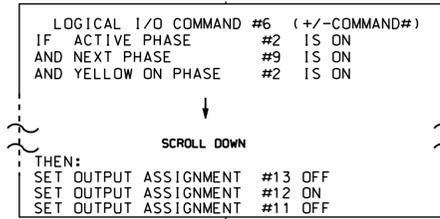
NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 1 (HEAD 11).



NOTE: LOGIC FOR P91, P92 PED CALL IF PED 4 NOT BEING CALLED.

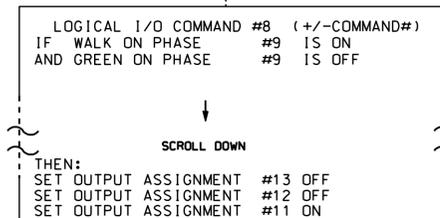
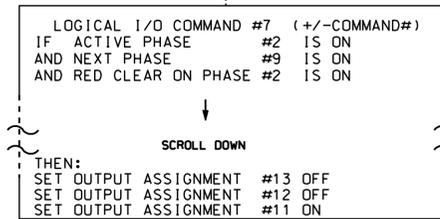


NOTE: LOGIC FOR SETTING PHASE 2 MIN/MAX IF PHASE 9 IS SERVED IN SAME CYCLE



← BEGIN LOGIC STATEMENTS FOR ADVANCE WALK WITH FYA. (LOGIC STATEMENTS 6-8).

NOTE: TURN HEADS 21,22 OFF DURING 9 PED ADVANCE WALK.



LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

I/O REFERENCE SCHEDULE

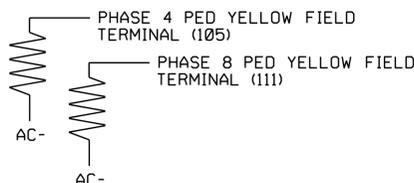
- OUTPUT 11 = Overlap E Red
- OUTPUT 12 = Overlap E Yellow
- OUTPUT 13 = Overlap E Green
- OUTPUT 14 = Overlap A Red
- OUTPUT 15 = Overlap A Yellow
- OUTPUT 16 = Overlap A Green
- OUTPUT 33 = Phase 1 Green
- OUTPUT 10 = PED OVERLAP A WALK
- INPUT 29 = Not Enabled
- INPUT 31 = Ped Detector 4
- INPUT 64 = Ped Detector 2
- INPUT 63 = Use Min 2 - Phase 2
- INPUT 62 = Use Max 2 - Phase 2

Note: Some I/O shown above have been remapped. See sheets 3 through 7 of this electrical detail.

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
PHASE: 12345678910111213141516
VEH OVL PARENTS: XX
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: _ RED _ YELLOW _ GREEN
FLASH COLORS: _ RED _ YELLOW X GREEN ← NOTICE GREEN FLASH
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0.0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0

PRESS '+' OR '-' TO POSITION ON OVERLAP E

PAGE 1: VEHICLE OVERLAP 'E' SETTINGS
PHASE: 12345678910111213141516
VEH OVL PARENTS: X X
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: _ RED _ YELLOW _ GREEN
FLASH COLORS: _ RED _ YELLOW _ GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0.0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0

OVERLAP PROGRAMMING COMPLETE

PEDESTRIAN OVERLAP "A" PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '2' (PEDESTRIAN OVERLAP SETTINGS).

PAGE 1: PEDESTRIAN OVERLAP 'A' SETTINGS
PHASE: 12345678910111213141516
PED OVL PARENTS: X X

PED OVERLAP PROGRAMMING COMPLETE

ADVANCED WALK NOTE

(program controller as shown below)

From Main Menu press '2' (Phase Control), then '1' (Phase Control Functions). Program phases 3, 4 and 9 for 'Advanced Walk'. Make sure the Walk Advance Time shown on the Signal Design plans are programmed in the 'Phase Timing' menu.

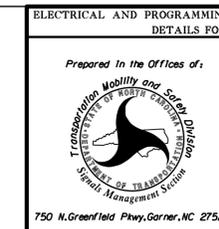
COUNTDOWN PEDESTRIAN SIGNAL OPERATION

Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

Electrical Detail - Sheet 2 of 7

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0257
DESIGNED: May 2016
SEALED: 5/23/2016
REVISED:



Electrical and Programming Details For:		NC 115 (Main Street) at SR 2411 (South Street)/Chairman Blake Ln.	
Division 10	Mecklenburg County	Davidson	
PLAN DATE: May 2016	REVIEWED BY: BAS		
PREPARED BY: C. Strickland	REVIEWED BY:		
REVISIONS	INIT.	DATE	

SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 030530
GREGORY M. LITTLE
DocuSigned by:
Gregory M. Little
5/24/2016
0021EFD4F8341F
DATE
SIG. INVENTORY NO. 10-0257

PEDESTRIAN OVERLAP "A" (P91,P92) OUTPUT ASSIGNMENT PROGRAMMING DETAIL

(program controller as shown below)

- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS).
- WITH CURSOR IN "OUTPUT ASSIGNMENT #" FIELD, USE + KEY TO FIND THE OUTPUT ASSIGNMENT NUMBER 9, AS SHOWN BELOW.
- PROGRAM CONTROLLER AS SHOWN:

```
PAGE:1 C1 PIN:10 PEDESTRIAN PHASE
OUTPUT ASSIGNMENT #.....9
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID, 1=FLASH.....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....
PEDESTRIAN OVERLAP.....Y
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
```

THE PEDESTRIAN PHASE 'Y' WILL REMAIN UNTIL THE FUNCTION OF THIS OUTPUT IS CHANGED. DO NOT ENTER A 'N'.

```
PAGE:1 C1 PIN:10 PEDESTRIAN PHASE
SELECT PED OVERLAP (A=1, P=16).....1
SELECT COLOR (O=DWALK,1=YEL,2=WALK)..0
```

WHEN A "Y" IS ENTERED FOR "PEDESTRIAN OVERLAP" THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN. PRESS ENTER AFTER ENTERING DATA, THEN ESC.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS "PEDESTRIAN OVERLAP" AS SHOWN BELOW:

```
PAGE:1 C1 PIN:10 PEDESTRIAN OVERLAP
OUTPUT ASSIGNMENT #.....9
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID, 1=FLASH.....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....
PEDESTRIAN OVERLAP.....Y
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
```

PEDESTRIAN OVERLAP 'A' DON'T WALK

PRESS '+' KEY FOR OUTPUT 10

```
PAGE:1 C1 PIN:11 PEDESTRIAN PHASE
OUTPUT ASSIGNMENT #.....10
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID, 1=FLASH.....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....
PEDESTRIAN OVERLAP.....Y
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
```

THE PEDESTRIAN PHASE 'Y' WILL REMAIN UNTIL THE FUNCTION OF THIS OUTPUT IS CHANGED. DO NOT ENTER A 'N'.

```
PAGE:1 C1 PIN:11 PEDESTRIAN PHASE
SELECT PED OVERLAP (A=1, P=16).....1
SELECT COLOR (O=DWALK,1=YEL,2=WALK)..2
```

WHEN A "Y" IS ENTERED FOR "PEDESTRIAN OVERLAP" THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN. PRESS ENTER AFTER ENTERING DATA, THEN ESC.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS "PEDESTRIAN OVERLAP" AS SHOWN BELOW:

```
PAGE:1 C1 PIN:11 PEDESTRIAN OVERLAP
OUTPUT ASSIGNMENT #.....10
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID, 1=FLASH.....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....
PEDESTRIAN OVERLAP.....Y
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
```

PEDESTRIAN OVERLAP 'A' WALK

PED 3 (P31,P32,P33,P34) OUTPUT ASSIGNMENT PROGRAMMING DETAIL

(program controller as shown below)

- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS).
- WITH CURSOR IN "OUTPUT ASSIGNMENT #" FIELD, USE + KEY TO FIND THE OUTPUT ASSIGNMENT NUMBER 17, AS SHOWN BELOW.
- PROGRAM CONTROLLER AS SHOWN:

```
PAGE:1 C1 PIN:19 PEDESTRIAN PHASE
OUTPUT ASSIGNMENT #.....17
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID, 1=FLASH.....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
```

```
PAGE:1 C1 PIN:19 PEDESTRIAN PHASE
SELECT PED PHASE (1-16).....3
SELECT COLOR (O=DWALK,1=YEL,2=WALK)..0
```

WHEN A "Y" IS ENTERED FOR "PEDESTRIAN PHASE" THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN. PRESS ENTER AFTER ENTERING DATA, THEN ESC.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS "PEDESTRIAN PHASE" AS SHOWN BELOW:

```
PAGE:1 C1 PIN:19 PEDESTRIAN PHASE
OUTPUT ASSIGNMENT #.....17
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID, 1=FLASH.....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
```

PEDESTRIAN PHASE '3' DON'T WALK

PRESS '+' KEY FOR OUTPUT 18

```
PAGE:1 C1 PIN:20 PEDESTRIAN PHASE
OUTPUT ASSIGNMENT #.....18
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID, 1=FLASH.....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
```

```
PAGE:1 C1 PIN:20 PEDESTRIAN PHASE
SELECT PED PHASE (A=1, P=16).....3
SELECT COLOR (O=DWALK,1=YEL,2=WALK)..2
```

WHEN A "Y" IS ENTERED FOR "PEDESTRIAN PHASE" THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN. PRESS ENTER AFTER ENTERING DATA, THEN ESC.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS "PEDESTRIAN PHASE" AS SHOWN BELOW:

```
PAGE:1 C1 PIN:20 PEDESTRIAN PHASE
OUTPUT ASSIGNMENT #.....18
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID, 1=FLASH.....0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
```

PEDESTRIAN PHASE '3' WALK

PED DETECTOR ASSIGNMENTS PROGRAMMING DETAIL

(program controller as shown below)

- FROM MAIN MENU SELECT '7' (DETECTORS), THEN '2' (PEDESTRIAN DETECTOR ASSIGNMENTS)
- CYCLE TO 'PED DETECTOR 2' BY DEPRESSING THE '+' KEY
- MODIFY PHASE ASSIGNED TO 'PED DETECTOR 2' FROM PHASE 2 TO PHASE 9
- CYCLE TO 'PED DETECTOR 8' BY REPEATEDLY DEPRESSING THE '+' KEY
- MODIFY PHASE ASSIGNED TO 'PED DETECTOR 8' FROM PHASE 8 TO PHASE 3

PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0257
DESIGNED: May 2016
SEALED: 5/23/2016
REVISED:

Electrical Detail - Sheet 3 of 7

ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared In the Offices of:  750 N. Greenfield Pkwy, Garner, NC 27529	NC 115 (Main Street) at SR 2411 (South Street)/ Chairman Blake Ln.		SEAL  ENGINEER GREGORY M. LITTLE
	Division 10 PLAN DATE: May 2016 PREPARED BY: C. Strickland	Mecklenburg County REVIEWED BY: BAS REVIEWED BY:	Davidson REVISIONS INIT. DATE

"PHASE 2" to OVERLAP "E" OUTPUT ASSIGNMENT PROGRAMMING DETAIL

(program controller as shown below)

1. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS).
2. WITH CURSOR IN "OUTPUT ASSIGNMENT #" FIELD, USE + KEY TO FIND THE OUTPUT ASSIGNMENT NUMBER 11, AS SHOWN BELOW.
3. PROGRAM CONTROLLER AS SHOWN:

```
PAGE:1 C1 PIN:12 VEHICLE PHASE
OUTPUT ASSIGNMENT #.....11
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID, 1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
```

```
PAGE:1 C1 PIN:12 VEHICLE PHASE
SELECT VEHICLE OVERLAP (A=1, P=16)...5
SELECT COLOR (0=RED,1=YEL,2=GRN)...0
```

WHEN A "Y" IS ENTERED FOR "VEHICLE OVERLAP" THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN. PRESS ENTER AFTER ENTERING DATA, THEN ESC.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS "VEHICLE OVERLAP" AS SHOWN BELOW:

```
PAGE:1 C1 PIN:12 VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.....11
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID, 1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
```

VEHICLE OVERLAP E (RED) LOAD SWITCH S2

```
PAGE:1 C1 PIN:15 VEHICLE PHASE
OUTPUT ASSIGNMENT #.....13
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID, 1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
```

```
PAGE:1 C1 PIN:15 VEHICLE PHASE
SELECT VEHICLE OVERLAP (A=1, P=16)...5
SELECT COLOR (0=RED,1=YEL,2=GRN)...2
```

WHEN A "Y" IS ENTERED FOR "VEHICLE OVERLAP" THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN. PRESS ENTER AFTER ENTERING DATA, THEN ESC.

VEHICLE OVERLAP E (GREEN) LOAD SWITCH S2

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS "VEHICLE OVERLAP" AS SHOWN BELOW:

```
PAGE:1 C1 PIN:15 VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.....13
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID, 1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
```

PRESS '+' KEY FOR OUTPUT 12

PRESS '+' KEY FOR OUTPUT 13

```
PAGE:1 C1 PIN:13 VEHICLE PHASE
OUTPUT ASSIGNMENT #.....12
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID, 1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
```

```
PAGE:1 C1 PIN:13 VEHICLE PHASE
SELECT VEHICLE OVERLAP (A=1, P=16)...5
SELECT COLOR (0=RED,1=YEL,2=GRN)...1
```

WHEN A "Y" IS ENTERED FOR "VEHICLE OVERLAP" THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN. PRESS ENTER AFTER ENTERING DATA, THEN ESC.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS "VEHICLE OVERLAP" AS SHOWN BELOW:

```
PAGE:1 C1 PIN:13 VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.....12
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID, 1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
```

VEHICLE OVERLAP E (YELLOW) LOAD SWITCH S2

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0257
DESIGNED: May 2016
SEALED: 5/23/2016
REVISED:

C:\Users\jgibson\Documents\Signal\Work\Output\sig\Main\strickland\100257_sme.e_xxv.dgn

Electrical Detail - Sheet 4 of 7

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

 <p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>NC 115 (Main Street) at SR 2411 (South Street)/ Chairman Blake Ln.</p> <p>Division 10 Mecklenburg County Davidson</p> <p>PLAN DATE: May 2016 REVIEWED BY: BAS</p> <p>PREPARED BY: C. Strickland REVIEWED BY:</p>	<p>SEAL</p>  <p>SEAL 030530 ENGINEER CARY M. LITTLE</p>								
<p>REVISIONS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>NO.</th> <th>DESCRIPTION</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		NO.	DESCRIPTION	INIT.	DATE					<p>DocuSigned by: <i>Cary M. Little</i> 5/24/2016</p> <p>0021EFD4F8341F DATE</p> <p>SIG. INVENTORY NO. 10-0257</p>
NO.	DESCRIPTION	INIT.	DATE							

FYA SIGNAL OUTPUT REMAPPING ASSIGNMENT PROGRAMMING DETAIL FOR SIGNAL HEAD 11

(program controller as shown below)

FROM MAIN MENU PRESS '6' (OUTPUTS), THEN
'1' (OUTPUT ASSIGNMENTS).
WITH CURSOR IN "OUTPUT ASSIGNMENT#" POSITION, ENTER "14"

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT
ASSIGNED AS 'VEHICLE OVERLAP' AS SHOWN BELOW.

```

PAGE:1 C1 PIN:16 VEHICLE PHASE
OUTPUT ASSIGNMENT #.....14
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID,1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

THE OUTPUT IS SET AS A VEHICLE PHASE BY DEFAULT. THIS
"Y" WILL REMAIN UNTIL THE OUTPUT IS CHANGED.
ENTER A "Y" FOR VEHICLE OVERLAP.

```

PAGE:1 C1 PIN:16 VEHICLE PHASE
SELECT VEHICLE OVERLAP (A=1,P=16)...1
SELECT COLOR(O=RED,1=YEL,2=GRN)...0
    
```

WHEN A 'Y' IS ENTERED FOR 'VEHICLE OVERLAP'
THE SCREEN SHOWN ABOVE WILL APPEAR.
ENTER DATA AS SHOWN.
PRESS THE 'ENT' KEY AFTER INPUTTING DATA,
THEN 'ESC'.

```

PAGE:1 C1 PIN:16 VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.....14
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID,1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

PRESS "+" KEY FOR OUTPUT 15

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT
ASSIGNED AS 'VEHICLE OVERLAP' AS SHOWN BELOW.

```

PAGE:1 C1 PIN:17 VEHICLE PHASE
OUTPUT ASSIGNMENT #.....15
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID,1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....Y
VEHICLE PHASE.....
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

THE OUTPUT IS SET AS A VEHICLE PHASE BY DEFAULT. THIS
"Y" WILL REMAIN UNTIL THE OUTPUT IS CHANGED.
ENTER A "Y" FOR VEHICLE OVERLAP.

```

PAGE:1 C1 PIN:17 VEHICLE PHASE
SELECT VEHICLE OVERLAP (A=1,P=16)...1
SELECT COLOR(O=RED,1=YEL,2=GRN)...1
    
```

WHEN A 'Y' IS ENTERED FOR 'VEHICLE OVERLAP'
THE SCREEN SHOWN ABOVE WILL APPEAR.
ENTER DATA AS SHOWN.
PRESS THE 'ENT' KEY AFTER INPUTTING DATA,
THEN 'ESC'.

```

PAGE:1 C1 PIN:17 VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.....15
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID,1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

PRESS "+" KEY FOR OUTPUT 16

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT
ASSIGNED AS 'VEHICLE OVERLAP' AS SHOWN BELOW.

```

PAGE:1 C1 PIN:18 VEHICLE PHASE
OUTPUT ASSIGNMENT #.....16
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID,1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

THE OUTPUT IS SET AS A VEHICLE PHASE BY DEFAULT. THIS
"Y" WILL REMAIN UNTIL THE OUTPUT IS CHANGED.
ENTER A "Y" FOR VEHICLE OVERLAP.

```

PAGE:1 C1 PIN:18 VEHICLE PHASE
SELECT VEHICLE OVERLAP (A=1,P=16)...1
SELECT COLOR(O=RED,1=YEL,2=GRN)...2
    
```

WHEN A 'Y' IS ENTERED FOR 'VEHICLE OVERLAP'
THE SCREEN SHOWN ABOVE WILL APPEAR.
ENTER DATA AS SHOWN.
PRESS THE 'ENT' KEY AFTER INPUTTING DATA,
THEN 'ESC'.

```

PAGE:1 C1 PIN:18 VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.....16
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID,1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

PRESS "+" UNTIL OUTPUT 33
IS REACHED.

```

PAGE:1 C1 PIN:35 NOT ENABLED
OUTPUT ASSIGNMENT #.....33
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID,1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....Y
VEHICLE PHASE.....
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

THE OUTPUT IS SET AS "NOT ENABLED" BY DEFAULT. THIS
"Y" WILL REMAIN UNTIL THE OUTPUT IS CHANGED.
ENTER A "Y" FOR VEHICLE PHASE.

```

PAGE:1 C1 PIN:35 NOT ENABLED
SELECT VEHICLE PHASE (1-16)...1
SELECT COLOR(O=RED,1=YEL,2=GRN)...2
    
```

WHEN A 'Y' IS ENTERED FOR 'VEHICLE PHASE'
THE SCREEN SHOWN ABOVE WILL APPEAR.
ENTER DATA AS SHOWN.
PRESS THE 'ENT' KEY AFTER INPUTTING DATA,
THEN 'ESC'.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT
ASSIGNED AS 'VEHICLE PHASE' AS SHOWN BELOW.

```

PAGE:1 C1 PIN:35 VEHICLE PHASE
OUTPUT ASSIGNMENT #.....33
FREQUENCY (O=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (O=DEFAULT) (0 - 100%)...0
MODE (O=SOLID,1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....
VEHICLE OVERLAP.....
PEDESTRIAN OVERLAP.....
WATCHDOG.....
DETECTOR RESET.....
ADVANCE BEACON.....
OUT OF PHASE FLASHER.....
CONTROLLER FLASH.....
RUN FREE.....
RESERVED.....
PREEMPT.....
SOFT PREEMPT.....
ANY PREEMPT.....
COORDINATION PLAN.....
OFFSET.....
PHASE CHECK.....
PHASE ON.....
PHASE NEXT.....
    
```

OUTPUT PROGRAMMING FOR HEAD 11 COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-0257
DESIGNED: May 2016
SEALED: 5/23/2016
REVISED:

Electrical Detail - Sheet 5 of 7

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

 <p>750 N. Greenfield Pkwy, Garner, NC 27529</p>	<p>NC 115 (Main Street) at SR 2411 (South Street)/ Chairman Blake Ln.</p> <p>Division 10 Mecklenburg County Davidson</p> <p>PLAN DATE: May 2016 REVIEWED BY: BAS</p> <p>PREPARED BY: C. Strickland REVIEWED BY:</p>	<p>SEAL</p>  <p>SEAL 030530 ENGINEER CARY M. LITTLE</p>								
<p>REVISIONS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>NO.</th> <th>DESCRIPTION</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		NO.	DESCRIPTION	INIT.	DATE					<p>DocuSigned by: <i>Cary M. Little</i> 5/24/2016</p> <p>0021EFD4F8341F DATE</p> <p>SIG. INVENTORY NO. 10-0257</p>
NO.	DESCRIPTION	INIT.	DATE							

24-May-2016 09:44
 S:\MITS\SIG\Sig\10-0257\Sig\10-0257-5.dgn
 C:\Users\cstrickland

INPUT ASSIGNMENT PROGRAMMING DETAIL FOR DISABLING PED DETECTOR 2 "INPUT 29"

(program controller as shown below)

1. FROM MAIN MENU PRESS '5' (INPUTS).
2. WITH CURSOR IN "INPUT ASSIGNMENT #" FIELD, USE + OR - KEY TO FIND THE INPUT ASSIGNMENT NUMBER 29, AS SHOWN BELOW.
3. PROGRAM CONTROLLER AS SHOWN:

```

PAGE:1 C1 PIN: 67 PEDESTRIAN DETECTOR
INPUT ASSIGNMENT #.....29
DEBOUNCE TIME (0-25.5 SEC).....0.5
DELAY TIME (0-25.5 SEC).....0.0
HOLD-OVER TIME (0-25.5 SEC).....0.0
ASSIGNMENT SELECTION:
NOT ENABLED.....Y
VEHICLE DETECTOR (1-64).....
PEDESTRIAN DETECTOR (1-16).....2
ALTERNATE PED DETECTOR (1-16).....
PREEMPT (1-10).....
INVERTED PREEMPT (1-10).....
STOP TIME (Y/N).....
FLASH SENSE (Y/N).....
DOOR OPEN (Y/N).....
MANUAL CONTROL ENABLE (Y/N).....
MANUAL CONTROL ADVANCE (Y/N).....
SPECIAL FUNCTION ALARM (1-8).....
TOD HOUR SYNCHRONIZATION (0-23).....
FORCE OFF RING (1-4).....
HOLD PHASES (1-16).....
PLAN (65=FLSH,66=FREE)..... OFFSET#..
CHANGE PHASE SEQUENCE PAGE (1-12)...
CHANGE PHASE TIMING PAGE (1-4).....
CHANGE PHASE CONTROL PAGE (1-4).....
CHANGE OVERLAP CONTROL PAGE (1-4)...
CHANGE INPUT PAGE (1-4).....
CHANGE OUTPUT PAGE (1-4).....
OVERRIDE PHASE CONTROL FUNCTION (Y)..
    
```

SCROLL DOWN TO VIEW ALL DATA
↓

SELECT "Y" TO DISABLE PEDESTRIAN DETECTOR
EXISTING DEFAULT PROGRAMMING (IGNORE FOR NOW)
SCREEN NOW APPEARS AS SHOWN TO THE RIGHT.
(PROGRAMMING COMPLETE)

```

PAGE:1 C1 PIN:67 NOT ENABLED
INPUT ASSIGNMENT #.....29
DEBOUNCE TIME (0-25.5 SEC).....0.5
DELAY TIME (0-25.5 SEC).....0.0
HOLD-OVER TIME (0-25.5 SEC).....0.0
ASSIGNMENT SELECTION:
NOT ENABLED.....Y
VEHICLE DETECTOR (1-64).....
PEDESTRIAN DETECTOR (1-16).....0.0
ALTERNATE PED DETECTOR (1-16).....
PREEMPT (1-10).....
INVERTED PREEMPT (1-10).....
STOP TIME (Y/N).....
FLASH SENSE (Y/N).....
DOOR OPEN (Y/N).....
MANUAL CONTROL ENABLE (Y/N).....
MANUAL CONTROL ADVANCE (Y/N).....
SPECIAL FUNCTION ALARM (1-8).....
TOD HOUR SYNCHRONIZATION (0-23).....
FORCE OFF RING (1-4).....
HOLD PHASES (1-16).....
PLAN (65=FLSH,66=FREE)..... OFFSET#..
CHANGE PHASE SEQUENCE PAGE (1-12)...
CHANGE PHASE TIMING PAGE (1-4).....
CHANGE PHASE CONTROL PAGE (1-4).....
CHANGE OVERLAP CONTROL PAGE (1-4)...
CHANGE INPUT PAGE (1-4).....
CHANGE OUTPUT PAGE (1-4).....
OVERRIDE PHASE CONTROL FUNCTION (Y)..
    
```

INPUT ASSIGNMENT PROGRAMMING DETAIL FOR "PED DETECTOR 2"

(program controller as shown below)

1. FROM MAIN MENU PRESS '5' (INPUTS).
2. WITH CURSOR IN "INPUT ASSIGNMENT #" FIELD, USE + OR - KEY TO FIND THE INPUT ASSIGNMENT NUMBER 64, AS SHOWN BELOW.
3. PROGRAM CONTROLLER AS SHOWN:

```

PAGE:1 C1 PIN: 0 NOT ENABLED
INPUT ASSIGNMENT #.....64
DEBOUNCE TIME (0-25.5 SEC).....0.0
DELAY TIME (0-25.5 SEC).....0.0
HOLD-OVER TIME (0-25.5 SEC).....0.0
ASSIGNMENT SELECTION:
NOT ENABLED.....Y
VEHICLE DETECTOR (1-64).....
PEDESTRIAN DETECTOR (1-16).....2
ALTERNATE PED DETECTOR (1-16).....
PREEMPT (1-10).....
INVERTED PREEMPT (1-10).....
STOP TIME (Y/N).....
FLASH SENSE (Y/N).....
DOOR OPEN (Y/N).....
MANUAL CONTROL ENABLE (Y/N).....
MANUAL CONTROL ADVANCE (Y/N).....
SPECIAL FUNCTION ALARM (1-8).....
TOD HOUR SYNCHRONIZATION (0-23).....
FORCE OFF RING (1-4).....
HOLD PHASES (1-16).....
PLAN (65=FLSH,66=FREE)..... OFFSET#..
CHANGE PHASE SEQUENCE PAGE (1-12)...
CHANGE PHASE TIMING PAGE (1-4).....
CHANGE PHASE CONTROL PAGE (1-4).....
CHANGE OVERLAP CONTROL PAGE (1-4)...
CHANGE INPUT PAGE (1-4).....
CHANGE OUTPUT PAGE (1-4).....
OVERRIDE PHASE CONTROL FUNCTION (Y)..
    
```

SCROLL DOWN TO VIEW ALL DATA
↓

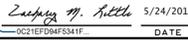
INPUT DATA AS SHOWN, THEN PRESS ENTER
EXISTING DEFAULT PROGRAMMING (IGNORE FOR NOW)
SCREEN NOW APPEARS AS SHOWN TO THE RIGHT.
(PROGRAMMING COMPLETE)

```

PAGE:1 C1 PIN:0 PEDESTRIAN DETECTOR
INPUT ASSIGNMENT #.....64
DEBOUNCE TIME (0-25.5 SEC).....0.0
DELAY TIME (0-25.5 SEC).....0.0
HOLD-OVER TIME (0-25.5 SEC).....0.0
ASSIGNMENT SELECTION:
NOT ENABLED.....
VEHICLE DETECTOR (1-64).....
PEDESTRIAN DETECTOR (1-16).....2
ALTERNATE PED DETECTOR (1-16).....
PREEMPT (1-10).....
INVERTED PREEMPT (1-10).....
STOP TIME (Y/N).....
FLASH SENSE (Y/N).....
DOOR OPEN (Y/N).....
MANUAL CONTROL ENABLE (Y/N).....
MANUAL CONTROL ADVANCE (Y/N).....
SPECIAL FUNCTION ALARM (1-8).....
TOD HOUR SYNCHRONIZATION (0-23).....
FORCE OFF RING (1-4).....
HOLD PHASES (1-16).....
PLAN (65=FLSH,66=FREE)..... OFFSET#..
CHANGE PHASE SEQUENCE PAGE (1-12)...
CHANGE PHASE TIMING PAGE (1-4).....
CHANGE PHASE CONTROL PAGE (1-4).....
CHANGE OVERLAP CONTROL PAGE (1-4)...
CHANGE INPUT PAGE (1-4).....
CHANGE OUTPUT PAGE (1-4).....
OVERRIDE PHASE CONTROL FUNCTION (Y)..
    
```

PED DETECTOR NOTE
NOTE: ENSURE TO ASSIGN PHASE 9 TO PED DETECTOR 2.
REFER TO "INPUT FILE CONNECTION & PROGRAMMING CHART" SHEET 1 OF 7.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0257
DESIGNED: May 2016
SEALED: 5/23/2016
REVISED:

Electrical Detail - Sheet 6 of 7		DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared In the Offices of:  750 N. Greenfield Pkwy, Garner, NC 27529	NC 115 (Main Street) at SR 2411 (South Street)/ Chairman Blake Ln. Division 10 Mecklenburg County Davidson PLAN DATE: May 2016 REVIEWED BY: BAS PREPARED BY: C. Strickland REVIEWED BY: REVISIONS INIT. DATE _____ _____ _____	SEAL  Zachary M. Little ENGINEER 5/24/2016 DATE _____ _____	DocuSigned by:  0021EFD4F8341F DATE _____ _____ SIG. INVENTORY NO. 10-0257

24-May-2016 09:45
S:\MITS\115\S\SIGNAL\work\hgr\oups\sig_mpn\strickland\00257_sml_e_xxnc.dgn
C:\STRICKLAND

INPUT ASSIGNMENT PROGRAMMING DETAIL FOR "USE MIN 2"

(program controller as shown below)

1. FROM MAIN MENU PRESS '5' (INPUTS).
2. WITH CURSOR IN "INPUT ASSIGNMENT #" FIELD, USE + OR - KEY TO FIND THE INPUT ASSIGNMENT NUMBER 63, AS SHOWN BELOW.
3. PROGRAM CONTROLLER AS SHOWN:

```

PAGE:1 C1 PIN: 0 NOT ENABLED
INPUT ASSIGNMENT #.....63
DEBOUNCE TIME (0-25.5 SEC).....0.0
DELAY TIME (0-25.5 SEC).....0.0
HOLD-OVER TIME (0-25.5 SEC).....0.0
ASSIGNMENT SELECTION:
NOT ENABLED.....Y
VEHICLE DETECTOR (1-64).....
PEDESTRIAN DETECTOR (1-16).....
ALTERNATE PED DETECTOR (1-16).....
PREEMPT (1-10).....
INVERTED PREEMPT (1-10).....
STOP TIME (Y/N).....
FLASH SENSE (Y/N).....
DOOR OPEN (Y/N).....
MANUAL CONTROL ENABLE (Y/N).....
MANUAL CONTROL ADVANCE (Y/N).....
SPECIAL FUNCTION ALARM (1-8).....
TOD HOUR SYNCHRONIZATION (0-23).....
FORCE OFF RING (1-4).....
HOLD PHASES (1-16).....
PLAN (65=FLSH,66=FREE).... OFFSET#..
CHANGE PHASE SEQUENCE PAGE (1-12)...
CHANGE PHASE TIMING PAGE (1-4).....
CHANGE PHASE CONTROL PAGE (1-4)....
CHANGE OVERLAP CONTROL PAGE (1-4)...
CHANGE INPUT PAGE (1-4).....
CHANGE OUTPUT PAGE (1-4).....
OVERRIDE PHASE CONTROL FUNCTION (Y).Y
    
```

SCROLL DOWN TO VIEW ALL DATA

EXISTING DEFAULT PROGRAMMING (IGNORE FOR NOW)

AFTER SELECTION IS MADE, THE PHASE CONTROL FUNCTIONS TABLE APPEARS. SCROLL DOWN ON THIS TABLE AND FIND "TIME MIN 2", THEN SELECT PHASE 2 "TIME MIN 2".

AFTER SELECTION IS MADE PRESS "ESC"

SCREEN NOW APPEARS AS SHOWN TO THE RIGHT.
(PROGRAMMING COMPLETE)

SELECT "Y" FOR "OVERRIDE PHASE CONTROL FUNCTION"

```

PAGE:1 C1 PIN:0 OVERRIDE PHASE CONTROL
INPUT ASSIGNMENT #.....63
DEBOUNCE TIME (0-25.5 SEC).....0.0
DELAY TIME (0-25.5 SEC).....0.0
HOLD-OVER TIME (0-25.5 SEC).....0.0
ASSIGNMENT SELECTION:
NOT ENABLED.....
VEHICLE DETECTOR (1-64).....
PEDESTRIAN DETECTOR (1-16).....
ALTERNATE PED DETECTOR (1-16).....
PREEMPT (1-10).....
INVERTED PREEMPT (1-10).....
STOP TIME (Y/N).....
FLASH SENSE (Y/N).....
DOOR OPEN (Y/N).....
MANUAL CONTROL ENABLE (Y/N).....
MANUAL CONTROL ADVANCE (Y/N).....
SPECIAL FUNCTION ALARM (1-8).....
TOD HOUR SYNCHRONIZATION (0-23)....
FORCE OFF RING (1-4).....
HOLD PHASES (1-16).....
PLAN (65=FLSH,66=FREE).... OFFSET#..
CHANGE PHASE SEQUENCE PAGE (1-12)...
CHANGE PHASE TIMING PAGE (1-4).....
CHANGE PHASE CONTROL PAGE (1-4)....
CHANGE OVERLAP CONTROL PAGE (1-4)...
CHANGE INPUT PAGE (1-4).....
CHANGE OUTPUT PAGE (1-4).....
OVERRIDE PHASE CONTROL FUNCTION (Y).Y
    
```

INPUT ASSIGNMENT PROGRAMMING DETAIL FOR "USE MAX 2"

(program controller as shown below)

1. FROM MAIN MENU PRESS '5' (INPUTS).
2. WITH CURSOR IN "INPUT ASSIGNMENT #" FIELD, USE + OR - KEY TO FIND THE INPUT ASSIGNMENT NUMBER 62, AS SHOWN BELOW.
3. PROGRAM CONTROLLER AS SHOWN:

```

PAGE:1 C1 PIN: 0 NOT ENABLED
INPUT ASSIGNMENT #.....62
DEBOUNCE TIME (0-25.5 SEC).....0.0
DELAY TIME (0-25.5 SEC).....0.0
HOLD-OVER TIME (0-25.5 SEC).....0.0
ASSIGNMENT SELECTION:
NOT ENABLED.....Y
VEHICLE DETECTOR (1-64).....
PEDESTRIAN DETECTOR (1-16).....
ALTERNATE PED DETECTOR (1-16).....
PREEMPT (1-10).....
INVERTED PREEMPT (1-10).....
STOP TIME (Y/N).....
FLASH SENSE (Y/N).....
DOOR OPEN (Y/N).....
MANUAL CONTROL ENABLE (Y/N).....
MANUAL CONTROL ADVANCE (Y/N).....
SPECIAL FUNCTION ALARM (1-8).....
TOD HOUR SYNCHRONIZATION (0-23).....
FORCE OFF RING (1-4).....
HOLD PHASES (1-16).....
PLAN (65=FLSH,66=FREE).... OFFSET#..
CHANGE PHASE SEQUENCE PAGE (1-12)...
CHANGE PHASE TIMING PAGE (1-4).....
CHANGE PHASE CONTROL PAGE (1-4)....
CHANGE OVERLAP CONTROL PAGE (1-4)...
CHANGE INPUT PAGE (1-4).....
CHANGE OUTPUT PAGE (1-4).....
OVERRIDE PHASE CONTROL FUNCTION (Y).Y
    
```

SCROLL DOWN TO VIEW ALL DATA

EXISTING DEFAULT PROGRAMMING (IGNORE FOR NOW)

AFTER SELECTION IS MADE, THE PHASE CONTROL FUNCTIONS TABLE APPEARS. SCROLL DOWN ON THIS TABLE AND FIND "TIME MAX 2", THEN SELECT PHASE 2 "TIME MAX 2".

AFTER SELECTION IS MADE PRESS "ESC"

SCREEN NOW APPEARS AS SHOWN TO THE RIGHT.
(PROGRAMMING COMPLETE)

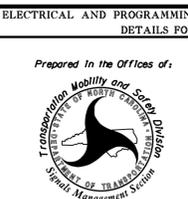
SELECT "Y" FOR "OVERRIDE PHASE CONTROL FUNCTION"

```

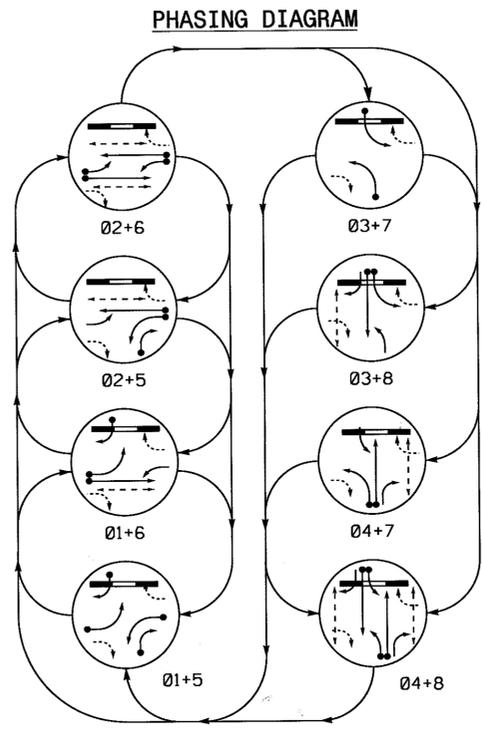
PAGE:1 C1 PIN:0 OVERRIDE PHASE CONTROL
INPUT ASSIGNMENT #.....62
DEBOUNCE TIME (0-25.5 SEC).....0.0
DELAY TIME (0-25.5 SEC).....0.0
HOLD-OVER TIME (0-25.5 SEC).....0.0
ASSIGNMENT SELECTION:
NOT ENABLED.....
VEHICLE DETECTOR (1-64).....
PEDESTRIAN DETECTOR (1-16).....
ALTERNATE PED DETECTOR (1-16).....
PREEMPT (1-10).....
INVERTED PREEMPT (1-10).....
STOP TIME (Y/N).....
FLASH SENSE (Y/N).....
DOOR OPEN (Y/N).....
MANUAL CONTROL ENABLE (Y/N).....
MANUAL CONTROL ADVANCE (Y/N).....
SPECIAL FUNCTION ALARM (1-8).....
TOD HOUR SYNCHRONIZATION (0-23)....
FORCE OFF RING (1-4).....
HOLD PHASES (1-16).....
PLAN (65=FLSH,66=FREE).... OFFSET#..
CHANGE PHASE SEQUENCE PAGE (1-12)...
CHANGE PHASE TIMING PAGE (1-4).....
CHANGE PHASE CONTROL PAGE (1-4)....
CHANGE OVERLAP CONTROL PAGE (1-4)...
CHANGE INPUT PAGE (1-4).....
CHANGE OUTPUT PAGE (1-4).....
OVERRIDE PHASE CONTROL FUNCTION (Y).Y
    
```

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0257
DESIGNED: May 2016
SEALED: 5/23/2016
REVISED:

Electrical Detail - Sheet 7 of 7

	<p>NC 115 (Main Street) at SR 2411 (South Street)/ Chairman Blake Ln.</p> <p>Division 10 Mecklenburg County Davidson</p> <p>PLAN DATE: May 2016 REVIEWED BY: BAS</p> <p>PREPARED BY: C. Strickland REVIEWED BY:</p>	<p>SEAL</p>  <p>SEAL 030530</p> <p>Zachary M. Little ENGINEER</p>
<p>750 N. Greenfield Pkwy, Garner, NC 27529</p>		<p>DocuSigned by: <i>Zachary M. Little</i> 5/24/2016</p> <p>0021EFD4F8341F DATE</p> <p>SIG. INVENTORY NO. 10-0257</p>

24-May-2016 09:46
 C:\MTS\115\Sigs\Sig\101\work\hgr\00257_sml_e_xxx.dgn
 C:\MTS\115\Sigs\Sig\101\work\hgr\00257_sml_e_xxx.dgn
 C:\MTS\115\Sigs\Sig\101\work\hgr\00257_sml_e_xxx.dgn



PHASING DIAGRAM DETECTION LEGEND
 ← ● DETECTED MOVEMENT
 ← ○ UNDETECTED MOVEMENT (OVERLAP)
 - - - UNSIGNALIZED MOVEMENT
 ← P PEDESTRIAN MOVEMENT

SIGNAL FACE I.D.

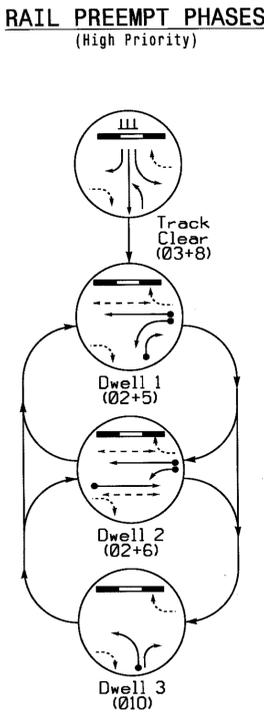
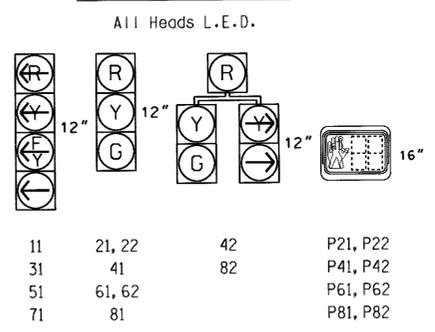


TABLE OF OPERATION

SIGNAL FACE	PHASE											
	01+5	01+6	02+5	02+6	03+7	03+8	04+7	04+8	DWELL 1	DWELL 2	DWELL 3	FLASH
11	←	←	←	←	←	←	←	←	←	←	←	←
21, 22	R	R	G	G	R	R	R	R	G	G	R	Y
31	←	←	←	←	←	←	←	←	←	←	←	←
41	R	R	R	R	R	R	G	G	R	R	R	R
42	R	R	R	R	R	R	G	G	R	R	R	R
51	←	←	←	←	←	←	←	←	←	←	←	←
61, 62	R	G	R	G	R	R	R	R	R	R	G	Y
71	←	←	←	←	←	←	←	←	←	←	←	←
81	R	R	R	R	R	G	R	G	R	R	R	R
82	R	R	R	R	R	G	R	G	R	R	R	R
P21, P22	DW	DW	W	DW	DW	DW	DW	DW	W	W	DW	DRK
P41, P42	DW	DW	DW	DW	DW	W	W	DW	DW	DW	DW	DRK
P61, P62	DW	W	DW	W	DW	DW	DW	DW	DW	W	DW	DRK
P81, P82	DW	DW	DW	DW	W	DW	W	DW	DW	DW	DW	DRK

OASIS 2070 RR PREEMPT

FUNCTION	PRE 1
Interval 1 - Track Clearance Green	12
Interval 1 - Track Clearance Yellow	4.0
Interval 1 - Track Clearance Red	1.5
Interval 2 - Dwell Green	255
Interval 2 - Dwell Yellow	0.0*
Interval 2 - Dwell Red	0.0*
Interval 5 - Exit Green	1
Interval 5 - Yellow	0.0
Interval 5 - Red	0.0
Exit Phase(s)	3.7
Priority	HIGH
Delay Time	0.0
Min Green Before Pre	1
Ped Clear Before Pre	4
Yellow Clear Before Pre	3.9
Red Clear Before Pre	3.1
Dwell Min Time	10
Enable Backup Protection	N
Ped Clear Through Yellow	Y
Omit Overlaps	A, P

* Time defaults to time used for phase during normal operation

OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

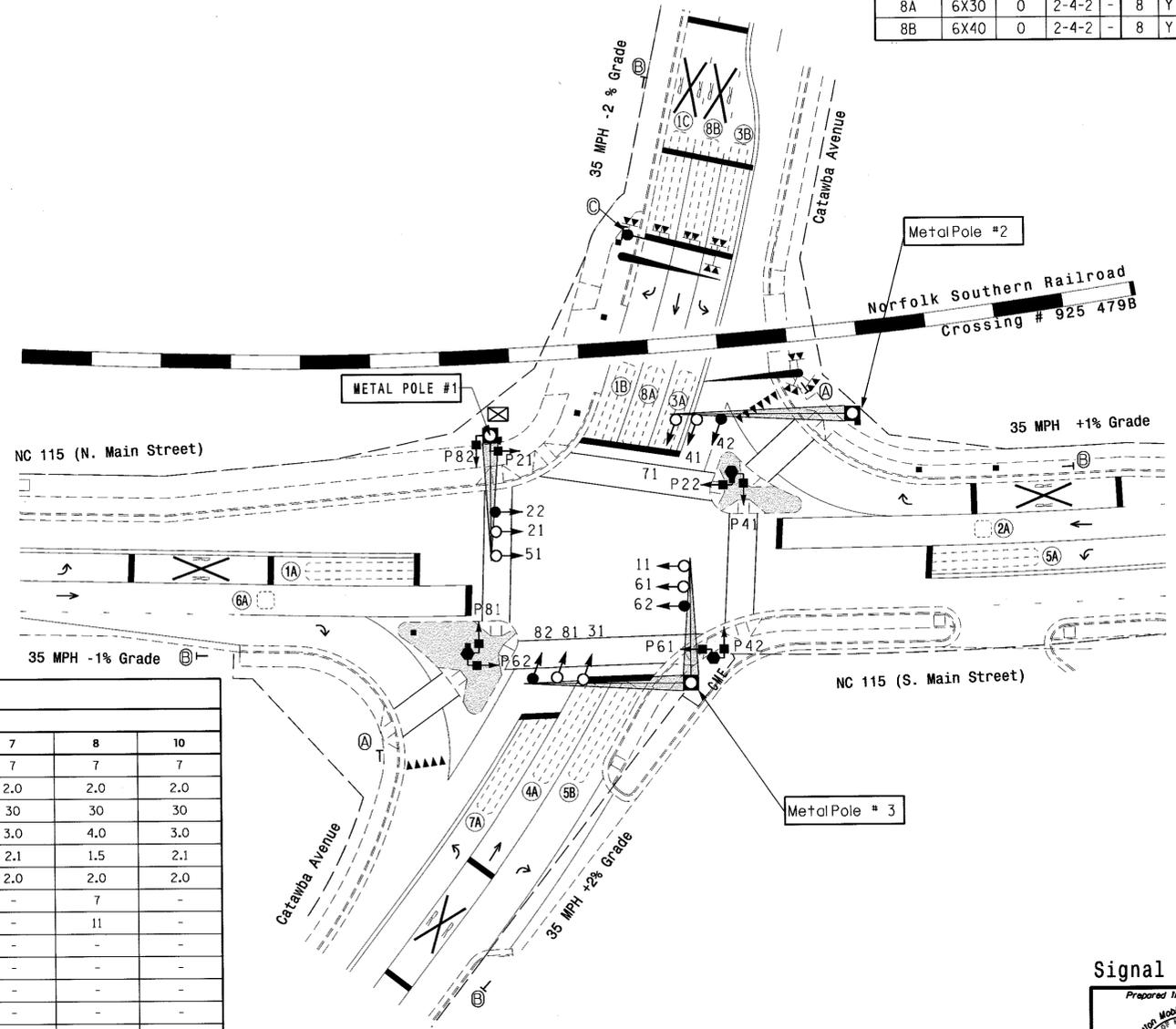
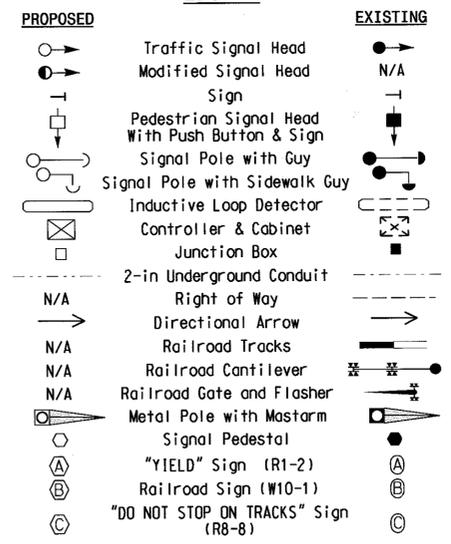
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD	
					PHASE	CALLING	EXTENSION	STRETCH TIME			DELAY TIME
1A	6X40	0	2-4-2	-	1	Y	Y	-	15	-	Y
1B	6X30	0	2-4-2	-	1	Y	Y	-	15	-	Y
1C	6X40	0	2-4-2	-	1	Y	Y	-	15	-	Y
2A	6X6	70	5	-	2	Y	Y	-	15	-	Y
3A	6X30	0	2-4-2	-	8	Y	Y	-	3	-	Y
3B	6X40	0	2-4-2	-	3	Y	Y	-	15	-	Y
4A	6X40	0	2-4-2	-	4	Y	Y	-	15	-	Y
5A	6X40	0	2-4-2	-	5	Y	Y	-	15	-	Y
6A	6X6	70	5	-	6	Y	Y	-	15	-	Y
7A	6X40	0	2-4-2	-	4/10	Y	Y	-	3	-	Y
8A	6X30	0	2-4-2	-	8	Y	Y	-	15	-	Y
8B	6X40	0	2-4-2	-	8	Y	Y	-	15	-	Y

8 Phase Fully Actuated W/ RR Preemption Isolated

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- This location contains railroad preemption phasing. Do not program signal for late night flashing operation.
- Phase 1 and/or phase 5 may be lagged.
- Phase 3 and/or phase 7 may be lagged.
- Reposition existing signal heads as needed.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- Pavement markings are existing.
- Program parent phases for Overlap "P" for all phases used in normal operation.

LEGEND



OASIS 2070 TIMING CHART

FEATURE	PHASE									
	1	2	3	4	5	6	7	8	10	10
Min Green 1*	7	10	7	7	7	10	7	7	7	7
Extension 1*	2.0	3.0	2.0	2.0	2.0	3.0	2.0	2.0	2.0	2.0
Max Green 1*	20	90	20	30	20	90	30	30	30	30
Yellow Clearance	3.0	3.9	3.0	4.0	3.0	3.9	3.0	4.0	3.0	3.0
Red Clearance	3.2	3.1	1.9	1.5	3.9	3.1	2.1	1.5	2.1	2.1
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1*	-	7	-	7	-	7	-	7	-	-
Don't Walk 1	-	14	-	8	-	15	-	11	-	-
Seconds Per Actuation*	-	-	-	-	-	-	-	-	-	-
Max Variable Initial*	-	-	-	-	-	-	-	-	-	-
Time Before Reduction*	-	-	-	-	-	-	-	-	-	-
Time To Reduce*	-	-	-	-	-	-	-	-	-	-
Minimum Gap	-	-	-	-	-	-	-	-	-	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-	-	-	-
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW	-	-	-	-
Dual Entry	-	-	-	-	-	-	-	-	-	-
Simultaneous Gap	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

This signal is designed for simultaneous preemption

Signal Upgrade

Prepared in the Offices of:
 TRANSPORTATION MOBILITY AND SAFETY DIVISION
 NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 Signal Design Section
 750 N. Greenfield Pkwy, Garner, NC 27529

NC 115 (Main Street) at Catawba Avenue

Division 10 Mecklenburg County Cornelius
 PLAN DATE: October 2013 REVIEWED BY: P. Alexander
 PREPARED BY: M. Mahbooba REVIEWED BY:

SCALE: 1"=30'

REVISIONS: _____

SIGNATURE: _____ DATE: _____

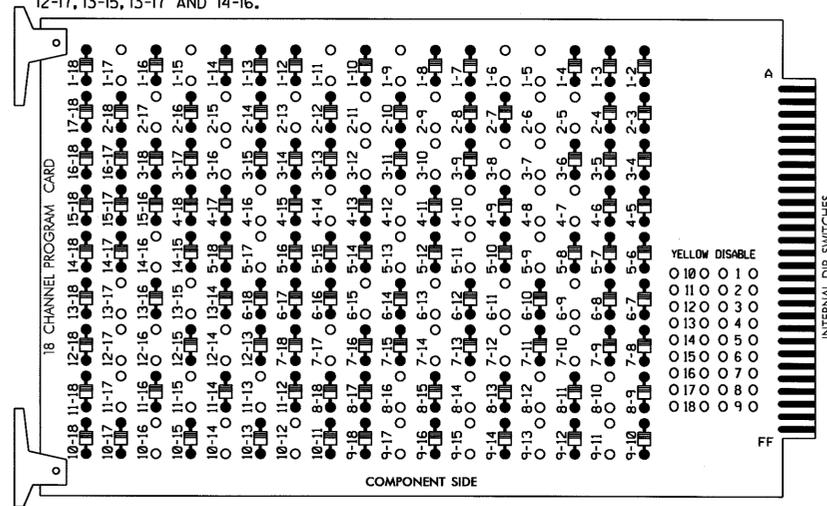
SIC. INVENTORY NO. 10-0267

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 99-1070-2013-05-27
 100-1070-2013-05-27

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

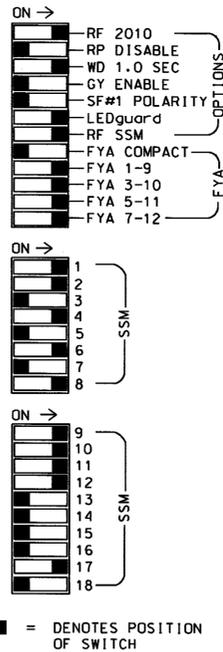
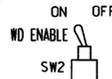
REMOVE DIODE JUMPERS: 1-5, 1-6, 1-9, 1-11, 1-15, 1-17, 2-5, 2-6, 2-9, 2-11, 2-13, 2-15, 2-17, 3-7, 3-8, 3-10, 3-12, 3-16, 4-7, 4-8, 4-10, 4-12, 4-14, 4-16, 5-9, 5-11, 5-13, 5-17, 6-9, 6-11, 6-13, 6-15, 7-10, 7-12, 7-14, 7-17, 8-10, 8-12, 8-14, 8-16, 9-11, 9-13, 9-15, 9-17, 10-12, 10-14, 10-16, 11-13, 11-15, 11-17, 12-14, 12-16, 12-17, 13-15, 13-17 AND 14-16.



REMOVE JUMPERS AS SHOWN

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.



NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Program phases 4 and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2, 4, 6 and 8 for 'STARTUP PED CALL'.
- Program phases 2 and 6 for Yellow Flash and overlaps 1 and 2 as Wag Overlaps.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
 CABINET.....332 /W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S3,S4,S5,S6,S7,S8,S9,S10,
 S11,S12,AUX S1,AUX S2,AUX S3
 ,AUX S4,AUX S5.
 PHASES USED.....1,2,3,4,5,6,7,8,2 PED,4 PED,
 6 PED,8 PED,*10
 OVERLAP "A".....1+2
 OVERLAP "B".....3+4
 OVERLAP "C".....5+6
 OVERLAP "D".....7+8+10
 OVERLAP "E".....5+10
 OVERLAP "F".....NOT USED
 OVERLAP "G".....7+10
 OVERLAP "P".....1+2+3+4+5+6+7+8
 * USED ONLY DURING PREEMPT.

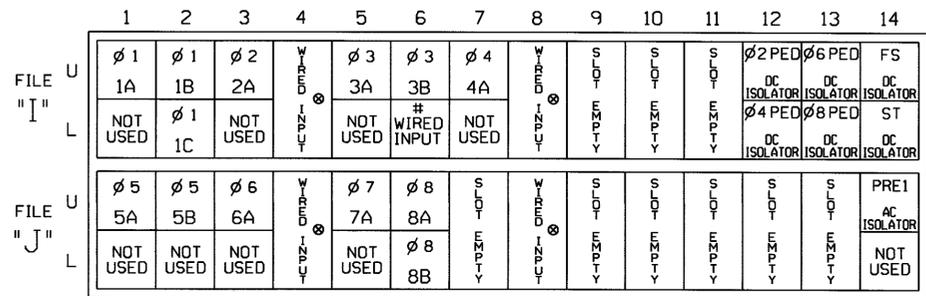
SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CMU CHANNEL NO.	1	2	13	3	4	14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1	2	2 PED	3	4	4 PED	5	6	6 PED	OLG	8	8 PED	OLA	OLB	OLE	OLC	OLD	NU
SIGNAL HEAD NO.	11*	82	21,22	P21, P22	31*	41,42	P41, P42	51*	61,62	P61, P62	71*	81,82	P81, P82	11*	31*	42	51*	71*
RED	*	128			101			134			107			*				
YELLOW		129		*	102		*	135		*	108							
GREEN		130			103			136			109							
RED ARROW													A121	A124		A114	A101	
YELLOW ARROW	126												A122	A125	A112	A115	A102	
FLASHING YELLOW ARROW													A123	A126		A116	A103	
GREEN ARROW	127	127		118			133		124							A113		
Hand				113			104		119				110					
Person				115			106		121				112					

NU = Not Used
 * Denotes install load resistor. See load resistor installation detail this sheet.
 * See pictorial of head wiring in detail below.

INPUT FILE POSITION LAYOUT

(front view)



EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME
 PRE1 = RAILROAD PREEMPT

- ⊗ Wired Input - Do not populate slot with detector card
- # Wired Input - Disable Channel 2.

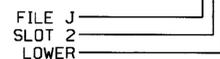
INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A ¹	TB2-1,2	I1U	56	18	1	1	Y	Y			15
	-	J4U	48	10	26	6	Y	Y			
1B	TB2-5,6	I2U	39	1	2	1	Y	Y			15
1C	TB2-7,8	I2L	43	5	12	1	Y	Y			15
2A	TB2-9,10	I3U	63	25	32	2	Y	Y			
3A ²	TB4-5,6	I5U	58	20	3	3	Y	Y			15
	-	J8U	50	12	28	8	Y	Y			3
3B ³	TB4-9,10	I6U	41	3	4	3	Y	Y			15
	-	I6L	45	7	14	8	Y	Y			
4A	TB6-1,2	I7U	65	27	34	4	Y	Y			
5A ⁴	TB3-1,2	J1U	95	17	5	5	Y	Y			15
	-	I4U	47	9	22	2	Y	Y			
5B	TB3-5,6	J2U	40	2	6	5	Y	Y			15
6A	TB3-9,10	J3U	64	26	36	6	Y	Y			
7A ⁵	TB5-5,6	J5U	57	19	7	7	Y	Y			15
	-	I8U	49	11	24	4/10	Y	Y			3
8A	TB5-9,10	J6U	42	4	8	8	Y	Y			
8B	TB5-11,12	J6L	46	8	18	8	Y	Y			
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29					2 PED		
P41,P42	TB8-5,6	I12L	69	31					4 PED		
P61,P62	TB8-7,9	I13U	68	30					6 PED		
P81,P82	TB8-8,9	I13L	70	32					8 PED		

NOTE:
 INSTALL DC ISOLATORS IN INPUT FILE SLOTS 112 AND 113.

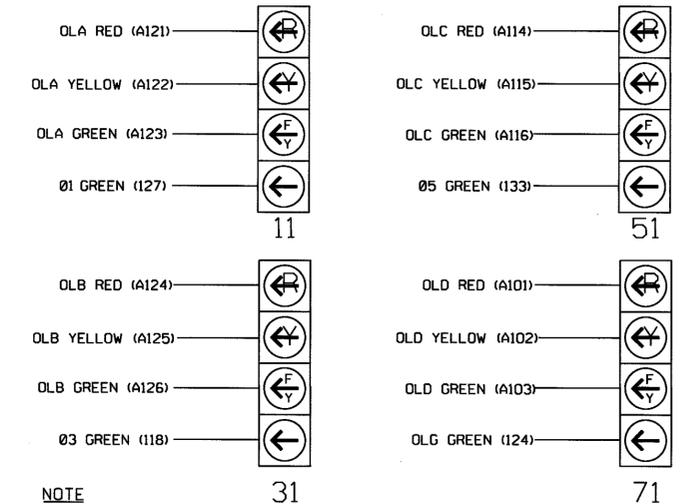
- Add jumper from I1-W to J4-W. on rear of input file.
- Add jumper from I5-W to J8-W. on rear of input file.
- Add jumper from I6-F to I6-W. on rear of input file.
- Add jumper from J1-W to I4-W. on rear of input file.
- Add jumper from J5-W to I8-W. on rear of input file.

INPUT FILE POSITION LEGEND: J2L



4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

1. The sequence display for these signals require special logic programming. See sheet 2 for programming instructions.

PREEMPT ONLY PHASE OMIT NOTE

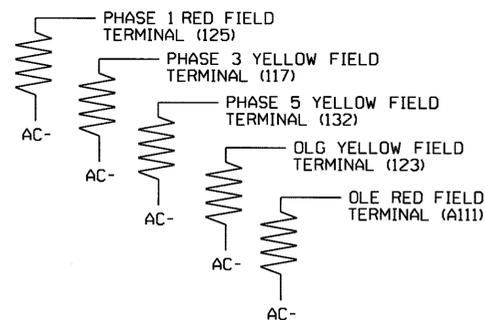
(program controller as shown below)

From Main Menu press '2' (Phase Control). Then '1' (Phase Control Functions). Program Phase 10 for 'Omit Phase' and Phases 1,2,3,4,5,6,7 and 8 for 'Startup Calls'. This is to prevent Phase 10 from being served when not in Preempt.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

VALUE (ohms)	WATTAGE
1.5K - 1.9K	25W (min)
2.0K - 3.0K	10W (min)



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0267
 DESIGNED: October 2013
 SEALED: 11-20-13
 REVISED: N/A

ELECTRICAL DETAIL SHEET 1 OF 4

Prepared In the Offices of:
 Transportation Utility and Safety
 Division of Transportation
 Signal Management Section
 750 N. Greenfield Pkwy, Garner, NC 27529

NC 115 (Main Street) at Catawba Avenue
 Division 10 Mecklenburg County Cornelius
 PLAN DATE: November 2013 REVIEWED BY: JTK
 PREPARED BY: James Peterson REVIEWED BY:
 REVISIONS INIT. DATE

SEAL
 JAMES T. ROWE, JR.
 PROFESSIONAL ENGINEER
 SEAL 008453
 SIGNATURE DATE 11-21-13
 SIG. INVENTORY NO. 10-0267

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, AND 12.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

LOGICAL I/O COMMAND #1 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON
AND RED CLEAR ON PHASE #1 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #50 ON
SET OUTPUT ASSIGNMENT #51 OFF

PRESS '+'

NOTE: LOGIC FOR PHASE 1 RED CLEAR WHEN TRANSITIONING FROM PHASE 1 TO PHASE 2 (HEAD 11).

LOGICAL I/O COMMAND #2 (+/-COMMAND#)
IF ACTIVE PHASE #1 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #52 OFF

PRESS '+'

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 1 (HEAD 11).

LOGICAL I/O COMMAND #3 (+/-COMMAND#)
IF YELLOW ON PHASE #1 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #51 ON

PRESS '+'

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 1 (HEAD 11).

LOGICAL I/O COMMAND #4 (+/-COMMAND#)
IF ACTIVE PHASE #5 IS ON
AND RED CLEAR ON PHASE #5 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #42 ON
SET OUTPUT ASSIGNMENT #43 OFF

PRESS '+'

NOTE: LOGIC FOR PHASE 5 RED CLEAR WHEN TRANSITIONING FROM PHASE 5 TO PHASE 6 (HEAD 51).

LOGICAL I/O COMMAND #5 (+/-COMMAND#)
IF ACTIVE PHASE #5 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #44 OFF

PRESS '+'

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 5 (HEAD 51).

LOGICAL I/O COMMAND #6 (+/-COMMAND#)
IF YELLOW ON PHASE #5 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #43 ON

PRESS '+'

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 5 (HEAD 51).

LOGICAL I/O COMMAND #7 (+/-COMMAND#)
IF ACTIVE PHASE #3 IS ON
AND RED CLEAR ON PHASE #3 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #47 ON
SET OUTPUT ASSIGNMENT #48 OFF

PRESS '+'

NOTE: LOGIC FOR PHASE 3 RED CLEAR WHEN TRANSITIONING FROM PHASE 3 TO PHASE 4 (HEAD 31).

LOGICAL I/O COMMAND #8 (+/-COMMAND#)
IF ACTIVE PHASE #3 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #49 OFF

PRESS '+'

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 3 (HEAD 31).

LOGICAL I/O COMMAND #9 (+/-COMMAND#)
IF YELLOW ON PHASE #3 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #48 ON

PRESS '+'

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 3 (HEAD 31).

LOGICAL I/O COMMAND #10 (+/-COMMAND#)
IF ACTIVE OVERLAP #7 IS ON
AND RED CLEAR ON OVL #7 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #39 ON
SET OUTPUT ASSIGNMENT #40 OFF

PRESS '+'

NOTE: LOGIC FOR PHASE 7 RED CLEAR WHEN TRANSITIONING FROM PHASE 7 TO PHASE 8 (HEAD 71).

LOGICAL I/O COMMAND #11 (+/-COMMAND#)
IF ACTIVE OVERLAP #7 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #41 OFF

PRESS '+'

NOTE: LOGIC FOR SWITCHING FLASHING YELLOW ARROW "OFF" DURING PHASE 7 (HEAD 71).

LOGICAL I/O COMMAND #12 (+/-COMMAND#)
IF YELLOW ON OVERLAP #7 IS ON

↓
SCROLL DOWN

THEN:
SET OUTPUT ASSIGNMENT #40 ON

PRESS '+'

NOTE: LOGIC FOR YELLOW ARROW CLEARANCE FROM PHASE 7 (HEAD 71).

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
PHASE: 12345678910111213141516
VEH OVL PARENTS: XX
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN

↓
PRESS '+'

NOTICE GREEN FLASH

PAGE 1: VEHICLE OVERLAP 'B' SETTINGS
PHASE: 12345678910111213141516
VEH OVL PARENTS: XX
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN

↓
PRESS '+'

NOTICE GREEN FLASH

PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
PHASE: 12345678910111213141516
VEH OVL PARENTS: XX
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN

↓
PRESS '+'

NOTICE GREEN FLASH

PAGE 1: VEHICLE OVERLAP 'D' SETTINGS
PHASE: 12345678910111213141516
VEH OVL PARENTS: XX X
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW X GREEN

↓
PRESS '+'

NOTICE GREEN FLASH

PAGE 1: VEHICLE OVERLAP 'E' SETTINGS
PHASE: 12345678910111213141516
VEH OVL PARENTS: X X
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW GREEN

↓
PRESS '+' TWICE

PAGE 1: VEHICLE OVERLAP 'G' SETTINGS
PHASE: 12345678910111213141516
VEH OVL PARENTS: X X
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW GREEN

↓
PRESS '+' 9 TIMES

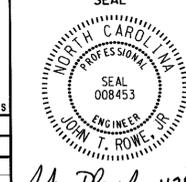
PAGE 1: VEHICLE OVERLAP 'P' SETTINGS
PHASE: 12345678910111213141516
VEH OVL PARENTS: XXXXXXXX
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: - RED - YELLOW - GREEN
FLASH COLORS: - RED - YELLOW GREEN

↓
OVERLAP PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE	
USE TO INTERPRET LOGIC PROCESSOR	
OUTPUT 39	= Overlap D Red
OUTPUT 40	= Overlap D Yellow
OUTPUT 41	= Overlap D Green
OUTPUT 42	= Overlap C Red
OUTPUT 43	= Overlap C Yellow
OUTPUT 44	= Overlap C Green
OUTPUT 47	= Overlap B Red
OUTPUT 48	= Overlap B Yellow
OUTPUT 49	= Overlap B Green
OUTPUT 50	= Overlap A Red
OUTPUT 51	= Overlap A Yellow
OUTPUT 52	= Overlap A Green

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0267
DESIGNED: October 2013
SEALED: 11-20-13
REVISED: N/A

ELECTRICAL DETAIL SHEET 2 OF 4

 Prepared in the Offices of: Transportation Mobility and Safety Division STATE OF NORTH CAROLINA Signal Management Section 750 N. Greenfield Pkwy, Corner, NC 27529	NC 115 (Main Street) at Catawba Avenue Division 10 Mecklenburg County Cornelius PLAN DATE: November 2013 REVIEWED BY: JTR PREPARED BY: James Peterson REVIEWED BY:	SEAL  JOHN T. ROWE, JR. ENGINEER 11/20/13 DATE								
REVISIONS: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>NO.</th> <th>DESCRIPTION</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>			NO.	DESCRIPTION	INIT.	DATE				
NO.	DESCRIPTION	INIT.	DATE							
SIG. INVENTORY NO. 10-0267										

20-NOV-2013 11:18 S:\1156SUM\115_Signals\wagroups\510_NonPetersen\00267_sgm_e-xxxx.dgn JTPetersen

OVERLAP "E" OUTPUT ASSIGNMENT PROGRAMMING DETAIL *(program controller as shown below)*

- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS).
- WITH CURSOR IN "OUTPUT ASSIGNMENT #" FIELD, USE + KEY TO FIND THE OUTPUT ASSIGNMENT NUMBER 45, AS SHOWN BELOW.
- PROGRAM CONTROLLER AS SHOWN:

```

PAGE:1 C1 PIN:91 NOT ENABLED
OUTPUT ASSIGNMENT #.....45
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID, 1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....Y
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....Y
WATCHDOG.....Y
DETECTOR RESET.....Y
ADVANCE BEACON.....Y
OUT OF PHASE FLASHER.....Y
CONTROLLER FLASH.....Y
RUN FREE.....Y
RESERVED.....Y
PREEMPT.....Y
SOFT PREEMPT.....Y
ANY PREEMPT.....Y
COORDINATION PLAN.....Y
OFFSET.....Y
PHASE CHECK.....Y
PHASE ON.....Y
PHASE NEXT.....Y
    
```

SCROLL DOWN TO VIEW ALL DATA

```

PAGE:1 C1 PIN:91 NOT ENABLED
SELECT VEHICLE OVERLAP (A=1, P=16)...5
SELECT COLOR (0=RED,1=YEL,2=GRN)...0
    
```

WHEN A "Y" IS ENTERED FOR "VEHICLE OVERLAP" THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN. PRESS ENTER AFTER ENTERING DATA, THEN ESC.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS "VEHICLE OVERLAP" AS SHOWN BELOW:

```

PAGE:1 C1 PIN:91 VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.....45
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID, 1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....Y
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....Y
WATCHDOG.....Y
DETECTOR RESET.....Y
ADVANCE BEACON.....Y
OUT OF PHASE FLASHER.....Y
CONTROLLER FLASH.....Y
RUN FREE.....Y
RESERVED.....Y
PREEMPT.....Y
SOFT PREEMPT.....Y
ANY PREEMPT.....Y
COORDINATION PLAN.....Y
OFFSET.....Y
PHASE CHECK.....Y
PHASE ON.....Y
PHASE NEXT.....Y
    
```

VEHICLE OVERLAP E (RED) LOAD SWITCH AUX S3

- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS).
- WITH CURSOR IN "OUTPUT ASSIGNMENT #" FIELD, USE + KEY TO FIND THE OUTPUT ASSIGNMENT NUMBER 46, AS SHOWN BELOW.
- PROGRAM CONTROLLER AS SHOWN:

```

PAGE:1 C1 PIN:93 NOT ENABLED
OUTPUT ASSIGNMENT #.....46
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID, 1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....Y
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....Y
WATCHDOG.....Y
DETECTOR RESET.....Y
ADVANCE BEACON.....Y
OUT OF PHASE FLASHER.....Y
CONTROLLER FLASH.....Y
RUN FREE.....Y
RESERVED.....Y
PREEMPT.....Y
SOFT PREEMPT.....Y
ANY PREEMPT.....Y
COORDINATION PLAN.....Y
OFFSET.....Y
PHASE CHECK.....Y
PHASE ON.....Y
PHASE NEXT.....Y
    
```

SCROLL DOWN TO VIEW ALL DATA

```

PAGE:1 C1 PIN:93 NOT ENABLED
SELECT VEHICLE OVERLAP (A=1, P=16)...5
SELECT COLOR (0=RED,1=YEL,2=GRN)...2
    
```

WHEN A "Y" IS ENTERED FOR "VEHICLE OVERLAP" THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN. PRESS ENTER AFTER ENTERING DATA, THEN ESC.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS "VEHICLE OVERLAP" AS SHOWN BELOW:

```

PAGE:1 C1 PIN:93 VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.....46
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID, 1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....Y
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....Y
WATCHDOG.....Y
DETECTOR RESET.....Y
ADVANCE BEACON.....Y
OUT OF PHASE FLASHER.....Y
CONTROLLER FLASH.....Y
RUN FREE.....Y
RESERVED.....Y
PREEMPT.....Y
SOFT PREEMPT.....Y
ANY PREEMPT.....Y
COORDINATION PLAN.....Y
OFFSET.....Y
PHASE CHECK.....Y
PHASE ON.....Y
PHASE NEXT.....Y
    
```

VEHICLE OVERLAP E (GREEN) LOAD SWITCH AUX S3

- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS).
- WITH CURSOR IN "OUTPUT ASSIGNMENT #" FIELD, USE + KEY TO FIND THE OUTPUT ASSIGNMENT NUMBER 54, AS SHOWN BELOW.
- PROGRAM CONTROLLER AS SHOWN:

```

PAGE:1 C1 PIN:101 CONTROLLER FLASH
OUTPUT ASSIGNMENT #.....54
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID, 1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....Y
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....Y
WATCHDOG.....Y
DETECTOR RESET.....Y
ADVANCE BEACON.....Y
OUT OF PHASE FLASHER.....Y
CONTROLLER FLASH.....Y
RUN FREE.....Y
RESERVED.....Y
PREEMPT.....Y
SOFT PREEMPT.....Y
ANY PREEMPT.....Y
COORDINATION PLAN.....Y
OFFSET.....Y
PHASE CHECK.....Y
PHASE ON.....Y
PHASE NEXT.....Y
    
```

SCROLL DOWN TO VIEW ALL DATA

```

PAGE:1 C1 PIN:101 CONTROLLER FLASH
SELECT VEHICLE OVERLAP (A=1, P=16)...5
SELECT COLOR (0=RED,1=YEL,2=GRN)...1
    
```

WHEN A "Y" IS ENTERED FOR "VEHICLE OVERLAP" THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN. PRESS ENTER AFTER ENTERING DATA, THEN ESC.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS "VEHICLE OVERLAP" AS SHOWN BELOW:

```

PAGE:1 C1 PIN:101 VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.....54
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID, 1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....Y
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....Y
WATCHDOG.....Y
DETECTOR RESET.....Y
ADVANCE BEACON.....Y
OUT OF PHASE FLASHER.....Y
CONTROLLER FLASH.....Y
RUN FREE.....Y
RESERVED.....Y
PREEMPT.....Y
SOFT PREEMPT.....Y
ANY PREEMPT.....Y
COORDINATION PLAN.....Y
OFFSET.....Y
PHASE CHECK.....Y
PHASE ON.....Y
PHASE NEXT.....Y
    
```

VEHICLE OVERLAP E (YELLOW) LOAD SWITCH AUX S3

OVERLAP "G" OUTPUT ASSIGNMENT PROGRAMMING DETAIL *(program controller as shown below)*

- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '1' (OUTPUT ASSIGNMENTS).
- WITH CURSOR IN "OUTPUT ASSIGNMENT #" FIELD, USE + KEY TO FIND THE OUTPUT ASSIGNMENT NUMBER 22, AS SHOWN BELOW.
- PROGRAM CONTROLLER AS SHOWN:

```

PAGE:1 C1 PIN:24 VEHICLE PHASE
OUTPUT ASSIGNMENT #.....22
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID, 1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....Y
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....Y
WATCHDOG.....Y
DETECTOR RESET.....Y
ADVANCE BEACON.....Y
OUT OF PHASE FLASHER.....Y
CONTROLLER FLASH.....Y
RUN FREE.....Y
RESERVED.....Y
PREEMPT.....Y
SOFT PREEMPT.....Y
ANY PREEMPT.....Y
COORDINATION PLAN.....Y
OFFSET.....Y
PHASE CHECK.....Y
PHASE ON.....Y
PHASE NEXT.....Y
    
```

SCROLL DOWN TO VIEW ALL DATA

```

PAGE:1 C1 PIN:24 VEHICLE PHASE
SELECT VEHICLE OVERLAP (A=1, P=16)...7
SELECT COLOR (0=RED,1=YEL,2=GRN)...0
    
```

WHEN A "Y" IS ENTERED FOR "VEHICLE OVERLAP" THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN. PRESS ENTER AFTER ENTERING DATA, THEN ESC.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS "VEHICLE OVERLAP" AS SHOWN BELOW:

```

PAGE:1 C1 PIN:24 VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.....22
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID, 1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....Y
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....Y
WATCHDOG.....Y
DETECTOR RESET.....Y
ADVANCE BEACON.....Y
OUT OF PHASE FLASHER.....Y
CONTROLLER FLASH.....Y
RUN FREE.....Y
RESERVED.....Y
PREEMPT.....Y
SOFT PREEMPT.....Y
ANY PREEMPT.....Y
COORDINATION PLAN.....Y
OFFSET.....Y
PHASE CHECK.....Y
PHASE ON.....Y
PHASE NEXT.....Y
    
```

PRESS "+" KEY FOR OUTPUT 23

```

PAGE:1 C1 PIN:25 VEHICLE PHASE
OUTPUT ASSIGNMENT #.....23
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID, 1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....Y
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....Y
WATCHDOG.....Y
DETECTOR RESET.....Y
ADVANCE BEACON.....Y
OUT OF PHASE FLASHER.....Y
CONTROLLER FLASH.....Y
RUN FREE.....Y
RESERVED.....Y
PREEMPT.....Y
SOFT PREEMPT.....Y
ANY PREEMPT.....Y
COORDINATION PLAN.....Y
OFFSET.....Y
PHASE CHECK.....Y
PHASE ON.....Y
PHASE NEXT.....Y
    
```

SCROLL DOWN TO VIEW ALL DATA

```

PAGE:1 C1 PIN:25 VEHICLE PHASE
SELECT VEHICLE OVERLAP (A=1, P=16)...7
SELECT COLOR (0=RED,1=YEL,2=GRN)...1
    
```

WHEN A "Y" IS ENTERED FOR "VEHICLE OVERLAP" THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN. PRESS ENTER AFTER ENTERING DATA, THEN ESC.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS "VEHICLE OVERLAP" AS SHOWN BELOW:

```

PAGE:1 C1 PIN:25 VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.....23
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID, 1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....Y
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....Y
WATCHDOG.....Y
DETECTOR RESET.....Y
ADVANCE BEACON.....Y
OUT OF PHASE FLASHER.....Y
CONTROLLER FLASH.....Y
RUN FREE.....Y
RESERVED.....Y
PREEMPT.....Y
SOFT PREEMPT.....Y
ANY PREEMPT.....Y
COORDINATION PLAN.....Y
OFFSET.....Y
PHASE CHECK.....Y
PHASE ON.....Y
PHASE NEXT.....Y
    
```

PRESS "+" KEY FOR OUTPUT 24

```

PAGE:1 C1 PIN:26 VEHICLE PHASE
OUTPUT ASSIGNMENT #.....24
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID, 1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....Y
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....Y
WATCHDOG.....Y
DETECTOR RESET.....Y
ADVANCE BEACON.....Y
OUT OF PHASE FLASHER.....Y
CONTROLLER FLASH.....Y
RUN FREE.....Y
RESERVED.....Y
PREEMPT.....Y
SOFT PREEMPT.....Y
ANY PREEMPT.....Y
COORDINATION PLAN.....Y
OFFSET.....Y
PHASE CHECK.....Y
PHASE ON.....Y
PHASE NEXT.....Y
    
```

SCROLL DOWN TO VIEW ALL DATA

```

PAGE:1 C1 PIN:26 VEHICLE PHASE
SELECT VEHICLE OVERLAP (A=1, P=16)...7
SELECT COLOR (0=RED,1=YEL,2=GRN)...2
    
```

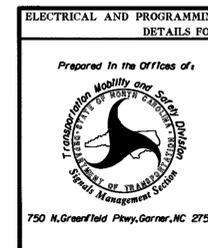
WHEN A "Y" IS ENTERED FOR "VEHICLE OVERLAP" THE SCREEN SHOWN ABOVE WILL APPEAR. ENTER DATA AS SHOWN. PRESS ENTER AFTER ENTERING DATA, THEN ESC.

DISPLAY WILL NOW SHOW THE SPECIFIED OUTPUT ASSIGNED AS "VEHICLE OVERLAP" AS SHOWN BELOW:

```

PAGE:1 C1 PIN:26 VEHICLE OVERLAP
OUTPUT ASSIGNMENT #.....24
FREQUENCY (0=DEFAULT) (0-25.5 HZ)...0.0
DUTY CYCLE (0=DEFAULT) (0 - 100%)...0
MODE (0=SOLID, 1=FLASH)...0
SELECT ASSIGNMENT:
NOT ENABLED.....Y
VEHICLE PHASE.....Y
PEDESTRIAN PHASE.....Y
VEHICLE OVERLAP.....Y
PEDESTRIAN OVERLAP.....Y
WATCHDOG.....Y
DETECTOR RESET.....Y
ADVANCE BEACON.....Y
OUT OF PHASE FLASHER.....Y
CONTROLLER FLASH.....Y
RUN FREE.....Y
RESERVED.....Y
PREEMPT.....Y
SOFT PREEMPT.....Y
ANY PREEMPT.....Y
COORDINATION PLAN.....Y
OFFSET.....Y
PHASE CHECK.....Y
PHASE ON.....Y
PHASE NEXT.....Y
    
```

ELECTRICAL DETAIL SHEET 4 OF 4



Prepared in the Offices of TECHNOLOGY CONSULTING & ENGINEERING 750 N. Greenfield Pkwy, Garner, NC 27529		SEAL NORTH CAROLINA PROFESSIONAL ENGINEER JOHN T. ROWE, JR. 008453									
NC 115 (Main Street) at Catawba Avenue		Division 10 Mecklenburg County Cornelius PLAN DATE: November 2013 REVIEWED BY: JTR PREPARED BY: James Peterson REVIEWED BY:									
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-0267 DESIGNED: October 2013 SEALED: 11-20-13 REVISED: N/A	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		REVISIONS	INIT.	DATE						
REVISIONS	INIT.	DATE									
SIGNATURE: <i>John Rowe</i> 11-21-13 DATE:		SIG. INVENTORY NO. 10-0267									



APPENDIX E: SYNCHRO OUTPUTS



APPENDIX E-1: SYNCHRO OUTPUT

2016 EXISTING CONDITIONS AM PEAK HOUR

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

Existing
 Timing Plan: AM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	7	111	20	32	104	10	303	40	8	7	39	355
Future Volume (vph)	7	111	20	32	104	10	303	40	8	7	39	355
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%		-5%			-3%					1%
Storage Length (ft)		0	0	0	0			0			75	
Storage Lanes		1	0	1	0			0			1	
Taper Length (ft)		100		100							100	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981		0.895			0.982					
Flt Protected		0.959		0.989							0.950	
Satd. Flow (prot)	0	1609	0	1521	0	0	1671	0	0	0	1585	1668
Flt Permitted		0.959		0.989							0.369	
Satd. Flow (perm)	0	1609	0	1521	0	0	1671	0	0	0	616	1668
Right Turn on Red			Yes			No			No			
Satd. Flow (RTOR)		194										
Link Speed (mph)		20		20			20					20
Link Distance (ft)		849		1070			1001					683
Travel Time (s)		28.9		36.5			34.1					23.3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	8	123	22	36	116	11	337	44	9	8	43	394
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	153	0	163	0	0	390	0	0	0	51	394
Turn Type	Prot	Prot		Prot			NA			pm+pt	pm+pt	NA
Protected Phases	4	4		3			2			1	1	6
Permitted Phases										6	6	
Detector Phase	4	4		3			2			1	1	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0			7.0			8.0	8.0	10.0
Minimum Split (s)	20.0	20.0		20.0			20.0			15.0	15.0	20.0
Total Split (s)	20.0	20.0		25.0			30.0			15.0	15.0	45.0
Total Split (%)	22.2%	22.2%		27.8%			33.3%			16.7%	16.7%	50.0%
Yellow Time (s)	3.0	3.0		3.0			5.0			3.0	3.0	3.0
All-Red Time (s)	2.9	2.9		2.9			2.0			3.1	3.1	3.1
Lost Time Adjust (s)		-0.9		-2.0			-2.0				-1.1	-1.1
Total Lost Time (s)		5.0		3.9			5.0				5.0	5.0
Lead/Lag	Lag	Lag		Lead			Lag			Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	
Recall Mode	Min	Min		Min			C-Max			None	None	Min
Act Effct Green (s)		8.3		16.5			42.7				51.3	51.3
Actuated g/C Ratio		0.09		0.18			0.47				0.57	0.57
v/c Ratio		0.47		0.59			0.49				0.11	0.41
Control Delay		7.7		41.8			22.4				10.8	13.6
Queue Delay		0.0		0.0			0.0				0.0	0.0
Total Delay		7.7		41.8			22.4				10.8	13.6
LOS		A		D			C				B	B
Approach Delay		7.7		41.8			22.4					13.2
Approach LOS		A		D			C					B
Queue Length 50th (ft)		0		85			165				12	117

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

Existing
 Timing Plan: AM Peak

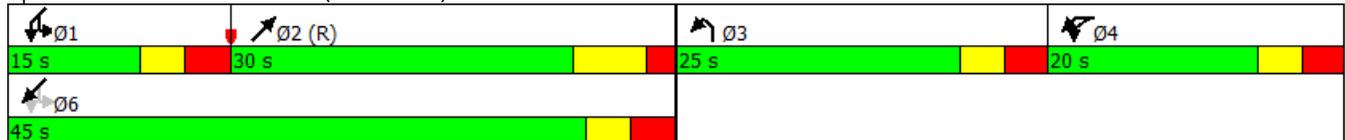
Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Queue Length 95th (ft)		32		141			297				33	217
Internal Link Dist (ft)		769		990			921					603
Turn Bay Length (ft)											75	
Base Capacity (vph)		429		356			791				459	951
Starvation Cap Reductn		0		0			0				0	0
Spillback Cap Reductn		0		0			0				0	0
Storage Cap Reductn		0		0			0				0	0
Reduced v/c Ratio		0.36		0.46			0.49				0.11	0.41

Intersection Summary

Area Type: CBD
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NET, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.59
 Intersection Signal Delay: 19.6
 Intersection Capacity Utilization 61.9%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 1: NC 115 (Main Street) & South Street & Chairman Blake Lane



Lanes, Volumes, Timings
2: NC 115 (Main Street) & Catawba Avenue

Existing
Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	175	84	343	142	81	45	173	520	69	32	506	118
Future Volume (vph)	175	84	343	142	81	45	173	520	69	32	506	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			-2%			1%			-1%	
Storage Length (ft)	150		100	100		200	150		150	175		100
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1577	1660	1411	1609	1693	1439	1585	1668	1418	1601	1685	1432
Flt Permitted	0.680			0.697			0.194			0.276		
Satd. Flow (perm)	1129	1660	1411	1180	1693	1439	324	1668	1418	465	1685	1432
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			231			110			261			261
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1077			1169			1020			1189	
Travel Time (s)		21.0			22.8			19.9			23.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	194	93	381	158	90	50	192	578	77	36	562	131
Shared Lane Traffic (%)												
Lane Group Flow (vph)	194	93	381	158	90	50	192	578	77	36	562	131
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2		Free	6		Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	15.0	20.0	15.0	15.0	20.0	15.0	15.0	40.0		15.0	40.0	
Total Split (%)	16.7%	22.2%	16.7%	16.7%	22.2%	16.7%	16.7%	44.4%		16.7%	44.4%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0	3.0	3.0	3.9		3.0	3.9	
All-Red Time (s)	2.1	1.5	3.9	1.9	1.5	3.2	3.9	3.1		3.2	3.1	
Lost Time Adjust (s)	-0.1	-0.5	-1.9	0.1	-0.5	-1.2	-1.9	-2.0		-1.2	-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	Min		None	Min							
Act Effct Green (s)	17.7	10.4	21.8	17.1	10.1	20.0	43.3	35.9	77.2	38.8	30.2	77.2
Actuated g/C Ratio	0.23	0.13	0.28	0.22	0.13	0.26	0.56	0.47	1.00	0.50	0.39	1.00
v/c Ratio	0.62	0.42	0.68	0.50	0.41	0.11	0.55	0.74	0.05	0.10	0.85	0.09
Control Delay	33.6	40.4	16.7	29.4	40.2	0.5	15.6	28.1	0.1	9.0	36.8	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.6	40.4	16.7	29.4	40.2	0.5	15.6	28.1	0.1	9.0	36.8	0.1
LOS	C	D	B	C	D	A	B	C	A	A	D	A
Approach Delay		24.9			27.8			22.7			28.9	
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	83	47	64	66	46	0	43	257	0	7	256	0

Lanes, Volumes, Timings
 2: NC 115 (Main Street) & Catawba Avenue

Existing
 Timing Plan: AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	143	94	162	117	90	1	87	#474	0	22	#469	0
Internal Link Dist (ft)		997			1089			940			1109	
Turn Bay Length (ft)	150		100	100		200	150		150	175		100
Base Capacity (vph)	331	338	570	337	345	487	353	814	1418	399	801	1432
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.28	0.67	0.47	0.26	0.10	0.54	0.71	0.05	0.09	0.70	0.09

Intersection Summary

Area Type: CBD
 Cycle Length: 90
 Actuated Cycle Length: 77.2
 Natural Cycle: 80
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 25.7
 Intersection Capacity Utilization 74.4%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Intersection LOS: C
 ICU Level of Service D

Splits and Phases: 2: NC 115 (Main Street) & Catawba Avenue

 Ø1	 Ø2	 Ø3	 Ø4
15 s	40 s	15 s	20 s
 Ø5	 Ø6	 Ø7	 Ø8
15 s	40 s	15 s	20 s



APPENDIX E-2: SYNCHRO OUTPUT

2016 EXISTING CONDITIONS PM PEAK HOUR

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

Existing
 Timing Plan: PM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	18	56	15	13	33	11	370	53	12	12	43	371
Future Volume (vph)	18	56	15	13	33	11	370	53	12	12	43	371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%		-5%			-3%					1%
Storage Length (ft)		0	0	0	0			0			75	
Storage Lanes		1	0	1	0			0			1	
Taper Length (ft)		100		100							100	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.977		0.895			0.980					
Flt Protected		0.960		0.989							0.950	
Satd. Flow (prot)	0	1604	0	1521	0	0	1668	0	0	0	1585	1668
Flt Permitted		0.960		0.989							0.321	
Satd. Flow (perm)	0	1604	0	1521	0	0	1668	0	0	0	535	1668
Right Turn on Red			Yes			No			No			
Satd. Flow (RTOR)		194										
Link Speed (mph)		20		20			20					20
Link Distance (ft)		849		1070			1001					683
Travel Time (s)		28.9		36.5			34.1					23.3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	20	62	17	14	37	12	411	59	13	13	48	412
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	99	0	63	0	0	483	0	0	0	61	412
Turn Type	Prot	Prot		Prot			NA			pm+pt	pm+pt	NA
Protected Phases	4	4		3			2			1	1	6
Permitted Phases										6	6	
Detector Phase	4	4		3			2			1	1	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0			7.0			8.0	8.0	10.0
Minimum Split (s)	20.0	20.0		20.0			20.0			15.0	15.0	20.0
Total Split (s)	20.0	20.0		20.0			35.0			15.0	15.0	50.0
Total Split (%)	22.2%	22.2%		22.2%			38.9%			16.7%	16.7%	55.6%
Yellow Time (s)	3.0	3.0		3.0			5.0			3.0	3.0	3.0
All-Red Time (s)	2.9	2.9		2.9			2.0			3.1	3.1	3.1
Lost Time Adjust (s)		-0.9		-2.0			-2.0				-1.1	-1.1
Total Lost Time (s)		5.0		3.9			5.0				5.0	5.0
Lead/Lag	Lead	Lead		Lag			Lag			Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	
Recall Mode	Min	Min		Min			C-Max			None	None	Min
Act Effct Green (s)		7.9		11.4			45.4				56.8	56.8
Actuated g/C Ratio		0.09		0.13			0.50				0.63	0.63
v/c Ratio		0.31		0.33			0.57				0.14	0.39
Control Delay		2.6		39.8			20.8				7.7	9.9
Queue Delay		0.0		0.0			0.0				0.0	0.0
Total Delay		2.6		39.8			20.8				7.7	9.9
LOS		A		D			C				A	A
Approach Delay		2.6		39.8			20.8					9.6
Approach LOS		A		D			C					A
Queue Length 50th (ft)		0		33			194				12	102

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

Existing
 Timing Plan: PM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Queue Length 95th (ft)		0		69			328				30	179
Internal Link Dist (ft)		769		990			921					603
Turn Bay Length (ft)											75	
Base Capacity (vph)		429		272			841				454	1052
Starvation Cap Reductn		0		0			0				0	0
Spillback Cap Reductn		0		0			0				0	0
Storage Cap Reductn		0		0			0				0	0
Reduced v/c Ratio		0.23		0.23			0.57				0.13	0.39

Intersection Summary

Area Type: CBD
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NET, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.57
 Intersection Signal Delay: 15.5
 Intersection Capacity Utilization 60.2%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 1: NC 115 (Main Street) & South Street & Chairman Blake Lane



Lanes, Volumes, Timings
2: NC 115 (Main Street) & Catawba Avenue

Existing
Timing Plan: PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	193	123	283	139	101	42	250	410	53	42	550	135
Future Volume (vph)	193	123	283	139	101	42	250	410	53	42	550	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			-2%			1%			-1%	
Storage Length (ft)	150		100	100		200	150		150	175		100
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1577	1660	1411	1609	1693	1439	1585	1668	1418	1601	1685	1432
Flt Permitted	0.685			0.532			0.155			0.422		
Satd. Flow (perm)	1137	1660	1411	901	1693	1439	259	1668	1418	711	1685	1432
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			220			90			255			255
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1077			1169			1020			1189	
Travel Time (s)		21.0			22.8			19.9			23.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	214	137	314	154	112	47	278	456	59	47	611	150
Shared Lane Traffic (%)												
Lane Group Flow (vph)	214	137	314	154	112	47	278	456	59	47	611	150
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2		Free	6		Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	16.0	25.0	18.0	22.0	31.0	14.0	18.0	49.0		14.0	45.0	
Total Split (%)	14.5%	22.7%	16.4%	20.0%	28.2%	12.7%	16.4%	44.5%		12.7%	40.9%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0	3.0	3.0	3.9		3.0	3.9	
All-Red Time (s)	2.1	1.5	3.9	1.9	1.5	3.2	3.9	3.1		3.2	3.1	
Lost Time Adjust (s)	-0.1	-0.5	-1.9	0.1	-0.5	-1.2	-1.9	-2.0		-1.2	-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes								
Recall Mode	None	Min		None	Min							
Act Effect Green (s)	24.2	13.5	31.5	25.6	14.2	27.6	58.0	47.7	98.3	48.5	40.2	98.3
Actuated g/C Ratio	0.25	0.14	0.32	0.26	0.14	0.28	0.59	0.49	1.00	0.49	0.41	1.00
v/c Ratio	0.65	0.60	0.52	0.49	0.46	0.10	0.84	0.56	0.04	0.11	0.89	0.10
Control Delay	38.7	52.1	12.0	31.1	43.9	1.2	40.7	24.1	0.1	11.4	45.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.7	52.1	12.0	31.1	43.9	1.2	40.7	24.1	0.1	11.4	45.2	0.1
LOS	D	D	B	C	D	A	D	C	A	B	D	A
Approach Delay		28.8			31.2			28.1			34.9	
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	107	82	42	73	65	0	86	203	0	11	341	0

Lanes, Volumes, Timings
 2: NC 115 (Main Street) & Catawba Avenue

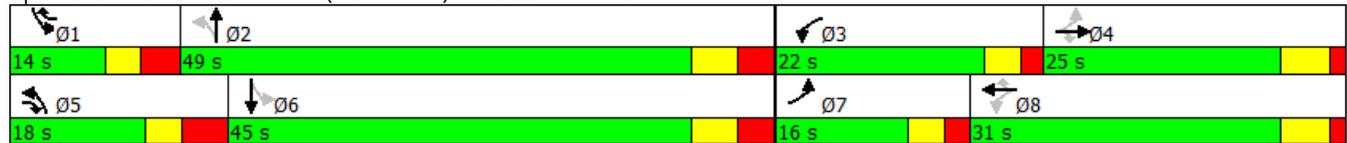
Existing
 Timing Plan: PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	171	150	128	124	117	5	#280	375	0	34	#658	0
Internal Link Dist (ft)		997			1089			940			1109	
Turn Bay Length (ft)	150		100	100		200	150		150	175		100
Base Capacity (vph)	332	339	602	398	449	477	329	810	1418	437	688	1432
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.40	0.52	0.39	0.25	0.10	0.84	0.56	0.04	0.11	0.89	0.10

Intersection Summary

Area Type: CBD
 Cycle Length: 110
 Actuated Cycle Length: 98.3
 Natural Cycle: 90
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.89
 Intersection Signal Delay: 30.8
 Intersection Capacity Utilization 82.0%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service E
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 2: NC 115 (Main Street) & Catawba Avenue





APPENDIX E-3: SYNCHRO OUTPUT

2021 NO-BUILD CONDITIONS AM PEAK HOUR

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

2021 No-Build
 Timing Plan: AM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	17	123	22	46	149	22	335	44	18	8	71	392
Future Volume (vph)	17	123	22	46	149	22	335	44	18	8	71	392
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%		-5%			-3%					1%
Storage Length (ft)		0	0	0	0			0			75	
Storage Lanes		1	0	1	0			0			1	
Taper Length (ft)		100		100							100	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982		0.894			0.979					
Flt Protected		0.958		0.990							0.950	
Satd. Flow (prot)	0	1609	0	1521	0	0	1666	0	0	0	1585	1668
Flt Permitted		0.958		0.990							0.278	
Satd. Flow (perm)	0	1609	0	1521	0	0	1666	0	0	0	464	1668
Right Turn on Red			Yes			No			No			
Satd. Flow (RTOR)		194										
Link Speed (mph)		20		20			20					20
Link Distance (ft)		849		1070			1001					683
Travel Time (s)		28.9		36.5			34.1					23.3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	19	137	24	51	166	24	372	49	20	9	79	436
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	180	0	241	0	0	441	0	0	0	88	436
Turn Type	Prot	Prot		Prot			NA			pm+pt	pm+pt	NA
Protected Phases	4	4		3			2			1	1	6
Permitted Phases										6	6	
Detector Phase	4	4		3			2			1	1	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0			7.0			8.0	8.0	10.0
Minimum Split (s)	20.0	20.0		20.0			20.0			15.0	15.0	20.0
Total Split (s)	20.0	20.0		25.0			30.0			15.0	15.0	45.0
Total Split (%)	22.2%	22.2%		27.8%			33.3%			16.7%	16.7%	50.0%
Yellow Time (s)	3.0	3.0		3.0			5.0			3.0	3.0	3.0
All-Red Time (s)	2.9	2.9		2.9			2.0			3.1	3.1	3.1
Lost Time Adjust (s)		-0.9		-2.0			-2.0				-1.1	-1.1
Total Lost Time (s)		5.0		3.9			5.0				5.0	5.0
Lead/Lag	Lag	Lag		Lead			Lag			Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	
Recall Mode	Min	Min		Min			C-Max			None	None	Min
Act Effect Green (s)		8.8		19.2			35.9				48.1	48.1
Actuated g/C Ratio		0.10		0.21			0.40				0.53	0.53
v/c Ratio		0.54		0.74			0.66				0.24	0.49
Control Delay		11.3		47.7			31.8				13.3	16.5
Queue Delay		0.0		0.0			0.0				0.0	0.0
Total Delay		11.3		47.7			31.8				13.3	16.5
LOS		B		D			C				B	B
Approach Delay		11.3		47.7			31.8					16.0
Approach LOS		B		D			C					B
Queue Length 50th (ft)		0		125			213				24	151

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

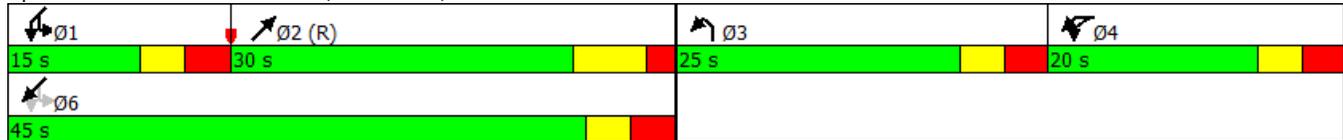
2021 No-Build
 Timing Plan: AM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Queue Length 95th (ft)		50		#213			#426				53	260
Internal Link Dist (ft)		769		990			921					603
Turn Bay Length (ft)											75	
Base Capacity (vph)		429		356			664				378	890
Starvation Cap Reductn		0		0			0				0	0
Spillback Cap Reductn		0		0			0				0	0
Storage Cap Reductn		0		0			0				0	0
Reduced v/c Ratio		0.42		0.68			0.66				0.23	0.49

Intersection Summary

Area Type: CBD
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NET, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 25.9
 Intersection Capacity Utilization 70.9%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service C
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: NC 115 (Main Street) & South Street & Chairman Blake Lane



Lanes, Volumes, Timings
2: NC 115 (Main Street) & Catawba Avenue

2021 No-Build
Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	193	155	379	229	164	73	191	574	137	54	559	130
Future Volume (vph)	193	155	379	229	164	73	191	574	137	54	559	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			-2%			1%			-1%	
Storage Length (ft)	150		100	100		200	150		150	175		100
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1577	1660	1411	1609	1693	1439	1585	1668	1418	1601	1685	1432
Flt Permitted	0.480			0.479			0.139			0.190		
Satd. Flow (perm)	797	1660	1411	811	1693	1439	232	1668	1418	320	1685	1432
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			148			110			261			261
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1077			1169			1020			1189	
Travel Time (s)		21.0			22.8			19.9			23.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	214	172	421	254	182	81	212	638	152	60	621	144
Shared Lane Traffic (%)												
Lane Group Flow (vph)	214	172	421	254	182	81	212	638	152	60	621	144
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2		Free	6		Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	15.0	20.0	15.0	15.0	20.0	15.0	15.0	40.0		15.0	40.0	
Total Split (%)	16.7%	22.2%	16.7%	16.7%	22.2%	16.7%	16.7%	44.4%		16.7%	44.4%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0	3.0	3.0	3.9		3.0	3.9	
All-Red Time (s)	2.1	1.5	3.9	1.9	1.5	3.2	3.9	3.1		3.2	3.1	
Lost Time Adjust (s)	-0.1	-0.5	-1.9	0.1	-0.5	-1.2	-1.9	-2.0		-1.2	-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	Min		None	Min							
Act Effect Green (s)	22.5	12.8	27.8	23.1	13.1	26.5	46.4	38.6	86.9	42.4	34.0	86.9
Actuated g/C Ratio	0.26	0.15	0.32	0.27	0.15	0.30	0.53	0.44	1.00	0.49	0.39	1.00
v/c Ratio	0.73	0.70	0.76	0.83	0.71	0.16	0.76	0.86	0.11	0.22	0.94	0.10
Control Delay	40.4	51.7	27.3	49.5	51.9	3.1	33.9	38.1	0.2	11.3	51.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.4	51.7	27.3	49.5	51.9	3.1	33.9	38.1	0.2	11.3	51.1	0.1
LOS	D	D	C	D	D	A	C	D	A	B	D	A
Approach Delay		36.0			43.0			31.5			39.3	
Approach LOS		D			D			C			D	
Queue Length 50th (ft)	93	92	137	113	98	0	57	335	0	15	331	0

Lanes, Volumes, Timings
 2: NC 115 (Main Street) & Catawba Avenue

2021 No-Build
 Timing Plan: AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	#171	#160	#259	#181	#178	19	#174	#571	0	33	#555	0
Internal Link Dist (ft)		997			1089			940			1109	
Turn Bay Length (ft)	150		100	100		200	150		150	175		100
Base Capacity (vph)	299	287	552	307	293	540	279	740	1418	310	680	1432
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.60	0.76	0.83	0.62	0.15	0.76	0.86	0.11	0.19	0.91	0.10

Intersection Summary

Area Type: CBD
 Cycle Length: 90
 Actuated Cycle Length: 86.9
 Natural Cycle: 90
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.94
 Intersection Signal Delay: 36.6
 Intersection Capacity Utilization 85.4%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Intersection LOS: D
 ICU Level of Service E

Splits and Phases: 2: NC 115 (Main Street) & Catawba Avenue

 Ø1	 Ø2	 Ø3	 Ø4
15 s	40 s	15 s	20 s
 Ø5	 Ø6	 Ø7	 Ø8
15 s	40 s	15 s	20 s



APPENDIX E-4: SYNCHRO OUTPUT

2021 NO-BUILD CONDITIONS PM PEAK HOUR

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

2021 No-Build
 Timing Plan: PM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	36	62	17	29	81	27	409	59	29	13	96	410
Future Volume (vph)	36	62	17	29	81	27	409	59	29	13	96	410
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%		-5%			-3%					1%
Storage Length (ft)		0	0	0	0			0			75	
Storage Lanes		1	0	1	0			0			1	
Taper Length (ft)		100		100							100	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980		0.893			0.976					
Flt Protected		0.959		0.990							0.950	
Satd. Flow (prot)	0	1607	0	1519	0	0	1661	0	0	0	1585	1668
Flt Permitted		0.959		0.990							0.202	
Satd. Flow (perm)	0	1607	0	1519	0	0	1661	0	0	0	337	1668
Right Turn on Red			Yes			No			No			
Satd. Flow (RTOR)		194										
Link Speed (mph)		20		20			20					20
Link Distance (ft)		849		1070			1001					683
Travel Time (s)		28.9		36.5			34.1					23.3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	40	69	19	32	90	30	454	66	32	14	107	456
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	128	0	152	0	0	552	0	0	0	121	456
Turn Type	Prot	Prot		Prot			NA			pm+pt	pm+pt	NA
Protected Phases	4	4		3			2			1	1	6
Permitted Phases										6	6	
Detector Phase	4	4		3			2			1	1	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0			7.0			8.0	8.0	10.0
Minimum Split (s)	20.0	20.0		20.0			20.0			15.0	15.0	20.0
Total Split (s)	20.0	20.0		20.0			35.0			15.0	15.0	50.0
Total Split (%)	22.2%	22.2%		22.2%			38.9%			16.7%	16.7%	55.6%
Yellow Time (s)	3.0	3.0		3.0			5.0			3.0	3.0	3.0
All-Red Time (s)	2.9	2.9		2.9			2.0			3.1	3.1	3.1
Lost Time Adjust (s)		-0.9		-2.0			-2.0				-1.1	-1.1
Total Lost Time (s)		5.0		3.9			5.0				5.0	5.0
Lead/Lag	Lead	Lead		Lag			Lag			Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	
Recall Mode	Min	Min		Min			C-Max			None	None	Min
Act Effct Green (s)		7.9		16.1			36.9				52.1	52.1
Actuated g/C Ratio		0.09		0.18			0.41				0.58	0.58
v/c Ratio		0.40		0.56			0.81				0.36	0.47
Control Delay		5.3		40.9			36.8				12.9	14.0
Queue Delay		0.0		0.0			0.0				0.0	0.0
Total Delay		5.3		40.9			36.8				12.9	14.0
LOS		A		D			D				B	B
Approach Delay		5.3		40.9			36.8					13.8
Approach LOS		A		D			D					B
Queue Length 50th (ft)		0		80			270				29	140

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

2021 No-Build
 Timing Plan: PM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Queue Length 95th (ft)		15		131			#525				64	251
Internal Link Dist (ft)		769		990			921					603
Turn Bay Length (ft)											75	
Base Capacity (vph)		429		299			681				340	964
Starvation Cap Reductn		0		0			0				0	0
Spillback Cap Reductn		0		0			0				0	0
Storage Cap Reductn		0		0			0				0	0
Reduced v/c Ratio		0.30		0.51			0.81				0.36	0.47

Intersection Summary

Area Type: CBD
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NET, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 24.9
 Intersection Capacity Utilization 68.8%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service C

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: NC 115 (Main Street) & South Street & Chairman Blake Lane



Lanes, Volumes, Timings
2: NC 115 (Main Street) & Catawba Avenue

2021 No-Build
Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	277	292	309	242	119	258	423	212	132	567	136
Future Volume (vph)	200	277	292	309	242	119	258	423	212	132	567	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			-2%			1%			-1%	
Storage Length (ft)	150		100	100		200	150		150	175		100
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1577	1660	1411	1609	1693	1439	1585	1668	1418	1601	1685	1432
Flt Permitted	0.483			0.164			0.091			0.317		
Satd. Flow (perm)	802	1660	1411	278	1693	1439	152	1668	1418	534	1685	1432
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			139			132			255			255
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1077			1169			1020			1189	
Travel Time (s)		21.0			22.8			19.9			23.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	222	308	324	343	269	132	287	470	236	147	630	151
Shared Lane Traffic (%)												
Lane Group Flow (vph)	222	308	324	343	269	132	287	470	236	147	630	151
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2		Free	6		Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	16.0	25.0	18.0	22.0	31.0	14.0	18.0	49.0		14.0	45.0	
Total Split (%)	14.5%	22.7%	16.4%	20.0%	28.2%	12.7%	16.4%	44.5%		12.7%	40.9%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0	3.0	3.0	3.9		3.0	3.9	
All-Red Time (s)	2.1	1.5	3.9	1.9	1.5	3.2	3.9	3.1		3.2	3.1	
Lost Time Adjust (s)	-0.1	-0.5	-1.9	0.1	-0.5	-1.2	-1.9	-2.0		-1.2	-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	Min		None	Min							
Act Effct Green (s)	30.9	20.0	38.0	42.0	26.1	40.0	57.2	44.2	110.0	48.8	40.0	110.0
Actuated g/C Ratio	0.28	0.18	0.35	0.38	0.24	0.36	0.52	0.40	1.00	0.44	0.36	1.00
v/c Ratio	0.74	1.02	0.56	1.10	0.67	0.22	1.16	0.70	0.17	0.46	1.03	0.11
Control Delay	43.1	103.2	20.4	111.3	47.4	5.1	134.9	34.4	0.3	18.9	79.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.1	103.2	20.4	111.3	47.4	5.1	134.9	34.4	0.3	18.9	79.6	0.1
LOS	D	F	C	F	D	A	F	C	A	B	E	A
Approach Delay		56.2			69.3			55.3			57.0	
Approach LOS		E			E			E			E	
Queue Length 50th (ft)	111	-226	103	-228	173	0	-195	273	0	52	-477	0

Lanes, Volumes, Timings
 2: NC 115 (Main Street) & Catawba Avenue

2021 No-Build
 Timing Plan: PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	#197	#405	196	#411	266	40	#366	398	0	88	#696	0
Internal Link Dist (ft)		997			1089			940			1109	
Turn Bay Length (ft)	150		100	100		200	150		150	175		100
Base Capacity (vph)	303	301	578	311	402	609	248	669	1418	325	612	1432
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	1.02	0.56	1.10	0.67	0.22	1.16	0.70	0.17	0.45	1.03	0.11

Intersection Summary

Area Type: CBD
 Cycle Length: 110
 Actuated Cycle Length: 110
 Natural Cycle: 120
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.16
 Intersection Signal Delay: 58.9
 Intersection Capacity Utilization 100.9%
 Analysis Period (min) 15

Intersection LOS: E
 ICU Level of Service G

- Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 2: NC 115 (Main Street) & Catawba Avenue





APPENDIX E-5: SYNCHRO OUTPUT

2021 BUILD CONDITIONS AM PEAK HOUR

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

2021 Build
 Timing Plan: AM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	17	123	22	46	179	22	335	44	18	8	82	392
Future Volume (vph)	17	123	22	46	179	22	335	44	18	8	82	392
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%		-5%			-3%					1%
Storage Length (ft)		0	0	0	0			0			75	
Storage Lanes		1	0	1	0			0			1	
Taper Length (ft)		100		100							100	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.982		0.890			0.979					
Flt Protected		0.958		0.991							0.950	
Satd. Flow (prot)	0	1609	0	1516	0	0	1666	0	0	0	1585	1668
Flt Permitted		0.958		0.991							0.266	
Satd. Flow (perm)	0	1609	0	1516	0	0	1666	0	0	0	444	1668
Right Turn on Red			Yes			No			No			
Satd. Flow (RTOR)		194										
Link Speed (mph)		20		20			20					20
Link Distance (ft)		849		1070			1001					683
Travel Time (s)		28.9		36.5			34.1					23.3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	19	137	24	51	199	24	372	49	20	9	91	436
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	180	0	274	0	0	441	0	0	0	100	436
Turn Type	Prot	Prot		Prot			NA			pm+pt	pm+pt	NA
Protected Phases	4	4		3			2			1	1	6
Permitted Phases										6	6	
Detector Phase	4	4		3			2			1	1	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0			7.0			8.0	8.0	10.0
Minimum Split (s)	20.0	20.0		20.0			20.0			15.0	15.0	20.0
Total Split (s)	20.0	20.0		25.0			30.0			15.0	15.0	45.0
Total Split (%)	22.2%	22.2%		27.8%			33.3%			16.7%	16.7%	50.0%
Yellow Time (s)	3.0	3.0		3.0			5.0			3.0	3.0	3.0
All-Red Time (s)	2.9	2.9		2.9			2.0			3.1	3.1	3.1
Lost Time Adjust (s)		-0.9		-2.0			-2.0				-1.1	-1.1
Total Lost Time (s)		5.0		3.9			5.0				5.0	5.0
Lead/Lag	Lag	Lag		Lead			Lag			Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	
Recall Mode	Min	Min		Min			C-Max			None	None	Min
Act Effct Green (s)		8.8		20.1			34.7				47.2	47.2
Actuated g/C Ratio		0.10		0.22			0.39				0.52	0.52
v/c Ratio		0.54		0.81			0.69				0.28	0.50
Control Delay		11.3		52.9			33.3				13.8	17.0
Queue Delay		0.0		0.0			0.0				0.0	0.0
Total Delay		11.3		52.9			33.3				13.8	17.0
LOS		B		D			C				B	B
Approach Delay		11.3		52.9			33.3					16.4
Approach LOS		B		D			C					B
Queue Length 50th (ft)		0		146			215				27	151

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

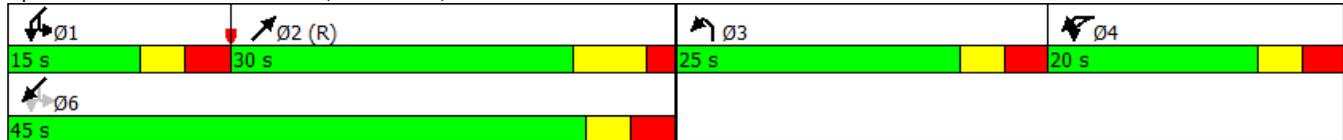
2021 Build
 Timing Plan: AM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Queue Length 95th (ft)		50		#267			#432				59	260
Internal Link Dist (ft)		769		990			921					603
Turn Bay Length (ft)											75	
Base Capacity (vph)		429		355			642				368	874
Starvation Cap Reductn		0		0			0				0	0
Spillback Cap Reductn		0		0			0				0	0
Storage Cap Reductn		0		0			0				0	0
Reduced v/c Ratio		0.42		0.77			0.69				0.27	0.50

Intersection Summary

Area Type: CBD
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NET, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 27.9
 Intersection Capacity Utilization 73.0%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: NC 115 (Main Street) & South Street & Chairman Blake Lane



Lanes, Volumes, Timings
2: NC 115 (Main Street) & Catawba Avenue

2021 Build
Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	193	160	379	244	179	73	191	574	142	54	559	130
Future Volume (vph)	193	160	379	244	179	73	191	574	142	54	559	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			-2%			1%			-1%	
Storage Length (ft)	150		100	100		200	150		150	175		100
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1577	1660	1411	1609	1693	1439	1585	1668	1418	1601	1685	1432
Flt Permitted	0.429			0.471			0.136			0.187		
Satd. Flow (perm)	712	1660	1411	798	1693	1439	227	1668	1418	315	1685	1432
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			142			110			261			261
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1077			1169			1020			1189	
Travel Time (s)		21.0			22.8			19.9			23.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	214	178	421	271	199	81	212	638	158	60	621	144
Shared Lane Traffic (%)												
Lane Group Flow (vph)	214	178	421	271	199	81	212	638	158	60	621	144
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2		Free	6		Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	15.0	20.0	15.0	15.0	20.0	15.0	15.0	40.0		15.0	40.0	
Total Split (%)	16.7%	22.2%	16.7%	16.7%	22.2%	16.7%	16.7%	44.4%		16.7%	44.4%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0	3.0	3.0	3.9		3.0	3.9	
All-Red Time (s)	2.1	1.5	3.9	1.9	1.5	3.2	3.9	3.1		3.2	3.1	
Lost Time Adjust (s)	-0.1	-0.5	-1.9	0.1	-0.5	-1.2	-1.9	-2.0		-1.2	-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	Min		None	Min							
Act Effct Green (s)	23.0	13.2	28.2	23.5	13.5	26.9	46.4	38.6	87.3	42.4	34.0	87.3
Actuated g/C Ratio	0.26	0.15	0.32	0.27	0.15	0.31	0.53	0.44	1.00	0.49	0.39	1.00
v/c Ratio	0.76	0.71	0.76	0.88	0.76	0.16	0.77	0.87	0.11	0.22	0.95	0.10
Control Delay	43.0	51.9	27.7	57.0	55.6	3.0	35.4	38.7	0.2	11.5	52.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.0	51.9	27.7	57.0	55.6	3.0	35.4	38.7	0.2	11.5	52.1	0.1
LOS	D	D	C	E	E	A	D	D	A	B	D	A
Approach Delay		37.1			48.5			31.9			40.1	
Approach LOS		D			D			C			D	
Queue Length 50th (ft)	93	96	141	122	108	0	59	339	0	15	335	0

Lanes, Volumes, Timings
 2: NC 115 (Main Street) & Catawba Avenue

2021 Build
 Timing Plan: AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	#181	#175	#267	#207	#203	19	#176	#571	0	33	#555	0
Internal Link Dist (ft)		997			1089			940			1109	
Turn Bay Length (ft)	150		100	100		200	150		150	175		100
Base Capacity (vph)	288	285	552	307	291	544	276	737	1418	306	677	1432
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.62	0.76	0.88	0.68	0.15	0.77	0.87	0.11	0.20	0.92	0.10

Intersection Summary

Area Type: CBD
 Cycle Length: 90
 Actuated Cycle Length: 87.3
 Natural Cycle: 90
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 38.2
 Intersection Capacity Utilization 86.3%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Intersection LOS: D
 ICU Level of Service E

Splits and Phases: 2: NC 115 (Main Street) & Catawba Avenue

Ø1	Ø2	Ø3	Ø4
15 s	40 s	15 s	20 s
Ø5	Ø6	Ø7	Ø8
15 s	40 s	15 s	20 s

Intersection

Int Delay, s/veh	1.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			4	4	
Traffic Vol, veh/h	30	30	11	182	171	10
Future Vol, veh/h	30	30	11	182	171	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	33	12	202	190	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	423	196	201	0	-	0
Stage 1	196	-	-	-	-	-
Stage 2	227	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	588	845	1371	-	-	-
Stage 1	837	-	-	-	-	-
Stage 2	811	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	582	845	1371	-	-	-
Mov Cap-2 Maneuver	582	-	-	-	-	-
Stage 1	837	-	-	-	-	-
Stage 2	803	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.8	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1371	-	689	-	-
HCM Lane V/C Ratio	0.009	-	0.097	-	-
HCM Control Delay (s)	7.6	0	10.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-



APPENDIX E-6: SYNCHRO OUTPUT

2021 BUILD CONDITIONS PM PEAK HOUR

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

2021 Build
 Timing Plan: PM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	36	62	17	29	104	27	409	59	29	13	135	410
Future Volume (vph)	36	62	17	29	104	27	409	59	29	13	135	410
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%		-5%			-3%					1%
Storage Length (ft)		0	0	0	0			0			75	
Storage Lanes		1	0	1	0			0			1	
Taper Length (ft)		100		100							100	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980		0.889			0.976					
Flt Protected		0.959		0.991							0.950	
Satd. Flow (prot)	0	1607	0	1514	0	0	1661	0	0	0	1585	1668
Flt Permitted		0.959		0.991							0.177	
Satd. Flow (perm)	0	1607	0	1514	0	0	1661	0	0	0	295	1668
Right Turn on Red			Yes			No			No			
Satd. Flow (RTOR)		194										
Link Speed (mph)		20		20			20					20
Link Distance (ft)		849		1070			1001					683
Travel Time (s)		28.9		36.5			34.1					23.3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	40	69	19	32	116	30	454	66	32	14	150	456
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	128	0	178	0	0	552	0	0	0	164	456
Turn Type	Prot	Prot		Prot			NA			pm+pt	pm+pt	NA
Protected Phases	4	4		3			2			1	1	6
Permitted Phases										6	6	
Detector Phase	4	4		3			2			1	1	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0			7.0			8.0	8.0	10.0
Minimum Split (s)	20.0	20.0		20.0			20.0			15.0	15.0	20.0
Total Split (s)	20.0	20.0		20.0			35.0			15.0	15.0	50.0
Total Split (%)	22.2%	22.2%		22.2%			38.9%			16.7%	16.7%	55.6%
Yellow Time (s)	3.0	3.0		3.0			5.0			3.0	3.0	3.0
All-Red Time (s)	2.9	2.9		2.9			2.0			3.1	3.1	3.1
Lost Time Adjust (s)		-0.9		-2.0			-2.0				-1.1	-1.1
Total Lost Time (s)		5.0		3.9			5.0				5.0	5.0
Lead/Lag	Lead	Lead		Lag			Lag			Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	
Recall Mode	Min	Min		Min			C-Max			None	None	Min
Act Effct Green (s)		7.9		17.7			34.8				50.5	50.5
Actuated g/C Ratio		0.09		0.20			0.39				0.56	0.56
v/c Ratio		0.40		0.60			0.86				0.51	0.49
Control Delay		5.3		40.8			43.0				16.8	15.1
Queue Delay		0.0		0.0			0.0				0.0	0.0
Total Delay		5.3		40.8			43.0				16.8	15.1
LOS		A		D			D				B	B
Approach Delay		5.3		40.8			43.0					15.6
Approach LOS		A		D			D					B
Queue Length 50th (ft)		0		93			289				43	147

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

2021 Build
 Timing Plan: PM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Queue Length 95th (ft)		15		149			#525				87	261
Internal Link Dist (ft)		769		990			921					603
Turn Bay Length (ft)											75	
Base Capacity (vph)		429		314			641				321	936
Starvation Cap Reductn		0		0			0				0	0
Spillback Cap Reductn		0		0			0				0	0
Storage Cap Reductn		0		0			0				0	0
Reduced v/c Ratio		0.30		0.57			0.86				0.51	0.49

Intersection Summary

Area Type: CBD
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NET, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 28.0
 Intersection Capacity Utilization 72.7%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service C
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: NC 115 (Main Street) & South Street & Chairman Blake Lane



Lanes, Volumes, Timings
2: NC 115 (Main Street) & Catawba Avenue

2021 Build
Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	297	292	320	253	119	258	423	232	132	567	136
Future Volume (vph)	200	297	292	320	253	119	258	423	232	132	567	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			-2%			1%			-1%	
Storage Length (ft)	150		100	100		200	150		150	175		100
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1577	1660	1411	1609	1693	1439	1585	1668	1418	1601	1685	1432
Flt Permitted	0.455			0.164			0.091			0.317		
Satd. Flow (perm)	755	1660	1411	278	1693	1439	152	1668	1418	534	1685	1432
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			139			132			255			255
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1077			1169			1020			1189	
Travel Time (s)		21.0			22.8			19.9			23.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	222	330	324	356	281	132	287	470	258	147	630	151
Shared Lane Traffic (%)												
Lane Group Flow (vph)	222	330	324	356	281	132	287	470	258	147	630	151
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2		Free	6		Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	16.0	25.0	18.0	22.0	31.0	14.0	18.0	49.0		14.0	45.0	
Total Split (%)	14.5%	22.7%	16.4%	20.0%	28.2%	12.7%	16.4%	44.5%		12.7%	40.9%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0	3.0	3.0	3.9		3.0	3.9	
All-Red Time (s)	2.1	1.5	3.9	1.9	1.5	3.2	3.9	3.1		3.2	3.1	
Lost Time Adjust (s)	-0.1	-0.5	-1.9	0.1	-0.5	-1.2	-1.9	-2.0		-1.2	-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	Min		None	Min							
Act Effct Green (s)	30.9	20.0	38.0	42.0	26.1	39.9	57.2	44.2	110.0	48.8	40.0	110.0
Actuated g/C Ratio	0.28	0.18	0.35	0.38	0.24	0.36	0.52	0.40	1.00	0.44	0.36	1.00
v/c Ratio	0.76	1.10	0.56	1.14	0.70	0.22	1.16	0.70	0.18	0.46	1.03	0.11
Control Delay	45.1	123.0	20.4	125.5	49.0	5.1	134.9	34.4	0.3	18.9	79.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.1	123.0	20.4	125.5	49.0	5.1	134.9	34.4	0.3	18.9	79.6	0.1
LOS	D	F	C	F	D	A	F	C	A	B	E	A
Approach Delay		65.3			76.8			54.1			57.0	
Approach LOS		E			E			D			E	
Queue Length 50th (ft)	111	-264	103	-248	183	0	-195	273	0	52	-477	0

Lanes, Volumes, Timings
 2: NC 115 (Main Street) & Catawba Avenue

2021 Build
 Timing Plan: PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	#204	#442	196	#435	279	40	#366	398	0	88	#696	0
Internal Link Dist (ft)		997			1089			940			1109	
Turn Bay Length (ft)	150		100	100		200	150		150	175		100
Base Capacity (vph)	294	301	578	311	401	608	248	669	1418	325	612	1432
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	1.10	0.56	1.14	0.70	0.22	1.16	0.70	0.18	0.45	1.03	0.11

Intersection Summary

Area Type: CBD
 Cycle Length: 110
 Actuated Cycle Length: 110
 Natural Cycle: 110
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.16
 Intersection Signal Delay: 62.5
 Intersection Capacity Utilization 102.8%
 Analysis Period (min) 15

Intersection LOS: E
 ICU Level of Service G

- Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 2: NC 115 (Main Street) & Catawba Avenue



Intersection

Int Delay, s/veh	1.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			Y	Y	
Traffic Vol, veh/h	23	22	39	192	216	40
Future Vol, veh/h	23	22	39	192	216	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	26	24	43	213	240	44

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	562	262	284	0	-	0
Stage 1	262	-	-	-	-	-
Stage 2	300	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	488	777	1278	-	-	-
Stage 1	782	-	-	-	-	-
Stage 2	752	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	469	777	1278	-	-	-
Mov Cap-2 Maneuver	469	-	-	-	-	-
Stage 1	782	-	-	-	-	-
Stage 2	723	-	-	-	-	-

Approach	EB		NB		SB
HCM Control Delay, s	11.8		1.3		0
HCM LOS	B				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1278	-	582	-	-
HCM Lane V/C Ratio	0.034	-	0.086	-	-
HCM Control Delay (s)	7.9	0	11.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-



**APPENDIX E-7:
SYNCHRO OUTPUT**

**2021 BUILD-IMPROVED CONDITIONS
AM PEAK HOUR**

Intersection							
Int Delay, s/veh	1.7						
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	↘		↘	↗	↗	↗	↗
Traffic Vol, veh/h	30	30	11	182	171	10	
Future Vol, veh/h	30	30	11	182	171	10	
Conflicting Peds, #/hr	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	
RT Channelized	-	None	-	None	-	None	
Storage Length	0	-	50	-	-	50	
Veh in Median Storage, #	0	-	-	0	0	-	
Grade, %	0	-	-	0	0	-	
Peak Hour Factor	90	90	90	90	90	90	
Heavy Vehicles, %	2	2	2	2	2	2	
Mvmt Flow	33	33	12	202	190	11	

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	417	190	190	0	-	0
Stage 1	190	-	-	-	-	-
Stage 2	227	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	592	852	1384	-	-	-
Stage 1	842	-	-	-	-	-
Stage 2	811	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	587	852	1384	-	-	-
Mov Cap-2 Maneuver	587	-	-	-	-	-
Stage 1	842	-	-	-	-	-
Stage 2	804	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.7	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1384	-	695	-	-
HCM Lane V/C Ratio	0.009	-	0.096	-	-
HCM Control Delay (s)	7.6	-	10.7	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-



**APPENDIX E-8:
SYNCHRO OUTPUT**

**2021 BUILD-IMPROVED CONDITIONS
PM PEAK HOUR**

Intersection

Int Delay, s/veh	1.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔		↔	↔	↔	↔
Traffic Vol, veh/h	23	22	39	192	216	40
Future Vol, veh/h	23	22	39	192	216	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	26	24	43	213	240	44

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	540	240	240	0	-	0
Stage 1	240	-	-	-	-	-
Stage 2	300	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	503	799	1327	-	-	-
Stage 1	800	-	-	-	-	-
Stage 2	752	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	487	799	1327	-	-	-
Mov Cap-2 Maneuver	487	-	-	-	-	-
Stage 1	800	-	-	-	-	-
Stage 2	728	-	-	-	-	-

Approach	EB		NB		SB
HCM Control Delay, s	11.5		1.3		0
HCM LOS	B				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1327	-	602	-	-
HCM Lane V/C Ratio	0.033	-	0.083	-	-
HCM Control Delay (s)	7.8	-	11.5	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-



APPENDIX E-9: SYNCHRO OUTPUT

2026 NO-BUILD CONDITIONS AM PEAK HOUR

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

2026 No-Build
 Timing Plan: AM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	18	135	24	50	161	23	369	49	19	9	76	433
Future Volume (vph)	18	135	24	50	161	23	369	49	19	9	76	433
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%		-5%			-3%					1%
Storage Length (ft)		0	0	0	0			0			75	
Storage Lanes		1	0	1	0			0			1	
Taper Length (ft)		100		100							100	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981		0.894			0.979					
Flt Protected		0.959		0.989							0.950	
Satd. Flow (prot)	0	1609	0	1519	0	0	1666	0	0	0	1585	1668
Flt Permitted		0.959		0.989							0.227	
Satd. Flow (perm)	0	1609	0	1519	0	0	1666	0	0	0	379	1668
Right Turn on Red			Yes			No			No			
Satd. Flow (RTOR)		194										
Link Speed (mph)		20		20			20					20
Link Distance (ft)		849		1070			1001					683
Travel Time (s)		28.9		36.5			34.1					23.3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	20	150	27	56	179	26	410	54	21	10	84	481
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	197	0	261	0	0	485	0	0	0	94	481
Turn Type	Prot	Prot		Prot			NA			pm+pt	pm+pt	NA
Protected Phases	4	4		3			2			1	1	6
Permitted Phases										6	6	
Detector Phase	4	4		3			2			1	1	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0			7.0			8.0	8.0	10.0
Minimum Split (s)	20.0	20.0		20.0			20.0			15.0	15.0	20.0
Total Split (s)	20.0	20.0		25.0			30.0			15.0	15.0	45.0
Total Split (%)	22.2%	22.2%		27.8%			33.3%			16.7%	16.7%	50.0%
Yellow Time (s)	3.0	3.0		3.0			5.0			3.0	3.0	3.0
All-Red Time (s)	2.9	2.9		2.9			2.0			3.1	3.1	3.1
Lost Time Adjust (s)		-0.9		-2.0			-2.0				-1.1	-1.1
Total Lost Time (s)		5.0		3.9			5.0				5.0	5.0
Lead/Lag	Lag	Lag		Lead			Lag			Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	
Recall Mode	Min	Min		Min			C-Max			None	None	Min
Act Effct Green (s)		9.3		19.7			34.9				47.0	47.0
Actuated g/C Ratio		0.10		0.22			0.39				0.52	0.52
v/c Ratio		0.58		0.78			0.75				0.28	0.55
Control Delay		13.2		50.6			36.2				14.5	18.5
Queue Delay		0.0		0.0			0.0				0.0	0.0
Total Delay		13.2		50.6			36.2				14.5	18.5
LOS		B		D			D				B	B
Approach Delay		13.2		50.6			36.2					17.8
Approach LOS		B		D			D					B
Queue Length 50th (ft)		2		138			244				26	173

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

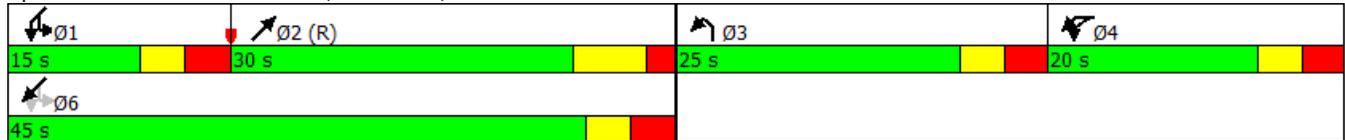
2026 No-Build
 Timing Plan: AM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Queue Length 95th (ft)		61		#249			#492				59	306
Internal Link Dist (ft)		769		990			921					603
Turn Bay Length (ft)											75	
Base Capacity (vph)		429		356			646				337	871
Starvation Cap Reductn		0		0			0				0	0
Spillback Cap Reductn		0		0			0				0	0
Storage Cap Reductn		0		0			0				0	0
Reduced v/c Ratio		0.46		0.73			0.75				0.28	0.55

Intersection Summary

Area Type: CBD
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NET, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 28.7
 Intersection Capacity Utilization 75.4%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service D
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: NC 115 (Main Street) & South Street & Chairman Blake Lane



Lanes, Volumes, Timings
2: NC 115 (Main Street) & Catawba Avenue

2026 No-Build
Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	213	164	418	245	174	78	211	634	145	58	617	144
Future Volume (vph)	213	164	418	245	174	78	211	634	145	58	617	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			-2%			1%			-1%	
Storage Length (ft)	150		100	100		200	150		150	175		100
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1577	1660	1411	1609	1693	1439	1585	1668	1418	1601	1685	1432
Flt Permitted	0.517			0.271			0.105			0.185		
Satd. Flow (perm)	858	1660	1411	459	1693	1439	175	1668	1418	312	1685	1432
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			142			145			252			252
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1077			1169			1020			1189	
Travel Time (s)		21.0			22.8			19.9			23.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	237	182	464	272	193	87	234	704	161	64	686	160
Shared Lane Traffic (%)												
Lane Group Flow (vph)	237	182	464	272	193	87	234	704	161	64	686	160
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2		Free	6		Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	17.0	20.0	21.0	21.0	24.0	14.0	21.0	65.0		14.0	58.0	
Total Split (%)	14.2%	16.7%	17.5%	17.5%	20.0%	11.7%	17.5%	54.2%		11.7%	48.3%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0	3.0	3.0	3.9		3.0	3.9	
All-Red Time (s)	2.1	1.5	3.9	1.9	1.5	3.2	3.9	3.1		3.2	3.1	
Lost Time Adjust (s)	-0.1	-0.5	-1.9	0.1	-0.5	-1.2	-1.9	-2.0		-1.2	-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	Min		None	Min							
Act Effct Green (s)	26.5	14.5	34.6	34.6	18.5	31.9	69.5	56.4	115.5	58.2	49.7	115.5
Actuated g/C Ratio	0.23	0.13	0.30	0.30	0.16	0.28	0.60	0.49	1.00	0.50	0.43	1.00
v/c Ratio	0.87	0.88	0.89	0.92	0.71	0.17	0.81	0.86	0.11	0.25	0.95	0.11
Control Delay	67.9	88.6	47.8	71.1	62.7	1.3	44.6	38.7	0.2	12.7	54.9	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.9	88.6	47.8	71.1	62.7	1.3	44.6	38.7	0.2	12.7	54.9	0.2
LOS	E	F	D	E	E	A	D	D	A	B	D	A
Approach Delay		61.6			57.2			34.3			42.3	
Approach LOS		E			E			C			D	
Queue Length 50th (ft)	151	141	251	178	144	0	104	451	0	19	490	0

Lanes, Volumes, Timings
 2: NC 115 (Main Street) & Catawba Avenue

2026 No-Build
 Timing Plan: AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	#243	#274	#452	#319	#245	5	#232	#673	0	37	#738	0
Internal Link Dist (ft)		997			1089			940			1109	
Turn Bay Length (ft)	150		100	100		200	150		150	175		100
Base Capacity (vph)	271	217	532	297	280	509	302	876	1418	259	778	1432
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.87	0.84	0.87	0.92	0.69	0.17	0.77	0.80	0.11	0.25	0.88	0.11

Intersection Summary

Area Type: CBD
 Cycle Length: 120
 Actuated Cycle Length: 115.5
 Natural Cycle: 90
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 47.1
 Intersection Capacity Utilization 92.4%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Intersection LOS: D
 ICU Level of Service F

Splits and Phases: 2: NC 115 (Main Street) & Catawba Avenue

Ø1 14 s	Ø2 65 s	Ø3 21 s	Ø4 20 s
Ø5 21 s	Ø6 58 s	Ø7 17 s	Ø8 24 s



APPENDIX E-10: SYNCHRO OUTPUT

2026 NO-BUILD CONDITIONS PM PEAK HOUR

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

2026 No-Build
 Timing Plan: PM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	38	68	18	31	85	28	451	65	31	15	101	452
Future Volume (vph)	38	68	18	31	85	28	451	65	31	15	101	452
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%		-5%			-3%					1%
Storage Length (ft)		0	0	0	0			0			75	
Storage Lanes		1	0	1	0			0			1	
Taper Length (ft)		100		100							100	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980		0.894			0.976					
Flt Protected		0.959		0.989							0.950	
Satd. Flow (prot)	0	1607	0	1519	0	0	1661	0	0	0	1585	1668
Flt Permitted		0.959		0.989							0.150	
Satd. Flow (perm)	0	1607	0	1519	0	0	1661	0	0	0	250	1668
Right Turn on Red			Yes			No			No			
Satd. Flow (RTOR)		194										
Link Speed (mph)		20		20			20					20
Link Distance (ft)		849		1070			1001					683
Travel Time (s)		28.9		36.5			34.1					23.3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	42	76	20	34	94	31	501	72	34	17	112	502
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	138	0	159	0	0	607	0	0	0	129	502
Turn Type	Prot	Prot		Prot			NA			pm+pt	pm+pt	NA
Protected Phases	4	4		3			2			1	1	6
Permitted Phases										6	6	
Detector Phase	4	4		3			2			1	1	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0			7.0			8.0	8.0	10.0
Minimum Split (s)	20.0	20.0		20.0			20.0			15.0	15.0	20.0
Total Split (s)	20.0	20.0		20.0			35.0			15.0	15.0	50.0
Total Split (%)	22.2%	22.2%		22.2%			38.9%			16.7%	16.7%	55.6%
Yellow Time (s)	3.0	3.0		3.0			5.0			3.0	3.0	3.0
All-Red Time (s)	2.9	2.9		2.9			2.0			3.1	3.1	3.1
Lost Time Adjust (s)		-0.9		-2.0			-2.0				-1.1	-1.1
Total Lost Time (s)		5.0		3.9			5.0				5.0	5.0
Lead/Lag	Lead	Lead		Lag			Lag			Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	
Recall Mode	Min	Min		Min			C-Max			None	None	Min
Act Effct Green (s)		8.1		16.5			36.5				51.5	51.5
Actuated g/C Ratio		0.09		0.18			0.41				0.57	0.57
v/c Ratio		0.43		0.57			0.90				0.44	0.53
Control Delay		6.3		40.9			46.1				15.2	15.4
Queue Delay		0.0		0.0			0.0				0.0	0.0
Total Delay		6.3		40.9			46.1				15.2	15.4
LOS		A		D			D				B	B
Approach Delay		6.3		40.9			46.1					15.4
Approach LOS		A		D			D					B
Queue Length 50th (ft)		0		83			316				32	162

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

2026 No-Build
 Timing Plan: PM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Queue Length 95th (ft)		21		135			#598				70	298
Internal Link Dist (ft)		769		990			921					603
Turn Bay Length (ft)											75	
Base Capacity (vph)		429		303			673				296	954
Starvation Cap Reductn		0		0			0				0	0
Spillback Cap Reductn		0		0			0				0	0
Storage Cap Reductn		0		0			0				0	0
Reduced v/c Ratio		0.32		0.52			0.90				0.44	0.53

Intersection Summary

Area Type: CBD
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NET, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.90
 Intersection Signal Delay: 29.4
 Intersection Capacity Utilization 73.2%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: NC 115 (Main Street) & South Street & Chairman Blake Lane



Lanes, Volumes, Timings
2: NC 115 (Main Street) & Catawba Avenue

2026 No-Build
Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	222	291	325	325	253	124	287	470	218	137	630	152
Future Volume (vph)	222	291	325	325	253	124	287	470	218	137	630	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			-2%			1%			-1%	
Storage Length (ft)	150		100	100		200	150		150	175		100
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1577	1660	1411	1609	1693	1439	1585	1668	1418	1601	1685	1432
Flt Permitted	0.478			0.157			0.080			0.276		
Satd. Flow (perm)	793	1660	1411	266	1693	1439	133	1668	1418	465	1685	1432
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			127			138			234			234
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1077			1169			1020			1189	
Travel Time (s)		21.0			22.8			19.9			23.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	247	323	361	361	281	138	319	522	242	152	700	169
Shared Lane Traffic (%)												
Lane Group Flow (vph)	247	323	361	361	281	138	319	522	242	152	700	169
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2		Free	6		Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	17.0	26.0	19.0	25.0	34.0	14.0	19.0	55.0		14.0	50.0	
Total Split (%)	14.2%	21.7%	15.8%	20.8%	28.3%	11.7%	15.8%	45.8%		11.7%	41.7%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0	3.0	3.0	3.9		3.0	3.9	
All-Red Time (s)	2.1	1.5	3.9	1.9	1.5	3.2	3.9	3.1		3.2	3.1	
Lost Time Adjust (s)	-0.1	-0.5	-1.9	0.1	-0.5	-1.2	-1.9	-2.0		-1.2	-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	Min		None	Min							
Act Effect Green (s)	33.0	21.0	40.0	46.0	29.0	42.8	64.0	50.2	120.0	53.8	45.0	120.0
Actuated g/C Ratio	0.28	0.18	0.33	0.38	0.24	0.36	0.53	0.42	1.00	0.45	0.38	1.00
v/c Ratio	0.83	1.11	0.65	1.11	0.69	0.23	1.33	0.75	0.17	0.52	1.11	0.12
Control Delay	55.5	132.6	27.8	115.7	51.2	5.3	203.6	37.7	0.3	22.2	105.6	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.5	132.6	27.8	115.7	51.2	5.3	203.6	37.7	0.3	22.2	105.6	0.2
LOS	E	F	C	F	D	A	F	D	A	C	F	A
Approach Delay		71.5			72.9			78.2			75.7	
Approach LOS		E			E			E			E	
Queue Length 50th (ft)	138	-287	154	-272	199	0	-276	338	0	58	-619	0

Lanes, Volumes, Timings
 2: NC 115 (Main Street) & Catawba Avenue

2026 No-Build
 Timing Plan: PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	#211	#470	266	#466	298	43	#462	480	0	97	#851	0
Internal Link Dist (ft)		997			1089			940			1109	
Turn Bay Length (ft)	150		100	100		200	150		150	175		100
Base Capacity (vph)	296	290	555	325	409	604	240	697	1418	294	631	1432
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	1.11	0.65	1.11	0.69	0.23	1.33	0.75	0.17	0.52	1.11	0.12

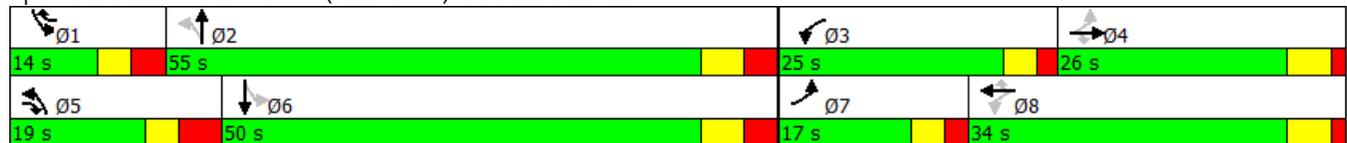
Intersection Summary

Area Type: CBD
 Cycle Length: 120
 Actuated Cycle Length: 120
 Natural Cycle: 130
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.33
 Intersection Signal Delay: 74.8
 Intersection Capacity Utilization 108.2%
 Analysis Period (min) 15

Intersection LOS: E
 ICU Level of Service G

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 2: NC 115 (Main Street) & Catawba Avenue





APPENDIX E-11: SYNCHRO OUTPUT

2026 BUILD CONDITIONS AM PEAK HOUR

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

2026 Build
 Timing Plan: AM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	18	135	24	50	191	23	369	49	19	9	87	433
Future Volume (vph)	18	135	24	50	191	23	369	49	19	9	87	433
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%		-5%			-3%					1%
Storage Length (ft)		0	0	0	0			0			75	
Storage Lanes		1	0	1	0			0			1	
Taper Length (ft)		100		100							100	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981		0.891			0.979					
Flt Protected		0.959		0.991							0.950	
Satd. Flow (prot)	0	1609	0	1517	0	0	1666	0	0	0	1585	1668
Flt Permitted		0.959		0.991							0.215	
Satd. Flow (perm)	0	1609	0	1517	0	0	1666	0	0	0	359	1668
Right Turn on Red			Yes			No			No			
Satd. Flow (RTOR)		194										
Link Speed (mph)		20		20			20					20
Link Distance (ft)		849		1070			1001					683
Travel Time (s)		28.9		36.5			34.1					23.3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	20	150	27	56	212	26	410	54	21	10	97	481
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	197	0	294	0	0	485	0	0	0	107	481
Turn Type	Prot	Prot		Prot			NA			pm+pt	pm+pt	NA
Protected Phases	4	4		3			2			1	1	6
Permitted Phases										6	6	
Detector Phase	4	4		3			2			1	1	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0			7.0			8.0	8.0	10.0
Minimum Split (s)	20.0	20.0		20.0			20.0			15.0	15.0	20.0
Total Split (s)	20.0	20.0		25.0			30.0			15.0	15.0	45.0
Total Split (%)	22.2%	22.2%		27.8%			33.3%			16.7%	16.7%	50.0%
Yellow Time (s)	3.0	3.0		3.0			5.0			3.0	3.0	3.0
All-Red Time (s)	2.9	2.9		2.9			2.0			3.1	3.1	3.1
Lost Time Adjust (s)		-0.9		-2.0			-2.0				-1.1	-1.1
Total Lost Time (s)		5.0		3.9			5.0				5.0	5.0
Lead/Lag	Lag	Lag		Lead			Lag			Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	
Recall Mode	Min	Min		Min			C-Max			None	None	Min
Act Effct Green (s)		9.3		20.5			34.0				46.3	46.3
Actuated g/C Ratio		0.10		0.23			0.38				0.51	0.51
v/c Ratio		0.58		0.85			0.77				0.33	0.56
Control Delay		13.2		57.4			37.8				15.3	18.9
Queue Delay		0.0		0.0			0.0				0.0	0.0
Total Delay		13.2		57.4			37.8				15.3	18.9
LOS		B		E			D				B	B
Approach Delay		13.2		57.4			37.8					18.2
Approach LOS		B		E			D					B
Queue Length 50th (ft)		2		159			246				30	173

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

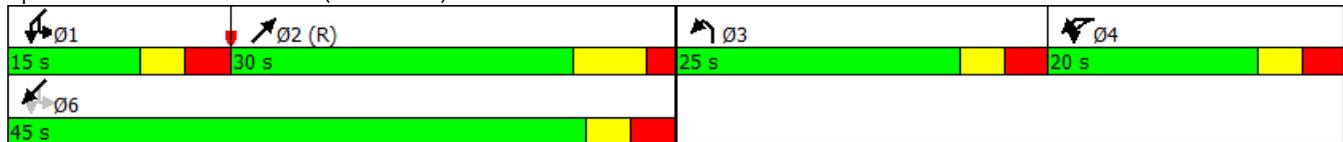
2026 Build
 Timing Plan: AM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Queue Length 95th (ft)		61		#295			#492				65	306
Internal Link Dist (ft)		769		990			921					603
Turn Bay Length (ft)											75	
Base Capacity (vph)		429		355			629				327	858
Starvation Cap Reductn		0		0			0				0	0
Spillback Cap Reductn		0		0			0				0	0
Storage Cap Reductn		0		0			0				0	0
Reduced v/c Ratio		0.46		0.83			0.77				0.33	0.56

Intersection Summary

Area Type: CBD
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NET, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 31.0
 Intersection Capacity Utilization 77.5%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: NC 115 (Main Street) & South Street & Chairman Blake Lane



Lanes, Volumes, Timings
2: NC 115 (Main Street) & Catawba Avenue

2026 Build
Timing Plan: AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	213	169	418	260	189	78	211	634	150	58	617	144
Future Volume (vph)	213	169	418	260	189	78	211	634	150	58	617	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			-2%			1%			-1%	
Storage Length (ft)	150		100	100		200	150		150	175		100
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1577	1660	1411	1609	1693	1439	1585	1668	1418	1601	1685	1432
Flt Permitted	0.459			0.259			0.104			0.184		
Satd. Flow (perm)	762	1660	1411	439	1693	1439	173	1668	1418	310	1685	1432
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			138			145			252			252
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1077			1169			1020			1189	
Travel Time (s)		21.0			22.8			19.9			23.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	237	188	464	289	210	87	234	704	167	64	686	160
Shared Lane Traffic (%)												
Lane Group Flow (vph)	237	188	464	289	210	87	234	704	167	64	686	160
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2		Free	6		Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	17.0	20.0	21.0	21.0	24.0	14.0	21.0	65.0		14.0	58.0	
Total Split (%)	14.2%	16.7%	17.5%	17.5%	20.0%	11.7%	17.5%	54.2%		11.7%	48.3%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0	3.0	3.0	3.9		3.0	3.9	
All-Red Time (s)	2.1	1.5	3.9	1.9	1.5	3.2	3.9	3.1		3.2	3.1	
Lost Time Adjust (s)	-0.1	-0.5	-1.9	0.1	-0.5	-1.2	-1.9	-2.0		-1.2	-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes								
Recall Mode	None	Min		None	Min							
Act Effct Green (s)	26.7	14.7	34.8	34.8	18.7	32.1	69.6	56.5	115.8	58.2	49.8	115.8
Actuated g/C Ratio	0.23	0.13	0.30	0.30	0.16	0.28	0.60	0.49	1.00	0.50	0.43	1.00
v/c Ratio	0.91	0.90	0.89	0.98	0.77	0.17	0.82	0.87	0.12	0.26	0.95	0.11
Control Delay	75.1	91.1	48.5	85.9	66.9	1.3	45.3	38.8	0.2	12.7	55.1	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.1	91.1	48.5	85.9	66.9	1.3	45.3	38.8	0.2	12.7	55.1	0.2
LOS	E	F	D	F	E	A	D	D	A	B	E	A
Approach Delay		64.6			66.5			34.3			42.5	
Approach LOS		E			E			C			D	
Queue Length 50th (ft)	151	146	255	-196	158	0	105	451	0	19	490	0

Lanes, Volumes, Timings
 2: NC 115 (Main Street) & Catawba Avenue

2026 Build
 Timing Plan: AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	#262	#286	#457	#354	#279	5	#234	#673	0	37	#738	0
Internal Link Dist (ft)		997			1089			940			1109	
Turn Bay Length (ft)	150		100	100		200	150		150	175		100
Base Capacity (vph)	260	216	531	294	279	511	300	873	1418	258	775	1432
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.87	0.87	0.98	0.75	0.17	0.78	0.81	0.12	0.25	0.89	0.11

Intersection Summary

Area Type: CBD
 Cycle Length: 120
 Actuated Cycle Length: 115.8
 Natural Cycle: 90
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.98
 Intersection Signal Delay: 49.6
 Intersection Capacity Utilization 93.3%
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Intersection LOS: D
 ICU Level of Service F

Splits and Phases: 2: NC 115 (Main Street) & Catawba Avenue



Intersection

Int Delay, s/veh 1.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			Y	Y	
Traffic Vol, veh/h	30	30	11	182	171	10
Future Vol, veh/h	30	30	11	182	171	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	33	12	202	190	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	423	196	201	0	-	0
Stage 1	196	-	-	-	-	-
Stage 2	227	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	588	845	1371	-	-	-
Stage 1	837	-	-	-	-	-
Stage 2	811	-	-	-	-	-
Platoon blocked, %						
Mov Cap-1 Maneuver	582	845	1371	-	-	-
Mov Cap-2 Maneuver	582	-	-	-	-	-
Stage 1	837	-	-	-	-	-
Stage 2	803	-	-	-	-	-

Approach	EB		NB		SB
HCM Control Delay, s	10.8		0.4		0
HCM LOS	B				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1371	-	689	-	-
HCM Lane V/C Ratio	0.009	-	0.097	-	-
HCM Control Delay (s)	7.6	0	10.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-



APPENDIX E-12: SYNCHRO OUTPUT

2026 BUILD CONDITIONS PM PEAK HOUR

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

2026 Build
 Timing Plan: PM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	38	68	18	31	108	28	451	65	31	15	140	452
Future Volume (vph)	38	68	18	31	108	28	451	65	31	15	140	452
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-4%		-5%			-3%					1%
Storage Length (ft)		0	0	0	0			0			75	
Storage Lanes		1	0	1	0			0			1	
Taper Length (ft)		100		100							100	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980		0.890			0.976					
Flt Protected		0.959		0.991							0.950	
Satd. Flow (prot)	0	1607	0	1516	0	0	1661	0	0	0	1585	1668
Flt Permitted		0.959		0.991							0.121	
Satd. Flow (perm)	0	1607	0	1516	0	0	1661	0	0	0	202	1668
Right Turn on Red			Yes			No			No			
Satd. Flow (RTOR)		194										
Link Speed (mph)		20		20			20					20
Link Distance (ft)		849		1070			1001					683
Travel Time (s)		28.9		36.5			34.1					23.3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	42	76	20	34	120	31	501	72	34	17	156	502
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	138	0	185	0	0	607	0	0	0	173	502
Turn Type	Prot	Prot		Prot			NA			pm+pt	pm+pt	NA
Protected Phases	4	4		3			2			1	1	6
Permitted Phases										6	6	
Detector Phase	4	4		3			2			1	1	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0			7.0			8.0	8.0	10.0
Minimum Split (s)	20.0	20.0		20.0			20.0			15.0	15.0	20.0
Total Split (s)	20.0	20.0		20.0			35.0			15.0	15.0	50.0
Total Split (%)	22.2%	22.2%		22.2%			38.9%			16.7%	16.7%	55.6%
Yellow Time (s)	3.0	3.0		3.0			5.0			3.0	3.0	3.0
All-Red Time (s)	2.9	2.9		2.9			2.0			3.1	3.1	3.1
Lost Time Adjust (s)		-0.9		-2.0			-2.0				-1.1	-1.1
Total Lost Time (s)		5.0		3.9			5.0				5.0	5.0
Lead/Lag	Lead	Lead		Lag			Lag			Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	
Recall Mode	Min	Min		Min			C-Max			None	None	Min
Act Effct Green (s)		8.1		17.9			34.3				50.1	50.1
Actuated g/C Ratio		0.09		0.20			0.38				0.56	0.56
v/c Ratio		0.43		0.61			0.96				0.62	0.54
Control Delay		6.3		41.4			57.8				24.6	16.4
Queue Delay		0.0		0.0			0.0				0.0	0.0
Total Delay		6.3		41.4			57.8				24.6	16.4
LOS		A		D			E				C	B
Approach Delay		6.3		41.4			57.8					18.5
Approach LOS		A		D			E					B
Queue Length 50th (ft)		0		96			~346				46	171

Lanes, Volumes, Timings
 1: NC 115 (Main Street) & South Street & Chairman Blake Lane

2026 Build
 Timing Plan: PM Peak

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Queue Length 95th (ft)		21		156			#598				#133	298
Internal Link Dist (ft)		769		990			921					603
Turn Bay Length (ft)											75	
Base Capacity (vph)		429		316			633				281	928
Starvation Cap Reductn		0		0			0				0	0
Spillback Cap Reductn		0		0			0				0	0
Storage Cap Reductn		0		0			0				0	0
Reduced v/c Ratio		0.32		0.59			0.96				0.62	0.54

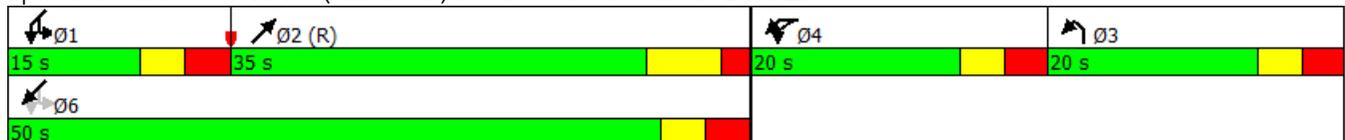
Intersection Summary

Area Type: CBD
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NET, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.96
 Intersection Signal Delay: 34.9
 Intersection Capacity Utilization 77.2%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service D

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 1: NC 115 (Main Street) & South Street & Chairman Blake Lane



Lanes, Volumes, Timings
2: NC 115 (Main Street) & Catawba Avenue

2026 Build
Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	222	311	325	336	264	124	287	470	238	137	630	152
Future Volume (vph)	222	311	325	336	264	124	287	470	238	137	630	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			-2%			1%			-1%	
Storage Length (ft)	150		100	100		200	150		150	175		100
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1577	1660	1411	1609	1693	1439	1585	1668	1418	1601	1685	1432
Flt Permitted	0.448			0.157			0.080			0.276		
Satd. Flow (perm)	744	1660	1411	266	1693	1439	133	1668	1418	465	1685	1432
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			127			138			234			234
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1077			1169			1020			1189	
Travel Time (s)		21.0			22.8			19.9			23.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	247	346	361	373	293	138	319	522	264	152	700	169
Shared Lane Traffic (%)												
Lane Group Flow (vph)	247	346	361	373	293	138	319	522	264	152	700	169
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2		Free	6		Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	17.0	26.0	19.0	25.0	34.0	14.0	19.0	55.0		14.0	50.0	
Total Split (%)	14.2%	21.7%	15.8%	20.8%	28.3%	11.7%	15.8%	45.8%		11.7%	41.7%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0	3.0	3.0	3.9		3.0	3.9	
All-Red Time (s)	2.1	1.5	3.9	1.9	1.5	3.2	3.9	3.1		3.2	3.1	
Lost Time Adjust (s)	-0.1	-0.5	-1.9	0.1	-0.5	-1.2	-1.9	-2.0		-1.2	-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	Min		None	Min							
Act Effect Green (s)	33.0	21.0	40.0	46.0	29.0	42.8	64.0	50.2	120.0	53.8	45.0	120.0
Actuated g/C Ratio	0.28	0.18	0.33	0.38	0.24	0.36	0.53	0.42	1.00	0.45	0.38	1.00
v/c Ratio	0.86	1.19	0.65	1.15	0.72	0.23	1.33	0.75	0.19	0.52	1.11	0.12
Control Delay	59.4	158.7	27.8	128.2	52.8	5.3	203.6	37.7	0.3	22.2	105.6	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.4	158.7	27.8	128.2	52.8	5.3	203.6	37.7	0.3	22.2	105.6	0.2
LOS	E	F	C	F	D	A	F	D	A	C	F	A
Approach Delay		83.5			79.7			76.7			75.7	
Approach LOS		F			E			E			E	
Queue Length 50th (ft)	138	-324	154	-292	209	0	-276	338	0	58	-619	0

Lanes, Volumes, Timings
2: NC 115 (Main Street) & Catawba Avenue

2026 Build
Timing Plan: PM Peak

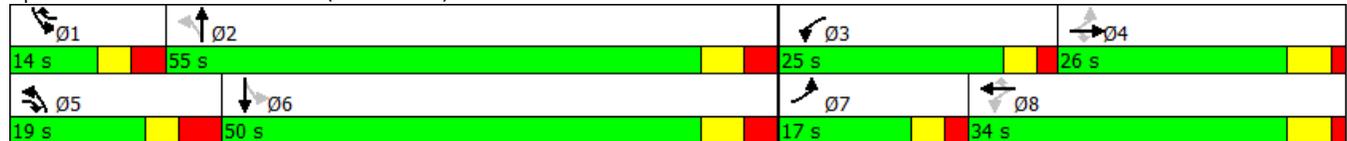
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	#224	#512	266	#487	311	43	#462	480	0	97	#851	0
Internal Link Dist (ft)		997			1089			940			1109	
Turn Bay Length (ft)	150		100	100		200	150		150	175		100
Base Capacity (vph)	287	290	555	325	409	604	240	697	1418	294	631	1432
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	1.19	0.65	1.15	0.72	0.23	1.33	0.75	0.19	0.52	1.11	0.12

Intersection Summary

Area Type: CBD
 Cycle Length: 120
 Actuated Cycle Length: 120
 Natural Cycle: 120
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.33
 Intersection Signal Delay: 78.7
 Intersection Capacity Utilization 110.0%
 Analysis Period (min) 15
 Intersection LOS: E
 ICU Level of Service H

~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 2: NC 115 (Main Street) & Catawba Avenue



Intersection

Int Delay, s/veh	1.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			Y	Y	
Traffic Vol, veh/h	23	22	39	192	216	40
Future Vol, veh/h	23	22	39	192	216	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	26	24	43	213	240	44

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	562	262	284	0	-	0
Stage 1	262	-	-	-	-	-
Stage 2	300	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	488	777	1278	-	-	-
Stage 1	782	-	-	-	-	-
Stage 2	752	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	469	777	1278	-	-	-
Mov Cap-2 Maneuver	469	-	-	-	-	-
Stage 1	782	-	-	-	-	-
Stage 2	723	-	-	-	-	-

Approach	EB		NB		SB
HCM Control Delay, s	11.8		1.3		0
HCM LOS	B				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1278	-	582	-	-
HCM Lane V/C Ratio	0.034	-	0.086	-	-
HCM Control Delay (s)	7.9	0	11.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-



**APPENDIX E-13:
SYNCHRO OUTPUT**

**2026 BUILD-IMPROVED CONDITIONS
AM PEAK HOUR**

Lanes, Volumes, Timings
2: NC 115 (Main Street) & Catawba Avenue

2026 Build-Improved
Timing Plan: AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	213	169	418	260	189	78	211	634	150	58	617	144
Future Volume (vph)	213	169	418	260	189	78	211	634	150	58	617	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			-2%			1%			-1%	
Storage Length (ft)	150		100	100		200	150		150	175		100
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1577	1660	1411	1609	1693	1439	1585	1668	1418	1601	1685	1432
Flt Permitted	0.459			0.259			0.104			0.184		
Satd. Flow (perm)	762	1660	1411	439	1693	1439	173	1668	1418	310	1685	1432
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			138			145			252			252
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1077			1169			1020			1189	
Travel Time (s)		21.0			22.8			19.9			23.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	237	188	464	289	210	87	234	704	167	64	686	160
Shared Lane Traffic (%)												
Lane Group Flow (vph)	237	188	464	289	210	87	234	704	167	64	686	160
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2		Free	6		Free
Detector Phase	7	4	5	3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	20.0	14.0	14.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	17.0	20.0	21.0	21.0	24.0	14.0	21.0	65.0		14.0	58.0	
Total Split (%)	14.2%	16.7%	17.5%	17.5%	20.0%	11.7%	17.5%	54.2%		11.7%	48.3%	
Yellow Time (s)	3.0	4.0	3.0	3.0	4.0	3.0	3.0	3.9		3.0	3.9	
All-Red Time (s)	2.1	1.5	3.9	1.9	1.5	3.2	3.9	3.1		3.2	3.1	
Lost Time Adjust (s)	-0.1	-0.5	-1.9	0.1	-0.5	-1.2	-1.9	-2.0		-1.2	-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes								
Recall Mode	None	Min		None	Min							
Act Effct Green (s)	26.7	14.7	34.8	34.8	18.7	32.1	69.6	56.5	115.8	58.2	49.8	115.8
Actuated g/C Ratio	0.23	0.13	0.30	0.30	0.16	0.28	0.60	0.49	1.00	0.50	0.43	1.00
v/c Ratio	0.91	0.90	0.89	0.98	0.77	0.17	0.82	0.87	0.12	0.26	0.95	0.11
Control Delay	75.1	91.1	48.5	85.9	66.9	1.3	45.3	38.8	0.2	12.7	55.1	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.1	91.1	48.5	85.9	66.9	1.3	45.3	38.8	0.2	12.7	55.1	0.2
LOS	E	F	D	F	E	A	D	D	A	B	E	A
Approach Delay		64.6			66.5			34.3			42.5	
Approach LOS		E			E			C			D	
Queue Length 50th (ft)	151	146	255	-196	158	0	105	451	0	19	490	0

Lanes, Volumes, Timings
 2: NC 115 (Main Street) & Catawba Avenue

2026 Build-Improved
 Timing Plan: AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	#262	#286	#457	#354	#279	5	#234	#673	0	37	#738	0
Internal Link Dist (ft)		997			1089			940			1109	
Turn Bay Length (ft)	150		100	100		200	150		150	175		100
Base Capacity (vph)	260	216	531	294	279	511	300	873	1418	258	775	1432
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.91	0.87	0.87	0.98	0.75	0.17	0.78	0.81	0.12	0.25	0.89	0.11

Intersection Summary

Area Type: CBD
 Cycle Length: 120
 Actuated Cycle Length: 115.8
 Natural Cycle: 90
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.98
 Intersection Signal Delay: 49.6
 Intersection Capacity Utilization 93.3%
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Intersection LOS: D
 ICU Level of Service F

Splits and Phases: 2: NC 115 (Main Street) & Catawba Avenue



Intersection

Int Delay, s/veh 1.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↘		↘	↗	↗	↗
Traffic Vol, veh/h	30	30	11	182	171	10
Future Vol, veh/h	30	30	11	182	171	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	33	12	202	190	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	417	190	190	0	-	0
Stage 1	190	-	-	-	-	-
Stage 2	227	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	592	852	1384	-	-	-
Stage 1	842	-	-	-	-	-
Stage 2	811	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	587	852	1384	-	-	-
Mov Cap-2 Maneuver	587	-	-	-	-	-
Stage 1	842	-	-	-	-	-
Stage 2	804	-	-	-	-	-

Approach	EB		NB		SB
HCM Control Delay, s	10.7		0.4		0
HCM LOS	B				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1384	-	695	-	-
HCM Lane V/C Ratio	0.009	-	0.096	-	-
HCM Control Delay (s)	7.6	-	10.7	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-



**APPENDIX E-14:
SYNCHRO OUTPUT**

**2026 BUILD-IMPROVED CONDITIONS
PM PEAK HOUR**

Lanes, Volumes, Timings
2: NC 115 (Main Street) & Catawba Avenue

2026 Build-Improved
Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	222	311	325	336	264	124	287	470	238	137	630	152
Future Volume (vph)	222	311	325	336	264	124	287	470	238	137	630	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%			-2%			1%			-1%	
Storage Length (ft)	150		100	100		200	150		150	175		100
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1577	1660	1411	1609	1693	1439	1585	1668	1418	1601	1685	1432
Flt Permitted	0.448			0.157			0.080			0.276		
Satd. Flow (perm)	744	1660	1411	266	1693	1439	133	1668	1418	465	1685	1432
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			234			138			234			234
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1077			1169			1020			1189	
Travel Time (s)		21.0			22.8			19.9			23.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	247	346	361	373	293	138	319	522	264	152	700	169
Shared Lane Traffic (%)												
Lane Group Flow (vph)	247	346	361	373	293	138	319	522	264	152	700	169
Turn Type	pm+pt	NA	Free	pm+pt	NA	pm+ov	pm+pt	NA	Free	pm+pt	NA	Free
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases	4		Free	8		8	2		Free	6		Free
Detector Phase	7	4		3	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	10.0		7.0	10.0	
Minimum Split (s)	14.0	20.0		14.0	20.0	14.0	14.0	20.0		14.0	20.0	
Total Split (s)	17.0	26.0		25.0	34.0	14.0	19.0	55.0		14.0	50.0	
Total Split (%)	14.2%	21.7%		20.8%	28.3%	11.7%	15.8%	45.8%		11.7%	41.7%	
Yellow Time (s)	3.0	4.0		3.0	4.0	3.0	3.0	3.9		3.0	3.9	
All-Red Time (s)	2.1	1.5		1.9	1.5	3.2	3.9	3.1		3.2	3.1	
Lost Time Adjust (s)	-0.1	-0.5		0.1	-0.5	-1.2	-1.9	-2.0		-1.2	-2.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None	None	None	Min		None	Min	
Act Effect Green (s)	33.0	21.0	120.0	46.0	29.0	42.8	64.0	50.2	120.0	53.8	45.0	120.0
Actuated g/C Ratio	0.28	0.18	1.00	0.38	0.24	0.36	0.53	0.42	1.00	0.45	0.38	1.00
v/c Ratio	0.86	1.19	0.26	1.15	0.72	0.23	1.33	0.75	0.19	0.52	1.11	0.12
Control Delay	59.4	158.7	0.4	128.2	52.8	5.3	203.6	37.7	0.3	22.2	105.6	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.4	158.7	0.4	128.2	52.8	5.3	203.6	37.7	0.3	22.2	105.6	0.2
LOS	E	F	A	F	D	A	F	D	A	C	F	A
Approach Delay		73.1			79.7			76.7			75.7	
Approach LOS		E			E			E			E	
Queue Length 50th (ft)	138	-324	0	-292	209	0	-276	338	0	58	-619	0

Lanes, Volumes, Timings
 2: NC 115 (Main Street) & Catawba Avenue

2026 Build-Improved
 Timing Plan: PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)	#224	#512	0	#487	311	43	#462	480	0	97	#851	0
Internal Link Dist (ft)		997			1089			940			1109	
Turn Bay Length (ft)	150		100	100		200	150		150	175		100
Base Capacity (vph)	287	290	1411	325	409	604	240	697	1418	294	631	1432
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	1.19	0.26	1.15	0.72	0.23	1.33	0.75	0.19	0.52	1.11	0.12

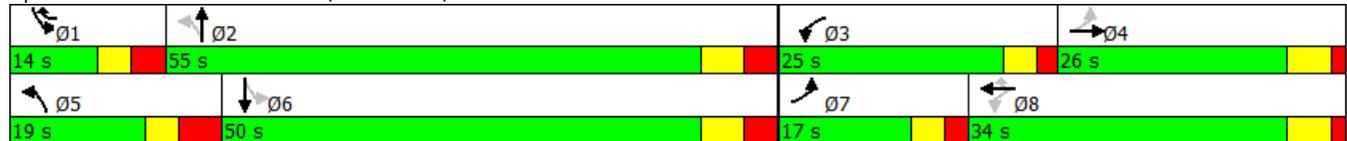
Intersection Summary

Area Type: CBD
 Cycle Length: 120
 Actuated Cycle Length: 120
 Natural Cycle: 130
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 1.33
 Intersection Signal Delay: 76.2
 Intersection Capacity Utilization 110.0%
 Analysis Period (min) 15

Intersection LOS: E
 ICU Level of Service H

- ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 2: NC 115 (Main Street) & Catawba Avenue



Intersection

Int Delay, s/veh	1.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↘↙		↘	↗	↗	↘
Traffic Vol, veh/h	23	22	39	192	216	40
Future Vol, veh/h	23	22	39	192	216	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	26	24	43	213	240	44

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	540	240	240	0	-	0
Stage 1	240	-	-	-	-	-
Stage 2	300	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	503	799	1327	-	-	-
Stage 1	800	-	-	-	-	-
Stage 2	752	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	487	799	1327	-	-	-
Mov Cap-2 Maneuver	487	-	-	-	-	-
Stage 1	800	-	-	-	-	-
Stage 2	728	-	-	-	-	-

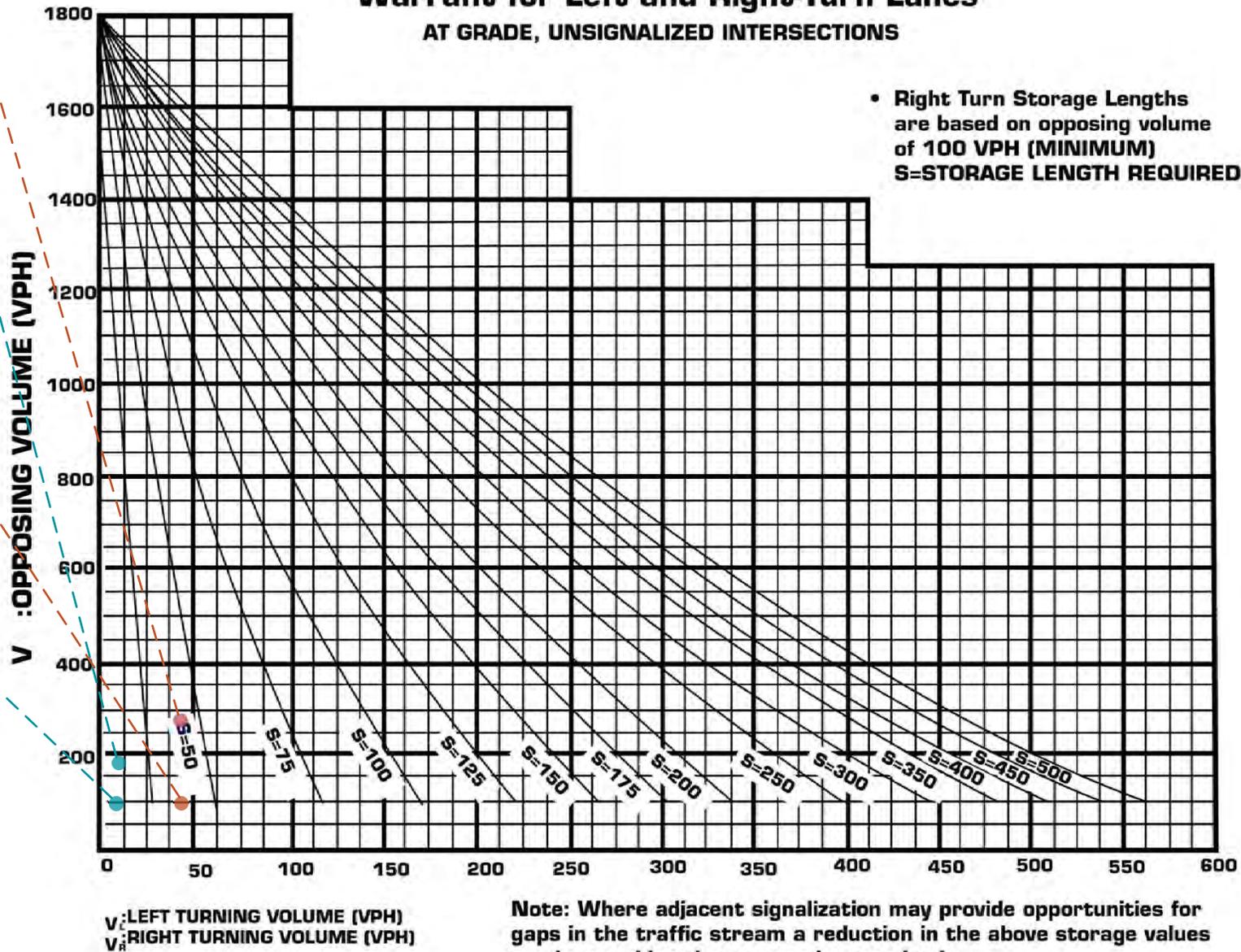
Approach	EB		NB		SB
HCM Control Delay, s	11.5		1.3		0
HCM LOS	B				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1327	-	602	-	-
HCM Lane V/C Ratio	0.033	-	0.083	-	-
HCM Control Delay (s)	7.8	-	11.5	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-



APPENDIX F: TURN LANE WARRANTS

Warrant for Left and Right-Turn Lanes AT GRADE, UNSIGNALIZED INTERSECTIONS



Intersection 3:
NBL – PM Peak
NBL: 39 VPH
VOPP: 256 VPH

Intersection 3:
NBL – AM Peak
NBL: 11 VPH
VOPP: 181 VPH

Intersection 3:
SBR – PM Peak
SBR: 40

Intersection 3:
SBR – AM Peak
SBR: 10

Page

July 2003

Policy On Street And Driveway Access to North Carolina Highways



APPENDIX G: TRAFFIC ENGINEERING ACCIDENT ANALYSIS SYSTEM (TEAAS) REPORTS

**North Carolina Department of Transportation
Traffic Engineering Accident Analysis System
Intersection Analysis Report**

Acc No	Crash ID	Date	Accident Type	Total Damage	Injuries				Condition			Road		Trfc Ctl	
					F	A	B	C	R	L	W	Ch	Ci	Dv	Op
9	104416211	06/24/2015 18:58	REAR END, SLOW OR STOP	\$ 1700	0	0	0	0	1	1	1	1	0	1	1
Unit	1 : 2	Alchl/Drgs: 0	Speed: 20 MPH Dir: S	Veh Mnvr / Ped Actn: 4		Obj Strk:									
Unit	2 : 1	Alchl/Drgs: 0	Speed: 20 MPH Dir: S	Veh Mnvr / Ped Actn: 1		Obj Strk:									
10	104539385	10/19/2015 12:10	PARKED MOTOR VEHICLE	\$ 400	0	0	0	0	1	1	1	1	0	3	1
Unit	1 : 32	Alchl/Drgs: 7	Speed: 20 MPH Dir: S	Veh Mnvr / Ped Actn: 4		Obj Strk:									
Unit	2 : 1	Alchl/Drgs: 7	Speed: 0 MPH Dir: S	Veh Mnvr / Ped Actn: 2		Obj Strk: 20									
11	104664981	03/01/2016 15:19	OTHER COLLISION WITH VEHICLE	\$ 100	0	0	0	0	1	1	1	1	0	3	1
Unit	1 : 32	Alchl/Drgs: 7	Speed: 20 MPH Dir: NE	Veh Mnvr / Ped Actn: 16		Obj Strk:									
Unit	2 : 4	Alchl/Drgs: 0	Speed: 20 MPH Dir: NE	Veh Mnvr / Ped Actn: 1		Obj Strk:									
12	104698841	04/01/2016 12:16	PEDESTRIAN	\$ 0	1	0	0	0	1	1	1	1	0	3	1
Unit	1 : 11	Alchl/Drgs: 0	Speed: 0 MPH Dir: SW	Veh Mnvr / Ped Actn: 8		Obj Strk: 14									
Unit	2 : 24	Alchl/Drgs: 0	Speed: 0 MPH Dir:	Veh Mnvr / Ped Actn:		Obj Strk: 14									
13	104699960	04/11/2016 09:20	PARKED MOTOR VEHICLE	\$ 1500	0	0	0	0	1	1	2	1	0	3	2
Unit	1 : 4	Alchl/Drgs: 0	Speed: 2 MPH Dir: W	Veh Mnvr / Ped Actn: 4		Obj Strk:									
Unit	2 : 1	Alchl/Drgs: 7	Speed: 0 MPH Dir: W	Veh Mnvr / Ped Actn: 2		Obj Strk:									
14	104707734	04/20/2016 15:23	BACKING UP	\$ 900	0	0	0	0	1	1	1	1	0	0	1
Unit	1 : 32	Alchl/Drgs: 7	Speed: 10 MPH Dir: E	Veh Mnvr / Ped Actn: 10		Obj Strk:									
Unit	2 : 1	Alchl/Drgs: 7	Speed: 0 MPH Dir: W	Veh Mnvr / Ped Actn: 2		Obj Strk:									
15	104740106	05/03/2016 08:28	MOVABLE OBJECT	\$ 400	0	0	0	0	2	1	2	1	0	0	
Unit	1 : 7	Alchl/Drgs: 0	Speed: 25 MPH Dir: N	Veh Mnvr / Ped Actn: 4		Obj Strk: 18									
Unit	2 : 2	Alchl/Drgs: 7	Speed: 0 MPH Dir: NE	Veh Mnvr / Ped Actn: 2		Obj Strk: 18									

Legend for Report Details:
 Acc No - Accident Number
 Injuries: F - Fatal, A - Class A, B - Class B, C - Class C
 Condition: R - Road Surface, L - Ambient Light, W - Weather
 Rd Ch - Road Character
 Rd Ci - Roadway Contributing Circumstances
 Trfc Ctl - Traffic Control: Dv - Device, Op - Operating
 Alchl/Drgs - Alcohol Drugs Suspected
 Veh Mnvr/Ped Actn - Vehicle Maneuver/Pedestrian Action
 Obj Strk - Object Struck

**North Carolina Department of Transportation
Traffic Engineering Accident Analysis System
Intersection Analysis Report**

Summary Statistics

High Level Crash Summary

Crash Type	Number of Crashes	Percent of Total
Total Crashes	15	100.00
Fatal Crashes	1	6.67
Non-Fatal Injury Crashes	1	6.67
Total Injury Crashes	2	13.33
Property Damage Only Crashes	13	86.67
Night Crashes	0	0.00
Wet Crashes	2	13.33
Alcohol/Drugs Involvement Crashes	0	0.00

Crash Severity Summary

Crash Type	Number of Crashes	Percent of Total
Total Crashes	15	100.00
Fatal Crashes	1	6.67
Class A Crashes	0	0.00
Class B Crashes	0	0.00
Class C Crashes	1	6.67
Property Damage Only Crashes	13	86.67

Vehicle Exposure Statistics

Annual ADT = 16500

Total Vehicle Exposure = 18.08 (MEV)

Crash Rate	Crashes Per 100 Million Vehicles Entered
Total Crash Rate	82.95
Fatal Crash Rate	5.53
Non Fatal Crash Rate	5.53
Night Crash Rate	0.00
Wet Crash Rate	11.06
EPDO Rate	543.02

**North Carolina Department of Transportation
Traffic Engineering Accident Analysis System
Intersection Analysis Report**

Miscellaneous Statistics

Severity Index =	6.55
EPDO Crash Index =	98.20
Estimated Property Damage Total = \$	20200.00

Accident Type Summary

Accident Type	Number of Crashes	Percent of Total
BACKING UP	2	13.33
FIXED OBJECT	1	6.67
MOVABLE OBJECT	1	6.67
OTHER COLLISION WITH VEHICLE	2	13.33
PARKED MOTOR VEHICLE	3	20.00
PEDESTRIAN	1	6.67
REAR END, SLOW OR STOP	3	20.00
SIDESWIPE, SAME DIRECTION	2	13.33

Injury Summary

Injury Type	Number of Injuries	Percent of Total
Fatal Injuries	1	50.00
Class A Injuries	0	0.00
Class B Injuries	0	0.00
Class C Injuries	1	50.00
Total Non-Fatal Injuries	1	50.00
Total Injuries	2	100.00

**North Carolina Department of Transportation
Traffic Engineering Accident Analysis System
Intersection Analysis Report**

Monthly Summary

Month	Number of Crashes	Percent of Total
Jan	1	6.67
Feb	0	0.00
Mar	1	6.67
Apr	3	20.00
May	4	26.67
Jun	3	20.00
Jul	0	0.00
Aug	0	0.00
Sep	2	13.33
Oct	1	6.67
Nov	0	0.00
Dec	0	0.00

Daily Summary

Day	Number of Crashes	Percent of Total
Mon	2	13.33
Tue	6	40.00
Wed	3	20.00
Thu	0	0.00
Fri	2	13.33
Sat	1	6.67
Sun	1	6.67

**North Carolina Department of Transportation
Traffic Engineering Accident Analysis System
Intersection Analysis Report**

Hourly Summary

Hour	Number of Crashes	Percent of Total
0000-0059	0	0.00
0100-0159	0	0.00
0200-0259	0	0.00
0300-0359	0	0.00
0400-0459	0	0.00
0500-0559	0	0.00
0600-0659	0	0.00
0700-0759	0	0.00
0800-0859	2	13.33
0900-0959	2	13.33
1000-1059	0	0.00
1100-1159	2	13.33
1200-1259	2	13.33
1300-1359	1	6.67
1400-1459	0	0.00
1500-1559	2	13.33
1600-1659	1	6.67
1700-1759	1	6.67
1800-1859	1	6.67
1900-1959	1	6.67
2000-2059	0	0.00
2100-2159	0	0.00
2200-2259	0	0.00
2300-2359	0	0.00

**North Carolina Department of Transportation
Traffic Engineering Accident Analysis System
Intersection Analysis Report**

Light and Road Conditions Summary

Condition	Dry	Wet	Other	Total
Day	13	2	0	15
Dark	0	0	0	0
Other	0	0	0	0
Total	13	2	0	15

Object Struck Summary

Object Type	Times Struck	Percent of Total
MOVABLE OBJECT	2	22.22
PARKED MOTOR VEHICLE	4	44.44
PEDESTRIAN	2	22.22
UTILITY POLE	1	11.11

Vehicle Type Summary

Vehicle Type	Number Involved	Percent of Total
PASSENGER CAR	9	30.00
PEDESTRIAN	1	3.33
PICKUP	3	10.00
SCHOOL BUS	1	3.33
SINGLE UNIT TRUCK (2-AXLE, 6-TIRE)	2	6.67
SINGLE UNIT TRUCK (3 OR MORE AXLES)	1	3.33
SPORT UTILITY	6	20.00
TRUCK/TRAILER	1	3.33
UNKNOWN	5	16.67
VAN	1	3.33

North Carolina Department of Transportation
Traffic Engineering Accident Analysis System
Intersection Analysis Report

Yearly Totals Summary

Accident Totals

Year	Total Accidents	Fatal Accidents	Injury Accidents	Property Damage Only Accidents
2013	0	0	0	0
2014	3	0	1	2
2015	7	0	0	7
2016	5	1	0	4
Total	15	1	1	13

Injury Totals

Year	Fatal Injuries	Class A, B, or C Injuries
2013	0	0
2014	0	1
2015	0	0
2016	1	0
Total	1	1

Miscellaneous Totals

Year	Property Damage	EPDO Index
2013	\$ 0	0.00
2014	\$ 9100	10.40
2015	\$ 8200	7.00
2016	\$ 2900	80.80
Total	\$ 20200	98.20

Type of Accident Totals

Year	Left Turn	Right Turn	Rear End	Run Off Road &				Other
				Fixed Object	Angle	Side Swipe		
2013	0	0	0	0	0	0	0	
2014	0	0	2	0	0	1	0	
2015	0	0	1	1	0	1	4	
2016	0	0	0	0	0	0	5	
Total	0	0	3	1	0	2	9	

**North Carolina Department of Transportation
Traffic Engineering Accident Analysis System
Intersection Analysis Report**

Study Criteria

Study Name	Log No.	PH No.	TIP No.	K/A Cf.	B/C Cf.	ADT	ADT Route
41000041892	41000041892			76.8	8.4	16500	

Request Date	Courier Service	Phone No.	Ext.	Fax No.

County			Municipality			Y-Line Ft.	Begin Date	End Date	Years
Name	Code	Div.	Name	Code					
MECKLENBURG	60	10	All and Rural		150	7/1/2013	6/30/2016	3.00	

Location Text	Requestor
NC 115- Main St at South St/ Chairman Blake Ln	Matthew Peach, P.E. PTOE

Included Accidents
104416211
104539385
104157929

Excluded Accidents
104003836
103979980
104770482

Fiche Roads

Name	Code
NC 115	30000115
SOUTH	50028612
MAIN	50018682
CHAIRMAN BLAKE	50041666

Intersection Road Combinations

Name	Code	Code	Name
NC 115	30000115	50028612	SOUTH
NC 115	30000115	50041666	CHAIRMAN BLAKE
MAIN	50018682	50028612	SOUTH
MAIN	50018682	50041666	CHAIRMAN BLAKE
SOUTH	50028612	50041666	CHAIRMAN BLAKE

**North Carolina Department of Transportation
Traffic Engineering Accident Analysis System
Intersection Analysis Report**

Acc No	Crash ID	Date	Accident Type	Total Damage	Injuries				Condition			Road		Trfc Ctl	
					F	A	B	C	R	L	W	Ch	Ci	Dv	Op
9	104232904	11/15/2014 08:56	LEFT TURN, SAME ROADWAY	\$ 12000	0	0	0	2	1	1	1	1	0	3	1
Unit	1 : 2	Alchl/Drgs: 0	Speed: 8 MPH Dir: N	Veh Mnvr / Ped Actn: 8	Obj Strk:										
Unit	2 : 1	Alchl/Drgs: 0	Speed: 10 MPH Dir: S	Veh Mnvr / Ped Actn: 4	Obj Strk:										

10	104354641	04/04/2015 15:40	LEFT TURN, SAME ROADWAY	\$ 1700	0	0	0	0	1	1	1	1	0	3	1
Unit	1 : 1	Alchl/Drgs: 0	Speed: 5 MPH Dir: E	Veh Mnvr / Ped Actn: 5	Obj Strk:										
Unit	2 : 4	Alchl/Drgs: 0	Speed: 5 MPH Dir: E	Veh Mnvr / Ped Actn: 12	Obj Strk:										

11	104654981	01/09/2016 14:58	HEAD ON	\$ 12000	0	0	0	0	2	1	2	1	0	3	1
Unit	1 : 1	Alchl/Drgs: 0	Speed: 25 MPH Dir: N	Veh Mnvr / Ped Actn: 8	Obj Strk:										
Unit	2 : 1	Alchl/Drgs: 0	Speed: 25 MPH Dir: S	Veh Mnvr / Ped Actn: 4	Obj Strk:										
Unit	3 : 1	Alchl/Drgs: 0	Speed: 0 MPH Dir: E	Veh Mnvr / Ped Actn: 1	Obj Strk:										

12	104755560	05/11/2016 20:32	LEFT TURN, SAME ROADWAY	\$ 4700	0	0	2	0	1	2	1	3	0		
Unit	1 : 1	Alchl/Drgs: 0	Speed: 15 MPH Dir: W	Veh Mnvr / Ped Actn: 8	Obj Strk:										
Unit	2 : 20	Alchl/Drgs: 0	Speed: 25 MPH Dir: S	Veh Mnvr / Ped Actn: 4	Obj Strk:										

13	104755564	05/12/2016 10:01	HEAD ON	\$ 2800	0	0	0	0	1	1	1	1	0		
Unit	1 : 1	Alchl/Drgs: 1	Speed: 20 MPH Dir: W	Veh Mnvr / Ped Actn: 4	Obj Strk:										
Unit	2 : 2	Alchl/Drgs: 0	Speed: 5 MPH Dir: E	Veh Mnvr / Ped Actn: 4	Obj Strk:										

14	104755455	05/17/2016 19:52	LEFT TURN, SAME ROADWAY	\$ 2700	0	0	0	1	1	2	1	1	0	3	1
Unit	1 : 1	Alchl/Drgs: 0	Speed: 10 MPH Dir: NE	Veh Mnvr / Ped Actn: 8	Obj Strk:										
Unit	2 : 1	Alchl/Drgs: 0	Speed: 15 MPH Dir: W	Veh Mnvr / Ped Actn: 4	Obj Strk:										

Legend for Report Details:
 Acc No - Accident Number
 Injuries: F - Fatal, A - Class A, B - Class B, C - Class C
 Condition: R - Road Surface, L - Ambient Light, W - Weather
 Rd Ch - Road Character
 Rd Ci - Roadway Contributing Circumstances
 Trfc Ctl - Traffic Control: Dv - Device, Op - Operating
 Alchl/Drgs - Alcohol Drugs Suspected
 Veh Mnvr/Ped Actn - Vehicle Maneuver/Pedestrian Action
 Obj Strk - Object Struck

**North Carolina Department of Transportation
Traffic Engineering Accident Analysis System
Intersection Analysis Report**

Summary Statistics

High Level Crash Summary

Crash Type	Number of Crashes	Percent of Total
Total Crashes	14	100.00
Fatal Crashes	0	0.00
Non-Fatal Injury Crashes	5	35.71
Total Injury Crashes	5	35.71
Property Damage Only Crashes	9	64.29
Night Crashes	4	28.57
Wet Crashes	2	14.29
Alcohol/Drugs Involvement Crashes	1	7.14

Crash Severity Summary

Crash Type	Number of Crashes	Percent of Total
Total Crashes	14	100.00
Fatal Crashes	0	0.00
Class A Crashes	0	0.00
Class B Crashes	1	7.14
Class C Crashes	4	28.57
Property Damage Only Crashes	9	64.29

Vehicle Exposure Statistics

Annual ADT = 23600

Total Vehicle Exposure = 25.87 (MEV)

Crash Rate	Crashes Per 100 Million Vehicles Entered
Total Crash Rate	54.13
Fatal Crash Rate	0.00
Non Fatal Crash Rate	19.33
Night Crash Rate	15.46
Wet Crash Rate	7.73
EPDO Rate	197.17

**North Carolina Department of Transportation
Traffic Engineering Accident Analysis System
Intersection Analysis Report**

Miscellaneous Statistics

Severity Index = 3.64
EPDO Crash Index = 51.00
Estimated Property Damage Total = \$ 72550.00

Accident Type Summary

Accident Type	Number of Crashes	Percent of Total
ANGLE	1	7.14
HEAD ON	2	14.29
LEFT TURN, SAME ROADWAY	8	57.14
RAN OFF ROAD - RIGHT	1	7.14
REAR END, SLOW OR STOP	1	7.14
RIGHT TURN, DIFFERENT ROADWAYS	1	7.14

Injury Summary

Injury Type	Number of Injuries	Percent of Total
Fatal Injuries	0	0.00
Class A Injuries	0	0.00
Class B Injuries	2	25.00
Class C Injuries	6	75.00
Total Non-Fatal Injuries	8	100.00
Total Injuries	8	100.00

**North Carolina Department of Transportation
Traffic Engineering Accident Analysis System
Intersection Analysis Report**

Monthly Summary

Month	Number of Crashes	Percent of Total
Jan	2	14.29
Feb	1	7.14
Mar	1	7.14
Apr	1	7.14
May	5	35.71
Jun	0	0.00
Jul	0	0.00
Aug	0	0.00
Sep	0	0.00
Oct	2	14.29
Nov	1	7.14
Dec	1	7.14

Daily Summary

Day	Number of Crashes	Percent of Total
Mon	0	0.00
Tue	3	21.43
Wed	3	21.43
Thu	2	14.29
Fri	3	21.43
Sat	3	21.43
Sun	0	0.00

**North Carolina Department of Transportation
Traffic Engineering Accident Analysis System
Intersection Analysis Report**

Hourly Summary

Hour	Number of Crashes	Percent of Total
0000-0059	0	0.00
0100-0159	1	7.14
0200-0259	0	0.00
0300-0359	0	0.00
0400-0459	0	0.00
0500-0559	0	0.00
0600-0659	0	0.00
0700-0759	0	0.00
0800-0859	1	7.14
0900-0959	0	0.00
1000-1059	1	7.14
1100-1159	0	0.00
1200-1259	0	0.00
1300-1359	0	0.00
1400-1459	2	14.29
1500-1559	3	21.43
1600-1659	0	0.00
1700-1759	1	7.14
1800-1859	0	0.00
1900-1959	2	14.29
2000-2059	1	7.14
2100-2159	1	7.14
2200-2259	1	7.14
2300-2359	0	0.00

**North Carolina Department of Transportation
Traffic Engineering Accident Analysis System
Intersection Analysis Report**

Light and Road Conditions Summary

Condition	Dry	Wet	Other	Total
Day	7	1	0	8
Dark	3	1	0	4
Other	2	0	0	2
Total	12	2	0	14

Object Struck Summary

Object Type	Times Struck	Percent of Total
MOVABLE OBJECT	1	100.00

Vehicle Type Summary

Vehicle Type	Number Involved	Percent of Total
MOTORCYCLE	1	3.57
PASSENGER CAR	16	57.14
PICKUP	5	17.86
POLICE	1	3.57
SPORT UTILITY	4	14.29
VAN	1	3.57

North Carolina Department of Transportation
 Traffic Engineering Accident Analysis System
 Intersection Analysis Report

Yearly Totals Summary

Accident Totals

Year	Total Accidents	Fatal Accidents	Injury Accidents	Property Damage Only Accidents
2013	2	0	0	2
2014	7	0	3	4
2015	1	0	0	1
2016	4	0	2	2
Total	14	0	5	9

Injury Totals

Year	Fatal Injuries	Class A, B, or C Injuries
2013	0	0
2014	0	5
2015	0	0
2016	0	3
Total	0	8

Miscellaneous Totals

Year	Property Damage	EPDO Index
2013	\$ 10500	2.00
2014	\$ 38150	29.20
2015	\$ 1700	1.00
2016	\$ 22200	18.80
Total	\$ 72550	51.00

Type of Accident Totals

Year	Left Turn	Right Turn	Rear End	Run Off Road &			
				Fixed Object	Angle	Side Swipe	Other
2013	1	0	1	0	0	0	0
2014	4	1	0	1	1	0	0
2015	1	0	0	0	0	0	0
2016	2	0	0	0	0	0	2
Total	8	1	1	1	1	0	2

**North Carolina Department of Transportation
Traffic Engineering Accident Analysis System
Intersection Analysis Report**

Study Criteria

Study Name	Log No.	PH No.	TIP No.	K/A Cf.	B/C Cf.	ADT	ADT Route
41000041901	41000041901			76.8	8.4	23600	

Request Date	Courier Service	Phone No.	Ext.	Fax No.

County			Municipality			Y-Line Ft.	Begin Date	End Date	Years
Name	Code	Div.	Name	Code					
MECKLENBURG	60	10	All and Rural		150	7/1/2013	6/30/2016	3.00	

Location Text	Requestor
NC 115- Main St at Catawba Ave	Matthew Peach, P.E. PTOE

Included Accidents
104354641
104030960

Excluded Accidents
104728735
104004871
104509201

Fiche Roads

Name	Code
NC 115	30000115
MAIN	50018682
CATAWBA	50005331
SR 5544	40005544

Intersection Road Combinations

Name	Code	Code	Name
NC 115	30000115	40005544	SR 5544
NC 115	30000115	50005331	CATAWBA
MAIN	50018682	40005544	SR 5544
MAIN	50018682	50005331	CATAWBA
NC 115	30000115	50043016	OLD CANAL
MAIN	50018682	50043016	OLD CANAL
CATAWBA	50005331	50043016	OLD CANAL
SR 5544	40005544	50043016	OLD CANAL