Traffic Impact Analysis
Tap Root Farms
Henderson County, North Carolina
March 2019

RAMEY KEMP & ASSOCIATES

TRAFFIC IMPACT ANALYSIS

FOR

TAP ROOT FARMS

LOCATED

IN

HENDERSON COUNTY, NORTH CAROLINA

Prepared For:
Tap Root Farms, LLC
P.O. Box 1157
Arden, North Carolina 28104

Prepared By:
Ramey Kemp & Associates, Inc.
621 Jonestown Road, Suite 221
Winston-Salem, North Carolina 27103
License #C-0910

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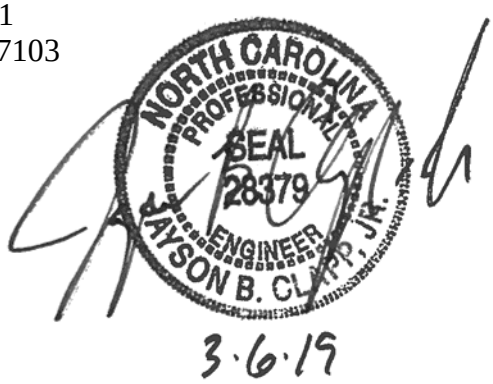

EXECUTIVE SUMMARY

This report summarizes the findings of the Traffic Impact Analysis (TIA) that was performed for Tap Root Farms that is proposed on Butler Bridge Road west of Interstate 26 in Henderson County, North Carolina. The site could consist of up to 530 single-family homes and 536 townhomes and is anticipated to be completed in the year 2028.

The purpose of this analysis is to determine the potential impact to the adjacent transportation system caused by the traffic generated by the proposed development. To accomplish this objective, the study analyzed existing (2018), future (2028) 'no-build', and future (2028) 'build' traffic conditions during the weekday AM and PM peak hours.

Under existing traffic conditions, the signalized intersections operate at an overall LOS C or better during the AM and PM peak hours. In addition, all intersection approaches operate at LOS D or better. As for the unsignalized intersections, the major street left turn movements [on NC 280 and Butler Bridge Road] experience minor delays and operate at LOS B or better during the AM and PM peak hours. The stop-controlled minor approaches [of Fanning Fields Road, Jeffress Road, Carrie Lane, Haw River Road, Yadkin Road, and North Rugby Road] experience minor to moderate overall delays and operate at LOS C or better during the peak hours except for the eastbound approach of Fanning Fields Road [at NC 280].

Under future 'no-build' traffic conditions, the signalized intersections are expected to operate at an overall LOS D or better during the AM and PM peak hours. In addition, all intersection approaches are expected to operate at LOS D or better except for the eastbound approach of Butler Bridge Road [at US 25] during the PM peak hour. Poorer levels of operation are not uncommon for side streets at signalized intersections when the signal is in a coordinated system where precedence is given to the mainline approaches to maximize progression. As for the unsignalized intersections, the major street left turn movements [on NC 280 and Butler Bridge Road] are expected to experience minor to moderate delays and operate at LOS C or better during the AM and PM peak hours. The stop-controlled minor approaches [of Fanning Fields Road, Jeffress Road, Carrie Lane, Haw River Road, Yadkin Road, and North Rugby Road] are expected to experience minor to moderate overall delays and operate at LOS D or better during the peak hours except for the eastbound approach of Fanning Fields Road [at NC 280].

With a traffic signal installed on NC 280 at Fanning Fields Road, the signalized intersection is expected to operate at an overall LOS C or better during the AM and PM peak hours. In addition, all intersection approaches are expected to operate at LOS D or better.

Under future 'build' traffic conditions, the signalized intersections are expected to operate at an overall LOS D or better during the AM and PM peak hours except for the intersection of US 25 and Butler Bridge Road during the PM peak hour. In addition, all intersection approaches are expected to operate at LOS D or better except for the southbound approach of US 25 [at Butler Bridge Road] during the AM and PM peak hours and the eastbound approach of Butler Bridge Road [at US 25] during the PM peak hour. With an exclusive

right turn lane provided on the southbound approach of US 25 and dual left turn lanes provided on the eastbound approach of Butler Bridge Road, the intersection is expected to operate at an overall LOS C during the AM and PM peak hours. In addition, all intersection approaches are expected to operate at LOS D or better.

As for the unsignalized intersections, the major street left turn movements [on Butler Bridge Road] are expected to experience minor delays and operate at LOS B or better during the AM and PM peak hours. The stop-controlled minor approaches [of Fanning Fields Road, Jeffress Road, Carrie Lane, Haw River Road, Yadkin Road, North Rugby Road, and the Site Accesses] are expected to experience minor to moderate overall delays and operate at LOS D or better during the peak hours except for the northbound approach of North Rugby Road and the southbound approach of Site Access 2 during the AM and PM peak hours. While greater delays and poorer levels of operation are not uncommon for a minor stop-controlled approaches due to higher traffic volumes on the major street during the peak hours, the intersection of Butler Bridge Road at North Rugby Road could be expected to operate at an overall LOS C or better during the AM and PM peak hours if signalized. In addition, all intersection approaches are expected to operate at LOS D or better.

The findings of this traffic impact analysis have identified the following geometric improvements to mitigate potential traffic impacts of the proposed development.

Intersection of Butler Bridge Road and Haw River Road/Site Access 1

- Construct an exclusive left turn lane on the eastbound approach of Butler Bridge Road and an exclusive right turn lane on the westbound approach. Provide a minimum of 100 feet of full storage and appropriate taper lengths.
- Provide a three-lane cross-section for the proposed site access including one ingress and two egress lanes [to be striped as a shared left-through lane and right turn lane]. Per NCDOT's "Policy on Street and Driveway Access to North Carolina Highways", "a minimum storage of 100 feet measured from the near edge of the right-of-way will be required before any crossing or left-turning conflicts are allowed".

Intersection of Butler Bridge Road and Site Access 2

- Construct an exclusive left turn lane on the eastbound approach of Butler Bridge Road and an exclusive right turn lane on the westbound approach. Provide a minimum of 100 feet of full storage and appropriate taper lengths.
- Provide a three-lane cross-section for the proposed site access including one ingress and two egress lanes [to be striped as left and right turn lanes]. Per NCDOT's "Policy on Street and Driveway Access to North Carolina Highways", "a minimum storage of 100 feet measured from the near edge of the right-of-way will be required before any crossing or left-turning conflicts are allowed".

Considering that this site will be constructed in phases over ten years, it is recommended that the following off-site improvements be phased. An initial phasing plan should be developed with supplemental analysis performed to determine if the following

improvements or traffic control measures are warranted at specific milestones of development.

Intersection of US 25 and Butler Bridge Road

- Construct an exclusive right turn lane on the southbound approach of US 25. Provide a minimum of 350 feet of full storage and an appropriate bay taper.
- Stripe the additional lane on the eastbound approach of Butler Bridge Road [that is to be provided under STIP I-4400C] and an additional left turn lane to provide dual left turn lanes onto US 25.

Intersection of Butler Bridge Road and North Rugby Road

- Install a three-phase traffic signal at this intersection.

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TAP ROOT FARMS
HENDERSON COUNTY, NORTH CAROLINA

1. INTRODUCTION

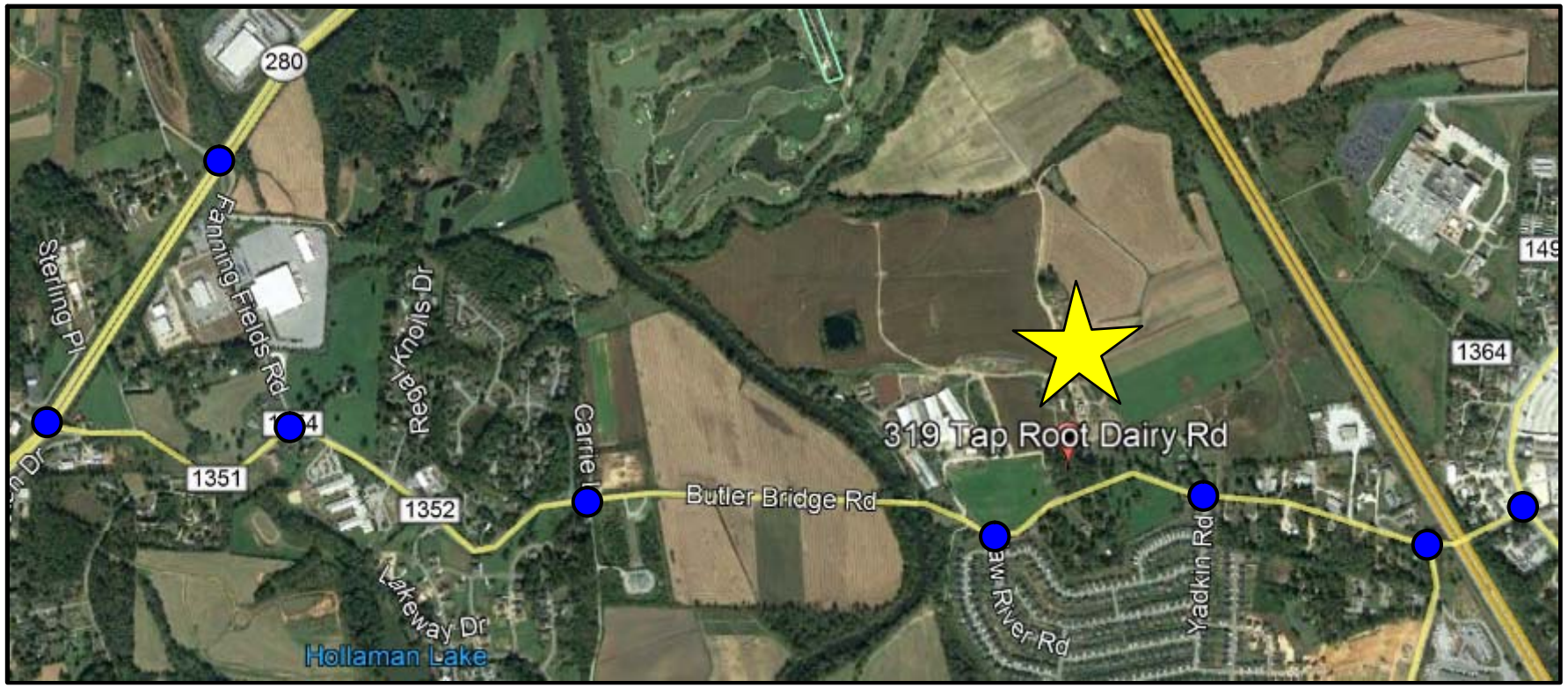
This report summarizes the findings of the Traffic Impact Analysis (TIA) that was prepared for Tap Root Farms in Henderson County, North Carolina. The purpose of this study is to determine the potential impact to the transportation system caused by the additional traffic generated by proposed development. To accomplish this objective; this study analyzed the weekday AM and PM peak hours for the existing (2018) traffic conditions, future (2028) 'no-build' traffic conditions without the site developed, and future (2028) 'build' traffic conditions with the site developed.

1.1. Site Location and Study Area

The site is located on the north side of Butler Bridge Road, west of Interstate 26. Refer to Figure 1 for the site location map and Figure 2 for the conceptual site plan. The study area for the TIA was determined through coordination with the North Carolina Department of Transportation (NCDOT), and consists of the following intersections:

1) Boylston Highway (NC 280) and Butler Bridge Road – Signalized
2) Ashville Highway (US 25) and Butler Bridge Road – Signalized
3) Boylston Highway (NC 280) and Fanning Fields Road – Unsignalized
4) Butler Bridge Road and Fanning Fields Road - Unsignalized
5) Butler Bridge Road and Jeffress Road/Carrie Lane – Unsignalized
6) Butler Bridge Road and Haw River Road/Site Access 1 - Unsignalized
7) Butler Bridge Road and Yadkin Road - Unsignalized
8) Butler Bridge Road and North Rugby Road - Unsignalized
9) Butler Bridge Road and Site Access 2 - Unsignalized

A copy of the NCDOT TIA Scoping Checklist can be found in Appendix A.



LEGEND

Site Location

Existing Study Intersections

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Site Location Map

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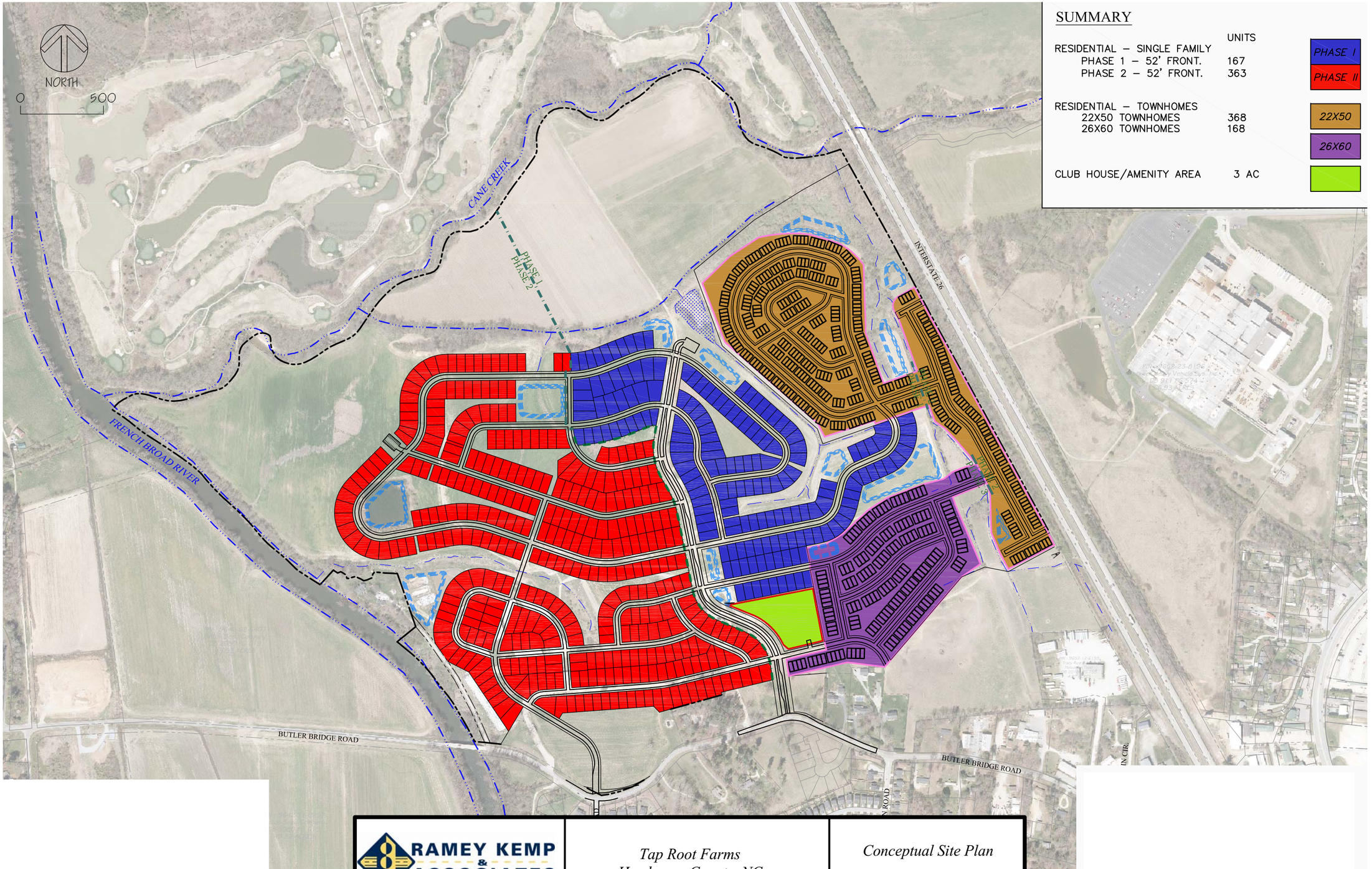

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Conceptual Site Plan

Scale: Not to Scale | Figure 2

1.2. Proposed Land Use and Site Access

According to the conceptual site plan, the site could consist of 530 single-family homes and 536 townhomes. The development is anticipated to be built out by the year 2028. Full movement access is to be provided via two (2) driveway connections on Butler Bridge Road, with one located opposite Haw River Road and the other located approximately 650 feet [measured center-to-center] west of Yadkin Road.

1.3. Existing Land Uses

The site is currently farm land. Residential land uses are located within the immediate vicinity of the site.

1.4. Existing Roadways

The study area for this TIA primarily consists of the following: NC 280, US 25, Butler Bridge Road, North Rugby Road, and Fanning Fields Road.

NC 280 is a four-lane median divided facility with a posted speed limit of 55 miles per hour (mph). An exclusive left turn lane is provided on the southbound approach, and a right turn taper is provided on the northbound approach at both Butler Bridge Road and Fanning Fields Road. NC 280 carries approximately 21,000 vehicles per day (vpd) south of Butler Bridge Road based on 2016 NCDOT Annual Average Daily Traffic (AADT) data, which is the most recent available data.

US 25 is a five-lane facility with a two-way left turn lane (TWLTL) with a posted speed limit of 45 mph. US 25 carries approximately 30,000 vpd south of Butler Bridge Road based on 2016 NCDOT AADT data, which is the most recent available data.

Butler Bridge Road is a two-lane facility with a posted speed limit of 35 mph. Exclusive left turn lanes are provided at US 25 [eastbound approach], Yadkin Road [westbound approach], Haw River Road [westbound approach], and Jeffress Road [westbound approach]. In addition, exclusive right turn lanes are provided at US 25 [eastbound approach] and channelized right turn lanes are provided at NC 280 [eastbound and westbound approaches]. Butler Bridge

Road carries approximately 7,600 vpd east of Yadkin Road based on 2016 NCDOT AADT data, which is the most recent available.

North Rugby Road is a two-lane facility with a posted speed limit of 45 mph. A channelized right turn lane is provided at Butler Bridge Road. North Rugby Road carries approximately 4,900 vpd south of Butler Bridge Road based on 2016 NCDOT AADT data, which is the most recent available.

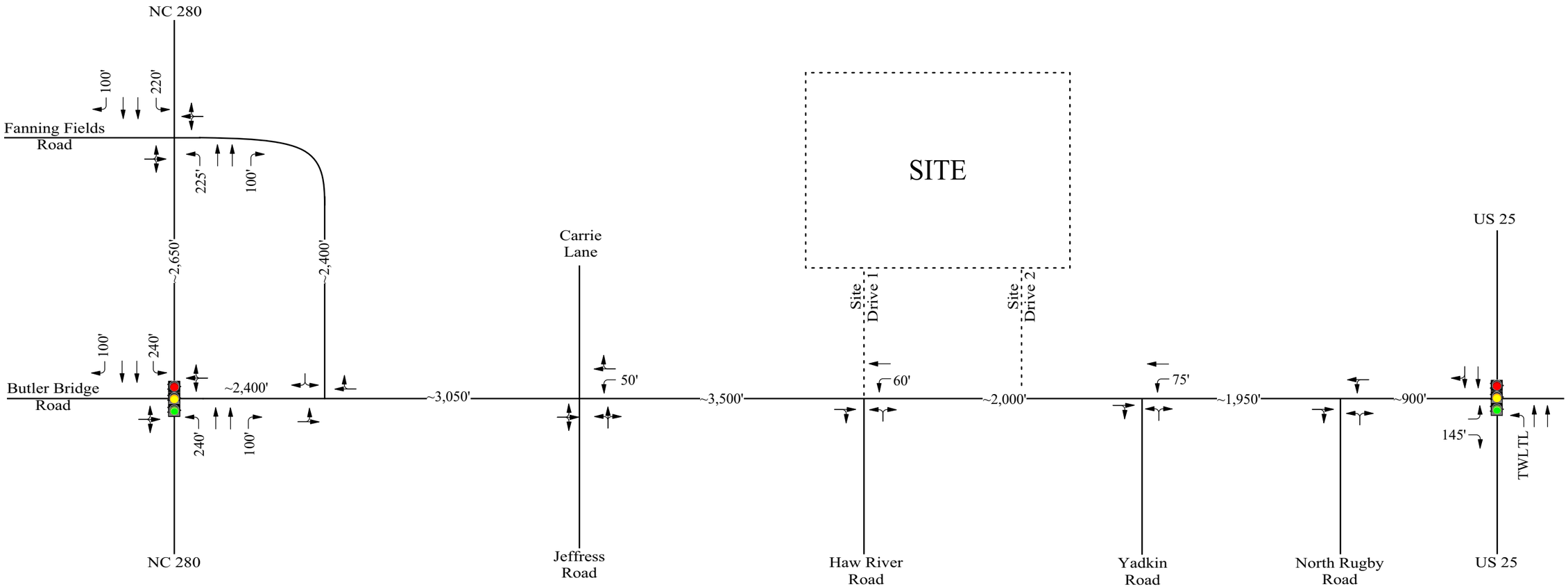
Fanning Fields Road is a two-lane facility with a posted speed limit of 35 mph. Channelized right turn lanes are provided at NC 280 [eastbound and westbound approaches]

Existing lane configurations (number of traffic lanes on the intersection approach), storage capacities, and other intersection and roadway information within the study area was collected through field reconnaissance by RKA. Refer to Figure 3 for the existing geometrics and traffic control at the study intersections.

2. EXISTING (2018) TRAFFIC CONDITIONS

All study intersections were analyzed using the methodology outlined in the Highway Capacity Manual (HCM) published by the Transportation Research Board. The computer software package, Synchro (Version 9.2, Build 215), was utilized to perform all analyses for the signalized and unsignalized intersections. Synchro was developed by Trafficware Corporation and allows the user to input data into Synchro software and calculate output based on methodologies in the HCM.

The HCM defines capacity as “the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under prevailing roadway, traffic, and control conditions”. Level of service (LOS) is a term used to represent different driving conditions, and is defined as a “qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers”. Level of service varies from Level “A” representing free flow, to Level “F” where greater vehicle delays are evident.



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Signalized Intersection

X'→ Existing Lane Configuration and Storage Length (in feet)

~X' Existing Link Distance (in feet)

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Existing Geometrics and Traffic Control

Not to Scale | Figure 3

For signalized intersections, Synchro provides LOS calculations for all approaches and an overall resulting LOS. Capacity analysis results for unsignalized intersections do not provide an overall LOS, but rather a LOS for movements and/or approaches that have a conflicting movement.

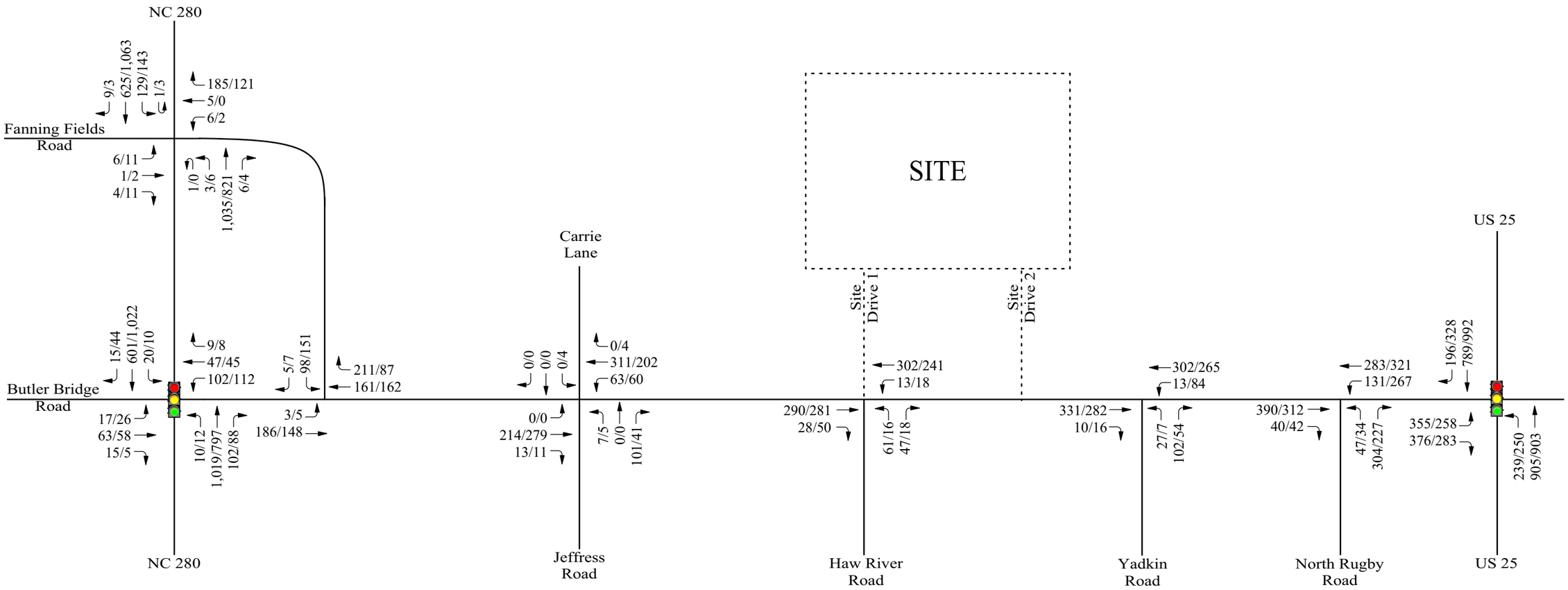
Refer to Table 1 for HCM levels of service and related average control delay per vehicle. Control delay as defined by the HCM includes "initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay". As shown in Table 1, an average control delay of 40 seconds at a signalized intersection results in a LOS D operation.

TABLE 1
HIGHWAY CAPACITY MANUAL LEVELS OF SERVICE AND DELAY

SIGNALIZED INTERSECTION		UNSIGNALIZED INTERSECTION	
Level of Service	**Average Control Delay Per Vehicle (Seconds)**	**Level of Service**	**Average Control Delay Per Vehicle (Seconds)**
A	0-10	A	0-10
B	10-20	B	10-15
C	20-35	C	15-25
D	35-55	D	25-35
E	55-80	E	35-50
F	>80	F	>50

2.1. Existing Peak Hour Traffic Volumes

Existing turning movement counts were conducted at the study intersections on a typical weekday during the AM (7:00 to 9:00) and PM (4:00 to 6:00) peak periods while schools were in session. Refer to Figure 4 for an illustration of the existing (2018) peak hour traffic volumes. Please note that traffic volumes were balanced upwards on NC 280 between Butler Bridge Road and Fanning Fields Road since there are no connections located between the intersections. As for traffic volumes on Butler Bridge Road and Fanning Fields Road where connections and developments exist, no adjustments were made to the peak hour traffic volumes if the difference between intersection volumes was within 5%. However, if the difference was greater than 5%, traffic volumes were balanced upwards [to within 5%] between intersections. A copy of the raw traffic count data can be found in Appendix B of this report.



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Signalized Intersection

X/Y AM/PM Peak Hour Traffic

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Existing (2018)
Traffic Volumes

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2.2. Analysis of Existing Traffic Conditions

To estimate the current operating levels of service (LOS) at the study intersection, the existing (2018) traffic volumes were analyzed under existing traffic control conditions with the lane configurations shown in Figure 3.

Existing traffic conditions were analyzed to determine how the study intersections currently operate. A peak hour factor (PHF) of 0.90 was utilized for all analyses. Signal plans were obtained from NCDOT for the existing signalized intersections and were utilized to perform the analysis. It is understood that the signalized intersection of US 25 and Butler Bridge Road operates under the Asheville Signal System; therefore, the signal system timings were obtained and utilized for the existing analysis. Copies of the signal plans and system timings that were obtained and can be found in Appendix C. Based on the signal plans, the signalized intersections were analyzed under the following circumstances during AM and PM peak hours under existing (2018) traffic conditions:

US 25 and Butler Bridge Road

- Existing cycle lengths, phase splits, and offsets were used. Cycle lengths of 120 seconds and 135 seconds were used for the AM and PM peak hours, respectively.
- Protective-permissive phasing is provided for the northbound left turn movement onto Butler Bridge Road from US 25.
- A right turn overlap is provided for the eastbound right turn movement onto US 25 from Butler Bridge Road, which coincides with the northbound protected left turn phase.
- Right turns on red were permitted on all intersection approaches.

NC 280 and Butler Bridge Road

- Cycle length optimized assuming a minimum of 120 seconds for the 5-phase signal.
- Protective-permissive phasing is provided for the northbound and southbound left turn movements onto Butler Bridge Road from NC 280. Permissive left turn phasing is provided on the eastbound and westbound approaches of Butler Bridge Road.
- Right turns on red were permitted on all intersection approaches.

Additionally, please note that a minimal peak hour volume of 4 vehicles (1 vehicle per 15-minute period) was assumed for all analyses. Table 2 provides a summary of the capacity analysis results for the existing (2018) traffic conditions. Refer to Appendix D for more detailed capacity analysis results.

Capacity analysis indicates that the signalized intersections operate at an overall LOS C or better during the AM and PM peak hours. In addition, all intersection approaches operate at LOS D or better. As for the unsignalized intersections, capacity analysis indicates that the major street left turn movements [on NC 280 and Butler Bridge Road] experience minor delays and operate at LOS B or better during the AM and PM peak hours. The stop-controlled minor approaches [of Fanning Fields Road, Jeffress Road, Carrie Lane, Haw River Road, Yadkin Road, and North Rugby Road] experience minor to moderate overall delays and operate at LOS C or better during the peak hours except for the eastbound approach of Fanning Fields Road [at NC 280].

TABLE 2
ANALYSIS SUMMARY OF EXISTING (2018) TRAFFIC CONDITIONS

INTERSECTION	APPROACH	AM PEAK HOUR				PM PEAK HOUR			
		Approach		Overall		Approach		Overall	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
NC 280 (NB/SB) & Butler Bridge Road (EB/WB) [Signalized]	NB SB EB WB	11.3 8.3 33.7 46.4	B A C D	**14.1**	**B**	9.0 10.4 33.5 43.8	A B C D	**13.2**	**B**
US 25 (NB/SB) & Butler Bridge Road [Signalized]	NB SB EB	13.6 26.8 42.8	B C D	**25.6**	**C**	16.7 30.5 47.7	B C D	**28.3**	**C**
NC 280 (NB/SB) & Fanning Fields Road (EB/WB) [Unsignalized]	NB[1] SB[1] EB[2] WB[2]	10.6 13.8 134.4 18.2	B B F C	-	-	11.2 11.6 255.7 13.7	B B F B	-	-
Butler Bridge Road (EB/WB) & Fanning Fields Road (SB) [Unsignalized]	EB[1] WB SB[2]	8.2 - 13.7	A - B	-	-	7.8 - 13.3	A - B	-	-
Butler Bridge Road (EB/WB) & Jeffress Road/Carrie Lane (NB/SB) [Unsignalized]	EB[1] WB[1] NB[2] SB[2]	8.0 7.9 9.8 15.3	A A A C	-	-	7.7 8.1 9.4 14.0	A A A B	-	-
Butler Bridge Road (EB/WB) & Haw River Road (NB) [Unsignalized]	EB WB[1] NB[2]	- 8.0 14.7	- A B	-	-	- 8.1 12.2	- A B	-	-
Butler Bridge Road (EB/WB) & Yadkin Road (NB) [Unsignalized]	EB WB[1] NB[2]	- 8.1 10.1	- A B	-	-	- 8.2 9.8	- A A	-	-
Butler Bridge Road (EB/WB) & North Rugby Road (NB) [Unsignalized]	EB WB[1] NB[2]	- 8.8 19.7	- A C	-	-	- 9.1 12.4	- A B	-	-

1. Level of service for left turn movement on major street approach.
2. Level of service for minor street approach.

3. FUTURE (2028) 'NO BUILD' TRAFFIC CONDITIONS

To account for the growth of traffic and subsequent traffic conditions at a future year, background traffic projections are needed. Background traffic is that component of traffic due to growth of the community and surrounding area that is anticipated to occur regardless of whether the proposed development is built out.

3.1. Future (2028) 'No-Build' Traffic Volumes

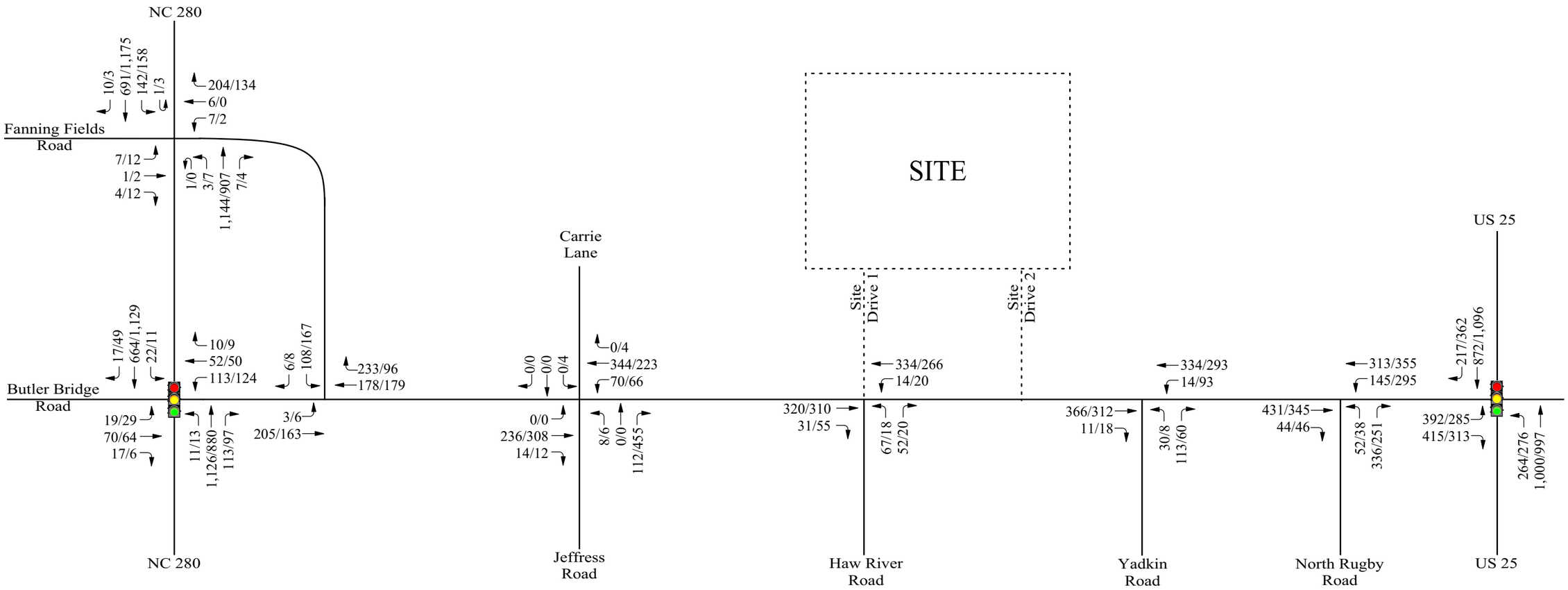
To account for the growth of traffic that is anticipated regardless of the site development, the existing traffic volumes within the study area were projected to the horizon year 2028 by applying a compounded annual growth rate of 1.0%. The future (2028) 'no-build' peak hour traffic volumes are illustrated in Figure 5.

3.2. Future Transportation Project

There is a NCDOT State Transportation Improvements Program (STIP) project that is to be completed prior to build out of the proposed development: I-4400C. STIP I-4400C is proposed to widen the bridge [over Interstate 26] on Butler Bridge Road from 2 lanes to 3 lanes. The additional lane will extend from US 25 to North Rugby Road where it would be dropped as a left turn lane. The existing eastbound right turn lane on Butler Bridge Road [at US 25] is also proposed to be extended with the bay taper starting at the bridge to maximize the right turn storage. In addition, North Rugby Road is to be widened to provide an exclusive left turn lane and right turn lane onto Butler Bridge Road.

3.3. Analysis of 'No-Build' Traffic Conditions

The purpose of the future 'no-build' analysis is to establish a base line scenario for a comparative analysis with the future 'build' scenario. The relative difference between the two scenarios can be characterized as the site impact. The analysis of future 'no-build' traffic conditions was performed using the same lane configurations, traffic control, and methodology as previously discussed under existing conditions in addition to the improvements associated with the NCDOT STIP project. With the STIP improvements on Butler Bridge Road at US 25, the northbound left turn movement was analyzed under protected-only phasing. In addition, no right turns on red were permitted at any traffic signals. Table 3 provides a



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Signalized Intersection

X/Y AM/PM Peak Hour Traffic

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Future (2028) 'No-Build'
Traffic Volumes

Not to Scale | Figure 5

summary of the capacity analysis results for the future (2028) 'no-build' traffic conditions. Refer to Appendix E for more detailed capacity analysis results.

Capacity analysis indicates that the signalized intersections are expected to operate at an overall LOS D or better during the AM and PM peak hours. In addition, all intersection approaches are expected to operate at LOS D or better except for the eastbound approach of Butler Bridge Road [at US 25] during the PM peak hour. Poorer levels of operation are not uncommon for side streets at signalized intersections when the signal is in a coordinated system where precedence is given to the mainline approaches to maximize progression. As for the unsignalized intersections, capacity analysis indicates that the major street left turn movements [on NC 280 and Butler Bridge Road] are expected to experience minor to moderate delays and operate at LOS C or better during the AM and PM peak hours. The stop-controlled minor approaches [of Fanning Fields Road, Jeffress Road, Carrie Lane, Haw River Road, Yadkin Road, and North Rugby Road] are expected to experience minor to moderate overall delays and operate at LOS D or better during the peak hours except for the eastbound approach of Fanning Fields Road [at NC 280].

At the request of NCDOT, a traffic signal warrant analysis was performed at the intersection of NC 280 and Fanning Fields Road. It was understood that an analysis had been performed several years ago, but the intersection did not warrant a traffic signal at that time. Based on the results of the traffic signal warrant analysis (refer to Section 4), the installation of a traffic signal is warranted at this location. Considering this, the expected delays, and NCDOT's past analysis, the intersection of NC 280 and Fanning Fields Road was analyzed under signalized conditions. With a traffic signal installed on NC 280 at Fanning Fields Road, capacity analysis indicates that the signalized intersection is expected to operate at an overall LOS C or better during the AM and PM peak hours. In addition, all intersection approaches are expected to operate at LOS D or better.

TABLE 3
ANALYSIS SUMMARY OF FUTURE (2028) 'NO-BUILD' TRAFFIC CONDITIONS

INTERSECTION	APPROACH	AM PEAK HOUR				PM PEAK HOUR			
		Approach		Overall		Approach		Overall	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
NC 280 (NB/SB) & Butler Bridge Road (EB/WB) [Signalized]	NB SB EB WB	16.5 10.8 28.6 34.2	B B C C	**16.7**	**B**	12.9 15.0 25.0 30.0	B B C C	**15.7**	**B**
US 25 (NB/SB) & Butler Bridge Road [Signalized]	NB SB EB	25.1 40.1 43.8	C D D	**35.0**	**D**	25.1 42.9 59.3	C D E	**39.1**	**D**
NC 280 (NB/SB) & Fanning Fields Road (EB/WB) [Unsignalized]	NB[1] SB[1] EB[2] WB[2]	11.1 16.0 333.8 31.7	B C F D	-	-	16.2 12.6 639.8 29.9	C B F D	-	-
NC 280 (NB/SB) & Fanning Fields Road (EB/WB) [**Signalized**]	NB SB EB WB	24.8 13.5 32.6 41.6	C B C D	**22.2**	**C**	22.1 10.9 30.2 35.6	C B C D	**16.8**	**B**
Butler Bridge Road (EB/WB) & Fanning Fields Road (SB) [Unsignalized]	EB[1] WB SB[2]	8.3 - 14.8	A - B	-	-	7.9 - 14.5	A - B	-	-
Butler Bridge Road (EB/WB) & Jeffress Road/Carrie Lane (NB/SB) [Unsignalized]	EB[1] WB[1] NB[2] SB[2]	8.1 8.0 10.0 16.6	A A B C	-	-	7.8 8.2 9.6 14.9	A A A C	-	-
Butler Bridge Road (EB/WB) & Haw River Road (NB) [Unsignalized]	EB WB[1] NB[2]	- 8.1 16.2	- A C	-	-	- 8.2 12.9	- A B	-	-
Butler Bridge Road (EB/WB) & Yadkin Road (NB) [Unsignalized]	EB WB[1] NB[2]	- 8.2 10.5	- A B	-	-	- 8.3 10.1	- A B	-	-
Butler Bridge Road (EB/WB) & North Rugby Road (NB) [Unsignalized]	EB WB[1] NB[2]	- 9.1 24.3	- A C	-	-	- 9.5 21.3	- A C	-	-

1. Level of service for left turn movement on major street approach.
2. Level of service for minor street approach.

4. TRAFFIC SIGNAL WARRANT ANALYSIS

A traffic signal should be warranted prior to its installation and operation. The Federal Highway Administration's (FHWA) Manual on Uniform Traffic Control Devices (MUTCD) has national standardized criteria for determining the warrants for traffic signals. Some warrants are based on actual or historical data such as accident history, pedestrian activity, or minor street delay. Other warrants compare the major street and minor street volumes to volume thresholds for various lengths of time for an average weekday.

Signal warrants criteria are based primarily on traffic volumes and vary based on the number of travel lanes on both the major and minor streets and the travel speed on the major street. For this analysis, an 85^{th} percentile vehicle speed on NC 280 is 40 miles per hour (mph) or greater since the posted speed limit is 55 mph.

Existing traffic volumes at the intersection of NC 280 and Fanning Fields Road were obtained from 12-hour turning movement counts. The existing traffic volumes were projected to the horizon year 2028 by applying an annual growth of 1.0%, as previously discussed. A summary of the existing and projected hourly traffic volumes can be found in Appendix F.

The intersection was analyzed with the future (2028) 'no-build' traffic volumes and existing lane configurations. The existing configuration of the major approaches of NC 280 consist of 2 or more lanes while the approaches of Fanning Fields Road consist of a shared left-through lane and a short channelized right; therefore, the minor approaches were analyzed as one-lane approaches. A summary of the traffic signal warrant analysis results is presented in Table 4.

TABLE 4
SIGNAL WARRANT ANALYSIS RESULTS
NC 280 AND FANNING FIELDS ROAD

Time Period	Vehicle Count		WARRANTS			
	MAJOR	MINOR	1A	1B	2	3
7 AM to 8 AM	1,895	204	Y	Y	Y	Y
8 AM to 9 AM	1,453	112	Y	Y	Y	Y
9 AM to 10 AM	1,336	82	N	Y	Y	Y
10 AM to 11 AM	1,380	74	N	Y	Y	N
11 AM to 12 AM	1,503	100	N	Y	Y	Y
12 AM to 1 PM	1,594	115	Y	Y	Y	Y
1 PM to 2 PM	1,503	104	N	Y	Y	Y
2 PM to 3 PM	1,750	95	N	Y	Y	Y
3 PM to 4 PM	1,898	140	Y	Y	Y	Y
4 PM to 5 PM	2,150	114	Y	Y	Y	Y
5 PM to 6 PM	2,065	121	Y	Y	Y	Y
6 PM to 7 PM	1,442	63	N	Y	Y	N
Number of Periods Met			6	12	12	10
Number of Periods Required			8	8	4	1
WARRANTS MET			**NO**	**YES**	**YES**	**YES**

5. TRIP GENERATION

Average weekday daily and peak hour trips for the proposed development were calculated utilizing methodology contained within the 10th Edition of the Institute of Transportation Engineers (ITE) *Trip Generation* manual. Traffic volumes for the single-family detached housing (ITE Code 210) and multifamily housing (ITE Code 220) were generated utilizing ITE equations [for the peak hour of the adjacent street traffic] and the number of dwelling units as the independent variable. Refer to Table 5 for a detailed breakdown of the trip generation results.

5.1. Average Daily Site Trips

According to the ITE *Trip Generation* manual, it is estimated that the proposed development could generate a total of 8,833 trips (in and out) during a typical weekday.

TABLE 5
TRIP GENERATION

ITE Land Use (Code)	Independent Variable	Average Daily Traffic (vpd)	AM Peak Hour (vph)		PM Peak Hour (vph)	
			Enter	Exit	Enter	Exit
Single-Family Detached Housing (210)	530 dwelling units	4,822	95	286	317	186
Low-Rise Multifamily Housing (220)	536 dwelling units	4,011	54	181	166	97
Total Trips		8,833	149	467	483	283

5.2. Average Peak Hour Site Trips

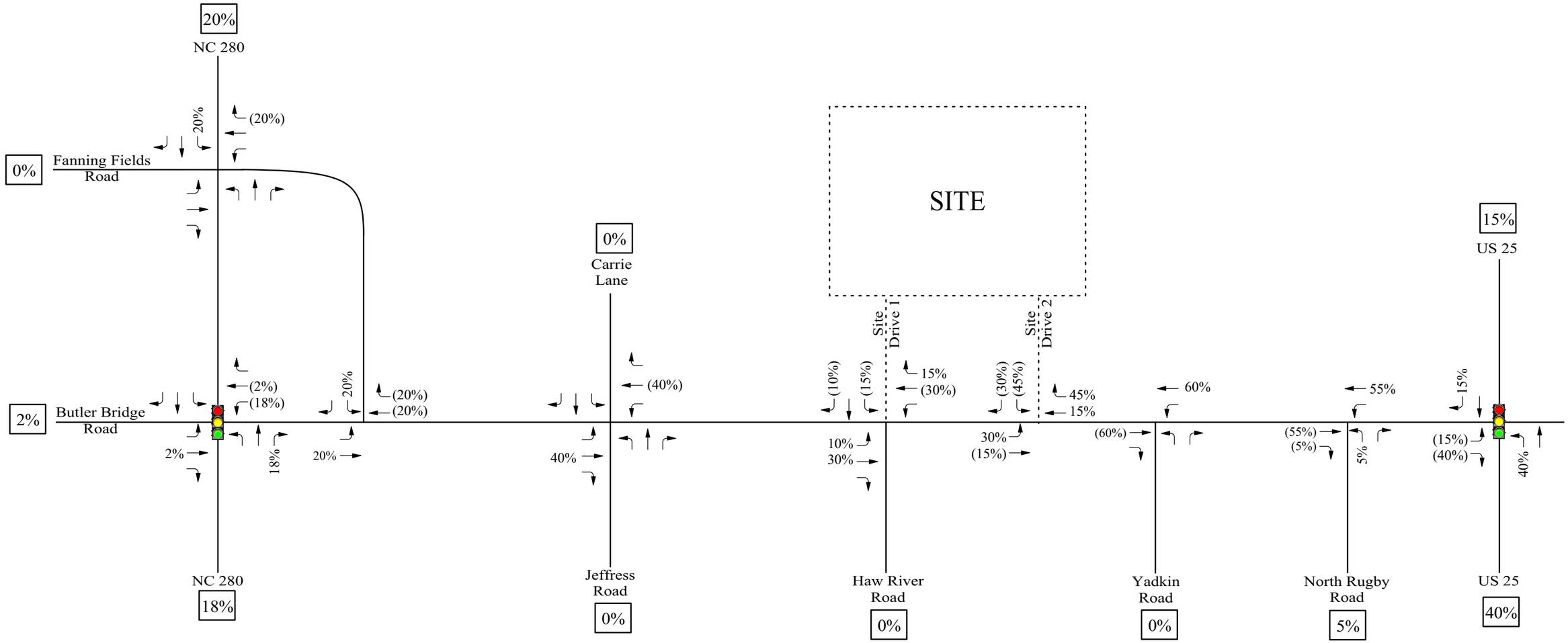
On a typical weekday, it is estimated that the proposed development could generate a total of 616 trips (149 entering and 467 exiting) during the AM peak hour and 766 trips (483 entering and 283 exiting) during the PM peak hour.

6. SITE TRIP DISTRIBUTION & ASSIGNMENT

Primary site trip distribution percentages were developed based on existing traffic patterns and engineering judgment. The trip distributions are summarized below:

- 15% to/from the north via US 25
- 40% to/from the south via US 25
- 20% to/from the north via NC 280
- 18% to/from the south via NC 280
- 5% to/from the south via North Rugby Road
- 2% to/from the west via Butler Bridge Road

Refer to Figures 6 and 7 for illustrations of the site trip distribution and assignment, respectively.



LEGEND

Signalized Intersection

X% Regional Trip Distribution

X%
(Y%) Entering (Exiting) Peak Hour Site Traffic

N

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TRANSPORTATION ENGINEERS

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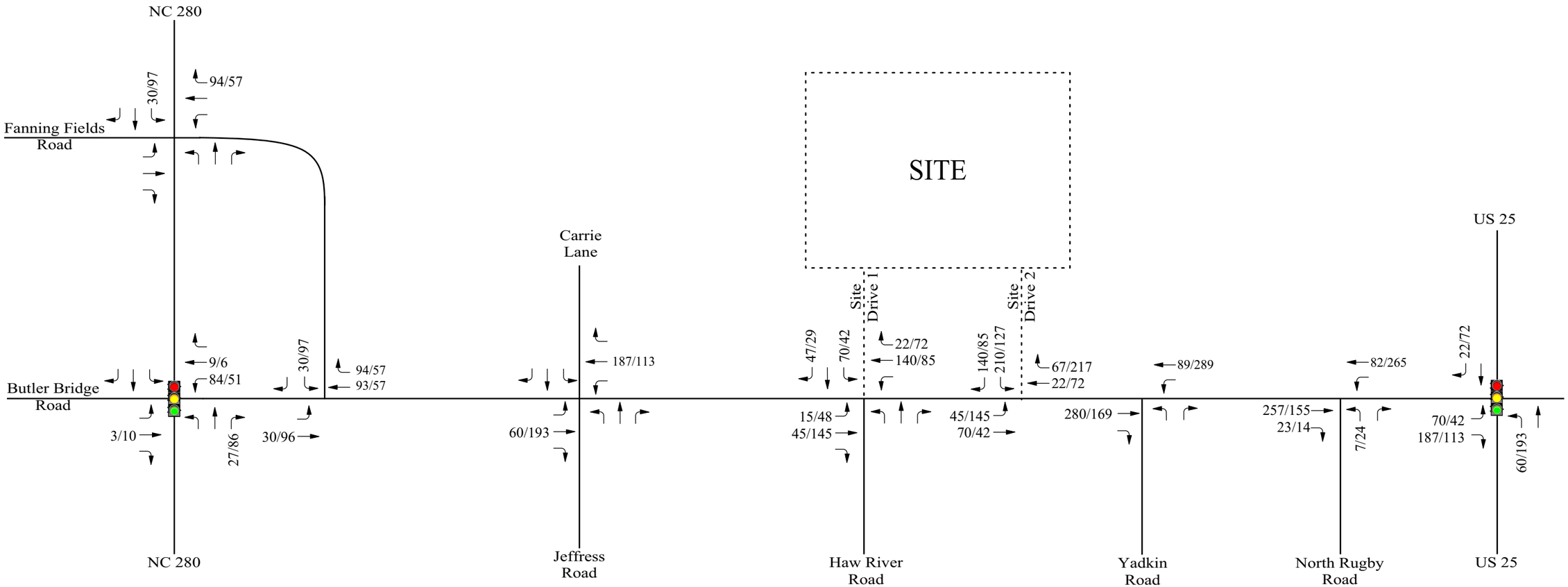
Henderson County, NC

Site Trip Distribution

Not to Scale | Figure 6



LEGEND

Signalized Intersection

X/Y AM/PM Peak Hour Site Traffic

N

RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Tap Root Farms
Henderson County, NC

Site Trip Assignment

Not to Scale | Figure 7

7. FUTURE (2028) 'BUILD' TRAFFIC CONDITIONS

To estimate traffic conditions with the proposed site developed, the site-generated traffic (Figure 7) was combined with the future (2028) 'no-build' peak hour traffic (Figure 5). Refer to Figure 8 for an illustration of the future (2028) 'build' peak hour traffic volumes.

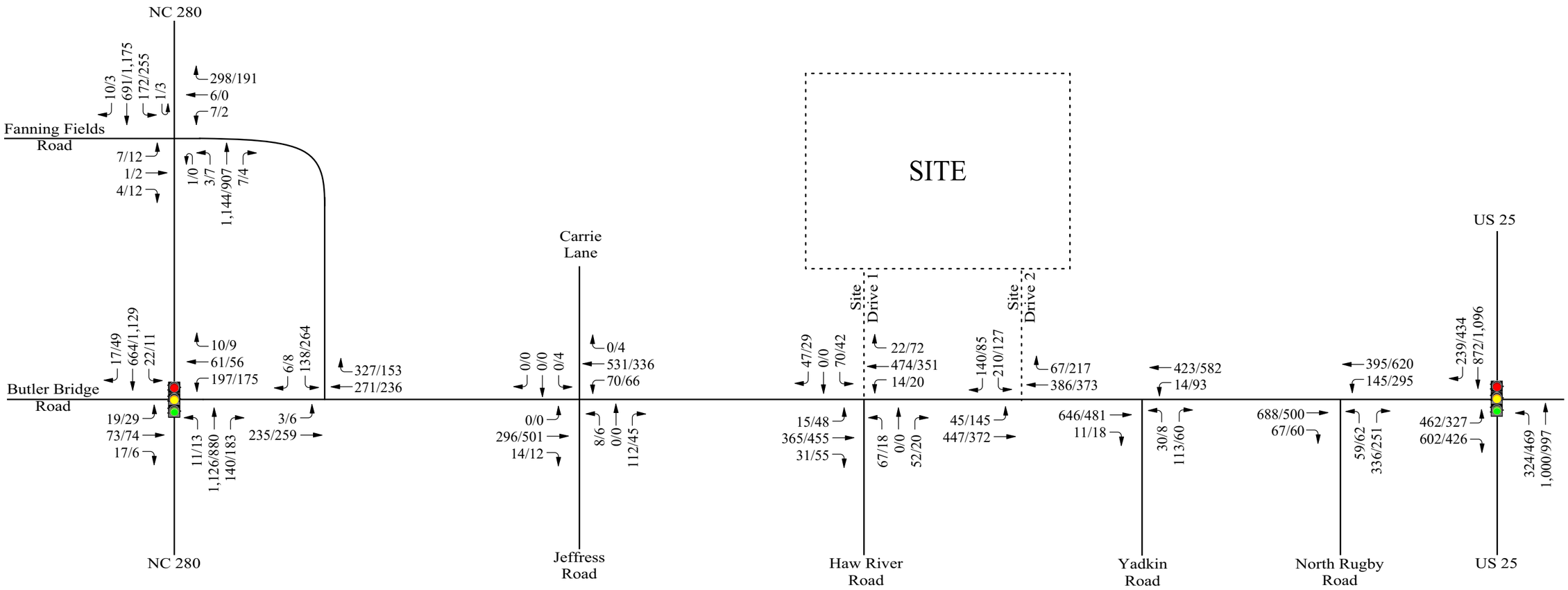
7.1. Analysis of 'Build' Traffic Conditions

The study intersections were analyzed with the 'build' traffic volumes using the same methodology previously discussed for the 'no-build' traffic conditions. Table 6 provides a summary of the capacity analysis results for the future (2028) 'build' traffic conditions. Refer to Appendix G for more detailed capacity analysis results.

Based on a review of the turn lane warrants contained within NCDOT's "Policy on Street and Driveway Access to North Carolina Highways" and Roadway Design Manual, eastbound left turn lanes and westbound right turn lanes are warranted at both site access connections on Butler Bridge Road. Refer to Appendix H for a copy of the left and right turn lane warrants charts.

Capacity analysis indicates that the signalized intersections are expected to operate at an overall LOS D or better during the AM and PM peak hours except for the intersection of US 25 and Butler Bridge Road during the PM peak hour. In addition, all intersection approaches are expected to operate at LOS D or better except for the southbound approach of US 25 [at Butler Bridge Road] during the AM and PM peak hours and the eastbound approach of Butler Bridge Road [at US 25] during the PM peak hour. When compared to the 'no-build' conditions:

- The overall level of operation at the intersection of NC 280 and Butler Bridge Road is expected to drop from LOS B to LOS C during the AM peak hour in addition to the level of operation of the westbound approach of Butler Bridge Road [at NC 280] expected to drop from LOS C to LOS D and the northbound approach of NC 280 [at Butler Bridge Road] expected to drop from LOS B to LOS C. The southbound approach of NC280 [at Butler Bridge Road] is expected to drop from LOS B to LOS C during the PM peak hour. In addition, the delay on the southbound approach is



LEGEND

Signalized Intersection

X/Y AM/PM Peak Hour Traffic

N

RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Tap Root Farms
Henderson County, NC

Future (2028) 'Build'
Traffic Volumes

Not to Scale | Figure 8

expected to increase by approximately 40% during the AM peak hour while the overall intersection delay is expected to increase just over 25% during the PM peak hour. While the need for mitigation improvements should be addressed if the Level of Service degrades by at least one level or the average delay at an intersection or individual approach increases by 25% or greater while maintaining the same level of service, no mitigation was identified considering that the increase in delays are expected to be less than 6.0 seconds per vehicle and the intersection and all approaches are expected to operate at an acceptable LOS D or better.

- With protected-only left turn phasing assumed for the northbound left turn movement and no right turns on red permitted, the level of operations of the southbound approach of US 25 [at Butler Bridge Road] is expected to drop from LOS D to LOS E during the AM peak hour, while the overall intersection and all intersection approaches are expected to degrade during the PM peak hour. In addition, the overall intersection delay is expected to increase just over 30% during the AM peak hour. With an exclusive right turn lane provided on the southbound approach of US 25 and dual left turn lanes provided on the eastbound approach of Butler Bridge Road, capacity analysis indicates that the intersection is expected to operate at an overall LOS C during the AM and PM peak hours. In addition, all intersection approaches are expected to operate at LOS D or better.

- The overall level of operation at the intersection of NC 280 and Fanning Fields Road is expected to drop from LOS B to LOS C during the PM peak hour. In addition, the overall intersection delay and southbound approach delay is expected to increase over 25% the AM peak hour while the southbound approach delay is expected to increase over 30% during the PM peak hour. While the need for mitigation improvements should be addressed if the Level of Service degrades by at least one level or the average delay at an intersection or individual approach increases by 25% or greater while maintaining the same level of service, no mitigation was identified considering that the increase in delays are expected to be less than 6.0 seconds per vehicle and the intersection and all approaches are expected to operate at an acceptable LOS D or better.

As for the unsignalized intersections, capacity analysis indicates that the major street left turn movements [on Butler Bridge Road] are expected to experience minor delays and operate at LOS B or better during the AM and PM peak hours. The stop-controlled minor approaches [of Fanning Fields Road, Jeffress Road, Carrie Lane, Haw River Road, Yadkin Road, North Rugby Road, and the Site Accesses] are expected to experience minor to moderate overall delays and operate at LOS D or better during the peak hours except for the northbound approach of North Rugby Road and the southbound approach of Site Access 2 during the AM and PM peak hours. The greater delays and poorer levels of operation on Site Access 2 are not uncommon for a minor stop-controlled approach due to higher traffic volumes on the major street during the peak hours. While the installation of a traffic signal would likely improve the operation on the stop-controlled approach, the likelihood of warranting a traffic signal would be unlikely and the operation of the mainline movements would suffer; therefore, making this type of mitigation measure impractical. Alternative access is also provided via Site Access 1. When compared to the 'no-build' conditions:

- The level of operations of the [stop-controlled] southbound approach of Fanning Fields Road [at Butler Bridge Road] are expected to drop from LOS B to LOS C and LOS B to LOS D during the AM and PM peak hour, respectively. While the need for mitigation improvements should be addressed if the Level of Service degrades by at least one level, no mitigation was identified considering that the increase in delays are expected to be less than 15.5 seconds per vehicle and both approaches are expected to operate at an acceptable LOS D or better. Furthermore, it is not uncommon for a minor stop-controlled approach to experience greater delays and operate at a poorer level of service due to higher traffic volumes on the major street during the peak hours.
- The level of operation of the [stop-controlled] northbound approach of Jeffress Road [at Butler Bridge Road] is expected to drop from LOS A to LOS B during the PM peak hour. While the need for mitigation improvements should be addressed if the Level of Service degrades by at least one level, no mitigation was identified considering that the increase in delay is expected to be less than 2.0 seconds per vehicle and the approach is expected to operate at an acceptable LOS B.

- The level of operation of the [stop-controlled] southbound approach of Carrie Lane [at Butler Bridge Road] is expected to drop from LOS B to LOS C during the PM peak hour. In addition, the southbound approach delay is expected to increase by more than 35% during the AM peak hour. While the need for mitigation improvements should be addressed if the Level of Service degrades by at least one level or the average delay at an intersection or individual approach increases by 25% or greater while maintaining the same level of service, no mitigation was identified considering that the increase in delay is expected to be less than 6.5 seconds per vehicle and the approach is expected to operate at an acceptable LOS C. Furthermore, no vehicles were counted on this approach during the [2-hour] AM peak period and only five (5) vehicles were counted on this approach during the [2-hour] PM peak period

- The level of operations of the [stop-controlled] northbound approach of Haw River Road [at Butler Bridge Road] are expected to drop from LOS C to LOS D and LOS B to LOS C during the AM and PM peak hour with the Site Access located on the opposite side, respectively. While the need for mitigation improvements should be addressed if the Level of Service degrades by at least one level, no mitigation was identified considering that the increase in delays are expected to be less than 18.0 seconds per vehicle and both approaches are expected to operate at an acceptable LOS D or better. Furthermore, it is not uncommon for a minor stop-controlled approach to experience greater delays and operate at a poorer level of service due to higher traffic volumes on the major street during the peak hours.

- The delay on the [stop-controlled] northbound approach of Yadkin Road [at Butler Bridge Road] is expected to increase by more than 357% during the AM peak hour. While the need for mitigation improvements should be addressed if the average delay at an intersection or individual approach increases by 25% or greater while maintaining the same level of service, no mitigation was identified considering that the increase in delay is expected to be less than 2.0 seconds per vehicle and the approach is expected to operate at an acceptable LOS B.

- The level of operations of the main street left turn movements onto North Rugby Road [from Butler Bridge Road] are expected to drop from LOS A to LOS B during the AM

and PM peak hours, while the level of operations of the [stop-controlled] northbound approach of North Rugby Road [at Butler Bridge Road] are expected to drop from LOS C to LOS F. With a traffic signal provided at this intersection, capacity analysis indicates that the signalized intersection is expected to operate at an overall LOS C or better during the AM and PM peak hours. In addition, all intersection approaches are expected to operate at LOS D or better.

TABLE 6
ANALYSIS SUMMARY OF FUTURE (2028) 'BUILD' TRAFFIC CONDITIONS

INTERSECTION	APPROACH	AM PEAK HOUR				PM PEAK HOUR			
		Approach		Overall		Approach		Overall	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
NC 280 (NB/SB) & Butler Bridge Road (EB/WB) [Signalized]	NB SB EB WB	22.3 15.1 25.4 36.2	C B C D	**21.9**	**C**	15.0 20.3 25.8 34.6	B C C C	**19.7**	**B**
US 25 (NB/SB) & Butler Bridge Road [Signalized]	NB SB EB	31.2 56.4 52.1	C E D	**45.6**	**D**	48.7 92.2 82.7	D F F	**73.3**	**E**
US 25 (NB/SB) & Butler Bridge Road [**with Improvements**]	NB SB EB	14.9 33.3 36.2	B C D	**27.2**	**C**	23.0 34.7 38.9	C C D	**31.0**	**C**
NC 280 (NB/SB) & Fanning Fields Road (EB/WB) [Signalized]	NB SB EB WB	30.1 18.0 25.0 48.7	C B C D	**28.0**	**C**	27.5 14.3 29.2 40.6	C B C D	**21.2**	**C**
Butler Bridge Road (EB/WB) & Fanning Fields Road (SB) [Unsignalized]	EB[1] WB SB[2]	8.9 - 21.0	A - C	-	-	8.2 - 29.9	A - D	-	-
Butler Bridge Road (EB/WB) & Jeffress Road/Carrie Lane (NB/SB) [Unsignalized]	EB[1] WB[1] NB[2] SB[2]	8.7 8.2 10.6 22.8	A A B C	-	-	8.1 8.9 11.2 21.4	A A B C	-	-
Butler Bridge Road (EB/WB) & Haw River Road/Site Access (NB/SB) [Unsignalized]	EB[1] WB[1] NB[2] SB[2]	8.6 8.3 33.9 28.4	A A D D	-	-	8.5 8.7 23.0 24.2	A A C C	-	-
Butler Bridge Road (EB/WB) & Yadkin Road (NB) [Unsignalized]	EB WB[1] NB[2]	- 9.2 14.4	- A B	-	-	- 8.9 11.7	- A B	-	-
Butler Bridge Road (EB/WB) & North Rugby Road (NB) [Unsignalized]	EB WB[1] NB[2]	- 10.7 76.0	- B F	-	-	- 10.7 102.4	- A F	-	-
Butler Bridge Road (EB/WB) & North Rugby Road (NB) [**Signalized**]	EB WB NB	26.2 10.1 46.4	C B D	**25.8**	**C**	23.4 18.5 43.2	C B D	**24.3**	**C**
Butler Bridge Road (EB/WB) & Site Access (SB) [Unsignalized]	EB[1] WB SB[2]	- 8.6 56.5	A A F	-	-	- 9.6 42.4	A A E	-	-

1. Level of service for left turn movement on major street approach.
2. Level of service for minor street approach.

8. QUEUING ANALYSIS

To evaluate the need for additional storage for auxiliary turn lanes at the study intersections, the queue lengths at each of the intersections under future conditions were analyzed. The queue lengths at the study intersections were determined by the larger of the 95th percentile queues calculated by Synchro or the maximum queue calculated by SimTraffic (based on an average of 10 simulation runs) for the future 'build' traffic conditions and were compared to the calculated queues for the future 'no-build' traffic conditions. Queue increases are expected to be less than 165 feet [when comparing the 'no-build' and 'build' traffic conditions], with anticipated increases expected to occur in full length lanes or the queues are expected to be accommodated by existing or proposed storage lengths except for the eastbound right turn storage on Butler Bridge Road [at US 25] that is maximized due to the proximity of the bridge over Interstate 26. Therefore, no mitigation was identified. Please note that increase in queue lengths on Butler Bridge Road at North Rugby Road are the result of installing a traffic signal. Refer to Appendix I for a comparison of the 'no-build' and 'build' queues at the study intersections in a tabular format.

9. CONCLUSIONS

This traffic impact study was performed to determine the potential impact to the transportation system caused by the additional traffic generated by the proposed mixed-use development.

Existing Traffic Conditions

The signalized intersections operate at an overall LOS C or better during the AM and PM peak hours. In addition, all intersection approaches operate at LOS D or better. As for the unsignalized intersections, the major street left turn movements [on NC 280 and Butler Bridge Road] experience minor delays and operate at LOS B or better during the AM and PM peak hours. The stop-controlled minor approaches [of Fanning Fields Road, Jeffress Road, Carrie Lane, Haw River Road, Yadkin Road, and North Rugby Road] experience minor to moderate overall delays and operate at LOS C or better during the peak hours except for the eastbound approach of Fanning Fields Road [at NC 280].

Future 'No Build' Traffic Conditions

The signalized intersections are expected to operate at an overall LOS D or better during the AM and PM peak hours. In addition, all intersection approaches are expected to operate at LOS D or better except for the eastbound approach of Butler Bridge Road [at US 25] during the PM peak hour. Poorer levels of operation are not uncommon for side streets at signalized intersections when the signal is in a coordinated system where precedence is given to the mainline approaches to maximize progression. As for the unsignalized intersections, the major street left turn movements [on NC 280 and Butler Bridge Road] are expected to experience minor to moderate delays and operate at LOS C or better during the AM and PM peak hours. The stop-controlled minor approaches [of Fanning Fields Road, Jeffress Road, Carrie Lane, Haw River Road, Yadkin Road, and North Rugby Road] are expected to experience minor to moderate overall delays and operate at LOS D or better during the peak hours except for the eastbound approach of Fanning Fields Road [at NC 280].

With a traffic signal installed on NC 280 at Fanning Fields Road, the signalized intersection is expected to operate at an overall LOS C or better during the AM and PM peak hours. In addition, all intersection approaches are expected to operate at LOS D or better.

Future 'Build' Traffic Conditions

The signalized intersections are expected to operate at an overall LOS D or better during the AM and PM peak hours except for the intersection of US 25 and Butler Bridge Road during the PM peak hour. In addition, all intersection approaches are expected to operate at LOS D or better except for the southbound approach of US 25 [at Butler Bridge Road] during the AM and PM peak hours and the eastbound approach of Butler Bridge Road [at US 25] during the PM peak hour. With an exclusive right turn lane provided on the southbound approach of US 25 and dual left turn lanes provided on the eastbound approach of Butler Bridge Road, the intersection is expected to operate at an overall LOS C during the AM and PM peak hours. In addition, all intersection approaches are expected to operate at LOS D or better.

As for the unsignalized intersections, the major street left turn movements [on Butler Bridge Road] are expected to experience minor delays and operate at LOS B or better during the AM and PM peak hours. The stop-controlled minor approaches [of Fanning Fields Road, Jeffress Road, Carrie Lane, Haw River Road, Yadkin Road, North Rugby Road, and the Site Accesses] are expected to experience minor to moderate overall delays and operate at LOS D or better during the peak hours except for the northbound approach of North Rugby Road and the southbound approach of Site Access 2 during the AM and PM peak hours. While greater delays and poorer levels of operation are not uncommon for a minor stop-controlled approaches due to higher traffic volumes on the major street during the peak hours, the intersection of Butler Bridge Road at North Rugby Road could be expected to operate at an overall LOS C or better during the AM and PM peak hours if signalized. In addition, all intersection approaches are expected to operate at LOS D or better.

10. RECOMMEDATIONS

The findings of this traffic impact analysis have identified the following geometric improvements to mitigate potential traffic impacts of the proposed development. Refer to Figure 9 for an illustration of the recommended improvements.

Intersection of Butler Bridge Road and Haw River Road/Site Access 1

- Construct an exclusive left turn lane on the eastbound approach of Butler Bridge Road and an exclusive right turn lane on the westbound approach. Provide a minimum of 100 feet of full storage and appropriate taper lengths.
- Provide a three-lane cross-section for the proposed site access including one ingress and two egress lanes [to be striped as a shared left-through lane and right turn lane]. Per NCDOT's "Policy on Street and Driveway Access to North Carolina Highways", "a minimum storage of 100 feet measured from the near edge of the right-of-way will be required before any crossing or left-turning conflicts are allowed".

Intersection of Butler Bridge Road and Site Access 2

- Construct an exclusive left turn lane on the eastbound approach of Butler Bridge Road and an exclusive right turn lane on the westbound approach. Provide a minimum of 100 feet of full storage and appropriate taper lengths.
- Provide a three-lane cross-section for the proposed site access including one ingress and two egress lanes [to be striped as left and right turn lanes]. Per NCDOT's "Policy on Street and Driveway Access to North Carolina Highways", "a minimum storage of 100 feet measured from the near edge of the right-of-way will be required before any crossing or left-turning conflicts are allowed".

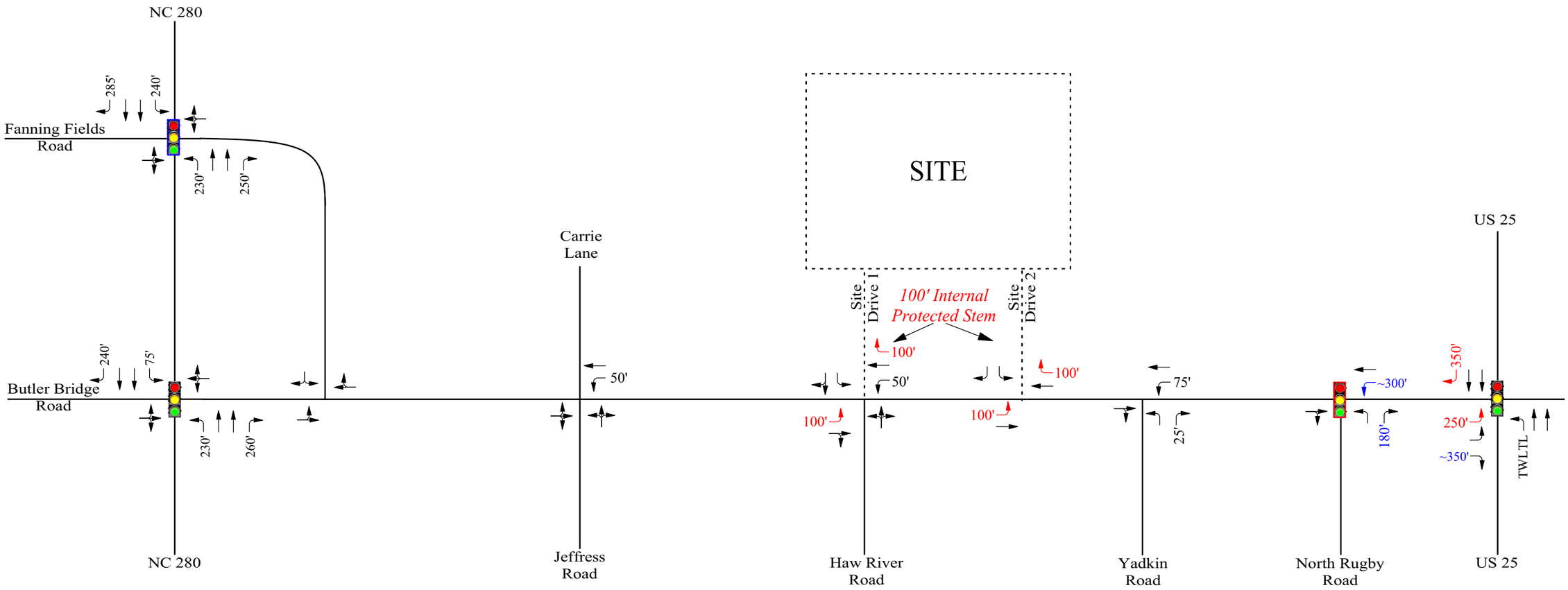
Considering that this site will be constructed in phases over ten years, it is recommended that the following off-site improvements be phased. An initial phasing plan should be developed with supplemental analysis performed to determine if the following improvements or traffic control measures are warranted at specific milestones of development.

Intersection of US 25 and Butler Bridge Road

- Construct an exclusive right turn lane on the southbound approach of US 25. Provide a minimum of 350 feet of full storage and an appropriate bay taper.
- Stripe the additional lane on the eastbound approach of Butler Bridge Road [that is to be provided under STIP I-4400C] and an additional left turn lane to provide dual left turn lanes onto US 25.

Intersection of Butler Bridge Road and North Rugby Road

- Install a three-phase traffic signal at this intersection.



LEGEND

Existing Signalized Intersection

Proposed Signalized Intersection [to be provided by developer]

Future Signalized Intersection [to be provided by NCDOT]

Lane Configuration and Storage Length (in feet)

X' → Existing

X' → Future [to be provided by NCDOT under STIP I-4400C]

X' → Future [to be provided by developer]

N

RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Tap Root Farms
Henderson County, NC

Proposed Geometrics and Traffic Control

Not to Scale | Figure 9

TECHNICAL APPENDIX

APPENDIX A

NCDOT TIA SCOPING CHECKLIST

NCDOT TIA Scoping Checklist

TIA Need Screening → TIA Scoping → TIA Submittal

Project Name: Tap Root Dairy **TIA Scoping Date:** 1-11-19

☐ **TIA Need Screening Forms are Attached.** Project Reference #: _____ Decision Date: _____

☒ **Site Plan and Access**

☒ Provide a site plan illustrating site access, internal and external roadways, buildings and land uses.
Refer to NCDOT's *Policy on Street and Driveway Access to North Carolina Highways* pages 14 and 15 for site plan requirements.

☒ Identify site access.

New Access	On Road	Access Type		Driveway Spacing		
	Road Name	Permitted Movements	Traffic Control	Distance (ft)	Direction	Nearest Intersection / Access
Access A	Buttler Bridge Rd	Conventional Full-Mvmt	2-Way Stop	0	North	Haw River Road
Access B	Buttler Bridge Rd	Conventional Full-Mvmt	2-Way Stop	650	West	Yadkin Road
Access C						
Access D						
Access E						
Access F						
Access G						
Access H						

Existing Access	Existing Intersection of		Access Modification	Proposed Interconnectivity (If Applicable)		
	Road A	Road B		Connector #	Road Connected	Adjacent Development
Access 1			Please Select	Connector 1		
Access 2				Connector 2		
Access 3				Connector 3		
Access 4				Connector 4		

☐ Additional access clarifications and provisions (e.g., proposed control-of-access or median breaks, modifications of existing access, loading/unloading area access, bike/pedestrian accommodation).

☐

Proposed K-12 School Site

☐ NCDOT MSTA School Traffic Calculator for Select School Type shall be used.

☐ Peak Hour Factors (PHFs) shall be adjusted/weighted for new school trips (0.5 PHF by default).

☐ Internal school circulation analysis is required, and should be submitted in advance or concurrent with the TIA submittal.

☐ Clarify traffic operation plans (e.g. traffic circulation pattern, pedestrian access, drop-off/pick-up zone location and configuration, queue storage area and, if applicable, staggered start times).

☒ Trip Generation

The TIA Consultant shall prepare trip generation estimates following the current *NCDOT Congestion Management Capacity Analysis Guidelines*, and submit the calculation sheets and supporting information to the District Engineer for approval prior to capacity analysis.

ITE LUC	Proposed Land Use	Size	Unit	Daily Trips	Peak Hour Type	AM Peak Hour Trips			PM Peak Hour Trips			Data Source
						Enter	Exit	Total	Enter	Exit	Total	
210	Single Family Det	551	D.U.	4998	Adj. Street	99	297	396	329	193	522	ITE Equation
220	Multi Family Low	361	D.U	2688	Adj. Street	37	124	161	117	69	186	ITE Equation
221	Multi Family Mid	312	D.U.	1727	Adj. Street	27	77	104	81	52	133	ITE Equation
Unadjusted Site Trips				9413		163	498	661	527	314	841	
Internal Capture Trips (Attach Calculation Sheets)												Please Select
Internal Capture % of Unadjusted Site Trips				%		%			%			
LUC	Proposed Land Use	Any Internal Trips?		Pass-By % of External Trips								
		Please Select		%		%			%			Please Select
				%		%			%			
				%		%			%			
				%		%			%			
				%		%			%			
Pass-By Trips (Attach Calculation Sheets)												
Adjacent Street Volumes												Please Select
Non-Pass-By Primary Trips												
Diverted Trips, if Applicable and Justifiable												Please Select

**Explain local or other data sources, if used:

☐ Existing Site Trip Information for Redevelopment Projects (Attach separate sheets as needed)

ITE LUC	Existing Land Use	Size	Unit	Daily Trips	Peak Hour Type	AM Peak Hour Trips			PM Peak Hour Trips			Data Source
						Enter	Exit	Total	Enter	Exit	Total	
					Please Select							Please Select
Total Existing Site Trips												

☒ Trip Generation

Revised 2/14/19 per change in land uses (eliminated apartments) - Refer to revised concept plan attached

The TIA Consultant shall prepare trip generation estimates following the current *NCDOT Congestion Management Capacity Analysis Guidelines*, and submit the calculation sheets and supporting information to the District Engineer for approval prior to capacity analysis.

ITE LUC	Proposed Land Use	Size	Unit	Daily Trips	Peak Hour Type	AM Peak Hour Trips			PM Peak Hour Trips			Data Source
						Enter	Exit	Total	Enter	Exit	Total	
210	Single Family Det	530	D.U.	4822	Adj. Street	95	286	381	317	186	503	ITE Equation
220	Multi Family Low	536	D.U	4011	Adj. Street	54	181	235	166	97	263	ITE Equation
Unadjusted Site Trips				8833		149	467	616	483	283	766	
Internal Capture Trips (Attach Calculation Sheets)												Please Select
Internal Capture % of Unadjusted Site Trips				%			%			%		
LUC	Proposed Land Use	Any Internal Trips?		Pass-By % of External Trips								
		Please Select		%			%			%		Please Select
				%			%			%		
				%			%			%		
				%			%			%		
				%			%			%		
Pass-By Trips (Attach Calculation Sheets)												
Adjacent Street Volumes												Please Select
Non-Pass-By Primary Trips												
Diverted Trips, if Applicable and Justifiable												Please Select

**Explain local or other data sources, if used:

☐ Existing Site Trip Information for Redevelopment Projects (Attach separate sheets as needed)

ITE LUC	Existing Land Use	Size	Unit	Daily Trips	Peak Hour Type	AM Peak Hour Trips			PM Peak Hour Trips			Data Source
						Enter	Exit	Total	Enter	Exit	Total	
					Please Select							Please Select
Total Existing Site Trips												

☒ **Trip Distribution**

☒ Trip distribution diagrams are submitted concurrently with this document (attach separate sheets).

☐ Trip distribution diagrams will be submitted separately, along with supporting information, to the District Engineer for review and approval prior to capacity analysis. The trip distribution shall be based on the current and anticipated traffic patterns, as well as instructions noted below.

If required by the District Engineer, the following additional diagrams shall also be submitted:

☐ Mixed-Use Developments (separate diagrams for residential, commercial, and office trips)

☐ Inter-Development Trips (if 'internal" trips cross public streets)

☐ Pass-By Trips

☐ Diverted Trips

☐ Each Analysis Period

☐ **Mode Split**

☐ Provide Data Source and Justification

Mode / Period	Auto		
AM Peak	%	%	%
PM Peak	%	%	%
Daily	%	%	%
	%	%	%

☐ Identify proper infrastructure and accommodation for other modes of travel.

☒ **Analysis Peak Periods:**

☒ Weekday AM Peak _____

☒ Weekday PM Peak _____

☐ Weekday Midday Peak _____

☐ Weekday PM School Peak _____

☐ Weekend _____ Peak _____

☐ Other _____

☒ Study Area Intersections and Data Collection

The study area shall include the site access intersections (both new and existing) identified under "Site Plan and Access" on page 1, as well as the following external and, if applicable, internal intersections.

External Intersection	Intersection of		Traffic Control	Intersection Turning Movement Counts			Notes
	Road A	Road B		New / Existing	Date of Counts	Growth Adjustment	
#1	NC 280	Fanning Fields Rd	2-Way Stop	Require New Counts	12/12/18		
#2	NC 280	Butler Bridge Rd	Signal	Require New Counts	12/12/18		
#3	Butler Bridge Rd	Fanning Fields Rd	2-Way Stop	Require New Counts	12/12/18		
#4	Butler Bridge Rd	Jeffress Rd	2-Way Stop	Require New Counts	12/12/18		
#5	Butler Bridge Rd	Haw River Rd	2-Way Stop	Require New Counts	12/12/18		
#6	Butler Bridge Rd	Yadkin Road	2-Way Stop	Require New Counts	12/12/18		
#7	Butler Bridge Rd	North Rugby Rd	2-Way Stop	Require New Counts	12/12/18		
#8	US 25	Butler Bridge Rd	Signal	Require New Counts	12/12/18		
#9	Butler Bridge Rd	Eastern Access	2-Way Stop				
#10							
#11							
#12							

Internal Intersection	Intersection of		Access Type		Intersection Spacing		
	Road A	Road B	Traffic Control	Permitted Movements	Distance (ft)	Direction	Nearest Intersection
#101			Please Select	Please Select		Please Select	
#102							
#103							
#104							
#105							

The following data will be collected:

☒ New traffic turning movement counts in ☒ 15-min intervals ☐ 5-min intervals (near schools)
Unless otherwise noted above, new traffic counts shall be collected at the existing study intersections during the analysis periods. Weekday counts shall avoid Mondays, Fridays, holidays, school breaks, road closures, and major weather events.

☐ To account for the impact of existing and/or proposed school traffic, PHFs will be adjusted for:

intersections numbered: _____

and access points numbered: _____

☐ Traffic Forecast Data for TIP: _____

☒ Roadway/Intersection Configuration & Traffic Control

☒ Traffic Signal Phasing & Timing Data

☐ Crash Data: _____ Period: _____

☐ Other:

☒ **Future Year Conditions**

☒ Project Build-Out Year: 2028

☒ Future Analysis Year(s): 2028

☐ Identify below any funded/committed future transportation improvements, as well as any approved but incomplete developments near the site.

Funded STIP / Local CIP Project	Project Description	Year Complete

Nearby Approved Development	Location	Future Land Use (exclude any completed phases)	Committed Improvements

☒ Annual Growth Factor: 1 %

Justification/Data Source: _____

☐ **Local Comprehensive Transportation Plan Compliance**

☐ Identify Applicable Local Transportation Planning Documents

☐ Identify Applicable Roadways inside the Study Area

Road Name	Classification	Speed Limit	Proposed Cross-Section	Proposed Right-of-Way	Compliance Requirements	Affect Study Intersection #

☒ Study Method

The traffic analysis shall follow the current *NCDOT Congestion Management Capacity Analysis Guidelines*, *Policy on Street and Driveway Access to North Carolina Highways*, and use the current approved version of analysis software (e.g. Synchro/SimTraffic, HCS, Sidra Intersection, TransModeler).

The study shall include the following analysis scenarios for each analysis period.

1. Existing Conditions
2. Future No-Build Conditions (existing + background growth + approved developments + committed or funded improvements)
3. Future Build Conditions (future no-build + site trips)
4. Future Build with Improvements Conditions (future build traffic with improvements to mitigate the proposed development's impacts) and, if applicable:

☐ 5. TIP Design Year Analysis _____

☐ 6. Alternative Access Scenario (without proposed control-of-access or median break / modification)

The following additional analysis/outputs should be provided as warranted:

☒ Signal Warrant Analysis for accesses/intersections NC 280 and Fanning Fields Road

☐ Multi-Modal Level of Service Analysis

☐ School Loading Zone Traffic Simulation

☐ Phasing Analysis (scope separately as needed)

☐ Safety/Crash Analysis

☐ Control-of-Access Modification Justification

☐ Median Break / Modification Justification

☐ Other _____

☒ Submittals

In addition to the hardcopies required below, the TIA Consultant shall provide the District Engineer and, if required, the local government an electronic copy of the study documents, including the latest site plan, figures and appendices, in searchable PDF files and the original traffic analysis files (e.g., Synchro, HCS). To expedite review, the NCDOT electronic submittals shall also be delivered concurrently to:

☒ Div. Traffic Engr ☐ Regional Traffic Engr ☐ Congestion Management ☐ Other _____

Submittals	NCDOT		Local Government	
	Electronic	Hardcopy	Electronic	Hardcopy
Trip Generation & Distribution	Required	0	Required	0
Draft TIA Report	Required	0		0
Final Sealed TIA Report	Required	4	Required	0

☐ **Additional Comments (**municipal TIA requirements, approved variations from NCDOT guidelines)

Agreement by All Parties

The undersigned agree to the contents and methodology described above for completing the required traffic impact analysis for the proposed development identified herein. Any changes to the above methodology contemplated by the Applicant or the TIA Consultant must be submitted to the District Engineer in writing. If approved by NCDOT, then such changes may be accepted for the TIA report. Subsequent revisions to the development plan (e.g. land use, density, site access, or schedule) may require additional scoping and analysis, and may modify the TIA requirements.

This agreement shall become effective on the date approved by NCDOT, and shall expire 12 months after the effective date or upon significant changes to the roadway network and/or development assumptions, whichever occurs first. Once expired, renewal or re-scoping will be required for subsequent TIA submittals.

APPLICANT

Signature	Jesse Gardner Print Name	1-11-19 Date

TIA CONSULTANT

Signature	Jay Clapp Print Name	1-11-19 Date

LOCAL GOVERNMENT REPRESENTATIVE (If Applicable)

Signature	Print Name	Date

Email concurrence may be used in lieu of the signature.

NCDOT DISTRICT REPRESENTATIVE

Reviewed and approved by the NCDOT Division ____ District ____ on _____.

Signature	Print Name

Email concurrence may be used in lieu of the signature.

Jay Clapp

From: Ownbey, Carl H <chownbey@ncdot.gov>
Sent: Monday, February 11, 2019 9:07 AM
To: Jay Clapp
Cc: Darnell, Russell H
Subject: RE: [External] RE: Tap Root Dairy TIA checklist

Jay,
We understand that the maximum storage will be assumed based on the design of the auxiliary lanes coming off the bridge. We do realize that the bridge will be widened with project I-4400C and the lanes will be widened/lengthened as they come off the bridge. Thanks for the comments and we look forward to further review of the project in the coming weeks. If you need anything else from this office, please let me know.

Carl H. Ownbey, Jr.
Engineering Technician
NC Department of Transportation
Division 14: District 1 – Henderson, Polk, & Transylvania Counties

828 891 7911 office
828 891 6026 fax
chownbey@ncdot.gov

4142 Haywood Road
Mills River, NC 28759

From: Jay Clapp <jclapp@rameykemp.com>
Sent: Friday, February 8, 2019 12:09 PM
To: Ownbey, Carl H <chownbey@ncdot.gov>
Subject: [External] RE: Tap Root Dairy TIA checklist

Carl,

Thank you for the response. We have modified Page 6 to show the Traffic Signal Warrant Analysis and the number of hard copies and attached the updated copy.

As for page 3 and the weekday PM school peak, no changes were made due to previous discussions regarding the study intersections as well as the peak periods that needed to counted and analyzed. In the attached email, it was stated and agreed to that all intersections would be counted during the AM (7-9) and PM (4-6) peak periods with the exception of the intersection of NC 280 and Fanning Fields Road. A 12-hour count would be conducted at the intersection of NC 280 and Fanning Fields Roads in order to perform the requested traffic signal warrant analysis.

As for the right turn lane on Butler Bridge Road, it is understood that we should assume maximum storage based on a design of the auxiliary turn lane starting as you come off the bridge. Is there a particular project we need to reference for this

improvement, and is this the only improvement that is being provided? Also, I thought there was a project to widen the bridge [on Butler Bridge Road] over I-26, and this improvement was part of that project? Is there not a project to widen the bridge?

Please respond with any comments, or your concurrence. If you should have any questions, or need anything else, please let me know.

Jay Clapp

Ramey Kemp & Associates, Inc.

Main: 336-725-5470
Direct: 336-631-4458
Cell: 336-202-0629

From: Ownbey, Carl H [mailto:chownbey@ncdot.gov]
Sent: Thursday, February 07, 2019 3:54 PM
To: Jay Clapp <jclapp@rameykemp.com>
Subject: Tap Root Dairy TIA checklist

Jay,
Again, I apologize for taking so long to get our responses to you on the checklist. We would like for you to review our attached revision list and let me know if there are any concerns or problems.

Carl H. Ownbey, Jr.
Engineering Technician
NC Department of Transportation
Division 14: District 1 – Henderson, Polk, & Transylvania Counties

828 891 7911 office
828 891 6026 fax
chownbey@ncdot.gov

4142 Haywood Road
Mills River, NC 28759

Email correspondence to and from this sender is subject to the N.C. Public Records Law and may be disclosed to third parties.

NORTH

0 500

SUMMARY

	ACRES	UNITS
RESIDENTIAL – SINGLE FAMILY		
PHASE 1 – 50' FRONT.	31	134
PHASE 1 – 60' FRONT.	9	34
PHASE 2 – 50' FRONT.	58	296
PHASE 2 – 60' FRONT.	21	87
RESIDENTIAL – TOWNHOMES		
PHASE 1	24	259
PHASE 2	10	102
RESIDENTIAL – MULTI–FAMILY	17	312
CLUB HOUSE/AMENITY AREA	3	
OPEN SPACE		
PHASE 1	48	
PHASE 2	50	

50'

60'

CANE CREEK

PHASE 1
PHASE 2

INTERSTATE 26

PHASE 2

PHASE 1

FRENCH BROAD RIVER

BUTLER BRIDGE ROAD

BUTLER BRIDGE ROAD

VAUGHN CIR.

HAW RIVER ROAD

YADKIN ROAD

CDC Civil Design Concepts, PA

NCBELS #: C-2184

TAP ROOT DAIRY
PLAN BULLETIN
NOVEMBER 2018

NORTH

0 500

SUMMARY

	UNITS
RESIDENTIAL – SINGLE FAMILY	
PHASE 1 – 52' FRONT.	167
PHASE 2 – 52' FRONT.	363
RESIDENTIAL – TOWNHOMES	
22X50 TOWNHOMES	368
26X60 TOWNHOMES	168
CLUB HOUSE/AMENITY AREA	3 AC

PHASE I

PHASE II

22X50

26X60

CANE CREEK

PHASE I
PHASE 2

INTERSTATE 26

FRENCH BROAD RIVER

BUTLER BRIDGE ROAD

BUTLER BRIDGE ROAD

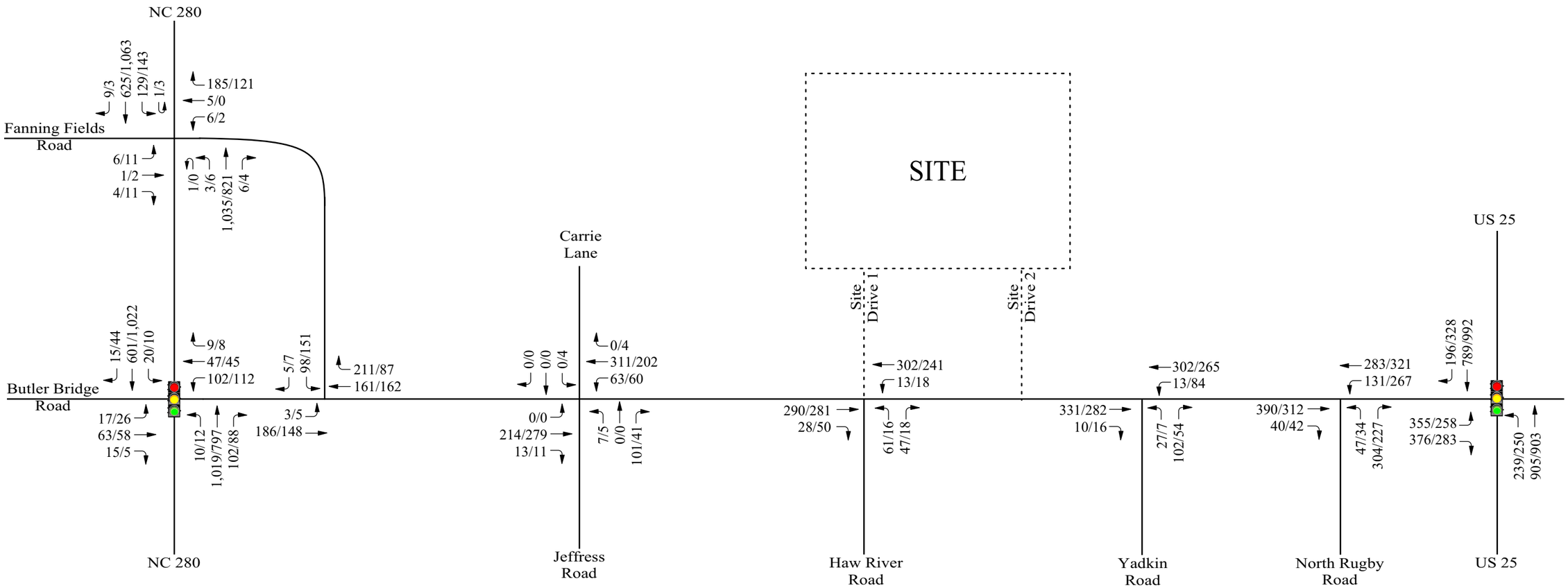
HAW RIVER ROAD

YADKIN ROAD

CDC Civil Design Concepts, PA

NCBELS #: C-2184

TAP ROOT FARMS
CONCEPT SITE PLAN
FEBRUARY 2019



LEGEND

Signalized Intersection

X/Y AM/PM Peak Hour Traffic

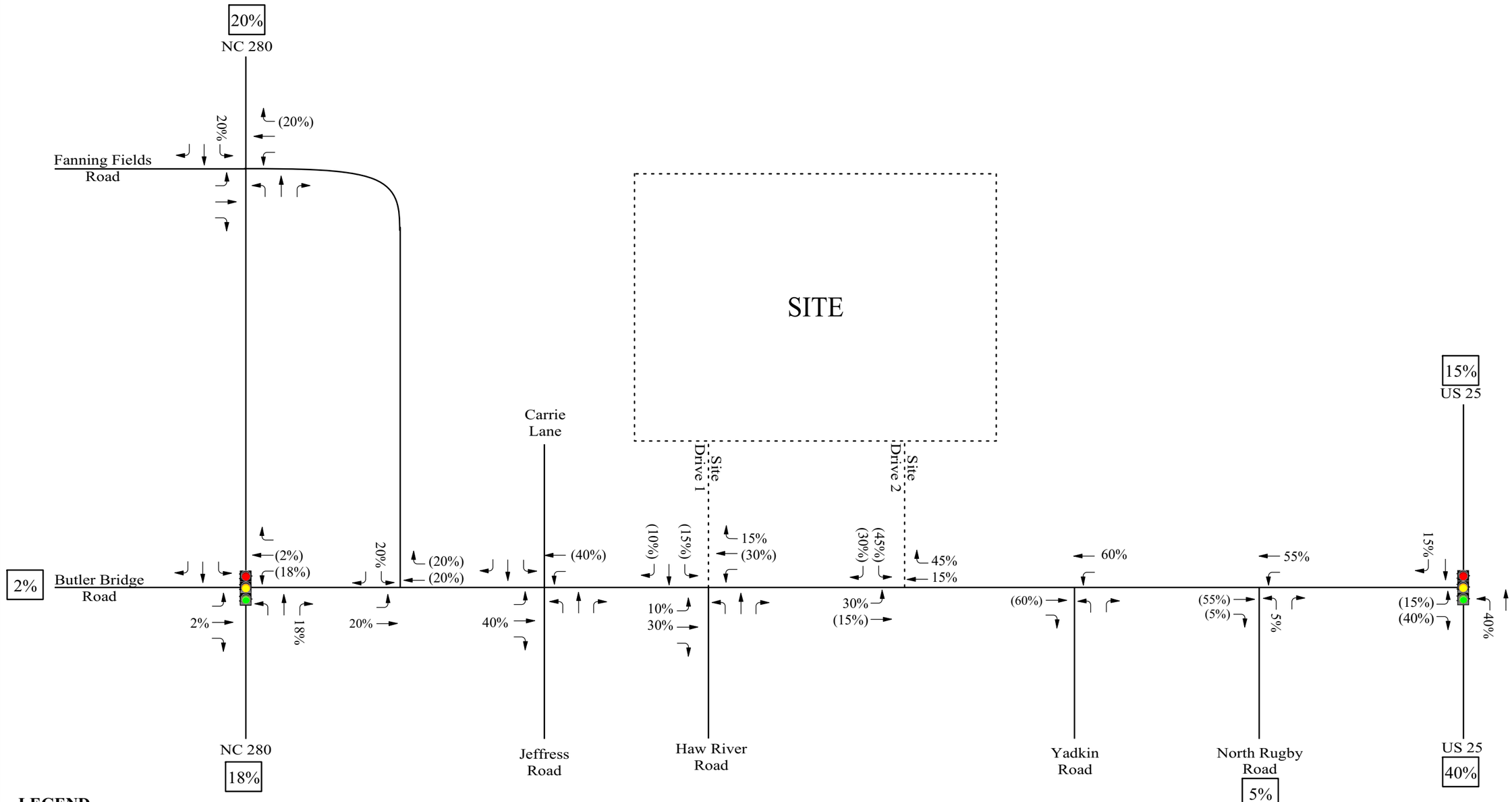
N

RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Tap Root Dairy
Henderson County, NC

Existing (2018)
Traffic Volumes

Not to Scale | Figure



LEGEND

Signalized Intersection

X% Regional Trip Distribution

X% (Y%) Entering (Exiting) Peak Hour Site Traffic

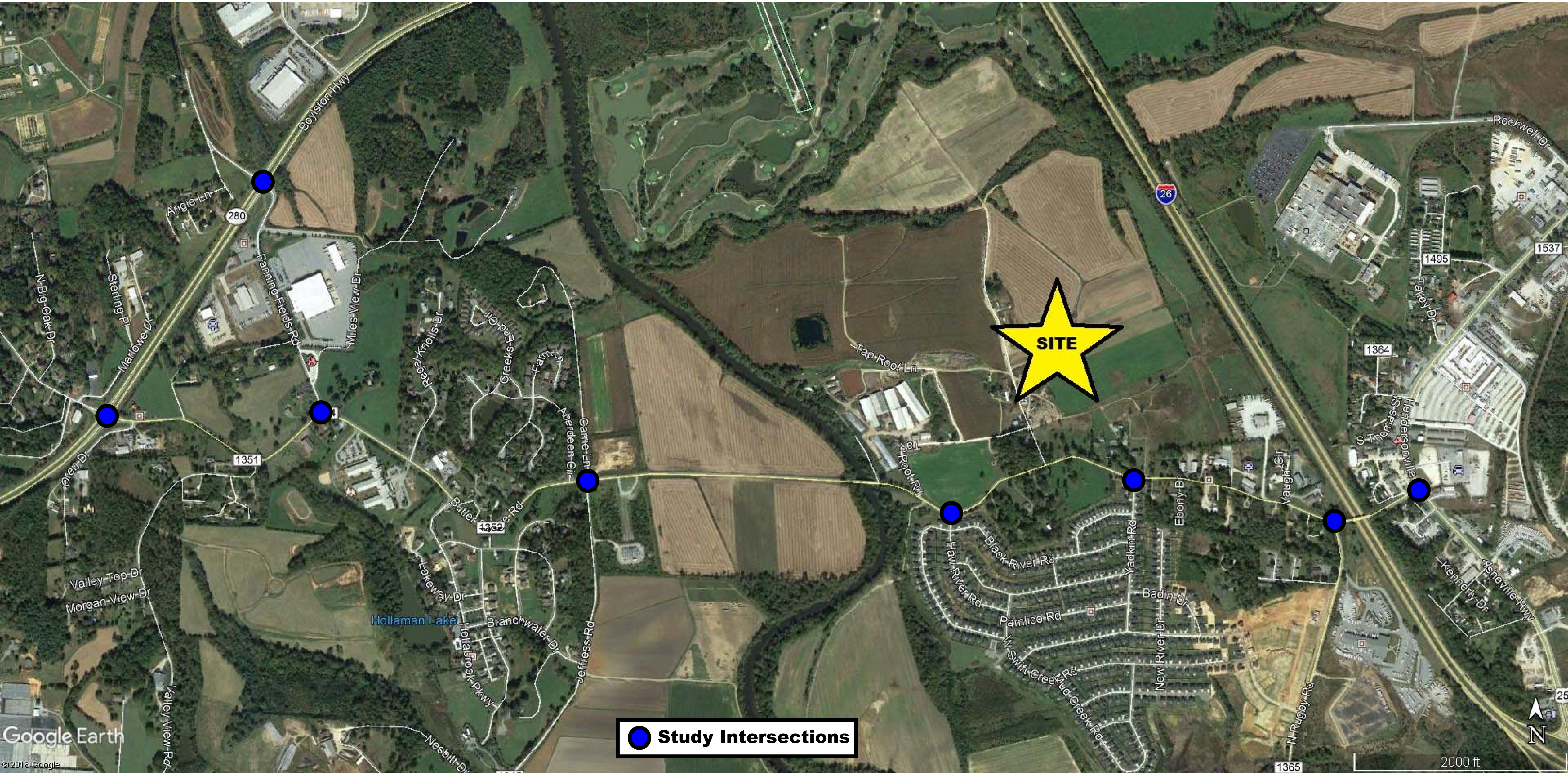
N

RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Tap Root Dairy
Henderson County, NC

Site Trip Distribution

Not to Scale | Figure



SITE
Study Intersections
Boylston Hwy
Tap Root Ln
Butler Bridge Rd
Jeffress Rd
Hollaman Lake
Black River Rd
Yadkin Rd
Ebony Dr
Rockwell Dr
Asheville Hwy
Hendersonville Rd
N Rugby Rd
Kennerly Dr
2000 ft
Google Earth
N

APPENDIX B

TRAFFIC COUNT DATA

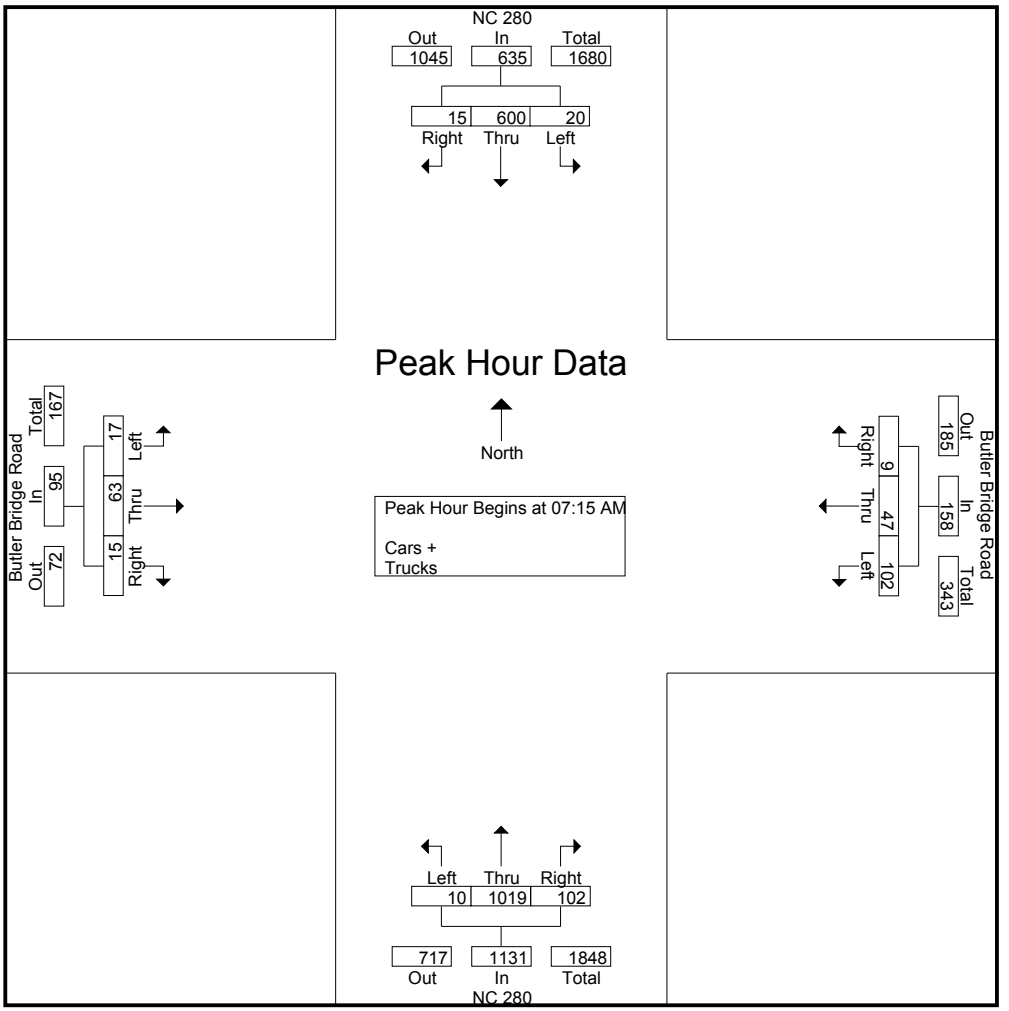
File Name : MillsRiver(Butler Bridge and NC-280) AM Peak
Site Code :
Start Date : 12/18/2018

Groups Printed- Cars + - Trucks

	NC 280 Southbound				Butler Bridge Road Westbound				NC 280 Northbound				Butler Bridge Road Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
07:00 AM	5	129	1	135	5	12	15	32	16	186	2	204	4	7	6	17	388
07:15 AM	4	142	2	148	2	6	20	28	33	244	0	277	7	16	5	28	481
07:30 AM	4	155	7	166	0	11	26	37	30	280	3	313	4	18	6	28	544
07:45 AM	4	157	9	170	5	15	30	50	24	276	4	304	2	20	4	26	550
Total	17	583	19	619	12	44	91	147	103	986	9	1098	17	61	21	99	1963
08:00 AM	3	146	2	151	2	15	26	43	15	219	3	237	2	9	2	13	444
08:15 AM	3	123	0	126	1	10	24	35	21	216	0	237	1	6	6	13	411
08:30 AM	5	109	3	117	6	13	30	49	16	196	0	212	2	9	9	20	398
08:45 AM	0	94	4	98	3	8	17	28	15	166	0	181	0	4	5	9	316
Total	11	472	9	492	12	46	97	155	67	797	3	867	5	28	22	55	1569
Grand Total	28	1055	28	1111	24	90	188	302	170	1783	12	1965	22	89	43	154	3532
Apprch %	2.5	95	2.5		7.9	29.8	62.3		8.7	90.7	0.6		14.3	57.8	27.9		
Total %	0.8	29.9	0.8	31.5	0.7	2.5	5.3	8.6	4.8	50.5	0.3	55.6	0.6	2.5	1.2	4.4	
Cars +	28	1045	28	1101	24	90	185	299	170	1772	11	1953	22	89	42	153	3506
% Cars +	100	99.1	100	99.1	100	100	98.4	99	100	99.4	91.7	99.4	100	100	97.7	99.4	99.3
Trucks	0	10	0	10	0	0	3	3	0	11	1	12	0	0	1	1	26
% Trucks	0	0.9	0	0.9	0	0	1.6	1	0	0.6	8.3	0.6	0	0	2.3	0.6	0.7

File Name : MillsRiver(Butler Bridge and NC-280) AM Peak
Site Code :
Start Date : 12/18/2018

	NC 280 Southbound				Butler Bridge Road Westbound				NC 280 Northbound				Butler Bridge Road Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	4	142	2	148	2	6	20	28	33	244	0	277	7	16	5	28	481
07:30 AM	4	155	7	166	0	11	26	37	30	280	3	313	4	18	6	28	544
07:45 AM	4	157	9	170	5	15	30	50	24	276	4	304	2	20	4	26	550
08:00 AM	3	146	2	151	2	15	26	43	15	219	3	237	2	9	2	13	444
Total Volume	15	600	20	635	9	47	102	158	102	1019	10	1131	15	63	17	95	2019
% App. Total	2.4	94.5	3.1		5.7	29.7	64.6		9	90.1	0.9		15.8	66.3	17.9		
PHF	.938	.955	.556	.934	.450	.783	.850	.790	.773	.910	.625	.903	.536	.788	.708	.848	.918



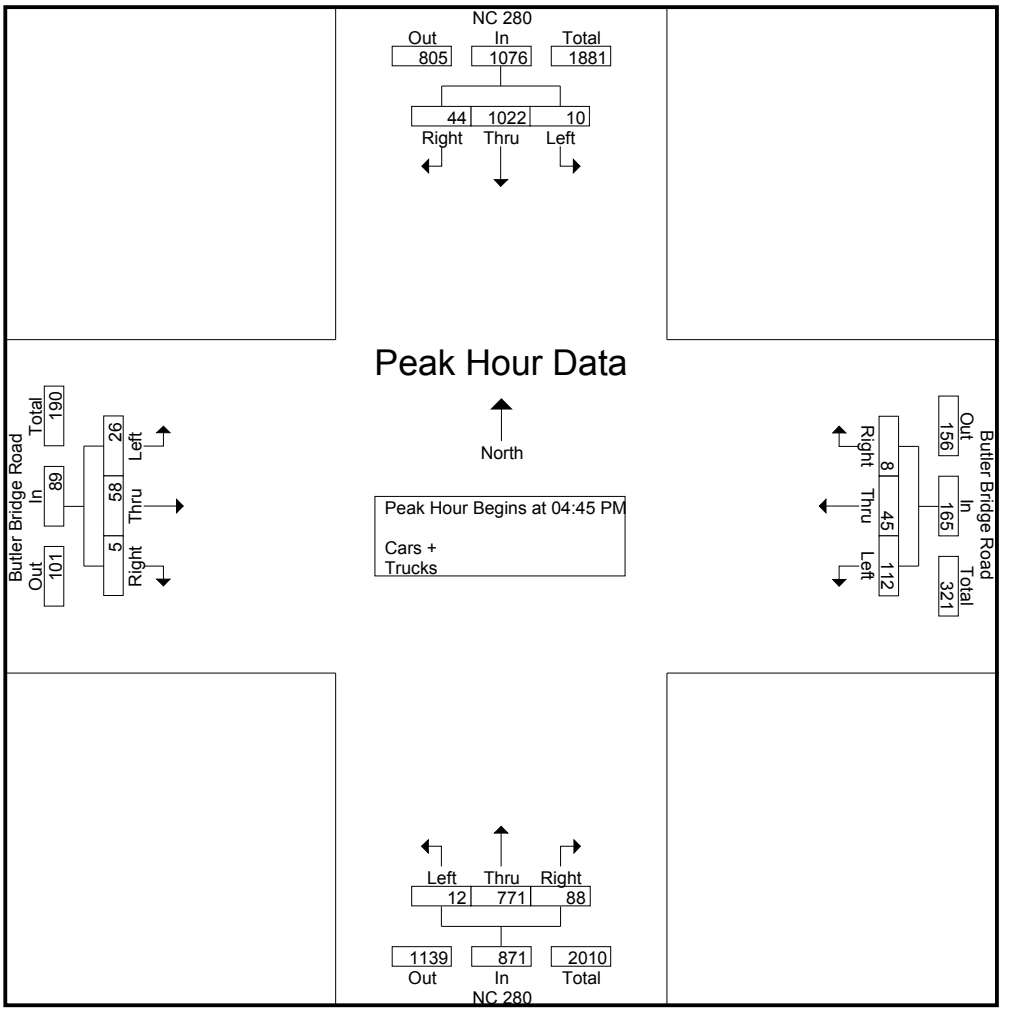
File Name : MillsRiver(Butler Bridge and NC-280) PM Peak
Site Code :
Start Date : 12/18/2018

Groups Printed- Cars + - Trucks

	NC 280 Southbound				Butler Bridge Road Westbound				NC 280 Northbound				Butler Bridge Road Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
04:00 PM	12	220	2	234	4	11	24	39	22	187	3	212	5	4	5	14	499
04:15 PM	10	262	1	273	1	21	29	51	12	197	2	211	1	12	7	20	555
04:30 PM	13	239	5	257	0	12	22	34	16	214	3	233	12	15	12	39	563
04:45 PM	16	220	2	238	4	16	33	53	11	174	0	185	1	8	8	17	493
Total	51	941	10	1002	9	60	108	177	61	772	8	841	19	39	32	90	2110
05:00 PM	13	255	4	272	0	8	28	36	27	179	6	212	0	27	5	32	552
05:15 PM	8	271	2	281	3	12	30	45	27	194	5	226	2	10	6	18	570
05:30 PM	7	276	2	285	1	9	21	31	23	224	1	248	2	13	7	22	586
05:45 PM	10	216	1	227	1	14	28	43	20	156	0	176	3	13	11	27	473
Total	38	1018	9	1065	5	43	107	155	97	753	12	862	7	63	29	99	2181
Grand Total	89	1959	19	2067	14	103	215	332	158	1525	20	1703	26	102	61	189	4291
Apprch %	4.3	94.8	0.9		4.2	31	64.8		9.3	89.5	1.2		13.8	54	32.3		
Total %	2.1	45.7	0.4	48.2	0.3	2.4	5	7.7	3.7	35.5	0.5	39.7	0.6	2.4	1.4	4.4	
Cars +	89	1952	19	2060	14	103	213	330	157	1507	20	1684	26	102	61	189	4263
% Cars +	100	99.6	100	99.7	100	100	99.1	99.4	99.4	98.8	100	98.9	100	100	100	100	99.3
Trucks	0	7	0	7	0	0	2	2	1	18	0	19	0	0	0	0	28
% Trucks	0	0.4	0	0.3	0	0	0.9	0.6	0.6	1.2	0	1.1	0	0	0	0	0.7

File Name : MillsRiver(Butler Bridge and NC-280) PM Peak
Site Code :
Start Date : 12/18/2018

	NC 280 Southbound				Butler Bridge Road Westbound				NC 280 Northbound				Butler Bridge Road Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	16	220	2	238	4	16	33	53	11	174	0	185	1	8	8	17	493
05:00 PM	13	255	4	272	0	8	28	36	27	179	6	212	0	27	5	32	552
05:15 PM	8	271	2	281	3	12	30	45	27	194	5	226	2	10	6	18	570
05:30 PM	7	276	2	285	1	9	21	31	23	224	1	248	2	13	7	22	586
Total Volume	44	1022	10	1076	8	45	112	165	88	771	12	871	5	58	26	89	2201
% App. Total	4.1	95	0.9		4.8	27.3	67.9		10.1	88.5	1.4		5.6	65.2	29.2		
PHF	.688	.926	.625	.944	.500	.703	.848	.778	.815	.860	.500	.878	.625	.537	.813	.695	.939



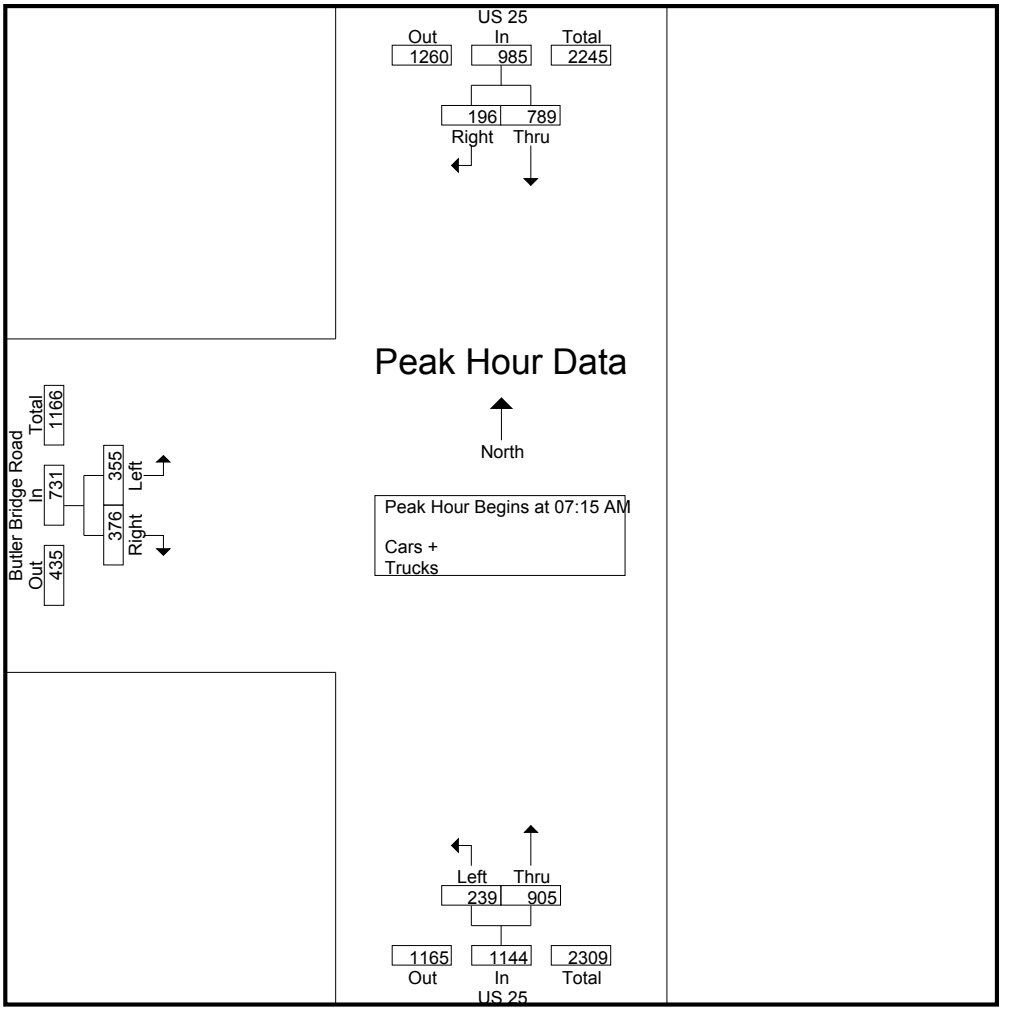
File Name : MillsRiver(Butler Bridge and US-25) AM Peak
Site Code :
Start Date : 12/18/2018
Page No : 1

Groups Printed- Cars + - Trucks

	US 25 Southbound			US 25 Northbound			Butler Bridge Road Eastbound			
Start Time	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	Int. Total
07:00 AM	29	138	167	113	26	139	86	65	151	457
07:15 AM	50	199	249	221	52	273	114	66	180	702
07:30 AM	51	228	279	237	62	299	105	112	217	795
07:45 AM	46	198	244	264	77	341	82	92	174	759
Total	176	763	939	835	217	1052	387	335	722	2713
08:00 AM	49	164	213	183	48	231	75	85	160	604
08:15 AM	38	145	183	176	50	226	78	62	140	549
08:30 AM	26	163	189	160	55	215	57	58	115	519
08:45 AM	25	132	157	163	40	203	48	51	99	459
Total	138	604	742	682	193	875	258	256	514	2131
Grand Total	314	1367	1681	1517	410	1927	645	591	1236	4844
Apprch %	18.7	81.3		78.7	21.3		52.2	47.8		
Total %	6.5	28.2	34.7	31.3	8.5	39.8	13.3	12.2	25.5	
Cars +	312	1328	1640	1481	405	1886	643	590	1233	4759
% Cars +	99.4	97.1	97.6	97.6	98.8	97.9	99.7	99.8	99.8	98.2
Trucks	2	39	41	36	5	41	2	1	3	85
% Trucks	0.6	2.9	2.4	2.4	1.2	2.1	0.3	0.2	0.2	1.8

File Name : MillsRiver(Butler Bridge and US-25) AM Peak
Site Code :
Start Date : 12/18/2018
Page No : 2

	US 25 Southbound			US 25 Northbound			Butler Bridge Road Eastbound			
Start Time	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	50	199	249	221	52	273	114	66	180	702
07:30 AM	51	228	279	237	62	299	105	112	217	795
07:45 AM	46	198	244	264	77	341	82	92	174	759
08:00 AM	49	164	213	183	48	231	75	85	160	604
Total Volume	196	789	985	905	239	1144	376	355	731	2860
% App. Total	19.9	80.1		79.1	20.9		51.4	48.6		
PHF	.961	.865	.883	.857	.776	.839	.825	.792	.842	.899



File Name : MillsRiver(Butler Bridge and US-25) PM Peak
Site Code :
Start Date : 12/18/2018
Page No : 1

Groups Printed- Cars + - Trucks

	US 25 Southbound			US 25 Northbound			Butler Bridge Road Eastbound			
Start Time	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	Int. Total
04:00 PM	64	237	301	211	59	270	60	59	119	690
04:15 PM	82	226	308	187	69	256	52	34	86	650
04:30 PM	87	277	364	176	43	219	75	64	139	722
04:45 PM	77	208	285	224	60	284	80	49	129	698
Total	310	948	1258	798	231	1029	267	206	473	2760
05:00 PM	92	277	369	225	64	289	72	66	138	796
05:15 PM	88	243	331	253	55	308	75	65	140	779
05:30 PM	71	264	335	201	71	272	56	78	134	741
05:45 PM	90	236	326	177	69	246	63	32	95	667
Total	341	1020	1361	856	259	1115	266	241	507	2983
Grand Total	651	1968	2619	1654	490	2144	533	447	980	5743
Apprch %	24.9	75.1		77.1	22.9		54.4	45.6		
Total %	11.3	34.3	45.6	28.8	8.5	37.3	9.3	7.8	17.1	
Cars +	650	1930	2580	1629	484	2113	533	447	980	5673
% Cars +	99.8	98.1	98.5	98.5	98.8	98.6	100	100	100	98.8
Trucks	1	38	39	25	6	31	0	0	0	70
% Trucks	0.2	1.9	1.5	1.5	1.2	1.4	0	0	0	1.2

File Name : MillsRiver(Butler Bridge and US-25) PM Peak
Site Code :
Start Date : 12/18/2018
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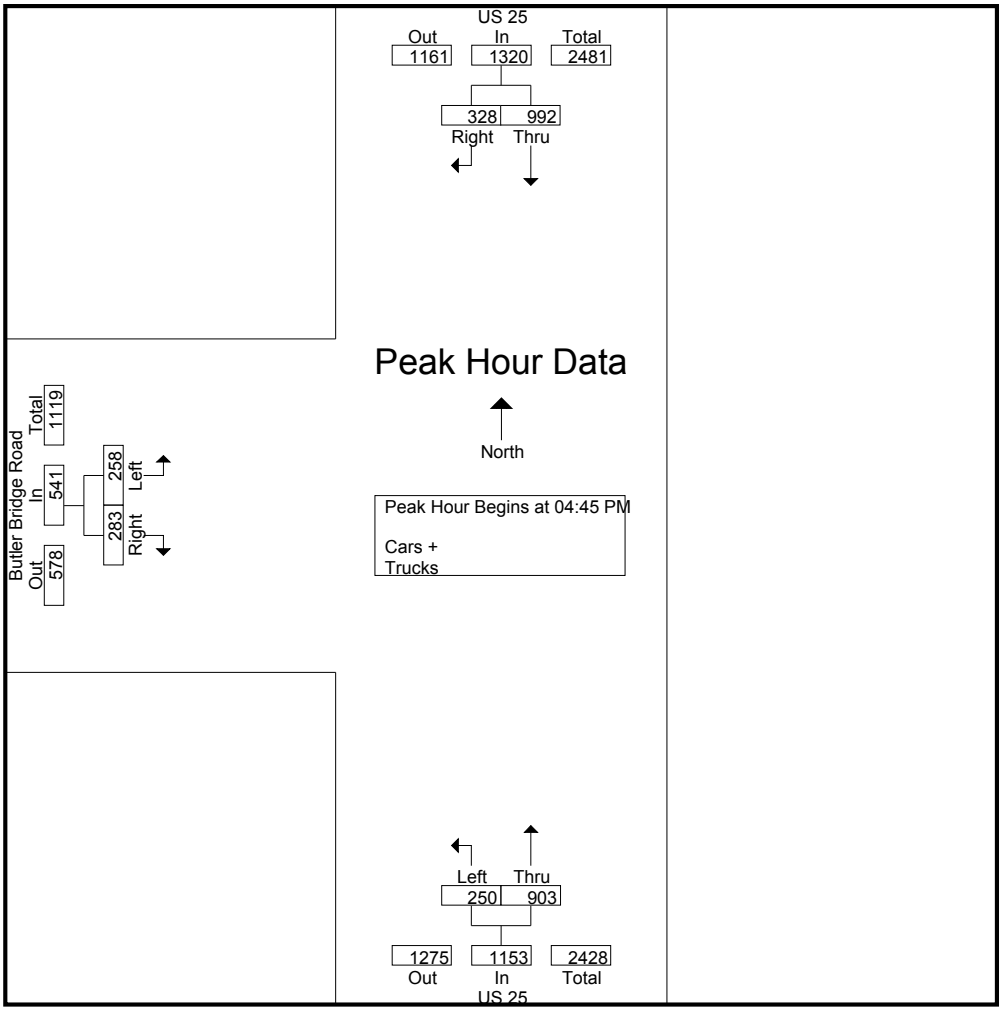
	US 25 Southbound			US 25 Northbound			Butler Bridge Road Eastbound			
Start Time	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	77	208	285	224	60	284	80	49	129	698
05:00 PM	92	277	369	225	64	289	72	66	138	796
05:15 PM	88	243	331	253	55	308	75	65	140	779
05:30 PM	71	264	335	201	71	272	56	78	134	741
Total Volume	328	992	1320	903	250	1153	283	258	541	3014
% App. Total	24.8	75.2		78.3	21.7		52.3	47.7		
PHF	.891	.895	.894	.892	.880	.936	.884	.827	.966	.947



File Name : MillsRiver(Fanning Fields And NC-280)
Site Code :
Start Date : 12/18/2018

Groups Printed- Cars + - Trucks

	NC 280 Southbound						Fanning Field Road Westbound						NC 280 Northbound						Fanning Field Road Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
07:00 AM	2	151	15	0	0	168	21	0	0	0	0	21	1	182	0	0	0	183	0	0	0	0	0	0	372
07:15 AM	0	143	28	1	0	172	22	0	0	0	0	22	1	245	1	1	0	248	1	0	2	0	0	3	445
07:30 AM	3	175	56	0	0	234	54	0	4	0	0	58	1	266	0	0	0	267	0	0	2	0	0	2	561
07:45 AM	6	155	32	0	0	193	80	4	1	0	0	85	2	249	2	0	0	253	3	0	1	0	0	4	535
Total	11	624	131	1	0	767	177	4	5	0	0	186	5	942	3	1	0	951	4	0	5	0	0	9	1913
08:00 AM	0	152	13	0	0	165	29	1	1	0	0	31	2	217	0	0	0	219	0	1	1	0	0	2	417
08:15 AM	0	116	13	0	0	129	33	0	2	0	0	35	3	210	0	0	0	213	1	0	0	0	0	1	378
08:30 AM	0	109	16	0	0	125	20	0	1	0	0	21	4	188	0	0	0	192	0	0	0	0	0	0	338
08:45 AM	1	94	19	0	0	114	15	0	0	0	0	15	1	158	0	0	0	159	2	0	0	0	0	2	290
Total	1	471	61	0	0	533	97	1	4	0	0	102	10	773	0	0	0	783	3	1	1	0	0	5	1423
09:00 AM	0	149	12	1	0	162	14	1	1	0	0	16	1	161	1	0	0	163	1	0	2	0	0	3	344
09:15 AM	0	116	10	0	0	126	19	0	4	0	0	23	1	161	1	0	0	163	1	0	1	0	0	2	314
09:30 AM	1	123	15	2	0	141	15	0	0	0	0	15	4	150	0	0	0	154	0	0	0	0	0	0	310
09:45 AM	0	116	15	0	0	131	21	0	0	0	0	21	3	169	0	0	0	172	2	0	1	0	0	3	327
Total	1	504	52	3	0	560	69	1	5	0	0	75	9	641	2	0	0	652	4	0	4	0	0	8	1295
10:00 AM	0	133	11	2	0	146	18	0	2	0	0	20	5	156	0	1	0	162	0	0	0	0	0	0	328
10:15 AM	0	138	16	0	0	154	10	0	1	0	0	11	1	164	0	0	0	165	0	1	0	0	0	1	331
10:30 AM	1	131	14	0	0	146	15	2	0	0	0	17	1	163	1	0	0	165	0	0	0	0	0	0	328
10:45 AM	2	134	17	0	0	153	17	0	2	0	0	19	1	161	0	0	0	162	0	2	0	0	0	2	336
Total	3	536	58	2	0	599	60	2	5	0	0	67	8	644	1	1	0	654	0	3	0	0	0	3	1323
11:00 AM	1	133	11	1	0	146	17	0	3	0	0	20	3	177	0	0	0	180	2	2	0	0	0	4	350
11:15 AM	2	145	17	2	0	166	14	1	0	0	0	15	3	187	0	0	0	190	0	1	1	0	0	2	373
11:30 AM	0	150	16	1	0	167	18	6	0	0	0	24	4	182	0	0	0	186	0	1	4	0	0	5	382
11:45 AM	1	146	17	1	0	165	27	1	4	0	0	32	2	164	0	0	0	166	2	0	0	0	0	2	365
Total	4	574	61	5	0	644	76	8	7	0	0	91	12	710	0	0	0	722	4	4	5	0	0	13	1470
12:00 PM	3	135	31	0	0	169	24	0	3	0	0	27	1	233	2	0	0	236	0	1	1	0	0	2	434
12:15 PM	2	149	22	0	0	173	29	0	1	0	0	30	3	207	0	0	0	210	1	0	1	0	0	2	415
12:30 PM	3	131	19	0	0	153	13	0	0	0	0	13	1	213	3	0	0	217	6	0	2	0	0	8	391
12:45 PM	2	119	15	0	0	136	31	0	4	0	0	35	0	150	1	0	0	151	0	1	0	0	0	1	323
Total	10	534	87	0	0	631	97	0	8	0	0	105	5	803	6	0	0	814	7	2	4	0	0	13	1563
01:00 PM	1	146	12	1	0	160	28	0	2	0	0	30	2	181	2	0	0	185	1	1	2	0	0	4	379
01:15 PM	3	143	14	1	0	161	18	2	3	0	0	23	1	194	1	1	0	197	0	0	1	0	0	1	382
01:30 PM	3	159	17	0	0	179	16	0	1	0	0	17	6	136	1	0	0	143	0	1	1	0	0	2	341
01:45 PM	0	148	13	0	0	161	21	0	4	0	0	25	3	177	0	0	0	180	1	0	1	0	0	2	368
Total	7	596	56	2	0	661	83	2	10	0	0	95	12	688	4	1	0	705	2	2	5	0	0	9	1470
02:00 PM	1	188	13	1	0	203	17	0	1	0	0	18	4	190	0	0	0	194	0	0	1	0	0	1	416
02:15 PM	2	178	25	0	0	205	21	0	2	0	0	23	2	184	0	0	0	186	0	0	2	0	0	2	416
02:30 PM	2	206	11	0	0	219	28	0	1	0	0	29	5	158	0	0	0	163	1	0	0	0	0	1	412
02:45 PM	1	183	17	0	0	201	15	0	1	0	0	16	3	209	2	0	0	214	1	1	1	0	0	3	434
Total	6	755	66	1	0	828	81	0	5	0	0	86	14	741	2	0	0	757	2	1	4	0	0	7	1678
03:00 PM	1	199	18	1	0	219	41	1	3	0	0	45	6	184	0	0	0	190	0	0	4	0	0	4	458
03:15 PM	0	195	29	0	0	224	26	0	3	0	0	29	1	202	0	0	0	203	0	0	0	0	0	0	456
03:30 PM	1	216	24	1	0	242	24	1	1	0	0	26	1	195	2	0	0	198	1	0	0	0	0	1	467
03:45 PM	2	229	25	0	0	256	24	0	3	0	0	27	3	185	1	0	0	189	2	0	1	0	0	3	475
Total	4	839	96	2	0	941	115	2	10	0	0	127	11	766	3	0	0	780	3	0	5	0	0	8	1856

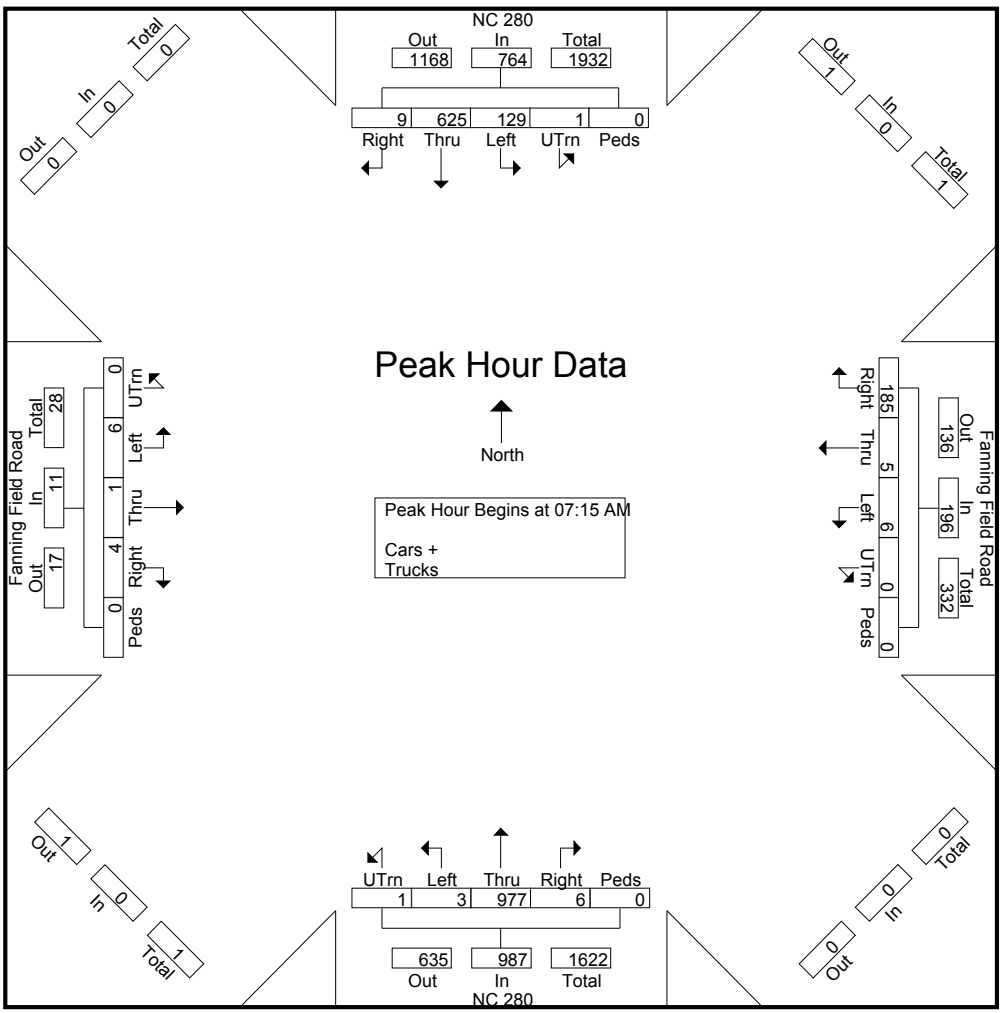
File Name : MillsRiver(Fanning Fields And NC-280)
Site Code :
Start Date : 12/18/2018

Groups Printed- Cars + - Trucks

	NC 280 Southbound						Fanning Field Road Westbound						NC 280 Northbound						Fanning Field Road Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
04:00 PM	1	240	30	2	0	273	20	1	1	0	0	22	1	186	1	0	0	188	1	1	1	0	0	3	486
04:15 PM	2	274	27	0	0	303	27	0	1	0	0	28	1	209	0	0	0	210	0	0	0	0	0	0	541
04:30 PM	1	211	36	0	0	248	28	0	0	0	0	28	1	229	0	0	0	230	8	1	10	0	0	19	525
04:45 PM	0	250	46	1	0	297	25	0	0	0	0	25	2	198	1	0	0	201	0	1	1	0	0	2	525
Total	4	975	139	3	0	1121	100	1	2	0	0	103	5	822	2	0	0	829	9	3	12	0	0	24	2077
05:00 PM	0	237	34	2	0	273	41	0	1	0	0	42	0	185	5	0	0	190	3	0	0	0	0	3	508
05:15 PM	0	273	27	0	0	300	23	0	2	0	0	25	0	202	1	0	0	203	0	1	0	0	0	1	529
05:30 PM	2	248	28	1	0	279	21	0	0	0	0	21	0	222	0	0	0	222	1	0	2	0	0	3	525
05:45 PM	1	214	30	0	0	245	19	0	4	0	0	23	0	159	1	1	0	161	1	0	1	0	0	2	431
Total	3	972	119	3	0	1097	104	0	7	0	0	111	0	768	7	1	0	776	5	1	3	0	0	9	1993
06:00 PM	0	197	25	0	0	222	18	0	2	0	0	20	3	158	2	0	0	163	0	0	0	0	0	0	405
06:15 PM	0	177	22	1	0	200	9	0	0	0	0	9	2	160	0	0	0	162	0	2	1	0	0	3	374
06:30 PM	0	155	24	1	0	180	12	0	1	0	0	13	0	130	0	0	0	130	0	0	0	0	0	0	323
06:45 PM	0	133	21	0	0	154	15	0	0	0	0	15	0	93	2	0	0	95	0	0	0	0	0	0	264
Total	0	662	92	2	0	756	54	0	3	0	0	57	5	541	4	0	0	550	0	2	1	0	0	3	1366
Grand Total	54	8042	1018	24	0	9138	1113	21	71	0	0	1205	96	8839	34	4	0	8973	43	19	49	0	0	111	19427
Apprch %	0.6	88	11.1	0.3	0		92.4	1.7	5.9	0	0		1.1	98.5	0.4	0	0		38.7	17.1	44.1	0	0		
Total %	0.3	41.4	5.2	0.1	0	47	5.7	0.1	0.4	0	0	6.2	0.5	45.5	0.2	0	0	46.2	0.2	0.1	0.3	0	0	0.6	
Cars +	53	7977	986	24	0	9040	1071	21	69	0	0	1161	88	8736	34	4	0	8862	42	19	49	0	0	110	19173
% Cars +	98.1	99.2	96.9	100	0	98.9	96.2	100	97.2	0	0	96.3	91.7	98.8	100	100	0	98.8	97.7	100	100	0	0	99.1	98.7
Trucks	1	65	32	0	0	98	42	0	2	0	0	44	8	103	0	0	0	111	1	0	0	0	0	1	254
% Trucks	1.9	0.8	3.1	0	0	1.1	3.8	0	2.8	0	0	3.7	8.3	1.2	0	0	0	1.2	2.3	0	0	0	0	0.9	1.3

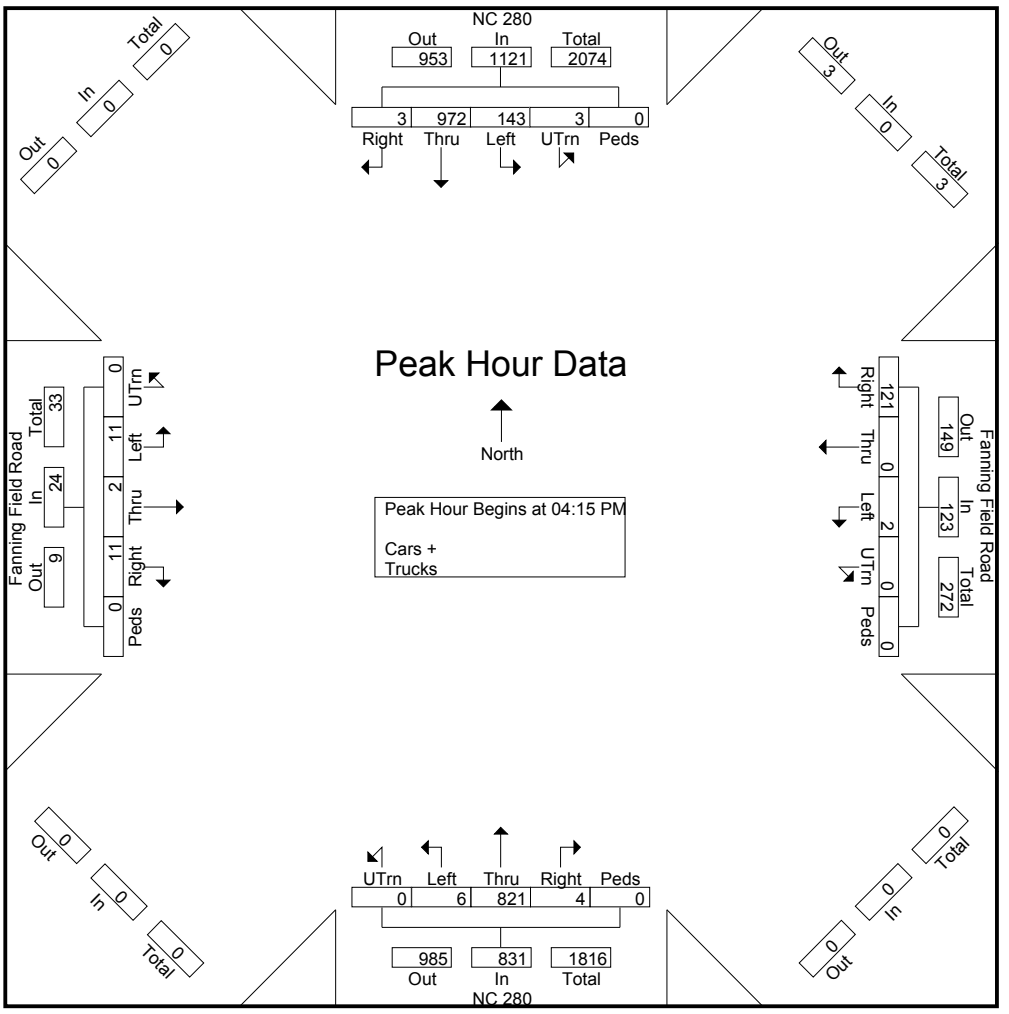
File Name : MillsRiver(Fanning Fields And NC-280)
Site Code :
Start Date : 12/18/2018
Page No : 3

	NC 280 Southbound						Fanning Field Road Westbound						NC 280 Northbound						Fanning Field Road Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:15 AM																									
07:15 AM	0	143	28	1	0	172	22	0	0	0	0	22	1	245	1	1	0	248	1	0	2	0	0	3	445
07:30 AM	3	175	56	0	0	234	54	0	4	0	0	58	1	266	0	0	0	267	0	0	2	0	0	2	561
07:45 AM	6	155	32	0	0	193	80	4	1	0	0	85	2	249	2	0	0	253	3	0	1	0	0	4	535
08:00 AM	0	152	13	0	0	165	29	1	1	0	0	31	2	217	0	0	0	219	0	1	1	0	0	2	417
Total Volume	9	625	129	1	0	764	185	5	6	0	0	196	6	977	3	1	0	987	4	1	6	0	0	11	1958
% App. Total	1.2	81.8	16.9	0.1	0		94.4	2.6	3.1	0	0		0.6	99	0.3	0.1	0		36.4	9.1	54.5	0	0		
PHF	.375	.893	.576	.250	.000	.816	.578	.313	.375	.000	.000	.576	.750	.918	.375	.250	.000	.924	.333	.250	.750	.000	.000	.688	.873



File Name : MillsRiver(Fanning Fields And NC-280)
Site Code :
Start Date : 12/18/2018
Page No : 4

	NC 280 Southbound						Fanning Field Road Westbound						NC 280 Northbound						Fanning Field Road Eastbound						
Start Time	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Right	Thru	Left	UTrn	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 06:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:15 PM																									
04:15 PM	2	274	27	0	0	303	27	0	1	0	0	28	1	209	0	0	0	210	0	0	0	0	0	0	541
04:30 PM	1	211	36	0	0	248	28	0	0	0	0	28	1	229	0	0	0	230	8	1	10	0	0	19	525
04:45 PM	0	250	46	1	0	297	25	0	0	0	0	25	2	198	1	0	0	201	0	1	1	0	0	2	525
05:00 PM	0	237	34	2	0	273	41	0	1	0	0	42	0	185	5	0	0	190	3	0	0	0	0	3	508
Total Volume	3	972	143	3	0	1121	121	0	2	0	0	123	4	821	6	0	0	831	11	2	11	0	0	24	2099
% App. Total	0.3	86.7	12.8	0.3	0		98.4	0	1.6	0	0		0.5	98.8	0.7	0	0		45.8	8.3	45.8	0	0		
PHF	.375	.887	.777	.375	.000	.925	.738	.000	.500	.000	.000	.732	.500	.896	.300	.000	.000	.903	.344	.500	.275	.000	.000	.316	.970



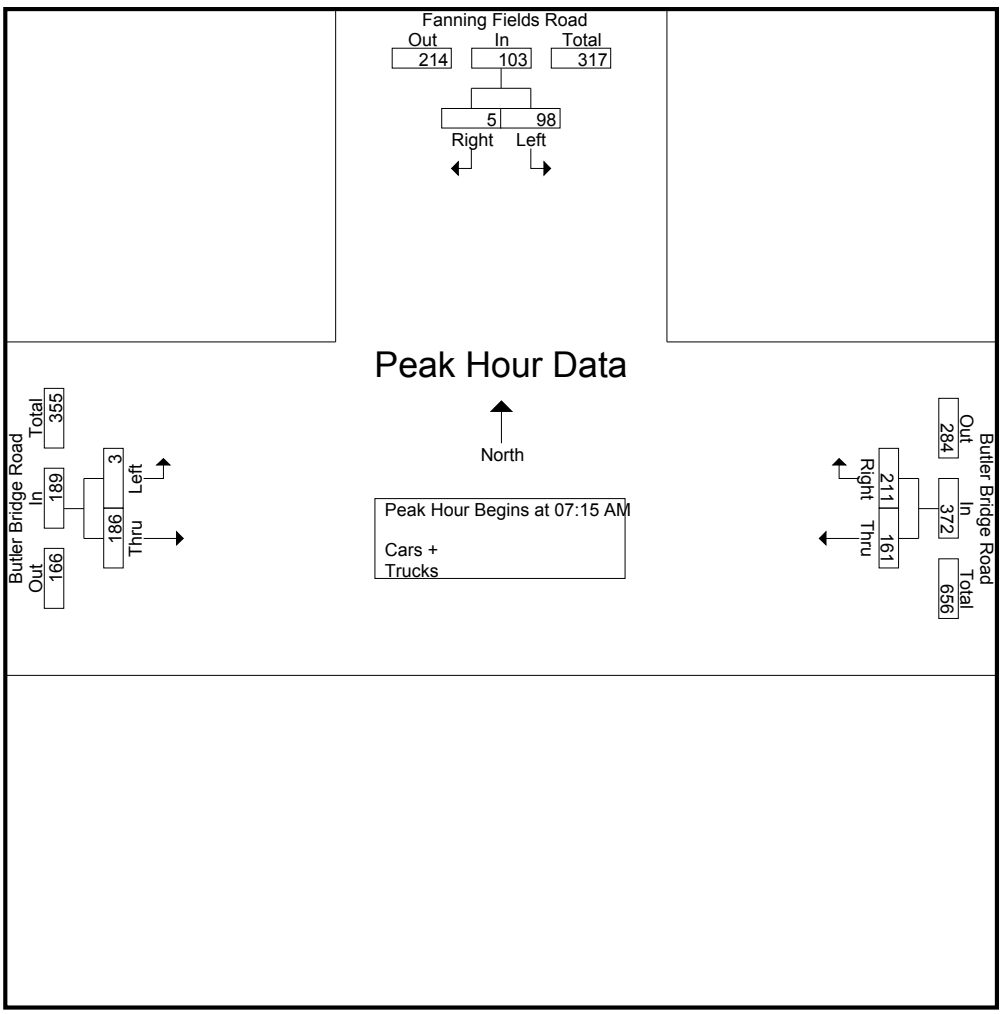
File Name : MillsRiver(Butler Bridge and Fanning Fields) AM Peak
Site Code :
Start Date : 12/18/2018
Page No : 1

Groups Printed- Cars + - Trucks

	Fanning Fields Road Southbound			Butler Bridge Road Westbound			Butler Bridge Road Eastbound			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
07:00 AM	0	14	14	20	26	46	28	0	28	88
07:15 AM	1	20	21	23	25	48	50	1	51	120
07:30 AM	1	39	40	62	43	105	56	1	57	202
07:45 AM	2	33	35	98	54	152	52	1	53	240
Total	4	106	110	203	148	351	186	3	189	650
08:00 AM	1	6	7	28	39	67	28	0	28	102
08:15 AM	0	13	13	31	38	69	28	1	29	111
08:30 AM	1	14	15	19	38	57	28	0	28	100
08:45 AM	0	18	18	8	25	33	23	0	23	74
Total	2	51	53	86	140	226	107	1	108	387
Grand Total	6	157	163	289	288	577	293	4	297	1037
Apprch %	3.7	96.3		50.1	49.9		98.7	1.3		
Total %	0.6	15.1	15.7	27.9	27.8	55.6	28.3	0.4	28.6	
Cars +	5	153	158	283	281	564	282	4	286	1008
% Cars +	83.3	97.5	96.9	97.9	97.6	97.7	96.2	100	96.3	97.2
Trucks	1	4	5	6	7	13	11	0	11	29
% Trucks	16.7	2.5	3.1	2.1	2.4	2.3	3.8	0	3.7	2.8

File Name : MillsRiver(Butler Bridge and Fanning Fields) AM Peak
Site Code :
Start Date : 12/18/2018

	Fanning Fields Road Southbound			Butler Bridge Road Westbound			Butler Bridge Road Eastbound			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	1	20	21	23	25	48	50	1	51	120
07:30 AM	1	39	40	62	43	105	56	1	57	202
07:45 AM	2	33	35	98	54	152	52	1	53	240
08:00 AM	1	6	7	28	39	67	28	0	28	102
Total Volume	5	98	103	211	161	372	186	3	189	664
% App. Total	4.9	95.1		56.7	43.3		98.4	1.6		
PHF	.625	.628	.644	.538	.745	.612	.830	.750	.829	.692



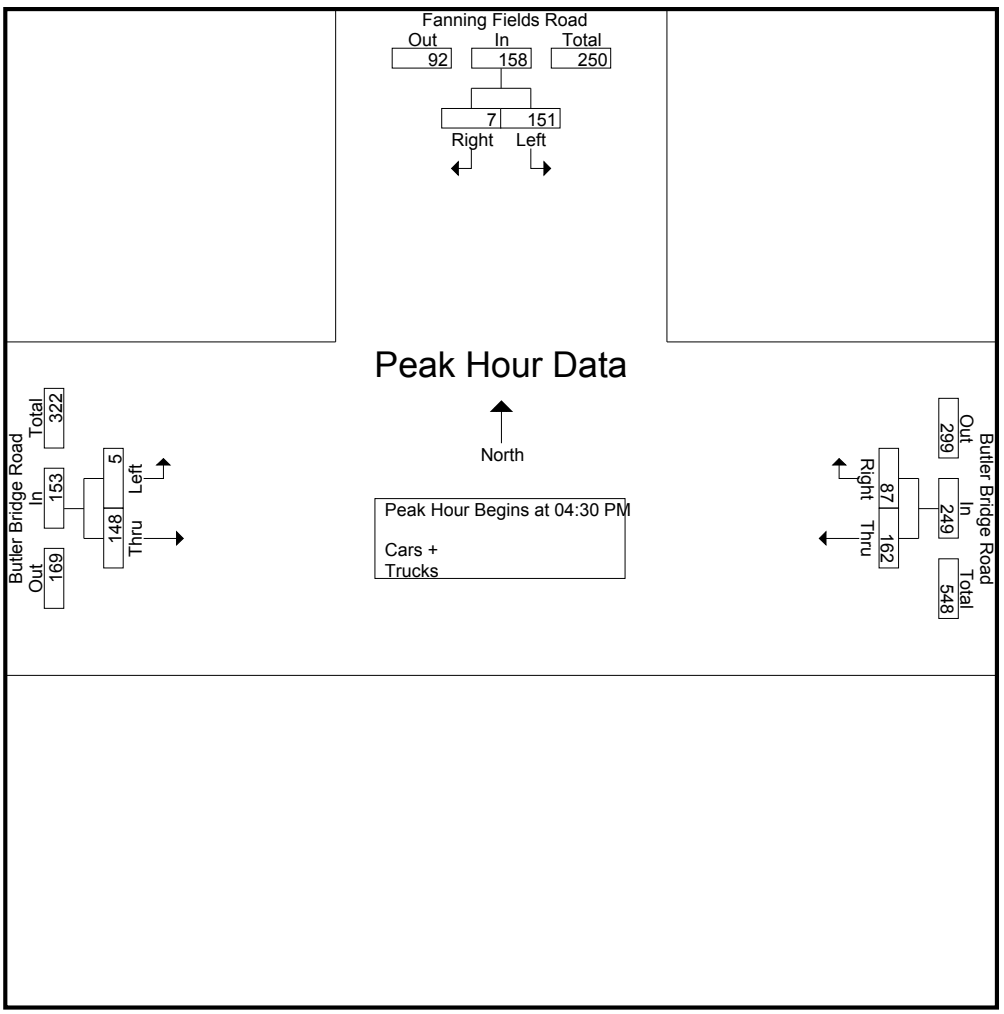
File Name : MillsRiver(Butler Bridge and Fanning Fields) PM Peak
Site Code :
Start Date : 12/18/2018
Page No : 1

Groups Printed- Cars + - Trucks

	Fanning Fields Road Southbound			Butler Bridge Road Westbound			Butler Bridge Road Eastbound			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
04:00 PM	2	18	20	14	36	50	24	2	26	96
04:15 PM	4	27	31	26	43	69	27	1	28	128
04:30 PM	0	35	35	24	43	67	28	1	29	131
04:45 PM	2	43	45	22	38	60	25	2	27	132
Total	8	123	131	86	160	246	104	6	110	487
05:00 PM	5	40	45	25	37	62	56	2	58	165
05:15 PM	0	33	33	16	44	60	39	0	39	132
05:30 PM	0	25	25	20	34	54	36	3	39	118
05:45 PM	2	24	26	16	38	54	35	0	35	115
Total	7	122	129	77	153	230	166	5	171	530
Grand Total	15	245	260	163	313	476	270	11	281	1017
Apprch %	5.8	94.2		34.2	65.8		96.1	3.9		
Total %	1.5	24.1	25.6	16	30.8	46.8	26.5	1.1	27.6	
Cars +	15	244	259	157	310	467	267	10	277	1003
% Cars +	100	99.6	99.6	96.3	99	98.1	98.9	90.9	98.6	98.6
Trucks	0	1	1	6	3	9	3	1	4	14
% Trucks	0	0.4	0.4	3.7	1	1.9	1.1	9.1	1.4	1.4

File Name : MillsRiver(Butler Bridge and Fanning Fields) PM Peak
Site Code :
Start Date : 12/18/2018

	Fanning Fields Road Southbound			Butler Bridge Road Westbound			Butler Bridge Road Eastbound			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	0	35	35	24	43	67	28	1	29	131
04:45 PM	2	43	45	22	38	60	25	2	27	132
05:00 PM	5	40	45	25	37	62	56	2	58	165
05:15 PM	0	33	33	16	44	60	39	0	39	132
Total Volume	7	151	158	87	162	249	148	5	153	560
% App. Total	4.4	95.6		34.9	65.1		96.7	3.3		
PHF	.350	.878	.878	.870	.920	.929	.661	.625	.659	.848



File Name : MillsRiver(Butler Bridge and Jeffress) AM Peak
Site Code :
Start Date : 12/18/2018

Groups Printed- Cars + - Trucks

	Carrie Lane Southbound				Butler Bridge Road Westbound				Jeffress Road Northbound				Butler Bridge Road Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
07:00 AM	0	0	0	0	1	35	10	46	14	0	0	14	1	49	0	50	110
07:15 AM	0	0	0	0	0	64	11	75	27	0	2	29	1	46	0	47	151
07:30 AM	0	0	0	0	0	101	21	122	27	0	2	29	2	66	0	68	219
07:45 AM	0	0	0	0	0	92	17	109	34	0	3	37	6	65	0	71	217
Total	0	0	0	0	1	292	59	352	102	0	7	109	10	226	0	236	697
08:00 AM	0	0	0	0	0	54	14	68	13	0	0	13	4	37	0	41	122
08:15 AM	0	0	0	0	0	56	9	65	16	0	3	19	0	33	0	33	117
08:30 AM	0	0	0	0	0	43	16	59	12	0	1	13	1	37	0	38	110
08:45 AM	0	0	0	0	0	27	8	35	14	0	1	15	1	25	0	26	76
Total	0	0	0	0	0	180	47	227	55	0	5	60	6	132	0	138	425
Grand Total	0	0	0	0	1	472	106	579	157	0	12	169	16	358	0	374	1122
Apprch %	0	0	0		0.2	81.5	18.3		92.9	0	7.1		4.3	95.7	0		
Total %	0	0	0	0	0.1	42.1	9.4	51.6	14	0	1.1	15.1	1.4	31.9	0	33.3	
Cars +	0	0	0	0	1	449	98	548	154	0	11	165	15	335	0	350	1063
% Cars +	0	0	0	0	100	95.1	92.5	94.6	98.1	0	91.7	97.6	93.8	93.6	0	93.6	94.7
Trucks	0	0	0	0	0	23	8	31	3	0	1	4	1	23	0	24	59
% Trucks	0	0	0	0	0	4.9	7.5	5.4	1.9	0	8.3	2.4	6.2	6.4	0	6.4	5.3

File Name : MillsRiver(Butler Bridge and Jeffress) AM Peak
Site Code :
Start Date : 12/18/2018
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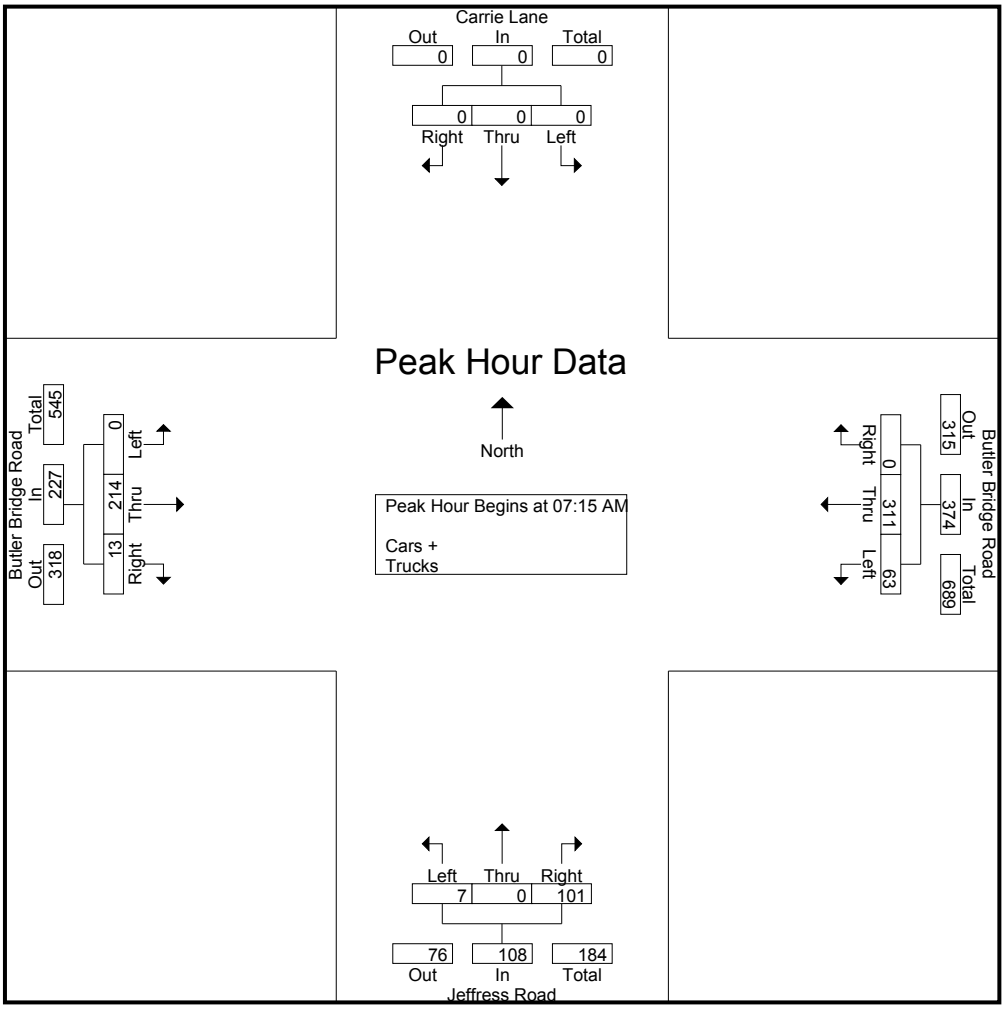
	Carrie Lane Southbound				Butler Bridge Road Westbound				Jeffress Road Northbound				Butler Bridge Road Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	0	0	0	0	64	11	75	27	0	2	29	1	46	0	47	151
07:30 AM	0	0	0	0	0	101	21	122	27	0	2	29	2	66	0	68	219
07:45 AM	0	0	0	0	0	92	17	109	34	0	3	37	6	65	0	71	217
08:00 AM	0	0	0	0	0	54	14	68	13	0	0	13	4	37	0	41	122
Total Volume	0	0	0	0	0	311	63	374	101	0	7	108	13	214	0	227	709
% App. Total	0	0	0		0	83.2	16.8		93.5	0	6.5		5.7	94.3	0		
PHF	.000	.000	.000	.000	.000	.770	.750	.766	.743	.000	.583	.730	.542	.811	.000	.799	.809



File Name : MillsRiver(Butler Bridge and Jeffress) PM Peak
Site Code :
Start Date : 12/18/2018

Groups Printed- Cars + - Trucks

	Carrie Lane Southbound				Butler Bridge Road Westbound				Jeffress Road Northbound				Butler Bridge Road Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
04:00 PM	0	0	0	0	0	46	13	59	17	0	2	19	0	36	2	38	116
04:15 PM	0	1	0	1	0	65	17	82	23	0	2	25	0	42	0	42	150
04:30 PM	0	0	0	0	1	54	18	73	15	0	1	16	3	63	0	66	155
04:45 PM	0	0	0	0	0	46	9	55	8	0	0	8	4	65	0	69	132
Total	0	1	0	1	1	211	57	269	63	0	5	68	7	206	2	215	553
05:00 PM	0	0	0	0	1	48	18	67	10	0	3	13	3	84	0	87	167
05:15 PM	0	0	4	4	2	54	15	71	8	0	1	9	1	67	0	68	152
05:30 PM	0	0	0	0	0	54	10	64	11	0	1	12	2	62	0	64	140
05:45 PM	0	0	0	0	0	50	11	61	9	0	1	10	1	56	0	57	128
Total	0	0	4	4	3	206	54	263	38	0	6	44	7	269	0	276	587
Grand Total	0	1	4	5	4	417	111	532	101	0	11	112	14	475	2	491	1140
Apprch %	0	20	80		0.8	78.4	20.9		90.2	0	9.8		2.9	96.7	0.4		
Total %	0	0.1	0.4	0.4	0.4	36.6	9.7	46.7	8.9	0	1	9.8	1.2	41.7	0.2	43.1	
Cars +	0	1	4	5	4	401	111	516	100	0	11	111	14	461	2	477	1109
% Cars +	0	100	100	100	100	96.2	100	97	99	0	100	99.1	100	97.1	100	97.1	97.3
Trucks	0	0	0	0	0	16	0	16	1	0	0	1	0	14	0	14	31
% Trucks	0	0	0	0	0	3.8	0	3	1	0	0	0.9	0	2.9	0	2.9	2.7

File Name : MillsRiver(Butler Bridge and Jeffress) PM Peak
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Start Date : 12/18/2018
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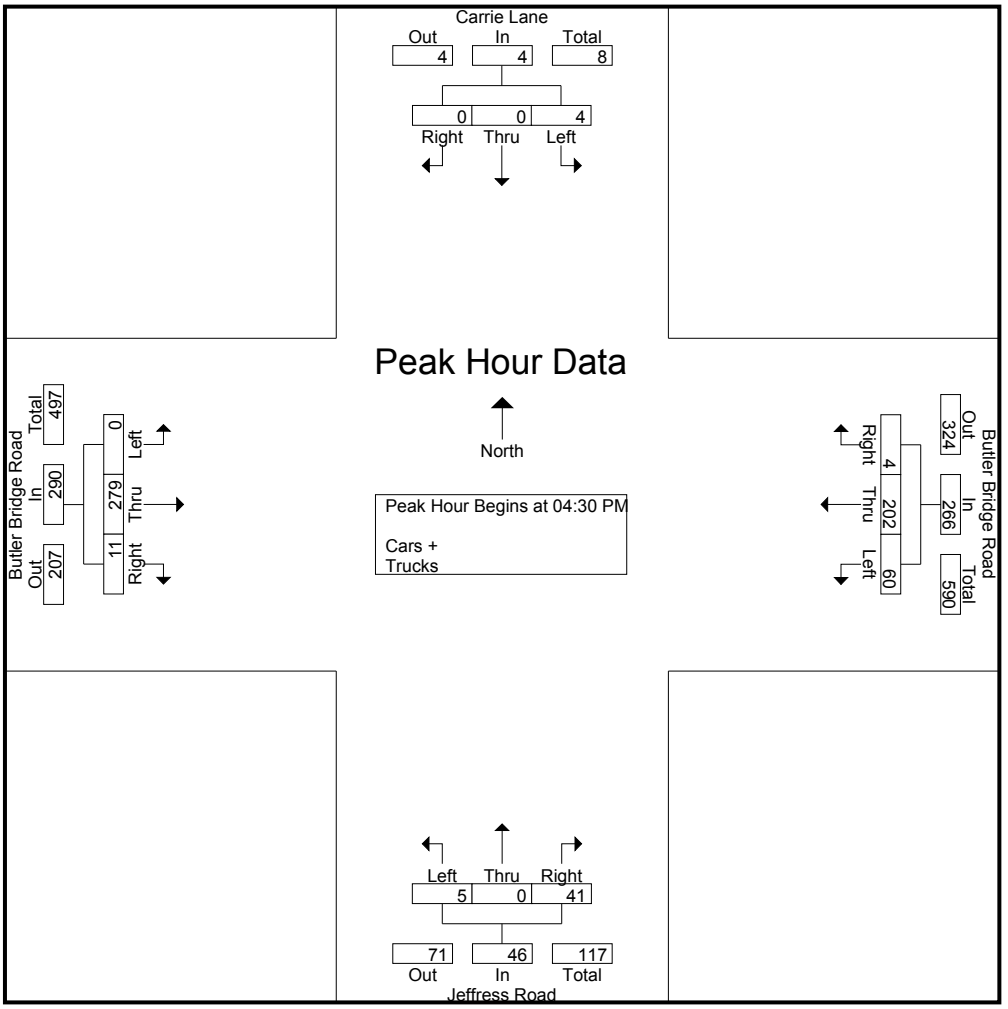
	Carrie Lane Southbound				Butler Bridge Road Westbound				Jeffress Road Northbound				Butler Bridge Road Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	0	0	0	1	54	18	73	15	0	1	16	3	63	0	66	155
04:45 PM	0	0	0	0	0	46	9	55	8	0	0	8	4	65	0	69	132
05:00 PM	0	0	0	0	1	48	18	67	10	0	3	13	3	84	0	87	167
05:15 PM	0	0	4	4	2	54	15	71	8	0	1	9	1	67	0	68	152
Total Volume	0	0	4	4	4	202	60	266	41	0	5	46	11	279	0	290	606
% App. Total	0	0	100		1.5	75.9	22.6		89.1	0	10.9		3.8	96.2	0		
PHF	.000	.000	.250	.250	.500	.935	.833	.911	.683	.000	.417	.719	.688	.830	.000	.833	.907



File Name : MillsRiver(Butler Bridge and Haw River) AM Peak
Site Code :
Start Date : 12/18/2018
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Groups Printed- Cars + - Trucks

	Butler Bridge Road Westbound			Haw River Road Northbound			Butler Bridge road Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
07:00 AM	36	1	37	10	9	19	2	59	61	117
07:15 AM	66	1	67	9	11	20	1	73	74	161
07:30 AM	91	3	94	13	28	41	11	82	93	228
07:45 AM	90	4	94	15	17	32	13	84	97	223
Total	283	9	292	47	65	112	27	298	325	729
08:00 AM	55	5	60	10	5	15	3	51	54	129
08:15 AM	65	4	69	6	6	12	3	49	52	133
08:30 AM	58	1	59	5	6	11	2	47	49	119
08:45 AM	31	5	36	5	1	6	1	38	39	81
Total	209	15	224	26	18	44	9	185	194	462
Grand Total	492	24	516	73	83	156	36	483	519	1191
Apprch %	95.3	4.7		46.8	53.2		6.9	93.1		
Total %	41.3	2	43.3	6.1	7	13.1	3	40.6	43.6	
Cars +	471	24	495	73	83	156	36	463	499	1150
% Cars +	95.7	100	95.9	100	100	100	100	95.9	96.1	96.6
Trucks	21	0	21	0	0	0	0	20	20	41
% Trucks	4.3	0	4.1	0	0	0	0	4.1	3.9	3.4

File Name : MillsRiver(Butler Bridge and Haw River) AM Peak
Site Code :
Start Date : 12/18/2018
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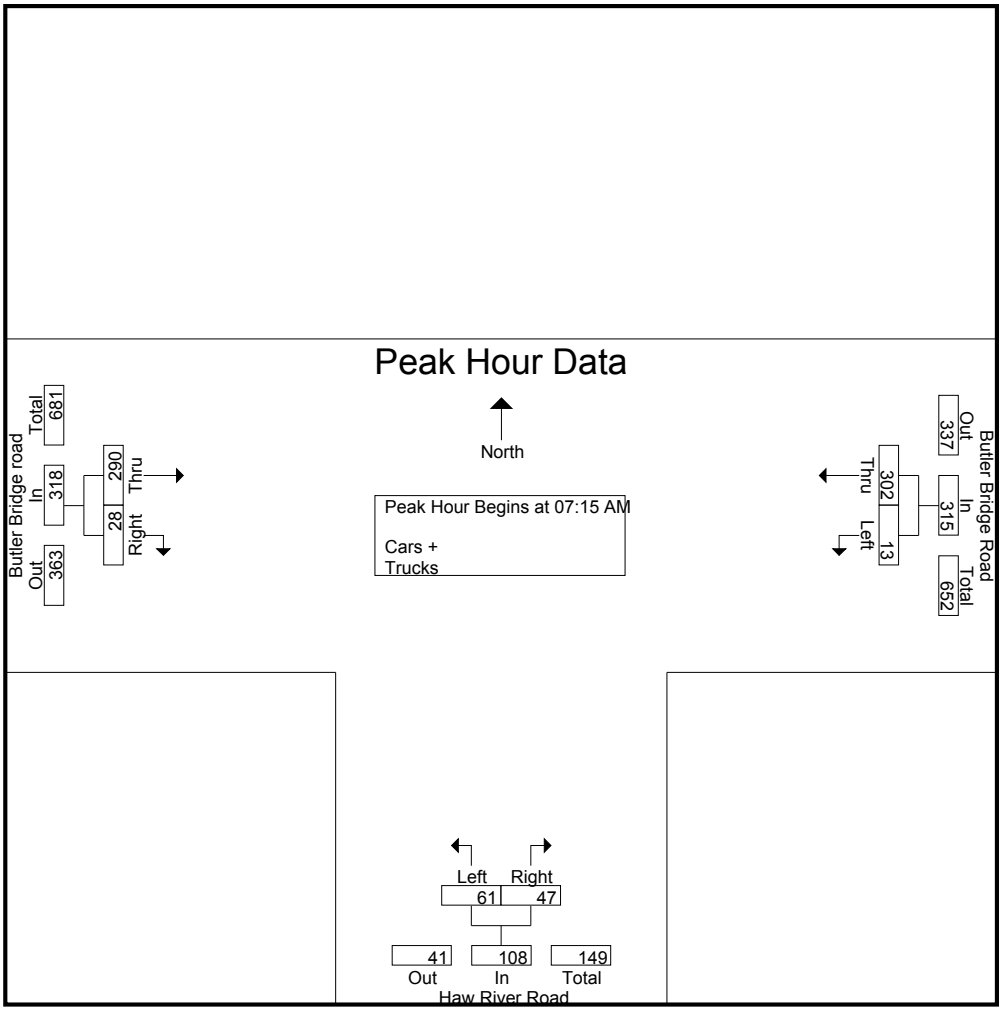
	Butler Bridge Road Westbound			Haw River Road Northbound			Butler Bridge road Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	66	1	67	9	11	20	1	73	74	161
07:30 AM	91	3	94	13	28	41	11	82	93	228
07:45 AM	90	4	94	15	17	32	13	84	97	223
08:00 AM	55	5	60	10	5	15	3	51	54	129
Total Volume	302	13	315	47	61	108	28	290	318	741
% App. Total	95.9	4.1		43.5	56.5		8.8	91.2		
PHF	.830	.650	.838	.783	.545	.659	.538	.863	.820	.813



File Name : MillsRiver(Butler Bridge and Haw River) PM Peak
Site Code :
Start Date : 12/18/2018
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Groups Printed- Cars + - Trucks

	Butler Bridge road Westbound			Haw River Road Northbound			Butler Bridge Road Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
04:00 PM	54	2	56	4	3	7	6	47	53	116
04:15 PM	78	7	85	4	6	10	10	52	62	157
04:30 PM	63	3	66	7	5	12	9	67	76	154
04:45 PM	56	4	60	1	4	5	16	61	77	142
Total	251	16	267	16	18	34	41	227	268	569
05:00 PM	54	5	59	6	3	9	17	76	93	161
05:15 PM	68	6	74	4	4	8	8	77	85	167
05:30 PM	62	5	67	2	7	9	15	61	76	152
05:45 PM	57	4	61	3	4	7	12	51	63	131
Total	241	20	261	15	18	33	52	265	317	611
Grand Total	492	36	528	31	36	67	93	492	585	1180
Apprch %	93.2	6.8		46.3	53.7		15.9	84.1		
Total %	41.7	3.1	44.7	2.6	3.1	5.7	7.9	41.7	49.6	
Cars +	481	36	517	31	36	67	93	482	575	1159
% Cars +	97.8	100	97.9	100	100	100	100	98	98.3	98.2
Trucks	11	0	11	0	0	0	0	10	10	21
% Trucks	2.2	0	2.1	0	0	0	0	2	1.7	1.8

File Name : MillsRiver(Butler Bridge and Haw River) PM Peak
Site Code :
Start Date : 12/18/2018
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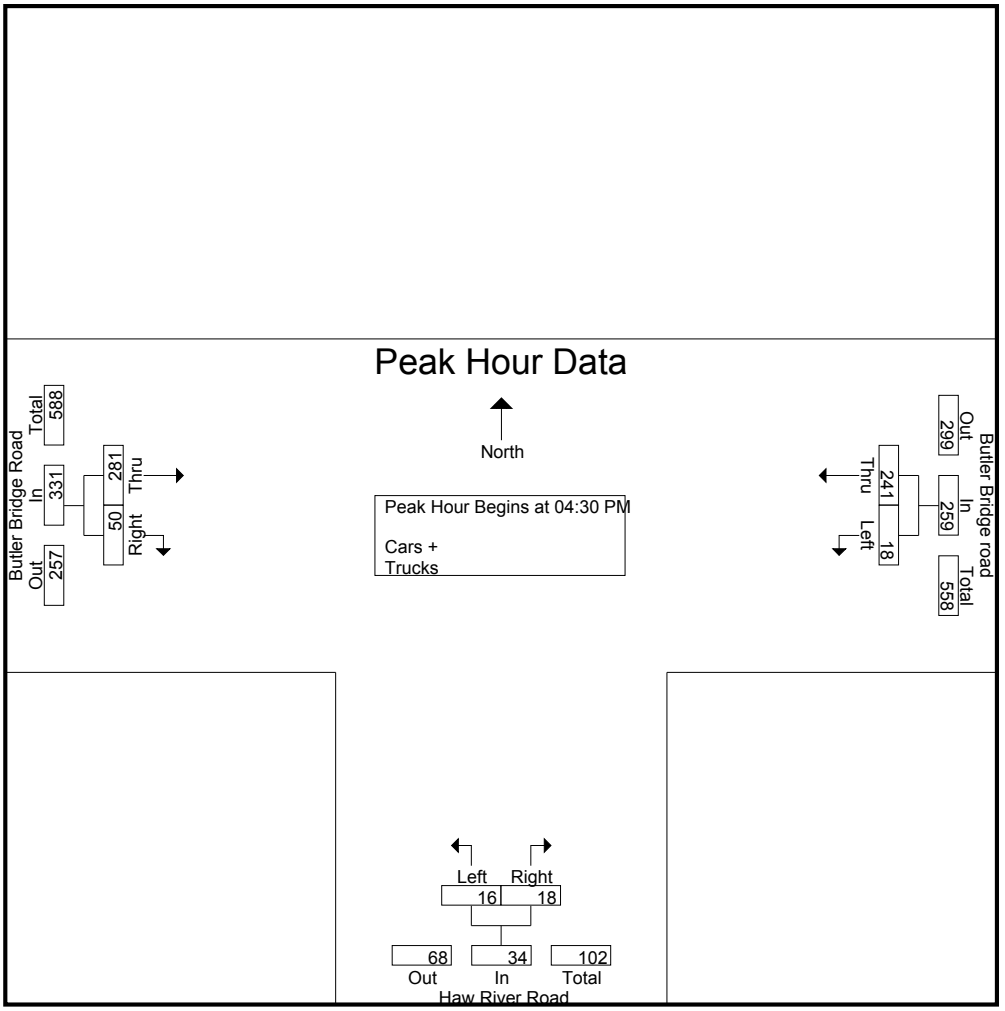
	Butler Bridge road Westbound			Haw River Road Northbound			Butler Bridge Road Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	63	3	66	7	5	12	9	67	76	154
04:45 PM	56	4	60	1	4	5	16	61	77	142
05:00 PM	54	5	59	6	3	9	17	76	93	161
05:15 PM	68	6	74	4	4	8	8	77	85	167
Total Volume	241	18	259	18	16	34	50	281	331	624
% App. Total	93.1	6.9		52.9	47.1		15.1	84.9		
PHF	.886	.750	.875	.643	.800	.708	.735	.912	.890	.934



File Name : MillsRiver(Butler Bridge and Yadkin) AM Peak
Site Code :
Start Date : 12/18/2018
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Groups Printed- Cars + - Trucks

	Butler Bridge Road Westbound			Yadkin Road Northbound			Butler Bridge Road Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
07:00 AM	25	3	28	31	2	33	0	64	64	125
07:15 AM	71	2	73	40	2	42	0	84	84	199
07:30 AM	80	3	83	17	15	32	2	92	94	209
07:45 AM	80	2	82	18	7	25	6	97	103	210
Total	256	10	266	106	26	132	8	337	345	743
08:00 AM	59	6	65	27	3	30	2	58	60	155
08:15 AM	67	1	68	18	4	22	1	56	57	147
08:30 AM	54	4	58	13	3	16	2	49	51	125
08:45 AM	39	10	49	9	0	9	2	41	43	101
Total	219	21	240	67	10	77	7	204	211	528
Grand Total	475	31	506	173	36	209	15	541	556	1271
Apprch %	93.9	6.1		82.8	17.2		2.7	97.3		
Total %	37.4	2.4	39.8	13.6	2.8	16.4	1.2	42.6	43.7	
Cars +	456	31	487	173	36	209	15	521	536	1232
% Cars +	96	100	96.2	100	100	100	100	96.3	96.4	96.9
Trucks	19	0	19	0	0	0	0	20	20	39
% Trucks	4	0	3.8	0	0	0	0	3.7	3.6	3.1

File Name : MillsRiver(Butler Bridge and Yadkin) AM Peak
Site Code :
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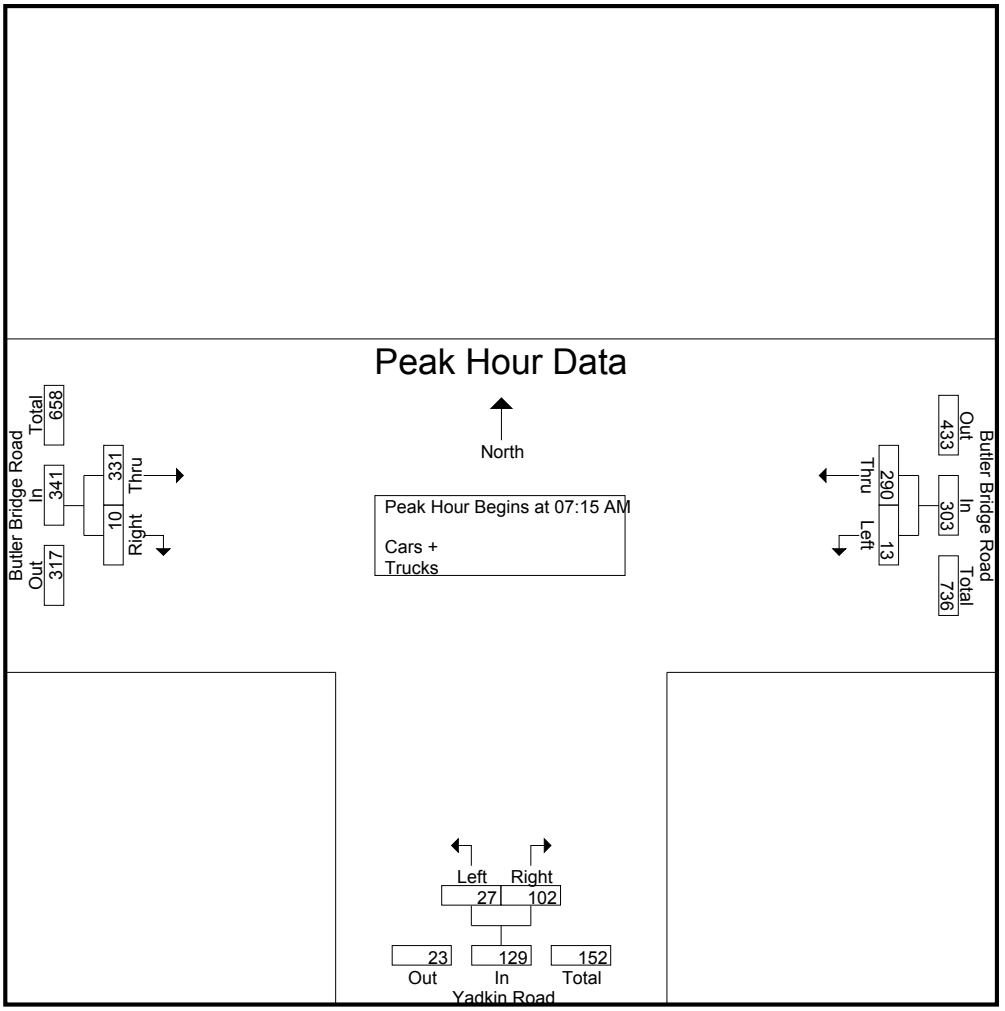
	Butler Bridge Road Westbound			Yadkin Road Northbound			Butler Bridge Road Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	71	2	73	40	2	42	0	84	84	199
07:30 AM	80	3	83	17	15	32	2	92	94	209
07:45 AM	80	2	82	18	7	25	6	97	103	210
08:00 AM	59	6	65	27	3	30	2	58	60	155
Total Volume	290	13	303	102	27	129	10	331	341	773
% App. Total	95.7	4.3		79.1	20.9		2.9	97.1		
PHF	.906	.542	.913	.638	.450	.768	.417	.853	.828	.920



File Name : MillsRiver(Butler Bridge and Yadkin) PM Peak
Site Code :
Start Date : 12/18/2018
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Groups Printed- Cars + - Trucks

	Butler Bridge Road Westbound			Yadkin Road Northbound			Butler Bridge Road Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
04:00 PM	55	18	73	13	3	16	1	50	51	140
04:15 PM	81	14	95	6	4	10	3	64	67	172
04:30 PM	63	13	76	10	1	11	1	67	68	155
04:45 PM	53	23	76	11	3	14	0	61	61	151
Total	252	68	320	40	11	51	5	242	247	618
05:00 PM	65	14	79	13	1	14	5	75	80	173
05:15 PM	74	25	99	12	2	14	1	75	76	189
05:30 PM	66	22	88	13	0	13	4	62	66	167
05:45 PM	60	23	83	16	4	20	6	44	50	153
Total	265	84	349	54	7	61	16	256	272	682
Grand Total	517	152	669	94	18	112	21	498	519	1300
Apprch %	77.3	22.7		83.9	16.1		4	96		
Total %	39.8	11.7	51.5	7.2	1.4	8.6	1.6	38.3	39.9	
Cars +	508	152	660	94	18	112	21	489	510	1282
% Cars +	98.3	100	98.7	100	100	100	100	98.2	98.3	98.6
Trucks	9	0	9	0	0	0	0	9	9	18
% Trucks	1.7	0	1.3	0	0	0	0	1.8	1.7	1.4

File Name : MillsRiver(Butler Bridge and Yadkin) PM Peak
Site Code :
Start Date : 12/18/2018
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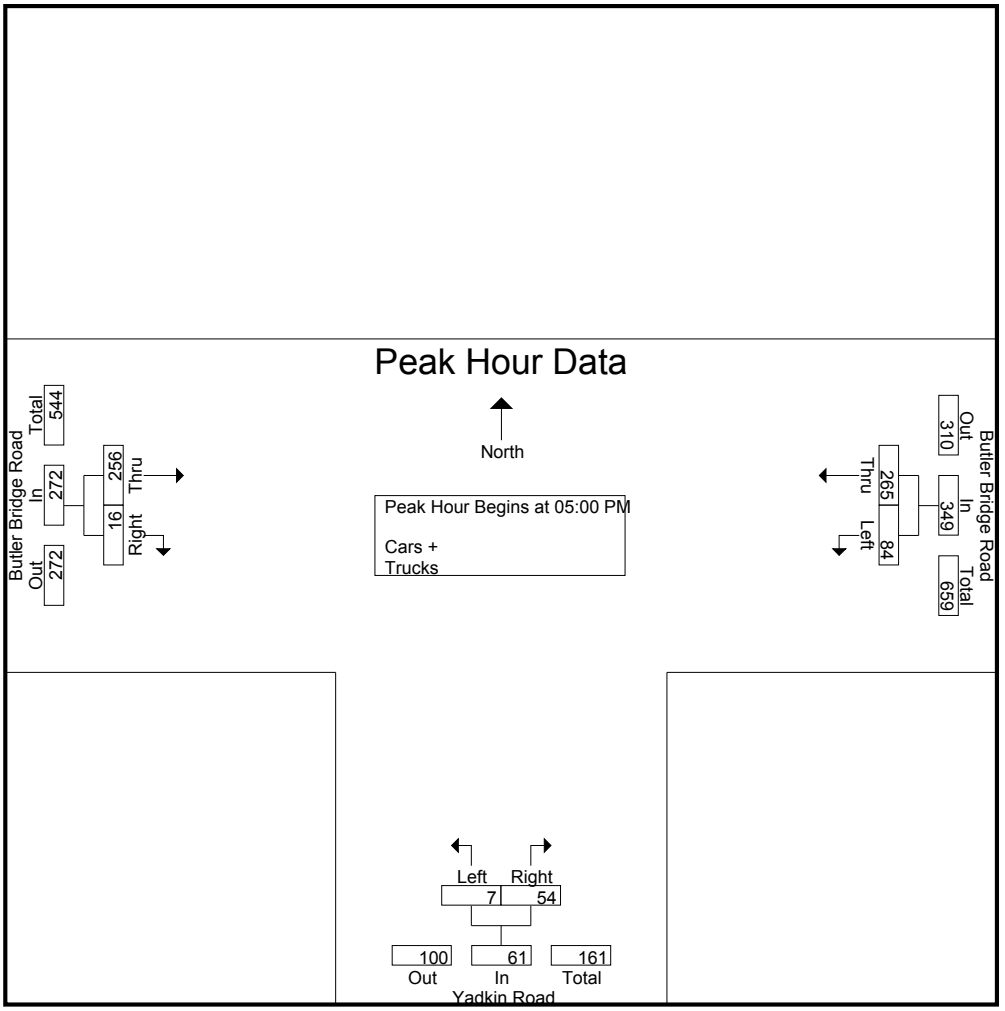
	Butler Bridge Road Westbound			Yadkin Road Northbound			Butler Bridge Road Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	65	14	79	13	1	14	5	75	80	173
05:15 PM	74	25	99	12	2	14	1	75	76	189
05:30 PM	66	22	88	13	0	13	4	62	66	167
05:45 PM	60	23	83	16	4	20	6	44	50	153
Total Volume	265	84	349	54	7	61	16	256	272	682
% App. Total	75.9	24.1		88.5	11.5		5.9	94.1		
PHF	.895	.840	.881	.844	.438	.763	.667	.853	.850	.902



File Name : MillsRiver(Butler Bridge and N. Rugby) AM Peak
Site Code :
Start Date : 12/22/2018
Page No : 1

Groups Printed- Cars + - Trucks

	Butler Bridge Road Westbound			Rugby Road Northbound			Butler Bridge Road Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
07:00 AM	35	23	58	61	3	64	19	100	119	241
07:15 AM	58	29	87	73	16	89	15	100	115	291
07:30 AM	74	31	105	100	14	114	9	93	102	321
07:45 AM	82	38	120	69	13	82	8	108	116	318
Total	249	121	370	303	46	349	51	401	452	1171
08:00 AM	68	33	101	62	4	66	8	89	97	264
08:15 AM	63	19	82	59	5	64	6	73	79	225
08:30 AM	51	25	76	51	5	56	5	60	65	197
08:45 AM	48	21	69	52	4	56	4	46	50	175
Total	230	98	328	224	18	242	23	268	291	861
Grand Total	479	219	698	527	64	591	74	669	743	2032
Apprch %	68.6	31.4		89.2	10.8		10	90		
Total %	23.6	10.8	34.4	25.9	3.1	29.1	3.6	32.9	36.6	
Cars +	458	218	676	525	64	589	73	648	721	1986
% Cars +	95.6	99.5	96.8	99.6	100	99.7	98.6	96.9	97	97.7
Trucks	21	1	22	2	0	2	1	21	22	46
% Trucks	4.4	0.5	3.2	0.4	0	0.3	1.4	3.1	3	2.3

File Name : MillsRiver(Butler Bridge and N. Rugby) AM Peak
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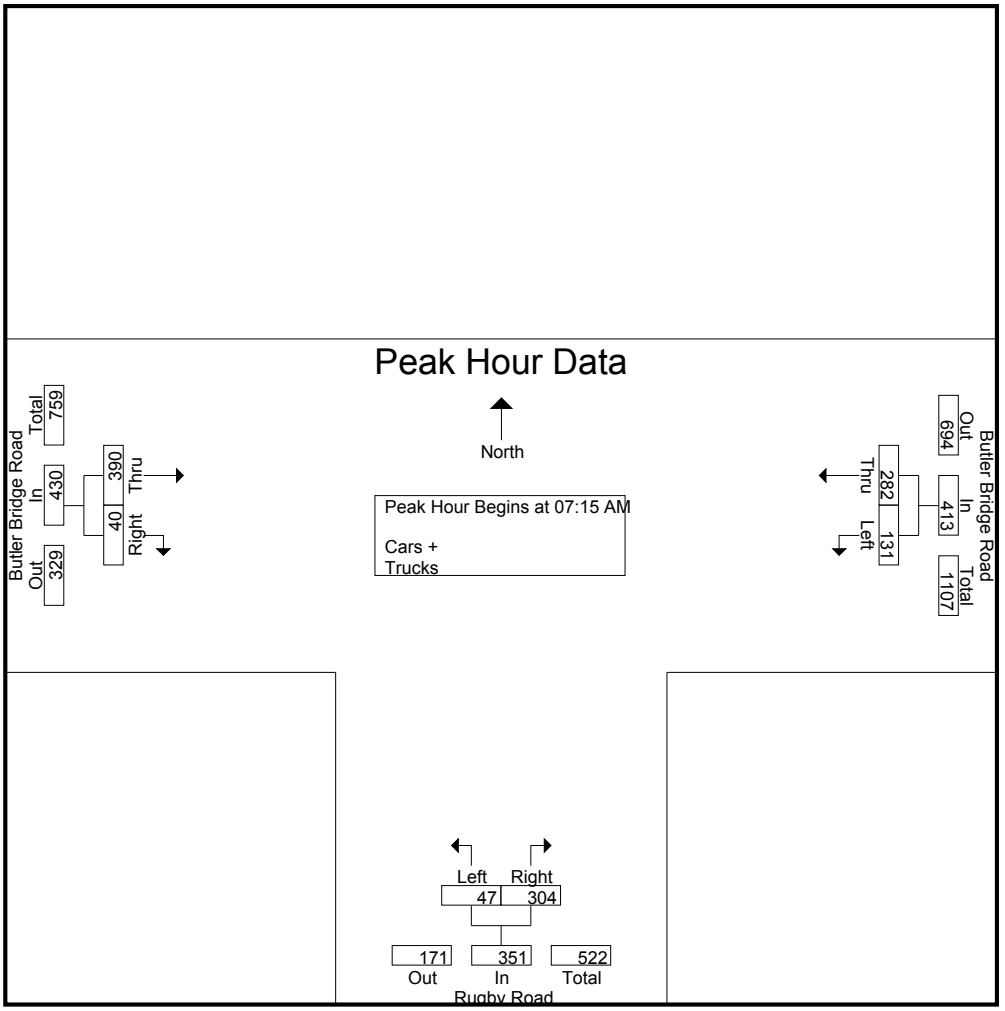
Start Date : 12/22/2018
Page No : 2

	Butler Bridge Road Westbound			Rugby Road Northbound			Butler Bridge Road Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	58	29	87	73	16	89	15	100	115	291
07:30 AM	74	31	105	100	14	114	9	93	102	321
07:45 AM	82	38	120	69	13	82	8	108	116	318
08:00 AM	68	33	101	62	4	66	8	89	97	264
Total Volume	282	131	413	304	47	351	40	390	430	1194
% App. Total	68.3	31.7		86.6	13.4		9.3	90.7		
PHF	.860	.862	.860	.760	.734	.770	.667	.903	.927	.930



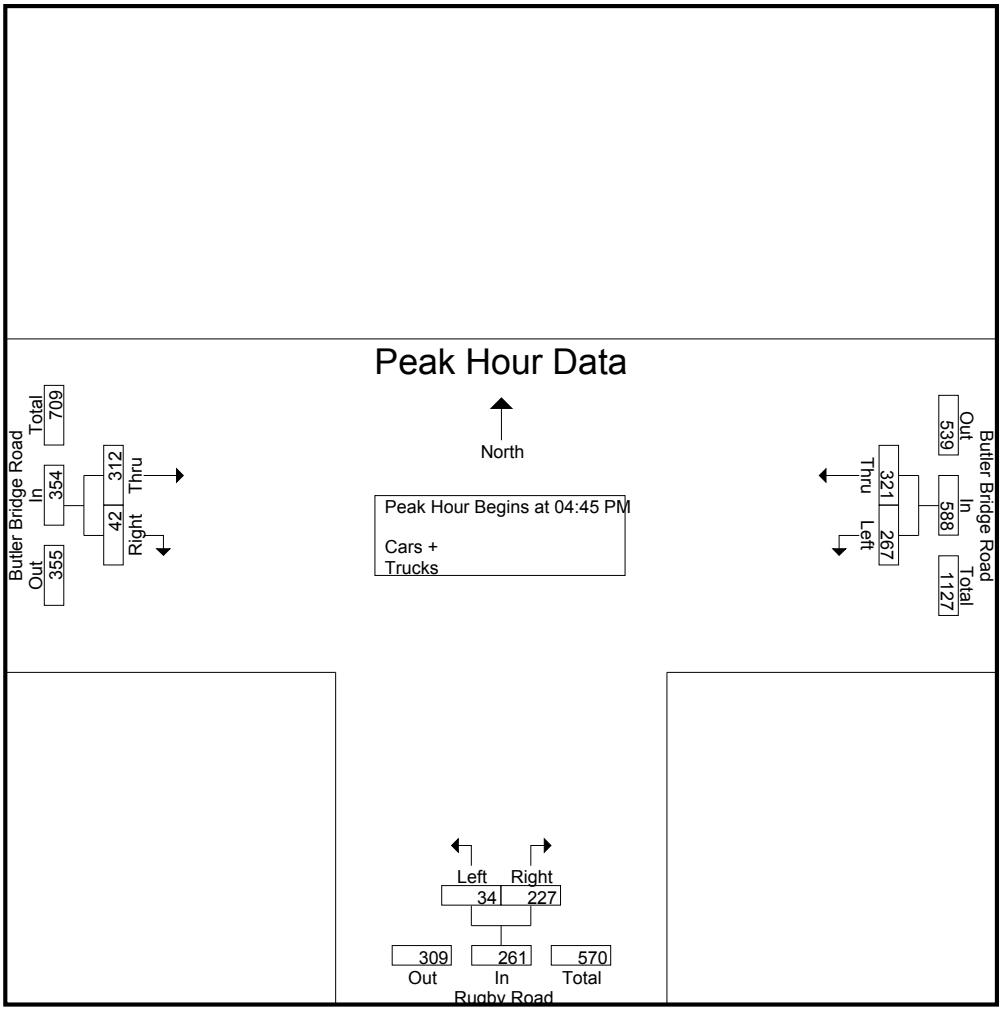
File Name : MillsRiver(Butler Bridge and N. Rugby) PM Peak
Site Code :
Start Date : 12/18/2018
Page No : 1

Groups Printed- Cars + - Trucks

	Butler Bridge Road Westbound			Rugby Road Northbound			Butler Bridge Road Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
04:00 PM	73	51	124	50	7	57	5	66	71	252
04:15 PM	98	54	152	40	5	45	10	55	65	262
04:30 PM	76	54	130	37	6	43	6	93	99	272
04:45 PM	76	60	136	61	7	68	10	67	77	281
Total	323	219	542	188	25	213	31	281	312	1067
05:00 PM	75	75	150	57	3	60	10	91	101	311
05:15 PM	83	72	155	59	12	71	10	85	95	321
05:30 PM	87	60	147	50	12	62	12	69	81	290
05:45 PM	79	71	150	36	10	46	8	60	68	264
Total	324	278	602	202	37	239	40	305	345	1186
Grand Total	647	497	1144	390	62	452	71	586	657	2253
Apprch %	56.6	43.4		86.3	13.7		10.8	89.2		
Total %	28.7	22.1	50.8	17.3	2.8	20.1	3.2	26	29.2	
Cars +	640	497	1137	390	62	452	71	585	656	2245
% Cars +	98.9	100	99.4	100	100	100	100	99.8	99.8	99.6
Trucks	7	0	7	0	0	0	0	1	1	8
% Trucks	1.1	0	0.6	0	0	0	0	0.2	0.2	0.4

File Name : MillsRiver(Butler Bridge and N. Rugby) PM Peak
Site Code :
Start Date : 12/18/2018
Page No : 2

	Butler Bridge Road Westbound			Rugby Road Northbound			Butler Bridge Road Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	76	60	136	61	7	68	10	67	77	281
05:00 PM	75	75	150	57	3	60	10	91	101	311
05:15 PM	83	72	155	59	12	71	10	85	95	321
05:30 PM	87	60	147	50	12	62	12	69	81	290
Total Volume	321	267	588	227	34	261	42	312	354	1203
% App. Total	54.6	45.4		87	13		11.9	88.1		
PHF	.922	.890	.948	.930	.708	.919	.875	.857	.876	.937

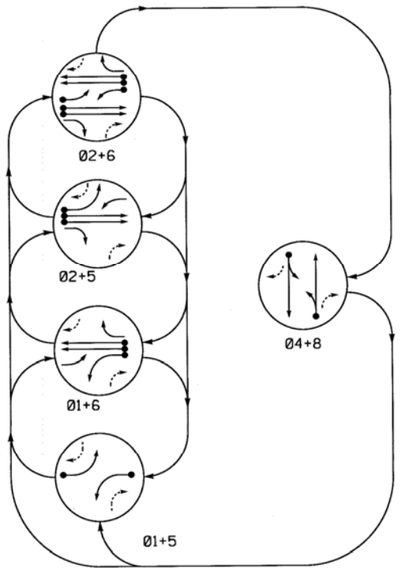


APPENDIX C

SIGNAL PLANS & TIMING INFORMATION

PROJECT REFERENCE NO.	SHEET NO.
N/A	Sig. 1

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

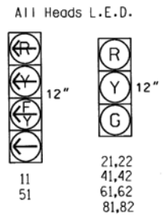
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	04+8	FLASH
11	←	—	F Y	F Y	~~R~~	~~Y~~
21,22	R	R	G	G	R	Y
41,42	R	R	R	R	G	R
51	~~←~~	F Y	~~←~~	F Y	~~R~~	~~Y~~
61,62	R	G	R	G	R	Y
81,82	R	R	R	R	G	R

SIGNAL FACE I.D.

All Heads L.E.D.



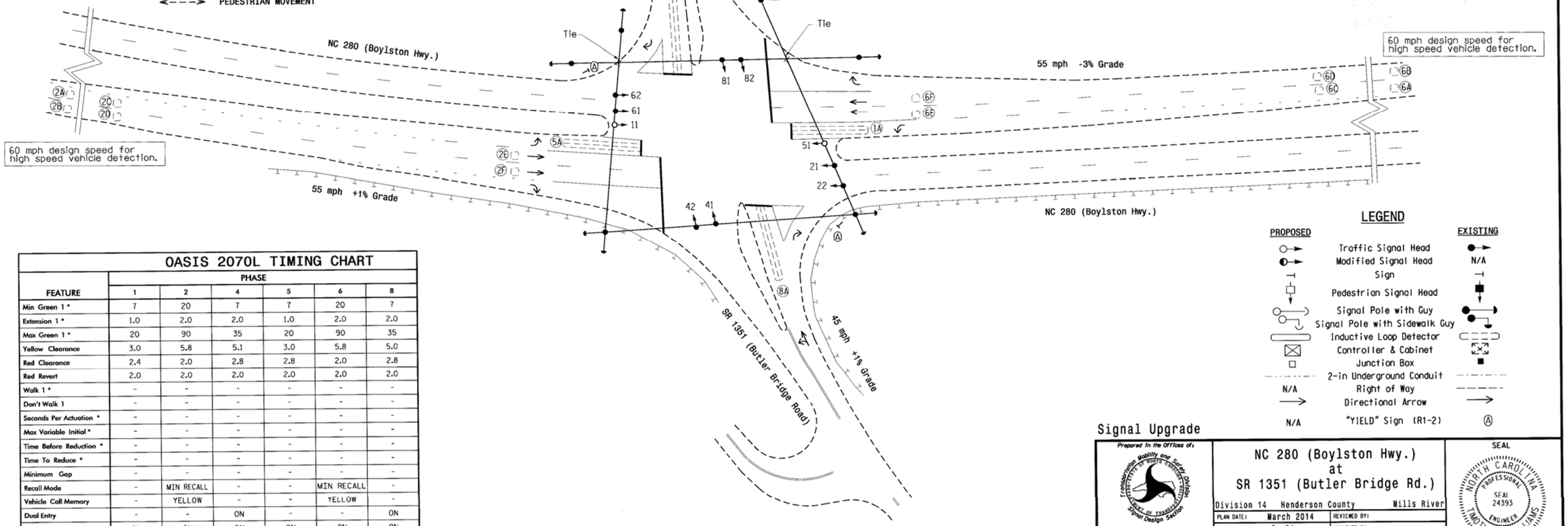
OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

INDUCTIVE LOOPS					DETECTOR PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X60	+5	2-4-2	-	1	Y	Y	-	-	15	-	Y
					6	Y	Y	-	-	-	-	Y
2A, 2B	6X6	850	Existing	-	2	Y	Y	-	3.3	-	-	Y
2C, 2D	6X6	420	Existing	-	2	Y	Y	-	2.3	-	-	Y
2E, 2F	6X6	110	Existing	-	2	Y	Y	-	-	-	-	Y
4A	6X6	0	Existing	-	4	Y	Y	-	-	3	-	Y
5A	6X60	+5	2-4-2	-	5	Y	Y	-	-	15	-	Y
					2	Y	Y	-	-	-	-	Y
6A, 6B	6X6	850	Existing	-	6	Y	Y	-	3.3	-	-	Y
6C, 6D	6X6	420	Existing	-	6	Y	Y	-	2.3	-	-	Y
6E, 6F	6X6	110	Existing	-	6	Y	Y	-	-	-	-	Y
8A	6X6	0	Existing	-	8	Y	Y	-	-	3	-	Y

5 Phase
Fully Actuated
Isolated

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 1 and/or phase 5 may be lagged.
4. Set all detector units to presence mode.
5. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
6. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
7. Pavement markings are existing.



LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
N/A	"YIELD" Sign (R1-2)	Ⓐ

OASIS 2070L TIMING CHART

FEATURE	PHASE 1	2	4	5	6	8
Min Green 1 *	7	20	7	7	20	7
Extension 1 *	1.0	2.0	2.0	1.0	2.0	2.0
Max Green 1 *	20	90	35	20	90	35
Yellow Clearance	3.0	5.8	5.1	3.0	5.8	5.0
Red Clearance	2.4	2.0	2.8	2.8	2.0	2.8
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-	-	-
Don't Walk 1	-	-	-	-	-	-
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	-	-	ON	-	-	ON
Simultaneous Gap	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.

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 280 (Boylston Hwy.) at SR 1351 (Butler Bridge Rd.)

Division 14 Henderson County Mills River

PLAN DATE: March 2014 REVIEWED BY:

PREPARED BY: C. Pierce REVIEWED BY:

SCALE 0 40 1" = 40'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY A. WILLIAMS

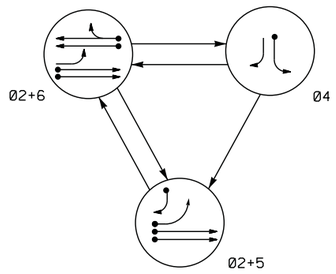
SIGNATURE 4/9/14 DATE

SIG. INVENTORY NO. 14-1061

08-APR-2014 13:39
S:\ITS&S\ITS-Signals\Signal Design Section\Western Region\0ir-14\14-1061\14-1061_sig_por_2014 xxxx.dgn
cepierce

PROJECT REFERENCE NO.	SHEET NO.
U-4715 B	Sig.224.0

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

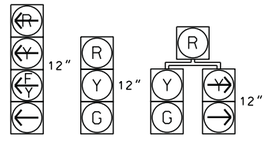
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 02+5	PHASE 02+6	PHASE 04	FLASH
21,22	G	G	R	Y
41	R	R	G	R
42	R/←	R	G	R
51	←	F Y	R	Y
61,62	R	G	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.



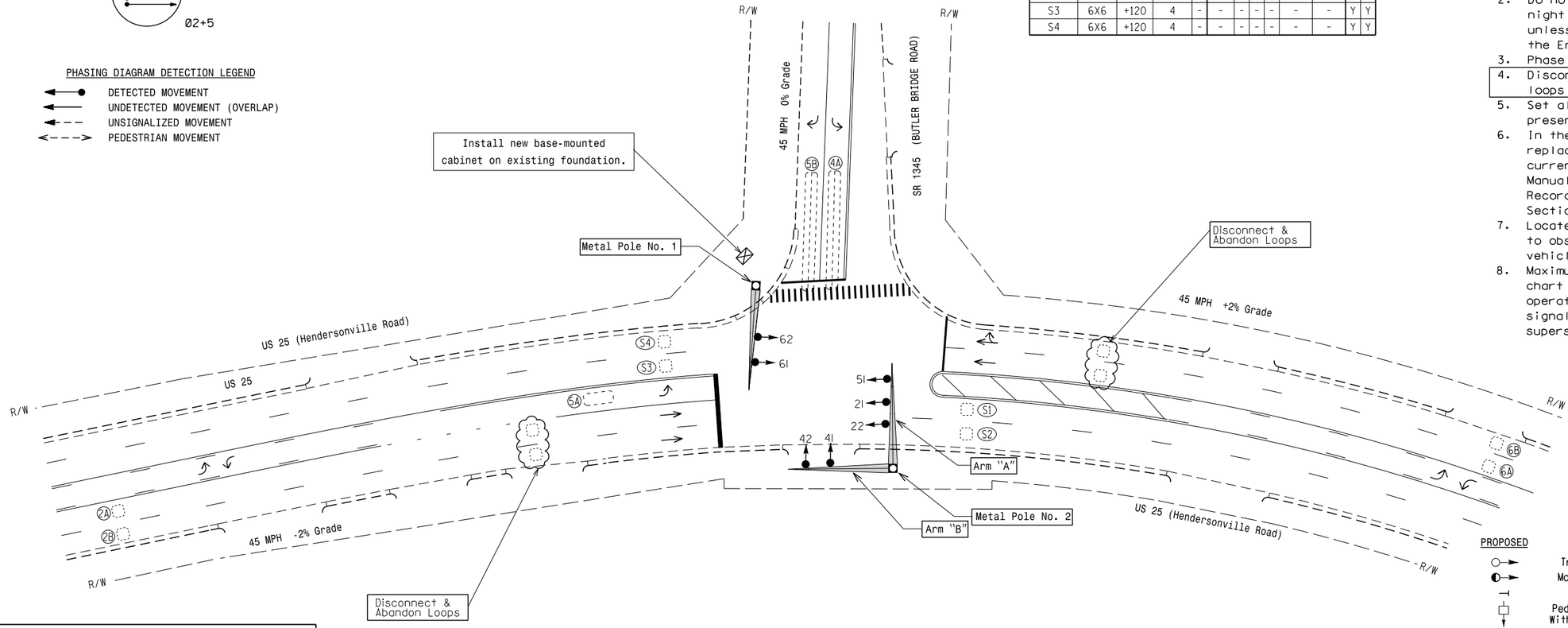
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

INDUCTIVE LOOPS					DETECTOR PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
2A	6X6	300	4	-	2	Y	Y	-	-	-	-	Y
2B	6X6	300	4	-	2	Y	Y	-	-	-	-	Y
4A	6X60	+5	2-4-2	-	4	Y	Y	-	-	3	-	Y
5A	6X15	50	3	-	5	Y	Y	-	-	10	-	Y
5B	6X60	+5	2-4-2	-	5	Y	Y	-	-	15	-	Y
6A	6X6	300	5	-	6	Y	Y	-	-	-	-	Y
6B	6X6	300	5	-	6	Y	Y	-	-	-	-	Y
S1	6X6	+120	4	-	-	-	-	-	-	-	Y	Y
S2	6X6	+120	4	-	-	-	-	-	-	-	Y	Y
S3	6X6	+120	4	-	-	-	-	-	-	-	Y	Y
S4	6X6	+120	4	-	-	-	-	-	-	-	Y	Y

3 Phase
Fully Actuated
Asheville Signal System

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Phase 5 may be lagged.
4. Disconnect and abandon existing loops as shown.
5. Set all detector units to presence mode.
6. In the event of loop replacement, refer to the current ITS and Signals Design Manual and submit a Plan of Record to the Signal Design Section.
7. Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
8. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.



OASIS 2070 TIMING CHART

FEATURE	PHASE 2	PHASE 4	PHASE 5	PHASE 6
Min Green 1 *	12	7	7	12
Extension 1 *	6.0	2.0	3.0	6.0
Max Green 1 *	90	20	20	90
Yellow Clearance	4.7	3.0	3.0	4.7
Red Clearance	1.3	2.4	2.8	1.3
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	1.5	-	-	1.5
Max Variable Initial *	34	-	-	34
Time Before Reduction *	15	-	-	15
Time To Reduce *	30	-	-	30
Minimum Gap	3.0	-	-	3.0
Recall Mode	MIN RECALL	-	-	MIN RECALL
Vehicle Call Memory	YELLOW	-	-	YELLOW
Dual Entry	-	-	-	-
Simultaneous Gap	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.

LEGEND

PROPOSED		EXISTING
	Traffic Signal Head	
	Modified Signal Head	N/A
	Sign	
	Pedestrian Signal Head With Push Button & Sign	
	Signal Pole with Guy	
	Signal Pole with Sidewalk Guy	
	Inductive Loop Detector	
	Controller & Cabinet	
	Junction Box	
	2-in Underground Conduit	
N/A	Right of Way	
	Directional Arrow	
	Metal Pole with Mastarm	

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

US 25 (Hendersonville Road)
at
SR 1345 (Butler Bridge Road)

Division 14 Henderson County Hendersonville

PLAN DATE:	April 2016	REVIEWED BY:	T. Williams
PREPARED BY:	M. Mahbooba	REVIEWED BY:	

SCALE 0 30 1"=30'

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS

Developed by T. J. Williams 8/9/2016
CAUTION IN SIGN DATE

SIG. INVENTORY NO. 14-0742

09-AUG-2016 13:26
S:\TIS&SU\ITS Signals\Signal Design Section\Western Region\Div-13\U-4715B (Asheville Signal System)\Signal Designs\14-0742\14-0742_sig_dsn.20160808.dgn
mahbooba

1400742 - US 25 @ SR 1345 (Butler Bridge Rd)
B - Scheduling Events 1-100
12/14/2018 10:38 AM

Event #	Event Type	Event Details	Pri	Start Date		Stop Date		Start Time		Stop Time		DOW Enabled	Del When Done	Cont	Event Groups Assigned
			LMH	MM	DD	MM	DD	HH	MM	HH	MM	1 2 3 4 5 6 7			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
1	Coordination Plan (1-66)	1-1	L	1	1	12	31	6	45	9	0	2 3 4 5 6	N	N	
2	Coordination Plan (1-66)	2-1	L	1	1	12	31	9	0	13	0	2 3 4 5 6	N	N	
3	Coordination Plan (1-66)	3-1	L	1	1	12	31	13	0	15	0	2 3 4 5 6	N	N	
4	Coordination Plan (1-66)	4-1	L	1	1	12	31	15	0	18	0	2 3 4 5 6	N	N	
5	Coordination Plan (1-66)	2-1	L	1	1	12	31	18	0	19	30	2 3 4 5 6	N	N	
6	None			0	0	0	0	0	0	0	0		N	N	
7	None			0	0	0	0	0	0	0	0		N	N	
8	None			0	0	0	0	0	0	0	0		N	N	
9	None			0	0	0	0	0	0	0	0		N	N	
10	None			0	0	0	0	0	0	0	0		N	N	
11	None			0	0	0	0	0	0	0	0		N	N	
12	None			0	0	0	0	0	0	0	0		N	N	
13	None			0	0	0	0	0	0	0	0		N	N	
14	None			0	0	0	0	0	0	0	0		N	N	
15	None			0	0	0	0	0	0	0	0		N	N	
16	None			0	0	0	0	0	0	0	0		N	N	
17	None			0	0	0	0	0	0	0	0		N	N	
18	None			0	0	0	0	0	0	0	0		N	N	
19	None			0	0	0	0	0	0	0	0		N	N	
20	None			0	0	0	0	0	0	0	0		N	N	
21	None			0	0	0	0	0	0	0	0		N	N	
22	None			0	0	0	0	0	0	0	0		N	N	
23	None			0	0	0	0	0	0	0	0		N	N	
24	None			0	0	0	0	0	0	0	0		N	N	
25	None			0	0	0	0	0	0	0	0		N	N	
26	None			0	0	0	0	0	0	0	0		N	N	
27	None			0	0	0	0	0	0	0	0		N	N	
28	None			0	0	0	0	0	0	0	0		N	N	
29	None			0	0	0	0	0	0	0	0		N	N	
30	None			0	0	0	0	0	0	0	0		N	N	
31	None			0	0	0	0	0	0	0	0		N	N	
32	None			0	0	0	0	0	0	0	0		N	N	
33	None			0	0	0	0	0	0	0	0		N	N	
34	None			0	0	0	0	0	0	0	0		N	N	
35	None			0	0	0	0	0	0	0	0		N	N	
36	None			0	0	0	0	0	0	0	0		N	N	
37	None			0	0	0	0	0	0	0	0		N	N	
38	None			0	0	0	0	0	0	0	0		N	N	
39	None			0	0	0	0	0	0	0	0		N	N	
40	None			0	0	0	0	0	0	0	0		N	N	
41	None			0	0	0	0	0	0	0	0		N	N	
42	None			0	0	0	0	0	0	0	0		N	N	
43	None			0	0	0	0	0	0	0	0		N	N	
44	None			0	0	0	0	0	0	0	0		N	N	
45	None			0	0	0	0	0	0	0	0		N	N	
46	None			0	0	0	0	0	0	0	0		N	N	
47	None			0	0	0	0	0	0	0	0		N	N	
48	None			0	0	0	0	0	0	0	0		N	N	
49	None			0	0	0	0	0	0	0	0		N	N	
50	None			0	0	0	0	0	0	0	0		N	N	

1400742 - US 25 @ SR 1345 (Butler Bridge Rd)
9 - Coordination Plan 1
12/14/2018 10:38 AM

Coordination Plan # 1

Cycle length (0-999 sec)	120
Min Transition Cycle (0-999 sec)	90
Max Transition Cycle (0-999 sec)	150

Offset # or Ring:	1	2	3	4
Offsets (0-999 sec)	103	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

Splits (0-255 sec)

Phase	1	2	3	4	5	6	7	8
Split	0	80	0	40	25	55	0	0
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

Phase/Function Settings:

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase		2				6										
Float Force Offs																
Hold to Force Off																
Hi Priority Ped																
Dynamic/Backup																

Options:

	(Y/N)	
Split/Timing in percent?	N	
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window
		4 = Walk

Active Pages:

Phase Sequence Page (1-12)	1
Phase Timing Page (1-4)	1
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

Global Manual Permissive windows:

*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

Manual Permissives by Phase:

*Applies when "Manual" permissive is selected

	Vehicle		Pedestrian	
(0-255 sec)	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0

1400742 - US 25 @ SR 1345 (Butler Bridge Rd)
9 - Coordination Plan 4
12/14/2018 10:38 AM

Coordination Plan # 4

Cycle length (0-999 sec)	135
Min Transition Cycle (0-999 sec)	100
Max Transition Cycle (0-999 sec)	150

Offset # or Ring:	1	2	3	4
Offsets (0-999 sec)	94	0	0	0
Act Coord Phase Min Green (0-255)	0	0	0	0

Splits (0-255 sec)

Phase	1	2	3	4	5	6	7	8
Split	0	95	0	40	25	70	0	0
Phase	9	10	11	12	13	14	15	16
Split	0	0	0	0	0	0	0	0

Verify Plan Data

Phase/Function Settings:

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coordinated Phase		2				6										
Float Force Offs																
Hold to Force Off																
Hi Priority Ped																
Dynamic/Backup																

Options:

	(Y/N)	
Split/Timing in percent?	N	
*Permissive Mode (0-4)	0	*0 = Auto
Enable Transition Permissive Mode?	N	1 = Open
Adjust Non-Coordinated Splits?	Y	2 = Manual
Cycle Once per Cycle Length?	Y	3 = Window
		4 = Walk

Active Pages:

Phase Sequence Page (1-12)	2
Phase Timing Page (1-4)	1
Phase Control Page (1-4)	1
OverLap Control Page (1-4)	1
Input Page (1-4)	1
Output Page (1-4)	1

Global Manual Permissive windows:

*Applies when "Window" permissive is selected

Manual Perm 1 End Point (0-255 sec)	0
Manual Perm 2 Start Point (0-255 sec)	0
Manual Perm 2 End Point (0-255 sec)	0

Manual Permissives by Phase:

*Applies when "Manual" permissive is selected

	Vehicle		Pedestrian	
(0-255 sec)	Start	Stop	Start	Stop
Phase 1	0	0	0	0
Phase 2	0	0	0	0
Phase 3	0	0	0	0
Phase 4	0	0	0	0
Phase 5	0	0	0	0
Phase 6	0	0	0	0
Phase 7	0	0	0	0
Phase 8	0	0	0	0
Phase 9	0	0	0	0
Phase 10	0	0	0	0
Phase 11	0	0	0	0
Phase 12	0	0	0	0
Phase 13	0	0	0	0
Phase 14	0	0	0	0
Phase 15	0	0	0	0
Phase 16	0	0	0	0

APPENDIX D

CAPACITY ANALYSIS CALCULATIONS

EXISTING (2018) CONDITIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	63	15	102	47	9	10	1019	102	20	601	15
Future Volume (vph)	17	63	15	102	47	9	10	1019	102	20	601	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-6%			1%			1%			-3%	
Storage Length (ft)	0		0	0		0	240		100	240		100
Storage Lanes	0		0	0		0	1		1	1		1
Taper Length (ft)	25			25			220			250		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.978			0.992				0.850			0.850
Flt Protected		0.991			0.969		0.950			0.950		
Satd. Flow (prot)	0	1860	0	0	1782	0	1761	3522	1575	1796	3592	1607
Flt Permitted		0.929			0.726		0.377			0.191		
Satd. Flow (perm)	0	1743	0	0	1335	0	699	3522	1575	361	3592	1607
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			2				97			97
Link Speed (mph)		35			35			55			55	
Link Distance (ft)		1264			755			1753			2656	
Travel Time (s)		24.6			14.7			21.7			32.9	
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	70	17	113	52	10	11	1132	113	22	668	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	106	0	0	175	0	11	1132	113	22	668	17
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	15.0	15.0		15.0	15.0		13.0	28.0	28.0	13.0	28.0	28.0
Total Split (s)	37.0	37.0		37.0	37.0		13.0	70.0	70.0	13.0	70.0	70.0
Total Split (%)	30.8%	30.8%		30.8%	30.8%		10.8%	58.3%	58.3%	10.8%	58.3%	58.3%
Yellow Time (s)	5.1	5.1		5.0	5.0		3.0	5.8	5.8	3.0	5.8	5.8
All-Red Time (s)	2.8	2.8		2.8	2.8		2.8	2.0	2.0	2.4	2.0	2.0
Lost Time Adjust (s)		-2.9			-2.8		-0.8	-2.8	-2.8	-0.4	-2.8	-2.8
Total Lost Time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)		20.4			20.4		64.4	61.7	61.7	65.0	63.8	63.8
Actuated g/C Ratio		0.21			0.21		0.67	0.64	0.64	0.67	0.66	0.66
v/c Ratio		0.28			0.62		0.02	0.50	0.11	0.06	0.28	0.02
Control Delay		33.7			46.4		6.4	12.1	3.4	6.5	8.5	0.0
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		33.7			46.4		6.4	12.1	3.4	6.5	8.5	0.0
LOS		C			D		A	B	A	A	A	A
Approach Delay		33.7			46.4			11.3			8.3	
Approach LOS		C			D			B			A	
Queue Length 50th (ft)		50			95		2	153	3	4	75	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)		108			186		9	350	32	15	181	0
Internal Link Dist (ft)		1184			675			1673			2576	
Turn Bay Length (ft)							240		100	240		100
Base Capacity (vph)		605			461		557	2464	1131	366	2593	1187
Starvation Cap Reductn		0			0		0	0	0	0	0	0
Spillback Cap Reductn		0			0		0	0	0	0	0	0
Storage Cap Reductn		0			0		0	0	0	0	0	0
Reduced v/c Ratio		0.18			0.38		0.02	0.46	0.10	0.06	0.26	0.01

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 96.7
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 14.1 Intersection LOS: B
Intersection Capacity Utilization 51.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 1: NC 280 & Butler Bridge Road

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	355	376	239	905	789	196
Future Volume (vph)	355	376	239	905	789	196
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			-2%	2%	
Storage Length (ft)	0	145	150			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.970	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1787	3575	3399	0
Flt Permitted	0.950		0.140			
Satd. Flow (perm)	1770	1583	263	3575	3399	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		66			31	
Link Speed (mph)	35			45	45	
Link Distance (ft)	885			1804	1779	
Travel Time (s)	17.2			27.3	27.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	394	418	266	1006	877	218
Shared Lane Traffic (%)						
Lane Group Flow (vph)	394	418	266	1006	1095	0
Turn Type	Prot	pm+ov	pm+pt	NA	NA	
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			
Detector Phase	4	5	5	2	6	
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	12.0	12.0	
Minimum Split (s)	13.0	13.0	13.0	18.0	18.0	
Total Split (s)	40.0	25.0	25.0	80.0	55.0	
Total Split (%)	33.3%	20.8%	20.8%	66.7%	45.8%	
Yellow Time (s)	3.0	3.0	3.0	4.7	4.7	
All-Red Time (s)	2.4	2.8	2.8	1.3	1.3	
Lost Time Adjust (s)	-0.4	-0.8	-0.8	-1.0	-1.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Lead/Lag		Lead	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Recall Mode	None	None	None	C-Min	C-Min	
Act Effct Green (s)	30.6	51.8	79.4	79.4	58.2	
Actuated g/C Ratio	0.26	0.43	0.66	0.66	0.48	
v/c Ratio	0.88	0.58	0.70	0.43	0.66	
Control Delay	63.0	23.7	24.1	10.8	26.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	63.0	23.7	24.1	10.8	26.8	
LOS	E	C	C	B	C	
Approach Delay	42.8			13.6	26.8	
Approach LOS	D			B	C	
Queue Length 50th (ft)	289	194	79	183	334	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Length 95th (ft)	399	267	180	245	452	
Internal Link Dist (ft)	805			1724	1699	
Turn Bay Length (ft)		145	150			
Base Capacity (vph)	517	772	431	2368	1673	
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	0.76	0.54	0.62	0.42	0.65	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 103 (86%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 25.6 Intersection LOS: C
Intersection Capacity Utilization 73.5% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 2: US 25 & Butler Bridge Road

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations														
Traffic Vol, veh/h	6	4	4	6	5	185	4	4	1035	6	4	129	625	9
Future Vol, veh/h	6	4	4	6	5	185	4	4	1035	6	4	129	625	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Yield	-	-	Yield	-	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	-	225	-	100	-	220	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	4	4	7	6	206	4	4	1150	7	4	143	694	10

Major/Minor	Minor2			Minor1			Major1				Major2			
Conflicting Flow All	1582	2161	347	1809	2164	575	694	704	0	0	1150	1157	0	0
Stage 1	988	988	-	1166	1166	-	-	-	-	-	-	-	-	-
Stage 2	594	1173	-	643	998	-	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	6.44	4.14	-	-	6.44	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.52	2.22	-	-	2.52	2.22	-	-
Pot Cap-1 Maneuver	73	47	649	49	47	461	521	890	-	-	266	600	-	-
Stage 1	265	323	-	206	266	-	-	-	-	-	-	-	-	-
Stage 2	458	264	-	428	320	-	-	-	-	-	-	-	-	-
Platoon blocked, %									-	-			-	-
Mov Cap-1 Maneuver	28	34	649	35	34	461	655	655	-	-	554	554	-	-
Mov Cap-2 Maneuver	28	34	-	35	34	-	-	-	-	-	-	-	-	-
Stage 1	261	237	-	203	262	-	-	-	-	-	-	-	-	-
Stage 2	245	260	-	306	235	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	134.4	18.2	0.1	2.4
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	655	-	-	42	488	554	-	-
HCM Lane V/C Ratio	0.014	-	-	0.37	0.446	0.267	-	-
HCM Control Delay (s)	10.6	-	-	134.4	18.2	13.8	-	-
HCM Lane LOS	B	-	-	F	C	B	-	-
HCM 95th %tile Q(veh)	0	-	-	1.3	2.3	1.1	-	-

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	186	161	211	98	5
Future Vol, veh/h	4	186	161	211	98	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
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	4	207	179	234	109	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	413	0	-	0	511	296
Stage 1	-	-	-	-	296	-
Stage 2	-	-	-	-	215	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1146	-	-	-	523	743
Stage 1	-	-	-	-	755	-
Stage 2	-	-	-	-	821	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1146	-	-	-	521	743
Mov Cap-2 Maneuver	-	-	-	-	521	-
Stage 1	-	-	-	-	752	-
Stage 2	-	-	-	-	821	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	13.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1146	-	-	-	529
HCM Lane V/C Ratio	0.004	-	-	-	0.216
HCM Control Delay (s)	8.2	0	-	-	13.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.8

Intersection

Int Delay, s/veh 2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	214	13	63	311	4	7	4	101	4	4	4
Future Vol, veh/h	4	214	13	63	311	4	7	4	101	4	4	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	None
Storage Length	-	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	238	14	70	346	4	8	4	112	4	4	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	350	0	0	252	0	0	745	743	245	743	748	348
Stage 1	-	-	-	-	-	-	253	253	-	488	488	-
Stage 2	-	-	-	-	-	-	492	490	-	255	260	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1209	-	-	1313	-	-	330	343	794	331	341	695
Stage 1	-	-	-	-	-	-	751	698	-	561	550	-
Stage 2	-	-	-	-	-	-	558	549	-	749	693	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1209	-	-	1313	-	-	310	323	794	269	322	695
Mov Cap-2 Maneuver	-	-	-	-	-	-	310	323	-	269	322	-
Stage 1	-	-	-	-	-	-	748	695	-	559	521	-
Stage 2	-	-	-	-	-	-	520	520	-	636	690	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.3	9.8	15.3
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	880	1209	-	-	1313	-	-	363
HCM Lane V/C Ratio	0.141	0.004	-	-	0.053	-	-	0.037
HCM Control Delay (s)	9.8	8	0	-	7.9	-	-	15.3
HCM Lane LOS	A	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0.5	0	-	-	0.2	-	-	0.1

Intersection	
Int Delay, s/veh	2.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	290	28	13	302	61	47
Future Vol, veh/h	290	28	13	302	61	47
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	60	-	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	322	31	14	336	68	52

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	353	0	702	338
Stage 1	-	-	-	-	338	-
Stage 2	-	-	-	-	364	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1206	-	404	704
Stage 1	-	-	-	-	722	-
Stage 2	-	-	-	-	703	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1206	-	399	704
Mov Cap-2 Maneuver	-	-	-	-	399	-
Stage 1	-	-	-	-	722	-
Stage 2	-	-	-	-	695	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	14.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	492	-	-	1206	-
HCM Lane V/C Ratio	0.244	-	-	0.012	-
HCM Control Delay (s)	14.7	-	-	8	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.9	-	-	0	-

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	331	10	13	302	27	102
Future Vol, veh/h	331	10	13	302	27	102
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	75	-	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	368	11	14	336	30	113

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	379	0	738	374
Stage 1	-	-	-	-	374	-
Stage 2	-	-	-	-	364	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1179	-	385	672
Stage 1	-	-	-	-	696	-
Stage 2	-	-	-	-	703	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1179	-	380	672
Mov Cap-2 Maneuver	-	-	-	-	380	-
Stage 1	-	-	-	-	696	-
Stage 2	-	-	-	-	695	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	10.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	850	-	-	1179	-
HCM Lane V/C Ratio	0.169	-	-	0.012	-
HCM Control Delay (s)	10.1	-	-	8.1	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.6	-	-	0	-

Intersection	
Int Delay, s/veh	6.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	390	40	131	283	47	304
Future Vol, veh/h	390	40	131	283	47	304
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
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	433	44	146	314	52	338

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	477	0	1061	455
Stage 1	-	-	-	-	455	-
Stage 2	-	-	-	-	606	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1085	-	248	605
Stage 1	-	-	-	-	639	-
Stage 2	-	-	-	-	545	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1085	-	208	605
Mov Cap-2 Maneuver	-	-	-	-	208	-
Stage 1	-	-	-	-	639	-
Stage 2	-	-	-	-	456	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.8	19.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	627	-	-	1085	-
HCM Lane V/C Ratio	0.622	-	-	0.134	-
HCM Control Delay (s)	19.7	-	-	8.8	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	4.3	-	-	0.5	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	58	5	112	45	8	12	797	88	10	1022	44
Future Volume (vph)	26	58	5	112	45	8	12	797	88	10	1022	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-6%			1%			1%			-3%	
Storage Length (ft)	0		0	0		0	240		100	240		100
Storage Lanes	0		0	0		0	1		1	1		1
Taper Length (ft)	25			25			220			250		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.992			0.993				0.850			0.850
Flt Protected		0.986			0.967		0.950			0.950		
Satd. Flow (prot)	0	1877	0	0	1780	0	1761	3522	1575	1796	3592	1607
Flt Permitted		0.878			0.741		0.191			0.280		
Satd. Flow (perm)	0	1671	0	0	1364	0	354	3522	1575	529	3592	1607
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			2				97			97
Link Speed (mph)		35			35			55			55	
Link Distance (ft)		1257			755			1754			2656	
Travel Time (s)		24.5			14.7			21.7			32.9	
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)	29	64	6	124	50	9	13	886	98	11	1136	49
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	99	0	0	183	0	13	886	98	11	1136	49
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	15.0	15.0		15.0	15.0		13.0	28.0	28.0	13.0	28.0	28.0
Total Split (s)	37.0	37.0		37.0	37.0		13.0	70.0	70.0	13.0	70.0	70.0
Total Split (%)	30.8%	30.8%		30.8%	30.8%		10.8%	58.3%	58.3%	10.8%	58.3%	58.3%
Yellow Time (s)	5.1	5.1		5.0	5.0		3.0	5.8	5.8	3.0	5.8	5.8
All-Red Time (s)	2.8	2.8		2.8	2.8		2.8	2.0	2.0	2.4	2.0	2.0
Lost Time Adjust (s)		-2.9			-2.8		-0.8	-2.8	-2.8	-0.4	-2.8	-2.8
Total Lost Time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)		20.6			20.6		62.1	60.8	60.8	61.9	60.8	60.8
Actuated g/C Ratio		0.22			0.22		0.66	0.65	0.65	0.66	0.65	0.65
v/c Ratio		0.27			0.61		0.04	0.39	0.09	0.02	0.49	0.05
Control Delay		33.5			43.8		6.8	9.7	2.6	6.7	10.9	0.1
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		33.5			43.8		6.8	9.7	2.6	6.7	10.9	0.1
LOS		C			D		A	A	A	A	B	A
Approach Delay		33.5			43.8			9.0			10.4	
Approach LOS		C			D			A			B	
Queue Length 50th (ft)		49			100		2	103	0	2	144	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)		105			194		10	257	25	9	357	1
Internal Link Dist (ft)		1177			675			1674			2576	
Turn Bay Length (ft)							240		100	240		100
Base Capacity (vph)		597			486		359	2531	1159	462	2579	1181
Starvation Cap Reductn		0			0		0	0	0	0	0	0
Spillback Cap Reductn		0			0		0	0	0	0	0	0
Storage Cap Reductn		0			0		0	0	0	0	0	0
Reduced v/c Ratio		0.17			0.38		0.04	0.35	0.08	0.02	0.44	0.04

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 93.8
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.61
Intersection Signal Delay: 13.2 Intersection LOS: B
Intersection Capacity Utilization 52.3% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 1: NC 280 & Butler Bridge Road

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	258	283	250	903	992	328
Future Volume (vph)	258	283	250	903	992	328
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			-2%	2%	
Storage Length (ft)	0	145	150			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		100			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.963	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1787	3575	3374	0
Flt Permitted	0.950		0.070			
Satd. Flow (perm)	1770	1583	132	3575	3374	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		51			46	
Link Speed (mph)	35			45	45	
Link Distance (ft)	885			1804	1784	
Travel Time (s)	17.2			27.3	27.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	287	314	278	1003	1102	364
Shared Lane Traffic (%)						
Lane Group Flow (vph)	287	314	278	1003	1466	0
Turn Type	Prot	pm+ov	pm+pt	NA	NA	
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			
Detector Phase	4	5	5	2	6	
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	12.0	12.0	
Minimum Split (s)	13.0	13.0	13.0	18.0	18.0	
Total Split (s)	40.0	25.0	25.0	95.0	70.0	
Total Split (%)	29.6%	18.5%	18.5%	70.4%	51.9%	
Yellow Time (s)	3.0	3.0	3.0	4.7	4.7	
All-Red Time (s)	2.4	2.8	2.8	1.3	1.3	
Lost Time Adjust (s)	-0.4	-0.8	-0.8	-1.0	-1.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Lead/Lag		Lead	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Recall Mode	None	None	None	C-Min	C-Min	
Act Effct Green (s)	26.7	52.7	98.3	98.3	72.3	
Actuated g/C Ratio	0.20	0.39	0.73	0.73	0.54	
v/c Ratio	0.82	0.48	0.79	0.39	0.80	
Control Delay	70.2	27.0	48.0	8.0	30.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	70.2	27.0	48.0	8.0	30.5	
LOS	E	C	D	A	C	
Approach Delay	47.7			16.7	30.5	
Approach LOS	D			B	C	
Queue Length 50th (ft)	243	162	158	156	555	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Length 95th (ft)	325	237	#321	239	699	
Internal Link Dist (ft)	805			1724	1704	
Turn Bay Length (ft)		145	150			
Base Capacity (vph)	458	660	366	2603	1828	
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	0.63	0.48	0.76	0.39	0.80	

Intersection Summary

Area Type: Other
Cycle Length: 135
Actuated Cycle Length: 135
Offset: 94 (70%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 28.3 Intersection LOS: C
Intersection Capacity Utilization 78.5% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: US 25 & Butler Bridge Road

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	11	4	11	2	4	121	6	821	4	4	143	1063	4
Future Vol, veh/h	11	4	11	2	4	121	6	821	4	4	143	1063	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Yield	-	-	Yield	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	225	-	100	-	220	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	4	12	2	4	134	7	912	4	4	159	1181	4

Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	1979	2437	591	1845	2437	456	1185	0	0	912	916	0	0
Stage 1	1507	1507	-	926	926	-	-	-	-	-	-	-	-
Stage 2	472	930	-	919	1511	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	6.44	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.52	2.22	-	-
Pot Cap-1 Maneuver	37	31	450	46	31	551	585	-	-	378	740	-	-
Stage 1	127	182	-	289	346	-	-	-	-	-	-	-	-
Stage 2	542	344	-	292	181	-	-	-	-	-	-	-	-
Platoon blocked, %								-	-			-	-
Mov Cap-1 Maneuver	20	24	450	32	24	551	585	-	-	711	711	-	-
Mov Cap-2 Maneuver	20	24	-	32	24	-	-	-	-	-	-	-	-
Stage 1	125	140	-	286	342	-	-	-	-	-	-	-	-
Stage 2	400	340	-	212	140	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	255.7	13.7	0.1	1.4
HCM LOS	F	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	585	-	-	36	554	711	-	-
HCM Lane V/C Ratio	0.011	-	-	0.802	0.255	0.23	-	-
HCM Control Delay (s)	11.2	-	-	255.7	13.7	11.6	-	-
HCM Lane LOS	B	-	-	F	B	B	-	-
HCM 95th %tile Q(veh)	0	-	-	2.9	1	0.9	-	-

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	148	162	87	151	7
Future Vol, veh/h	5	148	162	87	151	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
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	6	164	180	97	168	8

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	277	0	-	0	405	229
Stage 1	-	-	-	-	229	-
Stage 2	-	-	-	-	176	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1286	-	-	-	602	810
Stage 1	-	-	-	-	809	-
Stage 2	-	-	-	-	855	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1286	-	-	-	599	810
Mov Cap-2 Maneuver	-	-	-	-	599	-
Stage 1	-	-	-	-	805	-
Stage 2	-	-	-	-	855	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	13.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1286	-	-	-	606
HCM Lane V/C Ratio	0.004	-	-	-	0.29
HCM Control Delay (s)	7.8	0	-	-	13.3
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	1.2

Intersection

Int Delay, s/veh 1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	279	11	60	202	4	5	4	41	4	4	4
Future Vol, veh/h	4	279	11	60	202	4	5	4	41	4	4	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	None
Storage Length	-	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	310	12	67	224	4	6	4	46	4	4	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	228	0	0	322	0	0	688	686	316	686	690	226
Stage 1	-	-	-	-	-	-	324	324	-	360	360	-
Stage 2	-	-	-	-	-	-	364	362	-	326	330	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1340	-	-	1238	-	-	360	370	724	362	368	813
Stage 1	-	-	-	-	-	-	688	650	-	658	626	-
Stage 2	-	-	-	-	-	-	655	625	-	687	646	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1340	-	-	1238	-	-	339	349	724	321	347	813
Mov Cap-2 Maneuver	-	-	-	-	-	-	339	349	-	321	347	-
Stage 1	-	-	-	-	-	-	685	647	-	655	592	-
Stage 2	-	-	-	-	-	-	612	591	-	637	643	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.8	9.4	14
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	883	1340	-	-	1238	-	-	415
HCM Lane V/C Ratio	0.063	0.003	-	-	0.054	-	-	0.032
HCM Control Delay (s)	9.4	7.7	0	-	8.1	-	-	14
HCM Lane LOS	A	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0.2	-	-	0.1

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	281	50	18	241	16	18
Future Vol, veh/h	281	50	18	241	16	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	60	-	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	312	56	20	268	18	20

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	368	0	648	340
Stage 1	-	-	-	-	340	-
Stage 2	-	-	-	-	308	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1191	-	435	702
Stage 1	-	-	-	-	721	-
Stage 2	-	-	-	-	745	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1191	-	428	702
Mov Cap-2 Maneuver	-	-	-	-	428	-
Stage 1	-	-	-	-	721	-
Stage 2	-	-	-	-	732	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	12.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	539	-	-	1191	-
HCM Lane V/C Ratio	0.07	-	-	0.017	-
HCM Control Delay (s)	12.2	-	-	8.1	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	282	16	84	265	7	54
Future Vol, veh/h	282	16	84	265	7	54
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	75	-	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	313	18	93	294	8	60

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	331	0	802	322
Stage 1	-	-	-	-	322	-
Stage 2	-	-	-	-	480	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1228	-	353	719
Stage 1	-	-	-	-	735	-
Stage 2	-	-	-	-	622	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1228	-	326	719
Mov Cap-2 Maneuver	-	-	-	-	326	-
Stage 1	-	-	-	-	735	-
Stage 2	-	-	-	-	575	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	812	-	-	1228	-
HCM Lane V/C Ratio	0.083	-	-	0.076	-
HCM Control Delay (s)	9.8	-	-	8.2	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0.2	-

Intersection	
Int Delay, s/veh	4.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	312	42	267	321	34	227
Future Vol, veh/h	312	42	267	321	34	227
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
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	347	47	297	357	38	252

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	394	0	1322	371
Stage 1	-	-	-	-	371	-
Stage 2	-	-	-	-	951	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1165	-	173	675
Stage 1	-	-	-	-	698	-
Stage 2	-	-	-	-	375	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1165	-	118	675
Mov Cap-2 Maneuver	-	-	-	-	118	-
Stage 1	-	-	-	-	698	-
Stage 2	-	-	-	-	256	-

Approach	EB	WB	NB
HCM Control Delay, s	0	4.2	12.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	776	-	-	1165	-
HCM Lane V/C Ratio	0.374	-	-	0.255	-
HCM Control Delay (s)	12.4	-	-	9.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	1.7	-	-	1	-

APPENDIX E

CAPACITY ANALYSIS CALCULATIONS

FUTURE (2028) 'NO-BUILD' CONDITIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	70	17	113	52	10	11	1126	113	22	664	17
Future Volume (vph)	19	70	17	113	52	10	11	1126	113	22	664	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-6%			1%			1%			-3%	
Storage Length (ft)	0		0	0		0	240		100	240		100
Storage Lanes	0		0	0		0	1		1	1		1
Taper Length (ft)	25			25			220			250		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.978			0.992				0.850			0.850
Flt Protected		0.991			0.969		0.950			0.950		
Satd. Flow (prot)	0	1860	0	0	1782	0	1761	3522	1575	1796	3592	1607
Flt Permitted		0.925			0.749		0.331			0.123		
Satd. Flow (perm)	0	1736	0	0	1377	0	613	3522	1575	233	3592	1607
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			55			55	
Link Distance (ft)		1261			755			1751			2656	
Travel Time (s)		24.6			14.7			21.7			32.9	
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)	21	78	19	126	58	11	12	1251	126	24	738	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	118	0	0	195	0	12	1251	126	24	738	19
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	14.0	14.0		14.0	14.0		14.0	27.0	27.0	14.0	27.0	27.0
Total Split (s)	38.0	38.0		38.0	38.0		14.0	68.0	68.0	14.0	68.0	68.0
Total Split (%)	31.7%	31.7%		31.7%	31.7%		11.7%	56.7%	56.7%	11.7%	56.7%	56.7%
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-2.0			-2.0		-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)		21.1			21.1		43.2	40.6	40.6	44.0	42.8	42.8
Actuated g/C Ratio		0.27			0.27		0.56	0.53	0.53	0.57	0.55	0.55
v/c Ratio		0.25			0.52		0.02	0.68	0.15	0.07	0.37	0.02
Control Delay		28.6			34.2		7.4	17.0	12.3	7.7	11.0	10.2
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		28.6			34.2		7.4	17.0	12.3	7.7	11.0	10.2
LOS		C			C		A	B	B	A	B	B
Approach Delay		28.6			34.2			16.5			10.8	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)		40			71		2	174	23	4	83	3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)		121			203		10	440	84	16	219	19
Internal Link Dist (ft)		1181			675			1671			2576	
Turn Bay Length (ft)							240		100	240		100
Base Capacity (vph)		851			675		496	2850	1274	341	2910	1302
Starvation Cap Reductn		0			0		0	0	0	0	0	0
Spillback Cap Reductn		0			0		0	0	0	0	0	0
Storage Cap Reductn		0			0		0	0	0	0	0	0
Reduced v/c Ratio		0.14			0.29		0.02	0.44	0.10	0.07	0.25	0.01

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 77.2
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.68
Intersection Signal Delay: 16.7 Intersection LOS: B
Intersection Capacity Utilization 55.7% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: NC 280 & Butler Bridge Road

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	392	415	264	1000	872	217
Future Volume (vph)	392	415	264	1000	872	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			-2%	2%	
Storage Length (ft)	0	350	250			0
Storage Lanes	1	1	1			0
Taper Length (ft)	100		100			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.970	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1787	3575	3399	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1787	3575	3399	0
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	35			45	45	
Link Distance (ft)	885			1804	1773	
Travel Time (s)	17.2			27.3	26.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	436	461	293	1111	969	241
Shared Lane Traffic (%)						
Lane Group Flow (vph)	436	461	293	1111	1210	0
Turn Type	Prot	pm+ov	Prot	NA	NA	
Protected Phases	4	5	5	2	6	
Permitted Phases		4				
Detector Phase	4	5	5	2	6	
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	12.0	12.0	
Minimum Split (s)	14.0	14.0	14.0	19.0	19.0	
Total Split (s)	39.0	28.0	28.0	81.0	53.0	
Total Split (%)	32.5%	23.3%	23.3%	67.5%	44.2%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Lead/Lag		Lead	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Recall Mode	None	None	None	C-Min	C-Min	
Act Effct Green (s)	32.9	60.4	22.5	77.1	49.6	
Actuated g/C Ratio	0.27	0.50	0.19	0.64	0.41	
v/c Ratio	0.90	0.58	0.88	0.48	0.86	
Control Delay	64.6	24.1	73.9	12.2	40.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	64.6	24.1	73.9	12.2	40.1	
LOS	E	C	E	B	D	
Approach Delay	43.8			25.1	40.1	
Approach LOS	D			C	D	
Queue Length 50th (ft)	322	235	222	223	453	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Length 95th (ft)	#502	339	#372	273	#562	
Internal Link Dist (ft)	805			1724	1693	
Turn Bay Length (ft)		350	250			
Base Capacity (vph)	501	803	342	2297	1405	
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	0.87	0.57	0.86	0.48	0.86	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 35.0 Intersection LOS: D
Intersection Capacity Utilization 79.9% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: US 25 & Butler Bridge Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	7	4	4	7	6	204	4	4	1144	7	4	142
Future Volume (vph)	7	4	4	7	6	204	4	4	1144	7	4	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		50	0		0		225		100		220
Storage Lanes	0		0	0		0		1		1		1
Taper Length (ft)	25			25				250				300
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Frt		0.966			0.873					0.850		
Flt Protected		0.976			0.998			0.950				0.950
Satd. Flow (prot)	0	1756	0	0	1623	0	0	1770	3539	1583	0	1770
Flt Permitted		0.860			0.992			0.361				0.950
Satd. Flow (perm)	0	1547	0	0	1613	0	0	672	3539	1583	0	1770
Right Turn on Red			No			No				No		
Satd. Flow (RTOR)												
Link Speed (mph)		35			35				55			
Link Distance (ft)		1350			198				2656			
Travel Time (s)		26.3			3.9				32.9			
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	4	4	8	7	227	4	4	1271	8	4	158
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	16	0	0	242	0	0	8	1271	8	0	162
Turn Type	Perm	NA		Perm	NA		Perm	Perm	NA	Perm	Prot	Prot
Protected Phases		4			8				2		1	1
Permitted Phases	4			8			2	2	2	2		
Detector Phase	4	4		8	8		2	2	2	2	1	1
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		14.0	14.0	14.0	14.0	7.0	7.0
Minimum Split (s)	14.0	14.0		14.0	14.0		21.0	21.0	21.0	21.0	14.0	14.0
Total Split (s)	26.0	26.0		26.0	26.0		46.0	46.0	46.0	46.0	18.0	18.0
Total Split (%)	28.9%	28.9%		28.9%	28.9%		51.1%	51.1%	51.1%	51.1%	20.0%	20.0%
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-2.0			-2.0			-2.0	-2.0	-2.0		-2.0
Total Lost Time (s)		5.0			5.0			5.0	5.0	5.0		5.0
Lead/Lag							Lag	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		Min	Min	Min	Min	None	None
Act Effct Green (s)		11.4			18.1			36.7	36.7	36.7		12.4
Actuated g/C Ratio		0.14			0.22			0.44	0.44	0.44		0.15
v/c Ratio		0.08			0.69			0.03	0.81	0.01		0.61
Control Delay		32.6			41.6			14.0	24.9	13.6		46.0
Queue Delay		0.0			0.0			0.0	0.0	0.0		0.0
Total Delay		32.6			41.6			14.0	24.9	13.6		46.0
LOS		C			D			B	C	B		D
Approach Delay		32.6			41.6				24.8			
Approach LOS		C			D				C			
Queue Length 50th (ft)		8			125			2	307	2		87
Queue Length 95th (ft)		24			206			10	399	10		#164

Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	691	10
Future Volume (vph)	691	10
Ideal Flow (vphpl)	1900	1900
Storage Length (ft)		100
Storage Lanes		1
Taper Length (ft)		
Lane Util. Factor	0.95	1.00
Frt		0.850
Flt Protected		
Satd. Flow (prot)	3539	1583
Flt Permitted		
Satd. Flow (perm)	3539	1583
Right Turn on Red		No
Satd. Flow (RTOR)		
Link Speed (mph)	55	
Link Distance (ft)	1995	
Travel Time (s)	24.7	
Peak Hour Factor	0.90	0.90
Adj. Flow (vph)	768	11
Shared Lane Traffic (%)		
Lane Group Flow (vph)	768	11
Turn Type	NA	Perm
Protected Phases	6	
Permitted Phases		6
Detector Phase	6	6
Switch Phase		
Minimum Initial (s)	14.0	14.0
Minimum Split (s)	21.0	21.0
Total Split (s)	64.0	64.0
Total Split (%)	71.1%	71.1%
Yellow Time (s)	5.0	5.0
All-Red Time (s)	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0
Total Lost Time (s)	5.0	5.0
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	Min	Min
Act Effct Green (s)	54.2	54.2
Actuated g/C Ratio	0.66	0.66
v/c Ratio	0.33	0.01
Control Delay	6.8	5.4
Queue Delay	0.0	0.0
Total Delay	6.8	5.4
LOS	A	A
Approach Delay	13.5	
Approach LOS	B	
Queue Length 50th (ft)	87	2
Queue Length 95th (ft)	118	7

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Internal Link Dist (ft)		1270			118				2576			
Turn Bay Length (ft)								225		100		220
Base Capacity (vph)		401			418			340	1793	802		284
Starvation Cap Reductn		0			0			0	0	0		0
Spillback Cap Reductn		0			0			0	0	0		0
Storage Cap Reductn		0			0			0	0	0		0
Reduced v/c Ratio		0.04			0.58			0.02	0.71	0.01		0.57

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 82.5
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 22.2 Intersection LOS: C
Intersection Capacity Utilization 65.6% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: NC 280 & Fanning Fields Road

Lane Group	SBT	SBR
Internal Link Dist (ft)	1915	
Turn Bay Length (ft)		100
Base Capacity (vph)	2580	1154
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.30	0.01

Intersection Summary

Intersection														
Int Delay, s/veh	6.4													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations														
Traffic Vol, veh/h	7	4	4	7	6	204	4	4	1144	7	4	142	691	10
Future Vol, veh/h	7	4	4	7	6	204	4	4	1144	7	4	142	691	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Stop	-	-	Stop	-	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	-	225	-	100	-	220	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	4	4	8	7	227	4	4	1271	8	4	158	768	11

Major/Minor	Minor2			Minor1			Major1				Major2			
Conflicting Flow All	1747	2387	384	1997	2390	636	768	779	0	0	1271	1279	0	0
Stage 1	1092	1092	-	1287	1287	-	-	-	-	-	-	-	-	-
Stage 2	655	1295	-	710	1103	-	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	6.44	4.14	-	-	6.44	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.52	2.22	-	-	2.52	2.22	-	-
Pot Cap-1 Maneuver	55	34	614	36	33	421	467	834	-	-	222	539	-	-
Stage 1	229	289	-	174	233	-	-	-	-	-	-	-	-	-
Stage 2	421	231	-	391	285	-	-	-	-	-	-	-	-	-
Platoon blocked, %									-	-			-	-
Mov Cap-1 Maneuver	15	22	614	22	22	421	596	596	-	-	489	489	-	-
Mov Cap-2 Maneuver	15	22	-	22	22	-	-	-	-	-	-	-	-	-
Stage 1	226	193	-	171	230	-	-	-	-	-	-	-	-	-
Stage 2	186	228	-	254	191	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 333.8	31.7	0.1	2.8
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	596	-	-	23	367	489	-	-
HCM Lane V/C Ratio	0.015	-	-	0.725	0.657	0.332	-	-
HCM Control Delay (s)	11.1	-	-	$ 333.8	31.7	16	-	-
HCM Lane LOS	B	-	-	F	D	C	-	-
HCM 95th %tile Q(veh)	0	-	-	2.1	4.5	1.4	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	205	178	233	108	6
Future Vol, veh/h	4	205	178	233	108	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
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	4	228	198	259	120	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	457	0	-	0	564	328
Stage 1	-	-	-	-	328	-
Stage 2	-	-	-	-	236	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1104	-	-	-	487	713
Stage 1	-	-	-	-	730	-
Stage 2	-	-	-	-	803	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1104	-	-	-	485	713
Mov Cap-2 Maneuver	-	-	-	-	485	-
Stage 1	-	-	-	-	727	-
Stage 2	-	-	-	-	803	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	14.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1104	-	-	-	493
HCM Lane V/C Ratio	0.004	-	-	-	0.257
HCM Control Delay (s)	8.3	0	-	-	14.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	1

Intersection												
Int Delay, s/veh	2.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	236	14	70	344	4	8	4	112	4	4	4
Future Vol, veh/h	4	236	14	70	344	4	8	4	112	4	4	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	None
Storage Length	-	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	262	16	78	382	4	9	4	124	4	4	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	386	0	0	278	0	0	822	820	270	820	826	384
Stage 1	-	-	-	-	-	-	278	278	-	540	540	-
Stage 2	-	-	-	-	-	-	544	542	-	280	286	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1172	-	-	1285	-	-	293	310	769	294	307	664
Stage 1	-	-	-	-	-	-	728	680	-	526	521	-
Stage 2	-	-	-	-	-	-	523	520	-	727	675	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1172	-	-	1285	-	-	273	290	769	232	287	664
Mov Cap-2 Maneuver	-	-	-	-	-	-	273	290	-	232	287	-
Stage 1	-	-	-	-	-	-	725	677	-	524	489	-
Stage 2	-	-	-	-	-	-	484	488	-	603	672	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.3	10	16.6
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	851	1172	-	-	1285	-	-	323
HCM Lane V/C Ratio	0.162	0.004	-	-	0.061	-	-	0.041
HCM Control Delay (s)	10	8.1	0	-	8	-	-	16.6
HCM Lane LOS	B	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0.6	0	-	-	0.2	-	-	0.1

Intersection	
Int Delay, s/veh	2.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	320	31	14	334	67	52
Future Vol, veh/h	320	31	14	334	67	52
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	60	-	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	356	34	16	371	74	58

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	390	0	776	373
Stage 1	-	-	-	-	373	-
Stage 2	-	-	-	-	403	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1169	-	366	673
Stage 1	-	-	-	-	696	-
Stage 2	-	-	-	-	675	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1169	-	361	673
Mov Cap-2 Maneuver	-	-	-	-	361	-
Stage 1	-	-	-	-	696	-
Stage 2	-	-	-	-	666	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	16.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	453	-	-	1169	-
HCM Lane V/C Ratio	0.292	-	-	0.013	-
HCM Control Delay (s)	16.2	-	-	8.1	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	1.2	-	-	0	-

Intersection	
Int Delay, s/veh	1.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	366	11	14	334	30	113
Future Vol, veh/h	366	11	14	334	30	113
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	75	-	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	407	12	16	371	33	126

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	419	0	816	413
Stage 1	-	-	-	-	413	-
Stage 2	-	-	-	-	403	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1140	-	347	639
Stage 1	-	-	-	-	668	-
Stage 2	-	-	-	-	675	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1140	-	342	639
Mov Cap-2 Maneuver	-	-	-	-	342	-
Stage 1	-	-	-	-	668	-
Stage 2	-	-	-	-	666	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	10.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	809	-	-	1140	-
HCM Lane V/C Ratio	0.196	-	-	0.014	-
HCM Control Delay (s)	10.5	-	-	8.2	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.7	-	-	0	-

Intersection	
Int Delay, s/veh	8.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	431	44	145	313	52	336
Future Vol, veh/h	431	44	145	313	52	336
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	300	-	0	180
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	479	49	161	348	58	373

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	528	0	1174	504
Stage 1	-	-	-	-	504	-
Stage 2	-	-	-	-	670	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1039	-	212	568
Stage 1	-	-	-	-	607	-
Stage 2	-	-	-	-	509	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1039	-	179	568
Mov Cap-2 Maneuver	-	-	-	-	179	-
Stage 1	-	-	-	-	607	-
Stage 2	-	-	-	-	430	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.9	24.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	179	568	-	-	1039	-
HCM Lane V/C Ratio	0.323	0.657	-	-	0.155	-
HCM Control Delay (s)	34.4	22.7	-	-	9.1	-
HCM Lane LOS	D	C	-	-	A	-
HCM 95th %tile Q(veh)	1.3	4.8	-	-	0.5	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	64	6	124	50	9	13	880	97	11	1129	49
Future Volume (vph)	29	64	6	124	50	9	13	880	97	11	1129	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-6%			1%			1%			-3%	
Storage Length (ft)	0		0	0		0	240		100	240		100
Storage Lanes	0		0	0		0	1		1	1		1
Taper Length (ft)	25			25			220			250		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.991			0.993				0.850			0.850
Flt Protected		0.986			0.967		0.950			0.950		
Satd. Flow (prot)	0	1875	0	0	1780	0	1761	3522	1575	1796	3592	1607
Flt Permitted		0.882			0.760		0.121			0.212		
Satd. Flow (perm)	0	1677	0	0	1399	0	224	3522	1575	401	3592	1607
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			55			55	
Link Distance (ft)		1254			755			1763			2656	
Travel Time (s)		24.4			14.7			21.9			32.9	
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)	32	71	7	138	56	10	14	978	108	12	1254	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	110	0	0	204	0	14	978	108	12	1254	54
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	14.0	14.0		14.0	14.0		14.0	27.0	27.0	14.0	27.0	27.0
Total Split (s)	39.0	39.0		39.0	39.0		14.0	67.0	67.0	14.0	67.0	67.0
Total Split (%)	32.5%	32.5%		32.5%	32.5%		11.7%	55.8%	55.8%	11.7%	55.8%	55.8%
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-2.0			-2.0		-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)		20.8			20.8		39.2	38.1	38.1	39.2	38.1	38.1
Actuated g/C Ratio		0.29			0.29		0.55	0.53	0.53	0.55	0.53	0.53
v/c Ratio		0.23			0.50		0.04	0.52	0.13	0.03	0.66	0.06
Control Delay		25.0			30.0		8.2	13.2	10.9	8.0	15.3	10.6
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		25.0			30.0		8.2	13.2	10.9	8.0	15.3	10.6
LOS		C			C		A	B	B	A	B	B
Approach Delay		25.0			30.0			12.9			15.0	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)		30			61		2	111	18	2	158	9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)		113			209		12	318	74	11	444	42
Internal Link Dist (ft)		1174			675			1683			2576	
Turn Bay Length (ft)							240		100	240		100
Base Capacity (vph)		895			747		339	3006	1344	415	3066	1372
Starvation Cap Reductn		0			0		0	0	0	0	0	0
Spillback Cap Reductn		0			0		0	0	0	0	0	0
Storage Cap Reductn		0			0		0	0	0	0	0	0
Reduced v/c Ratio		0.12			0.27		0.04	0.33	0.08	0.03	0.41	0.04

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 71.9
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 15.7 Intersection LOS: B
Intersection Capacity Utilization 56.3% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: NC 280 & Butler Bridge Road

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	285	313	276	997	1096	362
Future Volume (vph)	285	313	276	997	1096	362
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			-2%	2%	
Storage Length (ft)	0	350	500			0
Storage Lanes	1	1	1			0
Taper Length (ft)	100		100			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.963	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1787	3575	3374	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1787	3575	3374	0
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	35			45	45	
Link Distance (ft)	885			1804	1780	
Travel Time (s)	17.2			27.3	27.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	317	348	307	1108	1218	402
Shared Lane Traffic (%)						
Lane Group Flow (vph)	317	348	307	1108	1620	0
Turn Type	Prot	pm+ov	Prot	NA	NA	
Protected Phases	4	5	5	2	6	
Permitted Phases		4				
Detector Phase	4	5	5	2	6	
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	12.0	12.0	
Minimum Split (s)	14.0	14.0	14.0	19.0	19.0	
Total Split (s)	31.0	30.0	30.0	104.0	74.0	
Total Split (%)	23.0%	22.2%	22.2%	77.0%	54.8%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Lead/Lag		Lead	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Recall Mode	None	None	None	C-Min	C-Min	
Act Effct Green (s)	26.0	56.0	25.0	99.0	69.0	
Actuated g/C Ratio	0.19	0.41	0.19	0.73	0.51	
v/c Ratio	0.93	0.53	0.93	0.42	0.94	
Control Delay	88.0	33.3	88.5	7.5	42.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	88.0	33.3	88.5	7.5	42.9	
LOS	F	C	F	A	D	
Approach Delay	59.3			25.1	42.9	
Approach LOS	E			C	D	
Queue Length 50th (ft)	276	226	268	176	683	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Length 95th (ft)	#456	324	#445	211	#865	
Internal Link Dist (ft)	805			1724	1700	
Turn Bay Length (ft)		350	500			
Base Capacity (vph)	340	656	330	2621	1724	
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	0.93	0.53	0.93	0.42	0.94	

Intersection Summary

Area Type: Other
Cycle Length: 135
Actuated Cycle Length: 135
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 39.1 Intersection LOS: D
Intersection Capacity Utilization 85.4% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: US 25 & Butler Bridge Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	12	4	12	4	4	134	4	7	907	4	4	158
Future Volume (vph)	12	4	12	4	4	134	4	7	907	4	4	158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0		225		100		220
Storage Lanes	0		0	0		0		1		1		1
Taper Length (ft)	25			25				250				300
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Frt		0.941			0.872					0.850		
Flt Protected		0.979			0.999			0.950				0.950
Satd. Flow (prot)	0	1716	0	0	1623	0	0	1770	3539	1583	0	1770
Flt Permitted		0.874			0.993			0.211				0.950
Satd. Flow (perm)	0	1532	0	0	1613	0	0	393	3539	1583	0	1770
Right Turn on Red			No			No				No		
Satd. Flow (RTOR)												
Link Speed (mph)		35			35				55			
Link Distance (ft)		1180			198				2656			
Travel Time (s)		23.0			3.9				32.9			
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)	13	4	13	4	4	149	4	8	1008	4	4	176
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	30	0	0	157	0	0	12	1008	4	0	180
Turn Type	Perm	NA		Perm	NA		Perm	Perm	NA	Perm	Prot	Prot
Protected Phases		4			8				2		1	1
Permitted Phases	4			8			2	2	2	2		
Detector Phase	4	4		8	8		2	2	2	2	1	1
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		14.0	14.0	14.0	14.0	7.0	7.0
Minimum Split (s)	14.0	14.0		14.0	14.0		21.0	21.0	21.0	21.0	14.0	14.0
Total Split (s)	23.0	23.0		23.0	23.0		44.0	44.0	44.0	44.0	23.0	23.0
Total Split (%)	25.6%	25.6%		25.6%	25.6%		48.9%	48.9%	48.9%	48.9%	25.6%	25.6%
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-2.0			-2.0			-2.0	-2.0	-2.0		-2.0
Total Lost Time (s)		5.0			5.0			5.0	5.0	5.0		5.0
Lead/Lag							Lag	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		Min	Min	Min	Min	None	None
Act Effct Green (s)		12.3			14.3			29.8	29.8	29.8		14.6
Actuated g/C Ratio		0.17			0.19			0.40	0.40	0.40		0.20
v/c Ratio		0.12			0.51			0.08	0.71	0.01		0.52
Control Delay		30.2			35.6			16.5	22.2	14.5		35.0
Queue Delay		0.0			0.0			0.0	0.0	0.0		0.0
Total Delay		30.2			35.6			16.5	22.2	14.5		35.0
LOS		C			D			B	C	B		D
Approach Delay		30.2			35.6				22.1			
Approach LOS		C			D				C			
Queue Length 50th (ft)		13			67			3	200	1		76
Queue Length 95th (ft)		38			141			15	300	7		158

Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	1175	4
Future Volume (vph)	1175	4
Ideal Flow (vphpl)	1900	1900
Storage Length (ft)		100
Storage Lanes		1
Taper Length (ft)		
Lane Util. Factor	0.95	1.00
Frt		0.850
Flt Protected		
Satd. Flow (prot)	3539	1583
Flt Permitted		
Satd. Flow (perm)	3539	1583
Right Turn on Red		No
Satd. Flow (RTOR)		
Link Speed (mph)	55	
Link Distance (ft)	1995	
Travel Time (s)	24.7	
Peak Hour Factor	0.90	0.90
Adj. Flow (vph)	1306	4
Shared Lane Traffic (%)		
Lane Group Flow (vph)	1306	4
Turn Type	NA	Perm
Protected Phases	6	
Permitted Phases		6
Detector Phase	6	6
Switch Phase		
Minimum Initial (s)	14.0	14.0
Minimum Split (s)	21.0	21.0
Total Split (s)	67.0	67.0
Total Split (%)	74.4%	74.4%
Yellow Time (s)	5.0	5.0
All-Red Time (s)	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0
Total Lost Time (s)	5.0	5.0
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	Min	Min
Act Effct Green (s)	49.5	49.5
Actuated g/C Ratio	0.67	0.67
v/c Ratio	0.55	0.00
Control Delay	7.6	4.5
Queue Delay	0.0	0.0
Total Delay	7.6	4.5
LOS	A	A
Approach Delay	10.9	
Approach LOS	B	
Queue Length 50th (ft)	142	1
Queue Length 95th (ft)	212	4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Internal Link Dist (ft)		1100			118				2576			
Turn Bay Length (ft)								225		100		220
Base Capacity (vph)		385			406			214	1931	863		445
Starvation Cap Reductn		0			0			0	0	0		0
Spillback Cap Reductn		0			0			0	0	0		0
Storage Cap Reductn		0			0			0	0	0		0
Reduced v/c Ratio		0.08			0.39			0.06	0.52	0.00		0.40

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 74.2
Natural Cycle: 55
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 16.8
Intersection LOS: B
Intersection Capacity Utilization 65.4%
ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 3: NC 280 & Fanning Fields Road

Lane Group	SBT	SBR
Internal Link Dist (ft)	1915	
Turn Bay Length (ft)		100
Base Capacity (vph)	2954	1321
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.44	0.00

Intersection Summary

Intersection	
Int Delay, s/veh	10

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations														
Traffic Vol, veh/h	12	4	12	4	4	134	4	7	907	4	4	158	1175	4
Future Vol, veh/h	12	4	12	4	4	134	4	7	907	4	4	158	1175	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Stop	-	-	Stop	-	-	-	None	-	-	-	None
Storage Length	-	-	-	-	-	-	-	225	-	100	-	220	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	-	0	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	-	0	-	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	4	13	4	4	149	4	8	1008	4	4	176	1306	4

Major/Minor	Minor2			Minor1			Major1				Major2			
Conflicting Flow All	2196	2702	653	2047	2702	504	1306	1310	0	0	1008	1012	0	0
Stage 1	1666	1666	-	1032	1032	-	-	-	-	-	-	-	-	-
Stage 2	530	1036	-	1015	1670	-	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	6.44	4.14	-	-	6.44	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.52	2.22	-	-	2.52	2.22	-	-
Pot Cap-1 Maneuver	25	21	410	33	21	513	211	524	-	-	328	681	-	-
Stage 1	100	152	-	249	308	-	-	-	-	-	-	-	-	-
Stage 2	500	307	-	255	151	-	-	-	-	-	-	-	-	-
Platoon blocked, %									-	-			-	-
Mov Cap-1 Maneuver	~ 11	15	410	19	15	513	335	335	-	-	652	652	-	-
Mov Cap-2 Maneuver	~ 11	15	-	19	15	-	-	-	-	-	-	-	-	-
Stage 1	96	110	-	240	297	-	-	-	-	-	-	-	-	-
Stage 2	337	296	-	171	109	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 639.8	29.9	0.2	1.5
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	335	-	-	21	298	652	-	-
HCM Lane V/C Ratio	0.036	-	-	1.481	0.529	0.276	-	-
HCM Control Delay (s)	16.2	-	-	$ 639.8	29.9	12.6	-	-
HCM Lane LOS	C	-	-	F	D	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	4.1	2.9	1.1	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	6	163	179	96	167	8
Future Vol, veh/h	6	163	179	96	167	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
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	7	181	199	107	186	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	306	0	-	0	448	253
Stage 1	-	-	-	-	253	-
Stage 2	-	-	-	-	195	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1255	-	-	-	568	786
Stage 1	-	-	-	-	789	-
Stage 2	-	-	-	-	838	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1255	-	-	-	565	786
Mov Cap-2 Maneuver	-	-	-	-	565	-
Stage 1	-	-	-	-	784	-
Stage 2	-	-	-	-	838	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	14.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1255	-	-	-	572
HCM Lane V/C Ratio	0.005	-	-	-	0.34
HCM Control Delay (s)	7.9	0	-	-	14.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	1.5

Intersection												
Int Delay, s/veh	1.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	308	12	66	223	4	6	4	45	4	4	4
Future Vol, veh/h	4	308	12	66	223	4	6	4	45	4	4	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	None
Storage Length	-	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	342	13	73	248	4	7	4	50	4	4	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	252	0	0	355	0	0	757	755	349	755	759	250
Stage 1	-	-	-	-	-	-	357	357	-	396	396	-
Stage 2	-	-	-	-	-	-	400	398	-	359	363	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1313	-	-	1204	-	-	324	338	694	325	336	789
Stage 1	-	-	-	-	-	-	661	628	-	629	604	-
Stage 2	-	-	-	-	-	-	626	603	-	659	625	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1313	-	-	1204	-	-	303	316	694	284	314	789
Mov Cap-2 Maneuver	-	-	-	-	-	-	303	316	-	284	314	-
Stage 1	-	-	-	-	-	-	658	625	-	626	567	-
Stage 2	-	-	-	-	-	-	580	566	-	605	623	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.8	9.6	14.9
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	848	1313	-	-	1204	-	-	376
HCM Lane V/C Ratio	0.072	0.003	-	-	0.061	-	-	0.035
HCM Control Delay (s)	9.6	7.8	0	-	8.2	-	-	14.9
HCM Lane LOS	A	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0.2	-	-	0.1

Intersection	
Int Delay, s/veh	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	310	55	20	266	18	20
Future Vol, veh/h	310	55	20	266	18	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	60	-	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	344	61	22	296	20	22

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	405	0	715	375
Stage 1	-	-	-	-	375	-
Stage 2	-	-	-	-	340	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1154	-	397	671
Stage 1	-	-	-	-	695	-
Stage 2	-	-	-	-	721	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1154	-	389	671
Mov Cap-2 Maneuver	-	-	-	-	389	-
Stage 1	-	-	-	-	695	-
Stage 2	-	-	-	-	707	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	12.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	499	-	-	1154	-
HCM Lane V/C Ratio	0.085	-	-	0.019	-
HCM Control Delay (s)	12.9	-	-	8.2	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Intersection	
Int Delay, s/veh	1.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	312	18	93	293	8	60
Future Vol, veh/h	312	18	93	293	8	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	75	-	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	347	20	103	326	9	67

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	367	0	889	357
Stage 1	-	-	-	-	357	-
Stage 2	-	-	-	-	532	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1192	-	314	687
Stage 1	-	-	-	-	708	-
Stage 2	-	-	-	-	589	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1192	-	287	687
Mov Cap-2 Maneuver	-	-	-	-	287	-
Stage 1	-	-	-	-	708	-
Stage 2	-	-	-	-	538	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2	10.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	779	-	-	1192	-
HCM Lane V/C Ratio	0.097	-	-	0.087	-
HCM Control Delay (s)	10.1	-	-	8.3	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0.3	-

Intersection	
Int Delay, s/veh	6.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	345	46	295	355	38	251
Future Vol, veh/h	345	46	295	355	38	251
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	300	-	0	180
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	383	51	328	394	42	279

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	434	0	1459	409
Stage 1	-	-	-	-	409	-
Stage 2	-	-	-	-	1050	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1126	-	142	642
Stage 1	-	-	-	-	671	-
Stage 2	-	-	-	-	337	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1126	-	101	642
Mov Cap-2 Maneuver	-	-	-	-	101	-
Stage 1	-	-	-	-	671	-
Stage 2	-	-	-	-	239	-

Approach	EB	WB	NB
HCM Control Delay, s	0	4.3	21.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	101	642	-	-	1126	-
HCM Lane V/C Ratio	0.418	0.434	-	-	0.291	-
HCM Control Delay (s)	64.1	14.8	-	-	9.5	-
HCM Lane LOS	F	B	-	-	A	-
HCM 95th %tile Q(veh)	1.7	2.2	-	-	1.2	-

APPENDIX F

SIGNAL WARRANT CALCULATIONS

Start Time	Existing (2018) Hourly Traffic Volumes															FUTURE (2028) 'NO-BUILD' Hourly Traffic Volumes													
	NC 280 Southbound				Fanning Fields Road Westbound			NC 280 Northbound				Fanning Fields Road Eastbound			*Total*	NC 280 Southbound				Fanning Fields Road Westbound			NC 280 Northbound				Fanning Fields Road Eastbound		
	Right	Thru	Left	U-Turn	Right	Thru	Left	Right	Thru	Left	U-Turn	Right	Thru	Left		Right	Thru	Left	U-Turn	Right	Thru	Left	Right	Thru	Left	U-Turn	Right	Thru	Left
07:00	2	151	15	0	21	0	0	1	182	0	0	0	0	0	*372*	2	167	17	0	23	0	0	1	201	0	0	0	0	0
07:15	0	143	28	1	22	0	0	1	245	1	1	1	0	2	*445*	0	158	31	1	24	0	0	1	271	1	1	1	0	2
07:30	3	175	56	0	54	0	4	1	266	0	0	0	0	2	*561*	3	193	62	0	60	0	4	1	294	0	0	0	0	2
07:45	6	155	32	0	80	4	1	2	249	2	0	3	0	1	*535*	7	171	35	0	88	4	1	2	275	2	0	3	0	1
TOTAL	**11**	**624**	**131**	**1**	**177**	**4**	**5**	**5**	**942**	**3**	**1**	**4**	**0**	**5**	***1,913***	**12**	**689**	**145**	**1**	**195**	**4**	**5**	**5**	**1,041**	**3**	**1**	**4**	**0**	**5**
08:00	0	152	13	0	29	1	1	2	217	0	0	0	1	1	*417*	0	168	14	0	32	1	1	2	240	0	0	0	1	1
08:15	0	116	13	0	33	0	2	3	210	0	0	1	0	0	*378*	0	128	14	0	36	0	2	3	232	0	0	1	0	0
08:30	0	109	16	0	20	0	1	4	188	0	0	0	0	0	*338*	0	120	18	0	22	0	1	4	208	0	0	0	0	0
08:45	1	94	19	0	15	0	0	1	158	0	0	2	0	0	*290*	1	104	21	0	17	0	0	1	175	0	0	2	0	0
TOTAL	**1**	**471**	**61**	**0**	**97**	**1**	**4**	**10**	**773**	**0**	**0**	**3**	**1**	**1**	***1,423***	**1**	**520**	**67**	**0**	**107**	**1**	**4**	**10**	**855**	**0**	**0**	**3**	**1**	**1**
09:00	0	149	12	1	14	1	1	1	161	1	0	1	0	2	*344*	0	165	13	1	15	1	1	1	178	1	0	1	0	2
09:15	0	116	10	0	19	0	4	1	161	1	0	1	0	1	*314*	0	128	11	0	21	0	4	1	178	1	0	1	0	1
09:30	1	123	15	2	15	0	0	4	150	0	0	0	0	0	*310*	1	136	17	2	17	0	0	4	166	0	0	0	0	0
09:45	0	116	15	0	21	0	0	3	169	0	0	2	0	1	*327*	0	128	17	0	23	0	0	3	187	0	0	2	0	1
TOTAL	**1**	**504**	**52**	**3**	**69**	**1**	**5**	**9**	**641**	**2**	**0**	**4**	**0**	**4**	***1,295***	**1**	**557**	**58**	**3**	**76**	**1**	**5**	**9**	**709**	**2**	**0**	**4**	**0**	**4**
10:00	0	133	11	2	18	0	2	5	156	0	1	0	0	0	*328*	0	147	12	2	20	0	2	6	172	0	1	0	0	0
10:15	0	138	16	0	10	0	1	1	164	0	0	0	1	0	*331*	0	152	18	0	11	0	1	1	181	0	0	0	1	0
10:30	1	131	14	0	15	2	0	1	163	1	0	0	0	0	*328*	1	145	15	0	17	2	0	1	180	1	0	0	0	0
10:45	2	134	17	0	17	0	2	1	161	0	0	0	2	0	*336*	2	148	19	0	19	0	2	1	178	0	0	0	2	0
TOTAL	**3**	**536**	**58**	**2**	**60**	**2**	**5**	**8**	**644**	**1**	**1**	**0**	**3**	**0**	***1,323***	**3**	**592**	**64**	**2**	**67**	**2**	**5**	**9**	**711**	**1**	**1**	**0**	**3**	**0**
11:00	1	133	11	1	17	0	3	3	177	0	0	2	2	0	*350*	1	147	12	1	19	0	3	3	196	0	0	2	2	0
11:15	2	145	17	2	14	1	0	3	187	0	0	0	1	1	*373*	2	160	19	2	15	1	0	3	207	0	0	0	1	1
11:30	0	150	16	1	18	6	0	4	182	0	0	0	1	4	*382*	0	166	18	1	20	7	0	4	201	0	0	0	1	4
11:45	1	146	17	1	27	1	4	2	164	0	0	2	0	0	*365*	1	161	19	1	30	1	4	2	181	0	0	2	0	0
TOTAL	**4**	**574**	**61**	**5**	**76**	**8**	**7**	**12**	**710**	**0**	**0**	**4**	**4**	**5**	***1,470***	**4**	**634**	**68**	**5**	**84**	**9**	**7**	**12**	**785**	**0**	**0**	**4**	**4**	**5**
12:00	3	135	31	0	24	0	3	1	233	2	0	0	1	1	*434*	3	149	34	0	27	0	3	1	257	2	0	0	1	1
12:15	2	149	22	0	29	0	1	3	207	0	0	1	0	1	*415*	2	165	24	0	32	0	1	3	229	0	0	1	0	1
12:30	3	131	19	0	13	0	0	1	213	3	0	6	0	2	*391*	3	145	21	0	14	0	0	1	235	3	0	7	0	2
12:45	2	119	15	0	31	0	4	0	150	1	0	0	1	0	*323*	2	131	17	0	34	0	4	0	166	1	0	0	1	0
TOTAL	**10**	**534**	**87**	**0**	**97**	**0**	**8**	**5**	**803**	**6**	**0**	**7**	**2**	**4**	***1,563***	**10**	**590**	**96**	**0**	**107**	**0**	**8**	**5**	**887**	**6**	**0**	**8**	**2**	**4**
13:00	1	146	12	1	28	0	2	2	181	2	0	1	1	2	*379*	1	161	13	1	31	0	2	2	200	2	0	1	1	2
13:15	3	143	14	1	18	2	3	1	194	1	1	0	0	1	*382*	3	158	15	1	20	2	3	1	214	1	1	0	0	1
13:30	3	159	17	0	16	0	1	6	136	1	0	0	1	1	*341*	3	176	19	0	18	0	1	7	150	1	0	0	1	1
13:45	0	148	13	0	21	0	4	3	177	0	0	1	0	1	*368*	0	163	14	0	23	0	4	3	196	0	0	1	0	1
TOTAL	**7**	**596**	**56**	**2**	**83**	**2**	**10**	**12**	**688**	**4**	**1**	**2**	**2**	**5**	***1,470***	**7**	**658**	**61**	**2**	**92**	**2**	**10**	**13**	**760**	**4**	**1**	**2**	**2**	**5**
14:00	1	188	13	1	17	0	1	4	190	0	0	0	0	1	*416*	1	208	14	1	19	0	1	4	210	0	0	0	0	1
14:15	2	178	25	0	21	0	2	2	184	0	0	0	0	2	*416*	2	197	28	0	23	0	2	2	203	0	0	0	0	2
14:30	2	206	11	0	28	0	1	5	158	0	0	1	0	0	*412*	2	228	12	0	31	0	1	6	175	0	0	1	0	0
14:45	1	183	17	0	15	0	1	3	209	2	0	1	1	1	*434*	1	202	19	0	17	0	1	3	231	2	0	1	1	1
TOTAL	**6**	**755**	**66**	**1**	**81**	**0**	**5**	**14**	**741**	**2**	**0**	**2**	**1**	**4**	***1,678***	**6**	**835**	**73**	**1**	**90**	**0**	**5**	**15**	**819**	**2**	**0**	**2**	**1**	**4**
15:00	1	199	18	1	41	1	3	6	184	0	0	0	0	4	*458*	1	220	20	1	45	1	3	7	203	0	0	0	0	4
15:15	0	195	29	0	26	0	3	1	202	0	0	0	0	0	*456*	0	215	32	0	29	0	3	1	223	0	0	0	0	0
15:30	1	216	24	1	24	1	1	1	195	2	0	1	0	0	*467*	1	239	27	1	27	1	1	1	215	2	0	1	0	0
15:45	2	229	25	0	24	0	3	3	185	1	0	2	0	1	*475*	2	253	28	0	27	0	3	3	204	1	0	2	0	1
TOTAL	**4**	**839**	**96**	**2**	**115**	**2**	**10**	**11**	**766**	**3**	**0**	**3**	**0**	**5**	***1,856***	**4**	**927**	**107**	**2**	**128**	**2**	**10**	**12**	**845**	**3**	**0**	**3**	**0**	**5**
16:00	1	240	30	2	20	1	1	1	186	1	0	1	1	1	*486*	1	265	33	2	22	1	1	1	205	1	0	1	1	1
16:15	2	274	27	0	27	0	1	1	209	0	0	0	0	0	*541*	2	303	30	0	30	0	1	1	231	0	0	0	0	0
16:30	1	211	36	0	28	0	0	1	229	0	0	8	1	10	*525*	1	233	40	0	31	0	0	1	253	0	0	9	1	11
16:45	0	250	46	1	25	0	0	2	198	1	0	0	1	1	*525*	0	276	51	1	28	0	0	2	219	1	0	0	1	1
TOTAL	**4**	**975**	**139**	**3**	**100**	**1**	**2**	**5**	**822**	**2**	**0**	**9**	**3**	**12**	***2,077***	**4**	**1,077**	**154**	**3**	**111**	**1**	**2**	**5**	**908**	**2**	**0**	**10**	**3**	**13**
17:00	0	237	34	2	41	0	1	0	185	5	0	3	0	0	*508*	0	262	38	2	45	0	1	0	204	6	0	3	0	0
17:15	0	273	27	0	23	0	2	0	202	1	0	0	1	0	*529*	0	302	30	0	25	0	2	0	223	1	0	0	1	0
17:30	2	248	28	1	21	0	0	0	222	0	0	1	0	2	*525*	2	274	31	1	23	0	0	0	245	0	0	1	0	2
17:45	1	214	30	0	19	0	4	0	159	1	1	1	0	1	*431*	1	236	33	0	21	0	4	0	176	1	1	1	0	1
TOTAL	**3**	**972**	**119**	**3**	**104**	**0**	**7**	**0**	**768**	**7**	**1**	**5**	**1**	**3**	***1,993***	**3**	**1,074**	**132**	**3**	**114**	**0**	**7**	**0**	**848**	**8**	**1**	**5**	**1**	**3**
18:00	0	197	25	0	18	0	2	3	158	2	0	0	0	0	*405*	0	218	28	0	20	0	2	3	175	2	0	0	0	0
18:15	0	177	22	1	9	0	0	2	160	0	0	0	2	1	*374*	0	196	24	1	10	0	0	2	177	0	0	0	2	1
18:30	0	155	24	1	12	0	1	0	130	0	0	0	0	0	*323*	0	171	27	1	13	0	1	0	144	0	0	0	0	0
18:45	0	133	21	0	15	0	0	0	93	2	0	0	0	0	*264*	0	147	23	0	17	0	0	0	103	2	0	0	0	0
TOTAL	**0**	**662**	**92**	**2**	**54**	**0**	**3**	**5**	**541**	**4**	**0**	**0**	**2**	**1**	***1,366***	**0**	**732**	**102**	**2**	**60**	**0**	**3**	**5**	**599**	**4**	**0**	**0**	**2**	**1**

APPENDIX G

CAPACITY ANALYSIS CALCULATIONS

FUTURE (2028) 'BUILD' CONDITIONS

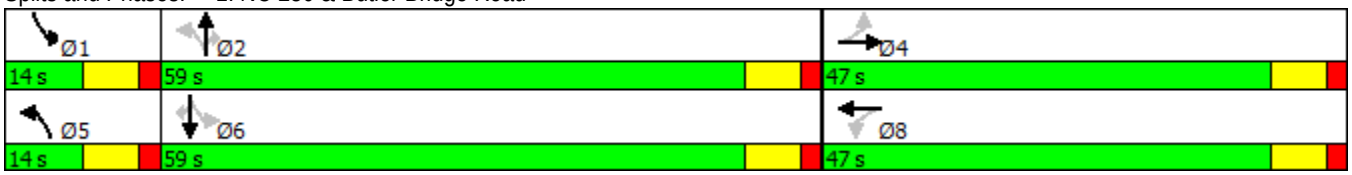
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	73	17	197	61	10	11	1126	140	22	664	17
Future Volume (vph)	19	73	17	197	61	10	11	1126	140	22	664	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-6%			1%			1%			-3%	
Storage Length (ft)	0		0	0		0	240		100	240		100
Storage Lanes	0		0	0		0	1		1	1		1
Taper Length (ft)	25			25			220			250		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.979			0.995				0.850			0.850
Flt Protected		0.991			0.965		0.950			0.950		
Satd. Flow (prot)	0	1861	0	0	1780	0	1761	3522	1575	1796	3592	1607
Flt Permitted		0.914			0.716		0.312			0.102		
Satd. Flow (perm)	0	1717	0	0	1320	0	578	3522	1575	193	3592	1607
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			55			55	
Link Distance (ft)		1263			755			1761			2656	
Travel Time (s)		24.6			14.7			21.8			32.9	
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)	21	81	19	219	68	11	12	1251	156	24	738	19
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	121	0	0	298	0	12	1251	156	24	738	19
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	15.0	15.0		14.0	14.0		14.0	27.0	27.0	14.0	27.0	27.0
Total Split (s)	47.0	47.0		47.0	47.0		14.0	59.0	59.0	14.0	59.0	59.0
Total Split (%)	39.2%	39.2%		39.2%	39.2%		11.7%	49.2%	49.2%	11.7%	49.2%	49.2%
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-2.0			-2.0		-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)		29.7			29.7		45.3	42.6	42.6	46.0	44.7	44.7
Actuated g/C Ratio		0.34			0.34		0.52	0.49	0.49	0.52	0.51	0.51
v/c Ratio		0.21			0.67		0.03	0.73	0.20	0.08	0.40	0.02
Control Delay		25.4			36.2		11.0	23.1	16.7	11.4	15.2	14.3
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		25.4			36.2		11.0	23.1	16.7	11.4	15.2	14.3
LOS		C			D		B	C	B	B	B	B
Approach Delay		25.4			36.2			22.3			15.1	
Approach LOS		C			D			C			B	
Queue Length 50th (ft)		46			136		3	254	43	6	121	5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)		112			296		13	517	119	20	257	22
Internal Link Dist (ft)		1183			675			1681			2576	
Turn Bay Length (ft)							240		100	240		100
Base Capacity (vph)		921			708		434	2378	1063	285	2512	1124
Starvation Cap Reductn		0			0		0	0	0	0	0	0
Spillback Cap Reductn		0			0		0	0	0	0	0	0
Storage Cap Reductn		0			0		0	0	0	0	0	0
Reduced v/c Ratio		0.13			0.42		0.03	0.53	0.15	0.08	0.29	0.02

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 87.7
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 21.9 Intersection LOS: C
Intersection Capacity Utilization 60.9% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: NC 280 & Butler Bridge Road



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	462	602	324	1000	872	239
Future Volume (vph)	462	602	324	1000	872	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			-2%	2%	
Storage Length (ft)	0	350	250			0
Storage Lanes	1	1	1			0
Taper Length (ft)	0		100			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.968	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1787	3575	3392	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1787	3575	3392	0
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	35			45	45	
Link Distance (ft)	885			1804	1767	
Travel Time (s)	17.2			27.3	26.8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	513	669	360	1111	969	266
Shared Lane Traffic (%)						
Lane Group Flow (vph)	513	669	360	1111	1235	0
Turn Type	Prot	pm+ov	Prot	NA	NA	
Protected Phases	4	5	5	2	6	
Permitted Phases		4				
Detector Phase	4	5	5	2	6	
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	12.0	12.0	
Minimum Split (s)	14.0	14.0	14.0	19.0	19.0	
Total Split (s)	40.0	30.0	30.0	80.0	50.0	
Total Split (%)	33.3%	25.0%	25.0%	66.7%	41.7%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Lead/Lag		Lead	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Recall Mode	None	None	None	C-Min	C-Min	
Act Effct Green (s)	35.0	65.0	25.0	75.0	45.0	
Actuated g/C Ratio	0.29	0.54	0.21	0.62	0.38	
v/c Ratio	0.99	0.78	0.97	0.50	0.97	
Control Delay	81.1	29.8	86.8	13.2	56.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	81.1	29.8	86.8	13.2	56.4	
LOS	F	C	F	B	E	
Approach Delay	52.1			31.2	56.4	
Approach LOS	D			C	E	
Queue Length 50th (ft)	396	394	279	229	490	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Length 95th (ft)	#624	568	#470	280	#645	
Internal Link Dist (ft)	805			1724	1687	
Turn Bay Length (ft)		350	250			
Base Capacity (vph)	516	857	372	2234	1272	
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	0.99	0.78	0.97	0.50	0.97	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 45.6 Intersection LOS: D
Intersection Capacity Utilization 87.8% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: US 25 & Butler Bridge Road

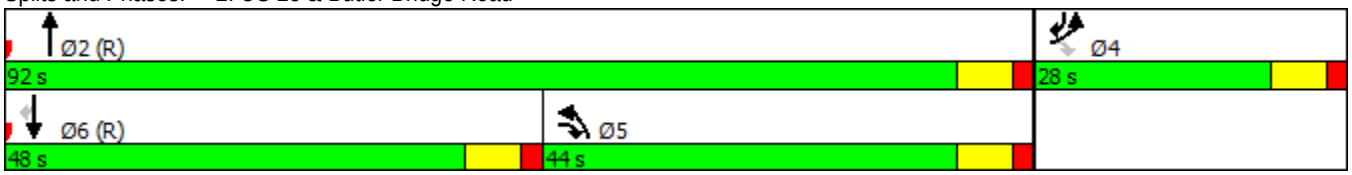
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	462	602	324	1000	872	239
Future Volume (vph)	462	602	324	1000	872	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			-2%	2%	
Storage Length (ft)	250	350	500			350
Storage Lanes	1	1	1			1
Taper Length (ft)	100		100			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3433	1583	1787	3575	3504	1567
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3433	1583	1787	3575	3504	1567
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	35			45	45	
Link Distance (ft)	885			1804	1767	
Travel Time (s)	17.2			27.3	26.8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	513	669	360	1111	969	266
Shared Lane Traffic (%)						
Lane Group Flow (vph)	513	669	360	1111	969	266
Turn Type	Prot	pm+ov	Prot	NA	NA	pm+ov
Protected Phases	4	5	5	2	6	4
Permitted Phases		4				6
Detector Phase	4	5	5	2	6	4
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	12.0	12.0	7.0
Minimum Split (s)	14.0	14.0	14.0	19.0	19.0	14.0
Total Split (s)	28.0	44.0	44.0	92.0	48.0	28.0
Total Split (%)	23.3%	36.7%	36.7%	76.7%	40.0%	23.3%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lag		Lead	
Lead-Lag Optimize?		Yes	Yes		Yes	
Recall Mode	None	None	None	C-Min	C-Min	None
Act Effct Green (s)	22.3	66.5	39.2	87.7	43.5	70.8
Actuated g/C Ratio	0.19	0.55	0.33	0.73	0.36	0.59
v/c Ratio	0.80	0.76	0.62	0.43	0.76	0.29
Control Delay	52.5	23.6	39.5	7.0	38.8	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.5	23.6	39.5	7.0	38.8	13.3
LOS	D	C	D	A	D	B
Approach Delay	36.2			14.9	33.3	
Approach LOS	D			B	C	
Queue Length 50th (ft)	203	255	232	158	352	98

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Length 95th (ft)	255	486	340	194	429	146
Internal Link Dist (ft)	805			1724	1687	
Turn Bay Length (ft)	250	350	500			350
Base Capacity (vph)	657	870	590	2611	1288	907
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.77	0.61	0.43	0.75	0.29

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 64 (53%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 27.2 Intersection LOS: C
Intersection Capacity Utilization 69.7% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 2: US 25 & Butler Bridge Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	7	4	4	7	6	298	4	4	1144	7	4	172
Future Volume (vph)	7	4	4	7	6	298	4	4	1144	7	4	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0		225		100		220
Storage Lanes	0		0	0		0		1		1		1
Taper Length (ft)	25			25				250				300
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Frt		0.966			0.871					0.850		
Flt Protected		0.976			0.999			0.950				0.950
Satd. Flow (prot)	0	1756	0	0	1621	0	0	1770	3539	1583	0	1770
Flt Permitted		0.839			0.995			0.361				0.950
Satd. Flow (perm)	0	1510	0	0	1614	0	0	672	3539	1583	0	1770
Right Turn on Red			No			No				No		
Satd. Flow (RTOR)												
Link Speed (mph)		35			35				55			
Link Distance (ft)		1369			198				2656			
Travel Time (s)		26.7			3.9				32.9			
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	4	4	8	7	331	4	4	1271	8	4	191
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	16	0	0	346	0	0	8	1271	8	0	195
Turn Type	Perm	NA		Perm	NA		Perm	Perm	NA	Perm	Prot	Prot
Protected Phases		4			8				2		1	1
Permitted Phases	4			8			2	2		2		
Detector Phase	4	4		8	8		2	2	2	2	1	1
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		14.0	14.0	14.0	14.0	7.0	7.0
Minimum Split (s)	14.0	14.0		14.0	14.0		21.0	21.0	21.0	21.0	14.0	14.0
Total Split (s)	29.0	29.0		29.0	29.0		43.0	43.0	43.0	43.0	18.0	18.0
Total Split (%)	32.2%	32.2%		32.2%	32.2%		47.8%	47.8%	47.8%	47.8%	20.0%	20.0%
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-2.0			-2.0			-2.0	-2.0	-2.0		-2.0
Total Lost Time (s)		5.0			5.0			5.0	5.0	5.0		5.0
Lead/Lag							Lag	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		Min	Min	Min	Min	None	None
Act Effct Green (s)		22.5			22.5			36.2	36.2	36.2		12.7
Actuated g/C Ratio		0.26			0.26			0.42	0.42	0.42		0.15
v/c Ratio		0.04			0.83			0.03	0.86	0.01		0.75
Control Delay		25.0			48.7			15.7	30.3	15.3		55.9
Queue Delay		0.0			0.0			0.0	0.0	0.0		0.0
Total Delay		25.0			48.7			15.7	30.3	15.3		55.9
LOS		C			D			B	C	B		E
Approach Delay		25.0			48.7				30.1			
Approach LOS		C			D				C			
Queue Length 50th (ft)		7			184			3	333	3		108
Queue Length 95th (ft)		23			#324			11	426	11		#213

Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	691	10
Future Volume (vph)	691	10
Ideal Flow (vphpl)	1900	1900
Storage Length (ft)		100
Storage Lanes		1
Taper Length (ft)		
Lane Util. Factor	0.95	1.00
Frt		0.850
Flt Protected		
Satd. Flow (prot)	3539	1583
Flt Permitted		
Satd. Flow (perm)	3539	1583
Right Turn on Red		No
Satd. Flow (RTOR)		
Link Speed (mph)	55	
Link Distance (ft)	1995	
Travel Time (s)	24.7	
Peak Hour Factor	0.90	0.90
Adj. Flow (vph)	768	11
Shared Lane Traffic (%)		
Lane Group Flow (vph)	768	11
Turn Type	NA	Perm
Protected Phases	6	
Permitted Phases		6
Detector Phase	6	6
Switch Phase		
Minimum Initial (s)	14.0	14.0
Minimum Split (s)	21.0	21.0
Total Split (s)	61.0	61.0
Total Split (%)	67.8%	67.8%
Yellow Time (s)	5.0	5.0
All-Red Time (s)	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0
Total Lost Time (s)	5.0	5.0
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	Min	Min
Act Effct Green (s)	54.0	54.0
Actuated g/C Ratio	0.62	0.62
v/c Ratio	0.35	0.01
Control Delay	8.5	6.6
Queue Delay	0.0	0.0
Total Delay	8.5	6.6
LOS	A	A
Approach Delay	18.0	
Approach LOS	B	
Queue Length 50th (ft)	100	2
Queue Length 95th (ft)	132	8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Internal Link Dist (ft)		1289			118				2576			
Turn Bay Length (ft)								225		100		220
Base Capacity (vph)		421			451			297	1565	700		267
Starvation Cap Reductn		0			0			0	0	0		0
Spillback Cap Reductn		0			0			0	0	0		0
Storage Cap Reductn		0			0			0	0	0		0
Reduced v/c Ratio		0.04			0.77			0.03	0.81	0.01		0.73

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 86.5
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 28.0 Intersection LOS: C
Intersection Capacity Utilization 73.0% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: NC 280 & Fanning Fields Road

Lane Group	SBT	SBR
Internal Link Dist (ft)	1915	
Turn Bay Length (ft)		100
Base Capacity (vph)	2307	1031
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.33	0.01

Intersection Summary

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	235	271	327	138	6
Future Vol, veh/h	4	235	271	327	138	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
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	4	261	301	363	153	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	664	0	-	0	752	483
Stage 1	-	-	-	-	483	-
Stage 2	-	-	-	-	269	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	925	-	-	-	378	584
Stage 1	-	-	-	-	620	-
Stage 2	-	-	-	-	776	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	925	-	-	-	376	584
Mov Cap-2 Maneuver	-	-	-	-	376	-
Stage 1	-	-	-	-	617	-
Stage 2	-	-	-	-	776	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	21
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	925	-	-	-	382
HCM Lane V/C Ratio	0.005	-	-	-	0.419
HCM Control Delay (s)	8.9	0	-	-	21
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	2

Intersection												
Int Delay, s/veh	2.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	296	14	70	531	4	8	4	112	4	4	4
Future Vol, veh/h	4	296	14	70	531	4	8	4	112	4	4	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	None
Storage Length	-	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	329	16	78	590	4	9	4	124	4	4	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	594	0	0	345	0	0	1097	1095	337	1095	1101	592
Stage 1	-	-	-	-	-	-	345	345	-	748	748	-
Stage 2	-	-	-	-	-	-	752	750	-	347	353	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	982	-	-	1214	-	-	191	214	705	191	212	506
Stage 1	-	-	-	-	-	-	671	636	-	404	420	-
Stage 2	-	-	-	-	-	-	402	419	-	669	631	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	982	-	-	1214	-	-	176	199	705	146	197	506
Mov Cap-2 Maneuver	-	-	-	-	-	-	176	199	-	146	197	-
Stage 1	-	-	-	-	-	-	668	633	-	402	393	-
Stage 2	-	-	-	-	-	-	369	392	-	544	628	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.9	10.6	22.8
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	781	982	-	-	1214	-	-	216
HCM Lane V/C Ratio	0.176	0.005	-	-	0.064	-	-	0.062
HCM Control Delay (s)	10.6	8.7	0	-	8.2	-	-	22.8
HCM Lane LOS	B	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0.6	0	-	-	0.2	-	-	0.2

Intersection	
Int Delay, s/veh	6.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	365	31	14	474	22	67	4	52	70	4	47
Future Vol, veh/h	15	365	31	14	474	22	67	4	52	70	4	47
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	60	-	100	-	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	406	34	16	527	24	74	4	58	78	4	52

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	551	0	0	440	0	0	1056	1040	423	1047	1033	527
Stage 1	-	-	-	-	-	-	457	457	-	559	559	-
Stage 2	-	-	-	-	-	-	599	583	-	488	474	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1019	-	-	1120	-	-	203	230	631	206	232	551
Stage 1	-	-	-	-	-	-	583	568	-	513	511	-
Stage 2	-	-	-	-	-	-	488	499	-	561	558	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1019	-	-	1120	-	-	177	223	631	180	225	551
Mov Cap-2 Maneuver	-	-	-	-	-	-	177	223	-	180	225	-
Stage 1	-	-	-	-	-	-	573	558	-	504	504	-
Stage 2	-	-	-	-	-	-	432	492	-	497	549	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.2	33.9	28.4
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	257	1019	-	-	1120	-	-	180	495
HCM Lane V/C Ratio	0.532	0.016	-	-	0.014	-	-	0.432	0.114
HCM Control Delay (s)	33.9	8.6	-	-	8.3	-	-	39.4	13.2
HCM Lane LOS	D	A	-	-	A	-	-	E	B
HCM 95th %tile Q(veh)	2.9	0.1	-	-	0	-	-	2	0.4

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	646	11	14	423	30	113
Future Vol, veh/h	646	11	14	423	30	113
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	75	-	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	718	12	16	470	33	126

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	730	0	1226	724
Stage 1	-	-	-	-	724	-
Stage 2	-	-	-	-	502	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	874	-	197	426
Stage 1	-	-	-	-	480	-
Stage 2	-	-	-	-	608	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	874	-	193	426
Mov Cap-2 Maneuver	-	-	-	-	193	-
Stage 1	-	-	-	-	480	-
Stage 2	-	-	-	-	597	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	14.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	539	-	-	874	-
HCM Lane V/C Ratio	0.295	-	-	0.018	-
HCM Control Delay (s)	14.4	-	-	9.2	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	1.2	-	-	0.1	-

Intersection	
Int Delay, s/veh	18.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	688	67	145	395	59	336
Future Vol, veh/h	688	67	145	395	59	336
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	300	-	0	180
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	764	74	161	439	66	373

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	838	0	1562	801
Stage 1	-	-	-	-	801	-
Stage 2	-	-	-	-	761	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	796	-	123	384
Stage 1	-	-	-	-	442	-
Stage 2	-	-	-	-	461	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	796	-	98	384
Mov Cap-2 Maneuver	-	-	-	-	98	-
Stage 1	-	-	-	-	442	-
Stage 2	-	-	-	-	368	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.9	76
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	98	384	-	-	796	-
HCM Lane V/C Ratio	0.669	0.972	-	-	0.202	-
HCM Control Delay (s)	96.1	72.5	-	-	10.7	-
HCM Lane LOS	F	F	-	-	B	-
HCM 95th %tile Q(veh)	3.3	11.2	-	-	0.8	-

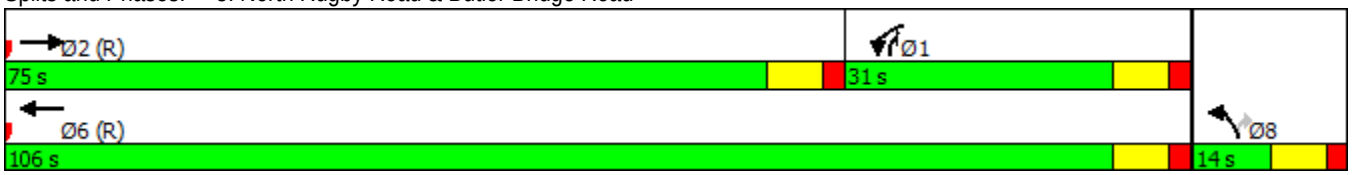
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	688	67	145	395	59	336
Future Volume (vph)	688	67	145	395	59	336
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	300		180	0
Storage Lanes		0	1		1	1
Taper Length (ft)			100		150	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.988					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1840	0	1770	1863	1770	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1840	0	1770	1863	1770	1583
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	35			35	45	
Link Distance (ft)	1951			885	1836	
Travel Time (s)	38.0			17.2	27.8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	764	74	161	439	66	373
Shared Lane Traffic (%)						
Lane Group Flow (vph)	838	0	161	439	66	373
Turn Type	NA		Prot	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases						8
Detector Phase	2		1	6	8	1
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	7.0	7.0
Minimum Split (s)	17.0		14.0	17.0	14.0	14.0
Total Split (s)	75.0		31.0	106.0	14.0	31.0
Total Split (%)	62.5%		25.8%	88.3%	11.7%	25.8%
Yellow Time (s)	5.0		5.0	5.0	5.0	5.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0		5.0	5.0	5.0	5.0
Lead/Lag	Lead		Lag			Lag
Lead-Lag Optimize?	Yes		Yes			Yes
Recall Mode	C-Min		None	C-Min	None	None
Act Effct Green (s)	70.3		27.6	104.0	9.8	39.7
Actuated g/C Ratio	0.59		0.23	0.87	0.08	0.33
v/c Ratio	0.78		0.40	0.27	0.46	0.71
Control Delay	26.2		34.6	1.1	63.5	43.4
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	26.2		34.6	1.1	63.5	43.4
LOS	C		C	A	E	D
Approach Delay	26.2			10.1	46.4	
Approach LOS	C			B	D	
Queue Length 50th (ft)	564		98	23	49	221
Queue Length 95th (ft)	654		195	25	98	367

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Internal Link Dist (ft)	1871			805	1756	
Turn Bay Length (ft)			300		180	
Base Capacity (vph)	1114		407	1627	144	523
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	0.75		0.40	0.27	0.46	0.71

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 104 (87%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 25.8 Intersection LOS: C
Intersection Capacity Utilization 69.4% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 8: North Rugby Road & Butler Bridge Road



Intersection	
Int Delay, s/veh	15.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	45	447	386	67	210	140
Future Vol, veh/h	45	447	386	67	210	140
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	0	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	50	497	429	74	233	156

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	503	0	-	0	1026	429
Stage 1	-	-	-	-	429	-
Stage 2	-	-	-	-	597	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1061	-	-	-	260	626
Stage 1	-	-	-	-	657	-
Stage 2	-	-	-	-	550	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1061	-	-	-	248	626
Mov Cap-2 Maneuver	-	-	-	-	248	-
Stage 1	-	-	-	-	626	-
Stage 2	-	-	-	-	550	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	56.5
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1061	-	-	-	248	626
HCM Lane V/C Ratio	0.047	-	-	-	0.941	0.248
HCM Control Delay (s)	8.6	-	-	-	85.7	12.6
HCM Lane LOS	A	-	-	-	F	B
HCM 95th %tile Q(veh)	0.1	-	-	-	8.5	1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	74	6	175	56	9	13	880	183	11	1129	49
Future Volume (vph)	29	74	6	175	56	9	13	880	183	11	1129	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-6%			1%			1%			-3%	
Storage Length (ft)	0		0	0		0	240		100	240		100
Storage Lanes	0		0	0		0	1		1	1		1
Taper Length (ft)	25			25			220			250		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.992			0.995				0.850			0.850
Flt Protected		0.987			0.965		0.950			0.950		
Satd. Flow (prot)	0	1879	0	0	1780	0	1761	3522	1575	1796	3592	1607
Flt Permitted		0.881			0.723		0.106			0.210		
Satd. Flow (perm)	0	1677	0	0	1333	0	196	3522	1575	397	3592	1607
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			55			55	
Link Distance (ft)		1254			777			1763			2668	
Travel Time (s)		24.4			15.1			21.9			33.1	
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)	32	82	7	194	62	10	14	978	203	12	1254	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	121	0	0	266	0	14	978	203	12	1254	54
Turn Type	Perm	NA		Perm	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	4	4		8	8		5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	14.0	14.0		14.0	14.0		14.0	27.0	27.0	14.0	27.0	27.0
Total Split (s)	44.0	44.0		44.0	44.0		14.0	62.0	62.0	14.0	62.0	62.0
Total Split (%)	36.7%	36.7%		36.7%	36.7%		11.7%	51.7%	51.7%	11.7%	51.7%	51.7%
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-2.0			-2.0		-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)		5.0			5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		None	Min	Min	None	Min	Min
Act Effct Green (s)		26.1			26.1		43.4	42.1	42.1	42.6	40.1	40.1
Actuated g/C Ratio		0.32			0.32		0.53	0.52	0.52	0.52	0.49	0.49
v/c Ratio		0.23			0.62		0.05	0.54	0.25	0.03	0.71	0.07
Control Delay		25.8			34.6		9.8	15.4	13.6	9.7	20.6	14.5
Queue Delay		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		25.8			34.6		9.8	15.4	13.6	9.7	20.6	14.5
LOS		C			C		A	B	B	A	C	B
Approach Delay		25.8			34.6			15.0			20.3	
Approach LOS		C			C			B			C	
Queue Length 50th (ft)		36			93		3	138	45	2	196	11

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)		117			269		13	348	146	12	486	46
Internal Link Dist (ft)		1174			697			1683			2588	
Turn Bay Length (ft)							240		100	240		100
Base Capacity (vph)		909			722		300	2709	1211	382	2705	1210
Starvation Cap Reductn		0			0		0	0	0	0	0	0
Spillback Cap Reductn		0			0		0	0	0	0	0	0
Storage Cap Reductn		0			0		0	0	0	0	0	0
Reduced v/c Ratio		0.13			0.37		0.05	0.36	0.17	0.03	0.46	0.04

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 81.4
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 19.7 Intersection LOS: B
Intersection Capacity Utilization 59.4% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: NC 280 & Butler Bridge Road

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	327	426	469	997	1096	434
Future Volume (vph)	327	426	469	997	1096	434
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			-2%	2%	
Storage Length (ft)	0	350	250			0
Storage Lanes	1	1	1			0
Taper Length (ft)	100		100			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.957	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1787	3575	3353	0
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1770	1583	1787	3575	3353	0
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	35			45	45	
Link Distance (ft)	885			1804	1780	
Travel Time (s)	17.2			27.3	27.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	363	473	521	1108	1218	482
Shared Lane Traffic (%)						
Lane Group Flow (vph)	363	473	521	1108	1700	0
Turn Type	Prot	pm+ov	Prot	NA	NA	
Protected Phases	4	5	5	2	6	
Permitted Phases		4				
Detector Phase	4	5	5	2	6	
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	12.0	12.0	
Minimum Split (s)	14.0	14.0	14.0	19.0	19.0	
Total Split (s)	29.0	39.0	39.0	106.0	67.0	
Total Split (%)	21.5%	28.9%	28.9%	78.5%	49.6%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	
Lead/Lag		Lead	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Recall Mode	None	None	None	C-Min	C-Min	
Act Effct Green (s)	24.0	63.0	34.0	101.0	62.0	
Actuated g/C Ratio	0.18	0.47	0.25	0.75	0.46	
v/c Ratio	1.16	0.64	1.16	0.41	1.10	
Control Delay	148.4	32.3	137.9	6.7	92.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	148.4	32.3	137.9	6.7	92.2	
LOS	F	C	F	A	F	
Approach Delay	82.7			48.7	92.2	
Approach LOS	F			D	F	
Queue Length 50th (ft)	~374	309	~539	164	~891	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Length 95th (ft)	#575	434	#763	197	#1030	
Internal Link Dist (ft)	805			1724	1700	
Turn Bay Length (ft)		350	250			
Base Capacity (vph)	314	738	450	2674	1539	
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	1.16	0.64	1.16	0.41	1.10	

Intersection Summary

Area Type: Other
Cycle Length: 135
Actuated Cycle Length: 135
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.16
Intersection Signal Delay: 73.3 Intersection LOS: E
Intersection Capacity Utilization 100.8% ICU Level of Service G
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.

Splits and Phases: 2: US 25 & Butler Bridge Road

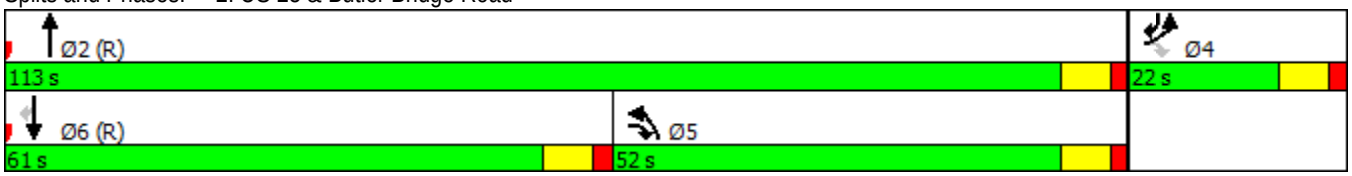
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	327	426	469	997	1096	434
Future Volume (vph)	327	426	469	997	1096	434
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%			-2%	2%	
Storage Length (ft)	250	350	500			350
Storage Lanes	1	1	1			1
Taper Length (ft)	100		100			
Lane Util. Factor	0.97	1.00	1.00	0.95	0.95	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3433	1583	1787	3575	3504	1567
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3433	1583	1787	3575	3504	1567
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	35			45	45	
Link Distance (ft)	885			1804	1780	
Travel Time (s)	17.2			27.3	27.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	363	473	521	1108	1218	482
Shared Lane Traffic (%)						
Lane Group Flow (vph)	363	473	521	1108	1218	482
Turn Type	Prot	pm+ov	Prot	NA	NA	pm+ov
Protected Phases	4	5	5	2	6	4
Permitted Phases		4				6
Detector Phase	4	5	5	2	6	4
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	12.0	12.0	7.0
Minimum Split (s)	14.0	14.0	14.0	19.0	19.0	14.0
Total Split (s)	22.0	52.0	52.0	113.0	61.0	22.0
Total Split (%)	16.3%	38.5%	38.5%	83.7%	45.2%	16.3%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag		Lag	Lag		Lead	
Lead-Lag Optimize?		Yes	Yes		Yes	
Recall Mode	None	None	None	C-Min	C-Min	None
Act Effct Green (s)	19.1	68.3	44.2	105.9	56.7	80.8
Actuated g/C Ratio	0.14	0.51	0.33	0.78	0.42	0.60
v/c Ratio	0.75	0.59	0.89	0.40	0.83	0.51
Control Delay	60.1	22.7	61.4	4.9	41.0	18.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.1	22.7	61.4	4.9	41.0	18.8
LOS	E	C	E	A	D	B
Approach Delay	38.9			23.0	34.7	
Approach LOS	D			C	C	
Queue Length 50th (ft)	150	273	419	123	498	247

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Queue Length 95th (ft)	#245	306	#606	147	595	345
Internal Link Dist (ft)	805			1724	1700	
Turn Bay Length (ft)	250	350	500			350
Base Capacity (vph)	484	797	622	2860	1491	938
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.59	0.84	0.39	0.82	0.51

Intersection Summary

Area Type: Other
Cycle Length: 135
Actuated Cycle Length: 135
Offset: 8 (6%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 31.0 Intersection LOS: C
Intersection Capacity Utilization 78.1% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: US 25 & Butler Bridge Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	12	4	12	4	4	191	4	7	907	4	4	255
Future Volume (vph)	12	4	12	4	4	191	4	7	907	4	4	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0		225		100		220
Storage Lanes	0		0	0		0		1		1		1
Taper Length (ft)	25			25				250				300
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Frt		0.941			0.870					0.850		
Flt Protected		0.979			0.999			0.950				0.950
Satd. Flow (prot)	0	1716	0	0	1619	0	0	1770	3539	1583	0	1770
Flt Permitted		0.845			0.996			0.211				0.950
Satd. Flow (perm)	0	1481	0	0	1614	0	0	393	3539	1583	0	1770
Right Turn on Red			No			No				No		
Satd. Flow (RTOR)												
Link Speed (mph)		35			35				55			
Link Distance (ft)		1356			198				2668			
Travel Time (s)		26.4			3.9				33.1			
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)	13	4	13	4	4	212	4	8	1008	4	4	283
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	30	0	0	220	0	0	12	1008	4	0	287
Turn Type	Perm	NA		Perm	NA		Perm	Perm	NA	Perm	Prot	Prot
Protected Phases		4			8				2		1	1
Permitted Phases	4			8			2	2		2		
Detector Phase	4	4		8	8		2	2	2	2	1	1
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		14.0	14.0	14.0	14.0	7.0	7.0
Minimum Split (s)	14.0	14.0		14.0	14.0		21.0	21.0	21.0	21.0	14.0	14.0
Total Split (s)	25.0	25.0		25.0	25.0		39.0	39.0	39.0	39.0	26.0	26.0
Total Split (%)	27.8%	27.8%		27.8%	27.8%		43.3%	43.3%	43.3%	43.3%	28.9%	28.9%
Yellow Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		-2.0			-2.0			-2.0	-2.0	-2.0		-2.0
Total Lost Time (s)		5.0			5.0			5.0	5.0	5.0		5.0
Lead/Lag							Lag	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	None		Min	Min	Min	Min	None	None
Act Effct Green (s)		15.1			17.1			30.1	30.1	30.1		18.6
Actuated g/C Ratio		0.19			0.21			0.37	0.37	0.37		0.23
v/c Ratio		0.11			0.65			0.08	0.77	0.01		0.71
Control Delay		29.2			40.6			19.9	27.6	17.5		41.0
Queue Delay		0.0			0.0			0.0	0.0	0.0		0.0
Total Delay		29.2			40.6			19.9	27.6	17.5		41.0
LOS		C			D			B	C	B		D
Approach Delay		29.2			40.6				27.5			
Approach LOS		C			D				C			
Queue Length 50th (ft)		14			113			4	253	1		148
Queue Length 95th (ft)		37			189			17	333	8		#242

Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	1175	4
Future Volume (vph)	1175	4
Ideal Flow (vphpl)	1900	1900
Storage Length (ft)		100
Storage Lanes		1
Taper Length (ft)		
Lane Util. Factor	0.95	1.00
Frt		0.850
Flt Protected		
Satd. Flow (prot)	3539	1583
Flt Permitted		
Satd. Flow (perm)	3539	1583
Right Turn on Red		No
Satd. Flow (RTOR)		
Link Speed (mph)	55	
Link Distance (ft)	1995	
Travel Time (s)	24.7	
Peak Hour Factor	0.90	0.90
Adj. Flow (vph)	1306	4
Shared Lane Traffic (%)		
Lane Group Flow (vph)	1306	4
Turn Type	NA	Perm
Protected Phases	6	
Permitted Phases		6
Detector Phase	6	6
Switch Phase		
Minimum Initial (s)	14.0	14.0
Minimum Split (s)	21.0	21.0
Total Split (s)	65.0	65.0
Total Split (%)	72.2%	72.2%
Yellow Time (s)	5.0	5.0
All-Red Time (s)	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0
Total Lost Time (s)	5.0	5.0
Lead/Lag		
Lead-Lag Optimize?		
Recall Mode	Min	Min
Act Effct Green (s)	53.8	53.8
Actuated g/C Ratio	0.66	0.66
v/c Ratio	0.56	0.00
Control Delay	8.5	5.0
Queue Delay	0.0	0.0
Total Delay	8.5	5.0
LOS	A	A
Approach Delay	14.3	
Approach LOS	B	
Queue Length 50th (ft)	175	1
Queue Length 95th (ft)	232	4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Internal Link Dist (ft)		1276			118				2588			
Turn Bay Length (ft)								225		100		220
Base Capacity (vph)		374			408			168	1521	681		470
Starvation Cap Reductn		0			0			0	0	0		0
Spillback Cap Reductn		0			0			0	0	0		0
Storage Cap Reductn		0			0			0	0	0		0
Reduced v/c Ratio		0.08			0.54			0.07	0.66	0.01		0.61

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 81.1
Natural Cycle: 55
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 21.2 Intersection LOS: C
Intersection Capacity Utilization 68.9% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: NC 280 & Fanning Fields Road

Lane Group	SBT	SBR
Internal Link Dist (ft)	1915	
Turn Bay Length (ft)		100
Base Capacity (vph)	2685	1201
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.49	0.00

Intersection Summary

Intersection	
Int Delay, s/veh	8.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	6	259	236	153	264	8
Future Vol, veh/h	6	259	236	153	264	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
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	7	288	262	170	293	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	432	0	-	0	649	347
Stage 1	-	-	-	-	347	-
Stage 2	-	-	-	-	302	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1128	-	-	-	434	696
Stage 1	-	-	-	-	716	-
Stage 2	-	-	-	-	750	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1128	-	-	-	431	696
Mov Cap-2 Maneuver	-	-	-	-	431	-
Stage 1	-	-	-	-	711	-
Stage 2	-	-	-	-	750	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	29.9
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1128	-	-	-	436
HCM Lane V/C Ratio	0.006	-	-	-	0.693
HCM Control Delay (s)	8.2	0	-	-	29.9
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	5.2

Intersection												
Int Delay, s/veh	1.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	501	12	66	336	4	6	4	45	4	4	4
Future Vol, veh/h	4	501	12	66	336	4	6	4	45	4	4	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	None
Storage Length	-	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	557	13	73	373	4	7	4	50	4	4	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	377	0	0	570	0	0	1097	1095	564	1095	1099	375
Stage 1	-	-	-	-	-	-	572	572	-	521	521	-
Stage 2	-	-	-	-	-	-	525	523	-	574	578	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1181	-	-	1002	-	-	191	214	525	191	212	671
Stage 1	-	-	-	-	-	-	505	504	-	539	532	-
Stage 2	-	-	-	-	-	-	536	530	-	504	501	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1181	-	-	1002	-	-	175	197	525	160	195	671
Mov Cap-2 Maneuver	-	-	-	-	-	-	175	197	-	160	195	-
Stage 1	-	-	-	-	-	-	502	501	-	536	493	-
Stage 2	-	-	-	-	-	-	489	491	-	450	498	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.4	11.2	21.4
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	642	1181	-	-	1002	-	-	233
HCM Lane V/C Ratio	0.095	0.004	-	-	0.073	-	-	0.057
HCM Control Delay (s)	11.2	8.1	0	-	8.9	-	-	21.4
HCM Lane LOS	B	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0.3	0	-	-	0.2	-	-	0.2

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	48	455	55	20	351	72	18	4	20	42	4	29
Future Vol, veh/h	48	455	55	20	351	72	18	4	20	42	4	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	60	-	100	-	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	90	90	90	90	92	90	92	90	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	52	506	61	22	390	78	20	4	22	46	4	32

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	468	0	0	567	0	0	1132	1153	537	1088	1105	390
Stage 1	-	-	-	-	-	-	641	641	-	434	434	-
Stage 2	-	-	-	-	-	-	491	512	-	654	671	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1094	-	-	1005	-	-	180	197	544	193	211	658
Stage 1	-	-	-	-	-	-	463	469	-	600	581	-
Stage 2	-	-	-	-	-	-	559	536	-	456	455	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1094	-	-	1005	-	-	160	183	544	172	196	658
Mov Cap-2 Maneuver	-	-	-	-	-	-	160	183	-	172	196	-
Stage 1	-	-	-	-	-	-	441	446	-	571	568	-
Stage 2	-	-	-	-	-	-	517	524	-	413	433	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.4	23	24.2
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	246	1094	-	-	1005	-	-	172	512
HCM Lane V/C Ratio	0.189	0.048	-	-	0.022	-	-	0.265	0.07
HCM Control Delay (s)	23	8.5	-	-	8.7	-	-	33.3	12.6
HCM Lane LOS	C	A	-	-	A	-	-	D	B
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0.1	-	-	1	0.2

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	481	18	93	582	8	60
Future Vol, veh/h	481	18	93	582	8	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	75	-	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	534	20	103	647	9	67

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	554	0	1397	544
Stage 1	-	-	-	-	544	-
Stage 2	-	-	-	-	853	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1016	-	155	539
Stage 1	-	-	-	-	582	-
Stage 2	-	-	-	-	418	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1016	-	139	539
Mov Cap-2 Maneuver	-	-	-	-	139	-
Stage 1	-	-	-	-	582	-
Stage 2	-	-	-	-	376	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.2	11.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	611	-	-	1016	-
HCM Lane V/C Ratio	0.124	-	-	0.102	-
HCM Control Delay (s)	11.7	-	-	8.9	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.4	-	-	0.3	-

Intersection	
Int Delay, s/veh	19.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	500	60	295	620	62	251
Future Vol, veh/h	500	60	295	620	62	251
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	300	-	0	180
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	556	67	328	689	69	279

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	623	0	1935	590
Stage 1	-	-	-	-	590	-
Stage 2	-	-	-	-	1345	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	958	-	72	508
Stage 1	-	-	-	-	554	-
Stage 2	-	-	-	-	243	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	958	-	~ 47	508
Mov Cap-2 Maneuver	-	-	-	-	~ 47	-
Stage 1	-	-	-	-	554	-
Stage 2	-	-	-	-	160	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.4	102.4
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	47	508	-	-	958	-
HCM Lane V/C Ratio	1.466	0.549	-	-	0.342	-
HCM Control Delay (s)	$ 434.4	20.4	-	-	10.7	-
HCM Lane LOS	F	C	-	-	B	-
HCM 95th %tile Q(veh)	6.6	3.3	-	-	1.5	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

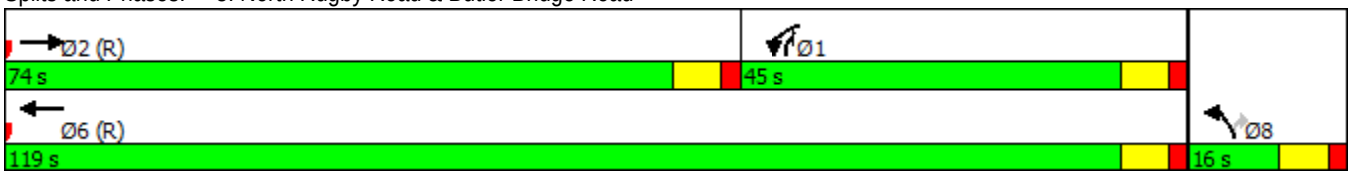
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	500	60	295	620	62	251
Future Volume (vph)	500	60	295	620	62	251
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	300		180	0
Storage Lanes		0	1		1	1
Taper Length (ft)			100		150	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.985					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1835	0	1770	1863	1770	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1835	0	1770	1863	1770	1583
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Link Speed (mph)	35			35	45	
Link Distance (ft)	1951			885	1836	
Travel Time (s)	38.0			17.2	27.8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	556	67	328	689	69	279
Shared Lane Traffic (%)						
Lane Group Flow (vph)	623	0	328	689	69	279
Turn Type	NA		Prot	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases						8
Detector Phase	2		1	6	8	1
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	7.0	7.0
Minimum Split (s)	17.0		14.0	17.0	14.0	14.0
Total Split (s)	74.0		45.0	119.0	16.0	45.0
Total Split (%)	54.8%		33.3%	88.1%	11.9%	33.3%
Yellow Time (s)	5.0		5.0	5.0	5.0	5.0
All-Red Time (s)	2.0		2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0		5.0	5.0	5.0	5.0
Lead/Lag	Lead		Lag			Lag
Lead-Lag Optimize?	Yes		Yes			Yes
Recall Mode	C-Min		None	C-Min	None	None
Act Effct Green (s)	78.5		32.7	117.2	11.6	46.5
Actuated g/C Ratio	0.58		0.24	0.87	0.09	0.34
v/c Ratio	0.58		0.77	0.43	0.46	0.51
Control Delay	23.4		49.7	3.4	68.5	36.9
Queue Delay	0.0		0.0	0.2	0.0	0.0
Total Delay	23.4		49.7	3.6	68.5	36.9
LOS	C		D	A	E	D
Approach Delay	23.4			18.5	43.2	
Approach LOS	C			B	D	
Queue Length 50th (ft)	358		281	197	58	184
Queue Length 95th (ft)	547		m310	85	111	247

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Internal Link Dist (ft)	1871			805	1756	
Turn Bay Length (ft)			300		180	
Base Capacity (vph)	1072		529	1631	157	580
Starvation Cap Reductn	0		0	295	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.58		0.62	0.52	0.44	0.48

Intersection Summary

Area Type: Other
Cycle Length: 135
Actuated Cycle Length: 135
Offset: 56 (41%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 24.3 Intersection LOS: C
Intersection Capacity Utilization 64.6% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: North Rugby Road & Butler Bridge Road



Intersection	
Int Delay, s/veh	7.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	145	372	373	217	127	85
Future Vol, veh/h	145	372	373	217	127	85
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	158	404	405	236	138	92

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	641	0	-	0	1125	405
Stage 1	-	-	-	-	405	-
Stage 2	-	-	-	-	720	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	943	-	-	-	227	646
Stage 1	-	-	-	-	673	-
Stage 2	-	-	-	-	482	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	943	-	-	-	189	646
Mov Cap-2 Maneuver	-	-	-	-	189	-
Stage 1	-	-	-	-	560	-
Stage 2	-	-	-	-	482	-

Approach	EB	WB	SB
HCM Control Delay, s	2.7	0	42.4
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	943	-	-	-	189	646
HCM Lane V/C Ratio	0.167	-	-	-	0.73	0.143
HCM Control Delay (s)	9.6	-	-	-	63.1	11.5
HCM Lane LOS	A	-	-	-	F	B
HCM 95th %tile Q(veh)	0.6	-	-	-	4.7	0.5

APPENDIX H

NCDOT TURN LANE WARRANT CHARTS

BUTLER BRIDGE ROAD & SITE DRIVE 1

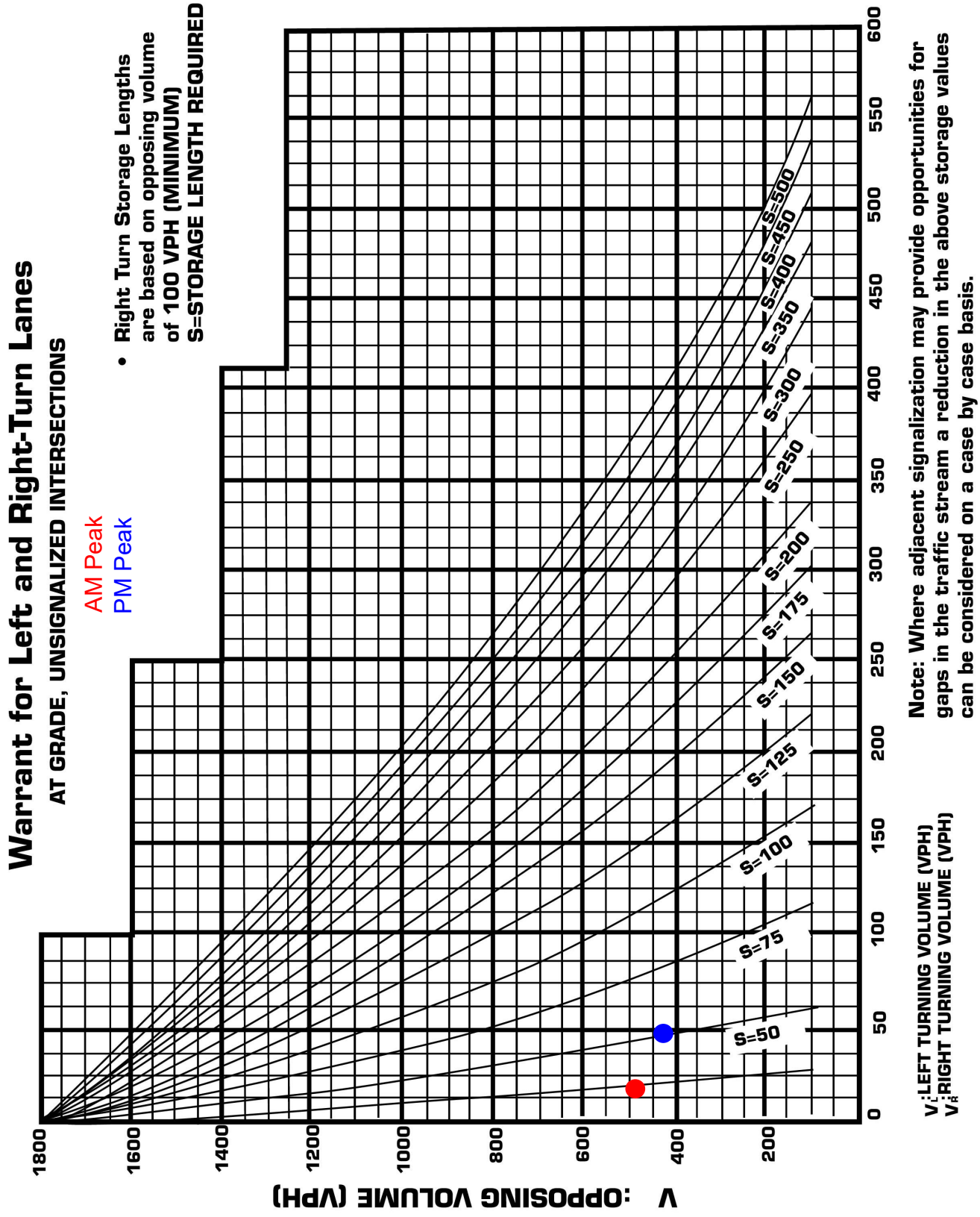
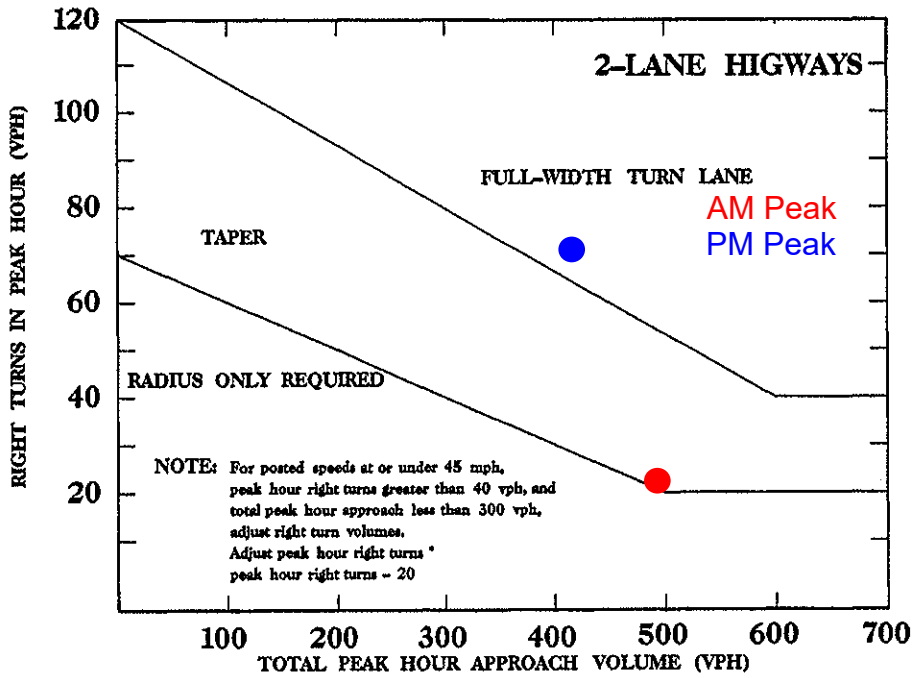
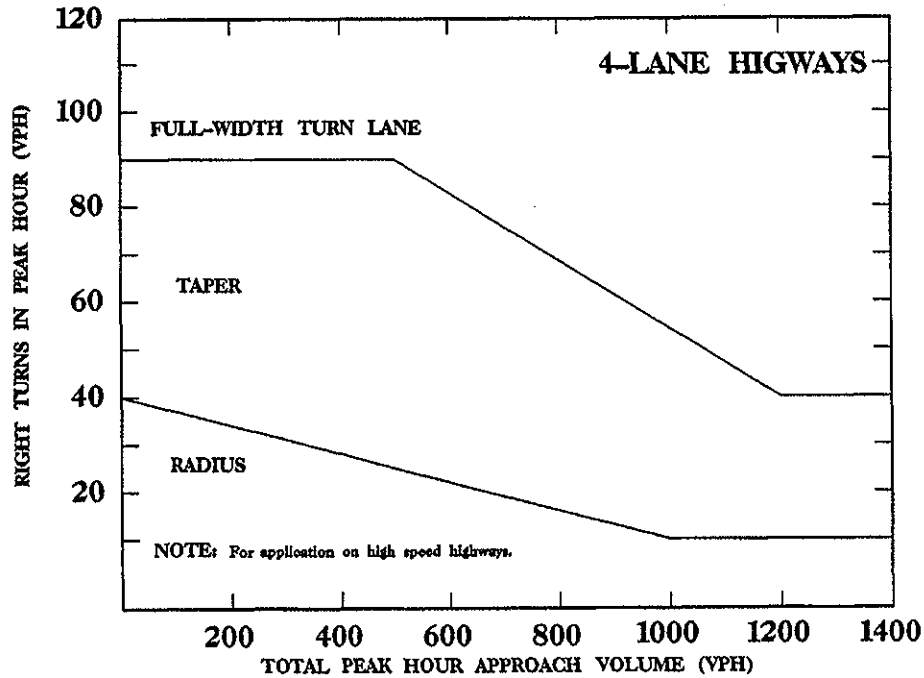

Warrant for Left and Right-Turn Lanes
AT GRADE, UNSIGNALIZED INTERSECTIONS
AM Peak
PM Peak
• Right Turn Storage Lengths are based on opposing volume of 100 VPH (MINIMUM)
S=STORAGE LENGTH REQUIRED
S=50
S=75
S=100
S=125
S=150
S=175
S=200
S=250
S=300
S=350
S=400
S=450
S=500
V : OPPOSING VOLUME (VPH)
1800
1600
1400
1200
1000
800
600
400
200
0
50
100
150
200
250
300
350
400
450
500
550
600
Note: Where adjacent signalization may provide opportunities for gaps in the traffic stream a reduction in the above storage values can be considered on a case by case basis.
V_L : LEFT TURNING VOLUME (VPH)
V_R : RIGHT TURNING VOLUME (VPH)

FIGURE 4 9 - 1
F – 4 C

RIGHT TURN LANE WARRANTS





BUTLER BRIDGE ROAD & SITE DRIVE 2

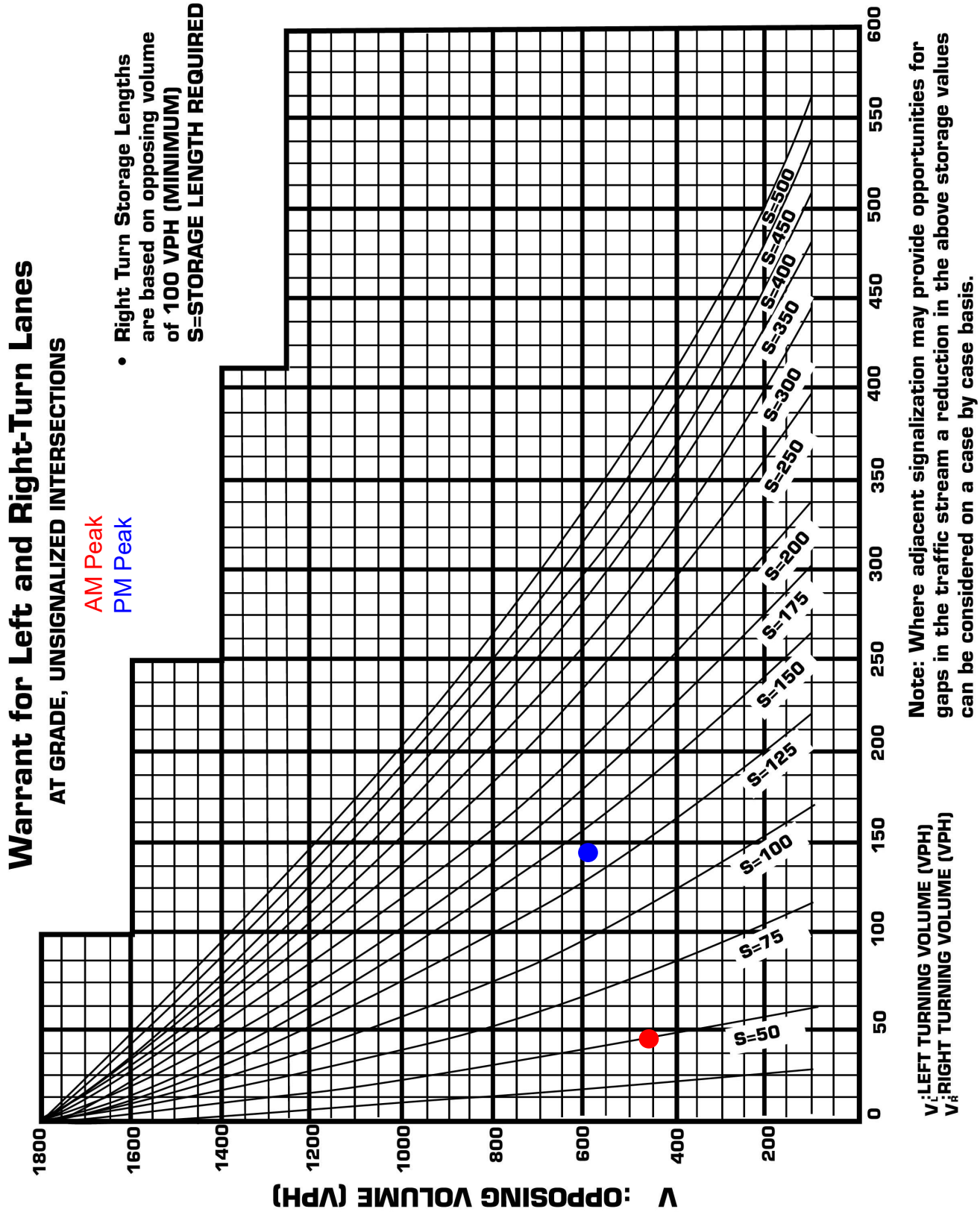
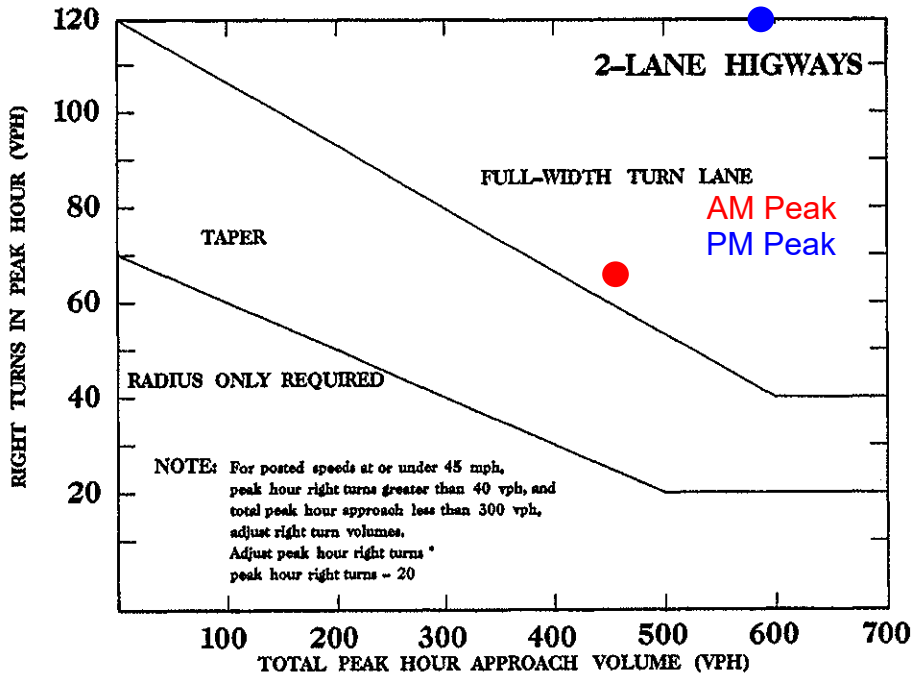
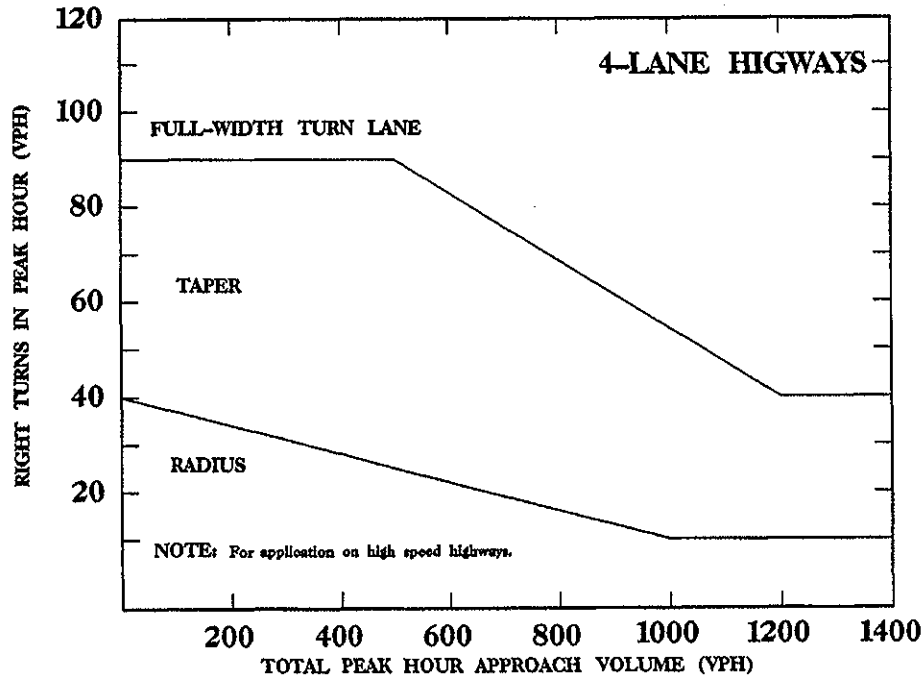

Warrant for Left and Right-Turn Lanes
AT GRADE, UNSIGNALIZED INTERSECTIONS
AM Peak
PM Peak
• Right Turn Storage Lengths are based on opposing volume of 100 VPH (MINIMUM)
S=STORAGE LENGTH REQUIRED
S=50
S=75
S=100
S=125
S=150
S=175
S=200
S=250
S=300
S=350
S=400
S=450
S=500
V : OPPOSING VOLUME (VPH)
0
50
100
150
200
250
300
350
400
450
500
550
600
200
400
600
800
1000
1200
1400
1600
1800
Note: Where adjacent signalization may provide opportunities for gaps in the traffic stream a reduction in the above storage values can be considered on a case by case basis.
V_L : LEFT TURNING VOLUME (VPH)
V_R : RIGHT TURNING VOLUME (VPH)

FIGURE 4 9 - 1
F – 4 C

RIGHT TURN LANE WARRANTS





APPENDIX I

QUEUING ANALYSIS CALCULATIONS

[FUTURE 'NO-BUILD' VS. FUTURE 'BUILD']

INTERSECTIONS	Lane	Storage	Taper	AM Peak Hour			PM Peak Hour		
				No-Build	Build	Comparison	No-Build	Build	Comparison
NC 280 & Butler Bridge Road	EBLTR			122	119	-3	126	117	-9
	WBLTR			203	296	93	209	269	60
	NBL	240	220	33	26	-7	34	34	0
	NBT			440	517	77	318	348	30
	NBT			440	517	77	318	348	30
	NBR	100	160	84	205	121	74	146	72
	SBL	240	250	47	49	2	28	37	9
	SBT			219	257	38	444	486	42
	SBT			219	257	38	444	486	42
	SBR	100	135	24	24	0	101	112	11
US 25 & Butler Bridge Road	EBL			502	269	-233	456	245	-211
	EBL	250	100		368	-134		275	-181
	EBR	350	100	394	486	92	354	347	-7
	NBL	500	100	372	340	-32	445	606	161
	NBT			273	201	-72	303	342	39
	NBT			273	194	-79	246	264	18
	SBT			562	429	-133	865	595	-270
	SBTR			562		-562	865		
	SBT				429	-133		595	-270
	SBR	350	100		220	-342		404	-461
NC 280 & Fanning Fields Road	EBLTR			44	29	-15	55	52	-3
	WBLTR			214	378	164	141	189	48
	NBL	225	250	31	41	10	37	37	0
	NBT			399	472	73	300	333	33
	NBT			399	494	95	300	333	33
	NBR	100	120	87	143	56	33	59	26
	SBL	220	300	165	249	84	162	262	100
	SBT			143	214	71	212	232	20
	SBT			122	189	67	212	232	20
	SBR	100	150	27	48	21	20	16	-4
Butler Bridge Road & Fanning Fields Road	EBLT			37	54	27	28	52	24
	WBTR			0	2	-35	0	0	-28
	SBLR			107	136	29	146	211	65
Butler Bridge Road & Jeffress Road/Carrie Lane	EBLTR			30	35	5	15	25	10
	WBL	50	85	57	48	-9	56	55	-1
	WBTR			0	0	0	0	0	0
	NBLTR			59	74	15	48	42	-6
	SBLTR			35	42	7	42	33	-9
Butler Bridge Road & Haw River Road/Site Access	EBL	100	100		26	26		45	45
	EBTR			0	0	0	0	0	0
	WBL	60	230	34	25	-9	33	32	-1
	WBT			0	0	0	0	0	0
	WBR	100	100		2	2		1	1
	NBLR			100			56		
	NBLTR				108	8		70	14
	SBL				75	75		58	58
	SBTR				65	65		65	65
Butler Bridge Road & Yadkin Road	EBTR			0	2	2	2	8	6
	WBL	75	150	25	33	8	61	62	1
	WBT			0	0	0	0	0	0
	NBLR			92	148	56	67	62	-5
Butler Bridge Road & North Rugby Road **[Unsignalized]**	EBTR			15	-		13	-	
	WBL	300	100	97			141		
	WBT			0			0		
	NBL			448			71		
	NBR	180	150	310			181		
Butler Bridge Road & North Rugby Road **[Signalized]**	EBTR			-	654	639	-	567	554
	WBL	300	100		213	116		358	217
	WBT				128	128		302	302
	NBL				256	-192		132	61
	NBR	180	150		377	67		247	66
Butler Bridge Road & Site Access 2	EBL	100	100	-	54	54	-	109	109
	EBT				0	0		30	30
	WBR	100	100		6	6		27	27
	WBT				0	0		0	0
	SBL				224	224		150	150
	SBR				91	91		94	94

Legend:	
	Storage increase proposed under NCDOT STIP I-4400C
	Revised lane configuration and/or new lane due to construction of proposed site
	Revised intersection traffic control due to construction of proposed site
	95th percentile Synchro queue > Maximum SimTraffic queue
	> 50 Foot queue increase from 'No-Build' to 'Build' Conditions

Intersection: 1: NC 280 & Butler Bridge Road

Movement	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	122	169	33	251	241	82	47	141	153	24
Average Queue (ft)	42	80	6	113	94	25	14	47	61	3
95th Queue (ft)	92	142	25	191	179	62	38	110	123	15
Link Distance (ft)	1202	670		1720	1720			2588	2588	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			240			100	240			100
Storage Blk Time (%)				0	4	0			2	
Queuing Penalty (veh)				0	5	0			0	

Intersection: 2: US 25 & Butler Bridge Road

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	T	TR
Maximum Queue (ft)	458	394	352	250	240	520	522
Average Queue (ft)	268	190	200	130	127	304	303
95th Queue (ft)	411	325	323	214	211	469	470
Link Distance (ft)	812			1769	1769	1733	1733
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		350	500				
Storage Blk Time (%)	3	0					
Queuing Penalty (veh)	14	1					

Intersection: 3: NC 280 & Fanning Fields Road

Movement	EB	WB	B20	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	T	UL	T	T	R	UL	T	T	R
Maximum Queue (ft)	44	169	45	31	344	343	87	165	143	122	27
Average Queue (ft)	7	76	1	6	184	185	6	84	67	49	2
95th Queue (ft)	28	149	20	24	315	314	45	141	115	99	15
Link Distance (ft)	1290	107	560		2588	2588			1968	1968	
Upstream Blk Time (%)		6									
Queuing Penalty (veh)		13									
Storage Bay Dist (ft)				225			100	220			100
Storage Blk Time (%)					4	20		0	0	0	
Queuing Penalty (veh)					0	1		0	0	0	

Intersection: 4: Butler Bridge Road & Fanning Fields Road

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	37	107
Average Queue (ft)	2	49
95th Queue (ft)	22	89
Link Distance (ft)	755	1533
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Jeffress Road/Carrie Lane & Butler Bridge Road

Movement	EB	WB	NB	SB
Directions Served	LTR	L	LTR	LTR
Maximum Queue (ft)	30	57	59	35
Average Queue (ft)	1	13	13	10
95th Queue (ft)	15	42	44	34
Link Distance (ft)	937		1244	912
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		50		
Storage Blk Time (%)		0		
Queuing Penalty (veh)		1		

Intersection: 6: Haw River Road & Butler Bridge Road

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	34	100
Average Queue (ft)	5	46
95th Queue (ft)	23	78
Link Distance (ft)		1148
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	60	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 7: Yadkin Road & Butler Bridge Road

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	25	92
Average Queue (ft)	4	37
95th Queue (ft)	19	80
Link Distance (ft)		1399
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	75	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: North Rugby Road & Butler Bridge Road

Movement	EB	WB	NB	NB
Directions Served	TR	L	L	R
Maximum Queue (ft)	15	97	448	310
Average Queue (ft)	1	38	105	140
95th Queue (ft)	7	76	447	348
Link Distance (ft)	1908		1800	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		300		180
Storage Blk Time (%)			0	27
Queuing Penalty (veh)			0	14

Network Summary

Network wide Queuing Penalty: 51

Intersection: 1: NC 280 & Butler Bridge Road

Movement	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	126	188	34	177	159	62	28	210	228	101
Average Queue (ft)	46	88	8	82	57	14	6	73	87	9
95th Queue (ft)	92	160	27	143	125	40	21	164	185	51
Link Distance (ft)	1196	670		1728	1728			2588	2588	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			240			100	240			100
Storage Blk Time (%)				0	1	0		0	5	
Queuing Penalty (veh)				0	1	0		0	2	

Intersection: 2: US 25 & Butler Bridge Road

Movement	EB	EB	NB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	T	TR
Maximum Queue (ft)	450	354	412	303	246	639	662
Average Queue (ft)	237	169	249	118	102	376	395
95th Queue (ft)	399	307	424	280	220	578	602
Link Distance (ft)	811			1769	1769	1739	1739
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		350	500				
Storage Blk Time (%)	4		2	0			
Queuing Penalty (veh)	13		11	0			

Intersection: 3: NC 280 & Fanning Fields Road

Movement	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	UL	T	T	R	UL	T	T	R
Maximum Queue (ft)	55	131	37	264	270	33	162	150	141	20
Average Queue (ft)	12	43	9	107	110	1	86	81	69	1
95th Queue (ft)	39	102	30	210	212	24	145	136	126	8
Link Distance (ft)	1121	107		2588	2588			1968	1968	
Upstream Blk Time (%)		1								
Queuing Penalty (veh)		1								
Storage Bay Dist (ft)			225			100	220			100
Storage Blk Time (%)				1	9				1	
Queuing Penalty (veh)				0	0				0	

Intersection: 4: Butler Bridge Road & Fanning Fields Road

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	28	146
Average Queue (ft)	2	66
95th Queue (ft)	14	119
Link Distance (ft)	755	1533
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Jeffress Road/Carrie Lane & Butler Bridge Road

Movement	EB	WB	NB	SB
Directions Served	LTR	L	LTR	LTR
Maximum Queue (ft)	15	56	48	42
Average Queue (ft)	1	14	10	13
95th Queue (ft)	9	42	34	38
Link Distance (ft)	937		1244	912
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		50		
Storage Blk Time (%)		0		
Queuing Penalty (veh)		1		

Intersection: 6: Haw River Road & Butler Bridge Road

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	33	56
Average Queue (ft)	7	23
95th Queue (ft)	28	51
Link Distance (ft)		1185
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	60	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 7: Yadkin Road & Butler Bridge Road

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	2	61	67
Average Queue (ft)	0	20	13
95th Queue (ft)	2	50	47
Link Distance (ft)	584		1399
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		75	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Intersection: 8: North Rugby Road & Butler Bridge Road

Movement	EB	WB	NB	NB
Directions Served	TR	L	L	R
Maximum Queue (ft)	13	141	71	181
Average Queue (ft)	1	59	22	25
95th Queue (ft)	6	113	53	116
Link Distance (ft)	1908		1800	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		300		180
Storage Blk Time (%)				1
Queuing Penalty (veh)				0

Network Summary

Network wide Queuing Penalty: 30

Intersection: 1: NC 280 & Butler Bridge Road

Movement	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	119	254	26	282	276	205	49	176	176	24
Average Queue (ft)	44	127	5	140	121	40	12	57	71	2
95th Queue (ft)	92	214	20	233	222	111	35	136	151	12
Link Distance (ft)	1205	670		1727	1727			2588	2588	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			240			100	240			100
Storage Blk Time (%)				1	8	0		0	3	
Queuing Penalty (veh)				0	11	2		0	1	

Intersection: 2: US 25 & Butler Bridge Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	269	368	424	332	201	186	389	369	220
Average Queue (ft)	145	167	223	192	110	98	256	236	86
95th Queue (ft)	228	287	374	305	176	163	355	338	166
Link Distance (ft)		801			1769	1769	1730	1730	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	250		350	500					350
Storage Blk Time (%)	0	1	2					0	
Queuing Penalty (veh)	2	8	8					1	

Intersection: 3: NC 280 & Fanning Fields Road

Movement	EB	WB	B20	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	T	UL	T	T	R	UL	T	T	R
Maximum Queue (ft)	29	187	191	41	472	494	143	249	214	189	48
Average Queue (ft)	6	133	36	6	246	233	9	116	86	63	3
95th Queue (ft)	22	215	151	27	421	414	66	213	166	141	30
Link Distance (ft)	1310	107	560		2588	2588			1968	1968	
Upstream Blk Time (%)		28									
Queuing Penalty (veh)		93									
Storage Bay Dist (ft)				225			100	220			100
Storage Blk Time (%)					13	28		3	1	2	
Queuing Penalty (veh)					1	2		10	1	0	

Intersection: 4: Butler Bridge Road & Fanning Fields Road

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	54	2	136
Average Queue (ft)	3	0	70
95th Queue (ft)	24	2	117
Link Distance (ft)	755	869	1533
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Jeffress Road/Carrie Lane & Butler Bridge Road

Movement	EB	WB	NB	SB
Directions Served	LTR	L	LTR	LTR
Maximum Queue (ft)	35	48	74	42
Average Queue (ft)	2	14	19	12
95th Queue (ft)	16	42	57	38
Link Distance (ft)	937		1244	912
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		50		
Storage Blk Time (%)		0		
Queuing Penalty (veh)		1		

Intersection: 6: Haw River Road/Site Access 1 & Butler Bridge Road

Movement	EB	WB	WB	NB	SB	SB
Directions Served	L	L	R	LTR	L	TR
Maximum Queue (ft)	26	25	2	108	75	65
Average Queue (ft)	3	3	0	50	35	25
95th Queue (ft)	17	16	2	90	65	51
Link Distance (ft)				1193	1549	1549
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	100	60	100			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 7: Yadkin Road & Butler Bridge Road

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	2	33	148
Average Queue (ft)	0	6	46
95th Queue (ft)	2	25	111
Link Distance (ft)	322		1398
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		75	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: North Rugby Road & Butler Bridge Road

Movement	EB	WB	WB	NB	NB
Directions Served	TR	L	T	L	R
Maximum Queue (ft)	631	213	128	256	377
Average Queue (ft)	358	93	27	62	184
95th Queue (ft)	566	174	84	159	337
Link Distance (ft)	1908		801		1800
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		300		180	
Storage Blk Time (%)				0	13
Queuing Penalty (veh)				0	8

Intersection: 9: Butler Bridge Road & Site Drive 2

Movement	EB	WB	SB	SB
Directions Served	L	R	L	R
Maximum Queue (ft)	54	6	224	91
Average Queue (ft)	14	0	96	45
95th Queue (ft)	42	3	182	75
Link Distance (ft)			1440	1440
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	100	100		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 149

Intersection: 1: NC 280 & Butler Bridge Road

Movement	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	114	227	34	185	174	125	37	271	279	112
Average Queue (ft)	48	112	7	97	73	44	6	104	117	11
95th Queue (ft)	97	193	26	164	149	97	24	229	244	55
Link Distance (ft)	1197	692		1728	1728			2600	2600	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)			240			100	240			100
Storage Blk Time (%)				0	3	1		1	8	
Queuing Penalty (veh)				0	5	4		0	4	

Intersection: 2: US 25 & Butler Bridge Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	240	275	347	522	342	264	524	519	404
Average Queue (ft)	128	144	177	326	112	88	327	313	198
95th Queue (ft)	209	229	306	501	336	229	479	470	364
Link Distance (ft)		799			1769	1769	1739	1739	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	250		350	500				350	
Storage Blk Time (%)	0	0	0	3	0			5	0
Queuing Penalty (veh)	1	3	1	15	0			23	1

Intersection: 3: NC 280 & Fanning Fields Road

Movement	EB	WB	B20	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	T	UL	T	T	R	UL	T	T	R
Maximum Queue (ft)	52	158	11	37	327	315	59	262	178	160	16
Average Queue (ft)	12	70	0	9	149	148	3	137	91	83	1
95th Queue (ft)	37	136	8	30	269	271	35	219	154	141	9
Link Distance (ft)	1308	107	560		2600	2600			1968	1968	
Upstream Blk Time (%)		4									
Queuing Penalty (veh)		7									
Storage Bay Dist (ft)				225			100	220			100
Storage Blk Time (%)					3	17		1		3	
Queuing Penalty (veh)					0	1		8		0	

Intersection: 4: Butler Bridge Road & Fanning Fields Road

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	52	211
Average Queue (ft)	3	118
95th Queue (ft)	24	187
Link Distance (ft)	755	1533
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Jeffress Road/Carrie Lane & Butler Bridge Road

Movement	EB	WB	NB	SB
Directions Served	LTR	L	LTR	LTR
Maximum Queue (ft)	25	55	42	33
Average Queue (ft)	1	18	8	10
95th Queue (ft)	16	45	31	34
Link Distance (ft)	937		1244	912
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		50		
Storage Blk Time (%)		0		
Queuing Penalty (veh)		1		

Intersection: 6: Haw River Road/Site Drive 1 & Butler Bridge Road

Movement	EB	WB	WB	NB	SB	SB
Directions Served	L	L	R	LTR	L	TR
Maximum Queue (ft)	45	32	1	70	58	65
Average Queue (ft)	8	6	0	28	21	23
95th Queue (ft)	27	26	2	58	45	51
Link Distance (ft)				1185	1539	1539
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	100	60	100			
Storage Blk Time (%)		0				
Queuing Penalty (veh)		0				

Intersection: 7: Yadkin Road & Butler Bridge Road

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	8	62	62
Average Queue (ft)	0	25	14
95th Queue (ft)	6	55	48
Link Distance (ft)	298		1398
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		75	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Intersection: 8: North Rugby Road & Butler Bridge Road

Movement	EB	WB	WB	NB	NB
Directions Served	TR	L	T	L	R
Maximum Queue (ft)	567	358	302	132	244
Average Queue (ft)	277	179	85	62	96
95th Queue (ft)	477	303	205	114	234
Link Distance (ft)	1908		799		1800
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		300		180	
Storage Blk Time (%)		1	0		4
Queuing Penalty (veh)		8	0		2

Intersection: 9: Butler Bridge Road & Site Drive 2

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	R	L	R
Maximum Queue (ft)	109	30	27	150	94
Average Queue (ft)	42	1	5	60	35
95th Queue (ft)	83	22	20	113	69
Link Distance (ft)		1212		1518	1518
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	100		100		
Storage Blk Time (%)	0	0			
Queuing Penalty (veh)	1	0			

Network Summary

Network wide Queuing Penalty: 87

RAMEY KEMP & ASSOCIATES

Charleston, SC - Charlotte, NC - Columbia, SC - Raleigh, NC - Richmond, VA - Winston-Salem, NC