TRAFFIC IMPACT STUDY

FOR THE

OAKHURST II COMMERCIAL DEVELOPMENT

LOCATED
IN
CORNELIUS, NORTH CAROLINA

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TRAFFIC IMPACT STUDY

OAKHURST II COMMERCIAL DEVELOPMENT
CORNELIUS, NORTH CAROLINA

1. EXECUTIVE SUMMARY

This report summarizes the findings of the Traffic Impact Study (TIS) that was performed for the proposed Oakhurst II commercial development to be located along the east side of US 21, north of Bailey Road in Cornelius, North Carolina. The purpose of this study is to determine the potential impact to the surrounding transportation system caused by the traffic generated by the proposed development.

The proposed site includes 20,000 square feet of general office building, 7,000 square feet of shopping center, a 7,000 square foot bank with drive-thru window, and 6,000 square feet of high-turnover (sit-down) restaurant. The project is expected to be completed by 2017. Access to the site is anticipated via a proposed driveway on Bailey Road (full access) and a proposed driveway on Washam Potts Road (full access).

The study area for the TIS was determined through coordination with the Town of Cornelius and the North Carolina Department of Transportation (NCDOT) and consists of the following intersections:

1. US 21 and Bailey Road (signalized)
2. US 21 and Westmoreland Road (signalized)
3. Washam Potts Road and Westmoreland Road (full access unsignalized)
4. Washam Potts Road and Bailey Road (full access unsignalized)
5. Bailey Road and Commercial Driveway / Site Drive 1 (full access unsignalized)
6. Washam Potts Road and Daycare Driveway / Site Drive 2 (full access unsignalized)

Based on coordination with NCDOT and the Town of Cornelius, no offsite developments were determined to have an impact on the project study area. In addition, no approved roadway projects are expected to be constructed that would have an impact on the project study area.

Several scenarios were analyzed using traffic analysis software. Traffic operations during the weekday AM and PM peak hours were modeled for each scenario. The results of each scenario were compared in order to determine impacts from background traffic growth and the proposed development. The following scenarios were modeled:

- 2015 Existing
- 2017 No-Build
- 2017 Build

Based on the analysis results, some impacts are expected by the proposed development. Refer to Figure 12 for an illustration of the recommended lane configurations. It is recommended the developer provide the following improvements:

US 21 and Bailey Road

- Extend the southbound US 21 left turn lane to provide 200 feet of storage and appropriate taper.

Bailey Road and Site Drive 1

- Construct Site Drive 1 with one ingress lane and one shared left/through/right egress lane.

Washam Potts Road and Site Drive 2

- Construct Site Drive 2 with one ingress lane and one shared left/through/right egress lane.

2. INTRODUCTION

2.1. Purpose of Report

This report summarizes the findings of the Traffic Impact Study (TIS) that was performed for the proposed Oakhurst II commercial development to be located along the east side of US 21, north of Bailey Road in Cornelius, North Carolina. The purpose of this study is to determine the potential impact to the surrounding transportation system caused by the traffic generated by the proposed development.

2.2. Study Objectives

The proposed site includes 20,000 square feet of general office building, 7,000 square feet of shopping center, a 7,000 square foot bank with drive-thru window, and 6,000 square feet of high-turnover (sit-down) restaurant. The project is expected to be completed by 2017. Access to the site is anticipated via a proposed driveway on Bailey Road (full access) and a proposed driveway on Washam Potts Road (full access).

Refer to Figure 1 of Appendix A for an illustration of the site location map, and to Figure 2 for the preliminary site plan. Refer to Appendix A for all figures. The objective of this report is to determine what geometric improvements are necessary to mitigate traffic conditions on the transportation network surrounding the site with the proposed development fully built out.

3. AREA CONDITIONS

3.1. Transportation Network Study Area

3.1.1. Area Roadway System

The project study area for this TIS was based on coordination with the Town of Cornelius and the NCDOT. Table 1 summarizes the characteristics of the roadways within the study area. The NCDOT Functional Class map was used to determine the classification of each road. Traffic Volume maps from NCDOT were used to find the average annual daily traffic (AADT) volumes in vehicles per day (vpd) for the roadways.

TABLE 1
STUDY AREA ROADS

ROADWAY	CLASSIFICATION	CROSS-SECTION	AADT (vpd)	SPEED LIMIT (mph)
US 21	Minor Arterial	Two-Lane	21,000	45
Westmoreland Road	Local	Two-Lane	9,500	45
Bailey Road	Local	Two-Lane	No Data	25
Washam Potts Road	Local	Two-Lane	9,700	35

3.1.1.1. Existing Roadway Conditions

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

3.1.1.2. Future Roadway Conditions

Based on coordination with NCDOT and the Town of Cornelius, no offsite developments were found to have an impact on the project study area. In addition, no approved roadway projects are expected to be constructed that would have an impact on the project study area.

3.1.2. Study Area and Existing Traffic Volumes

The study area for the TIS was determined through coordination with NCDOT and the Town of Cornelius and consists of the following intersections:

1. US 21 and Bailey Road (signalized)
2. US 21 and Westmoreland Road (signalized)
3. Washam Potts Road and Westmoreland Road (full access unsignalized)
4. Washam Potts Road and Bailey Road (full access unsignalized)
5. Bailey Road and Commercial Driveway / Site Drive 1 (full access unsignalized)
6. Washam Potts Road and Daycare Driveway / Site Drive 2 (full access unsignalized)

Existing traffic volumes were determined through traffic counts conducted during the AM peak period (7:00-9:00 AM) and the PM peak period (4:00-6:00 PM). Schools were in session when the traffic count data was taken. A copy of the traffic count data can be found in Appendix B of this report. Traffic volumes at the intersection of Washam Potts Road and the Daycare Driveway were estimated based on trip generation calculations for a 9,000 square foot daycare. The trips were split 50/50 at the Daycare Driveway. Refer to Appendix B for the Daycare Driveway trip generation. The peak hour traffic volumes were balanced between appropriate intersections. Refer to Figure 4 for an illustration of the existing peak hour traffic volumes.

3.2. Study Area – Adjacent Land Use

3.2.1. Existing Land Uses

The existing site is undeveloped while the surrounding land is a mix of residential, commercial, and undeveloped land.

3.2.2. Anticipated or Approved Future Development

Based on coordination with the NCDOT and the Town of Cornelius, no offsite developments were identified that would affect traffic operations within the study area.

4. PROJECTED TRAFFIC

4.1. Site Traffic

In order to determine the future traffic conditions after the proposed development is completed, an estimate of traffic projected to travel to / from the proposed development is required. The average weekday daily, AM peak hour, and PM peak hour site trips for this study were calculated based on the ITE *Trip Generation Manual, 9th Edition*.

4.1.1. Trip Generation

The average weekday daily as well as AM and PM peak hour site trips for this study were calculated based on the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 9th Edition*. Internal capture and pass-by trips were estimated. Internal capture describes trips that are expected to occur between land uses within the proposed site. Pass-by describes existing trips that are expected to enter the site and then exit the site before reaching their final destination. Table 2

summarizes the weekday trip generation. Additional trip generation data can be found in Appendix C.

TABLE 2
PROPOSED SITE TRIP GENERATION

LAND USE	DENSITY	AM PEAK HOUR			PM PEAK HOUR		
		Enter	Exit	Total	Enter	Exit	Total
General Office Building (710)	20,000 SF	27	4	31	5	25	30
Internal Capture Trips		4	3	7	1	1	2
Total New External Trips		23	1	24	4	24	28
Shopping Center (820)	7,000 SF	4	3	7	12	14	26
Internal Capture Trips		1	1	2	7	4	11
Total New External Trips		3	2	5	5	10	15
Drive-in Bank (912)	7,000 SF	48	37	85	85	85	170
Internal Capture Trips		0	0	0	0	0	0
Pass-By Trips		12	12	24	30	30	60
Total New External Trips		36	25	61	55	55	111
High Turnover Sit-down Restaurant (932)	6,000 SF	42	38	80	60	51	111
Internal Capture Trips		2	3	5	5	8	13
Pass-By Trips		0	0	0	21	21	42
Total New External Trips		40	35	75	34	22	56
Total Trips		121	82	203	162	175	337
Internal Capture Trips		7	7	14	13	13	26
Pass-By Trips		12	12	24	51	51	102
Final Total New External Trips		**102**	**63**	**165**	**98**	**111**	**209**

(1) Based on ITE Trip Generation - 9th Edition
(2) Weighted Rates were used for land uses 710 and 820 due to the small square footage of each.

4.1.2. Trip Distribution and Assignment

The primary trip distribution percentages were developed based on existing traffic patterns, nearby land uses, employment centers, and engineering judgment. Figure 5 illustrates the primary site trip distribution percentages. These trip distribution percentages were applied to the total new trip generation data to calculate the primary site trip assignments shown in Figure 6.

The pass-by trip distribution percentages were developed based on the existing traffic volumes at the locations of the proposed site drives. Figure 7 illustrates the pass-by trip distribution percentages. These percentages were applied to the pass-by trip generation to calculate the pass-by trip assignment shown in Figure 8.

Figure 9 illustrates the total site trips created by the proposed site. This includes both the primary and pass-by trip assignment.

5. TRAFFIC ANALYSIS

5.1. Traffic Analysis Scenarios

Several scenarios were analyzed using traffic analysis software. Traffic operations during the weekday AM and PM peak hours were modeled for each scenario. The results of each scenario were compared in order to determine impacts from background traffic growth, and the proposed development. The following scenarios were modeled:

- 2015 Existing
- 2017 No-Build
- 2017 Build

The 2015 Existing scenario included the traffic characteristics that currently exist in the study area. Existing peak hour traffic volumes were determined from the intersection counts. The timing data for the existing signals in the study area were obtained from the NCDOT and included in the traffic models. NCDOT Congestion Management guidelines recommend a minimum cycle length of 90 seconds for signals with three phases and 120 seconds for signals with four or more phases. The cycle lengths at the intersection of US 21 and Bailey Road and the intersection of US 21 and Westmoreland Road were set at 90 and 120 seconds respectively for all scenarios. The splits were optimized for each signal. Refer to Appendix D for the signal timing data for each signal. No changes to the existing lane configurations were made. Right turns on red are currently allowed on all approaches. All models allowed right turns on red.

The 2017 No-Build scenario was analyzed to determine the expected future traffic operations. A compounded growth rate of 2% per year was used to project the exiting traffic volumes to the

future volumes. These projected volumes represent the 2017 No-Build peak hour traffic volumes found in Figure 10. The existing signal timing data was used. The splits at both signalized intersections were optimized. No changes to the existing lane configurations were made.

The 2017 Build scenario was compared to the 2017 No-Build scenario to determine expected impacts caused by traffic created by the proposed site. This scenario included the same assumptions as the 2017 No-Build scenario. The trips expected to be generated by the proposed site (Figure 9) were added to the 2017 No-Build peak hour volumes (Figure 10). Refer to Figure 11 for the 2017 Build peak hour traffic volumes. The side street through movement volumes at the proposed driveways were assumed to be 4 vph. The existing signal timing data was used. The splits at both signalized intersections were optimized. The existing lane configurations were adjusted to incorporate the proposed driveways.

5.2. Traffic Analysis Procedure

All study intersections (both unsignalized and signalized) were analyzed using the methodology outlined in the Highway Capacity Manual (HCM) published by the Transportation Research Board. A computer software package, Synchro and SimTraffic (Version 9.1), was used to complete the analyses for all of the study area intersections. Synchro was developed by Trafficware Corporation and allows the user to input data into the Synchro software and calculate the output based on methodologies in the HCM. SimTraffic creates a traffic simulation model from the Synchro inputs. SimTraffic was used in this study to determine expected queue lengths.

Analysis results for signalized intersections provide delay, and level of service (LOS) for all movements and approaches. The overall intersection delay, and LOS is also provided. The capacity analysis for an unsignalized intersection does not provide an overall LOS for the intersection, but rather a LOS for movements and/or approaches that have a conflicting movement.

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”. 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". LOS varies from Level "A" representing free flow, to Level "F" where greater vehicle delays are evident.

Refer to Table 3 for HCM levels of service and related average control delay per vehicle for both signalized and unsignalized intersections. 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 3, an average control delay of 40 seconds at a signalized intersection results in a LOS D operation.

TABLE 3
HIGHWAY CAPACITY MANUAL - LEVELS OF SERVICE AND DELAY

UNSIGNALIZED INTERSECTION		SIGNALIZED 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	10-15	B	10-20
C	15-25	C	20-35
D	25-35	D	35-55
E	35-50	E	55-80
F	>50	F	>80

5.3. Mitigation Requirements

NCDOT has guidelines for determining when improvements are needed by the developer. The District Engineer is responsible for the final determination of the improvements. NCDOT typically requires mitigation to be identified when developments are expected to impact the traffic operations as described below:

- Overall intersection or intersection approach delay increases by 25% or more.
- LOS degrades by at least one level
- LOS is F
- Synchro 95th or SimTraffic maximum queue results are greater than the existing turn lane storage length

5.4. Capacity and Level of Service at Study Intersections

5.4.1. US 21 and Bailey Road

The intersection of US 21 and Bailey Road was analyzed as a three-leg signalized intersection with existing lane configurations and signal timing data. Table 4 summarizes the capacity analysis results. Values highlighted yellow indicate an impact by the development. Refer to Appendix E for the Synchro reports. All SimTraffic reports can be found in Appendix K.

The addition of site traffic is expected to have a minor effect on the operation of the intersection with minimal increases in delay during both peak hours. The PM peak hour LOS for the westbound approach is expected to degrade from LOS C to LOS D. However, this change is due to the approach delay being close to the level of service threshold under no-build conditions. Some increase in queueing could be expected.

SimTraffic indicates the southbound US 21 left turn lane is expected to queue past the existing storage. NCDOT Congestion Management guidelines state protected left turn phasing should be used to determine the recommended storage length for left turn lanes. However, the existing phasing is protected-permitted and no change in phasing is expected. It is recommended the developer extend the southbound US 21 left turn lane to provide 200 feet of storage and appropriate taper based on the existing protected-permitted phasing.

TABLE 4
ANALYSIS SUMMARY OF US 21 AND BAILEY ROAD

LOS AND DELAY								
Scenario	**Approach**	**Lane Configurations**	**AM Peak Hour**			**PM Peak Hour**		
			LOS	**Delay (seconds)**	**Overall LOS (Delay)**	**LOS**	**Delay (seconds)**	**Overall LOS (Delay)**
2015 Existing	WB	1 LT, 1 RT	D	43.0	C (32.0)	C	32.5	C (21.3)
	NB	1 TH, 1 RT	C	20.2		B	18.8	
	SB	1 LT, 1 TH	C	33.7		B	17.5	
2017 No-Build	WB	1 LT, 1 RT	D	47.8	D (35.8)	C	34.4	C (23.5)
	NB	1 TH, 1 RT	C	20.6		C	20.2	
	SB	1 LT, 1 TH	D	39.2		C	20.9	
2017 Build	WB	1 LT, 1 RT	D	51.7	D (37.1)	D	38.8	C (26.8)
	NB	1 TH, 1 RT	C	20.4		C	22.3	
	SB	1 LT, 1 TH	D	39.9		C	24.3	

5.4.2. US 21 and Westmoreland Road

The intersection of US 21 and Westmoreland Road was analyzed as a four-leg signalized intersection with existing lane configurations and signal timing data. Table 5 summarizes the capacity analysis results. Values highlighted yellow indicate an impact by the development. Refer to Appendix F for the Synchro reports. All SimTraffic reports can be found in Appendix K.

The addition of site traffic is expected to have a minor effect on the operation of the intersection. The PM peak hour LOS for the southbound approach is expected to degrade from LOS E to LOS F. The southbound through movement is expected to be over capacity under no-build conditions.

SimTraffic results indicate queues over 500 feet are expected during the AM peak hour on the eastbound shared left/through lane and the southbound through lane under no-build conditions. Queues over 1,000 feet are expected on these same lanes during the PM peak hour under no-build conditions. Increasing turn lane storage lengths on the impacted southbound approach is not expected to improve traffic operations due to the long queues on the through movement. No improvements are recommended.

TABLE 5
ANALYSIS SUMMARY OF US 21 AND WESTMORELAND ROAD

LOS AND DELAY								
Scenario	**Approach**	**Lane Configurations**	**AM Peak Hour**			**PM Peak Hour**		
			LOS	**Delay (seconds)**	**Overall LOS (Delay)**	**LOS**	**Delay (seconds)**	**Overall LOS (Delay)**
2015 Existing	EB	1 LT-TH, 1 RT	D	42.3	D (40.2)	E	69.9	E (56.1)
	WB	1 LT, 1 TH-RT	C	29.3		D	37.7	
	NB	1 TH, 1 TH-RT	C	32.7		D	54.9	
	SB	1 LT, 1 TH-RT	D	54.4		E	56.4	
2017 No-Build	EB	1 LT-TH, 1 RT	D	45.9	D (44.0)	E	70.1	E (65.3)
	WB	1 LT, 1 TH-RT	C	30.8		D	36.3	
	NB	1 TH, 1 TH-RT	D	38.5		E	66.3	
	SB	1 LT, 1 TH-RT	E	57.9		E	76.4	
2017 Build	EB	1 LT-TH, 1 RT	D	48.5	D (46.8)	E	72.6	E (72.7)
	WB	1 LT, 1 TH-RT	C	31.6		D	35.8	
	NB	1 TH, 1 TH-RT	D	42.1		E	72.2	
	SB	1 LT, 1 TH-RT	E	61.5		F	93.8	

5.4.3. Washam Potts Road and Westmoreland Road

The intersection of Washam Potts Road and Westmoreland Road was analyzed as a three-leg unsignalized intersection with existing lane configurations. Table 6 summarizes the capacity analysis results. Values highlighted yellow indicate an impact by the development. Refer to Appendix G for the Synchro reports. All SimTraffic reports can be found in Appendix K.

The addition of site traffic is expected to have a minor effect on the operation of the intersection with minimal increases in delay during both peak hours. The eastbound approach level of service is expected to degrade from LOS D to LOS E during the AM peak hour and from LOS E to LOS F during the PM peak hour. This approach delay is expected to increase more than 25% during the PM peak hour.

SimTraffic results indicate longer queue lengths can be expected on Westmoreland Road, mainly during the PM peak hour. The eastbound approach currently includes one left turn lane and one right turn lane. No additional storage can be added to the approach due to left turn lane into JV Washam Elementary School. Constructing a southbound Washam Potts Road right turn lane was also considered. This improvement is expected to decrease delay and queuing on Westmoreland Road. However, there is minimal right-of-way available to make this improvement and would likely involve removing a large oak tree on private property. No trips from the proposed site are expected to use this right turn lane. No improvements are recommended.

TABLE 6
ANALYSIS SUMMARY OF WASHAM POTTS ROAD AND WESTMORELAND ROAD

LOS AND DELAY								
Scenario	**Approach**	**Lane Configurations**	**AM Peak Hour**			**PM Peak Hour**		
			LOS	**Delay (seconds)**	**Overall LOS (Delay)**	**LOS**	**Delay (seconds)**	**Overall LOS (Delay)**
2015 Existing	EB[2]	1 LT, 1 RT	D	29.3	N/A[3]	E	40.3	N/A[3]
	NB[1]	1 LT-TH	A	5.5		A	2.6	
	SB	1 TH-RT	-	-		-	-	
2017 No-Build	EB[2]	1 LT, 1 RT	D	33.8	N/A[3]	E	49.6	N/A[3]
	NB[1]	1 LT-TH	A	5.7		A	2.6	
	SB	1 TH-RT	-	-		-	-	
2017 Build	EB[2]	1 LT, 1 RT	E	37.8	N/A[3]	F	69.3	N/A[3]
	NB[1]	1 LT-TH	A	5.7		A	2.9	
	SB	1 TH-RT	-	-		-	-	

1. Major street left-turn movement for unsignalized intersection.
2. Stop controlled approach for unsignalized intersection.
3. Overall intersection LOS is not provided for unsignalized intersections

5.4.4. Washam Potts Road and Bailey Road

The intersection of Washam Potts Road and Bailey Road was analyzed as a four-leg unsignalized intersection with existing lane configurations. Table 7 summarizes the capacity analysis results. Values highlighted yellow indicate an impact by the development. Refer to Appendix H for the Synchro reports. All SimTraffic reports can be found in Appendix K.

The addition of site traffic is expected to have a minor effect on the operation of the intersection. The northbound approach level of service is expected to degrade from LOS D to LOS E during the AM peak hour. However, this change is due to the approach delay being close to the level of service threshold under no-build conditions. During the PM peak hour, the northbound approach is expected to operate at LOS F during no-build and build conditions. The southbound approach level of service is expected to degrade from LOS D to LOS E during the PM peak hour. This approach delay is expected to increase more than 25% during the PM peak hour.

SimTraffic results indicate some queues can be expected to extend past adjacent intersections. However, this is not expected to cause any major traffic issues. No improvements are recommended.

TABLE 7
ANALYSIS SUMMARY OF WASHAM POTTS ROAD AND BAILEY ROAD

LOS AND DELAY								
Scenario	**Approach**	**Lane Configurations**	**AM Peak Hour**			**PM Peak Hour**		
			LOS	**Delay (seconds)**	**Overall LOS (Delay)**	**LOS**	**Delay (seconds)**	**Overall LOS (Delay)**
2015 Existing	EB[1]	1 LT-TH-RT	A	3.0	N/A[3]	A	5.7	N/A[3]
	WB[1]	1 LT-TH-RT	A	0.2		A	0.2	
	NB[2]	1 LT-TH-RT	D	30.3		F	88.4	
	SB[2]	1 LT-TH-RT	D	31.9		C	23.8	
2017 No-Build	EB[1]	1 LT-TH-RT	A	3.0	N/A[3]	A	5.9	N/A[3]
	WB[1]	1 LT-TH-RT	A	0.2		A	0.2	
	NB[2]	1 LT-TH-RT	D	33.5		F	112.4	
	SB[2]	1 LT-TH-RT	E	38.5		D	27.2	
2017 Build	EB[1]	1 LT-TH-RT	A	3.0	N/A[3]	A	6.0	N/A[3]
	WB[1]	1 LT-TH-RT	A	0.2		A	0.2	
	NB[2]	1 LT-TH-RT	E	35.1		F	122.6	
	SB[2]	1 LT-TH-RT	E	45.2		E	37.8	

1. Major street left-turn movement for unsignalized intersection.
2. Stop controlled approach for unsignalized intersection.
3. Overall intersection LOS is not provided for unsignalized intersections

5.4.5. Bailey Road and Commercial Driveway / Site Drive 1

The intersection of Bailey Road and Commercial Driveway was analyzed as a three-leg unsignalized intersection under the existing and no-build scenarios. The proposed Site Drive 1 would form the fourth leg at this intersection. Table 8 summarizes the capacity analysis results. Values highlighted yellow indicate an impact by the development. Refer to Appendix I for the Synchro reports. All SimTraffic reports can be found in Appendix K.

The addition of site traffic is expected to have a minor effect on the operation of the intersection. The northbound approach level of service is expected to degrade from LOS B to LOS C during the AM peak hour and from LOS D to LOS F during the PM peak hour. This approach delay is expected to increase more than 25% during both peak hours.

SimTraffic results indicate the northbound queue is expected to increase by only one to three vehicles. The eastbound Bailey Road queue (toward the signalized intersection of US 21 and Bailey Road) would be of particular concern. Review of the SimTraffic simulation indicated the queue from the eastbound Bailey Road left turn movement is not expected to reach the signalized intersection. It is recommended the developer construct Site Drive 1 with one shared left/through/right lane.

TABLE 8
ANALYSIS SUMMARY OF
BAILEY ROAD AND COMMERCIAL DRIVEWAY / SITE DRIVE 1

LOS AND DELAY								
Scenario	Approach	Lane Configurations	AM Peak Hour			PM Peak Hour		
			LOS	Delay (seconds)	Overall LOS (Delay)	LOS	Delay (seconds)	Overall LOS (Delay)
2015 Existing	EB[1]	1 TH-RT	-		N/A[3]	-	-	N/A[3]
	WB[1]	1 LT-TH, 1 TH	A	0.3		A	0.7	
	NB[2]	1 LT-RT	B	14.2		C	24.2	
2017 No-Build	EB[1]	1 TH-RT	-		N/A[3]	-	-	N/A[3]
	WB[1]	1 LT-TH, 1 TH	A	0.3		A	0.7	
	NB[2]	1 LT-RT	B	14.6		D	26.2	
2017 Build	EB[1]	1 LT-TH-RT	A	2.1	N/A[3]	A	2.1	N/A[3]
	WB[1]	1 LT-TH, 1 TH-RT	A	0.2		A	0.5	
	NB[2]	1 LT-TH-RT	C	23.1		F	75.1	
	SB[2]	1 LT-TH-RT	C	21.7		E	49.9	

1. Major street left-turn movement for unsignalized intersection.
2. Stop controlled approach for unsignalized intersection.
3. Overall intersection LOS is not provided for unsignalized intersections

5.4.6. Washam Potts Road and Daycare Driveway / Site Drive 2

The intersection of Washam Potts Road and Daycare Driveway / Site Drive 2 was analyzed as a three-leg unsignalized intersection under the existing and no-build scenarios. The proposed Site Drive 2 would form the fourth leg at this intersection. Table 9 summarizes the capacity analysis results. Refer to Appendix J for the Synchro reports. All SimTraffic reports can be found in Appendix K.

The addition of site traffic is expected to have a minor effect on the operation of the intersection. No impacts to LOS or delay are expected.

SimTraffic results indicate long queues on southbound Washam Potts Road can be expected during the AM peak hour under the no-build condition. This queueing occurs when vehicles on westbound Bailey Road spillback from the signal at US 21. Review of the SimTraffic simulation indicated this queuing is expected to form and recover several times during the AM peak hour. It is recommended the developer construct Site Drive 2 with one shared left/through/right lane.

TABLE 9
ANALYSIS SUMMARY OF
WASHAM POTTS ROAD AND DAYCARE DRIVEWAY / SITE DRIVE 2

LOS AND DELAY								
Scenario	**Approach**	**Lane Configurations**	**AM Peak Hour**			**PM Peak Hour**		
			LOS	**Delay (seconds)**	**Overall LOS (Delay)**	**LOS**	**Delay (seconds)**	**Overall LOS (Delay)**
2015 Existing	WB[2]	1 LT-RT	B	11.3	N/A[3]	B	12.0	N/A[3]
	NB	1 TH-RT	-	-		-	-	
	SB[1]	1 LT-TH	A	0.9		A	1.5	
2017 No-Build	WB[2]	1 LT-RT	B	11.5	N/A[3]	B	12.2	N/A[3]
	NB	1 TH-RT	-	-		-	-	
	SB[1]	1 LT-TH	A	0.9		A	1.5	
2017 Build	EB[2]	1 LT-TH-RT	B	14.5	N/A[3]	B	14.7	N/A[3]
	WB[2]	1 LT-TH-RT	B	12.6		B	13.4	
	NB[1]	1 LT-TH-RT	A	0.1		A	0.3	
	SB[1]	1 LT-TH-RT	A	0.8		A	1.3	

1. Major street left-turn movement for unsignalized intersection.
2. Stop controlled approach for unsignalized intersection.
3. Overall intersection LOS is not provided for unsignalized intersections

6. CONCLUSIONS

This report summarizes the findings of the Traffic Impact Study (TIS) that was performed for the proposed Oakhurst II commercial development to be located along the east side of US 21, north of Bailey Road in Cornelius, North Carolina. The purpose of this study is to determine the potential impact to the surrounding transportation system caused by the traffic generated by the proposed development.

The proposed site includes a 20,000 SF general office building, a 7,000 SF shopping center, a 7,000 SF bank with drive-thru window, and a 6,000 SF high-turnover (sit-down) restaurant. The project is expected to be completed by 2017. Access to the site is anticipated via a proposed driveway on Bailey Road (full access) and a proposed driveway on Washam Potts Road (full access).

6.1. Summary of Recommended Improvements

Based on the analysis results, some impacts are expected by the proposed development. Refer to Figure 12 for an illustration of the recommended lane configurations. It is recommended the developer provide the following improvements:

US 21 and Bailey Road

- Extend the southbound US 21 left turn lane to provide 200 feet of storage and appropriate taper.

Bailey Road and Site Drive 1

- Construct Site Drive 1 with one ingress lane and one shared left/through/right egress lane.

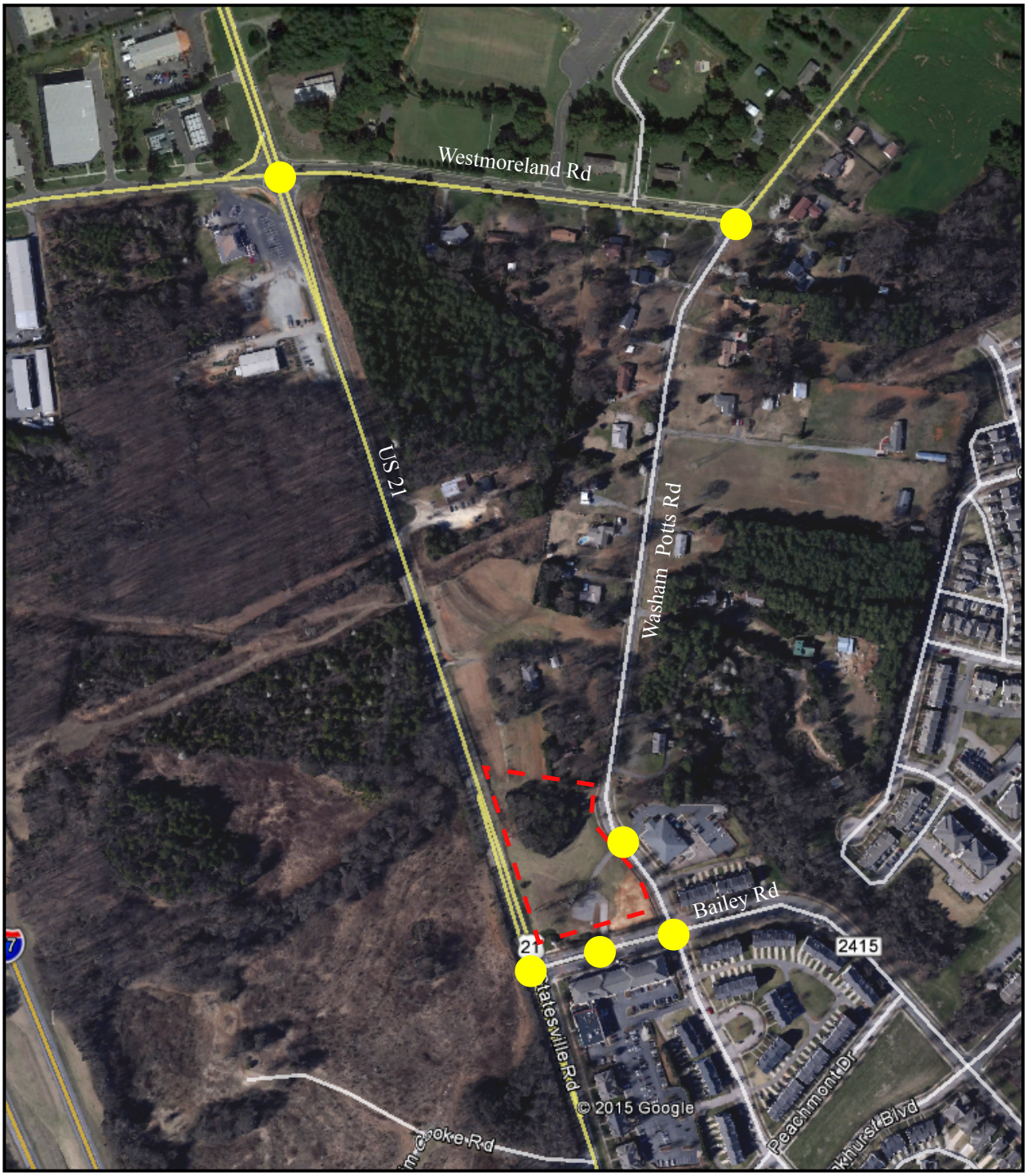
Washam Potts Road and Site Drive 2

- Construct Site Drive 2 with one ingress lane and one shared left/through/right egress lane.

TECHNICAL APPENDIX

APPENDIX A

FIGURES



N

LEGEND

Proposed Site Location

Study Intersection

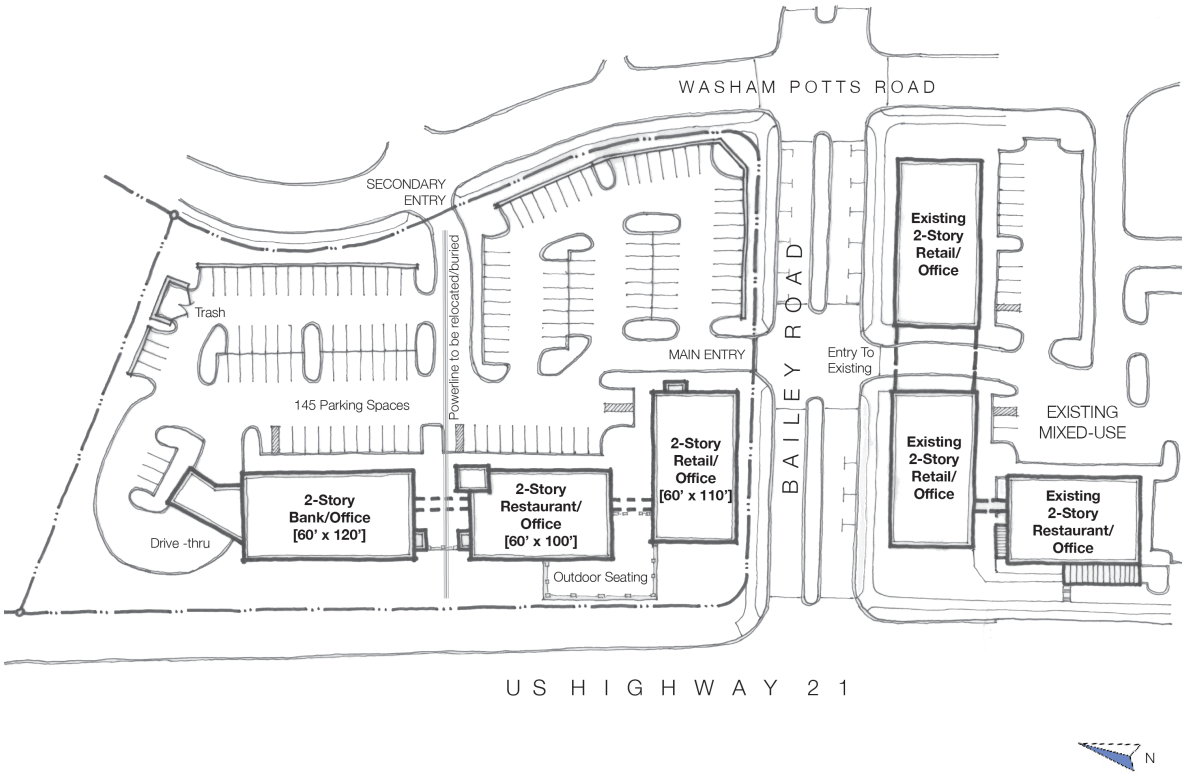
RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Oakhurst II
Commercial Development
Cornelius, NC

Site Location Map

Scale: Not to Scale

Figure 1



Conceptual Site Plan: OAKHURST COMMERCIAL II

September 3, 2015

Scale: Not to Scale

MIND'S EYE ARCHITECTURE
1950 Abbott Street, Suite 605
Charlotte, North Carolina 28203
P: 704.373.3101
F: 704.373.3103
www.mindseyearchitecture.net

PROJECT DATA:

Bank/Retail SF: 14,000
Req'd Parking: 28 spaces
(Ratio = 1:500)

Office SF: 20,000
Req'd Parking: 66 spaces
(Ratio = 1:300)

Restaurant SF: 6,000
Req'd Parking: 50 spaces
(Ratio = 1:3 seats,
approx. 150 seats)
(If 1:500, 12 spaces)

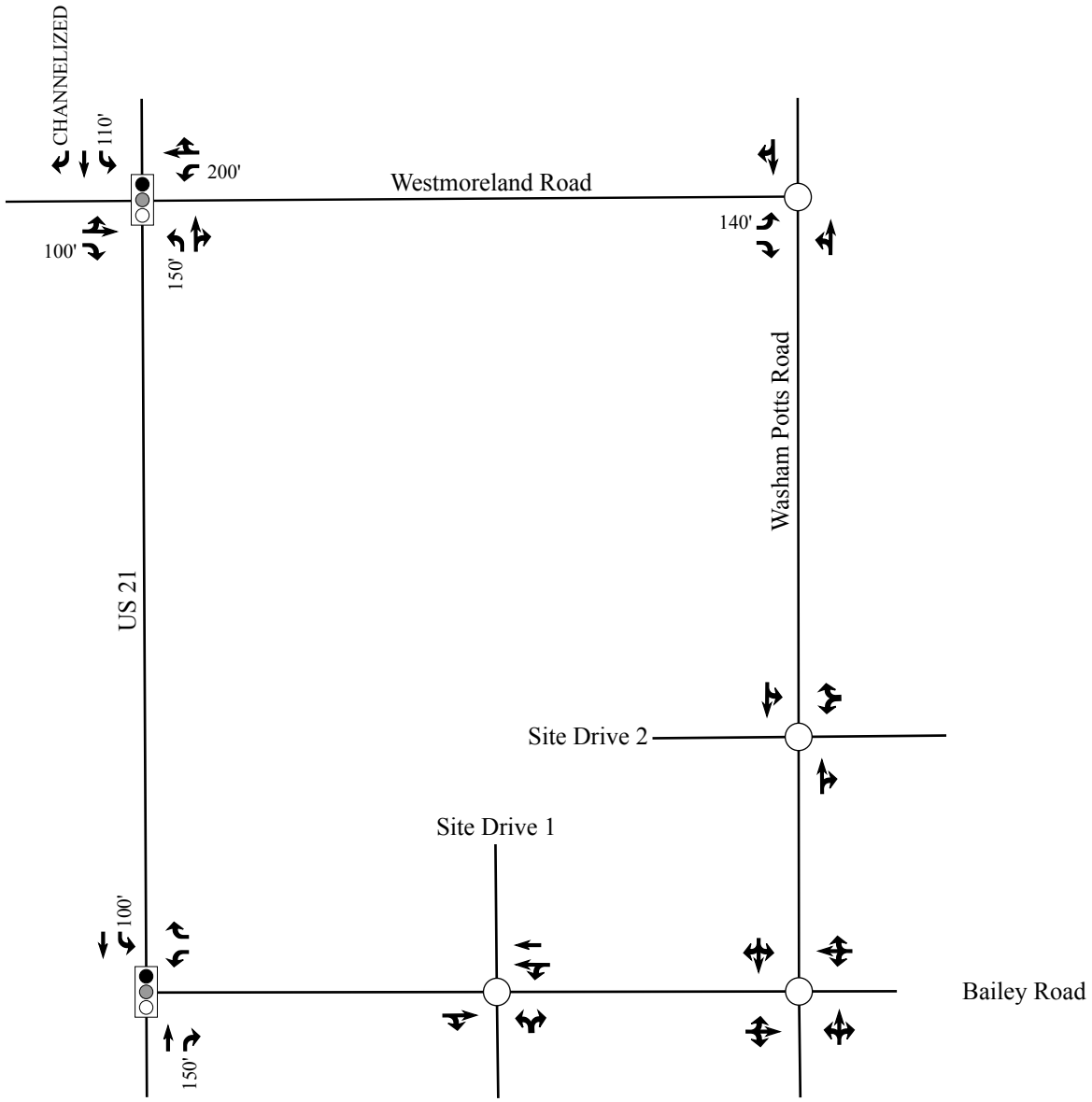
Total SF: +/- 40,000
Total Req'd Parking: 144

Parking Provided: 145

Overall Combined Ratio:
1/275

Preliminary: Not for Construction

RAMEY KEMP & ASSOCIATES TRANSPORTATION ENGINEERS	Oakhurst II Commercial Development Cornelius, NC	Preliminary Site Plan
		Scale: Not to Scale / Figure 2



LEGEND

- Unsignalized Intersection
- Signalized Intersection
- Existing Lane
- X' Storage (In Feet)

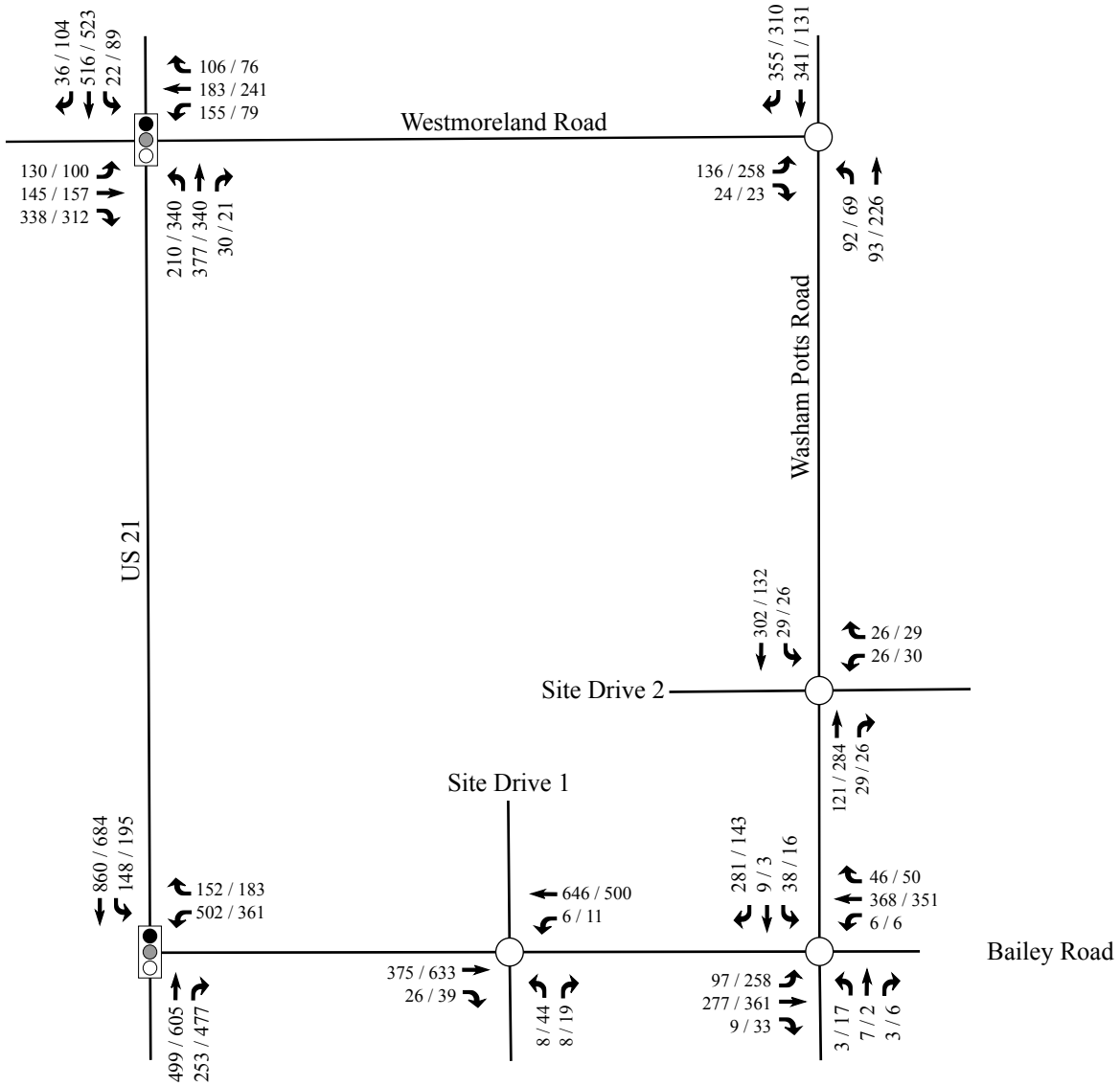
RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Oakhurst II
Commercial Development
Cornelius, NC

2015 Existing
Lane Configurations

Scale: Not to Scale

Figure 3



LEGEND

Unsignalized Intersection

Signalized Intersection

X / Y → AM / PM Peak Hour Traffic

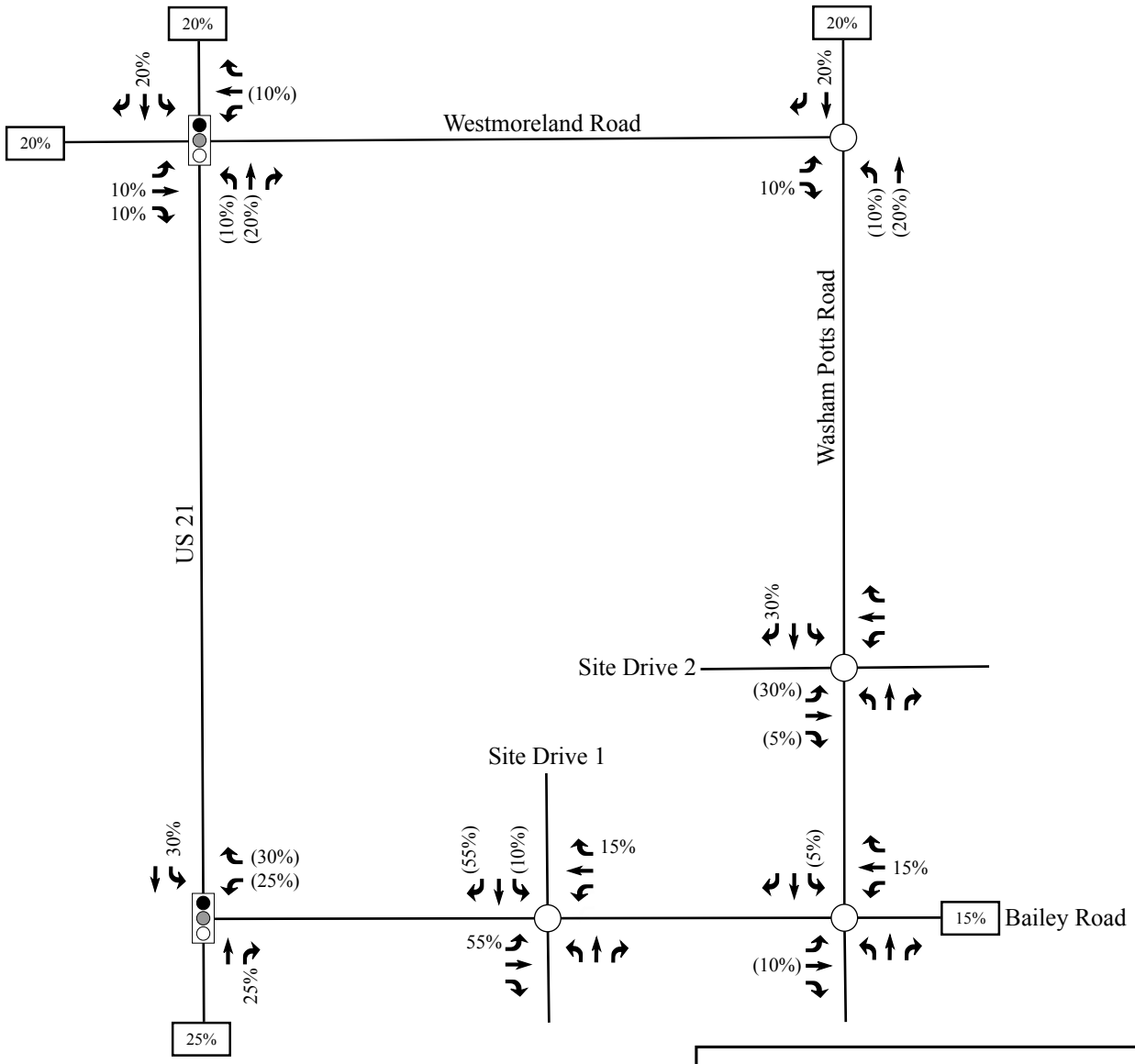
RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Oakhurst II
Commercial Development
Cornelius, NC

2015 Existing
Peak Hour Traffic Volumes

Scale: Not to Scale

Figure 4



LEGEND

- Unsignalized Intersection
- Signalized Intersection
- X% → Entering Trip Distribution
- (Y%) → Exiting Trip Distribution
- XX% Regional Trip Distribution

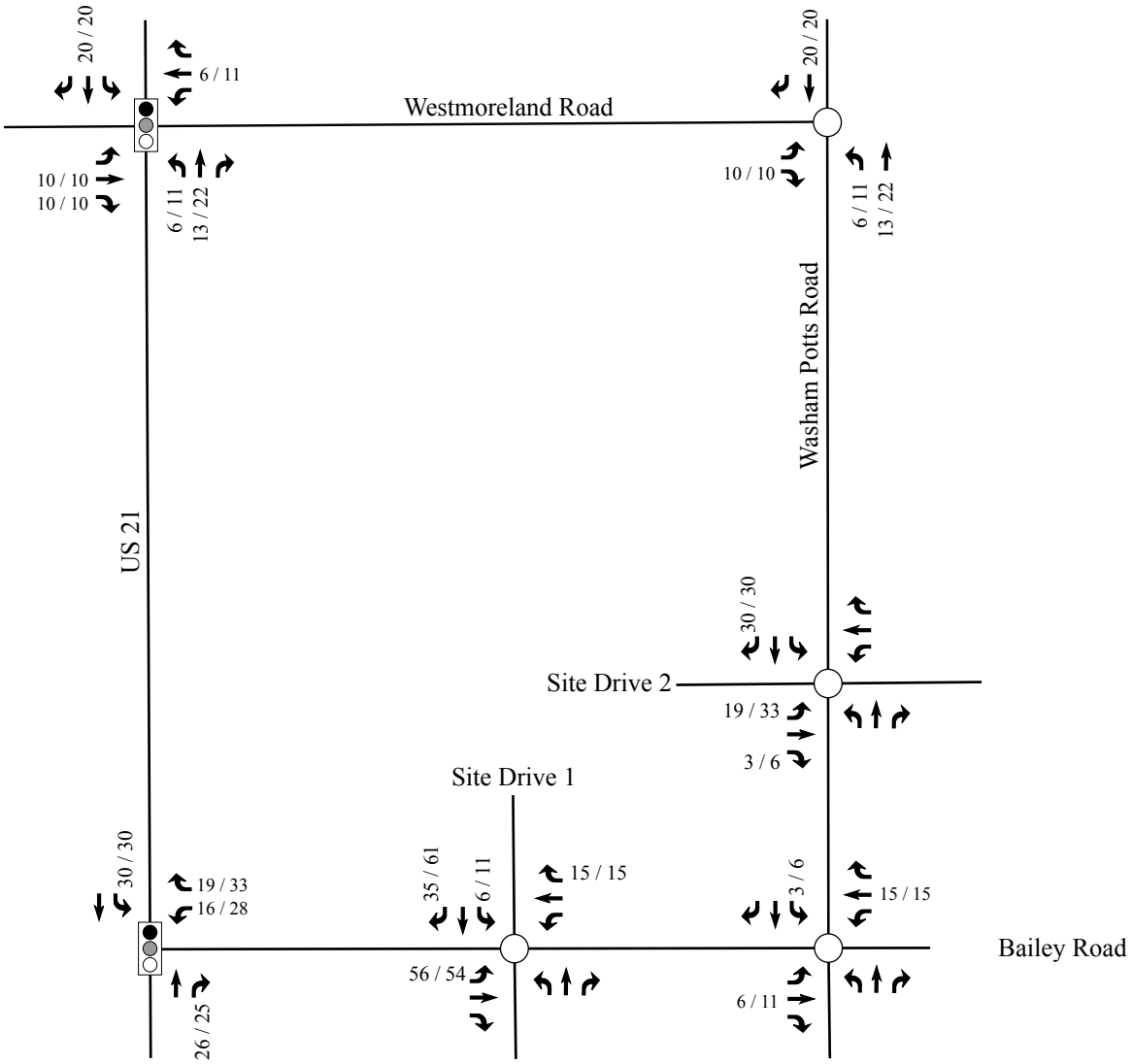
RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Oakhurst II
Commercial Development
Cornelius, NC

Proposed Site
Primary
Trip Distribution Percentages

Scale: Not to Scale

Figure 5



LEGEND

Unsignalized Intersection

Signalized Intersection

X / Y → AM / PM Peak Hour Traffic

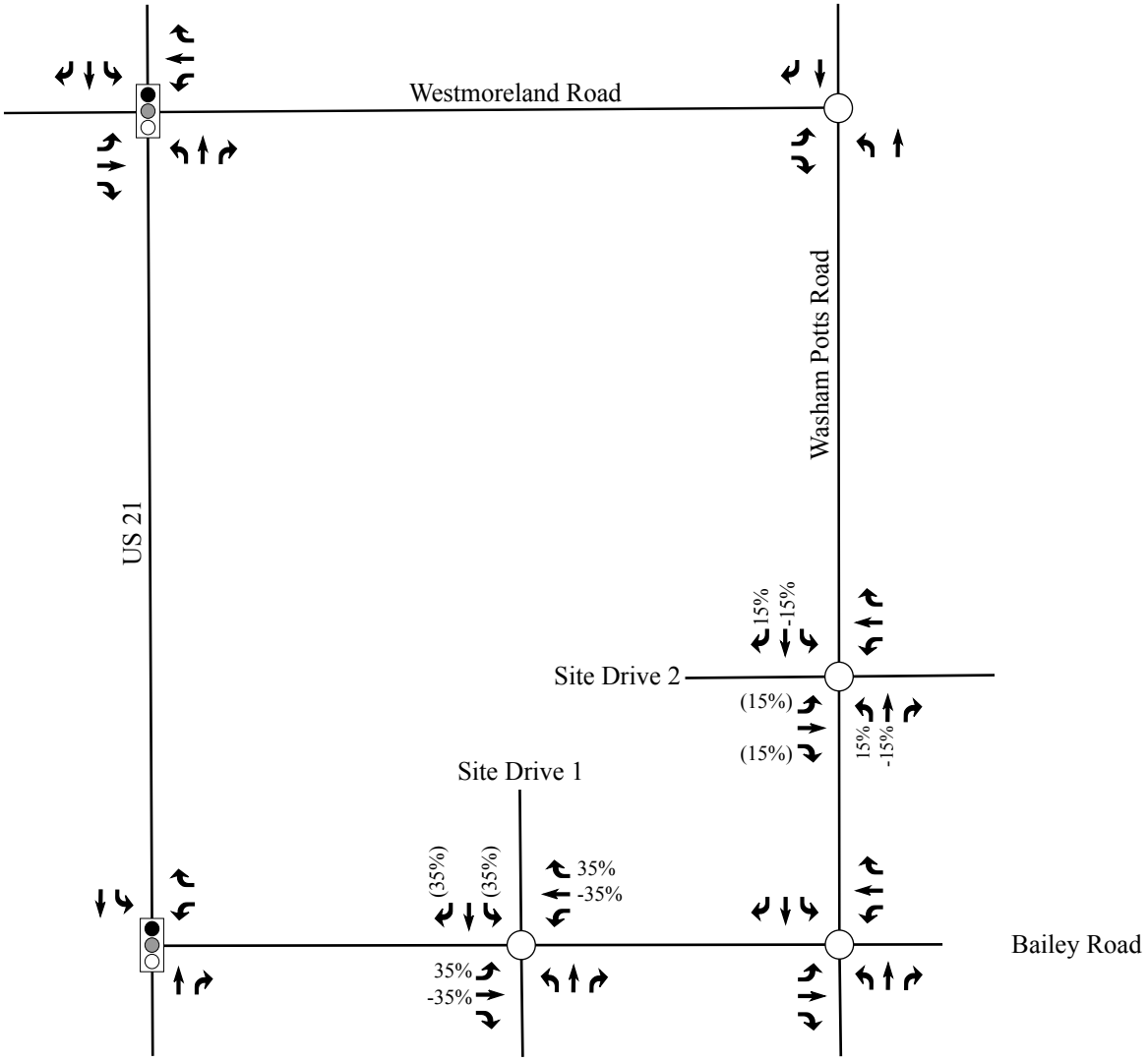
RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Oakhurst II
Commercial Development
Cornelius, NC

Proposed Site
Primary
Trip Assignment

Scale: Not to Scale

Figure 6



LEGEND

- Unsignalized Intersection
- Signalized Intersection
- X% → Entering Trip Distribution
- (Y%) → Exiting Trip Distribution

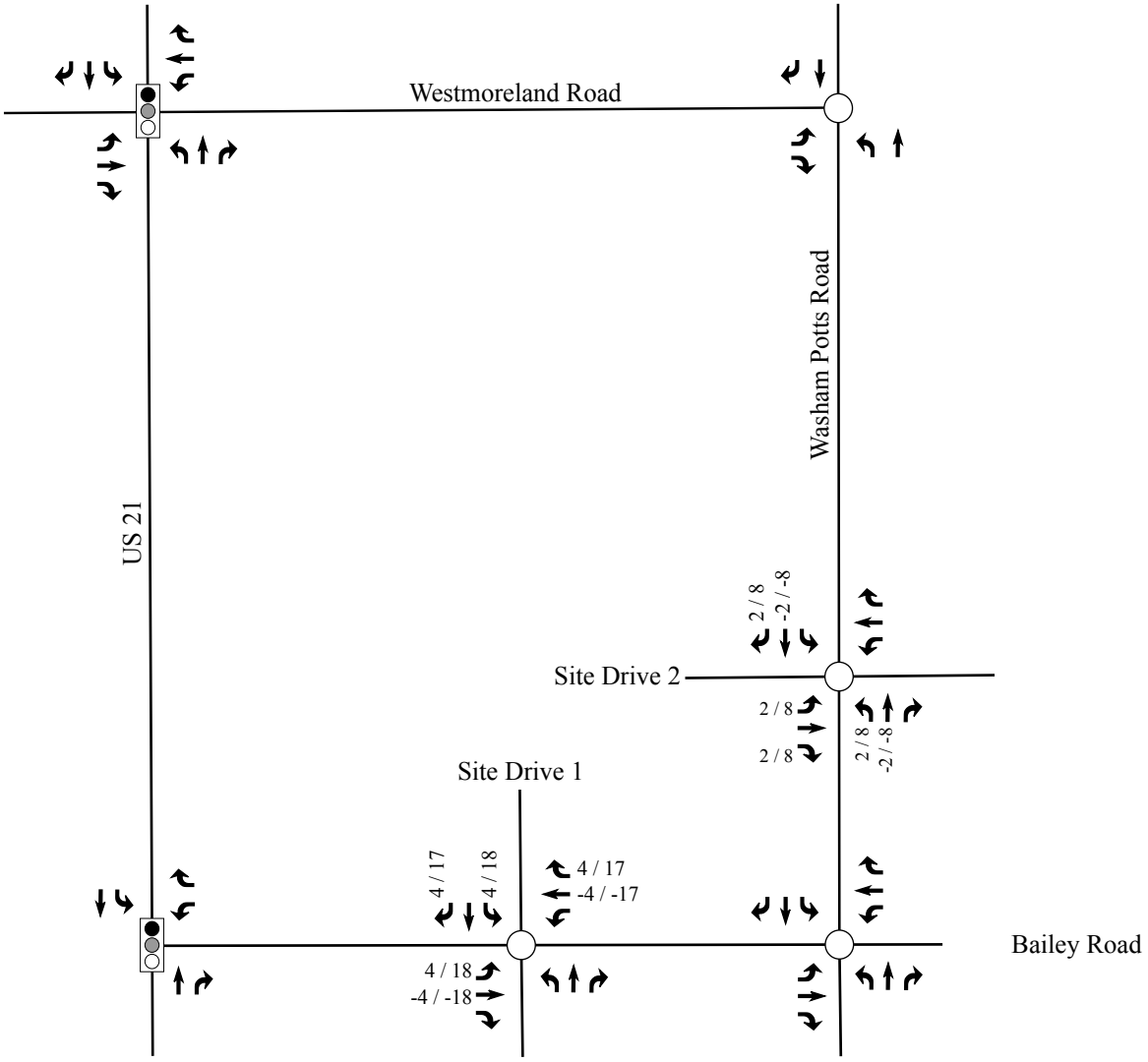
RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Oakhurst II
Commercial Development
Cornelius, NC

Proposed Site
Pass-By
Trip Distribution Percentages

Scale: Not to Scale

Figure 7



LEGEND

Unsignalized Intersection

Signalized Intersection

X / Y → AM / PM Peak Hour Traffic

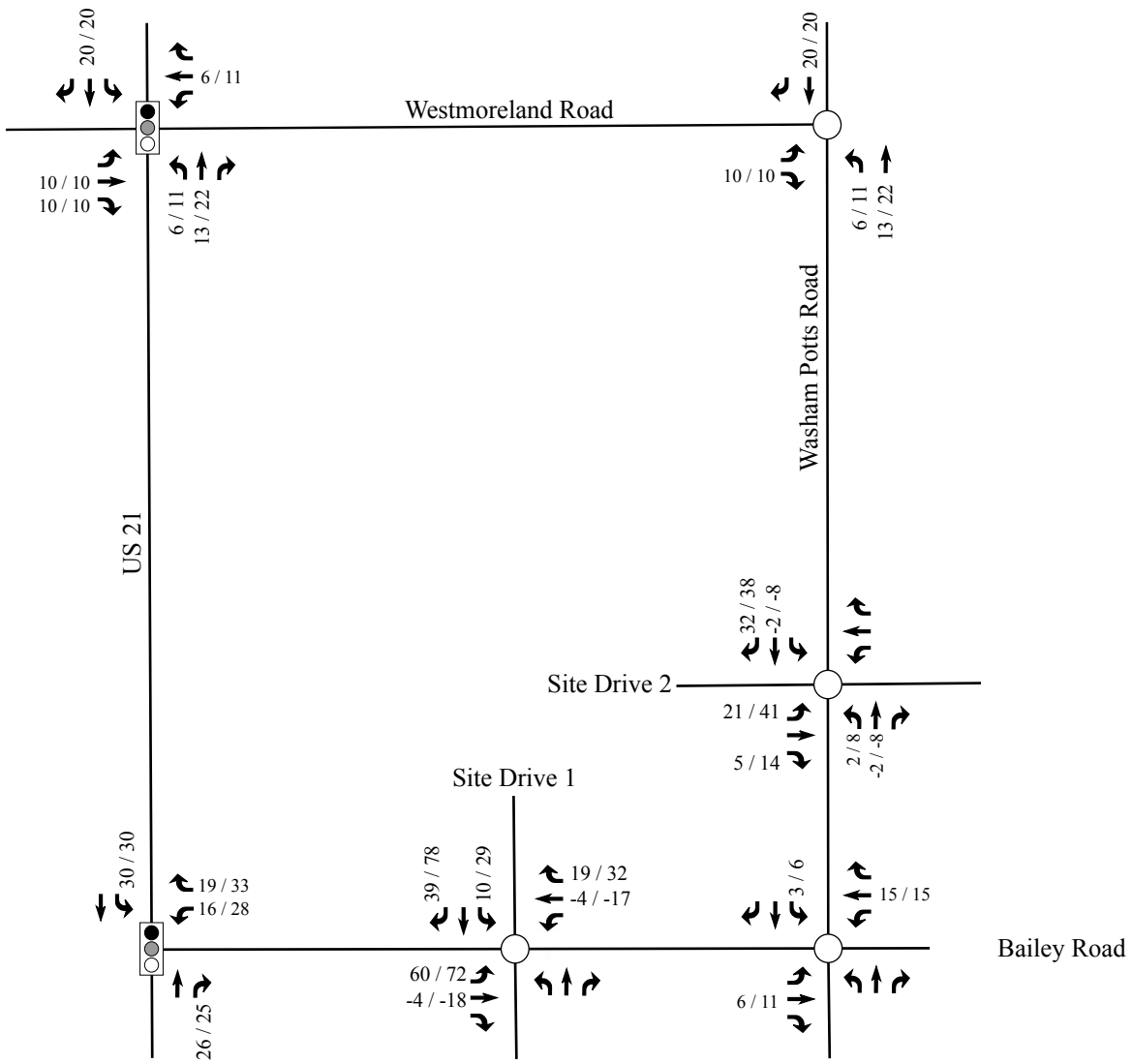
RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Oakhurst II
Commercial Development
Cornelius, NC

Proposed Site
Pass-By
Trip Assignment

Scale: Not to Scale

Figure 8



LEGEND

Unsignalized Intersection

Signalized Intersection

X / Y → AM / PM Peak Hour Traffic

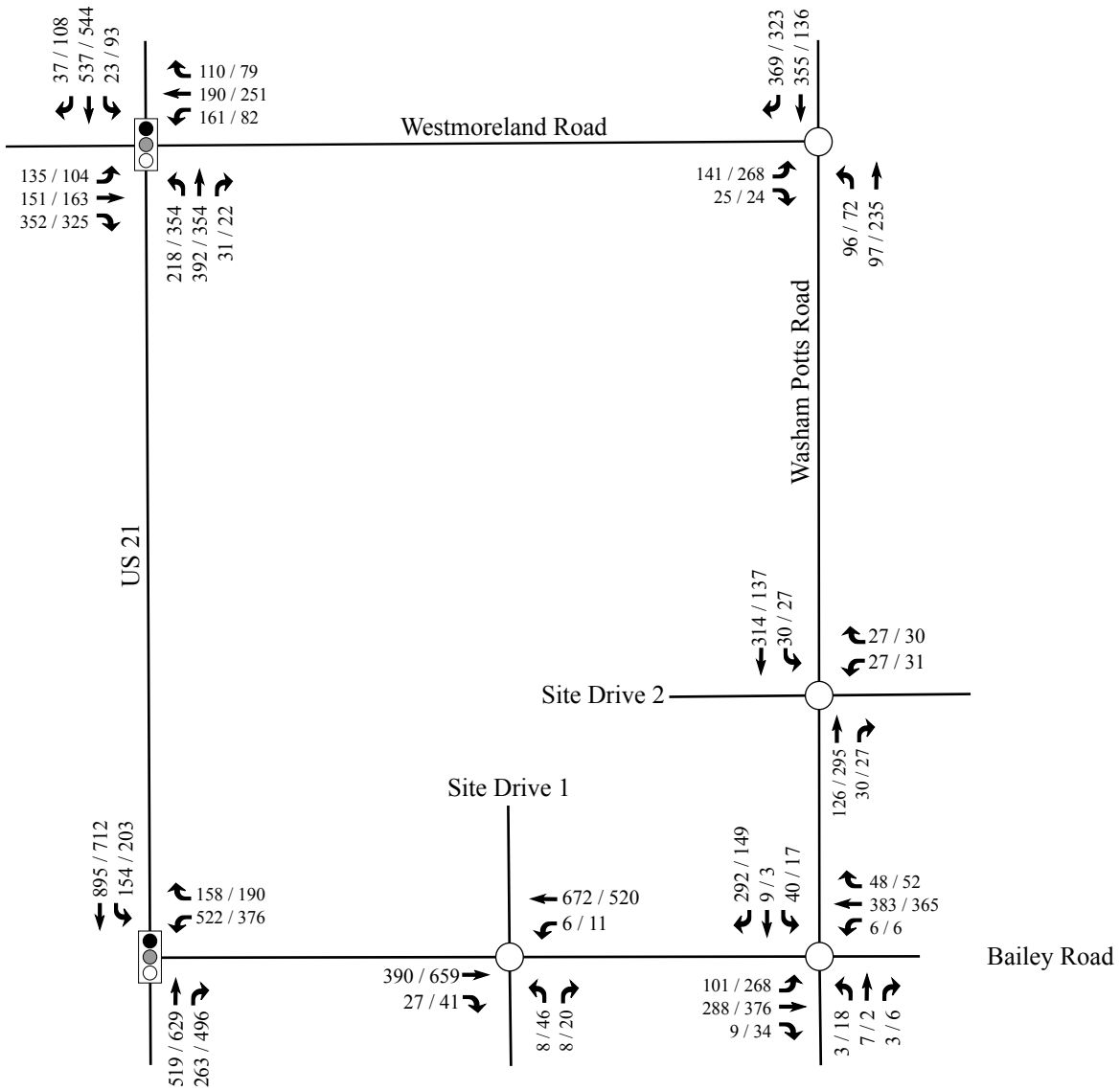
RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Oakhurst II
Commercial Development
Cornelius, NC

Proposed Site
Total
Trip Assignment

Scale: Not to Scale

Figure 9



LEGEND

Unsignalized Intersection

Signalized Intersection

X / Y → AM / PM Peak Hour Traffic

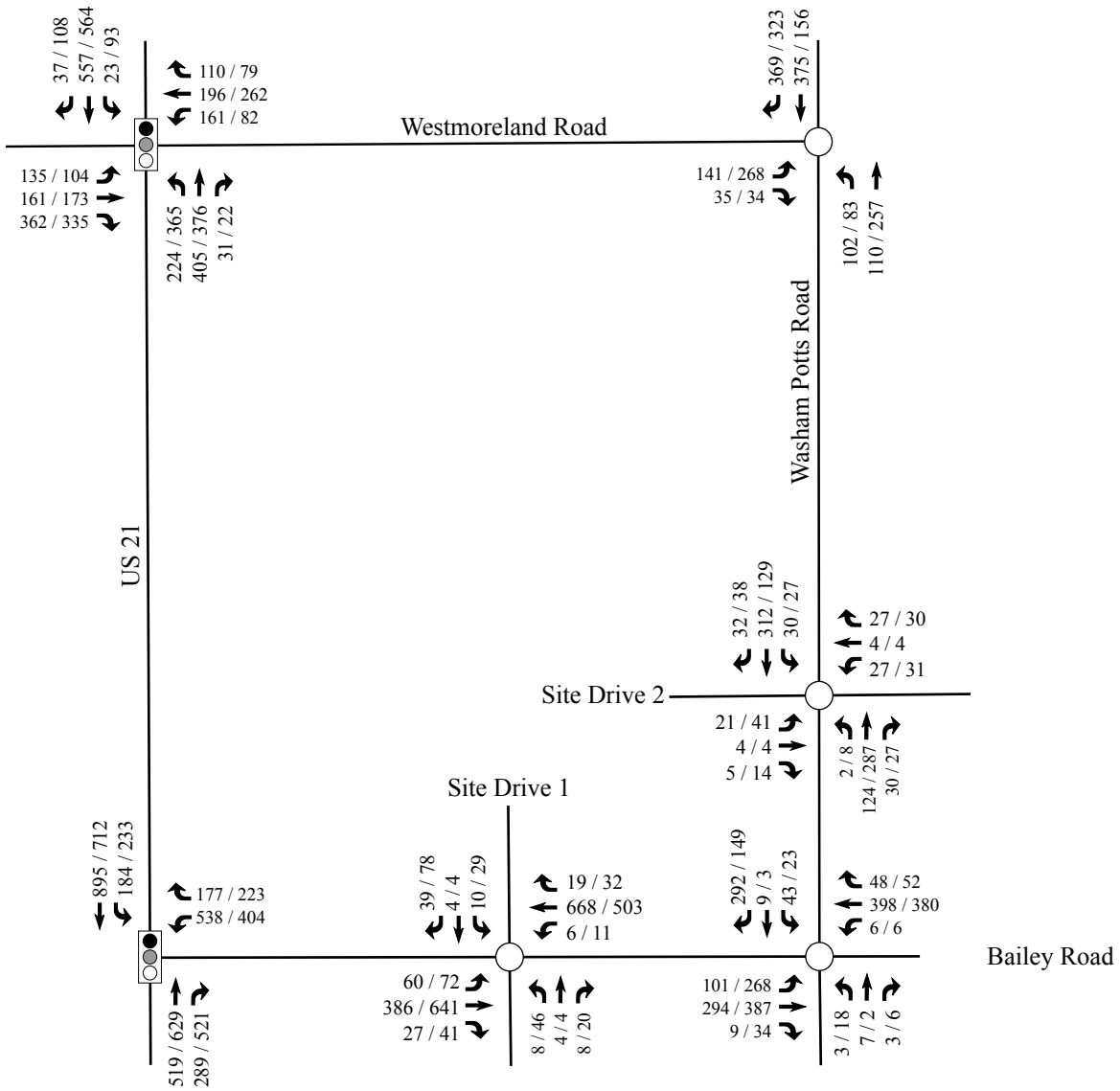
RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Oakhurst II
Commercial Development
Cornelius, NC

2017 No-Build
Peak Hour Traffic Volumes

Scale: Not to Scale

Figure 10



LEGEND

Unsignalized Intersection

Signalized Intersection

X / Y → AM / PM Peak Hour Traffic

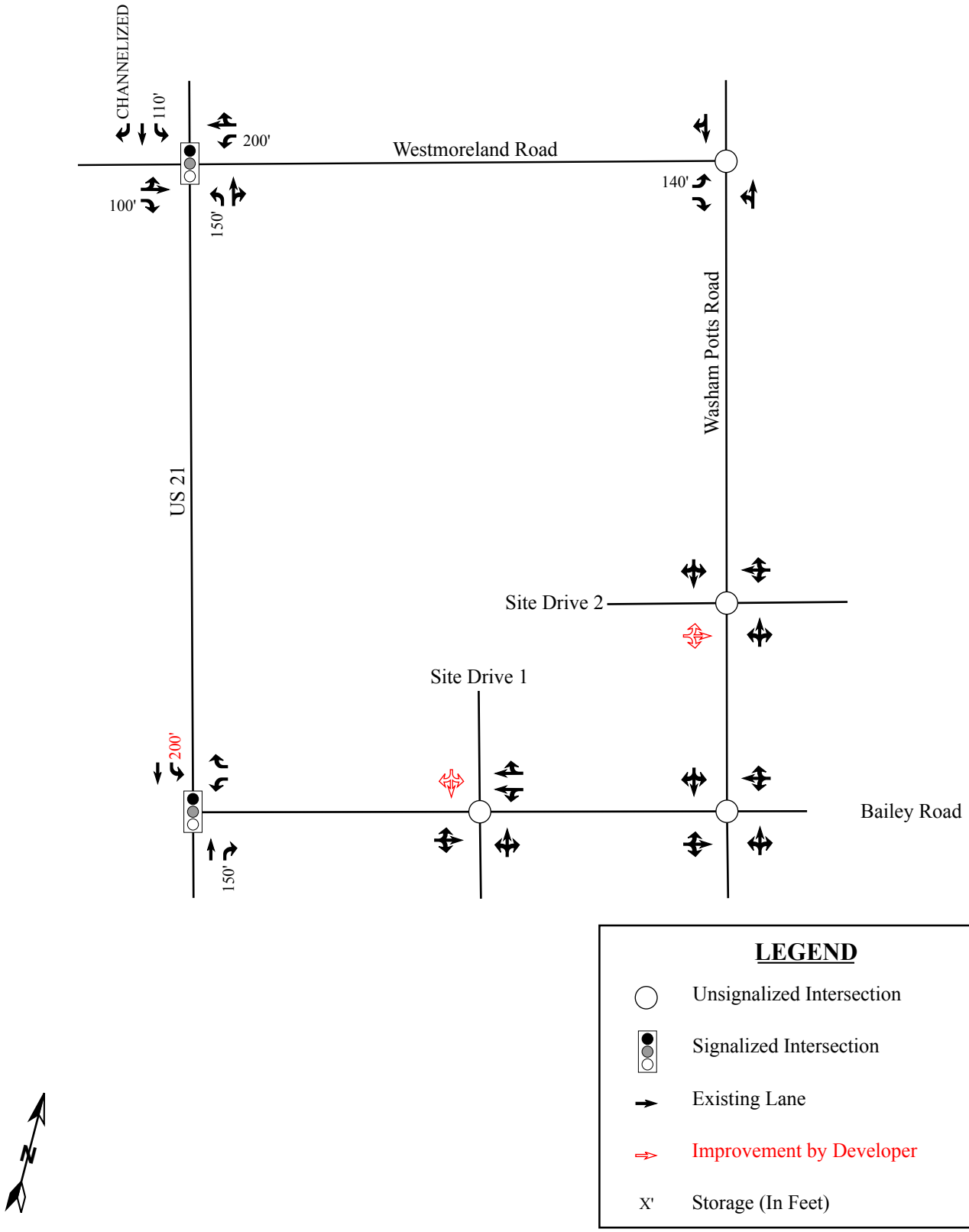
RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Oakhurst II
Commercial Development
Cornelius, NC

2017 Build
Peak Hour Traffic Volumes

Scale: Not to Scale

Figure 11



RAMEY KEMP & ASSOCIATES
TRANSPORTATION ENGINEERS

Oakhurst II
Commercial Development
Cornelius, NC

Recommended
Lane Configurations

Scale: Not to Scale

Figure 12

APPENDIX B

TRAFFIC COUNT DATA

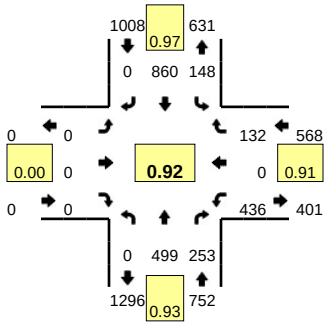
Type of peak hour being reported: Intersection Peak

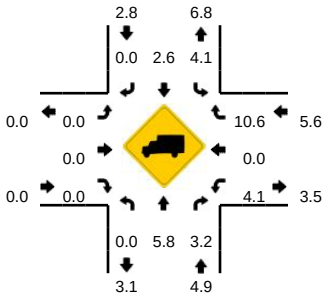
Method for determining peak hour: Total Entering Volume

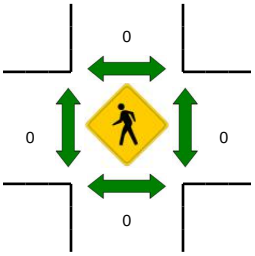
LOCATION: US 21 -- Bailey Rd
CITY/STATE: Cornelius, NC

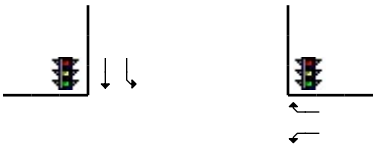
QC JOB #: 13635101
DATE: Thu, Oct 29 2015

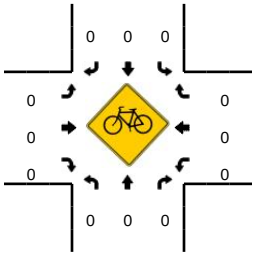
Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

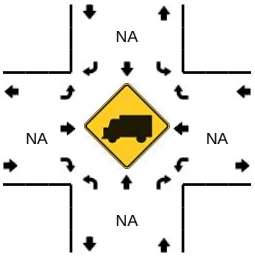


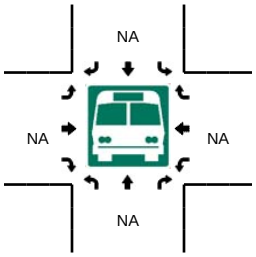












15-Min Count Period Beginning At	US 21 (Northbound)				US 21 (Southbound)				Bailey Rd (Eastbound)				Bailey Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	58	29	0	22	220	0	0	0	0	0	0	129	0	34	0	492	
7:15 AM	0	96	50	0	19	221	0	0	0	0	0	0	141	0	37	0	564	
7:30 AM	0	113	50	0	37	220	0	0	0	0	0	0	103	0	33	0	556	
7:45 AM	0	127	78	0	46	213	0	0	0	0	0	0	131	0	38	0	633	2245
8:00 AM	0	122	54	0	37	209	0	0	0	0	0	0	104	0	29	0	555	2308
8:15 AM	0	137	71	0	28	218	0	0	0	0	0	0	98	0	32	0	584	2328
8:30 AM	0	125	60	0	63	183	0	0	0	0	0	0	102	0	23	0	556	2328
8:45 AM	0	129	47	0	45	176	0	0	0	0	0	0	78	0	41	0	516	2211

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	508	312	0	184	852	0	0	0	0	0	0	524	0	152	0	2532
Heavy Trucks	0	32	12		8	24	0		0	0	0		20	0	40		136
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/4/2015 5:43 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

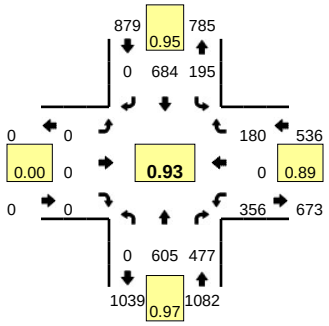
Type of peak hour being reported: Intersection Peak

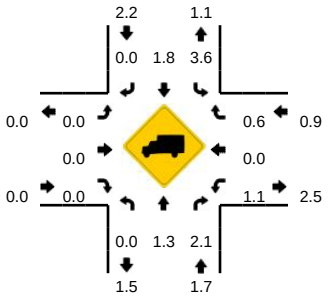
Method for determining peak hour: Total Entering Volume

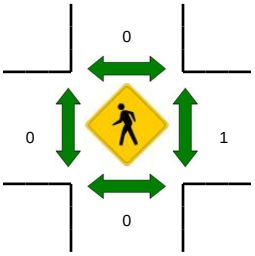
LOCATION: US 21 -- Bailey Rd
CITY/STATE: Cornelius, NC

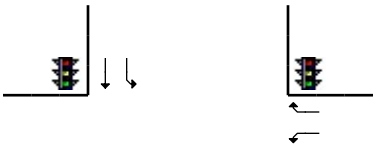
QC JOB #: 13635102
DATE: Thu, Oct 29 2015

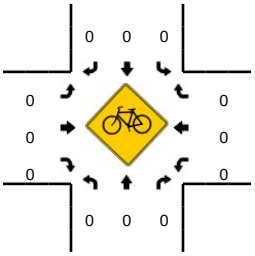
Peak-Hour: 4:45 PM -- 5:45 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

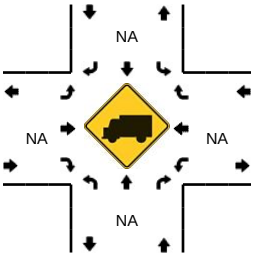


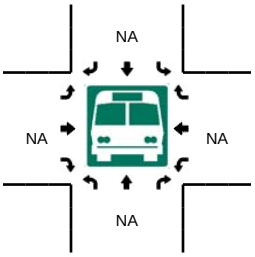












15-Min Count Period Beginning At	US 21 (Northbound)				US 21 (Southbound)				Bailey Rd (Eastbound)				Bailey Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	167	96	0	40	150	0	0	0	0	0	0	81	0	28	0	562	
4:15 PM	0	140	93	0	37	129	0	0	0	0	0	0	75	0	38	0	512	
4:30 PM	0	180	84	0	33	175	0	0	0	0	0	0	75	0	40	0	587	
4:45 PM	0	160	125	0	50	138	0	0	0	0	0	0	85	0	43	0	601	2262
5:00 PM	0	163	113	0	55	183	0	0	0	0	0	0	80	0	43	0	637	2337
5:15 PM	0	140	141	0	46	193	0	0	0	0	0	0	101	0	50	0	671	2496
5:30 PM	0	142	98	0	44	170	0	0	0	0	0	0	89	0	44	1	588	2497
5:45 PM	0	109	106	0	38	182	0	0	0	0	0	0	74	0	50	1	560	2456

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	560	564	0	184	772	0	0	0	0	0	0	404	0	200	0	2684
Heavy Trucks	0	8	8		0	12	0		0	0	0		4	0	0		32
Pedestrians		0				0				0				4			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/4/2015 5:43 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

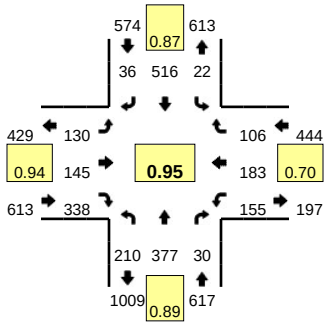
Type of peak hour being reported: Intersection Peak

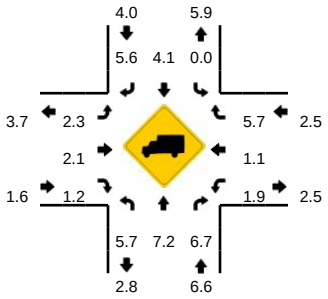
Method for determining peak hour: Total Entering Volume

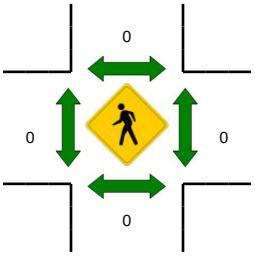
LOCATION: US 21 -- Westmoreland Rd
CITY/STATE: Cornelius, NC

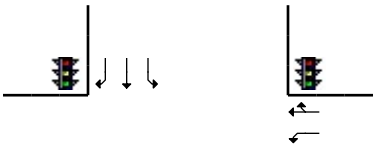
QC JOB #: 13635103
DATE: Thu, Oct 29 2015

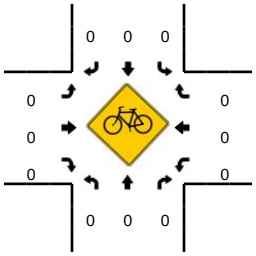
Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

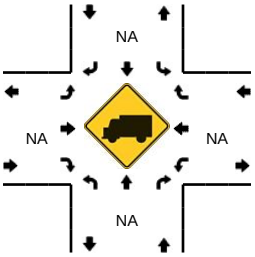


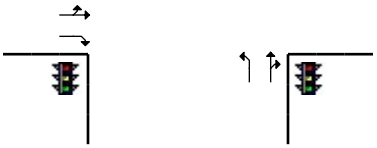


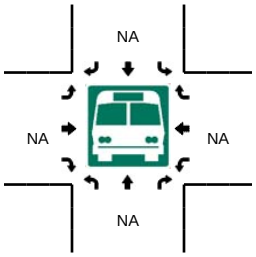












15-Min Count Period Beginning At	US 21 (Northbound)				US 21 (Southbound)				Westmoreland Rd (Eastbound)				Westmoreland Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	28	36	17	0	11	95	7	0	7	41	99	0	44	35	17	0	437	
7:15 AM	45	55	36	0	9	114	5	0	18	56	69	0	54	48	26	0	535	
7:30 AM	31	67	16	0	7	115	1	0	30	45	65	0	83	67	38	0	565	
7:45 AM	63	114	4	0	2	117	6	0	38	36	97	0	47	38	31	0	593	2130
8:00 AM	55	88	6	0	6	134	10	0	32	35	90	0	14	40	18	0	528	2221
8:15 AM	61	108	4	0	7	150	19	0	30	29	86	0	11	38	19	0	562	2248
8:30 AM	58	81	5	0	6	137	8	0	27	41	102	0	14	41	18	0	538	2221
8:45 AM	87	87	7	0	8	117	10	0	32	38	79	0	16	68	18	0	567	2195

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	252	456	16	0	8	468	24	0	152	144	388	0	188	152	124	0	2372
Heavy Trucks	24	44	0		0	24	8		4	0	4		0	4	12		124
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/4/2015 5:43 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

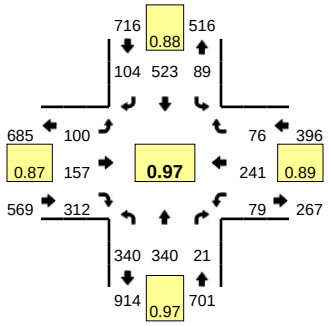
Type of peak hour being reported: Intersection Peak

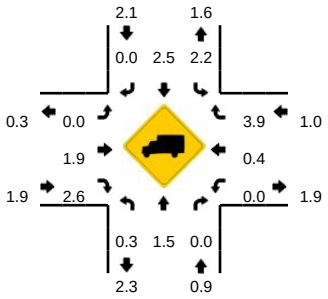
Method for determining peak hour: Total Entering Volume

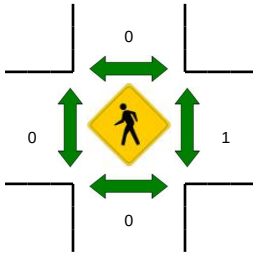
LOCATION: US 21 -- Westmoreland Rd
CITY/STATE: Cornelius, NC

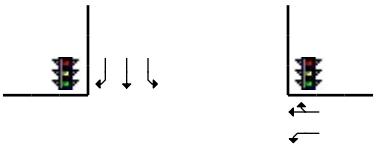
QC JOB #: 13635104
DATE: Thu, Oct 29 2015

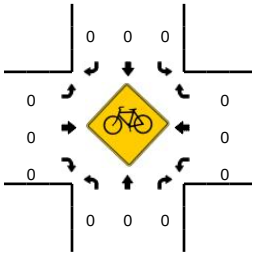
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

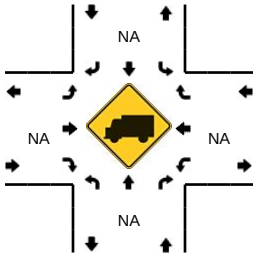


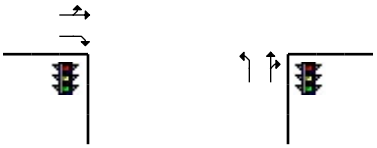


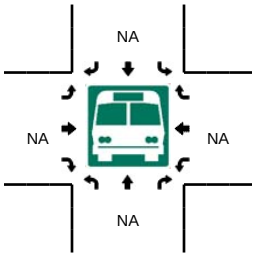












15-Min Count Period Beginning At	US 21 (Northbound)				US 21 (Southbound)				Westmoreland Rd (Eastbound)				Westmoreland Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	79	106	5	0	16	91	20	0	19	28	72	0	17	35	11	0	499	
4:15 PM	74	101	4	0	19	84	30	0	17	26	57	0	20	47	16	0	495	
4:30 PM	82	98	5	0	20	119	29	0	23	30	72	0	12	42	13	0	545	
4:45 PM	88	101	5	0	22	110	25	0	23	55	73	0	10	45	10	0	567	2106
5:00 PM	86	89	7	0	23	124	18	0	30	44	90	0	19	62	20	0	612	2219
5:15 PM	95	90	4	0	27	145	32	0	17	31	83	0	14	47	21	0	606	2330
5:30 PM	78	77	4	0	20	132	28	0	12	38	60	0	20	73	18	0	560	2345
5:45 PM	81	84	6	0	19	122	26	0	41	44	79	0	26	59	17	0	604	2382

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	344	356	28	0	92	496	72	0	120	176	360	0	76	248	80	0	2448
Heavy Trucks	0	0	0		0	16	0		0	0	8		0	0	0		24
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/4/2015 5:43 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

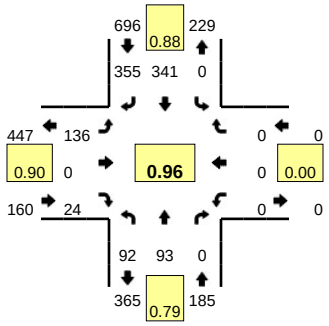
LOCATION: Washam Potts Rd -- Westmoreland Rd

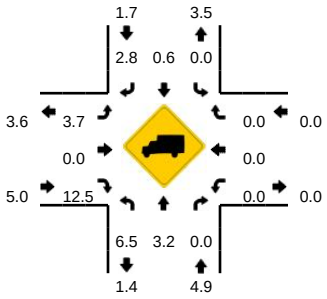
CITY/STATE: Cornelius, NC

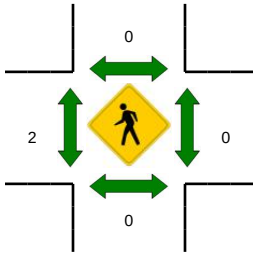
QC JOB #: 13635105

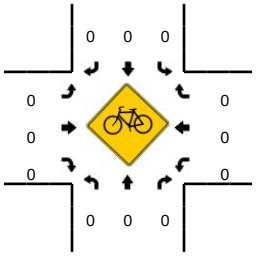
DATE: Thu, Oct 29 2015

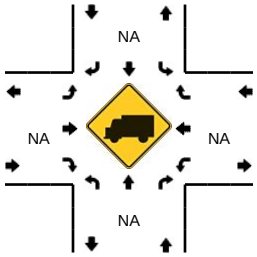
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

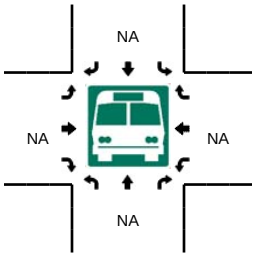












15-Min Count Period Beginning At	Washam Potts Rd (Northbound)				Washam Potts Rd (Southbound)				Westmoreland Rd (Eastbound)				Westmoreland Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	24	10	0	0	0	103	95	0	28	0	8	0	0	0	0	0	268	
7:15 AM	23	11	0	0	0	89	106	0	34	0	3	0	0	0	0	0	266	
7:30 AM	35	27	0	0	0	75	96	0	31	0	8	0	0	0	0	0	272	
7:45 AM	10	45	0	0	0	74	58	0	43	0	5	0	0	0	0	0	235	1041
8:00 AM	6	30	0	0	0	54	65	0	40	0	4	0	0	0	0	0	199	972
8:15 AM	7	37	0	0	0	43	51	0	34	0	4	0	0	0	0	0	176	882
8:30 AM	2	28	0	0	0	57	71	0	45	0	6	0	0	0	0	0	209	819
8:45 AM	5	36	0	0	0	43	99	0	46	0	4	0	0	0	0	0	233	817

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	140	108	0	0	0	300	384	0	124	0	32	0	0	0	0	0	1088
Heavy Trucks	0	0	0		0	4	8		4	0	8		0	0	0		24
Pedestrians		0				0				4				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/4/2015 5:43 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

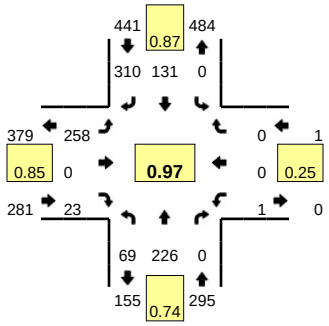
Type of peak hour being reported: Intersection Peak

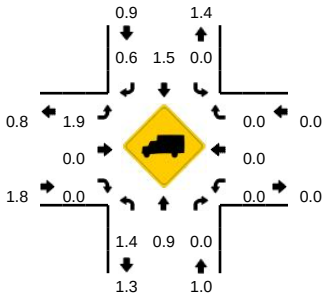
Method for determining peak hour: Total Entering Volume

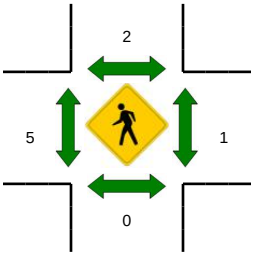
LOCATION: Washam Potts Rd -- Westmoreland Rd
CITY/STATE: Cornelius, NC

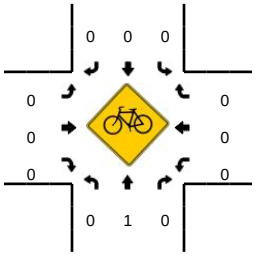
QC JOB #: 13635106
DATE: Thu, Oct 29 2015

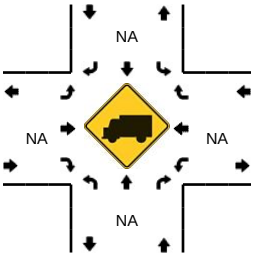
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:30 PM -- 5:45 PM

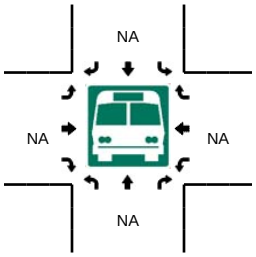












15-Min Count Period Beginning At	Washam Potts Rd (Northbound)				Washam Potts Rd (Southbound)				Westmoreland Rd (Eastbound)				Westmoreland Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	3	49	0	0	1	31	54	0	43	0	4	0	0	0	0	0	185	
4:15 PM	6	42	0	0	0	25	66	0	46	0	4	0	0	0	0	0	189	
4:30 PM	5	44	0	0	0	36	64	0	48	0	3	0	0	0	0	0	200	
4:45 PM	10	48	0	0	0	40	51	0	74	0	6	0	0	0	0	0	229	803
5:00 PM	14	53	0	0	0	28	76	0	67	0	4	0	0	0	0	0	242	860
5:15 PM	22	78	0	0	0	33	60	0	58	0	5	0	1	0	0	0	257	928
5:30 PM	16	56	0	0	0	37	90	0	57	0	7	0	0	0	0	0	263	991
5:45 PM	17	39	0	0	0	33	84	0	76	0	7	0	0	0	0	0	256	1018

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	64	224	0	0	0	148	360	0	228	0	28	0	0	0	0	0	1052
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/4/2015 5:43 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

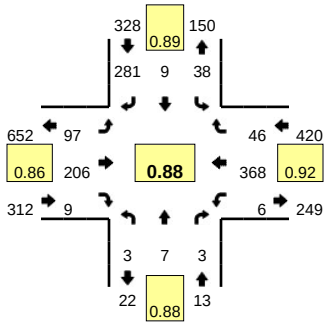
Type of peak hour being reported: Intersection Peak

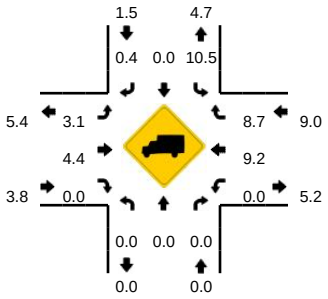
Method for determining peak hour: Total Entering Volume

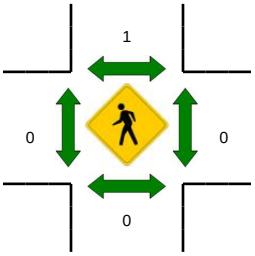
LOCATION: Washam Potts Rd -- Bailey Rd
CITY/STATE: Cornelius, NC

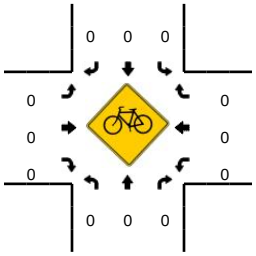
QC JOB #: 13635107
DATE: Thu, Oct 29 2015

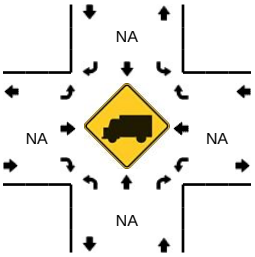
Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

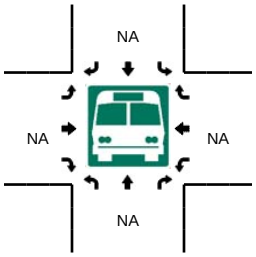












15-Min Count Period Beginning At	Washam Potts Rd (Northbound)				Washam Potts Rd (Southbound)				Bailey Rd (Eastbound)				Bailey Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	2	0	0	17	1	74	0	10	41	1	0	0	91	12	1	250	
7:15 AM	1	3	0	0	7	3	78	0	18	47	2	0	1	94	19	0	273	
7:30 AM	1	2	0	0	6	1	55	0	26	48	3	0	2	93	7	0	244	
7:45 AM	1	0	3	0	8	4	74	0	43	70	3	0	1	90	8	1	306	1073
8:00 AM	1	1	0	0	3	2	64	0	26	55	3	0	2	72	8	0	237	1060
8:15 AM	2	1	1	0	5	1	47	0	41	49	1	1	1	73	7	0	230	1017
8:30 AM	3	0	1	0	4	1	52	0	29	86	5	0	5	64	1	1	252	1025
8:45 AM	3	0	1	0	5	1	43	0	33	48	1	1	1	76	4	0	217	936

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	0	12	0	32	16	296	0	172	280	12	0	4	360	32	4	1224
Heavy Trucks	0	0	0		4	0	0		8	12	0		0	64	4		92
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/4/2015 5:43 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

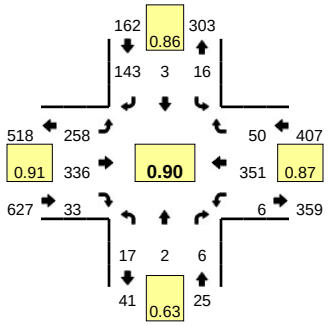
Type of peak hour being reported: Intersection Peak

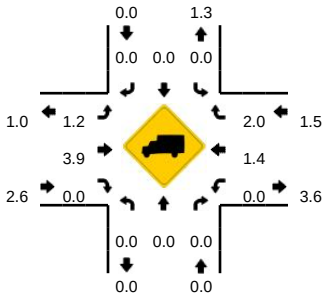
Method for determining peak hour: Total Entering Volume

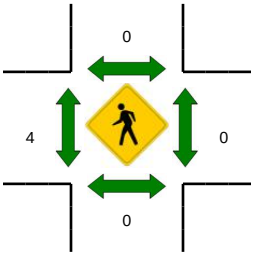
LOCATION: Washam Potts Rd -- Bailey Rd
CITY/STATE: Cornelius, NC

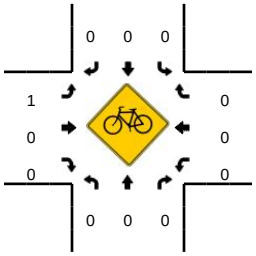
QC JOB #: 13635108
DATE: Thu, Oct 29 2015

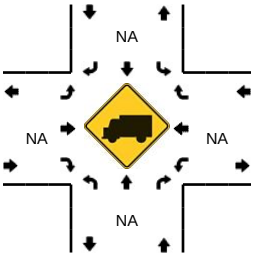
Peak-Hour: 4:45 PM -- 5:45 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

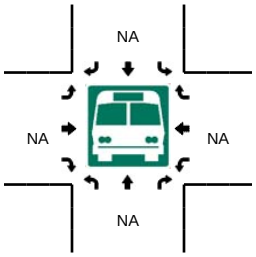












15-Min Count Period Beginning At	Washam Potts Rd (Northbound)				Washam Potts Rd (Southbound)				Bailey Rd (Eastbound)				Bailey Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	3	0	1	0	4	1	35	0	52	68	9	1	3	69	4	0	250	
4:15 PM	2	1	0	0	3	0	26	0	39	81	6	0	2	75	7	0	242	
4:30 PM	1	0	0	0	5	1	34	0	42	67	5	2	1	68	7	0	233	
4:45 PM	5	1	3	0	2	2	38	0	51	105	10	1	1	74	9	0	302	1027
5:00 PM	2	0	1	0	3	0	27	0	65	87	7	3	0	85	10	0	290	1067
5:15 PM	7	1	2	0	5	0	42	0	82	82	6	2	1	91	18	1	340	1165
5:30 PM	3	0	0	0	6	1	36	0	53	62	10	1	3	101	13	0	289	1221
5:45 PM	5	2	0	0	5	3	32	0	47	83	13	1	0	79	7	0	277	1196

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	28	4	8	0	20	0	168	0	328	328	24	8	4	364	72	4	1360
Heavy Trucks	0	0	0		0	0	0		4	4	0		0	4	0		12
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/4/2015 5:43 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Ramey Kemp and Associates

8307 University Executive Park Drive, Suite 260
Charlotte, NC 28262

File Name : Bailey Road and Commercial Driveway
Site Code : 11051501
Start Date : 11/5/2015
Page No : 1

Groups Printed- Unshifted - Bank 1

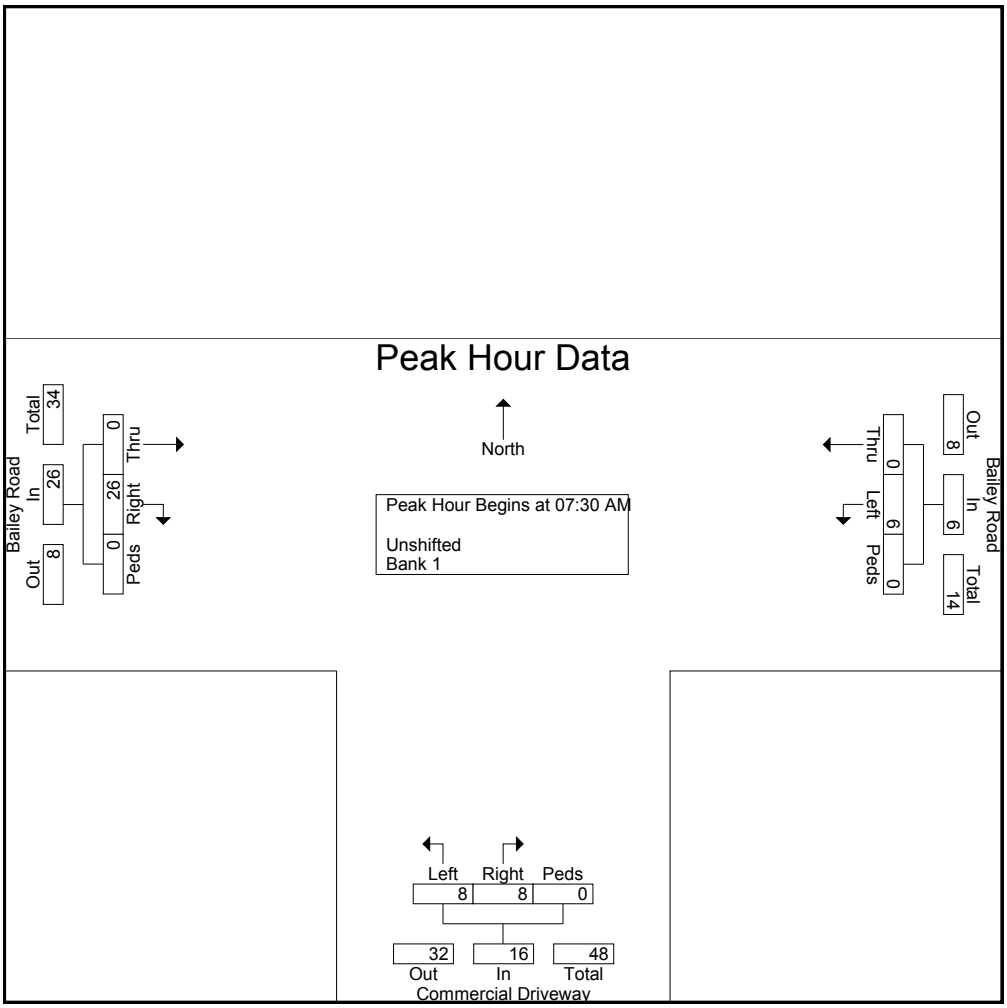
	Bailey Road Westbound				Commercial Driveway Northbond				Bailey Road Eastbound				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
07:00 AM	0	1	0	1	0	2	0	2	4	0	0	4	7
07:15 AM	0	1	0	1	1	0	0	1	3	0	0	3	5
07:30 AM	0	2	0	2	0	3	0	3	6	0	0	6	11
07:45 AM	0	2	0	2	2	1	0	3	7	0	0	7	12
Total	0	6	0	6	3	6	0	9	20	0	0	20	35
08:00 AM	0	2	0	2	1	0	0	1	11	0	0	11	14
08:15 AM	0	0	0	0	5	4	0	9	2	0	0	2	11
08:30 AM	0	1	0	1	1	0	0	1	7	0	0	7	9
08:45 AM	0	0	0	0	2	3	0	5	3	0	0	3	8
Total	0	3	0	3	9	7	0	16	23	0	0	23	42
*** BREAK ***													
04:00 PM	0	2	0	2	4	6	0	10	8	0	0	8	20
04:15 PM	0	1	0	1	3	8	0	11	10	0	0	10	22
04:30 PM	0	1	0	1	3	20	0	23	11	0	0	11	35
04:45 PM	0	2	0	2	6	9	0	15	8	0	0	8	25
Total	0	6	0	6	16	43	0	59	37	0	0	37	102
05:00 PM	0	3	0	3	3	6	0	9	12	0	0	12	24
05:15 PM	0	5	0	5	7	9	0	16	8	0	0	8	29
05:30 PM	0	2	0	2	4	10	0	14	10	0	0	10	26
05:45 PM	0	1	0	1	2	4	0	6	9	0	0	9	16
Total	0	11	0	11	16	29	0	45	39	0	0	39	95
Grand Total	0	26	0	26	44	85	0	129	119	0	0	119	274
Apprch %	0	100	0		34.1	65.9	0		100	0	0		
Total %	0	9.5	0	9.5	16.1	31	0	47.1	43.4	0	0	43.4	
Unshifted	0	26	0	26	44	85	0	129	119	0	0	119	274
% Unshifted	0	100	0	100	100	100	0	100	100	0	0	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0

Ramey Kemp and Associates

8307 University Executive Park Drive, Suite 260
Charlotte, NC 28262

File Name : Bailey Road and Commercial Driveway
Site Code : 11051501
Start Date : 11/5/2015
Page No : 2

	Bailey Road Westbound				Commercial Driveway Northbond				Bailey Road Eastbound				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	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 07:30 AM													
07:30 AM	0	**2**	**0**	**2**	0	3	0	3	6	0	0	6	11
07:45 AM	0	2	0	2	2	1	0	3	7	0	0	7	12
08:00 AM	0	2	0	2	1	0	0	1	**11**	0	0	**11**	**14**
08:15 AM	0	0	0	0	**5**	**4**	0	**9**	2	0	0	2	11
Total Volume	0	6	0	6	8	8	0	16	26	0	0	26	48
% App. Total	0	100	0		50	50	0		100	0	0		
PHF	.000	.750	.000	.750	.400	.500	.000	.444	.591	.000	.000	.591	.857

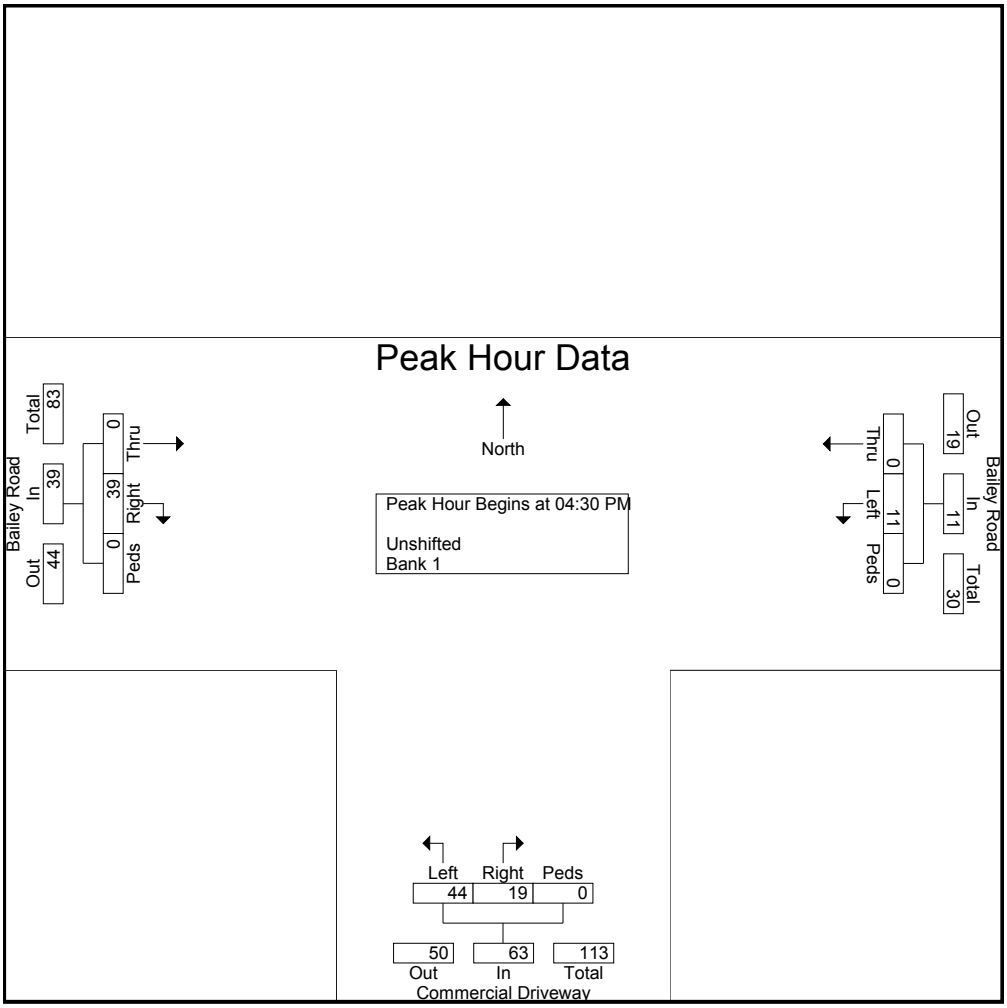


Ramey Kemp and Associates

8307 University Executive Park Drive, Suite 260
Charlotte, NC 28262

File Name : Bailey Road and Commercial Driveway
Site Code : 11051501
Start Date : 11/5/2015
Page No : 3

	Bailey Road Westbound				Commercial Driveway Northbond				Bailey Road Eastbound				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:30 PM													
04:30 PM	0	1	0	1	3	**20**	0	**23**	11	0	0	11	**35**
04:45 PM	0	2	0	2	6	9	0	15	8	0	0	8	25
05:00 PM	0	3	0	3	3	6	0	9	**12**	0	0	**12**	24
05:15 PM	0	**5**		**5**	**7**	9	0	16	8	0	0	8	29
Total Volume	0	11	0	11	19	44	0	63	39	0	0	39	113
% App. Total	0	100	0		30.2	69.8	0		100	0	0		
PHF	.000	.550	.000	.550	.679	.550	.000	.685	.813	.000	.000	.813	.807



Daycare Driveway Trip Generation

Land Use (ITE Code used)	Size	Units	Weekday								
			Daily			AM Peak Hour			PM Peak Hour		
			Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
Day Care Center (565)	9,000	SF	334	334	668	58	52	110	52	59	111

(1) Based on ITE Trip Generation - 9th Edition

APPENDIX C

TRIP GENERATION

Trip Generation

Land Use (ITE Code used)	Size	Units	Weekday								
			Daily			AM Peak Hour			PM Peak Hour		
			Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
General Office Building (710)	20,000	Square Feet	111	111	222	27	4	31	5	25	30
Internal Capture Trips			-	-	-	4	3	7	1	1	2
Total New External Trips			111	111	222	23	1	24	4	24	28
Shopping Center (820)	7,000	Square Feet	150	150	300	4	3	7	12	14	26
Internal Capture Trips			-	-	-	1	1	2	7	4	11
Total New External Trips			150	150	300	3	2	5	5	10	15
Drive-in Bank (912)	7,000	Square Feet	519	519	1,038	48	37	85	85	85	170
Internal Capture Trips			-	-	-	0	0	0	0	0	0
Pass-By Trips (29% AM, 35% PM)			-	-	-	12	12	24	30	30	60
Total New External Trips			519	519	1,038	36	25	61	55	55	111
High-Turnover (Sit-Down) Restaurant (932)	6,000	Square Feet	382	382	764	42	38	80	60	51	111
Internal Capture Trips			-	-	-	2	3	5	5	8	13
Pass-By Trips (0% AM, 43% PM)			-	-	-	0	0	0	21	21	42
Total New External Trips			382	382	764	40	35	75	34	22	56
Total Trips			1,162	1,162	2,324	121	82	203	162	175	337
Internal Capture Trips			-	-	-	7	7	14	13	13	26
Pass-By Trips			-	-	-	12	12	24	51	51	102
Final Total New External Trips			1,162	1,162	2,324	102	63	165	98	111	209

(1) Based on ITE Trip Generation - 9th Edition

(2) Weighted Rates were used for land use 710 and 820 due to the small square footage of each.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Oakhurst II	**Organization:**	RKA
Project Location:	Cornelius, NC	**Performed By:**	JAE
Scenario Description:		**Date:**	9/30/2015
Analysis Year:		**Checked By:**	
Analysis Period:	**AM Street Peak Hour**	**Date:**	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	20,000 SF		31	27	4
Retail	820	7,000 SF		7	4	3
Restaurant	932	6,000 SF		80	42	38
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]	912	7,000 SF		85	48	37
				203	121	82

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.10	0%	0%	1.10	0%	0%
Retail	1.10	0%	0%	1.10	0%	0%
Restaurant	1.10	0%	0%	1.10	0%	0%
Cinema/Entertainment	1.10	0%	0%	1.10	0%	0%
Residential	1.10	0%	0%	1.10	0%	0%
Hotel	1.10	0%	0%	1.10	0%	0%
All Other Land Uses[2]	1.10	0%	0%	1.10	0%	0%

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		1	2	0	0	0
Retail	1		0	0	0	0
Restaurant	4	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	223	133	90
Internal Capture Percentage	7%	6%	9%
External Vehicle-Trips[5]	189	114	75
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	17%	75%
Retail	25%	33%
Restaurant	4%	10%
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

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

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

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

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

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

[6]Person-Trips

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

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

Project Name:	Oakhurst II
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.10	27	30	1.10	4	4
Retail	1.10	4	4	1.10	3	3
Restaurant	1.10	42	46	1.10	38	42
Cinema/Entertainment	1.10	0	0	1.10	0	0
Residential	1.10	0	0	1.10	0	0
Hotel	1.10	0	0	1.10	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		1	3	0	0	0
Retail	1		0	0	0	0
Restaurant	13	6		0	2	1
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		1	11	0	0	0
Retail	1		23	0	0	0
Restaurant	4	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	1	1	9	0		0
Hotel	1	0	3	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	5	25	30	23	0	0
Retail	1	3	4	3	0	0
Restaurant	2	44	46	40	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	53	53	48	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	3	1	4	1	0	0
Retail	1	2	3	2	0	0
Restaurant	4	38	42	35	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	41	41	37	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

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

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

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Oakhurst II	**Organization:**	RKA
Project Location:	Cornelius, NC	**Performed By:**	JAE
Scenario Description:		**Date:**	9/30/2015
Analysis Year:		**Checked By:**	
Analysis Period:	**PM Street Peak Hour**	**Date:**	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office	710	20,000 SF		30	5	25
Retail	820	7,000 SF		26	12	14
Restaurant	932	6,000 SF		111	60	51
Cinema/Entertainment				0		
Residential				0		
Hotel				0		
All Other Land Uses[2]	912	7,000 SF		170	85	85
				337	162	175

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office	1.10	0%	0%	1.10	0%	0%
Retail	1.10	0%	0%	1.10	0%	0%
Restaurant	1.10	0%	0%	1.10	0%	0%
Cinema/Entertainment	1.10	0%	0%	1.10	0%	0%
Residential	1.10	0%	0%	1.10	0%	0%
Hotel	1.10	0%	0%	1.10	0%	0%
All Other Land Uses[2]	1.10	0%	0%	1.10	0%	0%

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		300	300			
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		1	1	0	0	0
Retail	0		4	0	0	0
Restaurant	2	7		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	372	179	193
Internal Capture Percentage	8%	8%	8%
External Vehicle-Trips[5]	311	149	162
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	33%	7%
Retail	62%	27%
Restaurant	8%	16%
Cinema/Entertainment	N/A	N/A
Residential	N/A	N/A
Hotel	N/A	N/A

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

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

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

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

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

[6]Person-Trips

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

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

Project Name:	Oakhurst II
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.10	5	6	1.10	25	28
Retail	1.10	12	13	1.10	14	15
Restaurant	1.10	60	66	1.10	51	56
Cinema/Entertainment	1.10	0	0	1.10	0	0
Residential	1.10	0	0	1.10	0	0
Hotel	1.10	0	0	1.10	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		5	1	0	1	0
Retail	0		4	1	4	1
Restaurant	2	23		4	10	4
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		1	1	0	0	0
Retail	2		19	0	0	0
Restaurant	2	7		0	0	0
Cinema/Entertainment	0	1	2		0	0
Residential	3	1	9	0		0
Hotel	0	0	3	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	2	4	6	4	0	0
Retail	8	5	13	5	0	0
Restaurant	5	61	66	55	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	94	94	85	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	2	26	28	24	0	0
Retail	4	11	15	10	0	0
Restaurant	9	47	56	43	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	94	94	85	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

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

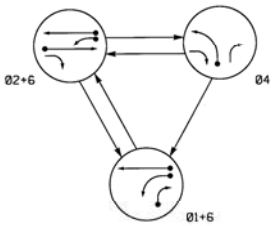
*Indicates computation that has been rounded to the nearest whole number.

APPENDIX D

SIGNAL TIMING PLANS

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

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

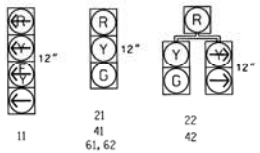
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE Ø1+6	PHASE Ø2+6	PHASE Ø4	PHASE FLASH
11	←	F Y	A Y	Y
21	R	G	R	Y
22	R	G	R/	Y
41	R	R	G	R
42	R/	R	G	R
61, 62	G	G	R	Y

SIGNAL FACE I.D.

All Heads L.E.D.



OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

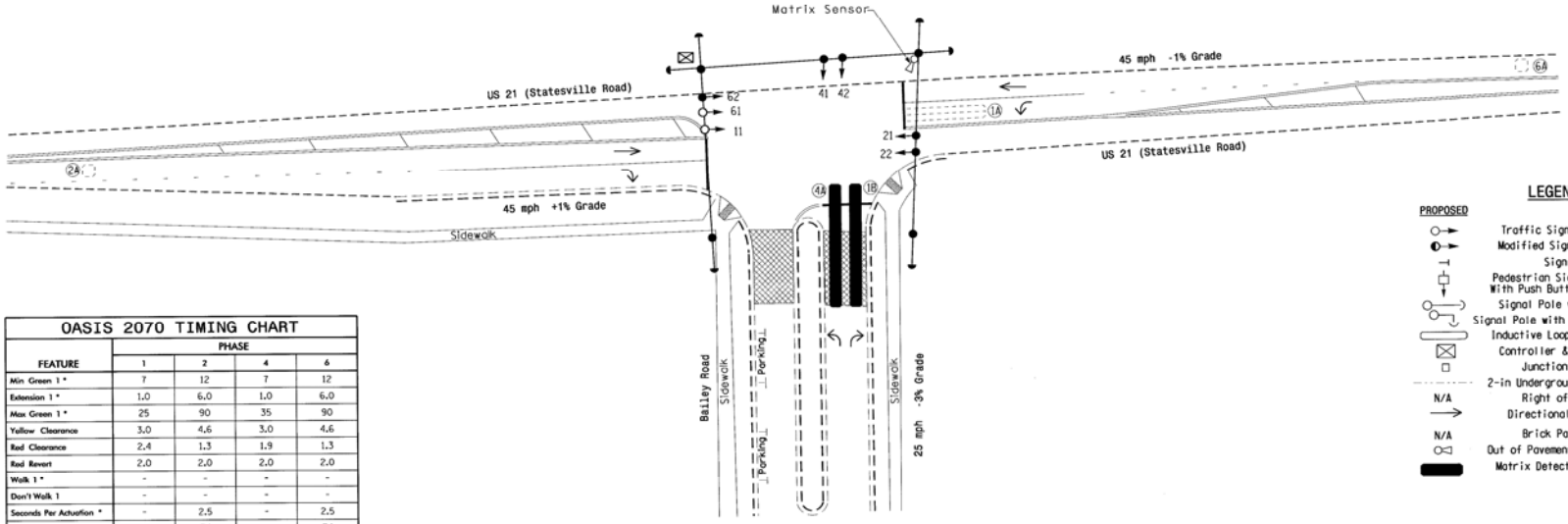
INDUCTIVE LOOPS					DETECTOR PROGRAMMING						
LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
1A	6X40	0	2-4-2	-	1	Y	Y	-	1.0	15	-	Y
					6	Y	Y	Y	-	3	-	Y
1B	6X60	+10	*	-	1	Y	Y	-	-	15	-	Y
2A	6X6	300	EXISTING	-	2	Y	Y	-	-	-	-	Y
4A	6X60	+10	*	-	4	Y	Y	-	-	-	-	Y
6A	6X6	300	EXISTING	-	6	Y	Y	-	-	-	-	Y

* Matrix Detection Zone

3 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 may be lagged.
4. Reposition existing signal head numbered 62.
5. Set all detector units to presence mode.
6. Pavement markings are existing.



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	
N/A	Brick Paving	
	Out of Pavement Detector	
	Matrix Detection Zone	N/A

OASIS 2070 TIMING CHART

FEATURE	PHASE 1	PHASE 2	PHASE 4	PHASE 6
Min Green 1 *	7	12	7	12
Extension 1 *	1.0	6.0	1.0	6.0
Max Green 1 *	25	90	35	90
Yellow Clearance	3.0	4.6	3.0	4.6
Red Clearance	2.4	1.3	1.9	1.3
Red Revert	2.0	2.0	2.0	2.0
Walk 1 *	-	-	-	-
Don't Walk 1	-	-	-	-
Seconds Per Actuation *	-	2.5	-	2.5
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.

THIS PLAN SHALL SUPERSEDE THE PLAN SEALED ON 10/31/13.

Signal Upgrade

Prepared in the Offices of:
Transportation Mobility and Safety Division
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

SCALE 0 30 1"=30'

US 21 (Statesville Road) at Bailey Road

Division 10 Mecklenburg County Cornelius

PLAN DATE: January 2014 REVIEWED BY:
PREPARED BY: C. Pierce REVIEWED BY:

REVISIONS	INIT.	DATE

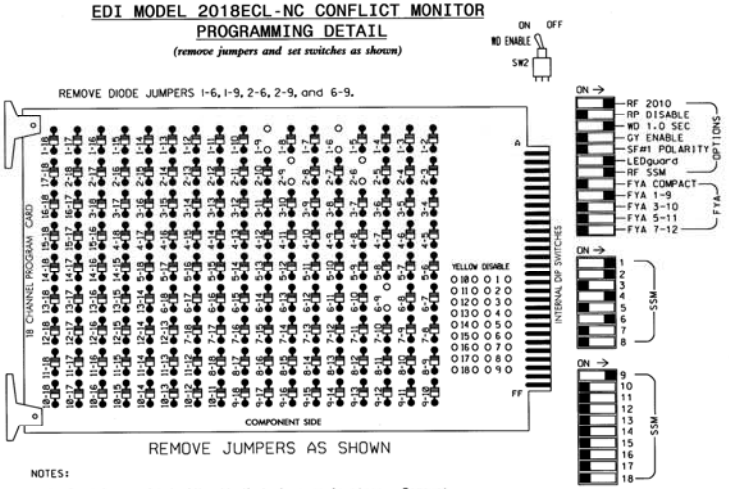
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 24393 ENGINEER TIMOTHY J. WILLIAMS
SIGNATURE 3/5/14 DATE
SIG. INVENTORY NO. 10-1105

03-MAR-2014 10:45
S:\ATS\Groups\Signal Design Section\Western Region\Civil\D10-1105\R10-1105_sig_dgn_2013xxx.dgn
$$$$USER$$$$

PROJECT REFERENCE NO.	SHEET NO.
	Sig.

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

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

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Start Up In Green.
5. Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.

EQUIPMENT INFORMATION

CONTROLLER.....2070L
CABINET.....332 W/ AUX
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S5,S8,AUX S1
PHASES USED.....1,2,4,6
OVERLAP "A".....1+2
OVERLAP "B".....NOT USED
OVERLAP "C".....NOT USED
OVERLAP "D".....NOT USED

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1		S2	S3	S4	S5		S6	S7	S8	S9	S10	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
CHN. CHANNEL NO.	1		2	13	3	4		14	5	6	15	7	8	16	9	10	17	11	12	18
PHASE	1		2	2 PED	3	4		4 PED	5	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
SIGNAL HEAD NO.	11 ★	42	21,22	NU	NU	22	41,42	NU	NU	61,62	NU	NU	NU	NU	11 ★	NU	NU	NU	NU	NU
RED		*	128				101			134										
YELLOW			129				102			135										
GREEN			130				103			136										
RED ARROW															A121					
YELLOW ARROW		126				102									A122					
FLASHING YELLOW ARROW															A123					
GREEN ARROW	127	127				103														

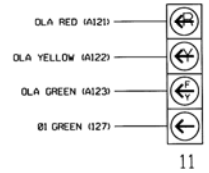
NU = Not Used

* Denotes install load resistor. See load resistor installation detail this sheet.

★ See pictorial of head wiring in detail below.

FYA SIGNAL WIRING DETAIL

(wire signal head as shown)



NOTE

The sequence display for signal head 11 requires special logic programming. See sheet 2 for programming instructions.

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	Ø1 1A	NOT USED	SDT EMPTY	SDT EMPTY	SDT EMPTY	Ø1 1B / Ø4 4A (CLICK ON CC 14-CHAN)	NOT USED	SDT EMPTY	SDT EMPTY	SDT EMPTY	SDT EMPTY	SDT EMPTY	SDT EMPTY	FS OC ISOLATOR
	L	NOT USED	Ø2 2A					NOT USED							ST OC ISOLATOR
FILE "J"	U	SDT EMPTY	Ø6 6A	SDT EMPTY	WD-D-EMPTY ⊗	SDT EMPTY	SDT EMPTY	SDT EMPTY	SDT EMPTY	SDT EMPTY	SDT EMPTY	SDT EMPTY	SDT EMPTY	SDT EMPTY	SDT EMPTY
	L		NOT USED												

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

FS = FLASH SENSE
ST = STOP TIME

⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A[1]	TB2-1,2	I1U	56	18	1	1	Y	Y		1.0	15
	-	J4U	48	10	26	6	Y	Y	Y		3
1B	★	I6U	41	3	4	1	Y	Y			15
2A	TB2-7,8	I2L	43	5	12	2	Y	Y			
4A	★	I6L	45	7	14	4	Y	Y			
6A	TB3-5,6	J2U	40	2	6	6	Y	Y			

[1] Add jumper from I1-W to J4-W, on rear of input file.

★ SPECIAL DETECTOR NOTE

For Zones 1B and 4A install a Wavetronix Matrix Radar detection system for vehicle detection. Perform installation according to manufacturer's directions and NCDOT engineer-approved mounting locations to accomplish the detection schemes shown on the Signal Design Plan.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

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

THIS ELECTRICAL DETAIL SUPERSEDES THE DETAIL SEALED ON 11/04/13

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-1105
DESIGNED: January 2014
SEALED: 3/5/14
REVISED: N/A

Electrical Detail - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 21 (Statesville Road) at Bailey Road

Division 10 Mecklenburg County Cornelius

PLAN DATE: February 2014 REVIEWED BY:
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS INIT. DATE

Prepared in the Offices of:
Traffic Management Unit
750 N.Greenfield Pkwy,Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN
SIGNATURE DATE 3/6/14
SIG. INVENTORY NO. 10-1105

PROJECT REFERENCE NO.	SHEET NO.
	Sig.

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

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL). THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1. 2. AND 3.

2. FROM MAIN MENU PRESS '6' (OUTPUTS). THEN '3' (LOGICAL I/O PROCESSOR).

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

SCROLL DOWN

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

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

PRESS '+'

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

SCROLL DOWN

THEN:
SET OUTPUT  ASSIGNMENT #52 OFF
```

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

PRESS '+'

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

SCROLL DOWN

THEN:
SET OUTPUT  ASSIGNMENT #51 ON
```

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

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE

OUTPUT 50 = Overlap A Red
OUTPUT 51 = Overlap A Yellow
OUTPUT 52 = Overlap A Green

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

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

```
PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
 PHASE:          :123456789101112131415 16
VEH OVL PARENTS::XX
VEH OVL NOT VEH::
VEH OVL NOT PED::
VEH OVL GRN EXT::
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  X GREEN
SELECT VEHICLE OVERLAP OPTIONS:   (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC).........0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)..0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)....0
```

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL SUPERSEDES THE DETAIL SEALED ON 11/04/13

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 10-1105
DESIGNED: January 2014
SEALED: 3/5/14
REVISED: N/A

Electrical Detail - Sheet 1 of 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared In the Offices of:

750 N.Greenfield Pkwy,Garner,NC 27529

US 21 (Statesville Road)
at
Bailey Road

Division 10 Mecklenburg County Cornelius

PLAN DATE: February 2014 REVIEWED BY: T. Vgn.
PREPARED BY: C. Strickland REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 022013 ENGINEER GEORGE C. BROWN

George C. Brown 3/6/14
SIGNATURE DATE

SIG. INVENTORY NO. 10-1105

05-MAR-2014 11:58
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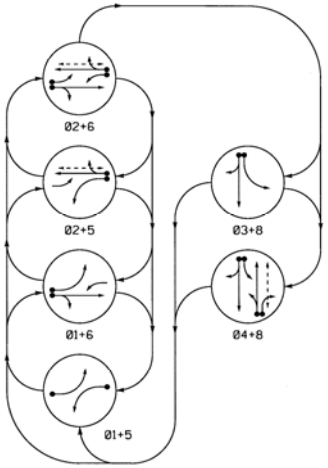
PROJECT REFERENCE NO.	SHEET NO.
N/A	Sig.1

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND

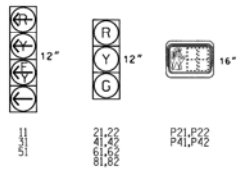
- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

SIGNAL FACE	PHASE 01+5	01+6	02+5	02+6	03+8	04+8	FLASH
11	←-	←-	F Y	F Y	~~R~~	~~R~~	~~Y~~
21,22	R	R	G	G	R	R	Y
31	~~R~~	~~R~~	~~R~~	~~R~~	←-	F Y	~~R~~
41,42	R	R	R	R	R	G	R
51	←-	F Y	←-	F Y	~~R~~	~~R~~	~~Y~~
61,62	R	G	R	G	R	R	Y
81,82	R	R	R	R	G	G	R
P21,P22	DW	DW	W	W	DW	DW	DRK
P41,P42	DW	DW	DW	DW	DW	W	DRK

SIGNAL FACE I.D.

All Heads L.E.D.



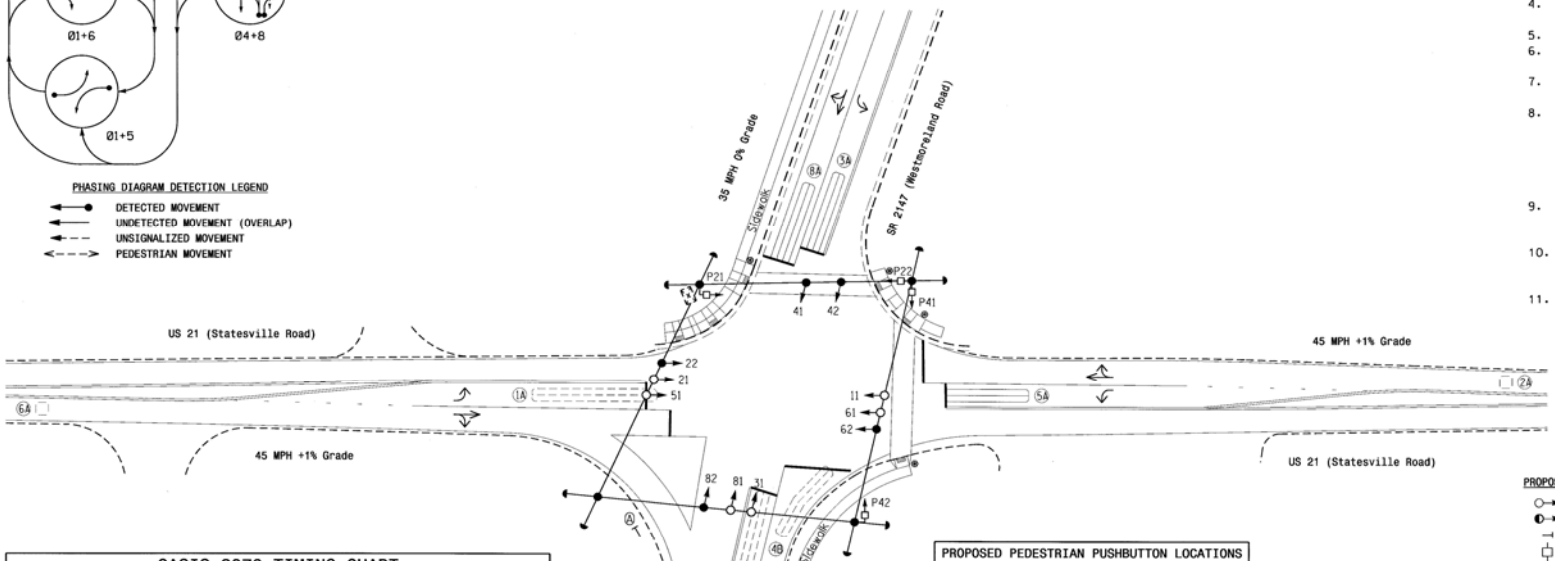
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

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
1A	6X60	+5	EXIST	-	1	Y	Y	-	-	15	-	-
					6	Y	Y	Y	-	3	-	-
2A	6X6	278	EXIST	-	2	Y	Y	-	-	-	-	-
3A	6X40	0	2-4-2	Y	3	Y	Y	-	-	15	-	-
					8	Y	Y	-	-	3	-	-
4A	6X60	0	EXIST	-	4	Y	Y	-	-	3	-	-
4B	6X40	0	EXIST	-	4	Y	Y	-	-	10	-	-
5A	6X40	0	2-4-2	Y	5	Y	Y	-	-	15	-	-
					2	Y	Y	Y	-	3	-	-
6A	6X6	300	EXIST	-	6	Y	Y	-	-	-	-	-
8A	6X40	0	2-4-2	Y	8	Y	Y	-	-	10	-	-

6 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. Disable Backup Protect for phase 2+6.
4. Phase 1 and/or phase 5 may be lagged.
5. Omit phase 3 during phase 4 on.
6. Reposition existing signal heads numbered 22, 62, and 82.
7. Set all detector units to presence mode.
8. 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.
9. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
10. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
11. Pavement markings are existing.

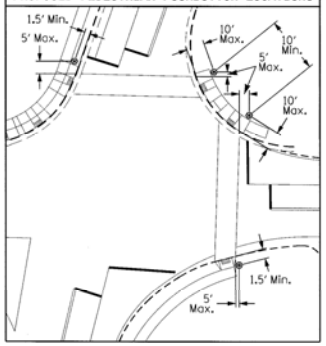


OASIS 2070 TIMING CHART

FEATURE	PHASE 1	2	3	4	5	6	8
Min Green 1 *	7	12	7	7	7	12	7
Extension 1 *	1.0	6.0	2.0	1.0	2.0	6.0	2.0
Max Green 1 *	20	90	20	30	20	90	30
Yellow Clearance	3.0	4.4	3.0	4.3	3.0	4.4	4.3
Red Clearance	3.4	2.0	3.3	2.5	3.3	2.0	2.5
Red Revert	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Walk 1 *	-	7	-	7	-	-	-
Don't Walk 1	-	15	-	15	-	-	-
Seconds Per Actuation *	-	2.5	-	-	-	2.5	-
Max Variable Initial *	-	34	-	-	-	34	-
Time Before Reduction *	-	20	-	-	-	20	-
Time To Reduce *	-	30	-	-	-	30	-
Minimum Gap	-	3.4	-	-	-	3.4	-
Recall Mode	-	MIN RECALL	-	-	-	MIN RECALL	-
Vehicle Call Memory	-	YELLOW	-	-	-	YELLOW	-
Dual Entry	-	-	-	ON	-	-	ON
Simultaneous Gap	ON	ON	ON	ON	ON	ON	ON

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

PROPOSED PEDESTRIAN PUSHBUTTON LOCATIONS



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	
	"YIELD" Sign (R1-2)	
	Type I Signal Pedestal	

Signal Upgrade

Prepared in the Offices of:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Signal Design Section
750 N.Greenfield Pkwy,Garner,NC 27529

US 21 (Statesville Road)
at
SR 2147 (Westmoreland Road)

Division 10 Mecklenburg County Cornelius

PLAN DATE: March 2014	REVIEWED BY: Z.W. Little
PREPARED BY: C.L. Sweeney	REVIEWED BY:

SCALE 0 30 1"=30'

REVISIONS	INIT.	DATE

SEAL NORTH CAROLINA PROFESSIONAL SEAL 30530 ENGINEER ZACHARY W. LITTLE

SIGNATURE DATE

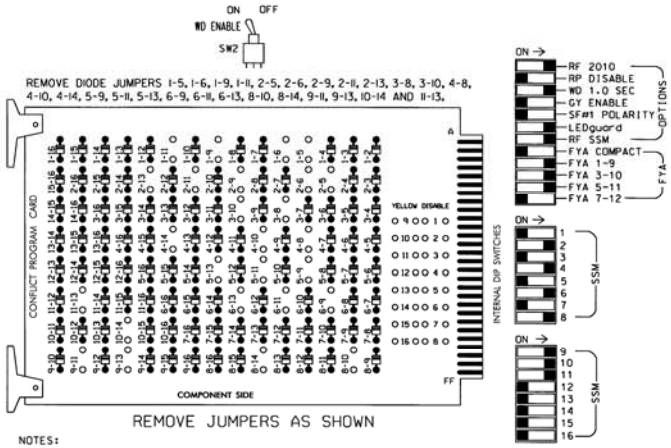
SIG. INVENTORY NO. 10-1104

22-APR-2014 08:59
S:\TPSDLive\TS Signals\Signal Design Section\Western Regional\U-5948D-116\U-5948D_Sig_Dsn_20140422.dgn
Sweeney

PROJECT REFERENCE NO.	SHEET NO.
	Sig.

EDI MODEL 2010ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Make sure jumpers SEL2-SEL5 are present on the monitor board.

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Ensure that Red Enable is active at all times during normal operation. To prevent Red Failures on unused monitor channels, tie unused red monitor inputs 1,3,5, 7,12,13,14,15 & 16 to load switch AC+ per the cabinet manufacturer's instructions.
3. Program phases 4 and 8 for Dual Entry.
4. Enable Simultaneous Gap-Out for all phases.
5. Program phases 2 and 6 for Variable Initial and Gap Reduction.
6. Program phases 2 and 6 for Start Up In Green.
7. Program phases 2 and 4 for 'STARTUP PED CALL'.
8. Program phases 2 and 6 for Yellow Flash, and overlaps 1 and 2 as Wag Overlaps.
9. Ensure Auxiliary Output File is compatible with existing cabinet. Auxiliary Output File required to conform to Caltrans *Traffic Signal Control Equipment Specifications* (TSCES).

SIGNAL HEAD HOOK-UP CHART

LOAD SWITCH NO.	S1	S2	S2P	S3	S4	S4P	S5	S6	S6P	S7	S8	S8P	S9	S10	S11	S12	S13	S14
PHASE	1★	2	2 PED	3★	4	4 PED	5★	6	6 PED	7	8	8 PED	OLA★	OLB★	SPARE	OLC★	OLD	SPARE
SIGNAL HEAD NO.	11	21,22	P21, P22	31	41,42	P41, P42	51	61,62	NU	NU	81,82	NU	11	31	NU	51	NU	NU
RED		128			101			134			107							
YELLOW	✱	129		✱	102		✱	135			108							
GREEN		130			103			136			109							
RED ARROW													A121	A124		A114		
YELLOW ARROW													A122	A125		A115		
FLASHING YELLOW ARROW													A123	A126		A116		
GREEN ARROW	127			118			133											
✋			113			104												
🚶			115			106												

NU = Not Used

✱ Denotes install load resistor. See load resistor installation detail this sheet.

★ See pictorial of head wiring in detail below.

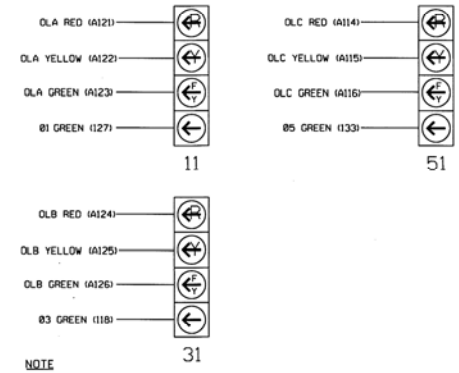
EQUIPMENT INFORMATION

CONTROLLER.....2070L
*CABINET.....332 /W/ AUX
SOFTWARE.....ECONOLITE OASIS
CABINET MOUNT.....BASE
OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
LOAD SWITCHES USED.....S1,S2,S2P,S3,S4,S4P,S5,S6,S8,S9, S10,S12.
PHASES USED.....1,2,3,4,5,6,8,2 PED,4 PED.
OVERLAP "A".....1+2
OVERLAP "B".....3+4
OVERLAP "C".....5+6
OVERLAP "D".....NOT USED

*In NOTES section refer to note 9.

4 SECTION FYA PPLT SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

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

INPUT FILE POSITION LAYOUT

(front view)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
FILE "I"	U	SPY	Ø1 1A	Ø2 2A	SPY	SPY	Ø3 3A	Ø4 4A	SPY	SPY	SPY	SPY	Ø2 PED DC ISOLATOR	SPY	FS DC ISOLATOR
	L	EMPTY	Ø6 1A	NOT USED	EMPTY	EMPTY	Ø8 3A	Ø4 4B	EMPTY	EMPTY	EMPTY	EMPTY	Ø4 PED DC ISOLATOR	EMPTY	ST DC ISOLATOR
FILE "J"	U	SPY	Ø5 5A	Ø6 6A	SPY	SPY	SPY	Ø8 8A	SPY	SPY	SPY	SPY	SPY	SPY	SPY
	L	EMPTY	Ø2 5A	NOT USED	EMPTY	EMPTY	EMPTY	NOT USED	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY	EMPTY

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

FS = FLASH SENSE
ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A[1]	TB2-5,6	I2U	39	1	2	1	Y	Y	-	-	15
	TB2-7,8	I2L	43	5	12	6	Y	Y	Y	-	3
2A	TB2-9,10	I3U	63	25	32	2	Y	Y	-	-	-
3A[2]	TB4-9,10	I6U	41	3	4	3	Y	Y	-	-	15
	TB4-11,12	I6L	45	7	14	8	Y	Y	-	-	3
4A	TB6-1,2	I7U	65	27	34	4	Y	Y	-	-	3
4B	TB6-3,4	I7L	78	40	44	4	Y	Y			10
5A[3]	TB3-5,6	J2U	40	2	6	5	Y	Y	-	-	15
	TB3-7,8	J2L	44	6	16	2	Y	Y	Y	-	3
6A	TB3-9,10	J3U	64	26	36	6	Y	Y	-	-	-
8A	TB7-1,2	J7U	66	28	38	8	Y	Y	-	-	10
PED PUSH BUTTONS											
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED					
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED					

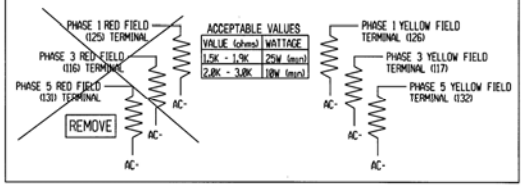
NOTE:
INSTALL DC ISOLATORS IN INPUT FILE SLOTS I12.

[1] Add jumpers from TB2-5 to TB2-7, and from TB2-6 to TB2-8.
[2] Add jumpers from TB4-9 to TB4-11, and from TB4-10 to TB4-12.
[3] Add jumpers from TB3-5 to TB3-7, and from TB3-6 to TB3-8.

INPUT FILE POSITION LEGEND: J2L
FILE J
SLOT 2
LOWER

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

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

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1104
DESIGNED: March 2014
SEALED: 4-23-14
REVISED: N/A

ELECTRICAL DETAIL SHEET 1 OF 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 21 (Statesville Road)
at
SR 2147 (Westmoreland Road)

Division 10 Mecklenburg County Cornelius

PLAN DATE: April 2014 REVIEWED BY: JTR
PREPARED BY: James Peterson REVIEWED BY:

REVISIONS | INIT. | DATE

Prepared in the Offices of:
Transportation Mobility and Safety Division
Traffic Engineering Branch
Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR.

SIGNATURE DATE 4-24-14
SIG. INVENTORY NO. 10-1104

23-APR-2014 13:21
S:\ATSSGIMTS\Signals\memory\projects\sig_Mpeterson\10104_ps_dtls_xxx.dgn
(Petersjm)

PROJECT REFERENCE NO.	SHEET NO.
	Sig.

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

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL). THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1. 2. 3. 4. 5. 6. 7. 8 AND 9.

2. FROM MAIN MENU PRESS '6' (OUTPUTS). THEN '3' (LOGICAL I/O PROCESSOR).

```
LOGICAL I/O COMMAND #1  (+/-COMMAND#)
IF  ACTIVE PHASE        #1  IS ON
AND RED CLEAR ON PHASE #1  IS ON
        SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #50 ON
SET OUTPUT  ASSIGNMENT #51 OFF
```

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

PRESS '+'

```
LOGICAL I/O COMMAND #2  (+/-COMMAND#)
IF  ACTIVE PHASE        #1  IS ON
        SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #52 OFF
```

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

PRESS '+'

```
LOGICAL I/O COMMAND #3  (+/-COMMAND#)
IF  YELLOW ON PHASE     #1  IS ON
        SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #51 ON
```

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

PRESS '+'

```
LOGICAL I/O COMMAND #4  (+/-COMMAND#)
IF  ACTIVE PHASE        #5  IS ON
AND RED CLEAR ON PHASE #5  IS ON
        SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #42 ON
SET OUTPUT  ASSIGNMENT #43 OFF
```

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

PRESS '+'

```
LOGICAL I/O COMMAND #5  (+/-COMMAND#)
IF  ACTIVE PHASE        #5  IS ON
        SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #44 OFF
```

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

PRESS '+'

```
LOGICAL I/O COMMAND #6  (+/-COMMAND#)
IF  YELLOW ON PHASE     #5  IS ON
        SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #43 ON
```

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

PRESS '+'

```
LOGICAL I/O COMMAND #7  (+/-COMMAND#)
IF  ACTIVE PHASE        #3  IS ON
AND RED CLEAR ON PHASE #3  IS ON
        SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #47 ON
SET OUTPUT  ASSIGNMENT #48 OFF
```

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

PRESS '+'

```
LOGICAL I/O COMMAND #8  (+/-COMMAND#)
IF  ACTIVE PHASE        #3  IS ON
        SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #49 OFF
```

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

PRESS '+'

```
LOGICAL I/O COMMAND #9  (+/-COMMAND#)
IF  YELLOW ON PHASE     #3  IS ON
        SCROLL DOWN
THEN:
SET OUTPUT  ASSIGNMENT #48 ON
```

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

LOGIC I/O PROCESSOR PROGRAMMING COMPLETE

OUTPUT REFERENCE SCHEDULE

USE TO INTERPRET LOGIC PROCESSOR

```
OUTPUT 42 = Overlap C Red
OUTPUT 43 = Overlap C Yellow
OUTPUT 44 = Overlap C Green
OUTPUT 47 = Overlap B Red
OUTPUT 48 = Overlap B Yellow
OUTPUT 49 = Overlap B Green
OUTPUT 50 = Overlap A Red
OUTPUT 51 = Overlap A Yellow
OUTPUT 52 = Overlap A Green
```

DYNAMIC BACK-UP CONTROL PROGRAMMING

(program controller as shown below)

1. From Main Menu press '2' (Phase Control). then '1' (Phase Control Functions). Scroll to the bottom of the menu and enable Dynamic/Backup Control Function 1.

2. From Phase Control Functions Menu press '2' (Dynamic/Backup Control Functions).

```
DYNAMIC/BACKUP CONTROL FUNCTION #01
                 OVERLAPS:|ABCDEFGHIJKLMNOP
IF OVERLAPS ARE ACTIVE :|
OR       PHASES:|123456789101112131415 16
IF PHASES ARE ON:|   X
OMIT PHASES      |   X
CALL PHASES      |
```

BACKUP PROTECTION PROGRAMMING COMPLETE

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

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

```
PAGE 1: VEHICLE OVERLAP 'A' SETTINGS
PHASE:          :123456789101112131415 16
VEH OVL PARENTS:|XX
VEH OVL NOT VEH:|
VEH OVL NOT PED:|
VEH OVL GRN EXT:|
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  X GREEN
SELECT VEHICLE OVERLAP OPTIONS:  (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC).........0
YELLOW CLEAR (0=PARENT.3-25.5 SEC)..0.0
RED CLEAR (0=PARENT.0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE. 1-16)....0
```

NOTICE GREEN FLASH

PRESS '+'

```
PAGE 1: VEHICLE OVERLAP 'B' SETTINGS
PHASE:          :123456789101112131415 16
VEH OVL PARENTS:|  XX
VEH OVL NOT VEH:|
VEH OVL NOT PED:|
VEH OVL GRN EXT:|
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  X GREEN
SELECT VEHICLE OVERLAP OPTIONS:  (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...N
GREEN EXTENSION (0-255 SEC).........0
YELLOW CLEAR (0=PARENT.3-25.5 SEC)..0.0
RED CLEAR (0=PARENT.0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE. 1-16)....0
```

NOTICE GREEN FLASH

PRESS '+'

```
PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
PHASE:          :123456789101112131415 16
VEH OVL PARENTS:|     XX
VEH OVL NOT VEH:|
VEH OVL NOT PED:|
VEH OVL GRN EXT:|
STARTUP COLOR: _ RED  _ YELLOW  _ GREEN
FLASH COLORS:  _ RED  _ YELLOW  X GREEN
SELECT VEHICLE OVERLAP OPTIONS:  (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC).........0
YELLOW CLEAR (0=PARENT.3-25.5 SEC)..0.0
RED CLEAR (0=PARENT.0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE. 1-16)....0
```

NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

Disable Backup Protect for phase 2+6.

FLASHER CIRCUIT MODIFICATION DETAIL

IN ORDER TO INSURE THAT SIGNALS FLASH CONCURRENTLY ON THE SAME APPROACH. MAKE THE FOLLOWING FLASHER CIRCUIT CHANGES:

1. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-4 AND TERMINATE ON T2-2.
2. ON REAR OF PDA - REMOVE WIRE FROM TERM. T2-5 AND TERMINATE ON T2-3.
3. REMOVE FLASHER UNIT 2.

THE CHANGES LISTED ABOVE TIES ALL PHASES AND OVERLAPS TO FLASHER UNIT 1.

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 10-1104
DESIGNED: March 2014
SEALED: 4-23-14
REVISED: N/A

ELECTRICAL DETAIL SHEET 2 OF 2

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared in the Offices of:
Transportation Mobility and Safety Division
Traffic Engineering Branch
Signal Management Section
750 N.Greenfield Pkwy,Garner,NC 27529

US 21 (Statesville Road)
at
SR 2147 (Westmoreland Road)

Division 10 Mecklenburg County Cornelius

PLAN DATE: April 2014	REVIEWED BY: JTK
PREPARED BY: James Peterson	REVIEWED BY:

REVISIONS	INIT.	DATE

SEAL
NORTH CAROLINA PROFESSIONAL SEAL 008453 ENGINEER JOHN T. ROWE, JR.

SIGNATURE 4-24-14 DATE

SIG. INVENTORY NO. 10-1104

23-APR-2014 12:03
S:\ATTSASSETS\Signals\memory\signals\sig_mpeterson\01104_ele.ele.xxx.dgn
jtaylor.dgn

APPENDIX E

US 21 AND
BAILEY ROAD

SYNCHRO REPORTS

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	502	152	499	253	148	860
Future Volume (vph)	502	152	499	253	148	860
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		150	100	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				125	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.950				0.181	
Satd. Flow (perm)	1770	1583	1863	1583	337	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		169		281		
Link Speed (mph)	25		45			45
Link Distance (ft)	230		752			2362
Travel Time (s)	6.3		11.4			35.8
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	558	169	554	281	164	956
Shared Lane Traffic (%)						
Lane Group Flow (vph)	558	169	554	281	164	956
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pt+ov	NA	pt+ov	pm+pt	NA
Protected Phases	4	4 1	2	2 4	1	6
Permitted Phases					6	
Detector Phase	4	4 1	2	2 4	1	6
Switch Phase						
Minimum Initial (s)	7.0		12.0		7.0	12.0
Minimum Split (s)	12.0		18.0		13.0	18.0
Total Split (s)	35.0		42.0		13.0	55.0
Total Split (%)	38.9%		46.7%		14.4%	61.1%
Maximum Green (s)	30.1		36.1		7.6	49.1
Yellow Time (s)	3.0		4.6		3.0	4.6
All-Red Time (s)	1.9		1.3		2.4	1.3
Lost Time Adjust (s)	0.1		-0.9		-0.4	-0.9
Total Lost Time (s)	5.0		5.0		5.0	5.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.0		6.0		1.0	6.0
Minimum Gap (s)	0.2		3.0		0.2	3.0
Time Before Reduce (s)	0.0		15.0		0.0	15.0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Time To Reduce (s)	0.0		30.0		0.0	30.0
Recall Mode	None		Min		None	Min
Act Effct Green (s)	28.4	41.3	33.3	66.7	46.2	46.2
Actuated g/C Ratio	0.34	0.49	0.39	0.79	0.55	0.55
v/c Ratio	0.94	0.20	0.76	0.22	0.52	0.94
Control Delay	55.2	2.9	30.1	0.7	15.9	36.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.2	2.9	30.1	0.7	15.9	36.8
LOS	E	A	C	A	B	D
Approach Delay	43.0		20.2			33.7
Approach LOS	D		C			C
Queue Length 50th (ft)	306	0	258	0	43	464
Queue Length 95th (ft)	#513	32	382	12	74	#756
Internal Link Dist (ft)	150		672			2282
Turn Bay Length (ft)				150	100	
Base Capacity (vph)	637	862	826	1327	321	1117
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	0.88	0.20	0.67	0.21	0.51	0.86

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 84.7
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 32.0 — Intersection LOS: C
Intersection Capacity Utilization 81.4% — 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: 1: US 21 & Bailey Road

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	522	158	519	263	154	895
Future Volume (vph)	522	158	519	263	154	895
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		150	100	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				125	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.950				0.171	
Satd. Flow (perm)	1770	1583	1863	1583	319	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		173		292		
Link Speed (mph)	25		45			45
Link Distance (ft)	230		752			2362
Travel Time (s)	6.3		11.4			35.8
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	580	176	577	292	171	994
Shared Lane Traffic (%)						
Lane Group Flow (vph)	580	176	577	292	171	994
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pt+ov	NA	pt+ov	pm+pt	NA
Protected Phases	4	4 1	2	2 4	1	6
Permitted Phases					6	
Detector Phase	4	4 1	2	2 4	1	6
Switch Phase						
Minimum Initial (s)	7.0		12.0		7.0	12.0
Minimum Split (s)	12.0		18.0		13.0	18.0
Total Split (s)	35.0		42.0		13.0	55.0
Total Split (%)	38.9%		46.7%		14.4%	61.1%
Maximum Green (s)	30.1		36.1		7.6	49.1
Yellow Time (s)	3.0		4.6		3.0	4.6
All-Red Time (s)	1.9		1.3		2.4	1.3
Lost Time Adjust (s)	0.1		-0.9		-0.4	-0.9
Total Lost Time (s)	5.0		5.0		5.0	5.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.0		6.0		1.0	6.0
Minimum Gap (s)	0.2		3.0		0.2	3.0
Time Before Reduce (s)	0.0		15.0		0.0	15.0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Time To Reduce (s)	0.0		30.0		0.0	30.0
Recall Mode	None		Min		None	Min
Act Effct Green (s)	29.8	42.6	35.8	70.6	48.5	48.5
Actuated g/C Ratio	0.34	0.48	0.40	0.80	0.55	0.55
v/c Ratio	0.97	0.21	0.77	0.22	0.57	0.97
Control Delay	61.4	3.0	30.8	0.7	17.5	42.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.4	3.0	30.8	0.7	17.5	42.9
LOS	E	A	C	A	B	D
Approach Delay	47.8		20.6			39.2
Approach LOS	D		C			D
Queue Length 50th (ft)	324	1	273	0	45	504
Queue Length 95th (ft)	#541	34	404	12	77	#804
Internal Link Dist (ft)	150		672			2282
Turn Bay Length (ft)				150	100	
Base Capacity (vph)	602	842	783	1326	306	1056
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	0.96	0.21	0.74	0.22	0.56	0.94

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 88.4
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.97
Intersection Signal Delay: 35.8 — Intersection LOS: D
Intersection Capacity Utilization 84.4% — 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: 1: US 21 & Bailey Road

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	538	177	519	289	184	895
Future Volume (vph)	538	177	519	289	184	895
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		150	100	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				125	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.950				0.169	
Satd. Flow (perm)	1770	1583	1863	1583	315	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		173		231		
Link Speed (mph)	25		45			45
Link Distance (ft)	230		752			2362
Travel Time (s)	6.3		11.4			35.8
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	598	197	577	321	204	994
Shared Lane Traffic (%)						
Lane Group Flow (vph)	598	197	577	321	204	994
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pt+ov	NA	pt+ov	pm+pt	NA
Protected Phases	4	4 1	2	2 4	1	6
Permitted Phases					6	
Detector Phase	4	4 1	2	2 4	1	6
Switch Phase						
Minimum Initial (s)	7.0		12.0		7.0	12.0
Minimum Split (s)	12.0		18.0		13.0	18.0
Total Split (s)	35.0		42.0		13.0	55.0
Total Split (%)	38.9%		46.7%		14.4%	61.1%
Maximum Green (s)	30.1		36.1		7.6	49.1
Yellow Time (s)	3.0		4.6		3.0	4.6
All-Red Time (s)	1.9		1.3		2.4	1.3
Lost Time Adjust (s)	0.1		-0.9		-0.4	-0.9
Total Lost Time (s)	5.0		5.0		5.0	5.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.0		6.0		1.0	6.0
Minimum Gap (s)	0.2		3.0		0.2	3.0
Time Before Reduce (s)	0.0		15.0		0.0	15.0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Time To Reduce (s)	0.0		30.0		0.0	30.0
Recall Mode	None		Min		None	Min
Act Effct Green (s)	30.0	42.9	35.6	70.7	48.5	48.5
Actuated g/C Ratio	0.34	0.48	0.40	0.80	0.55	0.55
v/c Ratio	1.00	0.23	0.77	0.25	0.68	0.97
Control Delay	67.5	3.8	31.1	1.1	22.7	43.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.5	3.8	31.1	1.1	22.7	43.5
LOS	E	A	C	A	C	D
Approach Delay	51.7		20.4			39.9
Approach LOS	D		C			D
Queue Length 50th (ft)	~346	7	273	8	55	504
Queue Length 95th (ft)	#564	42	404	22	#101	#804
Internal Link Dist (ft)	150		672			2282
Turn Bay Length (ft)				150	100	
Base Capacity (vph)	600	858	778	1309	304	1053
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	1.00	0.23	0.74	0.25	0.67	0.94

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 88.6
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 37.1 — Intersection LOS: D
Intersection Capacity Utilization 85.2% — ICU Level of Service E
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: 1: US 21 & Bailey Road

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	538	177	519	289	184	895
Future Volume (vph)	538	177	519	289	184	895
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		150	200	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				125	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.950				0.169	
Satd. Flow (perm)	1770	1583	1863	1583	315	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		173		231		
Link Speed (mph)	25		45			45
Link Distance (ft)	230		752			2362
Travel Time (s)	6.3		11.4			35.8
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	598	197	577	321	204	994
Shared Lane Traffic (%)						
Lane Group Flow (vph)	598	197	577	321	204	994
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pt+ov	NA	pt+ov	pm+pt	NA
Protected Phases	4	4 1	2	2 4	1	6
Permitted Phases					6	
Detector Phase	4	4 1	2	2 4	1	6
Switch Phase						
Minimum Initial (s)	7.0		12.0		7.0	12.0
Minimum Split (s)	12.0		18.0		13.0	18.0
Total Split (s)	35.0		42.0		13.0	55.0
Total Split (%)	38.9%		46.7%		14.4%	61.1%
Maximum Green (s)	30.1		36.1		7.6	49.1
Yellow Time (s)	3.0		4.6		3.0	4.6
All-Red Time (s)	1.9		1.3		2.4	1.3
Lost Time Adjust (s)	0.1		-0.9		-0.4	-0.9
Total Lost Time (s)	5.0		5.0		5.0	5.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.0		6.0		1.0	6.0
Minimum Gap (s)	0.2		3.0		0.2	3.0
Time Before Reduce (s)	0.0		15.0		0.0	15.0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Time To Reduce (s)	0.0		30.0		0.0	30.0
Recall Mode	None		Min		None	Min
Act Effct Green (s)	30.0	42.9	35.6	70.7	48.5	48.5
Actuated g/C Ratio	0.34	0.48	0.40	0.80	0.55	0.55
v/c Ratio	1.00	0.23	0.77	0.25	0.68	0.97
Control Delay	67.5	3.8	31.1	1.1	22.7	43.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.5	3.8	31.1	1.1	22.7	43.5
LOS	E	A	C	A	C	D
Approach Delay	51.7		20.4			39.9
Approach LOS	D		C			D
Queue Length 50th (ft)	~346	7	273	8	55	504
Queue Length 95th (ft)	#564	42	404	22	#101	#804
Internal Link Dist (ft)	150		672			2282
Turn Bay Length (ft)				150	200	
Base Capacity (vph)	600	858	778	1309	304	1053
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	1.00	0.23	0.74	0.25	0.67	0.94

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 88.6
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 37.1 — Intersection LOS: D
Intersection Capacity Utilization 85.2% — ICU Level of Service E
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: 1: US 21 & Bailey Road

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	361	183	605	477	195	684
Future Volume (vph)	361	183	605	477	195	684
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		150	100	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				125	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.950				0.129	
Satd. Flow (perm)	1770	1583	1863	1583	240	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		157		180		
Link Speed (mph)	25		45			45
Link Distance (ft)	230		752			2362
Travel Time (s)	6.3		11.4			35.8
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	401	203	672	530	217	760
Shared Lane Traffic (%)						
Lane Group Flow (vph)	401	203	672	530	217	760
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pt+ov	NA	pt+ov	pm+pt	NA
Protected Phases	4	4 1	2	2 4	1	6
Permitted Phases					6	
Detector Phase	4	4 1	2	2 4	1	6
Switch Phase						
Minimum Initial (s)	7.0		12.0		7.0	12.0
Minimum Split (s)	12.0		18.0		13.0	18.0
Total Split (s)	31.0		46.0		13.0	59.0
Total Split (%)	34.4%		51.1%		14.4%	65.6%
Maximum Green (s)	26.1		40.1		7.6	53.1
Yellow Time (s)	3.0		4.6		3.0	4.6
All-Red Time (s)	1.9		1.3		2.4	1.3
Lost Time Adjust (s)	0.1		-0.9		-0.4	-0.9
Total Lost Time (s)	5.0		5.0		5.0	5.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.0		6.0		1.0	6.0
Minimum Gap (s)	0.2		3.0		0.2	3.0
Time Before Reduce (s)	0.0		15.0		0.0	15.0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Time To Reduce (s)	0.0		30.0		0.0	30.0
Recall Mode	None		Min		None	Min
Act Effct Green (s)	20.6	33.8	33.2	59.0	46.4	46.4
Actuated g/C Ratio	0.27	0.44	0.43	0.76	0.60	0.60
v/c Ratio	0.85	0.26	0.84	0.42	0.72	0.68
Control Delay	46.1	5.6	31.3	2.9	26.3	15.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.1	5.6	31.3	2.9	26.3	15.0
LOS	D	A	C	A	C	B
Approach Delay	32.5		18.8			17.5
Approach LOS	C		B			B
Queue Length 50th (ft)	192	13	297	38	48	247
Queue Length 95th (ft)	#349	55	465	63	#155	397
Internal Link Dist (ft)	150		672			2282
Turn Bay Length (ft)				150	100	
Base Capacity (vph)	614	780	1020	1361	307	1343
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	0.65	0.26	0.66	0.39	0.71	0.57

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 77.4
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 21.3 — Intersection LOS: C
Intersection Capacity Utilization 75.1% — 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: 1: US 21 & Bailey Road

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	376	190	629	496	203	712
Future Volume (vph)	376	190	629	496	203	712
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		150	100	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				125	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.950				0.112	
Satd. Flow (perm)	1770	1583	1863	1583	209	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		144		149		
Link Speed (mph)	25		45			45
Link Distance (ft)	230		752			2362
Travel Time (s)	6.3		11.4			35.8
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	418	211	699	551	226	791
Shared Lane Traffic (%)						
Lane Group Flow (vph)	418	211	699	551	226	791
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pt+ov	NA	pt+ov	pm+pt	NA
Protected Phases	4	4 1	2	2 4	1	6
Permitted Phases					6	
Detector Phase	4	4 1	2	2 4	1	6
Switch Phase						
Minimum Initial (s)	7.0		12.0		7.0	12.0
Minimum Split (s)	12.0		18.0		13.0	18.0
Total Split (s)	31.0		46.0		13.0	59.0
Total Split (%)	34.4%		51.1%		14.4%	65.6%
Maximum Green (s)	26.1		40.1		7.6	53.1
Yellow Time (s)	3.0		4.6		3.0	4.6
All-Red Time (s)	1.9		1.3		2.4	1.3
Lost Time Adjust (s)	0.1		-0.9		-0.4	-0.9
Total Lost Time (s)	5.0		5.0		5.0	5.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.0		6.0		1.0	6.0
Minimum Gap (s)	0.2		3.0		0.2	3.0
Time Before Reduce (s)	0.0		15.0		0.0	15.0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Time To Reduce (s)	0.0		30.0		0.0	30.0
Recall Mode	None		Min		None	Min
Act Effct Green (s)	21.8	35.0	34.9	61.9	48.1	48.1
Actuated g/C Ratio	0.27	0.44	0.44	0.77	0.60	0.60
v/c Ratio	0.87	0.27	0.86	0.44	0.80	0.71
Control Delay	48.3	6.7	33.6	3.2	37.3	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.3	6.7	33.6	3.2	37.3	16.2
LOS	D	A	C	A	D	B
Approach Delay	34.4		20.2			20.9
Approach LOS	C		C			C
Queue Length 50th (ft)	215	21	333	45	60	285
Queue Length 95th (ft)	#373	64	#541	76	#189	428
Internal Link Dist (ft)	150		672			2282
Turn Bay Length (ft)				150	100	
Base Capacity (vph)	589	759	978	1330	285	1320
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	0.71	0.28	0.71	0.41	0.79	0.60

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 80.2
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 23.5 — Intersection LOS: C
Intersection Capacity Utilization 77.7% — 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: 1: US 21 & Bailey Road

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	404	223	629	521	233	712
Future Volume (vph)	404	223	629	521	233	712
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		150	100	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				125	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.950				0.100	
Satd. Flow (perm)	1770	1583	1863	1583	186	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		137		135		
Link Speed (mph)	25		45			45
Link Distance (ft)	230		752			2362
Travel Time (s)	6.3		11.4			35.8
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	449	248	699	579	259	791
Shared Lane Traffic (%)						
Lane Group Flow (vph)	449	248	699	579	259	791
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pt+ov	NA	pt+ov	pm+pt	NA
Protected Phases	4	4 1	2	2 4	1	6
Permitted Phases					6	
Detector Phase	4	4 1	2	2 4	1	6
Switch Phase						
Minimum Initial (s)	7.0		12.0		7.0	12.0
Minimum Split (s)	12.0		18.0		13.0	18.0
Total Split (s)	30.0		45.0		15.0	60.0
Total Split (%)	33.3%		50.0%		16.7%	66.7%
Maximum Green (s)	25.1		39.1		9.6	54.1
Yellow Time (s)	3.0		4.6		3.0	4.6
All-Red Time (s)	1.9		1.3		2.4	1.3
Lost Time Adjust (s)	0.1		-0.9		-0.4	-0.9
Total Lost Time (s)	5.0		5.0		5.0	5.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.0		6.0		1.0	6.0
Minimum Gap (s)	0.2		3.0		0.2	3.0
Time Before Reduce (s)	0.0		15.0		0.0	15.0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Time To Reduce (s)	0.0		30.0		0.0	30.0
Recall Mode	None		Min		None	Min
Act Effct Green (s)	23.3	38.1	35.4	63.7	50.2	50.2
Actuated g/C Ratio	0.28	0.46	0.42	0.76	0.60	0.60
v/c Ratio	0.91	0.31	0.89	0.47	0.88	0.71
Control Delay	55.6	8.3	37.5	3.9	49.3	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.6	8.3	37.5	3.9	49.3	16.1
LOS	E	A	D	A	D	B
Approach Delay	38.8		22.3			24.3
Approach LOS	D		C			C
Queue Length 50th (ft)	247	36	342	60	88	277
Queue Length 95th (ft)	#426	86	#553	102	#229	414
Internal Link Dist (ft)	150		672			2282
Turn Bay Length (ft)				150	100	
Base Capacity (vph)	538	786	907	1276	304	1246
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	0.83	0.32	0.77	0.45	0.85	0.63

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 83.6
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 26.8 — Intersection LOS: C
Intersection Capacity Utilization 80.9% — 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: 1: US 21 & Bailey Road

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	404	223	629	521	233	712
Future Volume (vph)	404	223	629	521	233	712
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		150	200	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				125	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	1863	1583	1770	1863
Flt Permitted	0.950				0.100	
Satd. Flow (perm)	1770	1583	1863	1583	186	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		137		135		
Link Speed (mph)	25		45			45
Link Distance (ft)	230		752			2362
Travel Time (s)	6.3		11.4			35.8
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	449	248	699	579	259	791
Shared Lane Traffic (%)						
Lane Group Flow (vph)	449	248	699	579	259	791
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pt+ov	NA	pt+ov	pm+pt	NA
Protected Phases	4	4 1	2	2 4	1	6
Permitted Phases					6	
Detector Phase	4	4 1	2	2 4	1	6
Switch Phase						
Minimum Initial (s)	7.0		12.0		7.0	12.0
Minimum Split (s)	12.0		18.0		13.0	18.0
Total Split (s)	30.0		45.0		15.0	60.0
Total Split (%)	33.3%		50.0%		16.7%	66.7%
Maximum Green (s)	25.1		39.1		9.6	54.1
Yellow Time (s)	3.0		4.6		3.0	4.6
All-Red Time (s)	1.9		1.3		2.4	1.3
Lost Time Adjust (s)	0.1		-0.9		-0.4	-0.9
Total Lost Time (s)	5.0		5.0		5.0	5.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.0		6.0		1.0	6.0
Minimum Gap (s)	0.2		3.0		0.2	3.0
Time Before Reduce (s)	0.0		15.0		0.0	15.0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Time To Reduce (s)	0.0		30.0		0.0	30.0
Recall Mode	None		Min		None	Min
Act Effct Green (s)	23.3	38.1	35.4	63.7	50.2	50.2
Actuated g/C Ratio	0.28	0.46	0.42	0.76	0.60	0.60
v/c Ratio	0.91	0.31	0.89	0.47	0.88	0.71
Control Delay	55.6	8.3	37.5	3.9	49.3	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.6	8.3	37.5	3.9	49.3	16.1
LOS	E	A	D	A	D	B
Approach Delay	38.8		22.3			24.3
Approach LOS	D		C			C
Queue Length 50th (ft)	247	36	342	60	88	277
Queue Length 95th (ft)	#426	86	#553	102	#229	414
Internal Link Dist (ft)	150		672			2282
Turn Bay Length (ft)				150	200	
Base Capacity (vph)	538	786	907	1276	304	1246
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	0.83	0.32	0.77	0.45	0.85	0.63

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 83.6
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 26.8 — Intersection LOS: C
Intersection Capacity Utilization 80.9% — 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: 1: US 21 & Bailey Road

APPENDIX F

US 21 AND
WESTMORELAND ROAD

SYNCHRO REPORTS

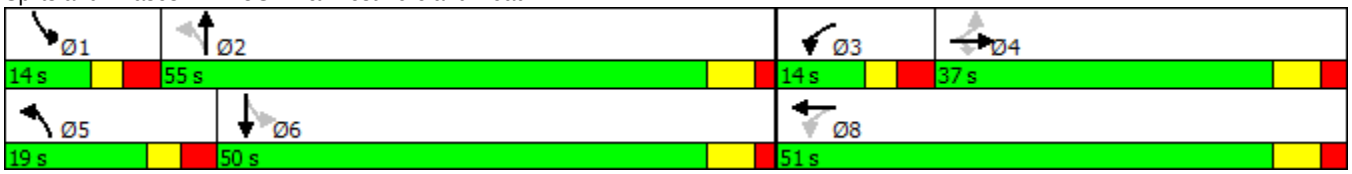
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	145	338	155	183	106	210	377	30	22	516	36
Future Volume (vph)	130	145	338	155	183	106	210	377	30	22	516	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	200		0	150		0	110		0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25			100			90			90		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.945			0.989			0.990	
Flt Protected		0.977		0.950			0.950			0.950		
Satd. Flow (prot)	0	1820	1583	1770	1760	0	1770	1842	0	1770	1844	0
Flt Permitted		0.697		0.276			0.099			0.411		
Satd. Flow (perm)	0	1298	1583	514	1760	0	184	1842	0	766	1844	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			252		28			4			3	
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		1196			1305			2362			1607	
Travel Time (s)		18.1			19.8			35.8			24.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	144	161	376	172	203	118	233	419	33	24	573	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	305	376	172	321	0	233	452	0	24	613	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0		7.0	12.0	
Minimum Split (s)	29.0	29.0	29.0	14.0	14.0		14.0	29.0		14.0	19.0	
Total Split (s)	37.0	37.0	37.0	14.0	51.0		19.0	55.0		14.0	50.0	
Total Split (%)	30.8%	30.8%	30.8%	11.7%	42.5%		15.8%	45.8%		11.7%	41.7%	
Maximum Green (s)	30.2	30.2	30.2	7.7	44.2		12.7	48.6		7.6	43.6	
Yellow Time (s)	4.3	4.3	4.3	3.0	4.3		3.0	4.4		3.0	4.4	
All-Red Time (s)	2.5	2.5	2.5	3.3	2.5		3.3	2.0		3.4	2.0	
Lost Time Adjust (s)		-1.8	-1.8	-1.3	-1.8		-1.3	-1.4		-1.4	-1.4	
Total Lost Time (s)		5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lag	Lag	Lag	Lead			Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		2.0	6.0		1.0	6.0	
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2		0.2	3.4		0.2	3.4	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	20.0		0.0	20.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	30.0		0.0	30.0	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0	7.0					7.0				
Flash Dont Walk (s)	15.0	15.0	15.0					15.0				
Pedestrian Calls (#/hr)	0	0	0					0				
Act Effct Green (s)		29.3	29.3	43.3	43.3		59.6	52.0		49.1	40.6	
Actuated g/C Ratio		0.26	0.26	0.38	0.38		0.53	0.46		0.43	0.36	
v/c Ratio		0.91	0.63	0.58	0.46		0.80	0.53		0.06	0.92	
Control Delay		72.5	17.7	33.7	27.0		45.1	26.3		14.1	56.0	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		72.5	17.7	33.7	27.0		45.1	26.3		14.1	56.0	
LOS		E	B	C	C		D	C		B	E	
Approach Delay		42.3			29.3			32.7			54.4	
Approach LOS		D			C			C			D	
Queue Length 50th (ft)		227	79	90	168		113	261		8	438	
Queue Length 95th (ft)		#392	187	145	253		#248	370		22	#653	
Internal Link Dist (ft)		1116			1225			2282			1527	
Turn Bay Length (ft)			100	200			150			110		
Base Capacity (vph)		371	633	298	740		295	862		417	744	
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		0.82	0.59	0.58	0.43		0.79	0.52		0.06	0.82	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 113
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 40.2 Intersection LOS: D
Intersection Capacity Utilization 88.6% 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 21 & Westmoreland Road



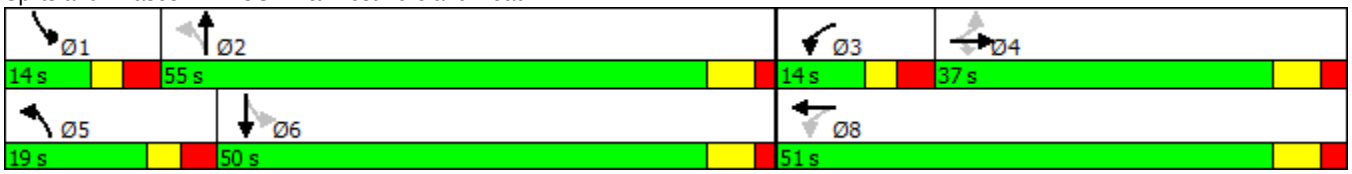
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	151	352	161	190	110	218	392	31	23	537	37
Future Volume (vph)	135	151	352	161	190	110	218	392	31	23	537	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	200		0	150		0	110		0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25			100			90			90		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.945			0.989			0.990	
Flt Protected		0.977		0.950			0.950			0.950		
Satd. Flow (prot)	0	1820	1583	1770	1760	0	1770	1842	0	1770	1844	0
Flt Permitted		0.692		0.261			0.081			0.391		
Satd. Flow (perm)	0	1289	1583	486	1760	0	151	1842	0	728	1844	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			252		28			4			3	
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		1196			1305			2362			1607	
Travel Time (s)		18.1			19.8			35.8			24.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	150	168	391	179	211	122	242	436	34	26	597	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	318	391	179	333	0	242	470	0	26	638	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0		7.0	12.0	
Minimum Split (s)	29.0	29.0	29.0	14.0	14.0		14.0	29.0		14.0	19.0	
Total Split (s)	37.0	37.0	37.0	14.0	51.0		19.0	55.0		14.0	50.0	
Total Split (%)	30.8%	30.8%	30.8%	11.7%	42.5%		15.8%	45.8%		11.7%	41.7%	
Maximum Green (s)	30.2	30.2	30.2	7.7	44.2		12.7	48.6		7.6	43.6	
Yellow Time (s)	4.3	4.3	4.3	3.0	4.3		3.0	4.4		3.0	4.4	
All-Red Time (s)	2.5	2.5	2.5	3.3	2.5		3.3	2.0		3.4	2.0	
Lost Time Adjust (s)		-1.8	-1.8	-1.3	-1.8		-1.3	-1.4		-1.4	-1.4	
Total Lost Time (s)		5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lag	Lag	Lag	Lead			Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		2.0	6.0		1.0	6.0	
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2		0.2	3.4		0.2	3.4	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	20.0		0.0	20.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	30.0		0.0	30.0	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0	7.0					7.0				
Flash Dont Walk (s)	15.0	15.0	15.0					15.0				
Pedestrian Calls (#/hr)	0	0	0					0				
Act Effct Green (s)		30.6	30.6	44.6	44.6		61.5	53.8		50.9	42.5	
Actuated g/C Ratio		0.26	0.26	0.38	0.38		0.53	0.46		0.44	0.37	
v/c Ratio		0.94	0.65	0.63	0.48		0.88	0.55		0.07	0.95	
Control Delay		78.8	19.0	36.3	27.8		61.0	27.0		14.2	59.7	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		78.8	19.0	36.3	27.8		61.0	27.0		14.2	59.7	
LOS		E	B	D	C		E	C		B	E	
Approach Delay		45.9			30.8			38.5			57.9	
Approach LOS		D			C			D			E	
Queue Length 50th (ft)		241	91	94	176		134	275		9	465	
Queue Length 95th (ft)		#418	204	150	264		#287	388		24	#698	
Internal Link Dist (ft)		1116			1225			2282			1527	
Turn Bay Length (ft)			100	200			150			110		
Base Capacity (vph)		356	619	286	716		275	854		403	718	
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		0.89	0.63	0.63	0.47		0.88	0.55		0.06	0.89	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 116.2
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 44.0 Intersection LOS: D
Intersection Capacity Utilization 91.4% ICU Level of Service F
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 21 & Westmoreland Road



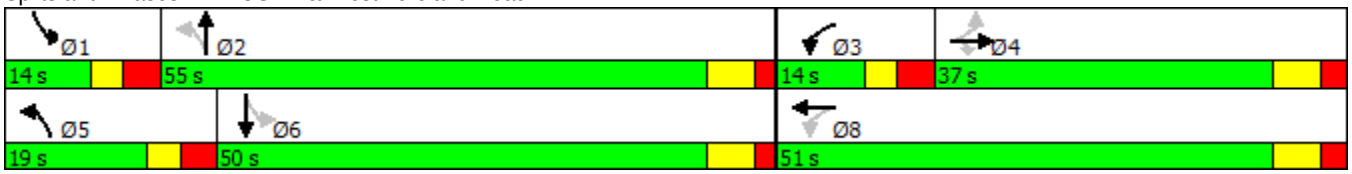
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	161	362	161	196	110	224	405	31	23	557	37
Future Volume (vph)	135	161	362	161	196	110	224	405	31	23	557	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	200		0	150		0	110		0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25			100			90			90		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.946			0.989			0.991	
Flt Protected		0.978		0.950			0.950			0.950		
Satd. Flow (prot)	0	1822	1583	1770	1762	0	1770	1842	0	1770	1846	0
Flt Permitted		0.696		0.248			0.078			0.375		
Satd. Flow (perm)	0	1296	1583	462	1762	0	145	1842	0	699	1846	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			250		27			4			3	
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		1196			1305			2362			1607	
Travel Time (s)		18.1			19.8			35.8			24.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	150	179	402	179	218	122	249	450	34	26	619	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	329	402	179	340	0	249	484	0	26	660	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0		7.0	12.0	
Minimum Split (s)	29.0	29.0	29.0	14.0	14.0		14.0	29.0		14.0	19.0	
Total Split (s)	37.0	37.0	37.0	14.0	51.0		19.0	55.0		14.0	50.0	
Total Split (%)	30.8%	30.8%	30.8%	11.7%	42.5%		15.8%	45.8%		11.7%	41.7%	
Maximum Green (s)	30.2	30.2	30.2	7.7	44.2		12.7	48.6		7.6	43.6	
Yellow Time (s)	4.3	4.3	4.3	3.0	4.3		3.0	4.4		3.0	4.4	
All-Red Time (s)	2.5	2.5	2.5	3.3	2.5		3.3	2.0		3.4	2.0	
Lost Time Adjust (s)		-1.8	-1.8	-1.3	-1.8		-1.3	-1.4		-1.4	-1.4	
Total Lost Time (s)		5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lag	Lag	Lag	Lead			Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		2.0	6.0		1.0	6.0	
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2		0.2	3.4		0.2	3.4	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	20.0		0.0	20.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	30.0		0.0	30.0	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0	7.0					7.0				
Flash Dont Walk (s)	15.0	15.0	15.0					15.0				
Pedestrian Calls (#/hr)	0	0	0					0				
Act Effct Green (s)		31.3	31.3	45.3	45.3		62.7	54.8		52.1	43.7	
Actuated g/C Ratio		0.27	0.27	0.38	0.38		0.53	0.46		0.44	0.37	
v/c Ratio		0.96	0.67	0.65	0.49		0.93	0.56		0.07	0.96	
Control Delay		83.1	20.3	37.7	28.4		70.5	27.5		14.2	63.4	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		83.1	20.3	37.7	28.4		70.5	27.5		14.2	63.4	
LOS		F	C	D	C		E	C		B	E	
Approach Delay		48.5			31.6			42.1			61.5	
Approach LOS		D			C			D			E	
Queue Length 50th (ft)		251	102	94	182		143	287		9	490	
Queue Length 95th (ft)		#436	219	150	271		#304	403		24	#735	
Internal Link Dist (ft)		1116			1225			2282			1527	
Turn Bay Length (ft)			100	200			150			110		
Base Capacity (vph)		351	611	277	704		269	857		393	706	
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		0.94	0.66	0.65	0.48		0.93	0.56		0.07	0.93	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 118	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.96	
Intersection Signal Delay: 46.8	Intersection LOS: D
Intersection Capacity Utilization 93.6%	ICU Level of Service F
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 21 & Westmoreland Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	157	312	79	241	76	340	340	21	89	523	104
Future Volume (vph)	100	157	312	79	241	76	340	340	21	89	523	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	200		0	150		0	110		0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25			100			90			90		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.964			0.991			0.975	
Flt Protected		0.981		0.950			0.950			0.950		
Satd. Flow (prot)	0	1827	1583	1770	1796	0	1770	1846	0	1770	1816	0
Flt Permitted		0.651		0.238			0.079			0.515		
Satd. Flow (perm)	0	1213	1583	443	1796	0	147	1846	0	959	1816	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			231		14			3			10	
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		1196			1305			2362			1607	
Travel Time (s)		18.1			19.8			35.8			24.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	111	174	347	88	268	84	378	378	23	99	581	116
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	285	347	88	352	0	378	401	0	99	697	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0		7.0	12.0	
Minimum Split (s)	29.0	29.0	29.0	14.0	14.0		14.0	29.0		14.0	19.0	
Total Split (s)	30.0	30.0	30.0	14.0	44.0		25.0	62.0		14.0	51.0	
Total Split (%)	25.0%	25.0%	25.0%	11.7%	36.7%		20.8%	51.7%		11.7%	42.5%	
Maximum Green (s)	23.2	23.2	23.2	7.7	37.2		18.7	55.6		7.6	44.6	
Yellow Time (s)	4.3	4.3	4.3	3.0	4.3		3.0	4.4		3.0	4.4	
All-Red Time (s)	2.5	2.5	2.5	3.3	2.5		3.3	2.0		3.4	2.0	
Lost Time Adjust (s)		-1.8	-1.8	-1.3	-1.8		-1.3	-1.4		-1.4	-1.4	
Total Lost Time (s)		5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lag	Lag	Lag	Lead			Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		2.0	6.0		1.0	6.0	
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2		0.2	3.4		0.2	3.4	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	20.0		0.0	20.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	30.0		0.0	30.0	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0	7.0					7.0				
Flash Dont Walk (s)	15.0	15.0	15.0					15.0				
Pedestrian Calls (#/hr)	0	0	0					0				
Act Effct Green (s)		25.1	25.1	35.9	35.9		71.0	57.3		54.5	45.9	
Actuated g/C Ratio		0.21	0.21	0.31	0.31		0.61	0.49		0.47	0.39	
v/c Ratio		1.10	0.67	0.37	0.63		1.03	0.44		0.20	0.97	
Control Delay		128.8	21.6	33.8	38.7		89.9	21.9		12.7	62.6	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		128.8	21.6	33.8	38.7		89.9	21.9		12.7	62.6	
LOS		F	C	C	D		F	C		B	E	
Approach Delay		69.9			37.7			54.9			56.4	
Approach LOS		E			D			D			E	
Queue Length 50th (ft)		~256	80	48	218		~270	199		31	526	
Queue Length 95th (ft)		#430	190	89	320		#466	287		56	#790	
Internal Link Dist (ft)		1116			1225			2282			1527	
Turn Bay Length (ft)			100	200			150			110		
Base Capacity (vph)		259	520	238	610		367	908		513	722	
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		1.10	0.67	0.37	0.58		1.03	0.44		0.19	0.97	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 116.9
Natural Cycle: 130
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.10
Intersection Signal Delay: 56.1 Intersection LOS: E
Intersection Capacity Utilization 100.4% 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 21 & Westmoreland Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	104	163	325	82	251	79	354	354	22	93	544	108
Future Volume (vph)	104	163	325	82	251	79	354	354	22	93	544	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	200		0	150		0	110		0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25			100			90			90		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.964			0.991			0.975	
Flt Protected		0.981		0.950			0.950			0.950		
Satd. Flow (prot)	0	1827	1583	1770	1796	0	1770	1846	0	1770	1816	0
Flt Permitted		0.670		0.227			0.080			0.487		
Satd. Flow (perm)	0	1248	1583	423	1796	0	149	1846	0	907	1816	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			233		14			3			10	
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		1196			1305			2362			1607	
Travel Time (s)		18.1			19.8			35.8			24.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	116	181	361	91	279	88	393	393	24	103	604	120
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	297	361	91	367	0	393	417	0	103	724	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0		7.0	12.0	
Minimum Split (s)	29.0	29.0	29.0	14.0	14.0		14.0	29.0		14.0	19.0	
Total Split (s)	31.0	31.0	31.0	14.0	45.0		25.0	61.0		14.0	50.0	
Total Split (%)	25.8%	25.8%	25.8%	11.7%	37.5%		20.8%	50.8%		11.7%	41.7%	
Maximum Green (s)	24.2	24.2	24.2	7.7	38.2		18.7	54.6		7.6	43.6	
Yellow Time (s)	4.3	4.3	4.3	3.0	4.3		3.0	4.4		3.0	4.4	
All-Red Time (s)	2.5	2.5	2.5	3.3	2.5		3.3	2.0		3.4	2.0	
Lost Time Adjust (s)		-1.8	-1.8	-1.3	-1.8		-1.3	-1.4		-1.4	-1.4	
Total Lost Time (s)		5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lag	Lag	Lag	Lead			Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		2.0	6.0		1.0	6.0	
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2		0.2	3.4		0.2	3.4	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	20.0		0.0	20.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	30.0		0.0	30.0	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0	7.0					7.0				
Flash Dont Walk (s)	15.0	15.0	15.0					15.0				
Pedestrian Calls (#/hr)	0	0	0					0				
Act Effct Green (s)		26.0	26.0	39.8	39.8		70.0	56.4		53.6	45.0	
Actuated g/C Ratio		0.22	0.22	0.33	0.33		0.58	0.47		0.45	0.38	
v/c Ratio		1.10	0.69	0.38	0.61		1.10	0.48		0.22	1.05	
Control Delay		128.0	22.5	33.0	37.1		111.3	23.9		13.5	85.3	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		128.0	22.5	33.0	37.1		111.3	23.9		13.5	85.3	
LOS		F	C	C	D		F	C		B	F	
Approach Delay		70.1			36.3			66.3			76.4	
Approach LOS		E			D			E			E	
Queue Length 50th (ft)		~261	89	49	227		~295	213		33	~609	
Queue Length 95th (ft)		#438	202	90	332		#495	306		59	#847	
Internal Link Dist (ft)		1116			1225			2282			1527	
Turn Bay Length (ft)			100	200			150			110		
Base Capacity (vph)		270	525	241	609		357	870		473	688	
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		1.10	0.69	0.38	0.60		1.10	0.48		0.22	1.05	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 119.8
Natural Cycle: 120
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.10
Intersection Signal Delay: 65.3 — Intersection LOS: E
Intersection Capacity Utilization 103.8% — 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 21 & Westmoreland Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	104	173	335	82	262	79	365	376	22	93	564	108
Future Volume (vph)	104	173	335	82	262	79	365	376	22	93	564	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	200		0	150		0	110		0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25			100			90			90		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.965			0.992			0.976	
Flt Protected		0.982		0.950			0.950			0.950		
Satd. Flow (prot)	0	1829	1583	1770	1798	0	1770	1848	0	1770	1818	0
Flt Permitted		0.658		0.224			0.082			0.454		
Satd. Flow (perm)	0	1226	1583	417	1798	0	153	1848	0	846	1818	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			234		14			3			9	
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		1196			1305			2362			1607	
Travel Time (s)		18.1			19.8			35.8			24.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	116	192	372	91	291	88	406	418	24	103	627	120
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	308	372	91	379	0	406	442	0	103	747	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		7.0	12.0		7.0	12.0	
Minimum Split (s)	29.0	29.0	29.0	14.0	14.0		14.0	29.0		14.0	19.0	
Total Split (s)	32.0	32.0	32.0	14.0	46.0		25.0	60.0		14.0	49.0	
Total Split (%)	26.7%	26.7%	26.7%	11.7%	38.3%		20.8%	50.0%		11.7%	40.8%	
Maximum Green (s)	25.2	25.2	25.2	7.7	39.2		18.7	53.6		7.6	42.6	
Yellow Time (s)	4.3	4.3	4.3	3.0	4.3		3.0	4.4		3.0	4.4	
All-Red Time (s)	2.5	2.5	2.5	3.3	2.5		3.3	2.0		3.4	2.0	
Lost Time Adjust (s)		-1.8	-1.8	-1.3	-1.8		-1.3	-1.4		-1.4	-1.4	
Total Lost Time (s)		5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Lead/Lag	Lag	Lag	Lag	Lead			Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.0	1.0	1.0	2.0	2.0		2.0	6.0		1.0	6.0	
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2		0.2	3.4		0.2	3.4	
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	20.0		0.0	20.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	30.0		0.0	30.0	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0	7.0					7.0				
Flash Dont Walk (s)	15.0	15.0	15.0					15.0				
Pedestrian Calls (#/hr)	0	0	0					0				
Act Effct Green (s)		27.0	27.0	40.8	40.8		69.0	55.4		52.6	44.0	
Actuated g/C Ratio		0.23	0.23	0.34	0.34		0.58	0.46		0.44	0.37	
v/c Ratio		1.12	0.69	0.38	0.61		1.13	0.52		0.24	1.11	
Control Delay		132.6	22.9	32.3	36.6		123.2	25.4		14.2	104.7	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay		132.6	22.9	32.3	36.6		123.2	25.4		14.2	104.7	
LOS		F	C	C	D		F	C		B	F	
Approach Delay		72.6			35.8			72.2			93.8	
Approach LOS		E			D			E			F	
Queue Length 50th (ft)		~274	96	49	234		~316	234		34	~660	
Queue Length 95th (ft)		#453	211	89	339		#517	334		61	#900	
Internal Link Dist (ft)		1116			1225			2282			1527	
Turn Bay Length (ft)			100	200			150			110		
Base Capacity (vph)		276	538	243	624		358	855		443	673	
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		1.12	0.69	0.37	0.61		1.13	0.52		0.23	1.11	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 119.8
Natural Cycle: 120
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.13
Intersection Signal Delay: 72.7 Intersection LOS: E
Intersection Capacity Utilization 106.6% 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 21 & Westmoreland Road

APPENDIX G

WASHAM POTTS ROAD AND WESTMORELAND ROAD

SYNCHRO REPORTS

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	136	24	92	93	341	355
Future Volume (Veh/h)	136	24	92	93	341	355
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	151	27	102	103	379	394
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	883	576	773			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	883	576	773			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	46	95	88			
cM capacity (veh/h)	278	517	842			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	151	27	205	773
Volume Left	151	0	102	0
Volume Right	0	27	0	394
cSH	278	517	842	1700
Volume to Capacity	0.54	0.05	0.12	0.45
Queue Length 95th (ft)	75	4	10	0
Control Delay (s)	32.3	12.3	5.5	0.0
Lane LOS	D	B	A	
Approach Delay (s)	29.3		5.5	0.0
Approach LOS	D			

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	141	25	96	97	355	369
Future Volume (Veh/h)	141	25	96	97	355	369
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	157	28	107	108	394	410
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	921	599	804			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	921	599	804			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	40	94	87			
cM capacity (veh/h)	261	502	820			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	157	28	215	804
Volume Left	157	0	107	0
Volume Right	0	28	0	410
cSH	261	502	820	1700
Volume to Capacity	0.60	0.06	0.13	0.47
Queue Length 95th (ft)	89	4	11	0
Control Delay (s)	37.6	12.6	5.7	0.0
Lane LOS	E	B	A	
Approach Delay (s)	33.8		5.7	0.0
Approach LOS	D			

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	141	35	102	110	375	369
Future Volume (Veh/h)	141	35	102	110	375	369
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	157	39	113	122	417	410
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	970	622	827			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	970	622	827			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	35	92	86			
cM capacity (veh/h)	241	487	804			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	157	39	235	827
Volume Left	157	0	113	0
Volume Right	0	39	0	410
cSH	241	487	804	1700
Volume to Capacity	0.65	0.08	0.14	0.49
Queue Length 95th (ft)	101	7	12	0
Control Delay (s)	44.0	13.0	5.7	0.0
Lane LOS	E	B	A	
Approach Delay (s)	37.8		5.7	0.0
Approach LOS	E			

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	258	23	69	226	131	310
Future Volume (Veh/h)	258	23	69	226	131	310
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	287	26	77	251	146	344
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	723	318	490			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	723	318	490			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	21	96	93			
cM capacity (veh/h)	365	723	1073			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	287	26	328	490
Volume Left	287	0	77	0
Volume Right	0	26	0	344
cSH	365	723	1073	1700
Volume to Capacity	0.79	0.04	0.07	0.29
Queue Length 95th (ft)	165	3	6	0
Control Delay (s)	43.0	10.2	2.6	0.0
Lane LOS	E	B	A	
Approach Delay (s)	40.3		2.6	0.0
Approach LOS	E			

Intersection Summary			
Average Delay	11.9		
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	268	24	72	235	136	323
Future Volume (Veh/h)	268	24	72	235	136	323
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	298	27	80	261	151	359
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	752	330	510			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	752	330	510			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	15	96	92			
cM capacity (veh/h)	350	711	1055			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	298	27	341	510
Volume Left	298	0	80	0
Volume Right	0	27	0	359
cSH	350	711	1055	1700
Volume to Capacity	0.85	0.04	0.08	0.30
Queue Length 95th (ft)	196	3	6	0
Control Delay (s)	53.2	10.3	2.6	0.0
Lane LOS	F	B	A	
Approach Delay (s)	49.6		2.6	0.0
Approach LOS	E			

Intersection Summary			
Average Delay	14.5		
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	268	34	83	257	156	323
Future Volume (Veh/h)	268	34	83	257	156	323
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	298	38	92	286	173	359
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	822	352	532			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	822	352	532			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	5	95	91			
cM capacity (veh/h)	313	691	1036			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	298	38	378	532
Volume Left	298	0	92	0
Volume Right	0	38	0	359
cSH	313	691	1036	1700
Volume to Capacity	0.95	0.05	0.09	0.31
Queue Length 95th (ft)	242	4	7	0
Control Delay (s)	76.8	10.5	2.9	0.0
Lane LOS	F	B	A	
Approach Delay (s)	69.3		2.9	0.0
Approach LOS	F			

Intersection Summary			
Average Delay	19.5		
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		

APPENDIX H

WASHAM POTTS ROAD AND BAILEY ROAD

SYNCHRO REPORTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	97	277	9	6	368	46	3	7	3	38	9	281
Future Volume (Veh/h)	97	277	9	6	368	46	3	7	3	38	9	281
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	108	308	10	7	409	51	3	8	3	42	10	312
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		415										
pX, platoon unblocked												
vC, conflicting volume	460			318			1294	1003	313	984	982	434
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	460			318			1294	1003	313	984	982	434
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	90			99			95	96	100	79	96	50
cM capacity (veh/h)	1101			1242			62	217	727	203	223	622

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	426	467	14	364
Volume Left	108	7	3	42
Volume Right	10	51	3	312
cSH	1101	1242	156	483
Volume to Capacity	0.10	0.01	0.09	0.75
Queue Length 95th (ft)	8	0	7	160
Control Delay (s)	3.0	0.2	30.3	31.9
Lane LOS	A	A	D	D
Approach Delay (s)	3.0	0.2	30.3	31.9
Approach LOS			D	D

Intersection Summary			
Average Delay	10.5		
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	101	288	9	6	383	48	3	7	3	40	9	292
Future Volume (Veh/h)	101	288	9	6	383	48	3	7	3	40	9	292
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	112	320	10	7	426	53	3	8	3	44	10	324
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		415										
pX, platoon unblocked												
vC, conflicting volume	479			330			1344	1042	325	1022	1020	452
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	479			330			1344	1042	325	1022	1020	452
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	90			99			94	96	100	77	95	47
cM capacity (veh/h)	1083			1229			53	205	716	190	211	607

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	442	486	14	378
Volume Left	112	7	3	44
Volume Right	10	53	3	324
cSH	1083	1229	140	465
Volume to Capacity	0.10	0.01	0.10	0.81
Queue Length 95th (ft)	9	0	8	191
Control Delay (s)	3.0	0.2	33.5	38.5
Lane LOS	A	A	D	E
Approach Delay (s)	3.0	0.2	33.5	38.5
Approach LOS			D	E

Intersection Summary			
Average Delay	12.5		
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	101	294	9	6	398	48	3	7	3	43	9	292
Future Volume (Veh/h)	101	294	9	6	398	48	3	7	3	43	9	292
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	112	327	10	7	442	53	3	8	3	48	10	324
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		415										
pX, platoon unblocked												
vC, conflicting volume	495			337			1368	1065	332	1046	1044	468
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	495			337			1368	1065	332	1046	1044	468
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	90			99			94	96	100	74	95	46
cM capacity (veh/h)	1069			1222			50	198	710	183	204	595

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	449	502	14	382
Volume Left	112	7	3	48
Volume Right	10	53	3	324
cSH	1069	1222	134	446
Volume to Capacity	0.10	0.01	0.10	0.86
Queue Length 95th (ft)	9	0	9	216
Control Delay (s)	3.0	0.2	35.1	45.2
Lane LOS	A	A	E	E
Approach Delay (s)	3.0	0.2	35.1	45.2
Approach LOS			E	E

Intersection Summary			
Average Delay	14.3		
Intersection Capacity Utilization	79.9%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	258	361	33	6	351	50	17	2	6	16	3	143
Future Volume (Veh/h)	258	361	33	6	351	50	17	2	6	16	3	143
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	287	401	37	7	390	56	19	2	7	18	3	159
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		415										
pX, platoon unblocked												
vC, conflicting volume	446			438			1586	1454	420	1434	1444	418
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	446			438			1586	1454	420	1434	1444	418
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	74			99			63	98	99	79	97	75
cM capacity (veh/h)	1114			1122			51	96	634	87	97	635

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	725	453	28	180
Volume Left	287	7	19	18
Volume Right	37	56	7	159
cSH	1114	1122	69	368
Volume to Capacity	0.26	0.01	0.40	0.49
Queue Length 95th (ft)	26	0	39	65
Control Delay (s)	5.7	0.2	88.4	23.8
Lane LOS	A	A	F	C
Approach Delay (s)	5.7	0.2	88.4	23.8
Approach LOS			F	C

Intersection Summary			
Average Delay	7.9		
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	268	376	34	6	365	52	18	2	6	17	3	149
Future Volume (Veh/h)	268	376	34	6	365	52	18	2	6	17	3	149
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	298	418	38	7	406	58	20	2	7	19	3	166
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		415										
pX, platoon unblocked												
vC, conflicting volume	464			456			1650	1511	437	1490	1501	435
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	464			456			1650	1511	437	1490	1501	435
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	73			99			55	98	99	76	97	73
cM capacity (veh/h)	1097			1105			44	87	620	78	88	621

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	754	471	29	188
Volume Left	298	7	20	19
Volume Right	38	58	7	166
cSH	1097	1105	60	345
Volume to Capacity	0.27	0.01	0.49	0.54
Queue Length 95th (ft)	28	0	47	78
Control Delay (s)	5.9	0.2	112.4	27.2
Lane LOS	A	A	F	D
Approach Delay (s)	5.9	0.2	112.4	27.2
Approach LOS			F	D

Intersection Summary			
Average Delay	9.0		
Intersection Capacity Utilization	79.5%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	268	387	34	6	380	52	18	2	6	23	3	149
Future Volume (Veh/h)	268	387	34	6	380	52	18	2	6	23	3	149
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	298	430	38	7	422	58	20	2	7	26	3	166
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		415										
pX, platoon unblocked												
vC, conflicting volume	480			468			1678	1539	449	1518	1529	451
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	480			468			1678	1539	449	1518	1529	451
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	72			99			52	98	99	65	96	73
cM capacity (veh/h)	1082			1094			42	83	610	74	84	608

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	766	487	29	195
Volume Left	298	7	20	26
Volume Right	38	58	7	166
cSH	1082	1094	57	296
Volume to Capacity	0.28	0.01	0.51	0.66
Queue Length 95th (ft)	28	0	50	108
Control Delay (s)	6.0	0.2	122.6	37.8
Lane LOS	A	A	F	E
Approach Delay (s)	6.0	0.2	122.6	37.8
Approach LOS			F	E

Intersection Summary			
Average Delay	10.6		
Intersection Capacity Utilization	81.1%	ICU Level of Service	D
Analysis Period (min)	15		

APPENDIX I

BAILEY ROAD AND
COMMERCIAL DRIVEWAY / SITE DRIVE 1

SYNCHRO REPORTS

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	375	26	6	646	8	8
Future Volume (Veh/h)	375	26	6	646	8	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	417	29	7	718	9	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	230					
pX, platoon unblocked						
vC, conflicting volume			446		804	432
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			446		804	432
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		97	98
cM capacity (veh/h)			1111		318	572

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	446	246	479	18
Volume Left	0	7	0	9
Volume Right	29	0	0	9
cSH	1700	1111	1700	409
Volume to Capacity	0.26	0.01	0.28	0.04
Queue Length 95th (ft)	0	0	0	3
Control Delay (s)	0.0	0.3	0.0	14.2
Lane LOS		A		B
Approach Delay (s)	0.0	0.1		14.2
Approach LOS				B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	32.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	390	27	6	672	8	8
Future Volume (Veh/h)	390	27	6	672	8	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	433	30	7	747	9	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	230					
pX, platoon unblocked						
vC, conflicting volume			463		836	448
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			463		836	448
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		97	98
cM capacity (veh/h)			1095		304	558

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	463	256	498	18
Volume Left	0	7	0	9
Volume Right	30	0	0	9
cSH	1700	1095	1700	394
Volume to Capacity	0.27	0.01	0.29	0.05
Queue Length 95th (ft)	0	0	0	4
Control Delay (s)	0.0	0.3	0.0	14.6
Lane LOS		A		B
Approach Delay (s)	0.0	0.1		14.6
Approach LOS				B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	32.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	386	27	6	668	19	8	4	8	10	4	39
Future Volume (Veh/h)	60	386	27	6	668	19	8	4	8	10	4	39
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	67	429	30	7	742	21	9	4	9	11	4	43
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		230										
pX, platoon unblocked												
vC, conflicting volume	763			459			1008	1355	444	1356	1360	382
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	763			459			1008	1355	444	1356	1360	382
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			99			95	97	98	89	97	93
cM capacity (veh/h)	845			1098			166	136	561	97	135	616

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	526	378	392	22	58
Volume Left	67	7	0	9	11
Volume Right	30	0	21	9	43
cSH	845	1098	1700	220	273
Volume to Capacity	0.08	0.01	0.23	0.10	0.21
Queue Length 95th (ft)	6	0	0	8	20
Control Delay (s)	2.1	0.2	0.0	23.1	21.7
Lane LOS	A	A		C	C
Approach Delay (s)	2.1	0.1		23.1	21.7
Approach LOS				C	C

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	58.0%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	633	39	11	500	44	19
Future Volume (Veh/h)	633	39	11	500	44	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	703	43	12	556	49	21
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	230					
pX, platoon unblocked						
vC, conflicting volume			746		1026	724
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			746		1026	724
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		78	94
cM capacity (veh/h)			858		227	368

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	746	197	371	70
Volume Left	0	12	0	49
Volume Right	43	0	0	21
cSH	1700	858	1700	257
Volume to Capacity	0.44	0.01	0.22	0.27
Queue Length 95th (ft)	0	1	0	27
Control Delay (s)	0.0	0.7	0.0	24.2
Lane LOS		A		C
Approach Delay (s)	0.0	0.2		24.2
Approach LOS				C

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	659	41	11	520	46	20
Future Volume (Veh/h)	659	41	11	520	46	20
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	732	46	12	578	51	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	230					
pX, platoon unblocked						
vC, conflicting volume			778		1068	755
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			778		1068	755
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		76	94
cM capacity (veh/h)			834		214	351

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	778	205	385	73
Volume Left	0	12	0	51
Volume Right	46	0	0	22
cSH	1700	834	1700	242
Volume to Capacity	0.46	0.01	0.23	0.30
Queue Length 95th (ft)	0	1	0	31
Control Delay (s)	0.0	0.7	0.0	26.2
Lane LOS		A		D
Approach Delay (s)	0.0	0.2		26.2
Approach LOS				D

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	47.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	641	41	11	503	32	46	4	20	29	4	78
Future Volume (Veh/h)	72	641	41	11	503	32	46	4	20	29	4	78
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	80	712	46	12	559	36	51	4	22	32	4	87
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		230										
pX, platoon unblocked												
vC, conflicting volume	595			758			1288	1514	735	1520	1519	298
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	595			758			1288	1514	735	1520	1519	298
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			99			47	96	94	54	96	88
cM capacity (veh/h)	977			849			96	107	362	69	107	699

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	838	292	316	77	123
Volume Left	80	12	0	51	32
Volume Right	46	0	36	22	87
cSH	977	849	1700	122	196
Volume to Capacity	0.08	0.01	0.19	0.63	0.63
Queue Length 95th (ft)	7	1	0	81	90
Control Delay (s)	2.1	0.5	0.0	75.1	49.9
Lane LOS	A	A		F	E
Approach Delay (s)	2.1	0.3		75.1	49.9
Approach LOS				F	E

Intersection Summary			
Average Delay	8.4		
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

APPENDIX J

WASHAM POTTS ROAD AND DAYCARE DRIVEWAY / SITE DRIVE 2

SYNCHRO REPORTS

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	26	26	121	29	29	302
Future Volume (Veh/h)	26	26	121	29	29	302
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	29	29	134	32	32	336
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	550	150			166	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	550	150			166	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	97			98	
cM capacity (veh/h)	485	896			1412	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	58	166	368
Volume Left	29	0	32
Volume Right	29	32	0
cSH	629	1700	1412
Volume to Capacity	0.09	0.10	0.02
Queue Length 95th (ft)	8	0	2
Control Delay (s)	11.3	0.0	0.9
Lane LOS	B		A
Approach Delay (s)	11.3	0.0	0.9
Approach LOS	B		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	39.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	27	27	126	30	30	314
Future Volume (Veh/h)	27	27	126	30	30	314
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	30	30	140	33	33	349
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	572	156			173	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	572	156			173	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	97			98	
cM capacity (veh/h)	471	889			1404	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	60	173	382
Volume Left	30	0	33
Volume Right	30	33	0
cSH	615	1700	1404
Volume to Capacity	0.10	0.10	0.02
Queue Length 95th (ft)	8	0	2
Control Delay (s)	11.5	0.0	0.9
Lane LOS	B		A
Approach Delay (s)	11.5	0.0	0.9
Approach LOS	B		

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	40.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	4	5	27	4	27	2	124	30	30	312	32
Future Volume (Veh/h)	21	4	5	27	4	27	2	124	30	30	312	32
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	23	4	6	30	4	30	2	138	33	33	347	36
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	622	606	365	598	608	154	383			171		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	622	606	365	598	608	154	383			171		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	99	99	92	99	97	100			98		
cM capacity (veh/h)	376	401	680	400	400	891	1175			1406		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	33	64	173	416
Volume Left	23	30	2	33
Volume Right	6	30	33	36
cSH	412	539	1175	1406
Volume to Capacity	0.08	0.12	0.00	0.02
Queue Length 95th (ft)	6	10	0	2
Control Delay (s)	14.5	12.6	0.1	0.8
Lane LOS	B	B	A	A
Approach Delay (s)	14.5	12.6	0.1	0.8
Approach LOS	B	B		

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	30	29	284	26	26	132
Future Volume (Veh/h)	30	29	284	26	26	132
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	33	32	316	29	29	147
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	536	330			345	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	536	330			345	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	95			98	
cM capacity (veh/h)	494	711			1214	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	65	345	176
Volume Left	33	0	29
Volume Right	32	29	0
cSH	581	1700	1214
Volume to Capacity	0.11	0.20	0.02
Queue Length 95th (ft)	9	0	2
Control Delay (s)	12.0	0.0	1.5
Lane LOS	B		A
Approach Delay (s)	12.0	0.0	1.5
Approach LOS	B		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	38.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	31	30	295	27	27	137
Future Volume (Veh/h)	31	30	295	27	27	137
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	34	33	328	30	30	152
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	555	343			358	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	555	343			358	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	95			98	
cM capacity (veh/h)	480	700			1201	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	67	358	182
Volume Left	34	0	30
Volume Right	33	30	0
cSH	568	1700	1201
Volume to Capacity	0.12	0.21	0.02
Queue Length 95th (ft)	10	0	2
Control Delay (s)	12.2	0.0	1.5
Lane LOS	B		A
Approach Delay (s)	12.2	0.0	1.5
Approach LOS	B		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	39.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	41	4	14	31	4	30	8	287	27	27	129	38
Future Volume (Veh/h)	41	4	14	31	4	30	8	287	27	27	129	38
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	46	4	16	34	4	33	9	319	30	30	143	42
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	611	591	164	594	597	334	185			349		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	611	591	164	594	597	334	185			349		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	88	99	98	91	99	95	99			98		
cM capacity (veh/h)	375	407	881	396	403	708	1390			1210		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	66	71	358	215
Volume Left	46	34	9	30
Volume Right	16	33	30	42
cSH	438	499	1390	1210
Volume to Capacity	0.15	0.14	0.01	0.02
Queue Length 95th (ft)	13	12	0	2
Control Delay (s)	14.7	13.4	0.3	1.3
Lane LOS	B	B	A	A
Approach Delay (s)	14.7	13.4	0.3	1.3
Approach LOS	B	B		

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	35.0%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX K

SIMTRAFFIC REPORTS

Intersection: 1: US 21 & Bailey Road

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	R	T	R	L	T
Maximum Queue (ft)	160	125	369	193	225	667
Average Queue (ft)	153	56	195	44	120	338
95th Queue (ft)	167	111	324	154	247	598
Link Distance (ft)	149	149	718			2285
Upstream Blk Time (%)	34	0				
Queuing Penalty (veh)	115	0				
Storage Bay Dist (ft)				150	100	
Storage Blk Time (%)			16		6	32
Queuing Penalty (veh)			43		50	49

Intersection: 2: US 21 & Westmoreland Road

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	L	TR	L	TR
Maximum Queue (ft)	806	225	185	234	234	304	199	789
Average Queue (ft)	294	170	81	119	131	155	37	511
95th Queue (ft)	669	278	146	203	226	272	152	793
Link Distance (ft)	1153			1206		2285		1564
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		100	200		150		110	
Storage Blk Time (%)	49	21	0	1	4	9		65
Queuing Penalty (veh)	174	60	1	2	17	21		15

Intersection: 3: Washam Potts Road & Westmoreland Road

Movement	EB	EB	NB	SB
Directions Served	L	R	LT	TR
Maximum Queue (ft)	170	191	212	52
Average Queue (ft)	80	31	59	9
95th Queue (ft)	160	133	135	32
Link Distance (ft)		1206	993	1262
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	140			
Storage Blk Time (%)	7	0		
Queuing Penalty (veh)	2	0		

Intersection: 4: Washam Potts Road & Bailey Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	98	204	43	209
Average Queue (ft)	30	57	10	150
95th Queue (ft)	72	156	33	253
Link Distance (ft)	121	1178	777	198
Upstream Blk Time (%)	0			23
Queuing Penalty (veh)	0			80
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Commercial Driveway & Bailey Road

Movement	EB	WB	WB	NB
Directions Served	TR	LT	T	LR
Maximum Queue (ft)	12	150	138	48
Average Queue (ft)	0	114	13	15
95th Queue (ft)	6	183	76	44
Link Distance (ft)	149	121	121	571
Upstream Blk Time (%)		19	1	
Queuing Penalty (veh)		64	4	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Washam Potts Road & Daycare Driveway

Movement	WB	SB	B16
Directions Served	LR	LT	T
Maximum Queue (ft)	152	476	77
Average Queue (ft)	53	164	11
95th Queue (ft)	155	559	99
Link Distance (ft)	452	695	993
Upstream Blk Time (%)		4	
Queuing Penalty (veh)		17	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 713

Intersection: 1: US 21 & Bailey Road

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	R	T	R	L	T
Maximum Queue (ft)	166	135	483	350	225	758
Average Queue (ft)	154	65	207	55	146	399
95th Queue (ft)	170	121	364	192	264	703
Link Distance (ft)	153	153	718			2285
Upstream Blk Time (%)	36	0				
Queuing Penalty (veh)	129	1				
Storage Bay Dist (ft)				150	100	
Storage Blk Time (%)			17	0	10	36
Queuing Penalty (veh)			49	0	94	65

Intersection: 2: US 21 & Westmoreland Road

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	L	TR	L	TR
Maximum Queue (ft)	990	225	174	234	239	368	199	1532
Average Queue (ft)	555	201	89	131	137	172	41	1122
95th Queue (ft)	1140	282	150	218	237	308	164	1715
Link Distance (ft)	1153			1206		2285		1564
Upstream Blk Time (%)	6							22
Queuing Penalty (veh)	0							0
Storage Bay Dist (ft)		100	200		150		110	
Storage Blk Time (%)	68	32	0	1	6	11		69
Queuing Penalty (veh)	246	95	0	2	27	25		16

Intersection: 3: Washam Potts Road & Westmoreland Road

Movement	EB	EB	NB	SB
Directions Served	L	R	LT	TR
Maximum Queue (ft)	179	251	236	58
Average Queue (ft)	99	72	75	8
95th Queue (ft)	200	301	167	32
Link Distance (ft)		1206	993	1262
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	140			
Storage Blk Time (%)	18			
Queuing Penalty (veh)	6			

Intersection: 4: Washam Potts Road & Bailey Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	118	262	43	222
Average Queue (ft)	36	61	12	161
95th Queue (ft)	91	179	38	261
Link Distance (ft)	115	1178	777	204
Upstream Blk Time (%)	0			21
Queuing Penalty (veh)	1			74
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Commercial Driveway/Site Drive 1 & Bailey Road

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (ft)	154	155	120	88	130
Average Queue (ft)	41	112	14	26	44
95th Queue (ft)	114	170	74	80	99
Link Distance (ft)	153	115	115	571	318
Upstream Blk Time (%)	0	19	1		
Queuing Penalty (veh)	1	67	3		
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Washam Potts Road & Site Drive 2/Daycare Driveway

Movement	EB	WB	NB	SB	B16
Directions Served	LTR	LTR	LTR	LTR	T
Maximum Queue (ft)	47	162	12	533	52
Average Queue (ft)	17	47	1	129	4
95th Queue (ft)	42	129	7	497	37
Link Distance (ft)	182	452	204	685	993
Upstream Blk Time (%)				3	
Queuing Penalty (veh)				14	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 917

Intersection: 1: US 21 & Bailey Road

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	R	T	R	L	T
Maximum Queue (ft)	168	140	404	255	324	679
Average Queue (ft)	155	64	204	52	142	334
95th Queue (ft)	168	124	340	154	315	615
Link Distance (ft)	153	153	718			2285
Upstream Blk Time (%)	33	0				
Queuing Penalty (veh)	118	1				
Storage Bay Dist (ft)				150	200	
Storage Blk Time (%)			18	0	0	22
Queuing Penalty (veh)			52	0	3	40

Intersection: 2: US 21 & Westmoreland Road

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	L	TR	L	TR
Maximum Queue (ft)	1010	225	165	234	239	349	199	1582
Average Queue (ft)	502	195	87	129	131	176	39	1129
95th Queue (ft)	1028	284	151	211	232	296	160	1822
Link Distance (ft)	1153			1206		2285		1564
Upstream Blk Time (%)	4							22
Queuing Penalty (veh)	0							0
Storage Bay Dist (ft)		100	200		150		110	
Storage Blk Time (%)	68	30	0	1	6	12		69
Queuing Penalty (veh)	245	90	0	1	27	27		16

Intersection: 3: Washam Potts Road & Westmoreland Road

Movement	EB	EB	NB	SB
Directions Served	L	R	LT	TR
Maximum Queue (ft)	178	245	232	57
Average Queue (ft)	86	43	74	10
95th Queue (ft)	175	191	160	36
Link Distance (ft)		1206	993	1262
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	140			
Storage Blk Time (%)	12			
Queuing Penalty (veh)	4			

Intersection: 4: Washam Potts Road & Bailey Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	126	199	39	222
Average Queue (ft)	37	54	11	140
95th Queue (ft)	94	153	36	242
Link Distance (ft)	115	1178	777	204
Upstream Blk Time (%)	0			16
Queuing Penalty (veh)	2			55
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Commercial Driveway/Site Drive 1 & Bailey Road

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (ft)	152	153	125	78	108
Average Queue (ft)	46	110	15	25	41
95th Queue (ft)	121	172	78	61	87
Link Distance (ft)	153	115	115	571	318
Upstream Blk Time (%)	0	16	1		
Queuing Penalty (veh)	2	56	3		
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Washam Potts Road & Site Drive 2/Daycare Driveway

Movement	EB	WB	NB	SB	B16
Directions Served	LTR	LTR	LTR	LTR	T
Maximum Queue (ft)	66	165	14	420	18
Average Queue (ft)	21	46	1	103	1
95th Queue (ft)	50	139	10	419	13
Link Distance (ft)	182	452	204	685	993
Upstream Blk Time (%)				0	
Queuing Penalty (veh)				2	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 745

Intersection: 1: US 21 & Bailey Road

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	R	T	R	L	T
Maximum Queue (ft)	161	149	594	350	210	289
Average Queue (ft)	138	68	218	99	92	140
95th Queue (ft)	181	128	450	251	177	245
Link Distance (ft)	149	149	718			2285
Upstream Blk Time (%)	13	1	1			
Queuing Penalty (veh)	36	2	0			
Storage Bay Dist (ft)				150	100	
Storage Blk Time (%)			17	0	11	11
Queuing Penalty (veh)			83	2	76	22

Intersection: 2: US 21 & Westmoreland Road

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	L	TR	L	TR
Maximum Queue (ft)	1205	225	161	281	240	505	200	1613
Average Queue (ft)	931	216	52	168	169	178	133	1510
95th Queue (ft)	1516	279	111	259	258	379	276	1928
Link Distance (ft)	1153			1206		2285		1564
Upstream Blk Time (%)	50							81
Queuing Penalty (veh)	0							0
Storage Bay Dist (ft)		100	200		150		110	
Storage Blk Time (%)	86	19		5	18	6	0	75
Queuing Penalty (veh)	280	51		4	67	21	2	70

Intersection: 3: Washam Potts Road & Westmoreland Road

Movement	EB	EB	NB	SB
Directions Served	L	R	LT	TR
Maximum Queue (ft)	191	140	159	24
Average Queue (ft)	83	21	40	3
95th Queue (ft)	166	99	108	15
Link Distance (ft)		1206	993	1262
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	140			
Storage Blk Time (%)	5			
Queuing Penalty (veh)	1			

Intersection: 4: Washam Potts Road & Bailey Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	132	119	52	141
Average Queue (ft)	67	11	17	57
95th Queue (ft)	127	57	43	114
Link Distance (ft)	121	1178	777	198
Upstream Blk Time (%)	1			0
Queuing Penalty (veh)	6			0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Commercial Driveway & Bailey Road

Movement	EB	WB	WB	NB
Directions Served	TR	LT	T	LR
Maximum Queue (ft)	142	141	40	103
Average Queue (ft)	13	43	3	42
95th Queue (ft)	70	119	24	81
Link Distance (ft)	149	121	121	571
Upstream Blk Time (%)	0	2	0	
Queuing Penalty (veh)	1	4	0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Washam Potts Road & Daycare Driveway

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	71	57
Average Queue (ft)	29	7
95th Queue (ft)	55	33
Link Distance (ft)	452	695
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 728

Intersection: 1: US 21 & Bailey Road

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	R	T	R	L	T
Maximum Queue (ft)	162	156	743	350	215	288
Average Queue (ft)	147	79	276	135	100	140
95th Queue (ft)	178	142	530	331	175	248
Link Distance (ft)	153	153	718			2285
Upstream Blk Time (%)	19	1	1			
Queuing Penalty (veh)	59	3	0			
Storage Bay Dist (ft)				150	100	
Storage Blk Time (%)			26	1	11	10
Queuing Penalty (veh)			134	6	75	24

Intersection: 2: US 21 & Westmoreland Road

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	L	TR	L	TR
Maximum Queue (ft)	1201	225	156	316	240	542	200	1618
Average Queue (ft)	1141	220	51	161	196	249	135	1550
95th Queue (ft)	1316	269	118	265	277	489	274	1752
Link Distance (ft)	1153			1206		2285		1564
Upstream Blk Time (%)	76							85
Queuing Penalty (veh)	0							0
Storage Bay Dist (ft)		100	200		150		110	
Storage Blk Time (%)	89	21		4	27	9	0	75
Queuing Penalty (veh)	298	57		4	107	33	2	70

Intersection: 3: Washam Potts Road & Westmoreland Road

Movement	EB	EB	NB	SB
Directions Served	L	R	LT	TR
Maximum Queue (ft)	198	265	168	30
Average Queue (ft)	95	39	50	4
95th Queue (ft)	191	163	119	18
Link Distance (ft)		1206	993	1262
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	140			
Storage Blk Time (%)	11			
Queuing Penalty (veh)	4			

Intersection: 4: Washam Potts Road & Bailey Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	132	121	61	162
Average Queue (ft)	71	13	18	68
95th Queue (ft)	132	74	47	144
Link Distance (ft)	115	1178	777	204
Upstream Blk Time (%)	2			1
Queuing Penalty (veh)	14			2
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Commercial Driveway/Site Drive 1 & Bailey Road

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (ft)	163	136	81	140	181
Average Queue (ft)	56	57	5	58	67
95th Queue (ft)	140	130	38	122	145
Link Distance (ft)	153	115	115	571	318
Upstream Blk Time (%)	1	3	0		0
Queuing Penalty (veh)	7	9	0		0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Washam Potts Road & Site Drive 2/Daycare Driveway

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	62	91	12	74
Average Queue (ft)	25	34	1	8
95th Queue (ft)	48	65	7	48
Link Distance (ft)	182	452	204	685
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 908

Intersection: 1: US 21 & Bailey Road

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	R	T	R	L	T
Maximum Queue (ft)	168	157	537	350	205	262
Average Queue (ft)	145	79	252	126	95	125
95th Queue (ft)	181	142	445	300	158	225
Link Distance (ft)	153	153	718			2285
Upstream Blk Time (%)	17	1	0			
Queuing Penalty (veh)	53	3	0			
Storage Bay Dist (ft)				150	200	
Storage Blk Time (%)			24	1	0	1
Queuing Penalty (veh)			126	8	2	3

Intersection: 2: US 21 & Westmoreland Road

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	L	TR	L	TR	L	TR
Maximum Queue (ft)	1201	225	198	318	239	482	200	1618
Average Queue (ft)	1104	215	60	185	184	215	120	1550
95th Queue (ft)	1425	288	150	298	270	410	266	1787
Link Distance (ft)	1153			1206		2285		1564
Upstream Blk Time (%)	69							86
Queuing Penalty (veh)	0							0
Storage Bay Dist (ft)		100	200		150		110	
Storage Blk Time (%)	88	21		7	23	9	0	75
Queuing Penalty (veh)	296	58		6	93	32	1	70

Intersection: 3: Washam Potts Road & Westmoreland Road

Movement	EB	EB	NB	SB
Directions Served	L	R	LT	TR
Maximum Queue (ft)	199	293	182	37
Average Queue (ft)	108	52	57	4
95th Queue (ft)	204	221	133	22
Link Distance (ft)		1206	993	1262
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	140			
Storage Blk Time (%)	15			
Queuing Penalty (veh)	5			

Intersection: 4: Washam Potts Road & Bailey Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	131	76	57	189
Average Queue (ft)	69	11	17	68
95th Queue (ft)	131	50	47	141
Link Distance (ft)	115	1178	777	204
Upstream Blk Time (%)	2			2
Queuing Penalty (veh)	15			3
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Commercial Driveway/Site Drive 1 & Bailey Road

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	TR	LTR	LTR
Maximum Queue (ft)	163	139	86	170	237
Average Queue (ft)	61	59	6	68	86
95th Queue (ft)	149	135	44	149	203
Link Distance (ft)	153	115	115	571	318
Upstream Blk Time (%)	1	3	0		1
Queuing Penalty (veh)	6	8	0		0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Washam Potts Road & Site Drive 2/Daycare Driveway

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	58	87	28	81
Average Queue (ft)	27	33	2	9
95th Queue (ft)	47	60	14	52
Link Distance (ft)	182	452	204	685
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 786