TRAFFIC IMPACT ANALYSIS

For

THE BELLAMY AT WESTERN CAROLINA

LOCATED IN
CULLOWHEE, NORTH CAROLINA

Prepared For:
Mallory & Evans Development, LLC
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May 2017

JMT Project 0683

Table of Contents

INTRODUCTION AND BACKGROUND

This report summarizes the findings of the Traffic Impact Analysis (TIA) that was performed for a 97-unit (388-bedroom) apartment complex proposed in Cullowhee, North Carolina near the campus of Western Carolina University (WCU). (*Figures 1 & 2)* The purpose of this study is to determine the impact of the anticipated traffic associated with this development including trip generation, trip distribution, intersection delay, vehicle queue, and intersection capacity. Each of these aspects will be analyzed to determine any potential adverse traffic impacts on the adjacent roadway network from the proposed development.

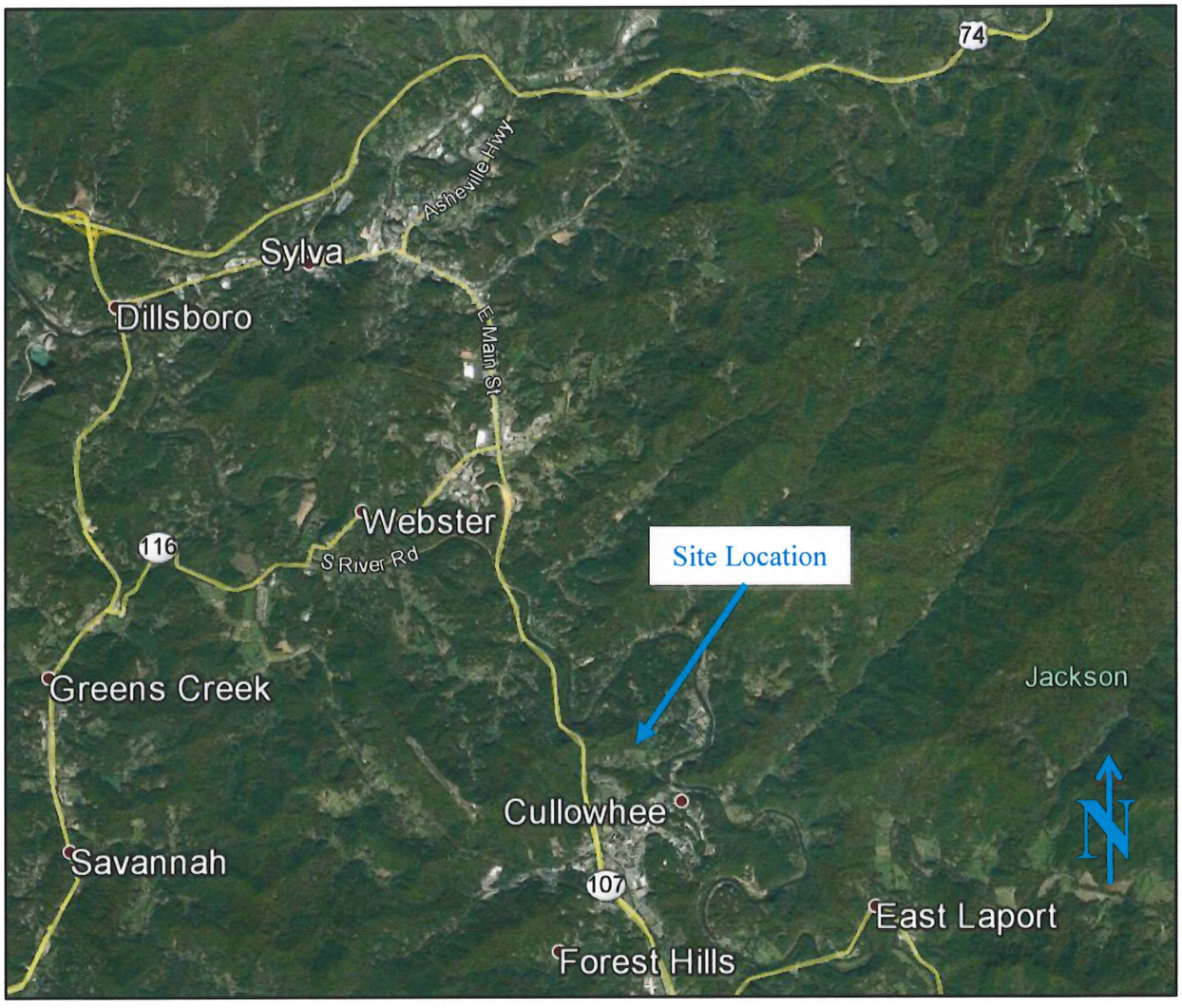


FIGURE 1 – REGION OF PROPOSED SITE LOCATION

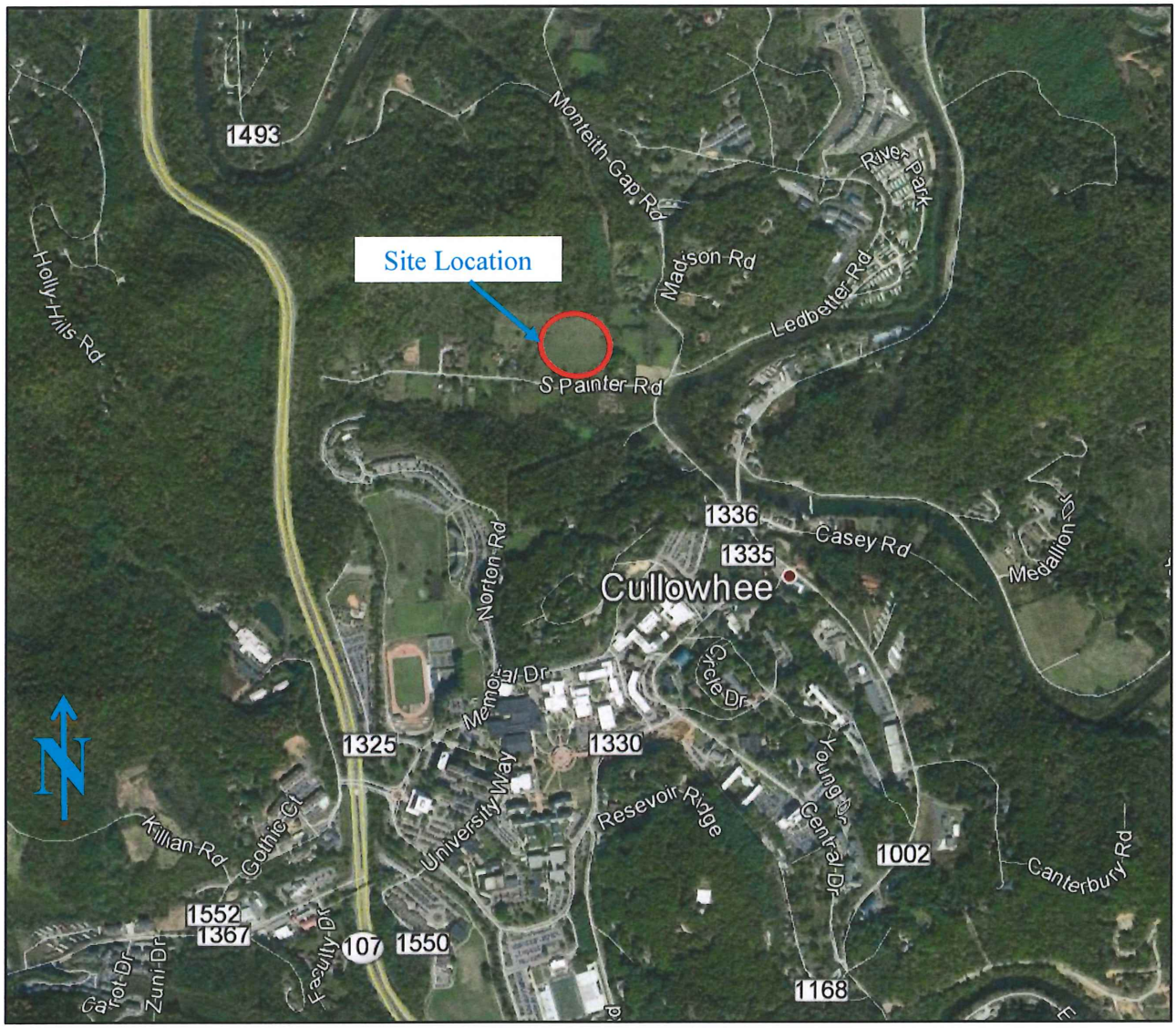


FIGURE 2 – PROPOSED SITE LOCATION

PROPOSED SITE USE AND ACCESS

The site plan consists of a 97-unit (388-bedroom) apartment complex targeted specifically for the student population at WCU. The proposed apartment complex will be rented out by the individual bedroom instead of individual units. The proposed site will have one (1) full-movement access location and one (1) full movement gated service access along S. Painter Road. *Figure 3* shows the proposed site layout of the development. A full size, to scale site plan can be found in *Appendix A.*

FIGURE 3 – Site Pan
(Site Plan Provided by Lofquist & Associates, Inc.)

PARAMETERS AND STUDY AREA

As determined through discussions with North Carolina Department of Transportation (NCDOT) officials and engineering judgment, the study area of this TIA includes:

- S. Painter Road (SR 1338) @ Monteith Gap Road (SR 1336) – Un-Signalized
- Proposed Site Access Location @ S. Painter Road – Un-signalized

Peak hour turning movement counts (7:00 – 9:00 AM & 4:00 – 6:00 PM) were obtained at the existing studied intersection. AM and PM peak hours were determined between the AM and PM peak periods. AM and PM peak hours for each intersection were analyzed for existing, background, and full build-out traffic conditions (2018).

The AM and PM peak hours for the studied intersection are as follows:

- S. Painter Road @ Monteith Gap Road
    - AM Peak Hour – 8:00 AM – 9:00 AM || PM Peak Hour – 5:00 PM – 6:00 PM

Other parameters include:

- Background Traffic Growth Factor of 2% per year
    - NCDOT approved growth factor
- Peak Hour Factor of 0.90 for projected conditions

SURROUNDING LAND USES

Western Carolina University (WCU), a major university of approximately 10,000 students, is located south of the proposed site. The immediate area surrounding the proposed site consists of university student apartments and single family residential units consisting of predominately students and faculty, as well as a community garden, undeveloped land, and flood plain.

SURROUNDING ROADWAYS

According to NCDOT's Online GIS, Monteith Gap Road is classified as a local road. Monteith Gap Road is a two-lane road with a posted speed limit of 25 mph within the vicinity of the proposed development. According to NCDOT data, the Average Annual Daily Traffic (AADT) on Monteith Gap Road within the vicinity of the proposed development was 4,000 vehicles per day (vpd) in 2014.

NCDOT's Online GIS classifies S. Painter Road as a local load. S. Painter Road is a two-lane road with a posted speed limit of 25 mph within the vicinity of the proposed development. NCDOT does not currently have any available AADT data along S. Painter Road.

NCDOT is currently working on a bridge replacement project (TIP Project B-4159 Bridge No. 108) over the Tuckasegee River on Old Cullowhee Road. As part of this bridge replacement project, the intersection geometry at the intersection of Monteith Gap Road @ Old Cullowhee Road will be realigned into a standard "T-type" intersection. NCDOT officials have confirmed this intersection will be converted from stop-control to a signalized intersection as part of the TIP Project B-4159.

EXISTING TRAFFIC

In order to determine existing traffic, peak period turning movement counts were conducted at the existing intersection listed above. The peak hours were identified from the peak periods and the existing peak hour volumes are shown in *Figure 4*. The existing turning movement counts can be found in *Appendix B*.

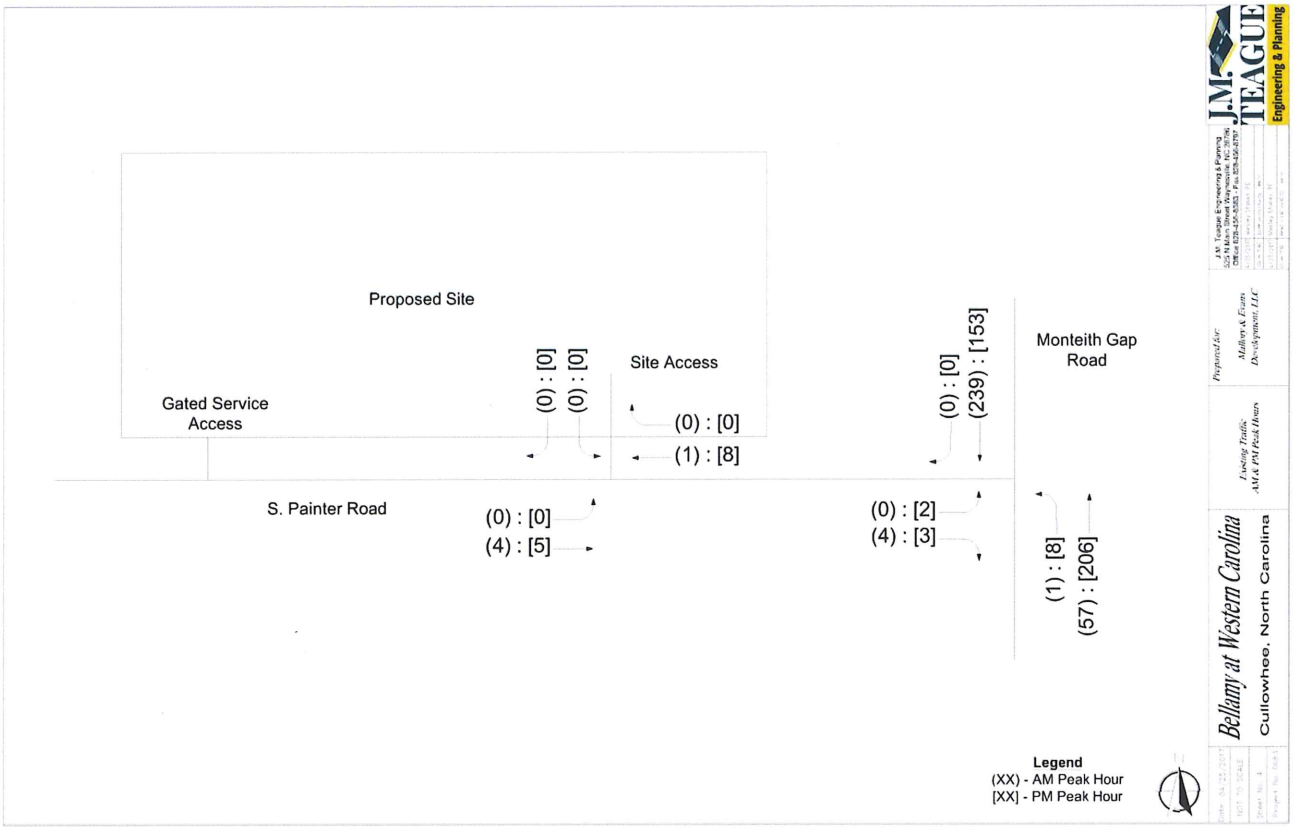


FIGURE 4 – EXISTING AM AND PM PEAK HOUR TRAFFIC

BACKGROUND TRAFFIC

Background traffic is defined as the traffic that would be at the studied intersections at the time of anticipated project completion (build-out), without the proposed development. Background traffic is comprised of existing traffic and any increase or decrease in volumes which might occur from general growth trends in the surrounding area or from nearby specific developments. It also assumes no significant roadway geometric changes from the existing condition scenario. Per NCDOT approval, a 2% background traffic growth factor was utilized for this study. The anticipated project completion year (build-out) is 2018 and the anticipated background traffic is shown in *Figure 5.* The complete background turning movement counts can be found in *Appendix B.*

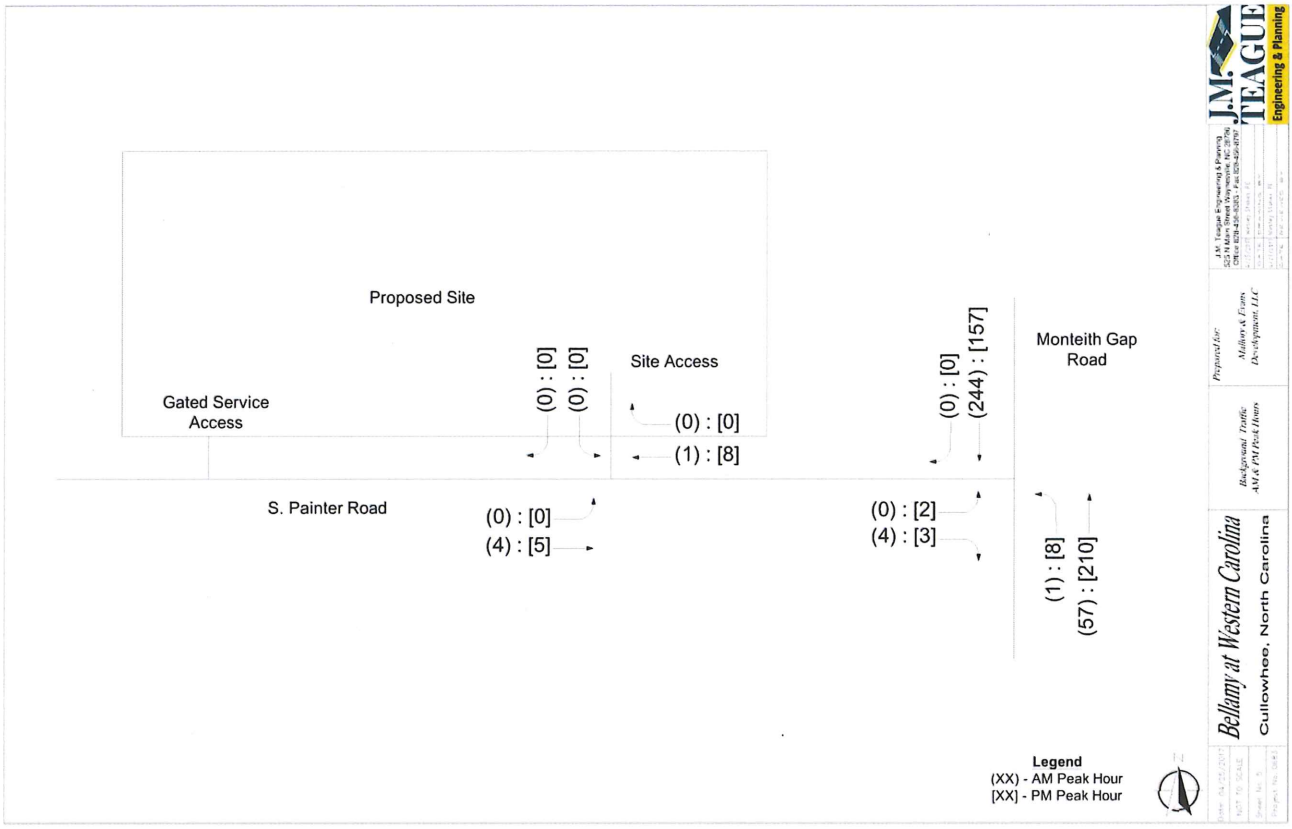


FIGURE 5 – BACKGROUND AM AND PM PEAK HOUR TRAFFIC

TRIP DISTRIBUTION

The trip distribution for this development was estimated from the existing traffic volume patterns within the surrounding roadway network, the surrounding population densities, the location of the proposed development, and engineering judgment. Trip distribution percentages can be seen in *Figure* 6.

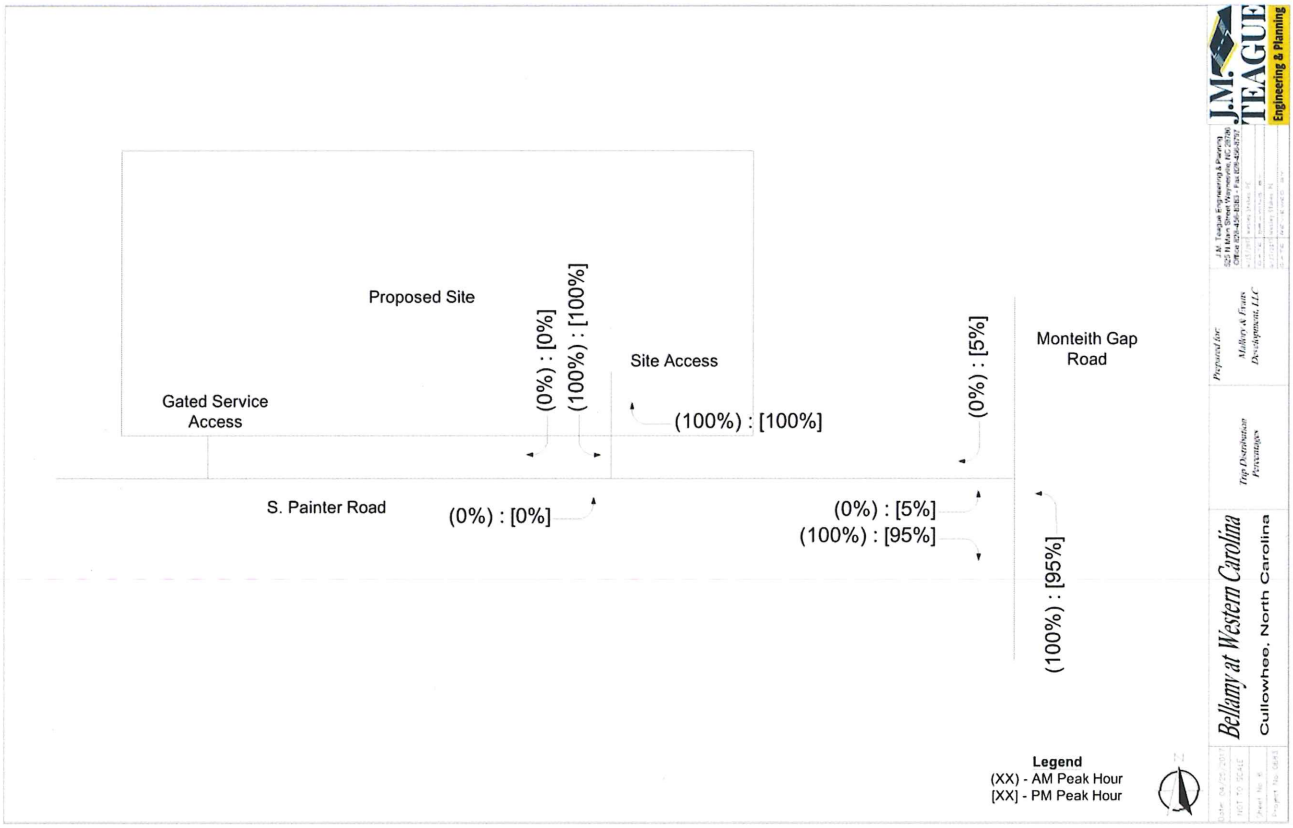


FIGURE 6 – TRIP DISTRIBUTION PERCENTAGES

TRIP GENERATION

The latest edition (9th) of the Trip Generation Manual published by the Institute of Transportation Engineers (ITE) was used as a baseline to determine site generated traffic. The proposed development is similar to the characteristics for ITE's Land Use Code 220 – Apartment. According to ITE's Trip Generation manual, "Apartments are rental dwelling units located within the same building with at least three other dwelling units." The proposed development will differ from a normal apartment complex since this complex will be rented by individual bedrooms instead of by dwelling units and be marketed towards students at WCU – creating a student-oriented housing development.

Although student-oriented housing is similar to apartment developments due to the high density of residents, there is typically relatively lower trip generation due to the fact that many trips are close to campus amenities and can be traveled by alternative modes of transportation such as walking, biking, and public transportation. By choosing alternative modes of transportation, the overall peak hour vehicle trips can be reduced and create less of an impact on the surrounding roadway network.

For the purposes of determining trip generation for this specific apartment complex, ITE Land Use Code 220 – Apartments was utilized due to the similar characteristics between apartments and student housing. Trip generation volumes were calculated utilizing individual beds (persons) since the proposed apartment complex will be rented by the bedroom instead of by dwelling unit.

The ITE rates for weekday total, AM peak hour, and PM peak hour are as follows:

- Weekday Rate
  - Rate = 3.31
- AM Peak Hour Rate – "Persons" (Beds)
  - Rate = 0.28 : 20% Entering / 80% Exiting
- PM Peak Hour Rate – "Persons" (Beds)
  - Rate = 0.40 : 65% Entering / 35% Exiting

Current development plans indicate a future desire to provide a transit stop for WCU's shuttle service to service the proposed development. For the purposes of this study, no alternative travel mode trip reductions were assumed. If WCU's shuttle service provides service to this development in the future, peak hour trips could be reduced and the development's overall impact to the surrounding roadway network could be reduced. The typical weekday trip generation volumes are shown in *Table 1.*

ITE Land Use Code 220 – Apartment	Size	Unit	ADT (vpd)	AM Peak (vph)		PM Peak (vph)	
				IN	OUT	IN	OUT
	388	Persons/Beds	1,285	22	87	101	54

Table 1 – Typical Weekday Trip Generation

Trip assignments were distributed using the percentages found in *Figure 6* and shown as AM & PM Peak Hour ingress and egress site generated trips in *Figure 7.*

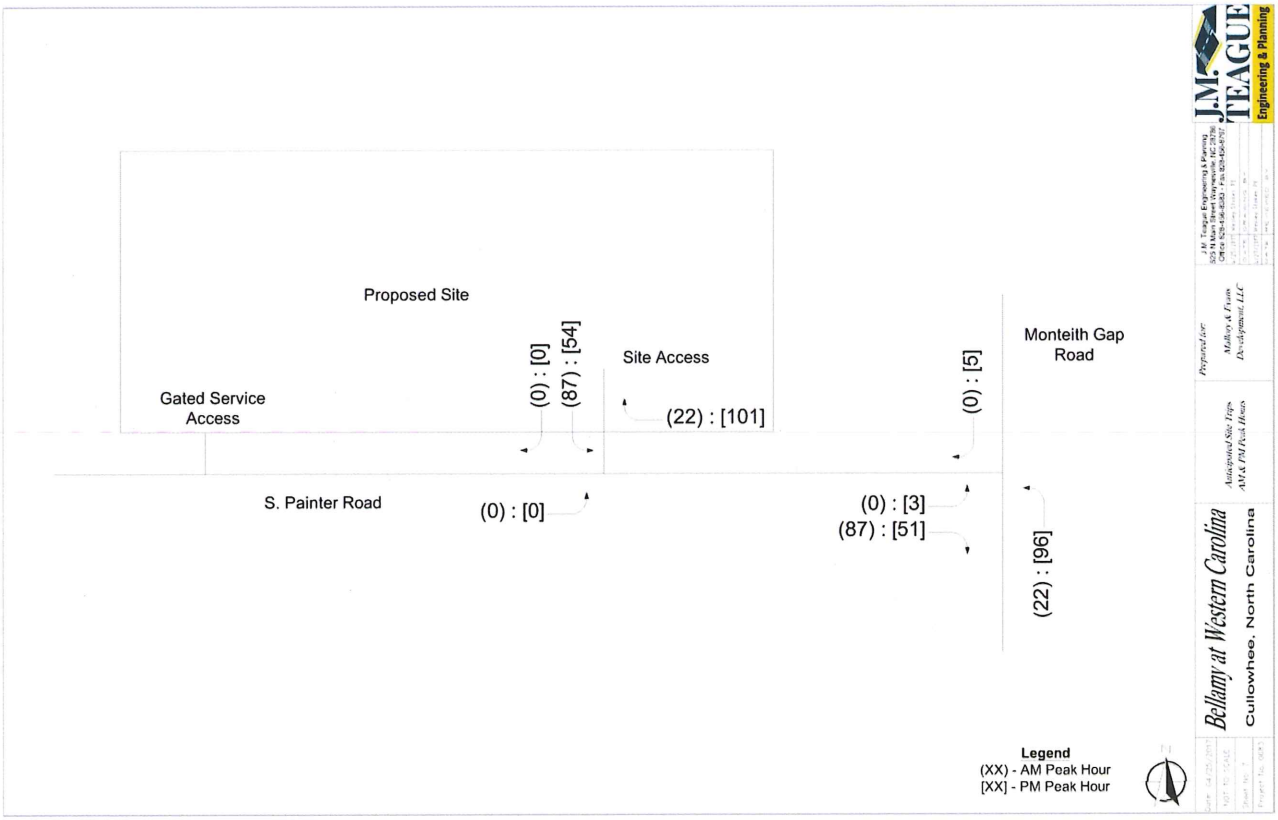


FIGURE 7 – ANTICIPATED SITE TRIPS – AM AND PM PEAK HOUR

BUILD-OUT TRAFFIC

Build-out traffic is defined as the total traffic volume that will be present on the surrounding roadway network at the time of project completion and full occupancy. This time is projected to be 2018. Build-out traffic was calculated by adding the background traffic and site traffic. *Figure 8* shows the anticipated build-out AM & PM Peak Hour traffic.

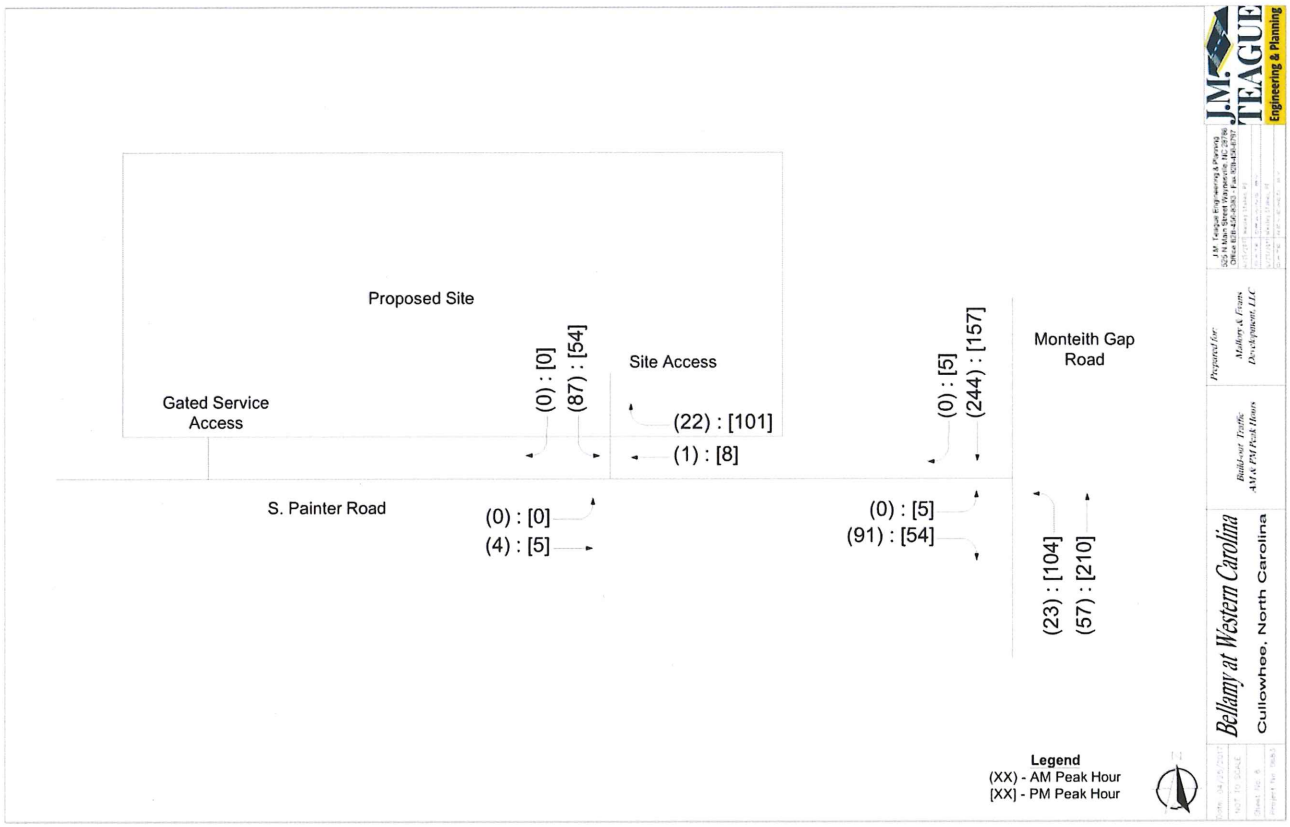


FIGURE 8 – BUILD-OUT AM AND PM PEAK HOUR TRAFFIC

METHOD OF ANALYSIS

The studied intersections were analyzed using Synchro. Synchro is a specialized software package that allows the user to model and simulate intersections and roadway networks to determine levels of service (LOS), based on the thresholds specified in the Highway Capacity Manual (HCM) published by the Transportation Research Board. Synchro also provides analysis of capacity, vehicle delay, volume to capacity ratio (v/c), queue lengths, traffic signal timing, and vehicle flow rate.

The HCM defines capacity as "the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point during a given time period under prevailing roadway, traffic, and control conditions". LOS is a term used to represent different driving conditions, primarily with respect to traffic congestion. It is defined as a "qualitative measure describing operational and perceptional conditions within a traffic stream". LOS "A" represents free flow traffic conditions with no congestion. LOS "F" represents severely impacted traffic flow due to vehicle congestion. LOS is generally determined by the total "Control Delay" experienced by drivers. Control delay is vehicle delay that is ultimately caused by the traffic control device. This includes deceleration delay, queue move-up time delay, stopped delay, and acceleration delay. (*Table 2)*

HIGHWAY CAPACITY MANUAL
LEVEL OF SERVICE AND DELAY

UN-SIGNALIZED 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

<Table 2>

The peak hour analysis for un-signalized intersections can project very high delays on the side street, thus it is recommended to use LOS measurements as a comparative tool rather than a design tool. The 95th Queue is defined to be the vehicle queue (back-up) that has only a 5% probability of being exceeded during the analysis period. At un-signalized intersections, p0 is the probability of a queue free state.

ANALYSIS OF EXISTING CONDITIONS

The analysis for existing conditions was based on methodology presented in NCDOT's *Congestion Management Capacity Analysis Guidelines.* In order to estimate the existing LOS, delay, v/c ratio, and queue at the study intersections, the existing traffic volumes from the AM & PM peak hours were analyzed using existing lane configurations and traffic control conditions. *(Table 3)* Since existing turning movement count data was collected, the existing peak hour factor (PHF) was utilized for analyzing existing conditions.

In accordance with NCDOT's *Congestion Management Capacity Analysis Guidelines,* zero volume movements were increased to four (4) vehicles per hour to prevent Synchro from incorrectly calculating one or more movements as being prohibited. The capacity analysis (Synchro Reports) for the existing conditions can be found in *Appendix C.* The estimated delay was field verified and found to generally coincide with the Synchro calculations.

S. PAINTER ROAD @ MONTEITH GAP ROAD
ANALYSIS OF EXISTING AM/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR			PM PEAK HOUR		
	Queue Free Percent (%)	LOS and Delay (sec)	V/C Ratio	Queue Free Percent (%)	LOS and Delay (sec)	V/C Ratio
Eastbound	99	B 10.7	0.02	99	A 9.9	0.02
Northbound	100	A 0.1	0.01	99	A 0.3	0.02
Southbound	100	A 0.0	0.21	100	A 0.0	0.10

<Table 3>

ANALYSIS OF BACKGROUND TRAFFIC CONDITIONS

The analysis for background conditions was based on methodology presented in NCDOT's *Congestion Management Capacity Analysis Guidelines.* In order to estimate the background LOS, delay, v/c ratio, and queue at the study intersections, the existing traffic volumes from the AM & PM peak hours were analyzed using existing lane configurations and traffic control conditions. *(Table 4)* A PHF of 0.90 was utilized for all background conditions.

In accordance with NCDOT's *Congestion Management Capacity Analysis Guidelines,* zero volume movements were increased to four (4) vehicles per hour to prevent Synchro from incorrectly calculating one or more movements as being prohibited. The capacity analysis (Synchro Reports) for the background conditions can be found in *Appendix C.*

S. PAINTER ROAD @ MONTEITH GAP ROAD
ANALYSIS OF BACKGROUND AM/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR			PM PEAK HOUR		
	Queue Free Percent (%)	LOS and Delay (sec)	V/C Ratio	Queue Free Percent (%)	LOS and Delay (sec)	V/C Ratio
Eastbound	99	B 10.1	0.01	100	A 10.0	0.01
Northbound	100	A 0.1	0.01	99	A 0.3	0.01
Southbound	100	A 0.0	0.16	100	A 0.0	0.10

<Table 4>

ANALYSIS OF BUILD-OUT TRAFFIC CONDITIONS

The analysis for build-out conditions was based on methodology presented in NCDOT's *Congestion Management Capacity Analysis Guidelines.* In order to estimate the background LOS, delay, v/c ratio, and queue at the study intersections, the existing traffic volumes from the AM & PM peak hours were analyzed using existing lane configurations and traffic control conditions. *(Tables 5 – 6)* A PHF of 0.90 was utilized for all build-out conditions.

In accordance with NCDOT's *Congestion Management Capacity Analysis Guidelines,* zero volume movements were increased to four (4) vehicles per hour to prevent Synchro from incorrectly calculating one or more movements as being prohibited. The capacity analysis (Synchro Reports) for the build-out conditions can be found in *Appendix C.*

S. PAINTER ROAD @ MONTEITH GAP ROAD
ANALYSIS OF BUILD-OUT AM/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR			PM PEAK HOUR		
	Queue Free Percent (%)	LOS and Delay (sec)	V/C Ratio	Queue Free Percent (%)	LOS and Delay (sec)	V/C Ratio
Eastbound	87	B 10.5	0.14	93	A 10.0	0.08
Northbound	98	A 2.4	0.02	92	A 3.1	0.08
Southbound	100	A 0.0	0.16	100	A 0.0	0.11

<Table 5>

PROPOSED SITE ACCESS @ S. PAINTER ROAD
ANALYSIS OF BUILD-OUT AM/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR			PM PEAK HOUR		
	Queue Free Percent (%)	LOS and Delay (sec)	V/C Ratio	Queue Free Percent (%)	LOS and Delay (sec)	V/C Ratio
Eastbound	100	A 0.0	0.01	100	A 0.0	0.01
Westbound	100	A 0.0	0.01	100	A 0.0	0.07
Southbound	90	A 9.0	0.10	94	A 9.1	0.06

<Table 6>

CONCLUSIONS AND RECOMMENDATIONS

The mitigation recommendations at each of the studied intersections were based on NCDOT's *Policy on Street and Driveway Access to North Carolina Highways* (Driveway Manual) methodology / mitigation threshold requirements and engineering judgement.

According to NCDOT, mitigation improvements are required to the studied roadway network if at least one of the following conditions exists when comparing base network conditions to project build-out conditions:

- Average intersection or approach delay increases by 25% or greater while maintaining same LOS,
- LOS degrades by at least one level
- LOS is F

S. Painter Road @ Monteith Gap Road:

Based on HCM and NCDOT guidance, "*LOS for un-signalized intersections is not defined as a whole and should only be reported for individual stop-controlled or yield movements.*" As a result, the free-flow movements / approaches were not utilized when comparing background conditions to build-out conditions. As can be seen in *Table 7*, the difference in LOS, delay, v/c ratio, and queue between background traffic and the anticipated trips generated by the project is only minimally increased for the eastbound and northbound approaches during the AM and PM peak hours.

S. PAINTER ROAD @ MONTEITH GAP ROAD
COMPARISON OF BACKGROUND VS BUILD-OUT PEAK HOUR TRAFFIC CONDITIONS

Approach	Peak Hour	Background			Build-out			Delay Increase %
		LOS	Delay	V/C	LOS	Delay	V/C	
Eastbound (*Painter*)	AM	B	10.1	0.01	B	10.5	0.14	4%
	PM	A	10.0	0.01	A	10.0	0.08	0%
Northbound (*Monteith Gap*)	AM	A	0.1	0.01	A	2.4	0.02	2,400%
	PM	A	0.3	0.01	A	3.1	0.08	1,033%
Southbound (*Monteith Gap*)	AM	A	0.0	0.16	A	0.0	0.16	0%
	PM	A	0.0	0.10	A	0.0	0.11	0%

<Table 7>

During the AM and PM peak hours, the northbound approach experiences a delay increase percentage beyond NCDOT thresholds. However, the increase in delay equates to a 2.3 second delay increase in the AM peak hour and 2.8 second delay increase in the PM peak hour while maintaining a LOS A operation.

Even though the northbound approach is beyond NCDOT delay increase percentage thresholds, LOS A operation is acceptable operation at an un-signalized intersection, especially under peak hour conditions. This increase in delay is not anticipated to negatively affect intersection operation for the northbound approach during the AM and PM peak hours.

From a capacity analysis standpoint, LOS A is acceptable operation for the northbound approach during a peak hour. However, as a secondary analysis, turn lane warrants were studied at this intersection. The NCDOT "*Warrant for Left and Right-Turn Lanes*" chart was utilized to determine potential turn lane storage length requirements for the northbound approach.

The results of the turn lane warrant analysis indicate that a northbound left turn lane is warranted under build-out conditions for the PM peak hour scenario. The left turning volumes compared to the opposing volumes during the PM peak hour are as follows: PM – 104 left turns opposing 162 vehicles. These volumes correspond to a turn lane with 75 feet of storage. It is recommended to install a 75-foot left turn lane on the northbound approach of Monteith Gap Road to accommodate traffic generated by the proposed development. The NCDOT "*Warrant for Left and Right-Turn Lanes*" chart can be found in *Appendix D.*

With the installation of a northbound left turn lane, northbound left turns onto Monteith Gap Road will be able to move out of the northbound through lane. The addition of site generated traffic is not anticipated to degrade general roadway or driver safety at this intersection.

Proposed Site Access @ S. Painter Road:

As can be seen in *Table 8*, the resulting LOS, delay, v/c ratio, and queue are within acceptable levels for the Proposed Site Access @ S. Painter Road. The southbound approach (proposed site access) is anticipated to operate at a LOS A during the AM & PM peak hours under build-out conditions.

PROPOSED SITE ACCESS @ S. PAINTER ROAD
ANALYSIS OF BUILD-OUT AM/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR			PM PEAK HOUR		
	Queue Free Percent (%)	LOS and Delay (sec)	V/C Ratio	Queue Free Percent (%)	LOS and Delay (sec)	V/C Ratio
Eastbound	100	A 0.0	0.01	100	A 0.0	0.01
Westbound	100	A 0.0	0.01	100	A 0.0	0.07
Southbound	90	A 9.0	0.10	94	A 9.1	0.06

<Table 8>

Since the site access approach (southbound approach) maintains adequate LOS operation for an un-signalized intersection during a peak hour, no changes are recommended at the site access location to accommodate traffic generated by the site under build-out conditions. The addition of site generated traffic is not anticipated to degrade general roadway or driver safety at these intersections.

Overall:

In order to accommodate site generated traffic at the intersections studied within this report, it is recommended to install a 75' northbound left turn lane at the intersection of S. Painter Road @ Monteith Gap Road. With the above mitigation, the additional traffic generated by the proposed development is anticipated to be adequately accommodated.

Appendix A

PROPOSED SITE PLAN

PRELIMINARY -DO NOT USE FOR CONSTRUCTION

NORTH

396 STANDARD PARKING SPACES PLUS
22 VAN ACCESSIBLE ADA SPACES =
418 TOTAL PARKING SPACES SHOWN

11 EACH - 8 RESIDENCE BUILDINGS
PLUS 1 EACH - 9 RESIDENCE BUILDING
WITH 4 BEDROOMS PER RESIDENCE =
388 BEDROOMS IN 97 RESIDENCES.

Lofquist & Associates, Inc.

CONCEPTUAL LAND PLAN

South Painter Road WCU Student Rental Housing Project

MALLORY & EVANS DEVELOPMENT, LLC - CLIENT

Jackson County, North Carolina
March 27, 2017

Appendix B

TURNING MOVEMENT COUNTS

J.M. Teague Engineering & Planning

525 North Main Street, Waynesville, NC
(828) 456-8383

File Name : S. Painter Rd @ Monteith Gap Rd - Existing AM
Site Code : 040517
Start Date : 4/5/2017
Page No : 1

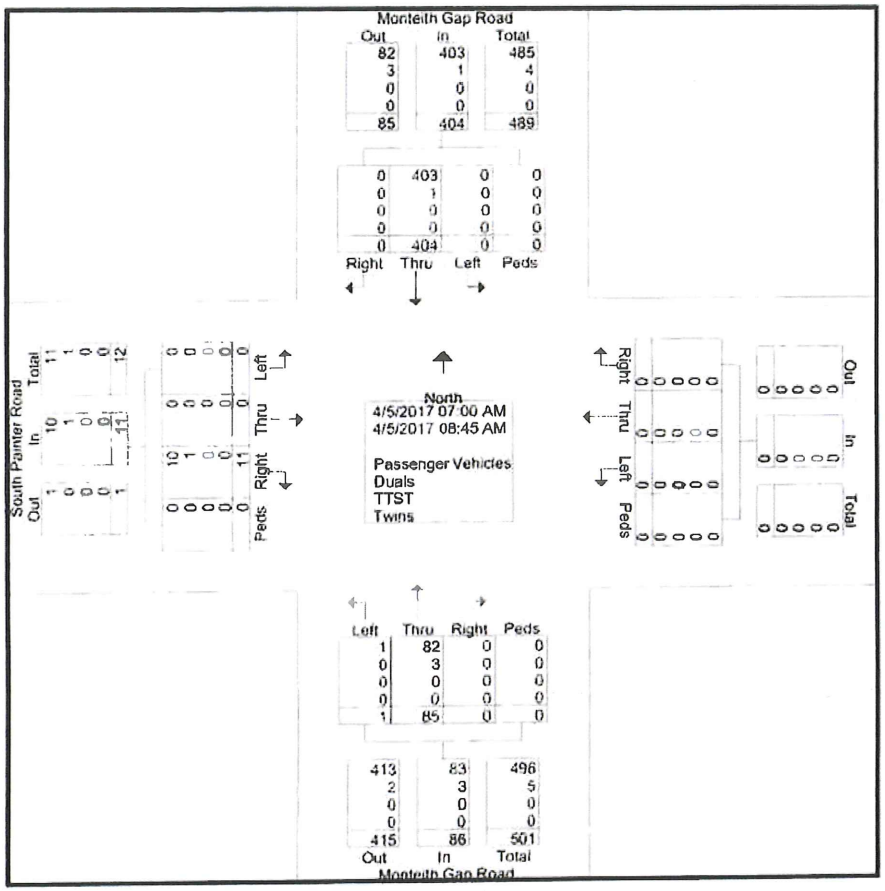
Groups Printed- Passenger Vehicles - Duals - TTST - Twins

	Monteith Gap Road Southbound					Westbound					Monteith Gap Road Northbound					South Painter Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	25	0	0	25	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	28
07:15 AM	0	31	0	0	31	0	0	0	0	0	0	10	0	0	10	0	0	2	0	2	43
07:30 AM	0	34	0	0	34	0	0	0	0	0	0	8	0	0	8	0	0	1	0	1	43
07:45 AM	0	75	0	0	75	0	0	0	0	0	0	8	0	0	8	0	0	3	0	3	86
Total	0	165	0	0	165	0	0	0	0	0	0	28	0	0	28	0	0	7	0	7	200
08:00 AM	0	39	0	0	39	0	0	0	0	0	1	20	0	0	21	0	0	1	0	1	61
08:15 AM	0	43	0	0	43	0	0	0	0	0	0	9	0	0	9	0	0	2	0	2	54
08:30 AM	0	68	0	0	68	0	0	0	0	0	0	19	0	0	19	0	0	0	0	0	87
08:45 AM	0	89	0	0	89	0	0	0	0	0	0	9	0	0	9	0	0	1	0	1	99
Total	0	239	0	0	239	0	0	0	0	0	1	57	0	0	58	0	0	4	0	4	301
Grand Total	0	404	0	0	404	0	0	0	0	0	1	85	0	0	86	0	0	11	0	11	501
Apprch %	0	100	0	0		0	0	0	0		1.2	98.8	0	0		0	0	100	0		
Total %	0	80.6	0	0	80.6	0	0	0	0	0	0.2	17	0	0	17.2	0	0	2.2	0	2.2	
Passenger Vehicles	0	403	0	0	403	0	0	0	0	0	1	82	0	0	83	0	0	10	0	10	496
% Passenger Vehicles	0	99.8	0	0	99.8	0	0	0	0	0	100	96.5	0	0	96.5	0	0	90.9	0	90.9	99
Duals	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	0	0	1	0	1	5
% Duals	0	0.2	0	0	0.2	0	0	0	0	0	0	3.5	0	0	3.5	0	0	9.1	0	9.1	1
TTST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% TTST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Twins	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Twins	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

J.M. Teague Engineering & Planning

525 North Main Street, Waynesville, NC
(828) 456-8383

File Name : S. Painter Rd @ Monteith Gap Rd - Existing AM
Site Code : 040517
Start Date : 4/5/2017
Page No : 2



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	Monteith Gap Road Southbound					Westbound					Monteith Gap Road Northbound					South Painter Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	39	0	0	39	0	0	0	0	0	1	20	0	0	21	0	0	1	0	1	61
08:15 AM	0	43	0	0	43	0	0	0	0	0	0	9	0	0	9	0	0	2	0	2	54
08:30 AM	0	68	0	0	68	0	0	0	0	0	0	19	0	0	19	0	0	0	0	0	87
08:45 AM	0	89	0	0	89	0	0	0	0	0	0	9	0	0	9	0	0	1	0	1	99
Total Volume	0	239	0	0	239	0	0	0	0	0	1	57	0	0	58	0	0	4	0	4	301
% App. Total	0	100	0	0		0	0	0	0		1.7	98.3	0	0		0	0	100	0		
PHF	.000	.671	.000	.000	.671	.000	.000	.000	.000	.000	.250	.713	.000	.000	.690	.000	.000	.500	.000	.500	.760
Passenger Vehicles	0	238	0	0	238	0	0	0	0	0	1	55	0	0	56	0	0	4	0	4	298
% Passenger Vehicles	0	99.6	0	0	99.6	0	0	0	0	0	100	96.5	0	0	96.6	0	0	100	0	100	99.0
Duals	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	3
% Duals	0	0.4	0	0	0.4	0	0	0	0	0	0	3.5	0	0	3.4	0	0	0	0	0	1.0
TTST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% TTST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Twins	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Twins	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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525 North Main Street, Waynesville, NC
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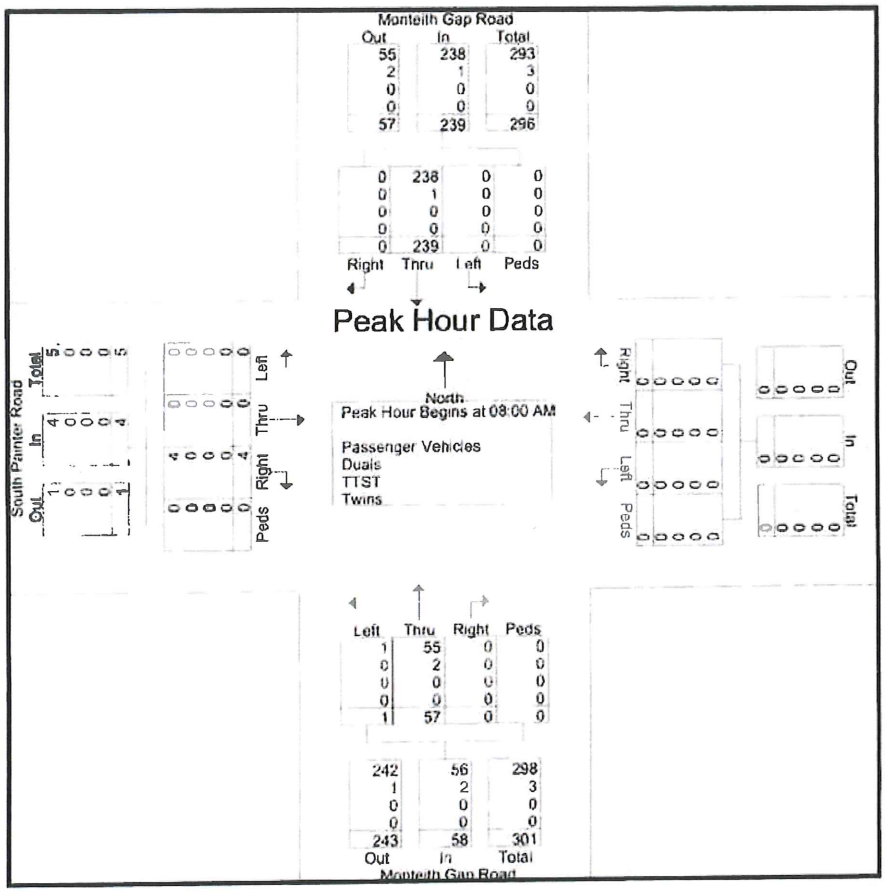
File Name : S. Painter Rd @ Monteith Gap Rd - Existing AM
Site Code : 040517
Start Date : 4/5/2017
Page No : 4



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File Name : S. Painter Rd @ Monteith Gap Rd - Existing PM
Site Code : 040517
Start Date : 4/5/2017
Page No : 1

Groups Printed- Passemger Vehicles - Duals - TTST - Twins

	Monteith Gap Road Southbound					Westbound					Monteith Gap Road Northbound					South Painter Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	22	0	0	22	0	0	0	0	0	0	47	0	0	47	1	0	2	0	3	72
04:15 PM	0	29	0	0	29	0	0	0	0	0	3	52	0	0	55	1	0	0	0	1	85
04:30 PM	0	43	0	0	43	0	0	0	0	0	3	55	0	0	58	0	0	1	0	1	102
04:45 PM	0	45	0	0	45	0	0	0	0	0	2	37	0	1	40	0	0	0	0	0	85
Total	0	139	0	0	139	0	0	0	0	0	8	191	0	1	200	2	0	3	0	5	344
05:00 PM	0	32	0	0	32	0	0	0	0	0	2	43	0	0	45	1	0	2	0	3	80
05:15 PM	0	38	0	0	38	0	0	0	0	0	2	63	0	0	65	1	0	0	0	1	104
05:30 PM	0	43	0	0	43	0	0	0	0	0	2	54	0	0	56	0	0	0	0	0	99
05:45 PM	0	40	0	0	40	0	0	0	0	0	2	46	0	0	48	0	0	1	0	1	89
Total	0	153	0	0	153	0	0	0	0	0	8	206	0	0	214	2	0	3	0	5	372
Grand Total	0	292	0	0	292	0	0	0	0	0	16	397	0	1	414	4	0	6	0	10	716
Apprch %	0	100	0	0		0	0	0	0		3.9	95.9	0	0.2		40	0	60	0		
Total %	0	40.8	0	0	40.8	0	0	0	0	0	2.2	55.4	0	0.1	57.8	0.6	0	0.8	0	1.4	
Passemger Vehicles	0	292	0	0	292	0	0	0	0	0	16	397	0	1	414	4	0	6	0	10	716
% Passemger Vehicles	0	100	0	0	100	0	0	0	0	0	100	100	0	100	100	100	0	100	0	100	100
Duals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Duals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TTST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% TTST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Twins	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Twins	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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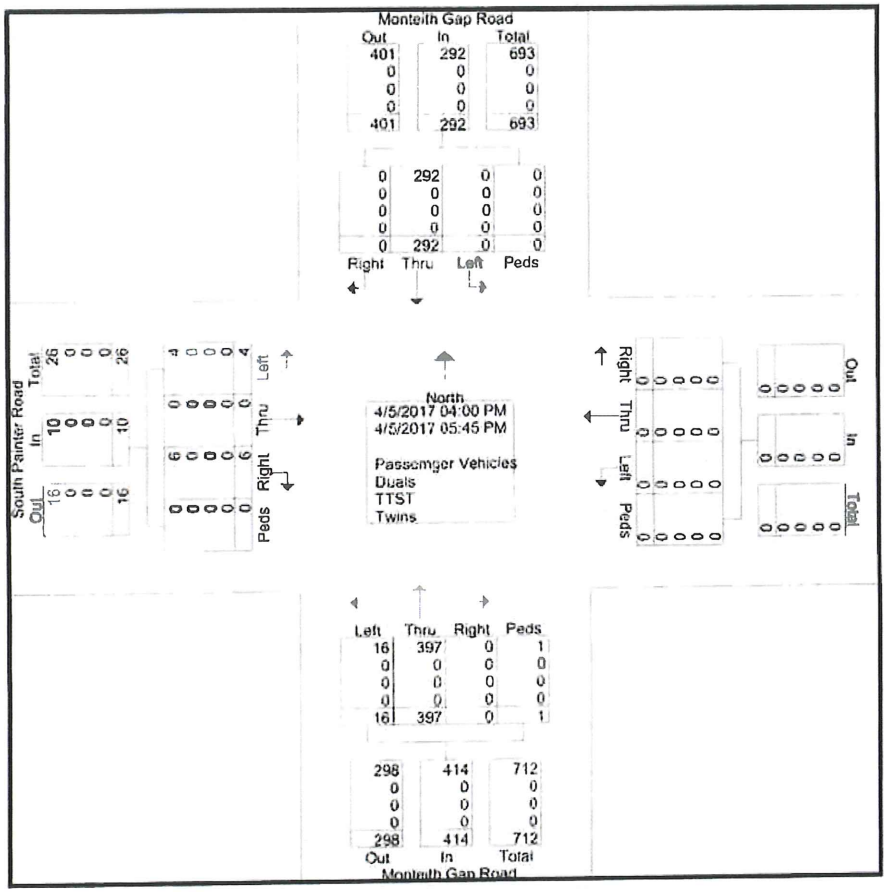
File Name : S. Painter Rd @ Monteith Gap Rd - Existing PM
Site Code : 040517
Start Date : 4/5/2017
Page No : 2



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File Name : S. Painter Rd @ Monteith Gap Rd - Existing PM
Site Code : 040517
Start Date : 4/5/2017
Page No : 3

	Monteith Gap Road Southbound					Westbound					Monteith Gap Road Northbound					South Painter Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	32	0	0	32	0	0	0	0	0	2	43	0	0	45	1	0	2	0	3	80
05:15 PM	0	38	0	0	38	0	0	0	0	0	2	63	0	0	65	1	0	0	0	1	104
05:30 PM	0	43	0	0	43	0	0	0	0	0	2	54	0	0	56	0	0	0	0	0	99
05:45 PM	0	40	0	0	40	0	0	0	0	0	2	46	0	0	48	0	0	1	0	1	89
Total Volume	0	153	0	0	153	0	0	0	0	0	8	206	0	0	214	2	0	3	0	5	372
% App. Total	0	100	0	0		0	0	0	0		3.7	96.3	0	0		40	0	60	0		
PHF	.000	.890	.000	.000	.890	.000	.000	.000	.000	.000	1.00	.817	.000	.000	.823	.500	.000	.375	.000	.417	.894
Passenger Vehicles	0	153	0	0	153	0	0	0	0	0	8	206	0	0	214	2	0	3	0	5	372
% Passenger Vehicles	0	100	0	0	100	0	0	0	0	0	100	100	0	0	100	100	0	100	0	100	100
Duals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Duals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TTST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% TTST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Twins	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Twins	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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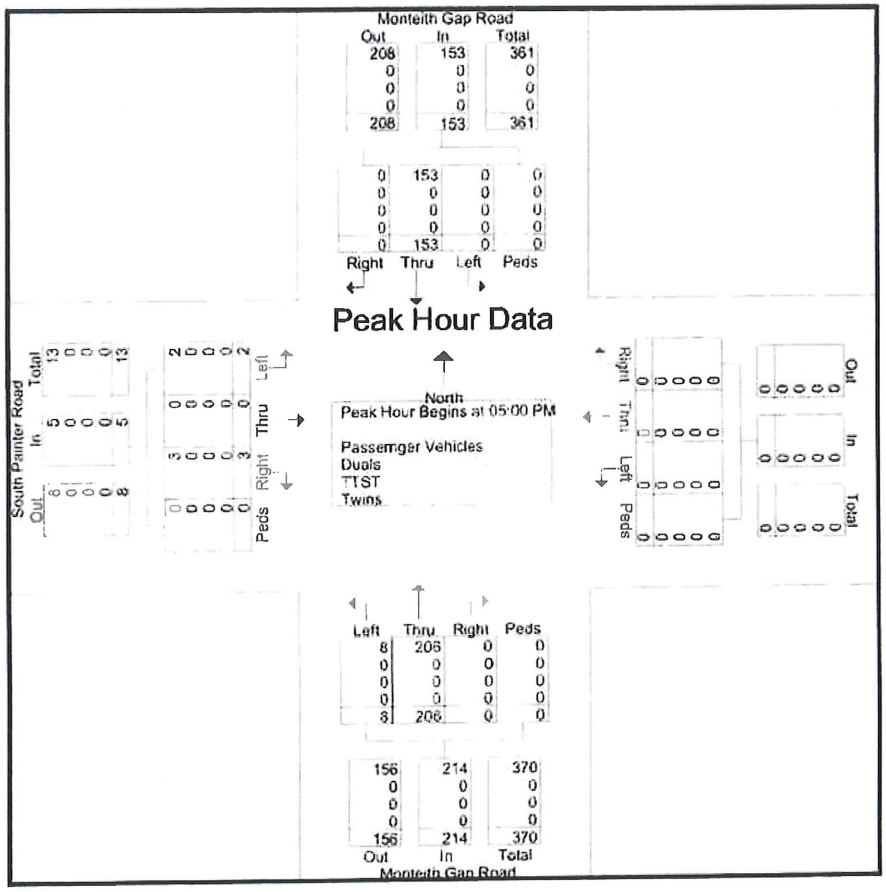
File Name : S. Painter Rd @ Monteith Gap Rd - Existing PM
Site Code : 040517
Start Date : 4/5/2017
Page No : 4



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File Name : S. Painter Rd @ Monteith Gap Rd - Background AM
Site Code : 040517
Start Date : 4/5/2017
Page No : 1

Groups Printed- Passenger Vehicles - Duals - TTST - Twins

	Monteith Gap Road Southbound					Westbound					Monteith Gap Road Northbound					South Painter Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	25	0	0	25	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	28
07:15 AM	0	32	0	0	32	0	0	0	0	0	0	10	0	0	10	0	0	2	0	2	44
07:30 AM	0	35	0	0	35	0	0	0	0	0	0	8	0	0	8	0	0	1	0	1	44
07:45 AM	0	76	0	0	76	0	0	0	0	0	0	8	0	0	8	0	0	3	0	3	87
Total	0	168	0	0	168	0	0	0	0	0	0	28	0	0	28	0	0	7	0	7	203
08:00 AM	0	40	0	0	40	0	0	0	0	0	1	20	0	0	21	0	0	1	0	1	62
08:15 AM	0	44	0	0	44	0	0	0	0	0	0	9	0	0	9	0	0	2	0	2	55
08:30 AM	0	69	0	0	69	0	0	0	0	0	0	19	0	0	19	0	0	0	0	0	88
08:45 AM	0	91	0	0	91	0	0	0	0	0	0	9	0	0	9	0	0	1	0	1	101
Total	0	244	0	0	244	0	0	0	0	0	1	57	0	0	58	0	0	4	0	4	306
Grand Total	0	412	0	0	412	0	0	0	0	0	1	85	0	0	86	0	0	11	0	11	509
Apprch %	0	100	0	0		0	0	0	0		1.2	98.8	0	0		0	0	100	0		
Total %	0	80.9	0	0	80.9	0	0	0	0	0	0.2	16.7	0	0	16.9	0	0	2.2	0	2.2	
Passenger Vehicles	0	411	0	0	411	0	0	0	0	0	1	82	0	0	83	0	0	10	0	10	504
% Passenger Vehicles	0	99.8	0	0	99.8	0	0	0	0	0	100	96.5	0	0	96.5	0	0	90.9	0	90.9	99
Duals	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	0	0	1	0	1	5
% Duals	0	0.2	0	0	0.2	0	0	0	0	0	0	3.5	0	0	3.5	0	0	9.1	0	9.1	1
TTST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% TTST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Twins	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Twins	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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525 North Main Street, Waynesville, NC
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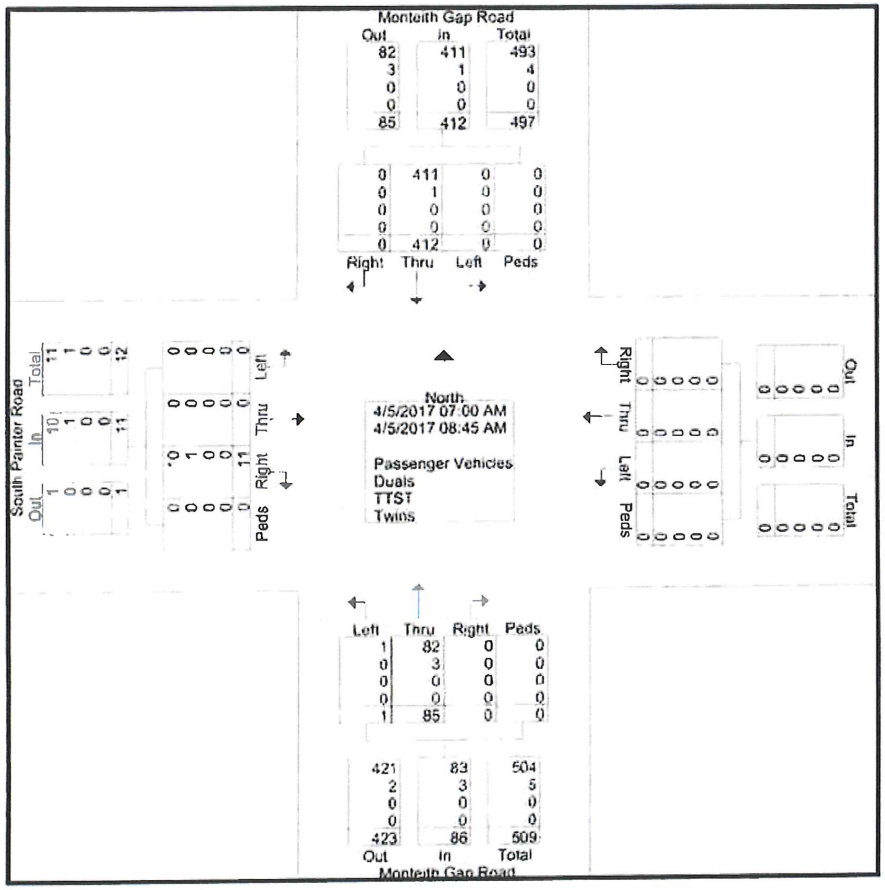
File Name : S. Painter Rd @ Monteith Gap Rd - Background AM
Site Code : 040517
Start Date : 4/5/2017
Page No : 2



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525 North Main Street, Waynesville, NC
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File Name : S. Painter Rd @ Monteith Gap Rd - Background AM
Site Code : 040517
Start Date : 4/5/2017
Page No : 3

	Monteith Gap Road Southbound					Westbound					Monteith Gap Road Northbound					South Painter Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	40	0	0	40	0	0	0	0	0	1	20	0	0	21	0	0	1	0	1	62
08:15 AM	0	44	0	0	44	0	0	0	0	0	0	9	0	0	9	0	0	2	0	2	55
08:30 AM	0	69	0	0	69	0	0	0	0	0	0	19	0	0	19	0	0	0	0	0	88
08:45 AM	0	91	0	0	91	0	0	0	0	0	0	9	0	0	9	0	0	1	0	1	101
Total Volume	0	244	0	0	244	0	0	0	0	0	1	57	0	0	58	0	0	4	0	4	306
% App. Total	0	100	0	0		0	0	0	0		1.7	98.3	0	0		0	0	100	0		
PHF	.000	.670	.000	.000	.670	.000	.000	.000	.000	.000	.250	.713	.000	.000	.690	.000	.000	.500	.000	.500	.757
Passenger Vehicles	0	243	0	0	243	0	0	0	0	0	1	55	0	0	56	0	0	4	0	4	303
% Passenger Vehicles	0	99.6	0	0	99.6	0	0	0	0	0	100	96.5	0	0	96.6	0	0	100	0	100	99.0
Duals	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	3
% Duals	0	0.4	0	0	0.4	0	0	0	0	0	0	3.5	0	0	3.4	0	0	0	0	0	1.0
TTST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% TTST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Twins	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Twins	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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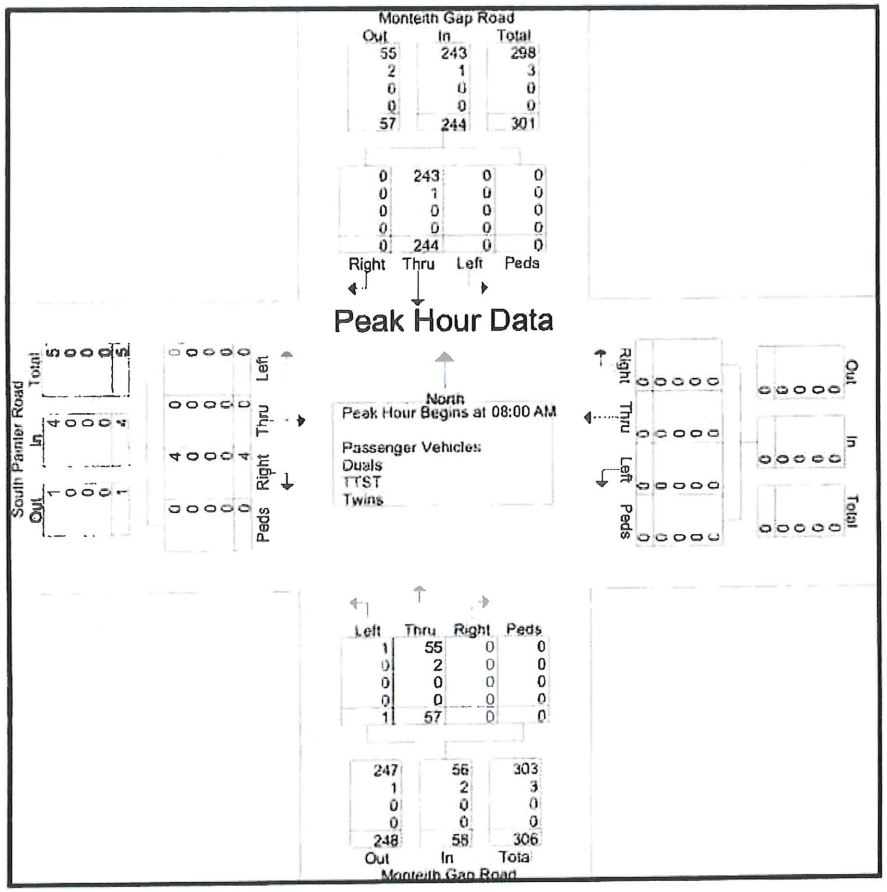
Page No : 4



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525 North Main Street, Waynesville, NC
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File Name : S. Painter Rd @ Monteith Gap Rd - Background PM
Site Code : 040517
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Page No : 1

Groups Printed- Passemger Vehicles - Duals - TTST - Twins

	Monteith Gap Road Southbound					Westbound					Monteith Gap Road Northbound					South Painter Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	22	0	0	22	0	0	0	0	0	0	48	0	0	48	1	0	2	0	3	73
04:15 PM	0	30	0	0	30	0	0	0	0	0	3	53	0	0	56	1	0	0	0	1	87
04:30 PM	0	44	0	0	44	0	0	0	0	0	3	56	0	0	59	0	0	1	0	1	104
04:45 PM	0	46	0	0	46	0	0	0	0	0	2	38	0	1	41	0	0	0	0	0	87
Total	0	142	0	0	142	0	0	0	0	0	8	195	0	1	204	2	0	3	0	5	351
05:00 PM	0	33	0	0	33	0	0	0	0	0	2	44	0	0	46	1	0	2	0	3	82
05:15 PM	0	39	0	0	39	0	0	0	0	0	2	64	0	0	66	1	0	0	0	1	106
05:30 PM	0	44	0	0	44	0	0	0	0	0	2	55	0	0	57	0	0	0	0	0	101
05:45 PM	0	41	0	0	41	0	0	0	0	0	2	47	0	0	49	0	0	1	0	1	91
Total	0	157	0	0	157	0	0	0	0	0	8	210	0	0	218	2	0	3	0	5	380
Grand Total	0	299	0	0	299	0	0	0	0	0	16	405	0	1	422	4	0	6	0	10	731
Apprch %	0	100	0	0		0	0	0	0		3.8	96	0	0.2		40	0	60	0		
Total %	0	40.9	0	0	40.9	0	0	0	0	0	2.2	55.4	0	0.1	57.7	0.5	0	0.8	0	1.4	
Passemger Vehicles	0	299	0	0	299	0	0	0	0	0	16	405	0	1	422	4	0	6	0	10	731
% Passemger Vehicles	0	100	0	0	100	0	0	0	0	0	100	100	0	100	100	100	0	100	0	100	100
Duals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Duals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TTST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% TTST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Twins	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Twins	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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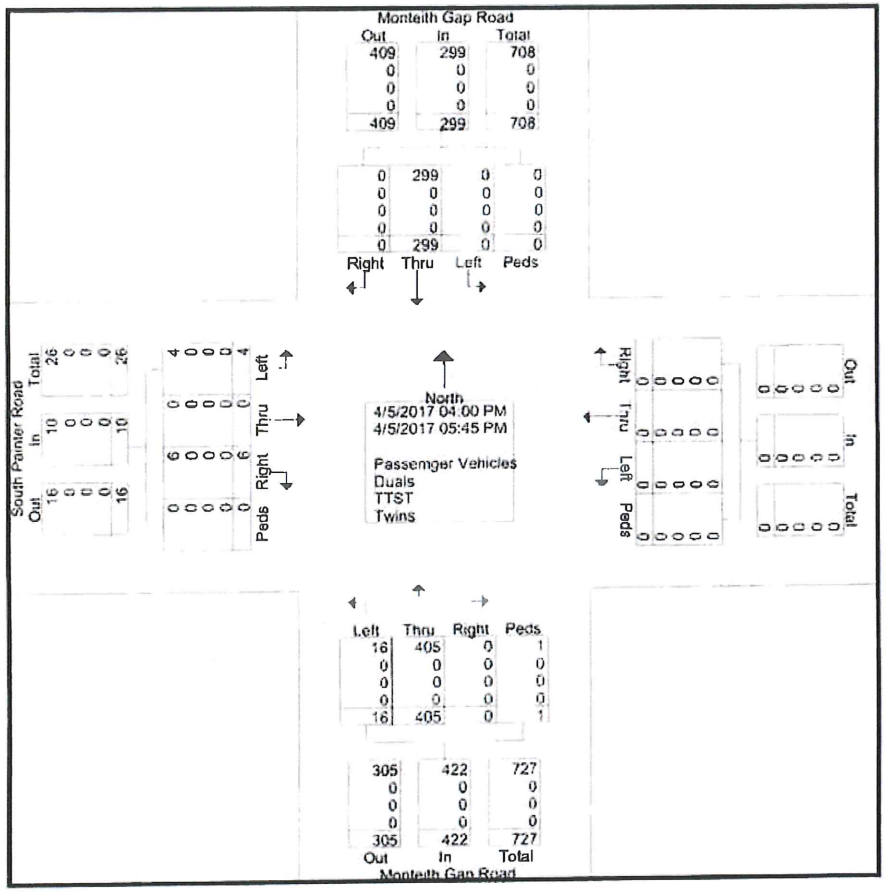

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Page No : 3

	Monteith Gap Road Southbound					Westbound					Monteith Gap Road Northbound					South Painter Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	33	0	0	33	0	0	0	0	0	2	44	0	0	46	1	0	2	0	3	82
05:15 PM	0	39	0	0	39	0	0	0	0	0	2	64	0	0	66	1	0	0	0	1	106
05:30 PM	0	44	0	0	44	0	0	0	0	0	2	55	0	0	57	0	0	0	0	0	101
05:45 PM	0	41	0	0	41	0	0	0	0	0	2	47	0	0	49	0	0	1	0	1	91
Total Volume	0	157	0	0	157	0	0	0	0	0	8	210	0	0	218	2	0	3	0	5	380
% App. Total	0	100	0	0		0	0	0	0		3.7	96.3	0	0		40	0	60	0		
PHF	.000	.892	.000	.000	.892	.000	.000	.000	.000	.000	1.00	.820	.000	.000	.826	.500	.000	.375	.000	.417	.896
Passenger Vehicles	0	157	0	0	157	0	0	0	0	0	8	210	0	0	218	2	0	3	0	5	380
% Passenger Vehicles	0	100	0	0	100	0	0	0	0	0	100	100	0	0	100	100	0	100	0	100	100
Duals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Duals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TTST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% TTST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Twins	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Twins	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

J.M. Teague Engineering & Planning

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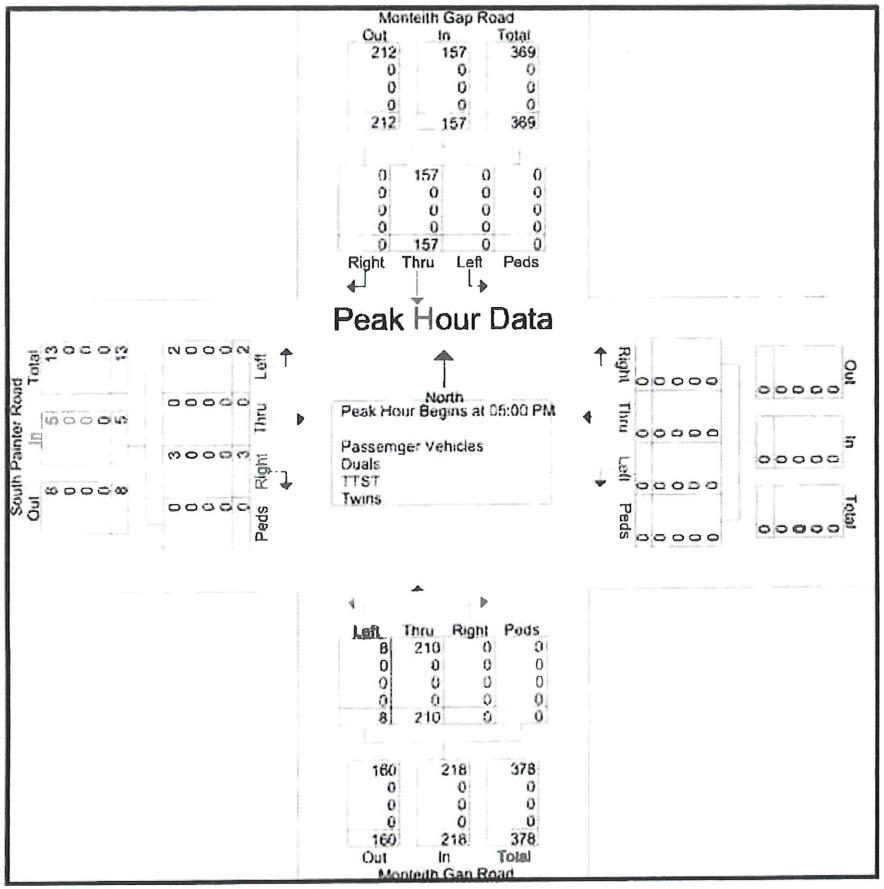
File Name : S. Painter Rd @ Monteith Gap Rd - Background PM
Site Code : 040517
Start Date : 4/5/2017
Page No : 4



Appendix C

INTERSECTION ANALYSIS REPORTS

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	4	1	57	239	4
Future Volume (Veh/h)	4	4	1	57	239	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.50	0.90	0.71	0.67	0.90
Hourly flow rate (vph)	4	8	1	80	357	4
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	441	359	361			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	441	359	361			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	100			
cM capacity (veh/h)	577	690	1209			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	12	81	361
Volume Left	4	1	0
Volume Right	8	0	4
cSH	648	1209	1700
Volume to Capacity	0.02	0.00	0.21
Queue Length 95th (ft)	1	0	0
Control Delay (s)	10.7	0.1	0.0
Lane LOS	B	A	
Approach Delay (s)	10.7	0.1	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	22.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	**2**	**3**	**8**	**206**	**153**	**4**
Future Volume (Veh/h)	2	3	8	206	153	4
Sign Control	**Stop**			**Free**	**Free**	
Grade	0%			0%	0%	
Peak Hour Factor	**0.50**	**0.38**	**1.00**	**0.82**	**0.89**	**0.90**
Hourly flow rate (vph)	4	8	8	251	172	4
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	441	174	176			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	**441**	**174**	**176**			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	**99**	**99**	**99**			
cM capacity (veh/h)	574	875	1412			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	12	259	176
Volume Left	**4**	**8**	**0**
Volume Right	8	0	4
cSH	**745**	**1412**	**1700**
Volume to Capacity	0.02	0.01	0.10
Queue Length 95th (ft)	**1**	**0**	**0**
Control Delay (s)	9.9	0.3	0.0
Lane LOS	**A**	**A**	
Approach Delay (s)	9.9	0.3	0.0
Approach LOS	**A**		

Intersection Summary			
Average Delay	**0.4**		
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	**15**		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	**4**	**4**	**1**	**57**	**244**	**4**
Future Volume (Veh/h)	4	4	1	57	244	4
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)	4	4	1	63	271	4
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	338	273	275			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	**338**	**273**	**275**			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	**99**	**99**	**100**			
cM capacity (veh/h)	661	771	1300			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	8	64	275
Volume Left	**4**	**1**	**0**
Volume Right	4	0	4
cSH	**712**	**1300**	**1700**
Volume to Capacity	0.01	0.00	0.16
Queue Length 95th (ft)	1	**0**	**0**
Control Delay (s)	10.1	0.1	0.0
Lane LOS	**B**	**A**	
Approach Delay (s)	10.1	0.1	0.0
Approach LOS	**B**		

Intersection Summary			
Average Delay	**0.3**		
Intersection Capacity Utilization	23.1%	ICU Level of Service	A
Analysis Period (min)	**15**		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	2	3	8	210	157	4
Future Volume (Veh/h)	2	3	8	210	157	4
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)	2	3	9	233	174	4
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	427	176	178			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	427	176	178			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	99			
cM capacity (veh/h)	585	872	1410			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	5	242	178
Volume Left	2	9	0
Volume Right	3	0	4
cSH	729	1410	1700
Volume to Capacity	0.01	0.01	0.10
Queue Length 95th (ft)	1	0	0
Control Delay (s)	10.0	0.3	0.0
Lane LOS	A	A	
Approach Delay (s)	10.0	0.3	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	27.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	91	23	57	244	4
Future Volume (Veh/h)	4	91	23	57	244	4
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)	4	101	26	63	271	4
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	388	273	275			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	388	273	275			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	87	98			
cM capacity (veh/h)	607	771	1300			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	105	89	275
Volume Left	4	26	0
Volume Right	101	0	4
cSH	763	1300	1700
Volume to Capacity	0.14	0.02	0.16
Queue Length 95th (ft)	12	2	0
Control Delay (s)	10.5	2.4	0.0
Lane LOS	B	A	
Approach Delay (s)	10.5	2.4	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	54	104	210	157	5
Future Volume (Veh/h)	5	54	104	210	157	5
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)	6	60	116	233	174	6
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	642	177	180			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	642	177	180			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	93	92			
cM capacity (veh/h)	405	871	1408			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	66	349	180
Volume Left	6	116	0
Volume Right	60	0	6
cSH	789	1408	1700
Volume to Capacity	0.08	0.08	0.11
Queue Length 95th (ft)	7	7	0
Control Delay (s)	10.0	3.1	0.0
Lane LOS	A	A	
Approach Delay (s)	10.0	3.1	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	39.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	4	1	22	87	0
Future Volume (Veh/h)	0	4	1	22	87	0
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)	0	4	1	24	97	0
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	25				17	13
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	25				17	13
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				90	100
cM capacity (veh/h)	1589				1001	1067

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	4	25	97
Volume Left	0	0	97
Volume Right	0	24	0
cSH	1589	1700	1001
Volume to Capacity	0.00	0.01	0.10
Queue Length 95th (ft)	0	0	8
Control Delay (s)	0.0	0.0	9.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.0
Approach LOS			A

Intersection Summary			
Average Delay	6.9		
Intersection Capacity Utilization	14.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	**0**	**5**	**8**	**101**	**54**	**0**
Future Volume (Veh/h)	0	5	8	101	54	0
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)	0	6	9	112	60	0
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	121				71	65
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	**121**				**71**	**65**
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	**100**				**94**	**100**
cM capacity (veh/h)	1467				933	999

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	6	121	60
Volume Left	**0**	**0**	**60**
Volume Right	0	112	0
cSH	**1467**	**1700**	**933**
Volume to Capacity	0.00	0.07	0.06
Queue Length 95th (ft)	**0**	**0**	**5**
Control Delay (s)	0.0	0.0	9.1
Lane LOS			**A**
Approach Delay (s)	0.0	0.0	9.1
Approach LOS			**A**

Intersection Summary			
Average Delay	**2.9**		
Intersection Capacity Utilization	16.7%	ICU Level of Service	A
Analysis Period (min)	**15**		

Appendix D

NCDOT Turn Lane Warrant Chart

S. Painter Road @ Monteith Gap Rd

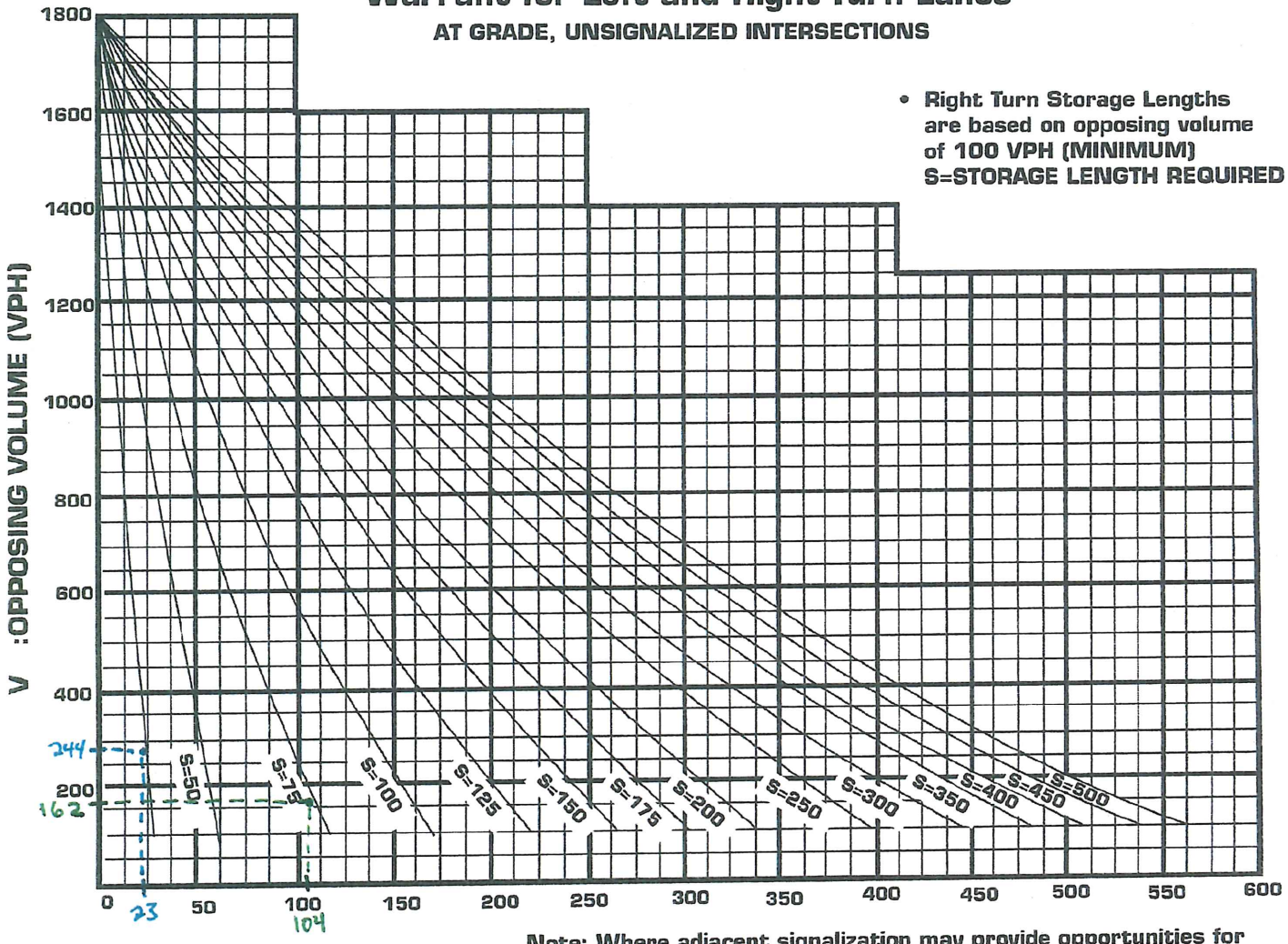
Movement: NB LT

AM Peak: $V_L = 23$ $V = 244$

PM Peak: $V_L = 104$ $V = 162$

Warrant for Left and Right-Turn Lanes

AT GRADE, UNSIGNALIZED INTERSECTIONS



Note: Where adjacent signalization may provide opportunities for gaps in the traffic stream a reduction in the above storage values can be considered on a case by case basis.