Turner Street Residential Development

Millbrook

Township of Cavan-Monaghan, County of Peterborough

Traffic Impact Study

Prepared by:

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Prepared for:

D.G. Biddle and Associates Ltd.

February, 2019

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February 20, 2019

Mr. Michael Fry, RPP
D.G. Biddle and Associates Limited
96 King Street East
Oshawa, ON
L1H 1B6

Dear Mr. Fry:

Re: Traffic Impact Study in Support of Proposed Turner Street Residential Development, in Millbrook, Township of Cavan-Monaghan, County of Peterborough

Enclosed please find our final report on the traffic study in support of the proposed Turner Street Residential Development to be located on not yet built portion of Turner Street north of Hunter Street. The traffic operational analyses described in this report have provided a detailed examination of the anticipated impacts of future background and site-generated traffic for the proposed development.

With the proposed development and the resulting additional site generated traffic, the study identified the following conclusions and recommendations:

- The study considered the weekday AM and PM peak hours vehicular volumes generated by the proposed development. The intersection capacity analysis indicates that NO mitigation measures will be required at the County Road 21/Turner Street, and at the County Road 21/Queen Street intersections to accommodate future increase in the background traffic or the traffic from the proposed development.

- An eastbound left turn storage lane on County Road 21 at Turner Street or at Queen Street is not warranted.

- A westbound right turn lane/taper County Road 21 at Turner Street or at Queen Street is not warranted. After a review of the functional classification of Turner Street and Queen Street based on the Township of Cavan-Monaghan's 2016 Road Needs Study Report (based on the MTO's

Inventory Manual for Municipal Roads, 1991), as well as Transportation Association of Canada (TAC)'s Geometric Design Guide for Canadian Roads, 2017. The study recommended the following:

- Turner Street to be classified as urban local (performing minor collector functions) designation.
- Queen Street to be classified as urban local (performing minor collector functions) designation.
- Internal Subdivision Roads to be built to urban local road standards.

If you should require further information on the study, please do not hesitate to contact us at your convenience.

Yours truly,

Seo-Woon Im, B.E.S.,
Senior Transportation Planner

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APPENDICES

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LIST OF TABLES

1.0 INTRODUCTION AND BACKGROUND

Tranplan Associates ("Tranplan") is pleased to present the findings and recommendations from our traffic impact study dealing with the proposed residential development to be located just north of Peterborough County Road 21 on Turner Street in the Village of Millbrook, in the Township of Cavan-Monaghan, County of Peterborough (see Exhibit 1.1: Key map). The proposed development is a 85 single family residential development consisting of 59 units of detached houses and 26 units of semi-detached houses.

As part of the planning approvals process, the owners have been carrying out a number of technical studies in support of the proposed development, including a traffic impact study. Tranplan Associates was retained by the owners to carry out the traffic impact assessment study in support of the proposed development. The study has been prepared for use by the study team to assist in the planning and design of the proposed site plan.

The study examined the traffic levels along County Road (CR) 21 in the vicinity of the study site, along with CR 21/Turner Street, and CR 21/Queen Street intersections. Traffic count program in the vicinity of the study site and at the study intersections was carried out on Tuesday October 30, 2018. This report describes the analysis and presents the study findings. A detailed set of intersection capacity analysis have been carried out for present and planned site development (expected to be fully built-out by 2020) with 2025 as the planning horizon.

EXHIBIT 1.1: KEY MAP

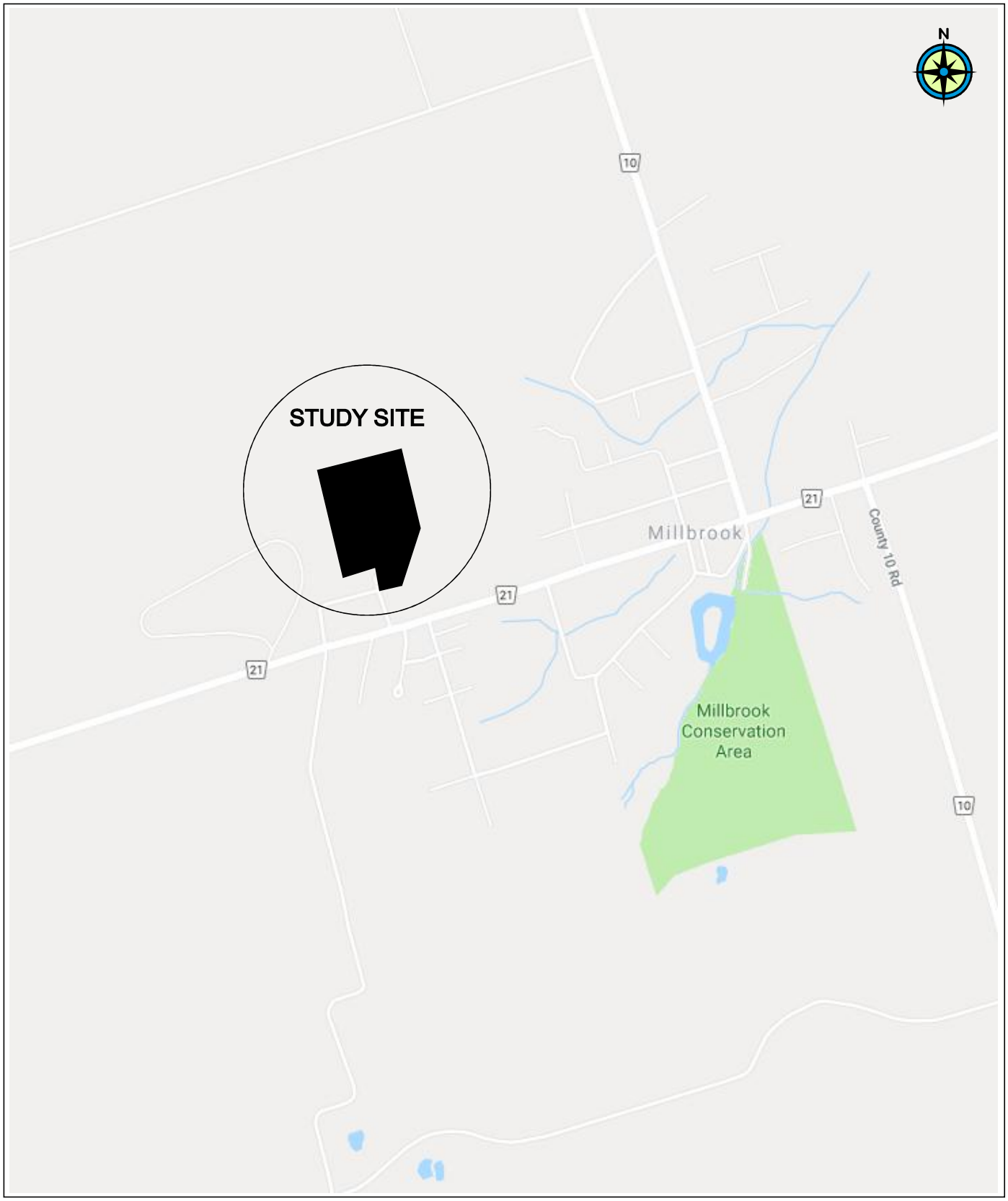


EXHIBIT 1.2: PROPOSED SITE PLAN

LAND USE SCHEDULE

PROPOSED USE	LOT/BLK #	# OF LOTS/BLKS	# OF UNITS	AREA (ha)
RESIDENTIAL				
LOW DENSITY RESIDENTIAL				
SINGLE DETACHED (10.7m)	41,42,43	3	3	0.103
SINGLE DETACHED (11.3m)	1–9, 12–26, 28–34, 36,40,44,48,55, 59–72	40	40	2.017
SINGLE DETACHED (12.2m)	10,11, 19–27, 56,57,58	14	14	0.788
SEMI DETACHED (18.0m)	35–39, 45–48, 50–54	15	28	0.774
TOTAL		72	85	3.682
NON RESIDENTIAL				
STORMWATER MANAGEMENT	BLOCK 73	1	0	0.403
OPEN SPACE	BLOCKS 74,75	2	0	5.758
ROAD ALLOWANCE				
STREET "A"	20.0m ROW	0	0	1.214
TOTALS		75	85	11.062

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51 OF THE PLANNING ACT

F NORTH –ENVIRONMENTAL PROTECTION
SOUTH –RESIDENTIAL
EAST –RESIDENTIAL/ENVIRONMENTAL PROTECTION
WEST –INSTITUTIONAL
H –PIPED MUNICIPAL WATER
I –TILL
K –ALL MUNICIPAL SERVICES AVAILABLE

OWNER'S AUTHORIZATION

I/WE LAND OWNER
BEING THE REGISTERED OWNER OF THE SUBJECT LANDS HEREBY AUTHORIZE D.G.BIDDLE AND ASSOC. LTD. TO PREPARE AND SUBMIT A DRAFT PLAN OF SUBDIVISION FOR APPROVAL
SIGNED _____ TITLE
DATE _____

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARY OF THE LANDS TO BE SUBDIVIDED AS SHOWN ON THIS PLAN AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN
ONTARIO LAND SURVEYOR
ONTARIO LAND SURVEYORS
SIGNED _____ O.L.S.
DATE _____

No.	REVISION	DATE	BY	APPROVED

REVISIONS

PRELIMINARY

DRAFT PLAN

PART OF LOT 11, CONCESSION 5
Former Village of Millbrook, Township of Cavan
Now In The
TOWNSHIP OF CAVAN MONAGHAN
COUNTY OF PETERBOROUGH

D.G. Biddle & Associates Limited
consulting engineers and planners
96 KING STREET EAST • OSHAWA, ON L1H 1B6
PHONE (905)576–8500 • FAX (905)576–9730
info@dgbiddle.com

SCALE: 1:1000
DRAWN BY: B.B.
DESIGN BY: M.F.
CHECKED BY: M.F.
PLOT DATE: 06/04/2018

115040
DP-2

2.0 EXISTING CONDITIONS

2.1 The Study Site

The study site, existing traffic controls and some of the land uses surrounding the study site are illustrated in Exhibit 2.1. The subject site is currently vacant.

2.2 Access to the Study Site

County Road 21 (CR 21) is under the jurisdiction of Peterborough County. It extends east from Highway 115 through to Millbrook and travels in a north-east direction south of Highway 115. In the vicinity of the study area, it has a rural cross section with two travelled lanes and a sidewalk on the south side of the street. In the vicinity of the study area, the posted speed limit is 50 km/h. Based on Peterborough County traffic data collected in the study area in 2016, the daily traffic volume is approximately 1,400 vehicles.

Turner Street, is a local road, under the jurisdiction of Township of Cavan-Monaghan, that will provide direct access to the proposed development. It currently has a rural cross section with surface treated pavement with an unposted speed limit of 50 km/h. Based on observed peak hour volumes in the vicinity of the study site, the daily traffic volume would range approximately from 150 to 200 vehicles per day.

Queen Street, north of CR 21, is a local road, under the jurisdiction of Township of Cavan-Monaghan, that will provide indirect access to the proposed development. It currently has a rural cross section with surface treated pavement with an unposted speed limit of 50 km/h. Based on observed peak hour volumes in the vicinity of the study site, the daily traffic volume would range approximately from 100 to 150 vehicles per day.

Exhibit 2.1: Existing Traffic Control and Lane Configurations

2.3 Peak Hour Traffic Volumes

Exhibit 2.2(a) shows the 2018 peak hour traffic volumes used for study analysis. The study intersections' volumes were collected on Tuesday October 30, 2018, see Appendix "A". The Peterborough County seasonal traffic data collected in 2016 (see Appendix "A") indicates that CR 21 volumes are fairly even between the seasons. While the traffic volumes are slightly higher during the summer months, the fall data collected is considered typical conditions and, as such, no adjustments are applied to the observed count data.

2.4 Level of Service

The existing peak hour traffic volumes were assessed against the capacity of the study area intersections in terms of Level of Service (LOS)[1] and volume/capacity ratios using the Highway Capacity Manual reports produced by Trafficware Traffic Signal Timing Software -Synchro Version 9.0. The results are summarized in Table 2.1 Summary of Intersection Analysis: Existing Conditions. Detailed reports from the analysis are contained in Appendix B Intersection Capacity Analysis.

Table 2.1: Summary of Intersection Capacity Analysis: Existing Conditions

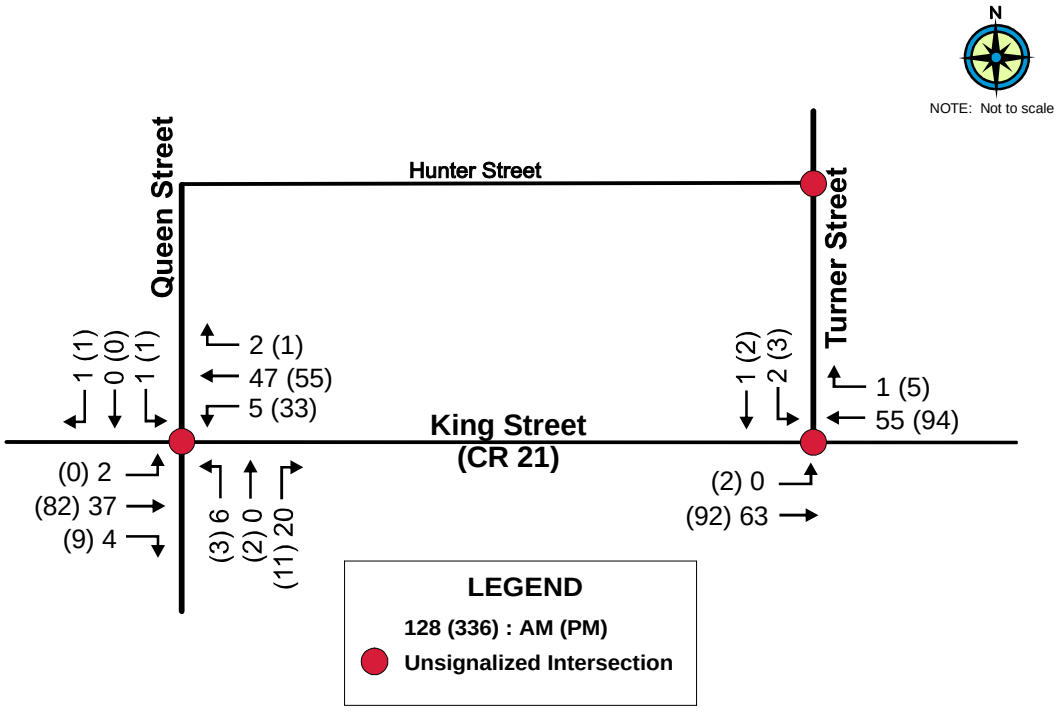
	Existing (2018) Conditions				Existing (2018) Conditions			
Intersection	**AM Peak**				**PM Peak**			
CR 21 (King St) & Turner St (TWSC)	LOS	Delay	95th Queue	v/c	LOS	Delay	95th Queue	v/c
EB-L	A	0.0	0.0	-	A	7.4	0.0	0.00
SB-LR	A	9.0	0.0	0.00	A	9.3	0.0	0.01
CR 21 (King St) & Queen St (TWSC)	LOS	Delay	95th Queue	v/c	LOS	Delay	95th Queue	v/c
NB-LTR	A	8.8	0.1	0.03	A	9.3	0.1	0.02
EB-L	A	7.3	0.0	0.00	A	0.0	0.0	-
WB-L	A	7.3	0.0	0.00	A	7.5	0.1	0.02
SB-LTR	A	8.9	0.0	0.00	A	9.4	0.0	0.00

Note: Delay in seconds; 95th Queue measurement in vehicles as provided in Synchro output files, see Appendix "B"

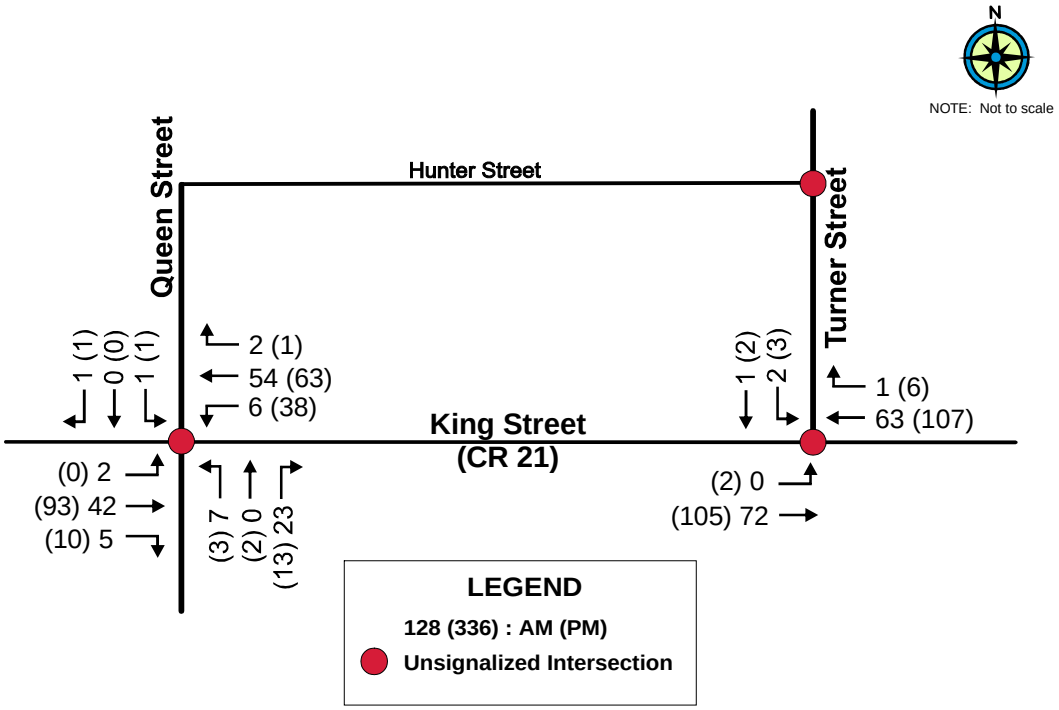
1 Level of Service (LOS) is commonly used in traffic engineering to describe the level of congestion along a roadway or at an intersection. Levels from "A" to "F" denote increasing amounts of congestion with "F" representing a complete breakdown in traffic flow. Level of Service "C" and "D" are commonly used as design standards. However, many individual turning movements at TWSC intersections and commercial entrances along urban arterial corridor operate at LOS "F" during peak periods. Synchro 9 software capable of producing Highway Capacity Manual 2010 results for unsignalized intersections was used to calculate the Levels of Service.

EXHIBIT 2.2: BACKGROUND TRAFFIC VOLUMES

A) 2018 Existing Traffic Volumes



B) 2025 Background Traffic Volumes



All study intersections and associated movements currently operate at LOS "A" with minimum delay during both AM and PM peak hours. No Movements at the study intersection was found to have any meaningful 95th percentile queue length (queue length of 0.1 vehicle), or any capacity issues. In assessing the three principal components of intersection measures of effectiveness (MOE's - delay, queue length and v/c ratio), it can be concluded that there will be sufficient capacity in the existing study road network to accommodate growth in the background traffic.

2.5 Collision Data

The recent collision data (past three to five years) on County Road 21 (King Street) in the vicinity of the study site was requested to County of Peterborough. The study was informed by the County staff that collision data would not be available for the study, as the collection and distribution between the police department and the County were being finalized.

3.0 TRAFFIC FORECASTS

3.1 Background Traffic

Background traffic is defined as all traffic within the study area that is not related to the proposed development. For the purposes of this study, a five year planning horizon, after the build-out of the subdivision in 2020, was assumed for use in the study analyses and the 2018 traffic volumes were projected ahead to 2025 based on an average growth rate of 2.0% per annum for the roads in the study area (see Exhibit 2.2: 2025 Background Traffic Volumes).

3.2 Traffic Generation by the Proposed Development

The proposed development is a 85 single family residential development consisting of 59 units of detached houses and 26 units of semi-detached houses. Forecasts of future site generated traffic volumes were developed using the trip generation relationships taken from the current Institute of Transportation Engineers (ITE) Trip Generation Manual[2]. The ITE land use Single Family (LU 210) using the number of units as an independent variable was used for the study analysis. The ITE peak hour trip generation of the single family dwelling units can be calculated using two methods, the average value and the fitted curve equation. The average value is a fixed rate which remains constant with the size of the development, that is, as the number of dwelling units increase, the number of forecast vehicle trips increase at the same rate. The fitted curve equation is a non-linear relationship where the number of dwelling units increase, the number of vehicle trips generated by the development will increase at a slightly reduced rate. The equilibrium between the two rates occurs when there are 200 single family home development, that is, both the ITE average rate and the fitted curve rate would produce the same

2 The Institute of Transportation Engineers, based in the United States, is an international association for traffic engineers and transportation planners. The organization publishes a number of handbooks and manuals, including the Trip Generation Manual which is based on American and Canadian experience. The tenth edition of this publication was used.

number of vehicle trips. As such, any development less than 200 units of single family homes, the fitted curve equation will forecast higher number of vehicle trips. In order to consider the "worst case" scenario, the study used the fitted curve equation for the total trip generation for the study site.

The forecast peak hour vehicular trip generation by the proposed development is summarized in Table 3.1 and illustrated in Exhibit 3.1.

Table 3.1: Projected Trip Generation by Proposed Development

LAND USE	WEEKDAY AM PEAK HOUR				WEEKDAY PM PEAK HOUR			
	Trip Generation Rate (ITE Trip Generation Manual - 10th Edition)	Vehicle Trips			Trip Generation Rate (ITE Trip Generation Manual - 10th Edition)	Vehicle Trips		
		Total	In	Out		Total	In	Out
Single Family - 85 Units (ITE Land Use #210)			25%	75%			63%	37%
	Trips Per Dwelling Units Ln(T)=0.71Ln(X)+4.80 where T = vehicle trips X = number of dwelling units	65	16	49	Trips Per Dwelling Units Ln(T)=0.96Ln(X)+0.20 where T = vehicle trips X = number of dwelling units	87	55	32

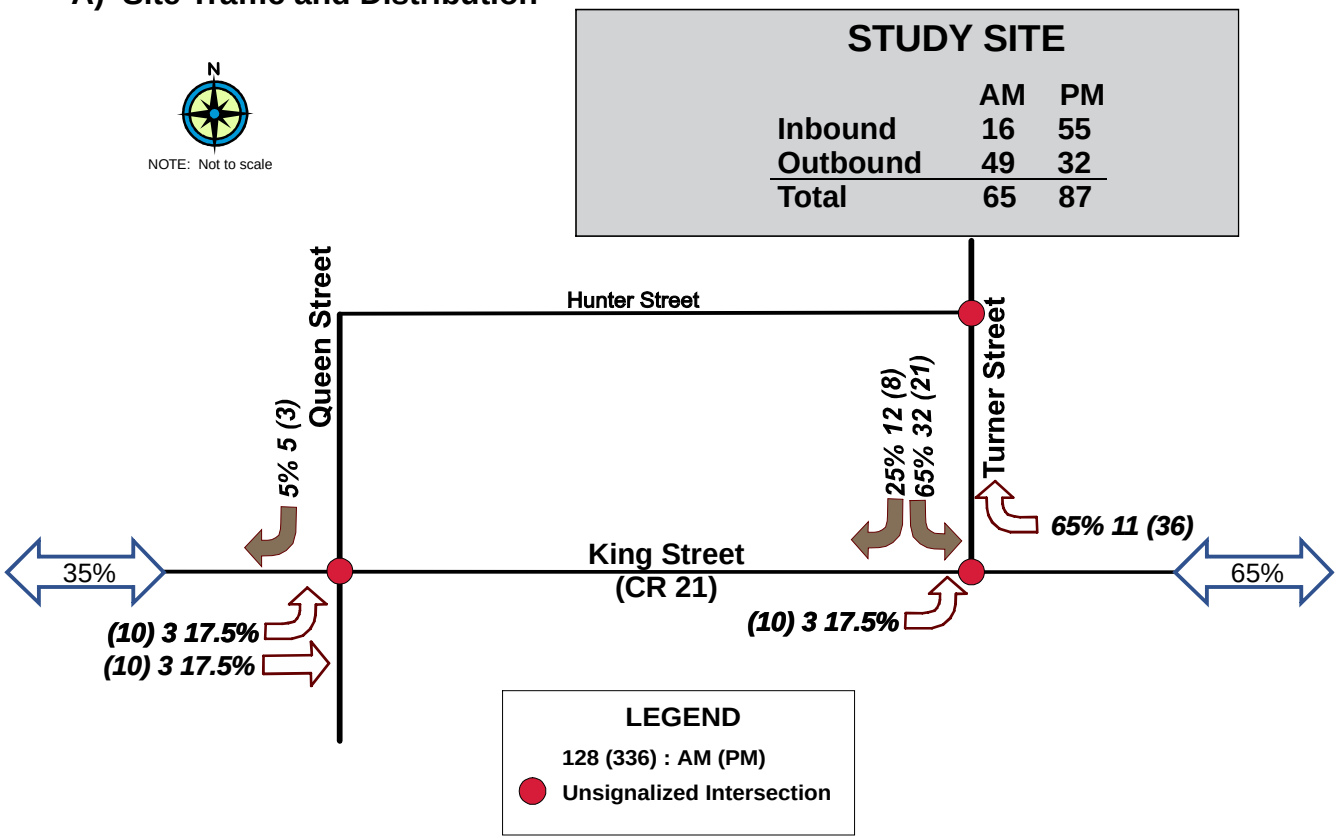
Note: Totals may not add up due to rounding

3.3 Directional Orientation of Site Traffic

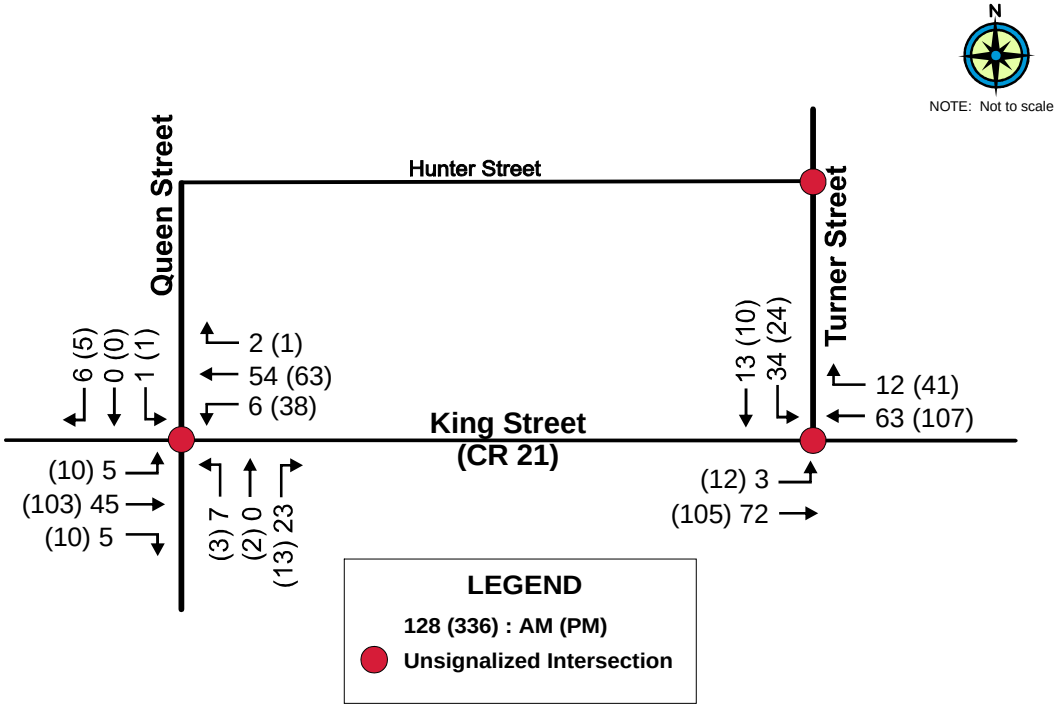
The directional orientation of the site traffic is expected to be similar to the trip patterns observed at the proposed site entrances and consistent with population distribution within commuting distance. Exhibit 3.1 describes the directional distribution of the future residents to/from the study site. In general, 65% of the site traffic is assumed to travel to/from the east on CR 21 and 35% site traffic is assumed to travel to/from the west on CR21. Exhibit 3.1 shows the projected site traffic vehicle volumes for the proposed development and the projected total traffic volumes in 2025 with the trips from the proposed development.

EXHIBIT 3.1: SITE and TOTAL TRAFFIC VOLUMES

A) Site Traffic and Distribution



B) 2025 Total Traffic Volumes



4.0 ANALYSIS OF PROJECTED TRAFFIC VOLUMES

Detailed intersection capacity analysis of conditions in 2025 with and without the proposed development was carried out using Trafficware Traffic Signal Timing Software -Synchro Version 9.0. The results are summarized in Table 4.1 Summary of Intersection Analysis, and detailed reports from the analysis are contained in Appendix B Intersection Capacity Analysis.

4.1 Study Intersections

2025 Background Conditions

Table 4.1: Summary of Intersection Capacity Analysis: 2025 Background Conditions

	Future (2025) Background Conditions				Future (2025) Background Conditions			
Intersection	**AM Peak**				**PM Peak**			
CR 21 (King St) & Turner St (TWSC)	LOS	Delay	95th Queue	v/c	LOS	Delay	95th Queue	v/c
EB-L	A	0.0	0.0	-	A	7.5	0.0	0.00
SB-LR	A	9.1	0.0	0.00	A	9.5	0.0	0.01
CR 21 (King St) & Queen St (TWSC)	LOS	Delay	95th Queue	v/c	LOS	Delay	95th Queue	v/c
NB-LTR	A	8.8	0.1	0.03	A	9.4	0.1	0.02
EB-L	A	7.3	0.0	0.00	A	0.0	0.0	-
WB-L	A	7.3	0.0	0.00	A	7.5	0.1	0.03
SB-LTR	A	9.0	0.0	0.00	A	9.6	0.0	0.00

Note: Delay in seconds; 95th Queue measurement in vehicles as provided in Synchro output files, see Appendix "B"

The impact of the growth in the background traffic at the study intersections is minimal and insignificant. All study intersections and associated movements are projected to continue to operate at LOS "A" with minimum delay during for both AM and PM peak hours. No Movements at the study intersection was found to have any meaningful 95th percentile queue length (queue length of 0.1 vehicle), or any capacity issues. In assessing the three principal components of intersection measures of effectiveness (MOE's - delay, queue length and v/c ratio), it can be concluded that there will be sufficient capacity in the existing study road network to accommodate growth in the background traffic.

2025 Total Traffic Conditions

Table 4.2: Summary of Intersection Capacity Analysis: 2025 Total Conditions

	Future (2025) Total Conditions				Future (2025) Total Conditions			
Intersection	**AM Peak**				**PM Peak**			
CR 21 (King St) & Turner St (TWSC)	LOS	Delay	95th Queue	v/c	LOS	Delay	95th Queue	v/c
EB-L	A	7.4	0.0	0.00	A	7.6	0.0	0.01
SB-LR	A	9.4	0.2	0.06	B	10.0	0.2	0.05
CR 21 (King St) & Queen St (TWSC)	LOS	Delay	95th Queue	v/c	LOS	Delay	95th Queue	v/c
NB-LTR	A	8.9	0.1	0.03	A	9.5	0.1	0.02
EB-L	A	7.3	0.0	0.00	A	7.4	0.0	0.01
WB-L	A	7.3	0.0	0.00	A	7.5	0.1	0.03
SB-LTR	A	8.7	0.0	0.01	A	9.0	0.0	0.01

Note: Delay in seconds; 95th Queue measurement in vehicles as provided in Synchro output files, see Appendix "B"

With the proposed development traffic added to the 2025 background traffic, all study intersections and associated movements are projected to continue to operate at LOS "B" or better with minimum delay during for both AM and PM peak hours. The traffic from the proposed development adds very minor increases in the three principal components of intersection measures of effectiveness (MOE's - delay, queue length and v/c ratio). The highest volume to capacity ratio will be at 0.06 for the southbound (outbound from the study site) CR 21/Turner Street intersection during the AM peak hour. The longest projected 95th percentile queue length is 0.2 vehicles, occurring at the southbound approach on Turner Street, indicates that there are no queuing issues at the study intersections.

The site traffic will add no meaningful increase to the delay or to the volume to capacity ratio or congestion for the County Road 21 corridor during the AM and PM peak hour period. In general, the study intersections are projected to operate with acceptable delays and residual capacity to accommodate future growth in background traffic with the added site traffic.

4.2 Auxiliary Turning Lane Analysis

Left Turn Lane Analysis

The left turn lane analysis is based on Ministry of Transportation, Ontario (MTO) left turn lane warrants. Left turn analysis is provided for the County Road 21/Turner Street intersection (the turning volumes as well as the through traffic volumes at this intersection is the highest) based on PM peak hour volumes (highest approach volumes occur during the PM peak hour) presented in Exhibit 3.1. The posted speed on County Road 21 is 50 km/hr. As such design speed of 70 km/hr is used for analyses, as per MTO guidelines. The left turn lane analyses indicate that left turn lane is not warranted on County Road 21 at Turner Street and at Queen Street (see, Appendix C).

Right Turn Lane Analysis

The right turn lane analysis is based on County of Peterborough right turn lane warrant guidelines (based on Virgina State Department of Transportation Guidelines). Right turn analysis is provided for the County Road 21/Turner Street intersection (the turning volumes as well as the through traffic volumes at this intersection is the highest) based on PM peak hour volumes (highest approach volumes occur during PM peak hour) presented in Exhibit 3.1. The right turn lane analyses indicate that no right turn taper or right turn lane is warranted on County Road 21 at Turner Street and at Queen Street (see Appendix D).

4.3 Impact of Site Traffic on the Local Road Network

The impact of the proposed development on the existing road network was assessed. The basis for the assessment included the Township of Cavan-Monaghan's 2016 Road Needs Study Report, (based on the MTO's Inventory Manual for Municipal Roads, 1991), excerpts are provided in Appendix E, as well

as Transportation Association of Canada (TAC)'s Geometric Design Guide for Canadian Roads, 2017 were used as references for the current road classifications and standards. The biggest impact of the proposed residential development is on Turner Street and the review and the analysis are provided in Table 4.3:

Table 4.3 - Existing and Future Road Conditions

Road Section	Existing Conditions		Future Conditions	Level of Impact
	TAC	Road Needs Study Recommendation		
Turner Street	Urban Local Residential <1000 veh/day	Upgrade 2U Excavate and Upgrade to Urban Cross-Section 2 Lifts – Urban	AADT increase to <1000 veh/day	Re-classify Local to Minor Collector when appropriate
Queen Street	Urban Local Residential <1000 veh/day	Upgrade 2U Excavate and Upgrade to Urban Cross-Section 2 Lifts – Urban	AADT increase to <1000 veh/day	Re-classify Local to Minor Collector when appropriate
New Internal Local Streets			AADT approx. <1000 veh/day	Urban Local Residential Road

MTO Inventory Manual noted (see Appendix F) that in cases where only a measure of "peak hour" traffic is available, an estimate of AADT may be obtained by multiplying the peak hour traffic by ten. According to TAC guidelines, a local residential road is expected to carry approximately 1,000 vehicles per day. The collector roads are expected to handle up to 8,000 vehicles per day. In the study area, Turner Street and Queen Street current AADT is less than 100 vehicles (as per 2016 Road Needs Study). When the proposed development is fully built-out, it is expected that Turner Street and (to less extent Queen Street) will perform a minor collector road functions as it will provide a direct access and general traffic movements within the study area and carry traffic volumes around 750 vehicles per day in certain section of the road.

5.0 PRINCIPAL FINDINGS AND RECOMMENDATIONS

This traffic impact study was carried out in support of the proposed residential development to be located just north of Peterborough County Road 21 on Turner Street in the Village of Millbrook, in the Township of Cavan-Monaghan, County of Peterborough. The traffic operational analyses described in this report have provided a detailed examination of the anticipated impacts of future background and site-generated traffic for the proposed development. The following are principal findings from the study and recommendations with respect to the proposed development.

5.1 The study considered the weekday peak hour periods using AM and PM peak hour vehicular volumes generated by the proposed development.

5.2 Under the existing conditions, the intersection capacity analysis indicates that all movements at all study intersections operate at LOS "A" with minimum delay, no queue and sufficient residual capacity to accommodate future growth in background traffic (see Table 2.1).

5.3 For planning purposes, the 2018 traffic volumes were projected ahead to 2025 planning horizon based on an average growth rate of 2.0% per annum for the roads in the study area.

5.4 Under the 2025 background conditions, the intersection capacity analysis indicates that all movements at all study intersections are projected to continue to operate at LOS "A" with minimum delay, no queue and sufficient residual capacity to accommodate future growth in background traffic (see Table 4.1).

5.5 The forecasts of future site trip generation for the proposed development were developed using the ITE land use Single Family (LU 210) using the number of units as an independent variable (using the “worst case” scenario analysis). The forecast peak hour vehicular trip generation by the proposed development is

summarized below and the resulting number of site generated vehicle trips is given in Table 3.1 and illustrated in Exhibit 3.1.

	AM Pk Hr	PM Pk Hr
Inbound	16	55
Outbound	55	32
Total	65	87

5.6 The projected distribution of site generated trips is illustrated on Exhibit 3.1. In general, the study assumed 65% of the site traffic travel to/from the east on CR 21.

5.7 Forecast future site generated trips are added to the 2025 background conditions to determine the 2025 total conditions. The intersection capacity analysis indicates that all movements at all study intersections are projected to continue to operate at LOS "B" or better with minimum delay, no queue and sufficient residual capacity to accommodate future growth in background traffic. The site traffic will add no significant increase to the average intersection delay or the volume to capacity ratio or congestion for the CR 21 corridor during the AM and PM peak hour period (see Table 4.2).

5.8 Auxiliary Turning Lane Analyses indicate that left turn lanes on CR21 at Queen Street and at Turner Street are not warranted and the right turn lanes on CR21 at Queen Street and at Turner Street are not warranted.

5.9 The study reviewed the functional classification of Turner Street and Queen Street based on the Township of Cavan-Monaghan's 2016 Road Needs Study Report (based on the MTO's Inventory Manual for Municipal Roads, 1991), as well as Transportation Association of Canada (TAC)'s Geometric Design Guide for Canadian Roads, 2017. The following are study recommendations:

- Turner Street to be classified as urban local (performing minor collector functions) designation.

- Queen Street to be classified as urban local (performing minor collector functions) designation.
- Internal Subdivision Roads to be built to urban local road standards.

5.10 The site generated peak hour volumes will have an acceptable level of impact on the study intersections.

5.11 No other mitigation measures will be necessary for the study intersections to support the proposed residential development.

TECHNICAL APPENDIX

APPENDIX A: Traffic Data

15 MINUTE REPORT

North-South Road: Turner Road / None **Municipality:** Millbrook **Day:** Tuesday
East-West Road: King Street West **Weather:** AM: Mainly Clear **Survey Date:** October 30, 2018

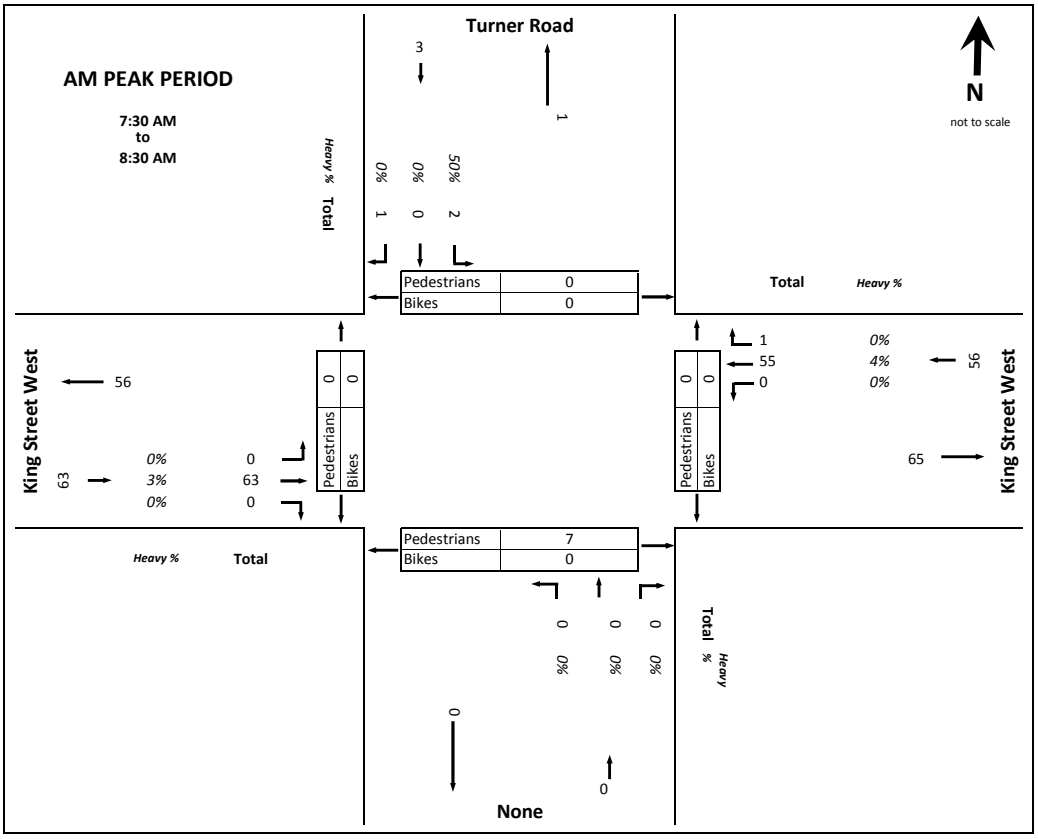
TIME BEGINNING	NORTH APPROACH								EAST APPROACH								SOUTH APPROACH								WEST APPROACH								Total Vehicular Traffic	Total PED/BIKE Traffic
	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike		
	Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right				
7:00	2	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	19	0
7:15	0	0	0	0	0	0	0	0	0	11	1	0	1	0	0	0	0	0	0	0	0	0	2	0	0	7	0	0	1	0	0	0	21	2
7:30	0	0	0	0	0	0	0	0	0	16	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	14	0	0	0	0	0	0	31	1
7:45	0	0	0	1	0	0	0	0	0	9	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	18	0	0	0	0	0	0	29	1
8:00	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	18	0	0	2	0	0	0	32	5
8:15	1	0	1	0	0	0	0	0	0	16	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	29	0
8:30	0	0	0	0	0	0	0	0	0	17	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	11	0	0	1	0	0	0	30	1
8:45	0	0	0	0	0	0	0	0	0	12	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	1	0	0	0	25	0

North-South Road: Turner Road / None **Municipality:** Millbrook **Day:** Tuesday
East-West Road: King Street West **Weather:** PM: Mainly Clear **Survey Date:** October 30, 2018

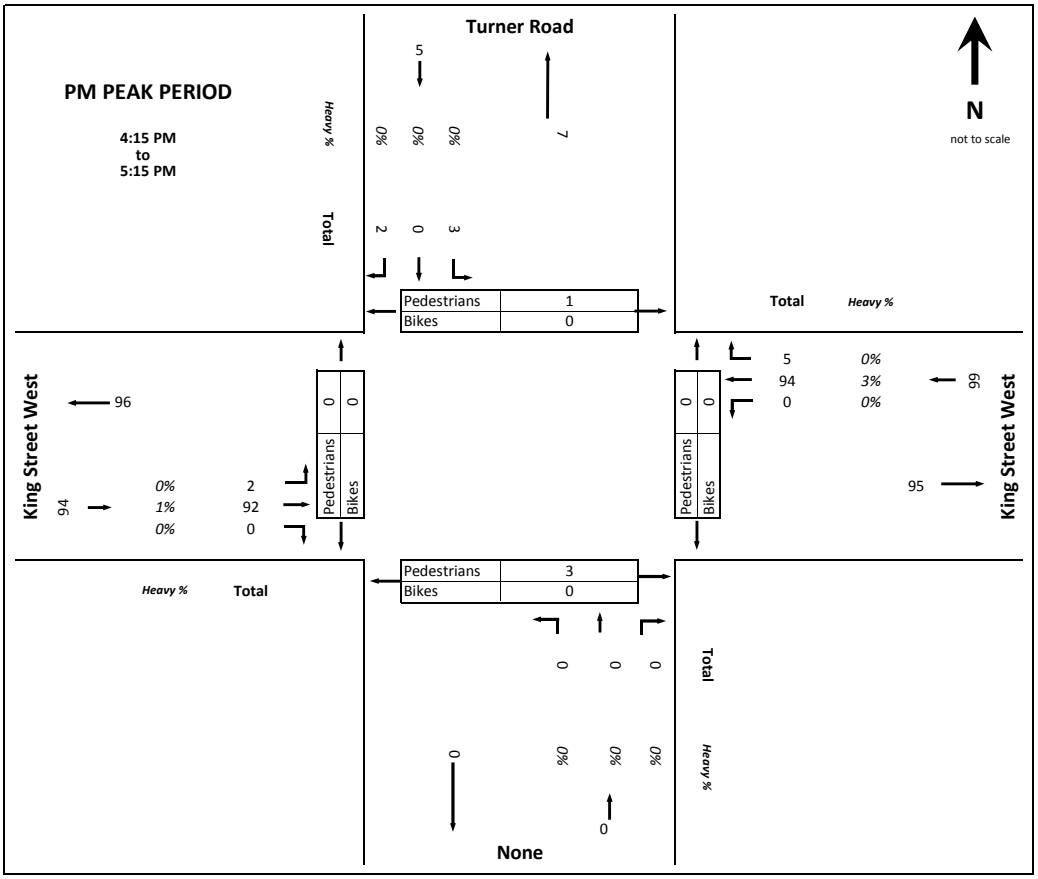
TIME BEGINNING	NORTH APPROACH								EAST APPROACH								SOUTH APPROACH								WEST APPROACH								Total Vehicular Traffic	Total PED/BIKE Traffic
	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike		
	Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right				
15:00	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	15	0	0	0	0	0	0	26	3
15:15	0	0	0	0	0	0	0	0	0	21	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0	20	0	0	2	0	0	0	44	3
15:30	0	0	0	0	0	0	0	0	0	15	1	0	0	0	0	0	0	0	0	0	0	0	1	2	0	24	0	0	0	0	0	0	40	3
15:45	0	0	0	0	0	0	0	0	0	11	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	19	0	0	0	0	0	0	31	1
16:00	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	18	0	0	0	0	0	0	33	2
16:15	0	0	0	0	0	0	0	0	0	25	3	0	1	0	0	0	0	0	0	0	0	0	2	0	0	22	0	0	1	0	0	0	52	2
16:30	1	0	0	0	0	0	1	0	0	25	1	0	2	0	0	0	0	0	0	0	0	0	1	0	0	24	0	0	0	0	0	0	53	2
16:45	1	0	1	0	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	24	0	0	0	0	0	0	45	0
17:00	1	0	1	0	0	0	0	0	0	22	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	21	0	0	0	0	0	0	46	0
17:15	1	0	0	0	0	0	0	1	0	19	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	0	0	0	0	0	0	49	1
17:30	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	19	0	0	0	0	0	0	41	1
17:45	2	0	0	0	0	0	0	0	0	16	1	0	0	0	0	0	0	0	0	0	0	0	5	0	0	29	0	0	0	0	0	0	48	5

TURNING MOVEMENT DIAGRAMS

North-South Road: Turner Road / None
East-West Road: King Street West
Municipality: Millbrook
Weather: AM: Mainly Clear
Day: Tuesday
Survey Date: October 30, 2018



South Road: Turner Road / None
East-West Road: King Street West
Municipality: Millbrook
Weather: PM: Mainly Clear
Day: Tuesday
Survey Date: October 30, 2018



15 MINUTE REPORT

North-South Road: Queen Street / Huston Road **Municipality:** Millbrook **Day:** Tuesday
East-West Road: King Street West **Weather:** AM: Mainly Clear **Survey Date:** October 30, 2018

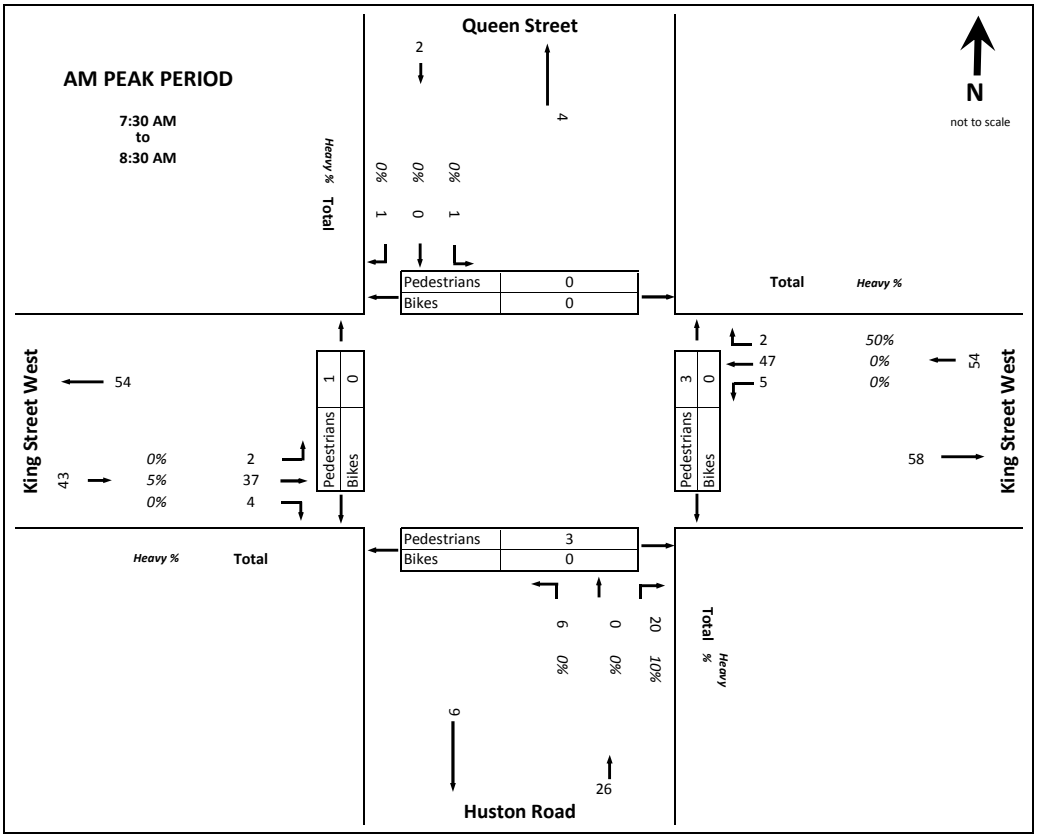
TIME BEGINNING	NORTH APPROACH								EAST APPROACH								SOUTH APPROACH								WEST APPROACH								Total Vehicular Traffic	Total PED/BIKE Traffic
	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike		
	Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right				
7:00	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	2	0	0	0	0	0	0	18	0
7:15	0	0	0	0	0	0	0	0	0	14	0	0	2	0	1	0	1	0	7	0	0	0	0	0	0	5	0	1	0	0	0	0	30	1
7:30	0	0	0	0	0	0	0	0	0	12	0	0	0	1	3	0	2	0	7	0	0	0	1	0	0	9	1	0	0	0	1	0	32	5
7:45	0	0	0	0	0	0	0	0	1	10	1	0	0	0	0	0	0	0	5	0	0	2	2	0	0	8	2	0	1	0	0	0	30	2
8:00	1	0	1	0	0	0	0	0	1	12	0	0	0	0	0	0	3	0	4	0	0	0	0	0	1	8	0	0	0	0	0	0	31	0
8:15	0	0	0	0	0	0	0	0	3	13	0	0	0	0	0	0	1	0	2	0	0	0	0	0	1	10	1	0	1	0	0	0	32	0
8:30	0	0	0	0	0	0	0	0	2	12	0	0	1	0	0	0	0	0	3	0	0	0	1	0	0	7	0	0	0	0	0	0	25	1
8:45	0	0	1	0	0	0	0	0	0	7	2	0	0	0	0	0	0	0	2	0	0	0	1	0	0	13	1	0	0	0	0	0	26	1

North-South Road: Queen Street / Huston Road **Municipality:** Millbrook **Day:** Tuesday
East-West Road: King Street West **Weather:** PM: Mainly Clear **Survey Date:** October 30, 2018

TIME BEGINNING	NORTH APPROACH								EAST APPROACH								SOUTH APPROACH								WEST APPROACH								Total Vehicular Traffic	Total PED/BIKE Traffic
	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike	CAR & PICKUP			HEAVY			Ped	Bike		
	Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right			Left	Thru	Right	Left	Thru	Right				
15:00	0	0	0	0	0	0	0	0	0	11	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0	15	0	0	1	0	0	0	28	3
15:15	0	0	0	0	0	0	0	0	0	21	0	0	1	0	0	0	0	0	0	1	0	0	3	0	0	20	0	0	0	0	0	0	43	3
15:30	0	0	0	0	0	0	0	0	0	15	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	24	0	0	1	0	0	0	41	1
15:45	0	0	0	0	0	0	0	0	0	11	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	19	0	0	0	0	0	0	31	1
16:00	0	0	0	0	0	0	0	0	0	15	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	18	0	0	1	0	0	0	35	2
16:15	0	0	0	0	0	0	0	0	0	25	3	0	0	0	0	0	0	0	0	0	0	0	2	0	0	22	0	0	0	0	0	0	50	2
16:30	1	0	0	0	0	0	1	1	0	25	1	0	1	0	0	1	0	0	0	0	0	0	1	0	0	24	0	0	0	0	0	0	52	4
16:45	1	0	1	0	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	24	0	0	0	0	0	0	46	0
17:00	1	0	1	0	0	0	0	0	0	22	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	21	0	0	0	0	0	0	47	1
17:15	1	0	0	0	0	0	0	0	0	19	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	0	0	0	0	0	0	49	0
17:30	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	19	0	0	0	0	0	0	41	1
17:45	2	0	0	0	0	0	0	0	0	16	1	0	0	0	0	0	0	0	0	0	0	0	5	0	0	29	0	0	0	0	0	0	48	5

TURNING MOVEMENT DIAGRAMS

North-South Road: Queen Street / Huston Road
East-West Road: King Street West
Municipality: Millbrook
Weather: AM: Mainly Clear
Day: Tuesday
Survey Date: October 30, 2018



South Road: Queen Street / Huston Road
East-West Road: King Street West
Municipality: Millbrook
Weather: PM: Mainly Clear
Day: Tuesday
Survey Date: October 30, 2018

Basic Volume Report: 021002

Station ID : 021002

Info Line 1 : wbound inter ahead sign
Info Line 2 : 150 m east 1/4 Tapley Line
GPS Lat/Lon :
DB File : 021002.DB

Last Connected Device Type : TT-8-BT
Version Number : 1.07
Serial Number : 98719

Number of Lanes : 1
Posted Speed Limit : 0.0 kph

Lane #1 Configuration

#	Dir.	Information	Volume Mode	Volume Sensors	Divide By 2	Comment
1.			Normal	Axle	Yes	

Lane #1 Basic Volume Data From: 00:00 - 05/10/2016 To: 23:59 - 05/10/2016

Date	DW	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total
051016	T	5	2	0	6	14	40	59	89	69	74	59	61	66	72	69	114	121	112	83	73	36	36	21	9	1290
Month Total :		5	2	0	6	14	40	59	89	69	74	59	61	66	72	69	114	121	112	83	73	36	36	21	9	1290
Percent :		0%	0%	0%	0%	1%	3%	5%	7%	5%	6%	5%	5%	5%	6%	5%	9%	9%	9%	6%	6%	3%	3%	2%	1%	
ADT :		5	2	0	6	14	40	59	89	69	74	59	61	66	72	69	114	121	112	83	73	36	36	21	9	1290

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
DW Totals :	0	0	1290	0	0	0	0
# Days :	0.0	0.0	1.0	0.0	0.0	0.0	0.0
ADT :	0	0	1290	0	0	0	0
Percent :	0%	0%	100%	0%	0%	0%	0%

	Total	Percent
Weekday (Mon-Fri) :	1290	100%
ADT :	1290	
Weekend (Sat-Sun) :	0	0%
ADT :	0	

Basic Volume Summary: 021002

Grand Total For Data From: 00:00 - 05/10/2016 To: 23:59 - 05/10/2016

Total Count	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total
Lane #1	5	2	0	6	14	40	59	89	69	74	59	61	66	72	69	114	121	112	83	73	36	36	21	9	1290
TOTAL	5	2	0	6	14	40	59	89	69	74	59	61	66	72	69	114	121	112	83	73	36	36	21	9	1290

Percents:	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
Lane #1	0%	0%	0%	0%	1%	3%	5%	7%	5%	6%	5%	5%	5%	6%	5%	9%	9%	9%	6%	6%	3%	3%	2%	1%
TOTAL	0%	0%	0%	0%	1%	3%	5%	7%	5%	6%	5%	5%	5%	6%	5%	9%	9%	9%	6%	6%	3%	3%	2%	1%

ADT:	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total
Lane #1	5	2	0	6	14	40	59	89	69	74	59	61	66	72	69	114	121	112	83	73	36	36	21	9	1290
TOTAL	5	2	0	6	14	40	59	89	69	74	59	61	66	72	69	114	121	112	83	73	36	36	21	9	1290

LANE #1

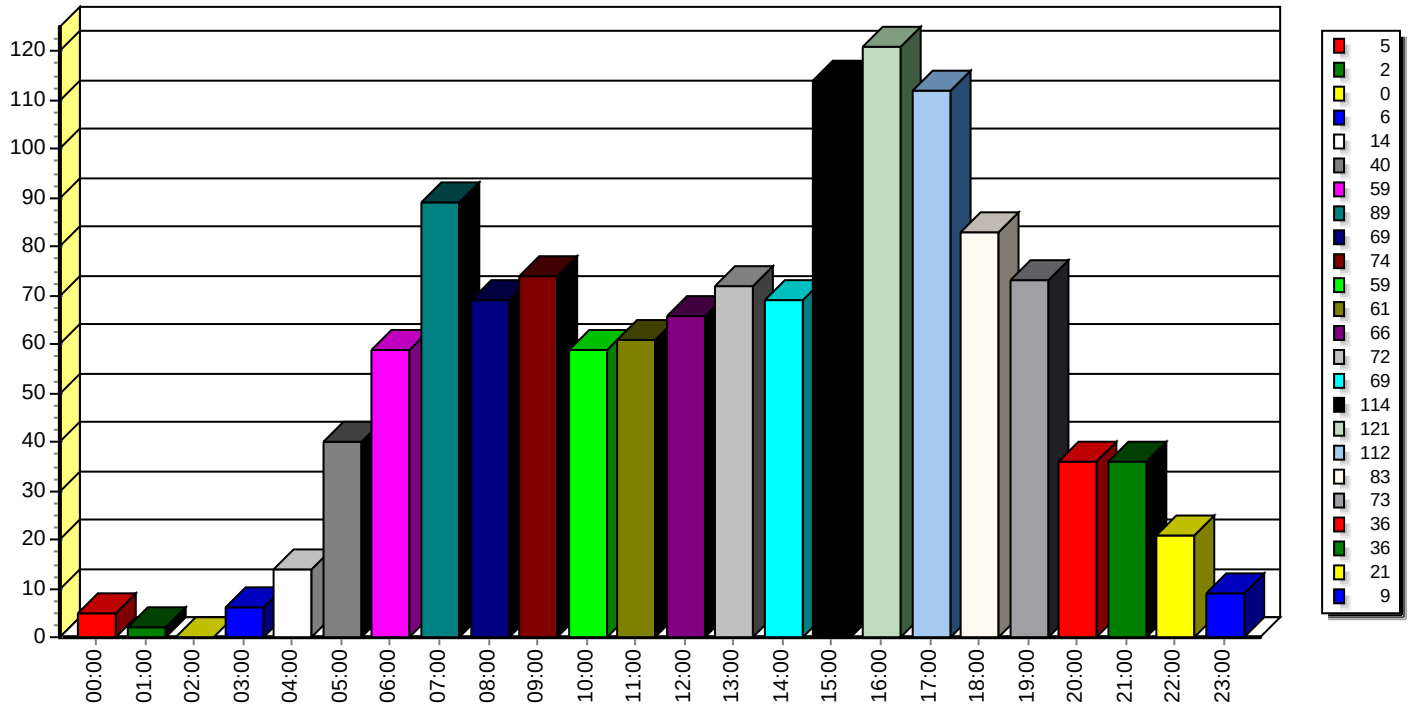
	Sun	Mon	Tue	Wed	Thu	Fri	Sat		Total	Percent
DW Totals :	0	0	1290	0	0	0	0	Weekday (Mon-Fri) :	1290	100%
# Days :	0.0	0.0	1.0	0.0	0.0	0.0	0.0	ADT :	1290	
ADT :	0	0	1290	0	0	0	0	Weekend (Sat-Sun) :	0	0%
Percent :	0%	0%	100%	0%	0%	0%	0%	ADT :	0	

ALL LANES

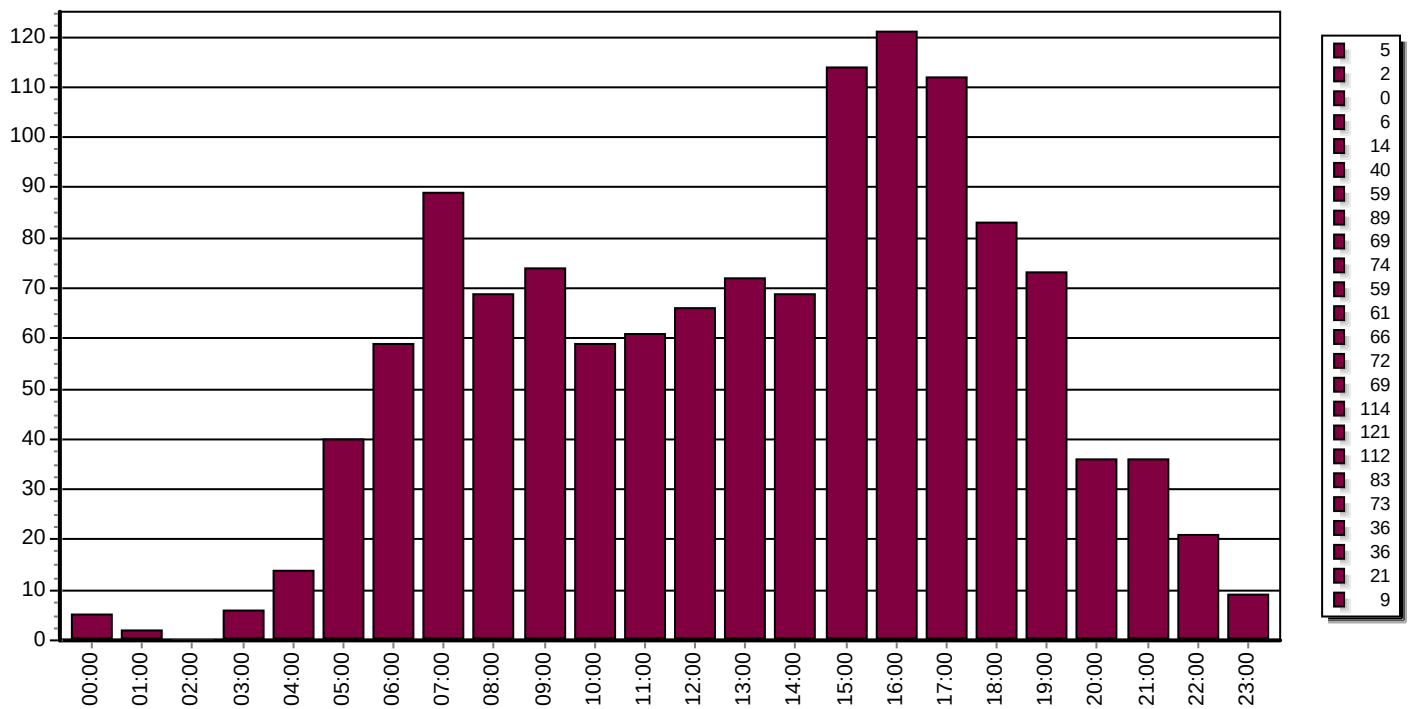
	Sun	Mon	Tue	Wed	Thu	Fri	Sat		Total	Percent
DW Totals :	0	0	1290	0	0	0	0	Weekday (Mon-Fri) :	1290	100%
# Days :	0.0	0.0	1.0	0.0	0.0	0.0	0.0	ADT :	1290	
ADT :	0	0	1290	0	0	0	0	Weekend (Sat-Sun) :	0	0%
Percent :	0%	0%	100%	0%	0%	0%	0%	ADT :	0	

021002 Charts For Data From: 00:00 - 05/10/2016 To: 23:59 - 05/10/2016

ADT Volume vs. Time (all lanes combined)

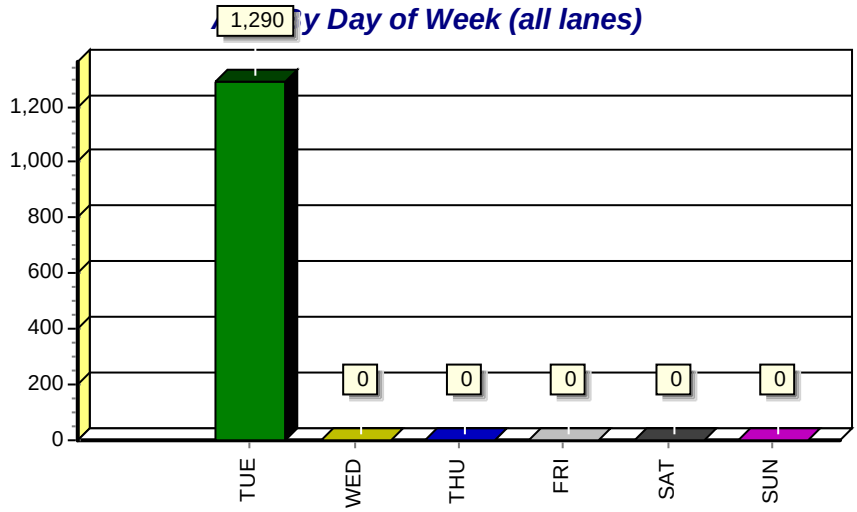


ADT Volume vs. Time (lane comparison)



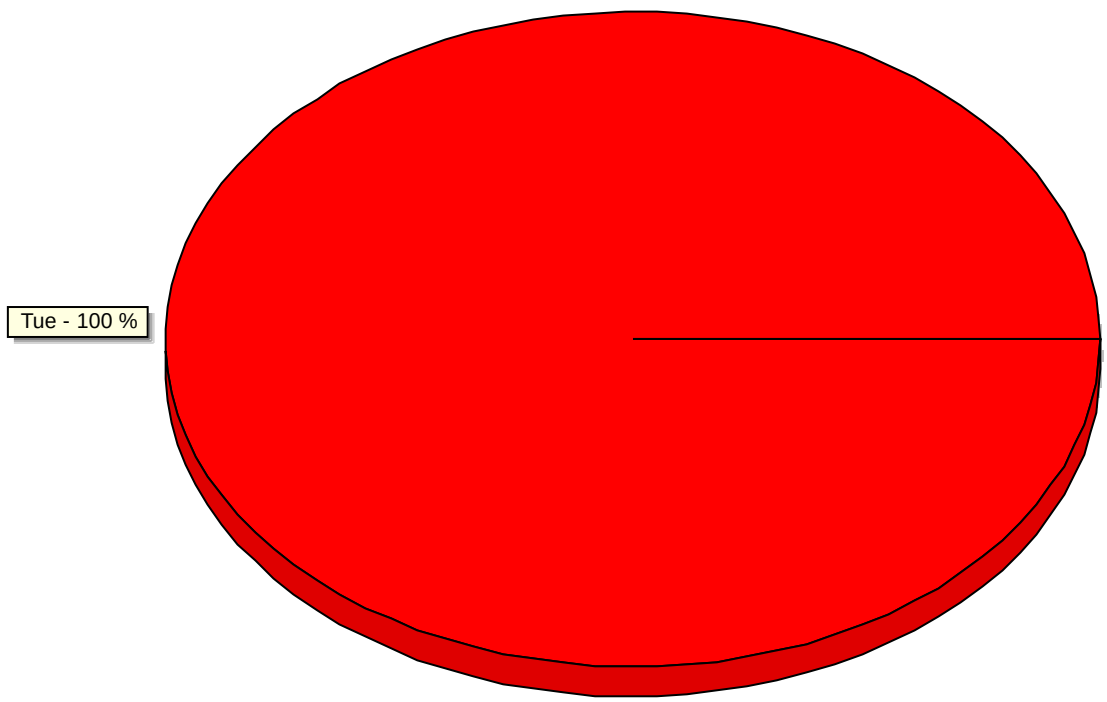
021002 Charts For Data From: 00:00 - 05/10/2016 To: 23:59 - 05/10/2016

Average by Day of Week (all lanes)



DAY	ADT	TOTAL	# DAYS
Mon	-	-	-
Tue	1290	1290	1.0
Wed	-	-	-
Thu	-	-	-
Fri	-	-	-
Sat	-	-	-
Sun	-	-	-

Percent of Totals by Day of Week



Basic Volume Report: 021002

Station ID : 021002

Info Line 1 : wbound inter ahead sign
Info Line 2 : 150 m east 1/4 Tapley Line
GPS Lat/Lon :
DB File : 021002.DB

Last Connected Device Type : Phoenix
Version Number : 2.94
Serial Number : 52367

Number of Lanes : 2
Posted Speed Limit : 0.0 kph

Lane #1 Configuration

#	Dir.	Information	Volume Mode	Volume Sensors	Divide By 2	Comment
1.	W	WB	Normal	Veh.	No	

Lane #1 Basic Volume Data From: 00:00 - 07/06/2016 To: 23:59 - 07/06/2016

Date	DW	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total
070616	W	1	1	0	7	16	39	32	47	45	44	40	40	33	39	48	49	36	60	40	27	32	21	7	4	708
Month Total :		1	1	0	7	16	39	32	47	45	44	40	40	33	39	48	49	36	60	40	27	32	21	7	4	708
Percent :		0%	0%	0%	1%	2%	6%	5%	7%	6%	6%	6%	6%	5%	6%	7%	7%	5%	8%	6%	4%	5%	3%	1%	1%	
ADT :		1	1	0	7	16	39	32	47	45	44	40	40	33	39	48	49	36	60	40	27	32	21	7	4	708

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
DW Totals :	0	0	0	708	0	0	0
# Days :	0.0	0.0	0.0	1.0	0.0	0.0	0.0
ADT :	0	0	0	708	0	0	0
Percent :	0%	0%	0%	100%	0%	0%	0%

	Total	Percent
Weekday (Mon-Fri) :	708	100%
ADT :	708	
Weekend (Sat-Sun) :	0	0%
ADT :	0	

Lane #2 Configuration

#	Dir.	Information	Volume Mode	Volume Sensors	Divide By 2	Comment
2.	E	EB	Normal	Veh.	No	

Lane #2 Basic Volume Data From: 00:00 - 07/06/2016 To: 23:59 - 07/06/2016

Date	DW	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total
070616	W	5	1	2	1	4	2	10	24	29	35	43	34	37	27	40	58	97	79	51	29	21	21	16	16	682
Month Total :		5	1	2	1	4	2	10	24	29	35	43	34	37	27	40	58	97	79	51	29	21	21	16	16	682
Percent :		1%	0%	0%	0%	1%	0%	1%	4%	4%	5%	6%	5%	5%	4%	6%	9%	14%	12%	7%	4%	3%	3%	2%	2%	
ADT :		5	1	2	1	4	2	10	24	29	35	43	34	37	27	40	58	97	79	51	29	21	21	16	16	682

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
DW Totals :	0	0	0	682	0	0	0
# Days :	0.0	0.0	0.0	1.0	0.0	0.0	0.0
ADT :	0	0	0	682	0	0	0
Percent :	0%	0%	0%	100%	0%	0%	0%

	Total	Percent
Weekday (Mon-Fri) :	682	100%
ADT :	682	
Weekend (Sat-Sun) :	0	0%
ADT :	0	

Basic Volume Summary: 021002

Grand Total For Data From: 00:00 - 07/06/2016 To: 23:59 - 07/06/2016

Total Count	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total
Lane #1	1	1	0	7	16	39	32	47	45	44	40	40	33	39	48	49	36	60	40	27	32	21	7	4	708
Lane #2	5	1	2	1	4	2	10	24	29	35	43	34	37	27	40	58	97	79	51	29	21	21	16	16	682
TOTAL	6	2	2	8	20	41	42	71	74	79	83	74	70	66	88	107	133	139	91	56	53	42	23	20	1390

Percents:	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
Lane #1	0%	0%	0%	1%	2%	6%	5%	7%	6%	6%	6%	6%	5%	6%	7%	7%	5%	8%	6%	4%	5%	3%	1%	1%
Lane #2	1%	0%	0%	0%	1%	0%	1%	4%	4%	5%	6%	5%	5%	4%	6%	9%	14%	12%	7%	4%	3%	3%	2%	2%
TOTAL	0%	0%	0%	1%	1%	3%	3%	5%	5%	6%	6%	5%	5%	5%	6%	8%	10%	10%	7%	4%	4%	3%	2%	1%

ADT:	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total
Lane #1	1	1	0	7	16	39	32	47	45	44	40	40	33	39	48	49	36	60	40	27	32	21	7	4	708
Lane #2	5	1	2	1	4	2	10	24	29	35	43	34	37	27	40	58	97	79	51	29	21	21	16	16	682
TOTAL	6	2	2	8	20	41	42	71	74	79	83	74	70	66	88	107	133	139	91	56	53	42	23	20	1390

LANE #1

	Sun	Mon	Tue	Wed	Thu	Fri	Sat		Total	Percent
DW Totals :	0	0	0	708	0	0	0	Weekday (Mon-Fri) :	708	100%
# Days :	0.0	0.0	0.0	1.0	0.0	0.0	0.0	ADT :	708	
ADT :	0	0	0	708	0	0	0	Weekend (Sat-Sun) :	0	0%
Percent :	0%	0%	0%	100%	0%	0%	0%	ADT :	0	

LANE #2

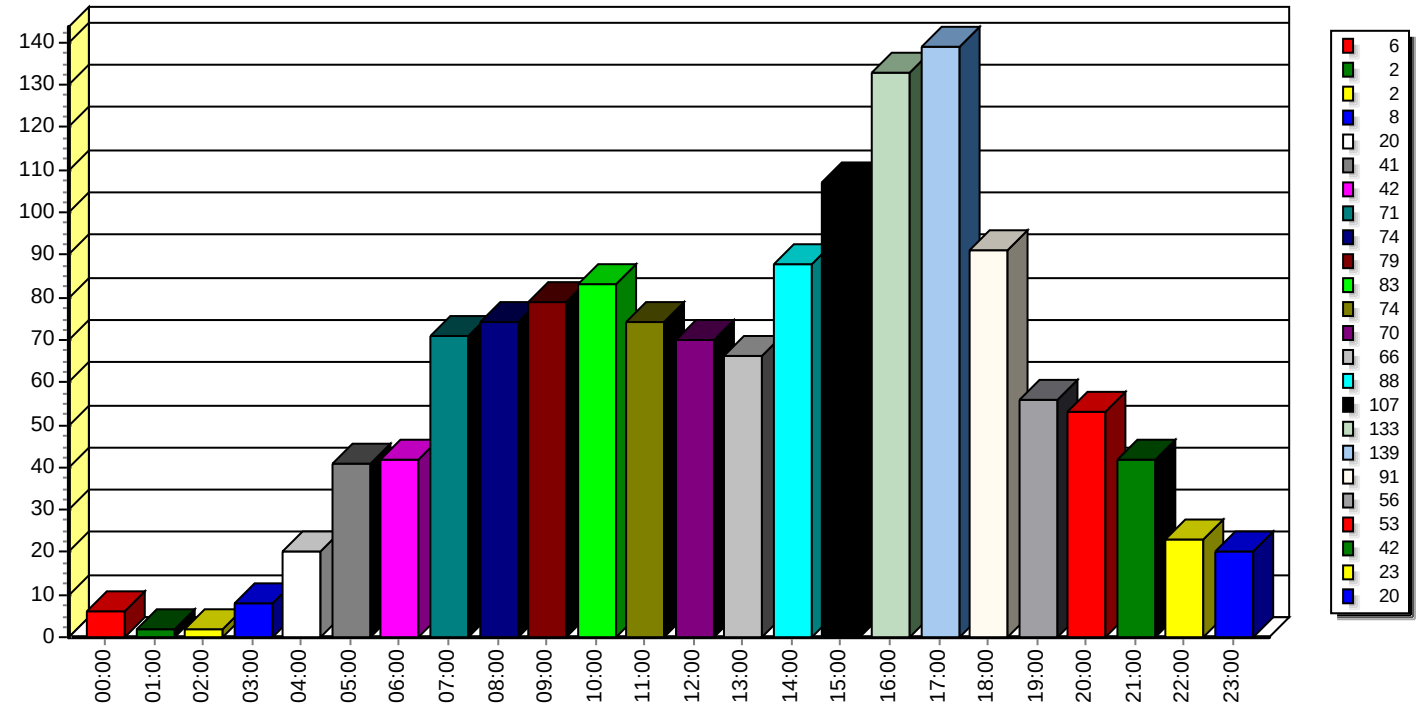
	Sun	Mon	Tue	Wed	Thu	Fri	Sat		Total	Percent
DW Totals :	0	0	0	682	0	0	0	Weekday (Mon-Fri) :	682	100%
# Days :	0.0	0.0	0.0	1.0	0.0	0.0	0.0	ADT :	682	
ADT :	0	0	0	682	0	0	0	Weekend (Sat-Sun) :	0	0%
Percent :	0%	0%	0%	100%	0%	0%	0%	ADT :	0	

ALL LANES

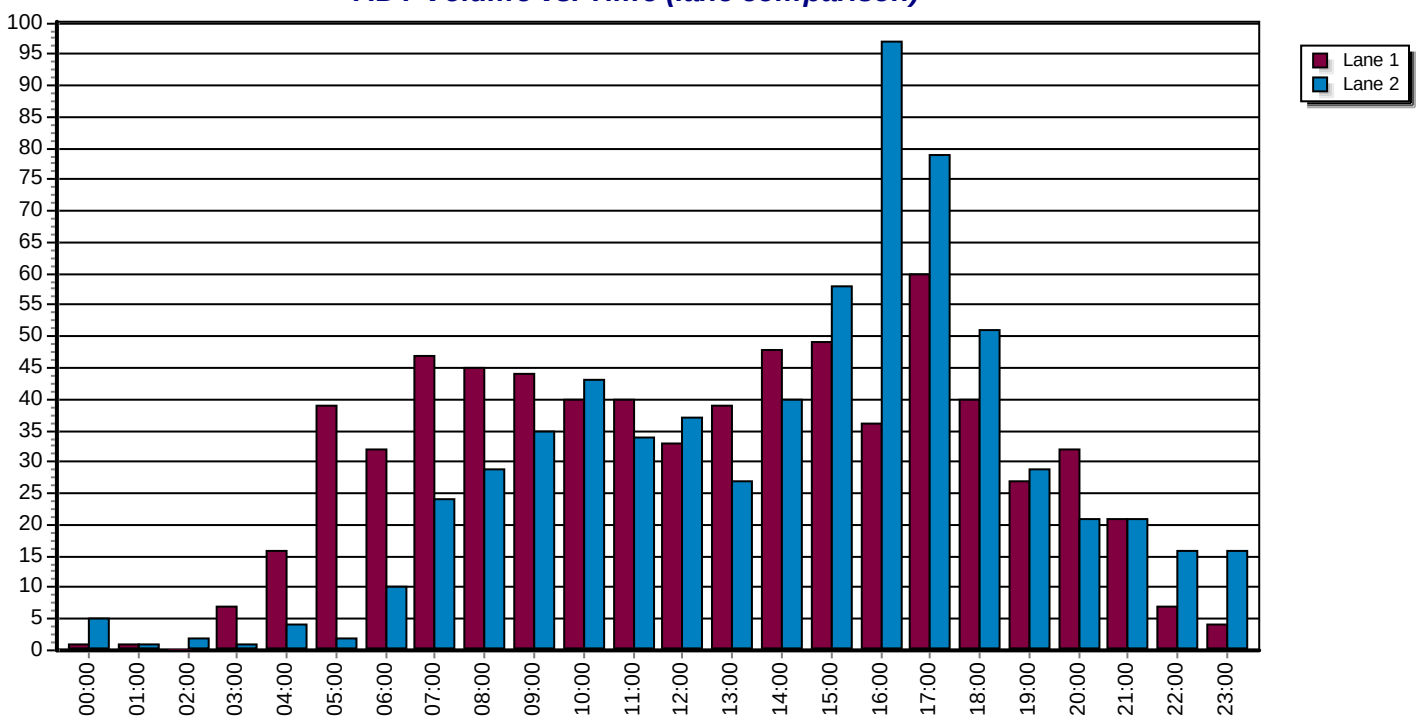
	Sun	Mon	Tue	Wed	Thu	Fri	Sat		Total	Percent
DW Totals :	0	0	0	1390	0	0	0	Weekday (Mon-Fri) :	1390	100%
# Days :	0.0	0.0	0.0	1.0	0.0	0.0	0.0	ADT :	1390	
ADT :	0	0	0	1390	0	0	0	Weekend (Sat-Sun) :	0	0%
Percent :	0%	0%	0%	100%	0%	0%	0%	ADT :	0	

021002 Charts For Data From: 00:00 - 07/06/2016 To: 23:59 - 07/06/2016

ADT Volume vs. Time (all lanes combined)

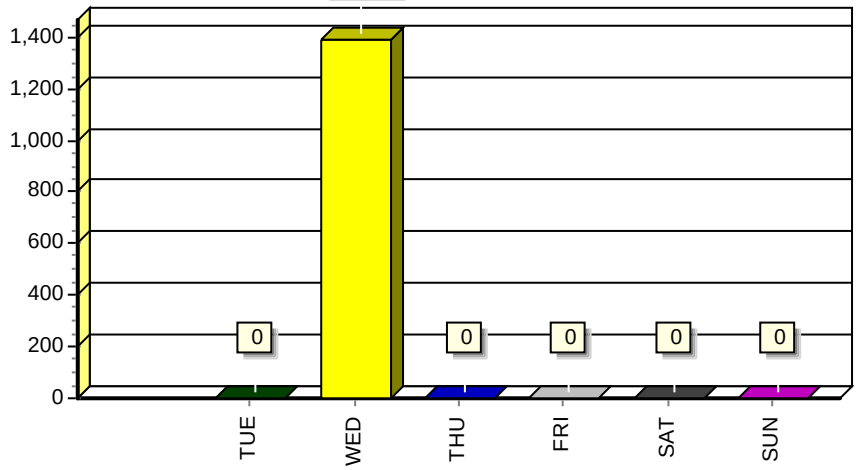


ADT Volume vs. Time (lane comparison)



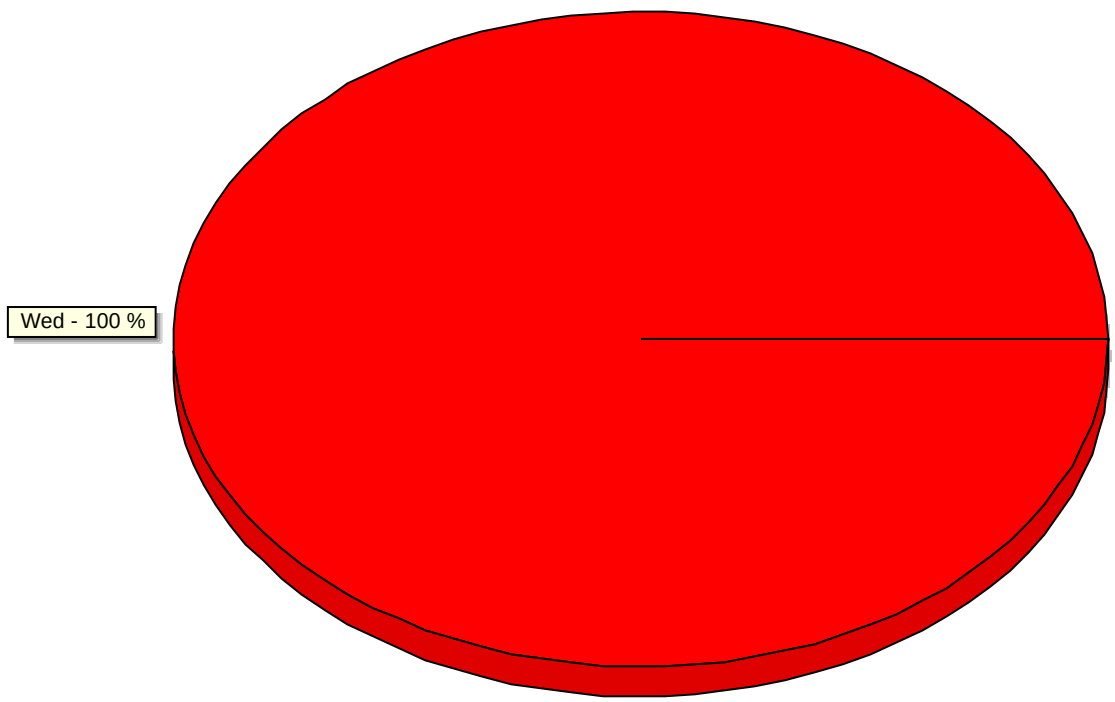
021002 Charts For Data From: 00:00 - 07/06/2016 To: 23:59 - 07/06/2016

ADT By 1,390 f Week (all lanes)



DAY	ADT	TOTAL	# DAYS
Mon	-	-	-
Tue	-	-	-
Wed	1390	1390	1.0
Thu	-	-	-
Fri	-	-	-
Sat	-	-	-
Sun	-	-	-

Percent of Totals by Day of Week



Basic Volume Report: 021002

Station ID : 021002

Info Line 1 : wbound inter ahead sign
Info Line 2 : 150 m east 1/4 Tapley Line
GPS Lat/Lon :
DB File : 021002.DB

Last Connected Device Type : Unicorn
Version Number : 2.94
Serial Number : 90679

Number of Lanes : 1
Posted Speed Limit : 0.0 kph

Lane #1 Configuration

#	Dir.	Information	Volume Mode	Volume Sensors	Divide By 2	Comment
1.			Normal	Axle	Yes	

Lane #1 Basic Volume Data From: 00:00 - 10/12/2016 To: 23:59 - 10/12/2016

Date	DW	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total
101216	W	1	3	1	5	21	38	57	72	73	52	59	64	52	74	88	110	105	111	85	51	23	22	24	13	1204
Month Total :		1	3	1	5	21	38	57	72	73	52	59	64	52	74	88	110	105	111	85	51	23	22	24	13	1204
Percent :		0%	0%	0%	0%	2%	3%	5%	6%	6%	4%	5%	5%	4%	6%	7%	9%	9%	9%	7%	4%	2%	2%	2%	1%	
ADT :		1	3	1	5	21	38	57	72	73	52	59	64	52	74	88	110	105	111	85	51	23	22	24	13	1204

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
DW Totals :	0	0	0	1204	0	0	0
# Days :	0.0	0.0	0.0	1.0	0.0	0.0	0.0
ADT :	0	0	0	1204	0	0	0
Percent :	0%	0%	0%	100%	0%	0%	0%

	Total	Percent
Weekday (Mon-Fri) :	1204	100%
ADT :	1204	
Weekend (Sat-Sun) :	0	0%
ADT :	0	

Basic Volume Summary: 021002

Grand Total For Data From: 00:00 - 10/12/2016 To: 23:59 - 10/12/2016

Total Count	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total
Lane #1	1	3	1	5	21	38	57	72	73	52	59	64	52	74	88	110	105	111	85	51	23	22	24	13	1204
TOTAL	1	3	1	5	21	38	57	72	73	52	59	64	52	74	88	110	105	111	85	51	23	22	24	13	1204

Percents:	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
Lane #1	0%	0%	0%	0%	2%	3%	5%	6%	6%	4%	5%	5%	4%	6%	7%	9%	9%	9%	7%	4%	2%	2%	2%	1%
TOTAL	0%	0%	0%	0%	2%	3%	5%	6%	6%	4%	5%	5%	4%	6%	7%	9%	9%	9%	7%	4%	2%	2%	2%	1%

ADT:	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total
Lane #1	1	3	1	5	21	38	57	72	73	52	59	64	52	74	88	110	105	111	85	51	23	22	24	13	1204
TOTAL	1	3	1	5	21	38	57	72	73	52	59	64	52	74	88	110	105	111	85	51	23	22	24	13	1204

LANE #1

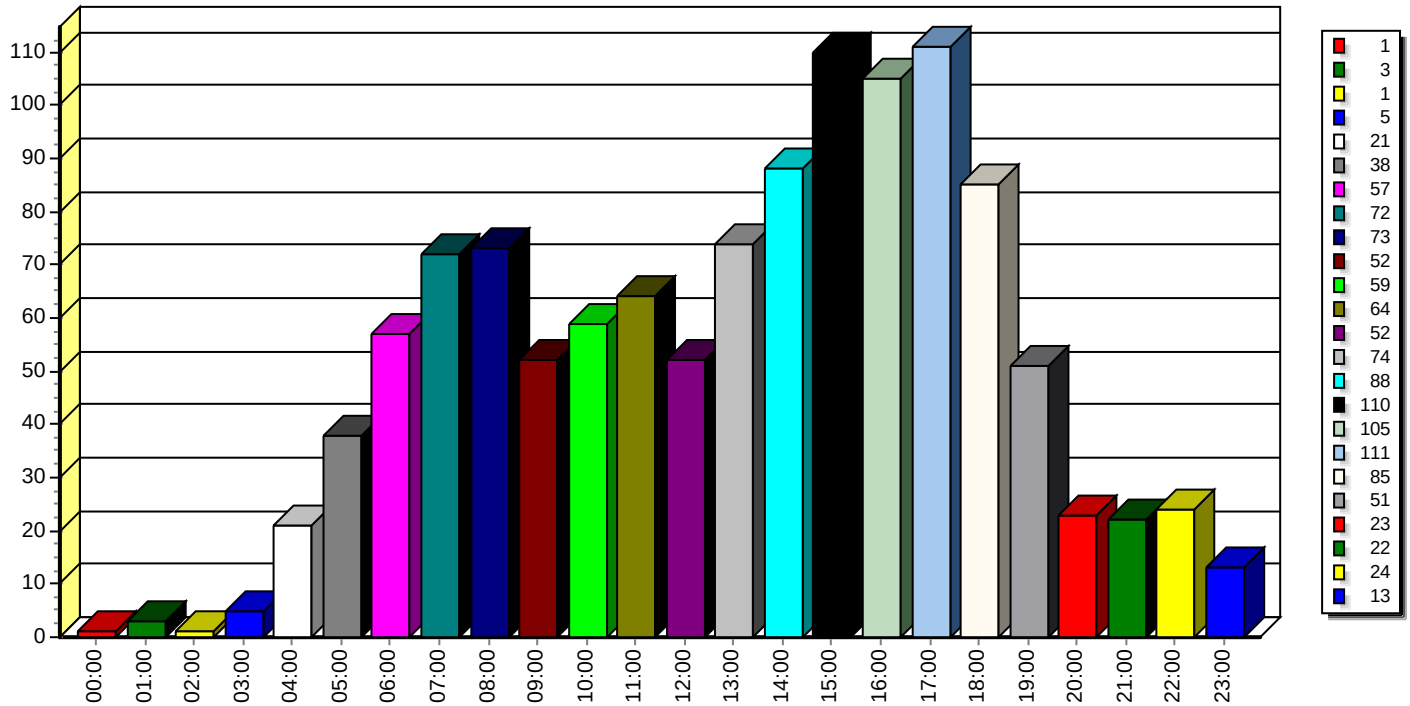
	Sun	Mon	Tue	Wed	Thu	Fri	Sat		Total	Percent
DW Totals :	0	0	0	1204	0	0	0	Weekday (Mon-Fri) :	1204	100%
# Days :	0.0	0.0	0.0	1.0	0.0	0.0	0.0	ADT :	1204	
ADT :	0	0	0	1204	0	0	0	Weekend (Sat-Sun) :	0	0%
Percent :	0%	0%	0%	100%	0%	0%	0%	ADT :	0	

ALL LANES

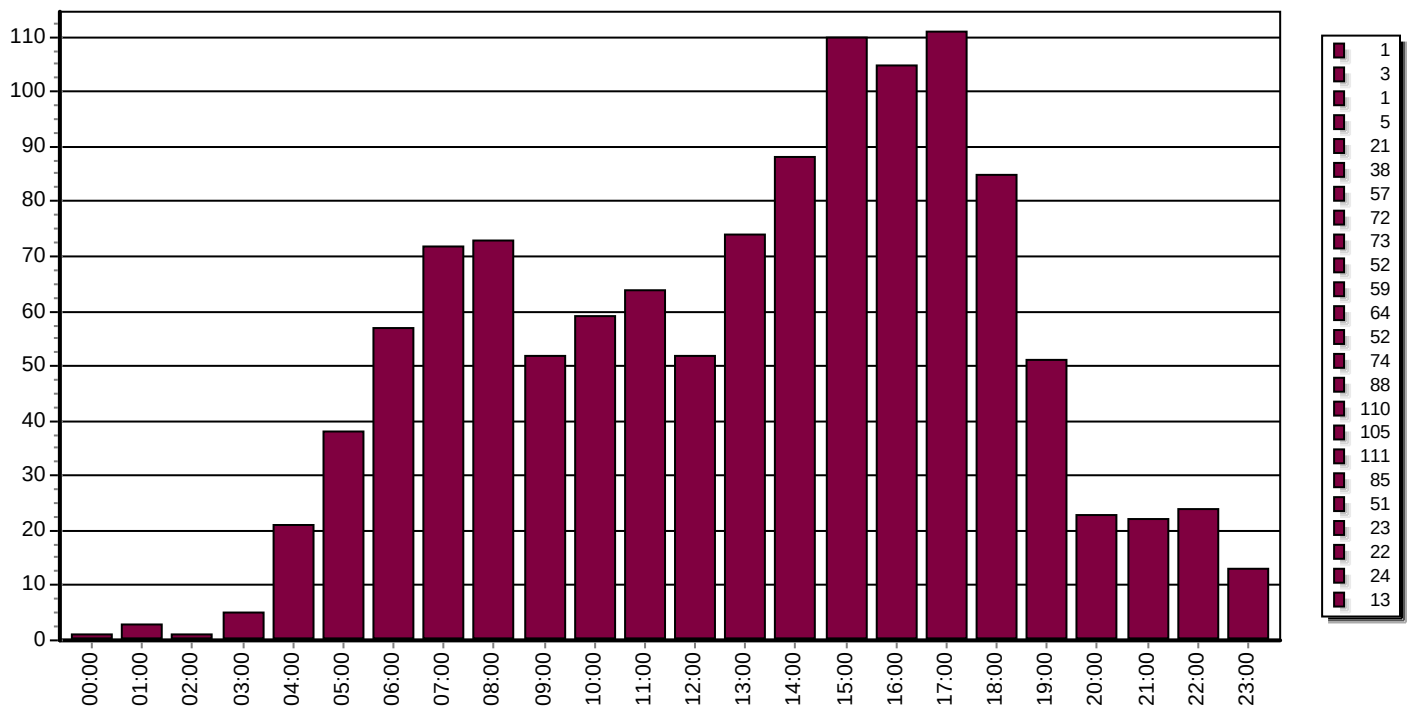
	Sun	Mon	Tue	Wed	Thu	Fri	Sat		Total	Percent
DW Totals :	0	0	0	1204	0	0	0	Weekday (Mon-Fri) :	1204	100%
# Days :	0.0	0.0	0.0	1.0	0.0	0.0	0.0	ADT :	1204	
ADT :	0	0	0	1204	0	0	0	Weekend (Sat-Sun) :	0	0%
Percent :	0%	0%	0%	100%	0%	0%	0%	ADT :	0	

021002 Charts For Data From: 00:00 - 10/12/2016 To: 23:59 - 10/12/2016

ADT Volume vs. Time (all lanes combined)

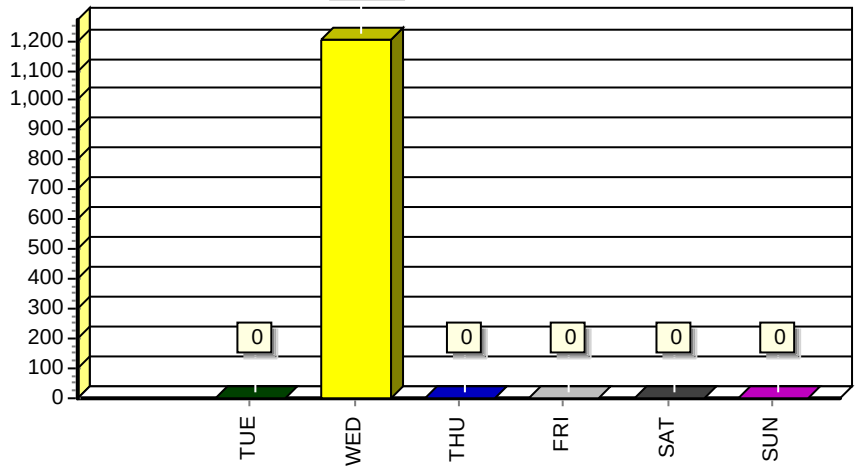


ADT Volume vs. Time (lane comparison)



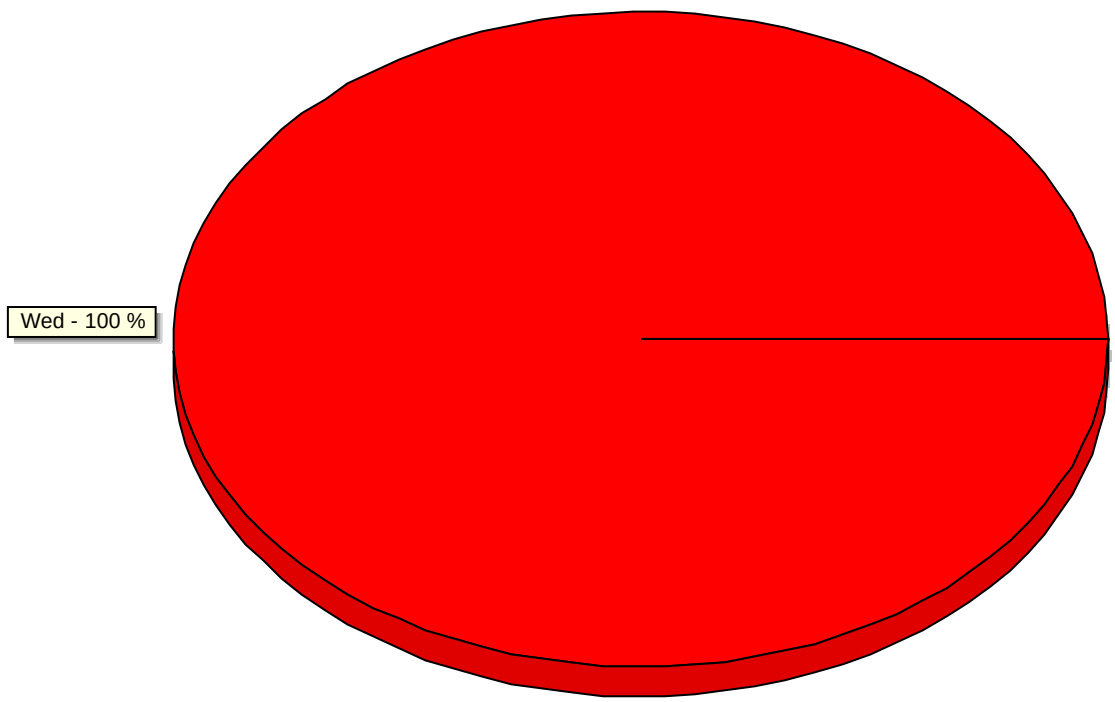
021002 Charts For Data From: 00:00 - 10/12/2016 To: 23:59 - 10/12/2016

ADT By 1,204 f Week (all lanes)



DAY	ADT	TOTAL	# DAYS
Mon	-	-	-
Tue	-	-	-
Wed	1204	1204	1.0
Thu	-	-	-
Fri	-	-	-
Sat	-	-	-
Sun	-	-	-

Percent of Totals by Day of Week



APPENDIX B: Intersection Analysis Summaries

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	63	55	1	2	1
Future Vol, veh/h	0	63	55	1	2	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	68	60	1	2	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	61	0	-	0	129	61
Stage 1	-	-	-	-	61	-
Stage 2	-	-	-	-	68	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1542	-	-	-	865	1004
Stage 1	-	-	-	-	962	-
Stage 2	-	-	-	-	955	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1542	-	-	-	865	1004
Mov Cap-2 Maneuver	-	-	-	-	865	-
Stage 1	-	-	-	-	962	-
Stage 2	-	-	-	-	955	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1542	-	-	-	907
HCM Lane V/C Ratio	-	-	-	-	0.004
HCM Control Delay (s)	0	-	-	-	9
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	37	4	5	47	2	6	0	20	1	0	1
Future Vol, veh/h	2	37	4	5	47	2	6	0	20	1	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	2	40	4	5	51	2	7	0	22	1	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	53	0	0	44	0	0	109	109	42	119	110	52
Stage 1	-	-	-	-	-	-	46	46	-	62	62	-
Stage 2	-	-	-	-	-	-	63	63	-	57	48	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1553	-	-	1564	-	-	870	781	1029	857	780	1016
Stage 1	-	-	-	-	-	-	968	857	-	949	843	-
Stage 2	-	-	-	-	-	-	948	842	-	955	855	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1553	-	-	1564	-	-	867	778	1029	836	777	1016
Mov Cap-2 Maneuver	-	-	-	-	-	-	867	778	-	836	777	-
Stage 1	-	-	-	-	-	-	967	856	-	948	840	-
Stage 2	-	-	-	-	-	-	944	839	-	934	854	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.7	8.8	8.9
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	986	1553	-	-	1564	-	-	917
HCM Lane V/C Ratio	0.029	0.001	-	-	0.003	-	-	0.002
HCM Control Delay (s)	8.8	7.3	0	-	7.3	0	-	8.9
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	92	94	5	3	2
Future Vol, veh/h	2	92	94	5	3	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	100	102	5	3	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	107	0	-	0	209	105
Stage 1	-	-	-	-	105	-
Stage 2	-	-	-	-	104	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1484	-	-	-	779	949
Stage 1	-	-	-	-	919	-
Stage 2	-	-	-	-	920	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1484	-	-	-	778	949
Mov Cap-2 Maneuver	-	-	-	-	778	-
Stage 1	-	-	-	-	918	-
Stage 2	-	-	-	-	920	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1484	-	-	-	838
HCM Lane V/C Ratio	0.001	-	-	-	0.006
HCM Control Delay (s)	7.4	0	-	-	9.3
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	82	9	33	55	1	3	2	11	1	0	1
Future Vol, veh/h	0	82	9	33	55	1	3	2	11	1	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	89	10	36	60	1	3	2	12	1	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	61	0	0	99	0	0	227	227	94	234	232	61
Stage 1	-	-	-	-	-	-	94	94	-	133	133	-
Stage 2	-	-	-	-	-	-	133	133	-	101	99	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1542	-	-	1494	-	-	728	672	963	721	668	1004
Stage 1	-	-	-	-	-	-	913	817	-	870	786	-
Stage 2	-	-	-	-	-	-	870	786	-	905	813	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1542	-	-	1494	-	-	713	655	963	696	651	1004
Mov Cap-2 Maneuver	-	-	-	-	-	-	713	655	-	696	651	-
Stage 1	-	-	-	-	-	-	913	817	-	870	766	-
Stage 2	-	-	-	-	-	-	847	766	-	891	813	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2.8	9.3	9.4
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	856	1542	-	-	1494	-	-	822
HCM Lane V/C Ratio	0.02	-	-	-	0.024	-	-	0.003
HCM Control Delay (s)	9.3	0	-	-	7.5	0	-	9.4
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0.1	-	-	0

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	72	63	1	2	1
Future Vol, veh/h	0	72	63	1	2	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	78	68	1	2	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	69	0	-	0	147	69
Stage 1	-	-	-	-	69	-
Stage 2	-	-	-	-	78	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1532	-	-	-	845	994
Stage 1	-	-	-	-	954	-
Stage 2	-	-	-	-	945	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1532	-	-	-	845	994
Mov Cap-2 Maneuver	-	-	-	-	845	-
Stage 1	-	-	-	-	954	-
Stage 2	-	-	-	-	945	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1532	-	-	-	889
HCM Lane V/C Ratio	-	-	-	-	0.004
HCM Control Delay (s)	0	-	-	-	9.1
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	42	5	6	54	2	7	0	23	1	0	1
Future Vol, veh/h	2	42	5	6	54	2	7	0	23	1	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	2	46	5	7	59	2	8	0	25	1	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	61	0	0	51	0	0	128	128	49	139	129	60
Stage 1	-	-	-	-	-	-	53	53	-	74	74	-
Stage 2	-	-	-	-	-	-	75	75	-	65	55	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1542	-	-	1555	-	-	845	763	1020	831	762	1005
Stage 1	-	-	-	-	-	-	960	851	-	935	833	-
Stage 2	-	-	-	-	-	-	934	833	-	946	849	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1542	-	-	1555	-	-	840	758	1020	807	757	1005
Mov Cap-2 Maneuver	-	-	-	-	-	-	840	758	-	807	757	-
Stage 1	-	-	-	-	-	-	959	850	-	934	829	-
Stage 2	-	-	-	-	-	-	928	829	-	922	848	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.7	8.8	9
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	971	1542	-	-	1555	-	-	895
HCM Lane V/C Ratio	0.034	0.001	-	-	0.004	-	-	0.002
HCM Control Delay (s)	8.8	7.3	0	-	7.3	0	-	9
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	105	107	6	3	2
Future Vol, veh/h	2	105	107	6	3	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	114	116	7	3	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	123	0	-	0	238	120
Stage 1	-	-	-	-	120	-
Stage 2	-	-	-	-	118	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1464	-	-	-	750	931
Stage 1	-	-	-	-	905	-
Stage 2	-	-	-	-	907	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1464	-	-	-	749	931
Mov Cap-2 Maneuver	-	-	-	-	749	-
Stage 1	-	-	-	-	904	-
Stage 2	-	-	-	-	907	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	9.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1464	-	-	-	813
HCM Lane V/C Ratio	0.001	-	-	-	0.007
HCM Control Delay (s)	7.5	0	-	-	9.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	93	10	38	63	1	3	2	13	1	0	1
Future Vol, veh/h	0	93	10	38	63	1	3	2	13	1	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	101	11	41	68	1	3	2	14	1	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	69	0	0	112	0	0	258	258	107	266	263	69
Stage 1	-	-	-	-	-	-	107	107	-	151	151	-
Stage 2	-	-	-	-	-	-	151	151	-	115	112	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1532	-	-	1478	-	-	695	646	947	687	642	994
Stage 1	-	-	-	-	-	-	898	807	-	851	772	-
Stage 2	-	-	-	-	-	-	851	772	-	890	803	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1532	-	-	1478	-	-	679	627	947	660	623	994
Mov Cap-2 Maneuver	-	-	-	-	-	-	679	627	-	660	623	-
Stage 1	-	-	-	-	-	-	898	807	-	851	750	-
Stage 2	-	-	-	-	-	-	825	750	-	874	803	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2.8	9.4	9.6
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	844	1532	-	-	1478	-	-	793
HCM Lane V/C Ratio	0.023	-	-	-	0.028	-	-	0.003
HCM Control Delay (s)	9.4	0	-	-	7.5	0	-	9.6
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0.1	-	-	0

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	3	72	63	12	34	13
Future Vol, veh/h	3	72	63	12	34	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	78	68	13	37	14

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	81	0	-	0	159	75
Stage 1	-	-	-	-	75	-
Stage 2	-	-	-	-	84	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1517	-	-	-	832	986
Stage 1	-	-	-	-	948	-
Stage 2	-	-	-	-	939	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1517	-	-	-	830	986
Mov Cap-2 Maneuver	-	-	-	-	830	-
Stage 1	-	-	-	-	946	-
Stage 2	-	-	-	-	939	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1517	-	-	-	868
HCM Lane V/C Ratio	0.002	-	-	-	0.059
HCM Control Delay (s)	7.4	0	-	-	9.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	45	5	6	54	2	7	0	23	1	0	6
Future Vol, veh/h	5	45	5	6	54	2	7	0	23	1	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	49	5	7	59	2	8	0	25	1	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	61	0	0	54	0	0	140	137	52	148	138	60
Stage 1	-	-	-	-	-	-	62	62	-	74	74	-
Stage 2	-	-	-	-	-	-	78	75	-	74	64	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1542	-	-	1551	-	-	830	754	1016	820	753	1005
Stage 1	-	-	-	-	-	-	949	843	-	935	833	-
Stage 2	-	-	-	-	-	-	931	833	-	935	842	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1542	-	-	1551	-	-	819	748	1016	795	747	1005
Mov Cap-2 Maneuver	-	-	-	-	-	-	819	748	-	795	747	-
Stage 1	-	-	-	-	-	-	946	840	-	932	829	-
Stage 2	-	-	-	-	-	-	920	829	-	909	839	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.7	8.9	8.7
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	962	1542	-	-	1551	-	-	968
HCM Lane V/C Ratio	0.034	0.004	-	-	0.004	-	-	0.008
HCM Control Delay (s)	8.9	7.3	0	-	7.3	0	-	8.7
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	12	105	107	41	24	10
Future Vol, veh/h	12	105	107	41	24	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	114	116	45	26	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	161	0	-	0	279	139
Stage 1	-	-	-	-	139	-
Stage 2	-	-	-	-	140	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1418	-	-	-	711	909
Stage 1	-	-	-	-	888	-
Stage 2	-	-	-	-	887	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1418	-	-	-	704	909
Mov Cap-2 Maneuver	-	-	-	-	704	-
Stage 1	-	-	-	-	879	-
Stage 2	-	-	-	-	887	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	10
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1418	-	-	-	754
HCM Lane V/C Ratio	0.009	-	-	-	0.049
HCM Control Delay (s)	7.6	0	-	-	10
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	103	10	38	63	1	3	2	13	1	0	5
Future Vol, veh/h	10	103	10	38	63	1	3	2	13	1	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	112	11	41	68	1	3	2	14	1	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	69	0	0	123	0	0	293	291	118	299	296	69
Stage 1	-	-	-	-	-	-	140	140	-	151	151	-
Stage 2	-	-	-	-	-	-	153	151	-	148	145	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1532	-	-	1464	-	-	659	619	934	653	616	994
Stage 1	-	-	-	-	-	-	863	781	-	851	772	-
Stage 2	-	-	-	-	-	-	849	772	-	855	777	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1532	-	-	1464	-	-	637	596	934	624	593	994
Mov Cap-2 Maneuver	-	-	-	-	-	-	637	596	-	624	593	-
Stage 1	-	-	-	-	-	-	856	775	-	844	750	-
Stage 2	-	-	-	-	-	-	820	750	-	833	771	-

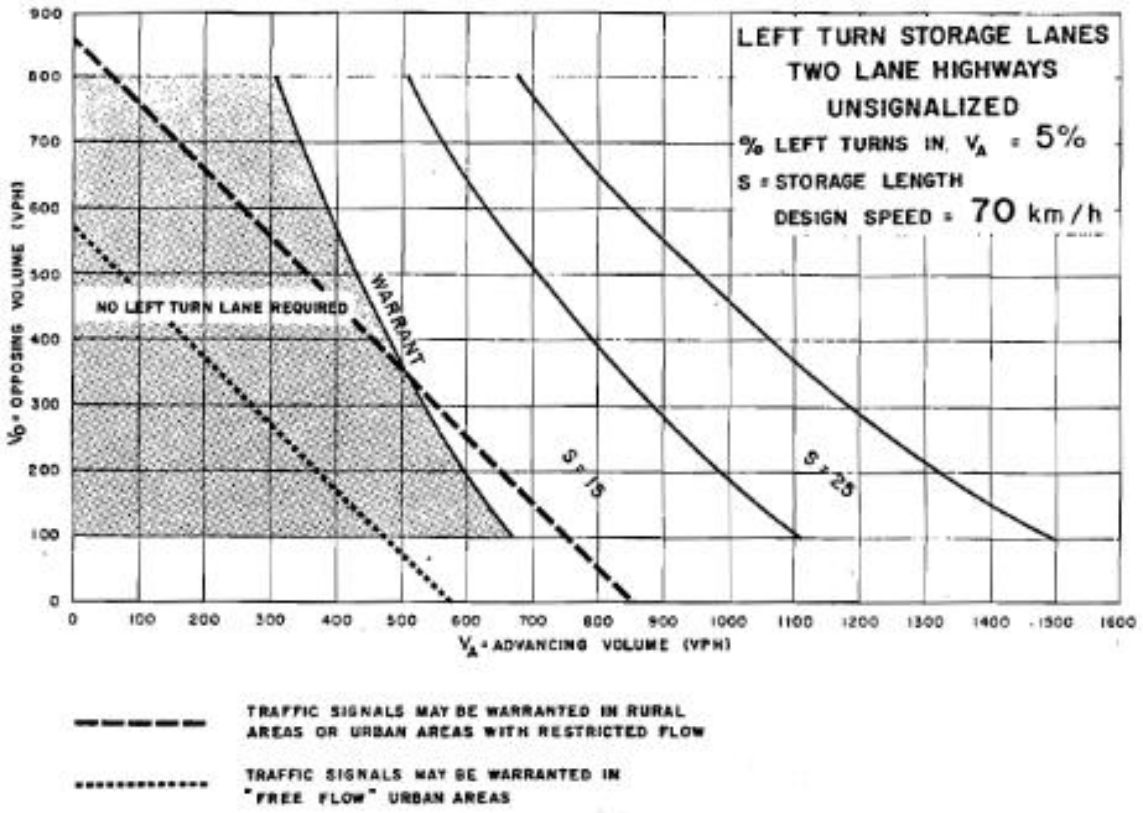
Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	2.8	9.5	9
HCM LOS			A	A

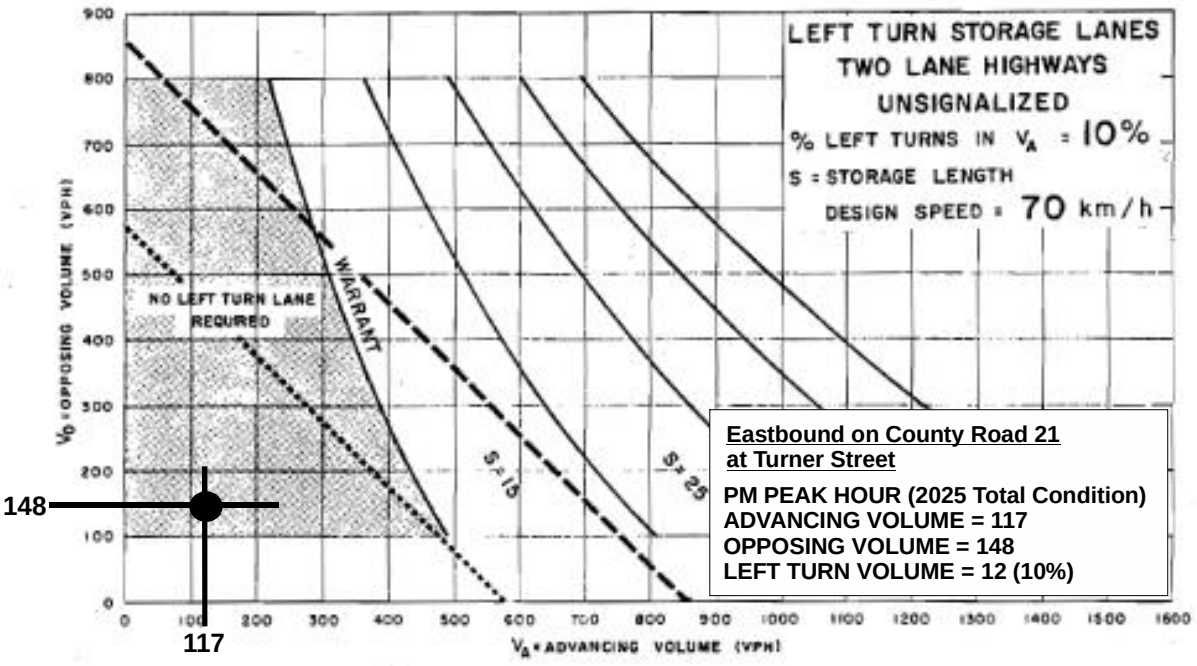
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	819	1532	-	-	1464	-	-	905
HCM Lane V/C Ratio	0.024	0.007	-	-	0.028	-	-	0.007
HCM Control Delay (s)	9.5	7.4	0	-	7.5	0	-	9
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0.1	-	-	0

APPENDIX C: Left Turn Lane Warrant Analysis

LEFT TURN LANE ANALYSIS

EASTBOUND LEFT TURN LANE ON COUNTY ROAD 21 AT TURNER STREET





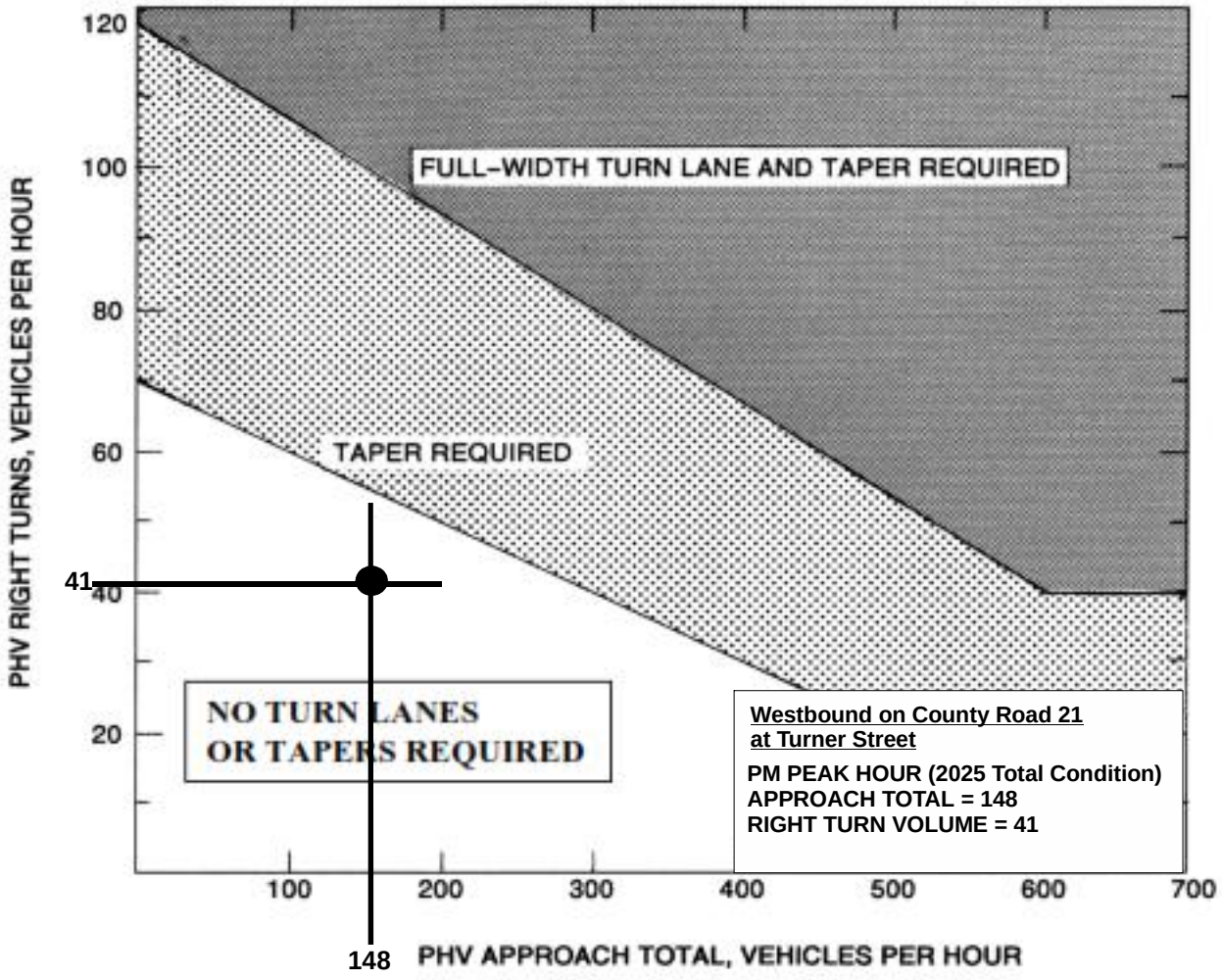
Eastbound on County Road 21 at Turner Street

PM PEAK HOUR (2025 Total Condition)
ADVANCING VOLUME = 117
OPPOSING VOLUME = 148
LEFT TURN VOLUME = 12 (10%)

APPENDIX D: Right Turn Lane Warrant Analysis

RIGHT TURN LANE ANALYSIS

WESTBOUND RIGHT TURN LANE ON COUNTY ROAD 21 AT TURNER STREET



Appropriate Radius required at all Intersections and Entrances (Commercial or Private).

LEGEND

PHV - Peak Hour Volume (also Design Hourly Volume equivalent)

Adjustment for Right Turns

For posted speeds at or under 45 mph, PHV right turns > 40, and PHV total < 300.
Adjusted right turns = PHV Right Turns - 20
If PHV is not known use formula: PHV = ADT x K x D

K = the percent of AADT occurring in the peak hour
D = the percent of traffic in the peak direction of flow

Note: An average of 11% for K x D will suffice.

When right turn facilities are warranted, see Figure 3-1 for design criteria.*

FIGURE 3-26 WARRANTS FOR RIGHT TURN TREATMENT (2-LANE HIGHWAY)

APPENDIX E: Excerpts from Township of Cavan-Monaghan 2016 Road Needs Study

Sect. No.	Road Name	From	To	Length (km)	AADT	Preliminary Improvement Type Recommendation	Cost (x1000)	Structural Adequacy	Surface Type Need	Surface Width Need
1260	Deer Ave.	Larmer Li	Plains Cl	0.76	200	*ST2A - Double Surface Treatment with Granular A*	*$67*	1-5	ADEQ	ADEQ
1695	Morton Li	520m West	Cnty Rd 10	5.66	196	*ST2PAW - Widening by 1 m, Double Surface Treatment, with Pulverization of Existing and Granular A*	*$709*	1-5	ADEQ	NOW
1375	Fallis Li	Tapley 1/4 Line	West End	3.89	240	*ST2A - Double Surface Treatment with Granular A*	*$343*	1-5	ADEQ	ADEQ
1150	Carmel Li	Brackenridge Dr	Cnty Rd 28	3.11	353	*ST2A - Double Surface Treatment with Granular A*	*$274*	1-5	ADEQ	ADEQ
1460	Hooton Dr	1500m East	Fieldview Dr	2.52	150	*ST2A - Double Surface Treatment with Granular A*	*$222*	1-5	ADEQ	ADEQ
1020	Anne St	Needler's Lane	Cavan Street	0.47	350	*Upgrade 2U - Upgrade to Urban*	*$355*	1-5	ADEQ	ADEQ
1995	Whitfield Rd	740m East of Cty Rd 28	End	1.89	200	*ST2A - Double Surface Treatment with Granular A*	*$166*	1-5	ADEQ	ADEQ
1585	Larmer Li	Highway 115	Tapley 1/4 Li	2.08	224	*ST2A - Double Surface Treatment with Granular A*	*$183*	6 - 10	ADEQ	ADEQ
1535	Johnston Dr	Carolyn St	North End	0.91	400	*Recon 1R - Full Reconstruction + 1 Lift*	*$323*	1-5	ADEQ	ADEQ
1955	Turner St	Hunter Street	King Street West	0.18	80	*Upgrade 2U - Upgrade to Urban*	*$136*	1-5	ADEQ	ADEQ
1740	Poplar Plains Dr	Cnty Rd 10	East End	0.18	70	*ST2A - Double Surface Treatment with Granular A*	*$16*	NOW	ADEQ	ADEQ
1345	Elgar Dr	White Birch Rd	South End	0.48	125	*ST2A - Double Surface Treatment with Granular A*	*$42*	1-5	ADEQ	ADEQ
1490	Hunter St	Queen St	Turner St	0.26	80	*Upgrade 2U - Upgrade to Urban*	*$196*	NOW	ADEQ	ADEQ
1480	Howden 1/4 Li	Stewart Li	Hooton Dr	1.45	90	*ST2A - Double Surface Treatment with Granular A*	*$128*	1-5	ADEQ	ADEQ

Sect. No.	Road Name	From	To	Length (km)	AADT	Preliminary Improvement Type Recommendation	Cost (x1000)	Structural Adequacy	Surface Type Need	Surface Width Need
1735	Plains Cl	Deer Avenue	Deer Avenue Loop	0.84	110	*ST2A - Double Surface Treatment with Granular A*	*$74*	1-5	ADEQ	ADEQ
1035	Ava Cres	Deyell Li	North End	1.41	60	*ST2A - Double Surface Treatment with Granular A*	*$124*	1-5	ADEQ	ADEQ
1315	Dufferin St	Gravel Rd	End	0.15	390	*Upgrade 2U - Upgrade to Urban*	*$113*	1-5	ADEQ	ADEQ
1605	Manor Dr	Cnty Rd 10	Union Street	0.18	750	*Upgrade 2U - Upgrade to Urban*	*$132*	1-5	NOW	ADEQ
1990	White Birch Rd	Elgar Dr	End	0.85	65	*ST2A - Double Surface Treatment with Granular A*	*$75*	NOW	ADEQ	ADEQ
1185	Cavan St	King Street West	Anne St	0.30	110	*Upgrade 2U - Upgrade to Urban*	*$227*	1-5	ADEQ	ADEQ
1775	Rothesay Av	South End	Lansdowne St W	0.54	125	*ST2A - Double Surface Treatment with Granular A*	*$48*	1-5	ADEQ	ADEQ
1465	Hooton Dr	2480m East	1500m East	1.52	71	*ST2PAW - Widening by 1 m, Double Surface Treatment, with Pulverization of Existing and Granular A*	*$190*	6 - 10	ADEQ	NOW
1015	Allen Ln	Needler's Lane	King Street West	0.12	250	*Upgrade 2U - Upgrade to Urban*	*$91*	1-5	ADEQ	ADEQ
1555	Kennedy Dr	Mount Pleasant Rd	South End	0.44	50	*Recon 1R - Full Reconstruction + 1 Lift*	*$156*	NOW	ADEQ	ADEQ
1395	Frederick St	Main St	Anne St	0.42	260	*ST2A - Double Surface Treatment with Granular A*	*$37*	6 - 10	ADEQ	ADEQ
1765	Queen St	King Street West	Hunter Street	0.18	85	*Upgrade 2U - Upgrade to Urban*	*$132*	1-5	ADEQ	ADEQ
1080	Bland Li	Albert St	Cty Rd 10	0.08	222	*Recon 1R - Full Reconstruction + 1 Lift*	*$28*	1-5	ADEQ	ADEQ
1280	Dobbin Rd	Cnty Rd 15	North End	1.12	500	*Upgrade 2U - Upgrade to Urban*	*$846*	1-5	ADEQ	ADEQ

APPENDIX F: Excerpts from MTO Road Inventory Manual

TRAFFIC COUNT

For most municipalities, the traffic information required will be the Annual Average Daily Traffic (AADT). However, for municipalities located in Tourist and/or cottage areas, the traffic data may include a measure of the summer traffic. See the Methods Manual for details on the various methods of counting and estimating traffic volumes.

ITEM 56 YEAR

In the first box enter the type of traffic.

CODE (A) - Annual Average Daily Traffic
(S) - If Summer Traffic has been included.

Enter in the two boxes following 19, the last two digits of the Year the count was taken or the estimate of traffic was made.

Enter the code in the last box as follows:

CODE (C) - Counted Traffic
(E) - Estimated Traffic

ITEM 57 PRESENT TRAFFIC VOLUME (AADT)

Enter the Present Traffic Volume in AADT (Average Annual Daily Traffic).

Note, that in cases where only a measure of "peak hour" traffic is available, an estimate of the AADT may be obtained by multiplying the peak hour traffic by ten.

All roads, including subdivision roads, must have a traffic volume entered. An estimate of traffic for subdivision and other local roads can be obtained from the trip generation table shown in **Appendix - A**. In Urban areas where traffic volumes are in the range of 4,000 AADT an actual traffic count should be considered or scheduled in the future.

ITEM 58 DESIGN HOURLY VOLUME FACTOR (DHV %)

Depending on the characteristics of the traffic on the road section, select and enter an appropriate DHV factor as a percentage of the present AADT (Item 57). Enter the DHV factor to the nearest tenth of a percent.

For sections with an AADT (Item 57) of less than 10,000 vpd, the information with respect to DHV is insignificant and the DHV factor (%) need not be entered.

In some cases, when the DHV is known, it may be necessary to calculate the DHV Factor from the AADT and the known value of DHV.

Where no DHV is given, nor a percentage with which to calculate one, and one is required, estimate a percentage and apply it to the AADT.

estimate a percentage and apply it to the AADT.

Note, that DHV's vary:

- from about 8% to 12% of the AADT on low seasonal variation urban type routes;
- from about 13% to 17% on average seasonal variation rural routes;
- and from about 18% to 35% on high seasonal variation tourist traffic routes.

Where a measure of "peak hour" traffic is available (such as for some higher volume urban sections) it may be assumed that this is equal to the DHV.

*ITEM 59 DESIGN HOURLY VOLUME (DHV)

The computer will calculate this item using the AADT (item 57) and DHV factor (item 58). For sections with a DHV of less than 1200 vph, the information with respect to the DHV is insignificant and no DHV value will be derived.

For sections with a DHV of 1200 vph or greater, the DHV is determined in vehicles per hour.

If neither the DHV nor the DHV Factor is available, the "peak hour" traffic volume may be used as a measure of the DHV.

ITEM 60 TRUCKS (%)

For all Upper Tier roads and all arterial and collector roads in the urban centres and rural roads with 400 AADT or more, enter the percentage of truck traffic to the nearest whole number.

Where classification counts are not available, estimate a percent from a low of 3% on low volume residential streets to a high of 15% on arterials and industrial collector roads. Where it is known that there is a high percentage of truck traffic on a low volume rural, residential or other local street, enter a percentage of trucks accordingly.

For needs study purposes, **a truck includes any vehicle with dual rear wheels and all buses.**

ITEM 61 TRAFFIC COUNT LOCATION

Completion of this item is optional. Traffic Count Location code numbers may be used, however, when the municipality has in place or intends to carry out a planned traffic counting program.

If available, enter the Traffic Count Location code number in the boxes provided for the location for which the existing traffic data were obtained.

If the road section lies between two count locations, enter the location code number which more closely reflects the actual traffic pattern.

ITEM 62 PEAK DIRECTIONAL SPLIT (%)

In all cases where a DHV is required, enter the given or estimated percentage of DHV travelling in the direction of the major traffic flow, rounded to the nearest whole number.

For one way streets (Item 53 coded 1W or 1M) enter 99.

ITEM 63 10 YEAR GROWTH FACTOR

For each road section, determine and enter the most realistic 10 Year Traffic Growth Factor to be applied to the existing AADT (**Item 57**) to obtain an estimated AADT for the end of the study period.

Rural Municipalities

The 10 Year Traffic Growth Factor may be derived using one of the following methods:

(i) where at leat two traffic counts are available with a minimum of a five year interval between them, a straight line projection of the 5 year traffic increase will establish the 10 year AADT.

(ii) a review of the past growth in population projected for the future 10 year period will provide a reasonable 10 Year Growth Factor to be applied to the existing AADT (Refer to **Appendix B** for guidelines).

(iii) a combination of the above where part of the municipality is exhibiting some growth while the other areas are relatively stable.

Urban Municipalities

In urban municipalities, there may be several growth factors developed for the various areas of the municipality. For example, the older, more stable areas may have a low factor while areas scheduled for new development or older areas where redevelopment is occurring or planned will have a higher factor. In all cases local residential and local commercial/industrial road classifications (**Item 33**) shall be given a low growth factor.

Most larger municipalities will have long range land use and transportation plans that can be used in developing the 10 Year Growth Factors. The small and medium sized municipalities will have official land use plans that will give guidance to the future development patterns. In all cases, municipalities must take into consideration all previous traffic data, previous traffic operation and/or transportation studies and any other material that is relative to the future transportation needs.

10 YEAR TRAFFIC FORECAST

The future traffic will be based on the traffic considerations noted in **Items 56 to 63.**