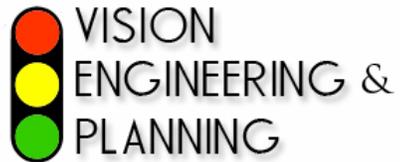


MD 202 at Kilmer Street Intersection Safety Study

Cheverly, Maryland

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July 2009

TABLE OF CONTENTS

I. MD 202 AT KILMER STREET OPERATIONAL AND SAFETY IMPROVEMENTS	<u>Page</u> 1
--	------------------

FIGURES

Figure 1.	MD 202 at Kilmer Street Peak Hour Volumes	3
Figure 2.	MD 202 at Kilmer Street Aerial Photo	7

TABLES

Table 1.	Summary of Existing Capacity Analysis	5
Table 2.	Summary of Crash Analysis	6

APPENDICES

Appendix A.	Crash Report
Appendix B.	Highway Capacity Analysis Worksheets

The Town of Cheverly is located in Prince George's County Maryland approximately 2 miles from the Washington, DC line. The BWI Parkway, US 50, and MD 202 provide access to Cheverly, and the WMATA orange metro line has a transit station in Cheverly. The goal of the Town of Cheverly Non-Motorized Transportation Study is to improve safety and accessibility for pedestrians and bicycles in the Town. Major points of interest for bicycle and pedestrian connections include the Anacostia River Trail, Cheverly Metro Station, Prince George's County Hospital Center, retail and commercial businesses along MD 202, multi-family residential units along MD 202, schools, and other recreational areas such as Euclid Park and Beaverdam Creek.

In support of the overall Non-Motorized Transportation Study, Vision Engineering and Planning was requested to conduct a safety and operational analysis at the intersection of MD 202 at Kilmer Street.

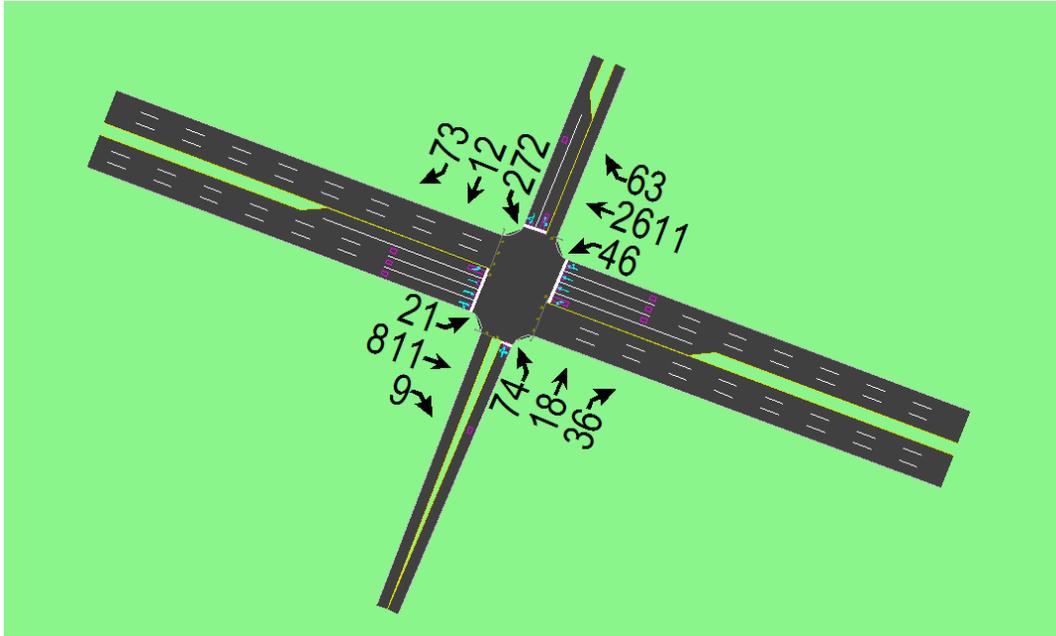
The intersection of MD 202 at Kilmer Street is located within walking distance of both schools. There are a number of retail establishments and multi-family housing units near the intersection which generate significant amounts of foot traffic at the intersection. As a part of the streetscape project, new, textured crosswalks were installed along with signage that discourages mid block crossings.



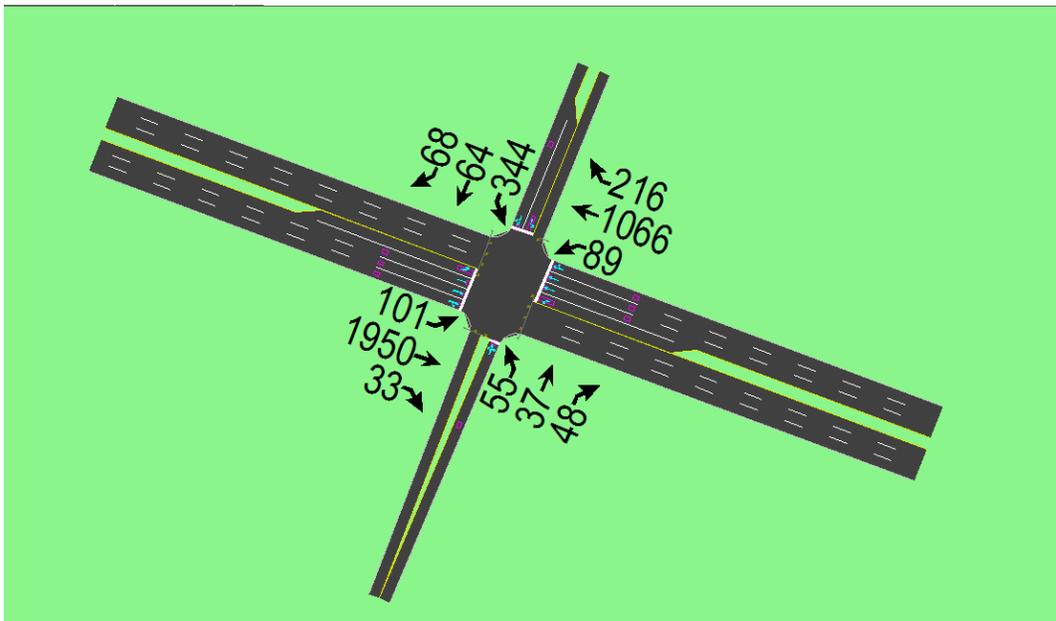
Existing MSHA peak hour turning movement counts collected in November, 2006 were used in the existing conditions analysis. The counts were collected at the study intersection from 6:00 AM to 7:00 PM. **Figure 1** summarizes the existing peak hour traffic volumes. The count data indicates that the existing peak hours occur from 7:00 AM to 8:00 AM and 5:00 PM to 6:00 PM.

Figure 1-Existing AM and PM Peak Hour Volumes

AM Peak Hour



PM Peak Hour



Existing Intersection Capacity and Level of Service

The methodology of the Highway Capacity Manual (HCM) was used to evaluate capacity for the study intersection during the AM and PM peak hours. A Synchro traffic model was developed and coded for each peak hour with the existing conditions data including roadway geometry, traffic volumes, pedestrian volumes and signal timing and phasing data as inventoried and documented in the field or as provided by Maryland SHA. The existing SHA counts were factored to the year 2009 using an annual growth factor of 2%, which was based on historical count data trends near the intersection.

Performance measures of effectiveness for HCM analysis include level of service, delay, and volume-to-capacity (v/c) ratio. The level of service (LOS) is a letter designation that corresponds to a certain range of roadway operating conditions and F indicating the worst, or failing, operating condition. The v/c ratio is the ratio of the current flow rate to the capacity of the intersection. This ratio is often used to determine how sufficient capacity is on a given roadway. Generally speaking, a ratio of 1.0 indicates that the roadway is operating at capacity. A ratio of greater than 1.0 indicates that the facility is failing as the number of vehicles exceeds the roadway capacity.

The results of the existing conditions capacity analysis are summarized in the following table; detailed HCM worksheets are included in **Appendix B**.

Table 1 - Summary of Existing Capacity Analysis; AM (PM)

Intersection	AM LOS	AM v/c	PM LOS	PM v/c
MD 202 at Kilmer Street	D	0.98	C	0.87

The results of the existing conditions capacity analysis indicate that the intersection is currently operating at a LOS D during the AM peak hour a LOS C during the PM peak hour with a volume to capacity ratio near 1 during the AM peak hour. This volume to capacity ratio is consistent with field observations which indicated queuing conditions beyond the US 50 ramp in the westbound direction of MD 202 during the AM peak hour.

Crash Analysis

In addition to the operational analysis, a crash analysis was conducted at the intersection to identify crash patterns and develop countermeasures to reduce the number of crashes at the study intersection. Particular attention was given to crashes involving pedestrians and/or bicyclists. The most recent four years of

crash data (2005, 2006, 2007, 2008) was provided by the Maryland State Highway Administration (MSHA).

Table 2 - Summary of Existing Crash Analysis

	Pedestrian	Angle	Left Turn	Rear End	Sideswipe	Fixed Object	Other
Number of Crashes	2	5	6	14	1	1	3

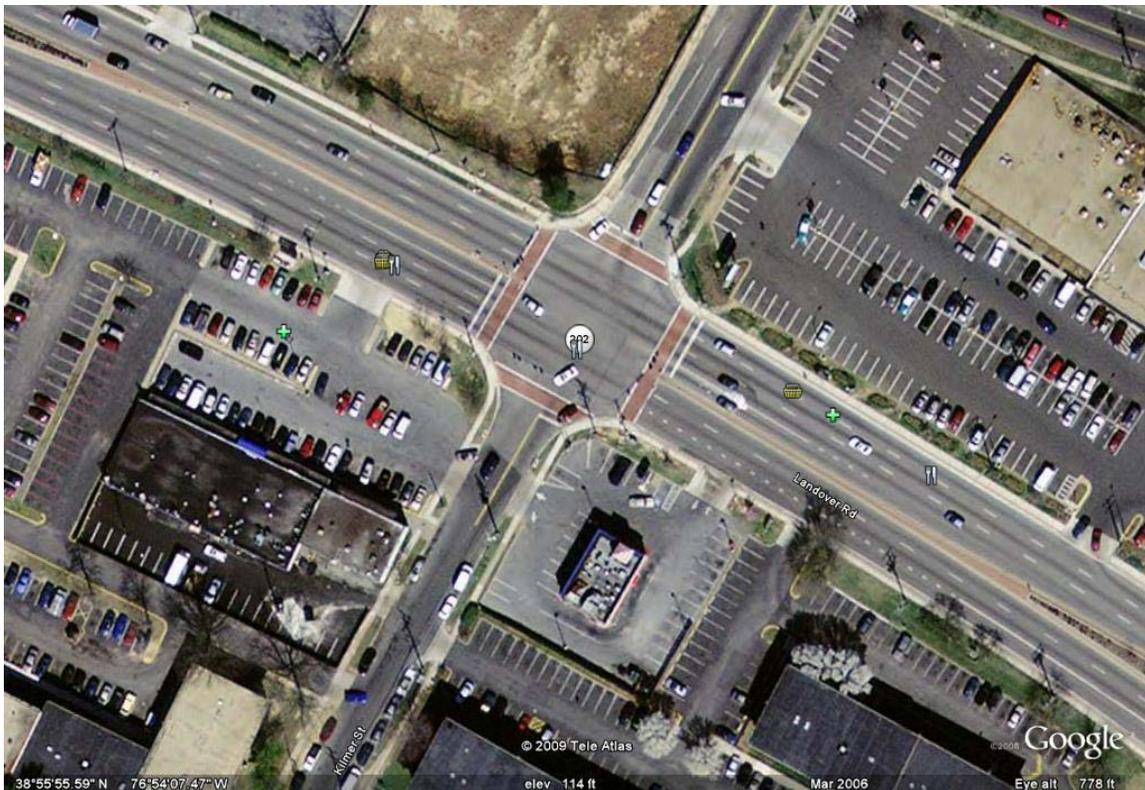
The results of the crash analysis indicate that there were a total of 31 crashes at the study intersection, including 14 rear end collisions, 6 left turn collisions, 5 angle collisions, and 2 crashes involving pedestrians. Thirteen of the crashes occurred at night, six occurred in wet conditions, thirteen crashes had injuries associated with them, and there was one fatality in 2008. Though rear end collisions are typically associated with less property damage and injuries than angle collisions, the one fatality at the intersection was associated with a rear end collision. While the pedestrian crashes did not result in a fatality, minimizing, if not eliminating pedestrian collisions at this intersection is one of the goals of the study.

MD 202 at Kilmer Road was identified by the Town of Cheverly as a candidate for a safety improvement study. The intersection is located near numerous multi-family housing units, retail and commercial establishments. This particular land use form leads to significant pedestrian demand which poses additional operational and safety issues at the subject intersection. MD 202 is a six lane, urban arterial with a posted speed limit of 35 mph in the study area. Kilmer Street is a local street that serves residential neighborhoods to the south of MD 202 as well as Spellman Elementary School. Notable characteristics of the study intersection include:

- The intersection is located immediately adjacent to the US 50 off ramp. The westbound US 50 off ramp carries traffic at high speeds and limited visibility when approaching the study intersection
- Textured crosswalks are present at all of the approaches; these crosswalks were part of the MD 202 streetscaping project
- New sidewalks are located on MD 202; these sidewalks were also installed as part of the streetscape project and include an approximately 6" setback from the travel lane, providing for increased pedestrian safety
- The pavement and signs are in good condition

- The adjacent land uses are primarily multi-family residential, retail, and commercial
- Bus stops are located on the east and west side of Kilmer Street
- The traffic signal at the intersection is currently being upgraded with new signal and pedestrian heads, poles, and controller

Figure 14-MD 202 at Kilmer Street



A Professional Traffic Operation Engineer observed traffic conditions during both peak and off-peak hours, specifically focusing on driver behavior, traffic and pedestrian patterns, geometry, and overall traffic operations. The following summarizes the observations:

- Mid-block pedestrian crossings east of Kilmer Street are unsafe due to the high speeds on MD 202 and the off ramp from US 50

- Mid-block pedestrian crossings occur south of MD 202 on Kilmer Street despite the presence of crosswalks nearby
- There are no sidewalks on the west side of Kilmer Street west of MD 202
- The existing protected/permitted left turn phasing on MD 202 requires turning vehicles to travel across three lanes of traffic traveling at speeds over 40 mph

Based on the analysis presented in the report, the suggested changes or improvements are summarized below.

- Install pedestrian barriers on MD 202 as previously recommended in the SRTS Plan
 - Advantages-eliminates mid-block pedestrian crossings
 - Disadvantages-cost of installation
- Expand education strategies from the SRTS plan to the surrounding neighborhoods to discourage mid-block pedestrian crossings
 - Advantages-could reduce mid-block crossings
 - Disadvantages-limited effectiveness without enforcement
- Install sidewalks on the west side of Kilmer Street north of MD 202
 - Advantages-improves pedestrian safety at intersection
 - Disadvantages-cost of installation
- Install pedestrian facilities and re-orient pedestrian traffic in the retail area located at the northeast corner of the intersection
 - Advantages-improves pedestrian safety in retail area and intersection
 - Disadvantages-cost of installation; coordination with private landowners required
- Change protected/permissive left turn phasing on MD 202 to protected left turn phasing
 - Advantages-reduces angle and left turn collisions
 - Disadvantages-potential for added intersection delay
- Install rumble strips and speed advisory on westbound US 50 off ramp
 - Advantages-reduces speeds on US 50 off ramp
 - Disadvantages-cost of installation; noise impacts

Appendix A
Crash Report

Maryland State Highway Administration
 Office of Traffic and Safety - Traffic Development and Support Division
 SHA 52.1 ADC Study Worksheet Output rev. 06/2006-1

Name: Dennis McMullen
 Date: 06/18/2009

Location: MD 202 @ KILMER STREET Logmile: 012.59 At 000.06 Radius: 150 ft
 County: Prince George's Period: Jan. 1, 2005 To approx. Sept. 30, 2008 Note(s): 2008 DATA IS UNEDITED

YEAR ▶	2005	2006	2007	2008	TOTAL
FATAL				1	1
No. KILLED				1	1
INJURY	3	6	3	1	13
No. INJURED	4	9	3	5	21
PROP DAMAGE	7	3	4	4	18
TOTAL ACC	10	9	7	6	32
OPPOSITE DIR					
REAR END	7	1	2	4	14
SIDESWIPE			1		1
LEFT TURN	1	4	1		6
ANGLE		1	3	1	5
PEDESTRIAN		1		1	2
PARKED VEH					
FIXED OBJECT		1			1
OTHER	2	1			3
U-TURN	2				2
BACKING		1			1
ANIMAL					
RAILROAD					
EXPL./FIRE					
OVERTURN					
OTHER/UNK					
TRUCK REL ACC	1				1
NIGHTTIME	1	4	5	3	13
WET SURFACE	2	2	1	1	6
ALCOHOL REL	1		1	1	3
INTERSEC REL	10	9	7	6	32
TOTAL VEH	20	18	15	14	67
TOTAL TRUCKS	1				1
PERCENT TRKS	5.0	0.0	0.0	0.0	1.5
Comments:					

Maryland State Highway Administration
 Office of Traffic and Safety - Traffic Development and Support Division
 SHA 52.1 ADC Combined Summary Output rev. 06/2006-1

Name: Dennis McMullen
 Date: 06/18/2009

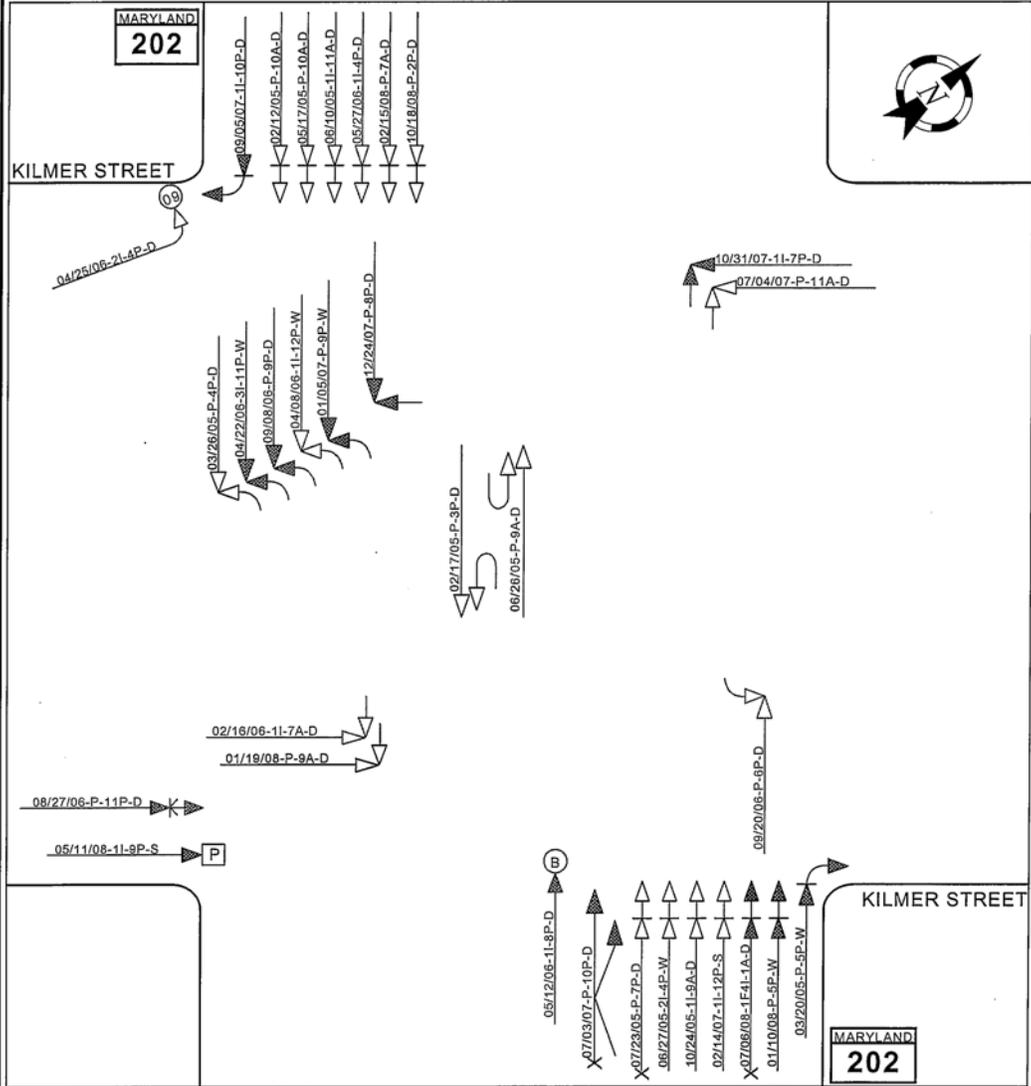
Location: MD 202 @ KILMER STREET Logmile: 012.59 At 000.06 Radius: 150 ft
 County: Prince George's Period: Jan. 1, 2005 To approx. Sept. 30, 2008 Note(s): 2008 DATA IS UNEDITED

SEVERITY	Fatal	Injury	P-Damage	Total	DAY OF THE WEEK																
Accidents	1	13	18	32	SUN	MON	TUE	WED	THU	FRI	SAT	UNK									
Veh Occ	1	19	5	3	3	5	3	5	8										
Pedestrian		2									
MONTH OF THE YEAR												CONDITION: DRIVER	PED								
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	UNK	Normal:	20	1						
3	5	2	3	4	3	4	1	3	3		1		ALCOHOL:	3							
.....												Other:	9	1							
TIME	12	01	02	03	04	05	06	07	08	09	10	11	UNK	VEHICLES INVOLVED PER ACCIDENT							
AM:		1						2	3	2	2			1	2	3	4	5	6+	UNK	TOTAL
PM:	2		1	1	4	2	1	2	2	3	2	2		2	26	3	1				67
VEHICLE TYPE		SURFACE		MOVEMENTS																	
M_Cycle/Moped	Trk_Trailer	6	WET	NORTH			SOUTH			EAST			WEST								
39 Passenger Veh	1 Passenger Bus	24	DRY	LF	ST	RT	LF	ST	RT	LF	ST	RT	LF	ST	RT						
9 Light Truck	School Bus	2	SNO/ICE	5	20	1	1	22	1	1	4				3						
1 Heavy Truck	1 Emergency Veh		MUD																	
16 Other Types		OTHER	OTHER MOVEMENTS 9																	
PROBABLE CAUSES				COLLISION TYPES				FAT	INJ	PROP	TOTAL										
Inf. of Drugs	Improper Parking			OPPOSITE DIR	RELATED:																
2 Inf. of Alcohol	Passenger Interfere/Obstr.			UNRELATED:																	
Inf. of Medication	Illegally in Roadway			REAR END	RELATED:		1	6	7	14											
Inf. of Combined Substance	Bicycle Violation			UNRELATED:																	
1 Physical/Mental Difficulty	Clothing not Visible			SIDESWIPE	RELATED:				1	1											
Fell Asleep/Fainted etc.	Smog, Smoke			UNRELATED:																	
21 Fail to give full attent.	Sleet, Hail, Frz. Rain			LEFT TURN	RELATED:		2	4		6											
Lic. Restr. Non-comply	Blowing Sand, Soil, Dirt			UNRELATED:																	
5 Fail to Yield Rightofway	Severe Crosswinds			ANGLE	RELATED:		2	3		5											
Fail to Obey Stop Sign	Rain, Snow			UNRELATED:																	
Fail to Obey Traffic Sig	Animal			PEDESTRIAN	RELATED:		2			2											
Fail to Obey Other Contr.	Vision Obstruction			UNRELATED:																	
Fail to Keep Right of Ctr	Vehicle Defect			PARKED VEH.	RELATED:																
Fail to Stop for Sch. Bus	Wet			UNRELATED:																	
Wrong Way on One Way	Icy or Snow Covered			OTHER CT	RELATED:			3		3											
Exceeded Speed Limit	Debris or Obstruction			UNRELATED:																	
1 Too Fast for Conditions	Ruts, Holes, Bumps			F	BRIDGE	01															
Followed too Closely	Road Under Construction			I	BUILDING	02															
Improper Turn	Traffic Cntrl Device Inop.			X	CULVERT/DITCH	03															
Improper Lane Change	Shoulders Low, Soft, High			E	CURB	04															
Improper Backing				D	GUARDRAIL/BARRIER	05															
Improper Passing	2 Other or Unknown				EMBANKMENT	06															
Improper Signal				O	FENCE	07															
				B	LIGHT POLE	08															
				J	SIGN POST	09		1		1											
				B	OTHER POLE	10															
				C	TREE/SHRUBBERY	11															
				T	CONSTR. BARRIER	12															
				S	CRASH ATTENUATOR	13															
					OTHER FIXED OBJECT																
WEATHER	ILLUMINATION	TOTALS																			
24 CLEAR/CLDY	19 DAY																				
FOGGY	DAWN/DUSK	2005	10																		
7 RAINING	12 DARK - LIGHTS ON	2006	9																		
1 SNOW/SLEET	1 DARK - NO LIGHTS	2007	7																		
OTHER	OTHER	2008	6																		



Office of Traffic & Safety
Traffic Development & Support Division
Crash Analysis Safety Team

Location: MD 202 @ Kilmer Street
County: PRINCE GEORGES
Study Period: 01/01/2005 to 09/30/2008
Analyst: Dennis McMullen Date: 06/18/2009



<p>← DATE-SEVERITY-TIME-SOURCE</p> <p>▲ NIGHT</p> <p>▲ ALCOHOL X</p> <p>▲ DRUGS ⊗</p>	<p>SEVERITY</p> <p>F - Fatalities</p> <p>I - Injured</p> <p>P - Property Damage Only</p> <p>SURFACE</p> <p>D - Dry Surface</p> <p>W - Wet Surface</p> <p>I - Icy Surface</p> <p>S - Snowy Surface</p>	<p>00 - Not Applicable</p> <p>01 - Bridge or Overpass</p> <p>02 - Building</p> <p>03 - Culvert or Ditch</p> <p>04 - Curb</p> <p>05 - Guardrail or Barrier</p> <p>06 - Embankment</p> <p>07 - Fence</p> <p>08 - Light Support Pole</p> <p>09 - Sign Support Pole</p> <p>10 - Other Pole</p> <p>11 - Tree Shrubbery</p> <p>12 - Construction Barrier</p> <p>13 - Crash Attenuator</p> <p>18 - Other</p> <p>99 - Unknown</p>	<p>B - Bicycle</p> <p>P - Other Pedalcycle</p> <p>T - Railway Train</p> <p>A - Animal</p> <p>Q - Other Object</p> <p>S - Loaded Cargo</p> <p>J - Jackknife</p>	<p>U - Units Separated</p> <p>N - Other Non collision</p> <p>D - Off Road</p> <p>R - Downhill Runaway</p> <p>F - Explosion or Fire</p> <p>? - Unknown</p>	<p>U - TURN</p> <p>BACKING</p> <p>OVERTURN</p> <p>Parked Vehicle</p> <p>P Pedestrian</p>
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Appendix B
Highway Capacity Analysis Worksheets

HCM Signalized Intersection Capacity Analysis

3: Int

7/1/2009

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗			↕		↖	↖	
Volume (vph)	20	780	9	44	2511	61	71	17	35	262	12	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0			6.0		6.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91			1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00			0.96		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00			0.97		0.95	1.00	
Satd. Flow (prot)	1770	5075		1769	5065			1732		1765	1607	
Flt Permitted	0.07	1.00		0.27	1.00			0.77		0.67	1.00	
Satd. Flow (perm)	139	5075		494	5065			1375		1247	1607	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor (vph)	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%
Adj. Flow (vph)	23	882	10	50	2839	69	80	19	40	296	14	79
RTOR Reduction (vph)	0	1	0	0	2	0	0	14	0	0	59	0
Lane Group Flow (vph)	23	891	0	50	2906	0	0	125	0	296	34	0
Confl. Peds. (#/hr)	1		4	4		1	1		3	3		1
Bus Blockages (#/hr)	0	0	6	0	0	5	0	0	0	0	0	0
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	56.1	53.5		61.9	56.4			26.0		26.0	26.0	
Effective Green, g (s)	56.1	53.5		61.9	56.4			26.0		26.0	26.0	
Actuated g/C Ratio	0.55	0.52		0.61	0.55			0.25		0.25	0.25	
Clearance Time (s)	5.0	6.0		5.0	6.0			6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	118	2662		369	2801			350		318	410	
v/s Ratio Prot	0.00	0.18		c0.01	c0.57						0.02	
v/s Ratio Perm	0.10			0.08				0.09		c0.24		
v/c Ratio	0.19	0.33		0.14	1.04			0.36		0.93	0.08	
Uniform Delay, d1	22.6	14.0		8.4	22.8			31.1		37.1	28.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.8	0.3		0.2	27.7			0.6		32.9	0.1	
Delay (s)	23.4	14.3		8.6	50.5			31.8		70.0	29.0	
Level of Service	C	B		A	D			C		E	C	
Approach Delay (s)		14.6			49.8			31.8			60.2	
Approach LOS		B			D			C			E	
Intersection Summary												
HCM Average Control Delay			42.8			HCM Level of Service					D	
HCM Volume to Capacity ratio			0.98									
Actuated Cycle Length (s)			102.0			Sum of lost time (s)			17.0			
Intersection Capacity Utilization			83.7%			ICU Level of Service					E	
Analysis Period (min)			15									
c Critical Lane Group												

Existing AM Peak Hour

HCM Signalized Intersection Capacity Analysis

3: Int

7/1/2009

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑↑		↑	↑↑↑			↑↓		↑	↑	
Volume (vph)	97	1875	32	86	1025	208	53	36	46	331	62	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0			6.0		6.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91			1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		0.99	1.00	
Frt	1.00	1.00		1.00	0.97			0.95		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00			0.98		0.95	1.00	
Satd. Flow (prot)	1769	5070		1770	4933			1723		1751	1703	
Flt Permitted	0.12	1.00		0.08	1.00			0.83		0.64	1.00	
Satd. Flow (perm)	228	5070		156	4933			1450		1188	1703	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor (vph)	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%
Adj. Flow (vph)	110	2120	36	97	1159	235	60	41	52	374	70	73
RTOR Reduction (vph)	0	2	0	0	29	0	0	18	0	0	37	0
Lane Group Flow (vph)	110	2154	0	97	1365	0	0	135	0	374	106	0
Confl. Peds. (#/hr)	4		3	3		4	7		13	13		7
Bus Blockages (#/hr)	0	0	6	0	0	5	0	0	0	0	0	0
Turn Type	pm+pt		pm+pt		Perm			Perm				
Protected Phases	1	6		5	2			4				8
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	57.4	49.3		54.6	47.9			27.0		27.0		27.0
Effective Green, g (s)	57.4	49.3		54.6	47.9			27.0		27.0		27.0
Actuated g/C Ratio	0.57	0.49		0.55	0.48			0.27		0.27		0.27
Clearance Time (s)	5.0	6.0		5.0	6.0			6.0		6.0		6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0		3.0
Lane Grp Cap (vph)	256	2500		193	2363			392		321		460
v/s Ratio Prot	c0.03	c0.42		0.03	0.28							0.06
v/s Ratio Perm	0.21			0.24				0.09		c0.31		
v/c Ratio	0.43	0.86		0.50	0.58			0.34		1.17		0.23
Uniform Delay, d1	11.6	22.3		17.4	18.8			29.4		36.5		28.4
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00		1.00
Incremental Delay, d2	1.2	4.2		2.1	1.0			0.5		102.9		0.3
Delay (s)	12.7	26.6		19.5	19.8			29.9		139.4		28.7
Level of Service	B	C		B	B			C		F		C
Approach Delay (s)		25.9			19.8			29.9				108.8
Approach LOS		C			B			C				F
Intersection Summary												
HCM Average Control Delay		33.6										C
HCM Volume to Capacity ratio		0.87										
Actuated Cycle Length (s)			100.0							11.0		
Intersection Capacity Utilization			95.7%									F
Analysis Period (min)			15									
c Critical Lane Group												

Existing PM Peak Hour