



REPORT

**Billtown Center
6503 Billtown Road
Louisville, KY**

Traffic Impact Study

Louisville Metro Planning

January 26, 2016

**CDM
Smith**

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Introduction

Shalimar Investments LLC is proposing a neighborhood retail center on Billtown Road in Louisville, KY. The neighborhood retail center is proposed as a convenience store with eight fueling positions, a 12,000 square foot building, and a 1,820 square foot restaurant. **Figure 1** displays a map of the site. Access to the site will be from an entrance on Billtown Road and a right-in/right-out on Gellhaus Lane. The purpose of this study is to examine the traffic impacts of the proposed development upon the adjacent highway system. For this study the impact area was defined to be the intersections of Billtown Road at Gellhaus Lane and Gellhaus Lane at Longview Farm Road/school entrance.

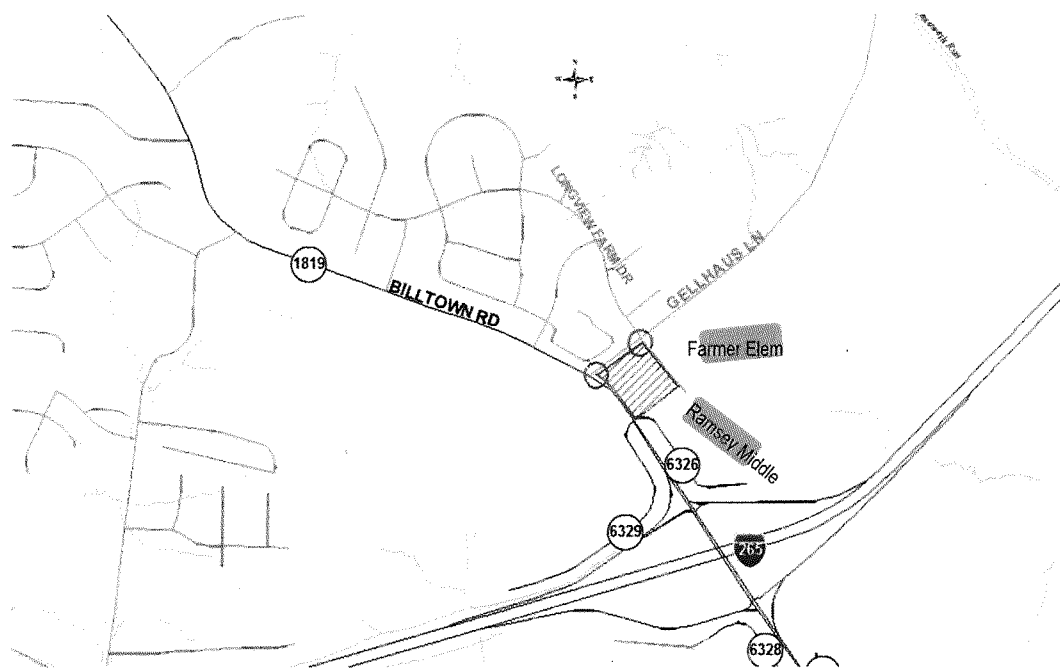


Figure 1
Site Location

Existing Conditions

Billtown Road, KY 1819, is maintained by the Kentucky Transportation Cabinet (KYTC) with an estimated 2015 ADT of 10,000 vehicles per day between I 265 and Lovers Lane (KY 1065), as estimated from the Kentucky Transportation Cabinet count at station 325. The road is a two-lane road with nine-foot lanes and a three-foot shoulder. The posted speed limit is 35 mph. There are no sidewalks south of Gellhaus Lane. The intersection with Gellhaus Lane is controlled with a traffic signal. There is a southbound left turn lane on Billtown Road. The Gellhaus Lane approach has separate right and left turn lanes.

Gellhaus Lane is maintained by Metro Louisville with an estimated 2015 ADT of 2,400 vehicles per day, as estimated from the Kentucky Transportation Cabinet count at station 324. The road is a two lane road with ten-foot lanes and a one foot shoulder. The posted speed limit is 35 mph.

There are sidewalks on the north side and along the school property. The intersection with Longview Farm Drive/school entrance is controlled with a stop sign. There is a left turn lane on Gellhaus Lane. The driveway serving both Farmer Elementary and Ramsey Middle School is wide enough to accommodate a separate left turn lane. During arrival and dismissal the schools provide a crossing guard.

A.m. and p.m. peak hour traffic counts were obtained at the intersection on December 17, 2015. The a.m. peak hour occurred between 7:00 and 8:00 and the p.m. peak hour occurred between 4:45 and 5:45 p.m. **Figure 2** illustrates the existing peak hour traffic volumes.

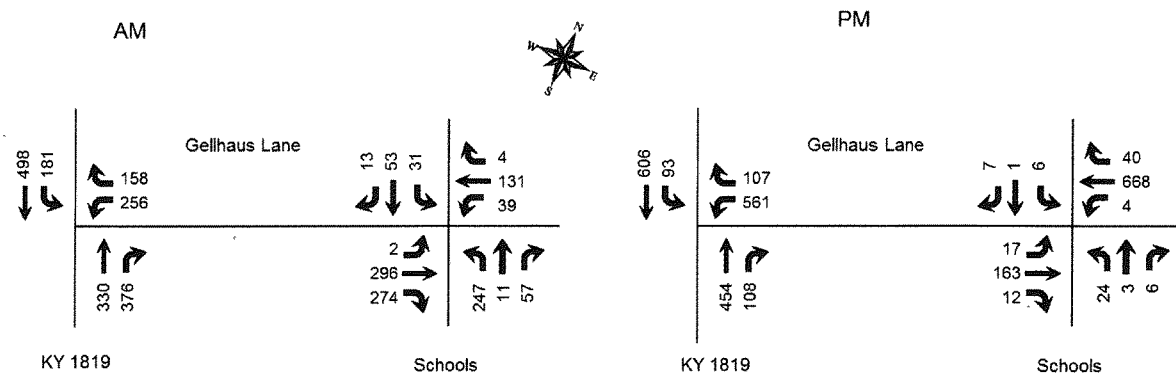


Figure 2
2015 Peak Hour Counts

Future Conditions

The projected completion year for this development is 2017, so the analysis year for this study is 2017. To predict traffic conditions in 2017, two and one third percent annual growth in traffic was added. **Figure 3** displays the 2017 No Build volumes.

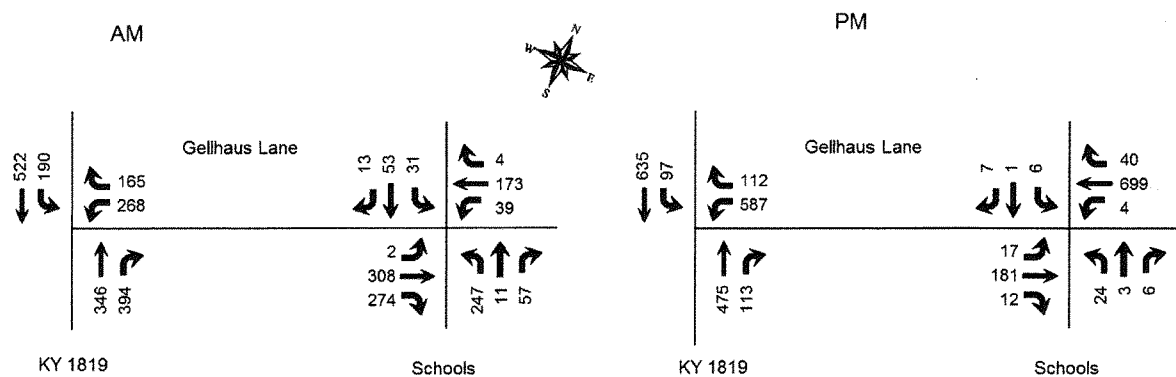


Figure 3
2017 No Build Peak Hour Volumes

Trip Generation

The Institute of Transportation Engineers Trip Generation Manual, 9th Edition contains trip generation rates for a wide range of developments. The land uses of “Gas/Service with a Convenience Market (945)”, “Fast Food with a Drive Through (934), and “Specialty Retail Center (826)” best describes this development. For the a.m. peak hour there is no data for Specialty Retail Center therefore “Shopping Center” (820) was used. The site plan shows three potential fast food sites incorporated into the buildings. The table below reflects the total potential square feet of fast-food space. The trip generation results are listed in **Table 1**. The results of the trip generation analysis are that this development will generate 375 a.m. peak hour trips and 337 p.m. peak hour trips. The trips were assigned to the highway network with 50 percent to/from the north, 30 percent to/from the south, 10 percent to/from Billtown Farms and 10 percent to/from Gellhaus Lane. Pass-by trips were assigned to the network using the existing traffic patterns.

Figure 4 shows the trips generated by this development and distributed throughout the road network for the year 2017 during the peak hours. Pass-by trips are shown in parenthesis. **Figure 5** displays the individual turning movements for the year 2017 for the peak hours when the development is completed.

Table 1 – Trip Generation

	AM Peak Hour				PM Peak Hour			
	Total	Enter	Exit	Pass-by	Total	Enter	Exit	Pass-by
Gas/Service w/ Convenience Store (8 pumps)	255	130	125	64	183	95	88	48
Fast Food w/ Drive Thru Window (5,620 sq. ft.)	81	41	40	25	108	54	54	30
Specialty Retail Center (10,200 sq. ft.)	39	24	15	0	46	20	26	0
TOTAL	375	195	180	89	337	169	168	78

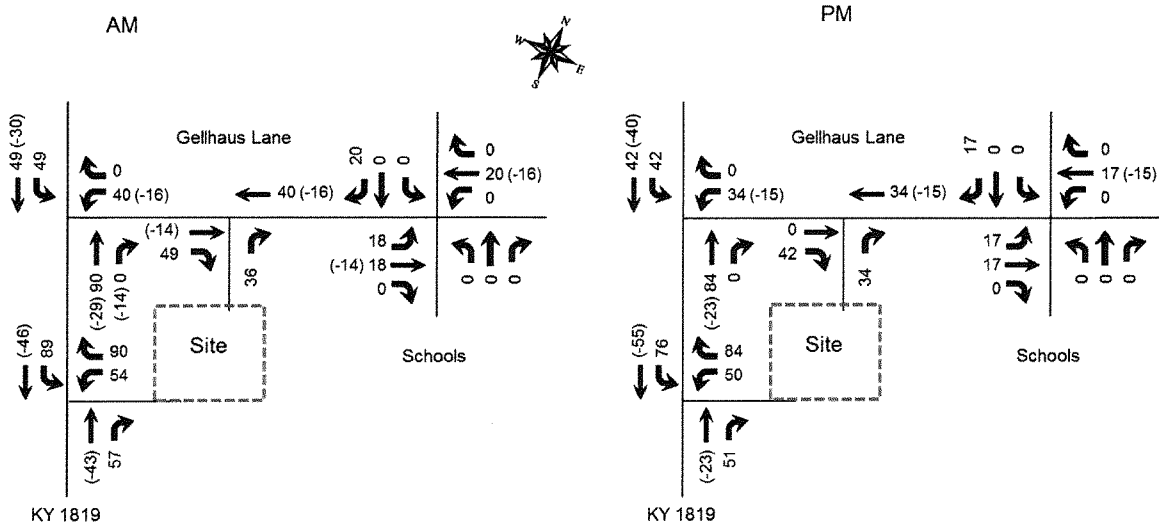


Figure 4
Trip Distribution for Site

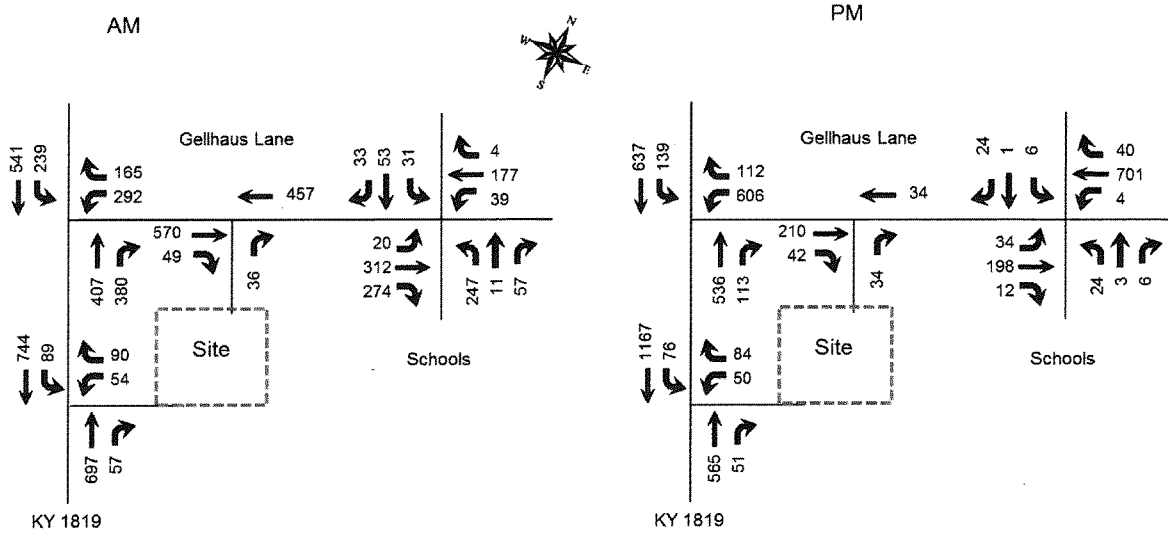


Figure 5
2017 Build Peak Hour Volumes

Analysis

The qualitative measure of operation for a roadway facility or intersection is evaluated by assigning a "Level of Service" or LOS. Level of Service is a ranking scale from A through F with each level representing a range. LOS results depend upon the type of facility that is analyzed. In this case, the LOS is based upon the average vehicle delay each movement experiences at an intersection.

To evaluate the impact of the proposed development, the vehicle delays at the intersection were determined using procedures detailed in the Highway Capacity Manual, 2010 edition. Future delay and Level of Service were determined for the intersection using HCS 2010 Streets and TWSC (version 6.70) and software. **Table 2** shows the results of the analysis for the three scenarios analyzed. The full printouts are included in Appendix B.

Using the Kentucky Transportation Cabinet Auxiliary Turn Lane Policy dated 7/20/2009 and the volumes in **Figure 5**, a southbound left turn lane will be required at the proposed entrance. The volumes do not meet the warrants for a northbound right turn lane.

Table 2 - Level of Service Results

	AM Peak Hour				PM Peak Hour			
	2015 Existing	2017 No Build	2017 Build	2017 Build Imp.	2015 Existing	2017 No Build	2017 Build	2017 Build Imp.
Billtown Road at Gellhaus Lane	C 30.2	D 40.3	E 64.2	B 18.5	C 32.6	D 37.7	D 50.5	D 36.5
Gellhaus Lane Westbound	D 37.0	D 39.9	D 44.8	C 26.8	D 43.4	D 47.9	E 75.0	D 49.6
Billtown Road Northbound	D 42.2	E 63.3	F 117.9	C 21.1	D 35.4	D 44.2	D 56.2	D 37.2
Billtown Road Southbound	B 13.7	B 16.5	C 21.5	B 11.1	C 20.1	C 22.8	C 23.1	C 23.9
Gellhaus Lane at Longview Farm Drive								
Gellhaus Lane Eastbound	A 9.4	A 9.4	A 9.5	A 9.5	A 9.2	A 9.4	A 9.5	A 9.5
Gellhaus Lane Westbound	A 9.3	A 9.4	A 9.4	A 9.4	A 7.6	A 7.6	A 7.7	A 7.7
School Northbound	F 96.6	F 121.4	F 190.7	F 87.8	C 15.8	C 16.5	C 18.1	C 18.0
Longview Farm Drive Southbound	B 10.5	B 10.9	B 11.6	B 10.3	B 14.2	B 14.7	B 15.0	B 15.0
Billtown Road at Entrance								
Entrance Westbound			D 26.9				D 31.1	
Billtown Road Southbound Left			B 10.3				A 9.2	

Note: Level of Service, delay in seconds

The poor level of service in the a.m. peak hour was further evaluated to determine improvements. At the intersection of Billtown Road and Gellhaus Lane a northbound right turn lane was evaluated and determined to provide significant improvement to the intersection. At the intersection of Gellhaus Lane at Longview Farm Drive/School entrance, an eastbound right turn lane will improve the operation of the intersection. Implementation of this option needs to be coordinated with Jefferson County Public Schools.

Conclusions

Based upon the volume of traffic generated by the development and the amount of traffic forecasted for the year 2017, there will be manageable impacts to the existing highway network. The proposed entrance will require a southbound left turn lane.

The existing operating conditions are deficient and improvements are needed without this development. The intersection of Billtown Road at Gellhaus Lane should have a northbound right turn lane constructed. The intersection of Gellhaus Lane at Longview Drive should have an eastbound right turn lane constructed.

Appendix A

Traffic Counts

Study Name Billtown Rd & Gelhaus Ln

Start Date 12/17/2015

Start Time 7:01 AM

Site Code

Start Time	Southbound Approach Southbound		Westbound Approach Westbound		Northbound Approach Northbound		Total
	Left	Thru	Left	Right	Right	Thru	
7:01 AM	41	116	74	28	71	80	410
7:16 AM	77	127	72	58	102	79	515
7:31 AM	49	132	72	63	88	60	464
7:46 AM	14	123	38	9	115	111	410
8:01 AM	17	92	29	10	62	93	303
8:16 AM	16	104	25	2	55	99	301
8:31 AM	38	102	31	4	58	89	322
8:46 AM	56	100	60	33	62	65	376
4:01 PM	21	151	89	56	25	95	437
4:16 PM	11	125	90	19	21	109	375
4:31 PM	19	147	89	24	26	130	435
4:46 PM	33	162	125	17	29	100	466
5:01 PM	27	146	110	26	21	118	448
5:16 PM	16	164	152	30	30	124	516
5:31 PM	17	134	174	34	28	112	499
5:46 PM	12	125	122	21	23	93	396

Start Time	Southbound Approach Southbound		Westbound Approach Westbound		Northbound Approach Northbound		Total
	Left	Thru	Left	Right	Right	Thru	
7:01 AM	41	116	74	28	71	80	410
7:16 AM	77	127	72	58	102	79	515
7:31 AM	49	132	72	63	88	60	464
7:46 AM	14	123	38	9	115	111	410
TOTAL	181	498	256	158	376	330	1799

4:46 PM	33	162	125	17	29	100	466
5:01 PM	27	146	110	26	21	118	448
5:16 PM	16	164	152	30	30	124	516
5:31 PM	17	134	174	34	28	112	499
TOTAL	93	606	561	107	108	454	1929

Study Name Gelhaus Dr & Longview Farm Dr

Start Date 12/17/2015

Start Time 7:00 AM

Site Code

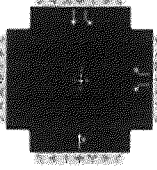
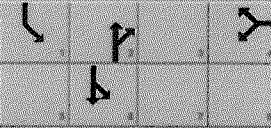
Start Time	Southbound Approach Southbound			Westbound Approach Westbound			Northbound Approach Northbound			Eastbound Approach Eastbound			TOTAL
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	9	5	6	7	35	2	66	2	6	2	49	100	289
7:15 AM	4	28	3	21	31	1	102	3	23	0	49	108	373
7:30 AM	13	20	1	11	36	1	72	5	28	0	108	53	348
7:45 AM	5	0	3	0	29	0	7	1	0	0	90	13	148
8:00 AM	3	1	5	0	24	1	3	0	0	2	54	12	105
8:15 AM	2	2	5	2	23	1	2	0	1	2	54	22	116
8:30 AM	5	11	8	7	24	0	29	0	6	2	45	66	203
8:45 AM	7	32	3	15	19	1	88	12	19	0	47	79	322
4:00 PM	0	3	1	3	62	3	64	6	9	2	28	10	191
4:15 PM	3	0	4	0	87	3	9	0	1	1	23	3	134
4:30 PM	3	0	2	1	108	3	18	2	1	5	45	5	193
4:45 PM	1	1	2	2	143	6	8	2	2	5	48	6	226
5:00 PM	0	0	1	1	159	6	9	0	4	2	39	3	224
5:15 PM	1	0	1	0	182	15	4	1	0	5	42	2	253
5:30 PM	4	0	3	1	184	13	3	0	0	5	34	1	248
5:45 PM	1	1	5	1	126	7	5	0	1	5	34	7	193

Start Time	Southbound Approach Southbound			Westbound Approach Westbound			Northbound Approach Northbound			Eastbound Approach Eastbound			TOTAL
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	9	5	6	7	35	2	66	2	6	2	49	100	289
7:15 AM	4	28	3	21	31	1	102	3	23	0	49	108	373
7:30 AM	13	20	1	11	36	1	72	5	28	0	108	53	348
7:45 AM	5	0	3	0	29	0	7	1	0	0	90	13	148
TOTAL	31	53	13	39	131	4	247	11	57	2	296	274	1158

4:45 PM	1	1	2	2	143	6	8	2	2	5	48	6	226
5:00 PM	0	0	1	1	159	6	9	0	4	2	39	3	224
5:15 PM	1	0	1	0	182	15	4	1	0	5	42	2	253
5:30 PM	4	0	3	1	184	13	3	0	0	5	34	1	248
TOTAL	6	1	7	4	668	40	24	3	6	17	163	12	951

Appendix B

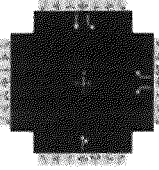
HCS Reports

HCS 2010 Signalized Intersection Results Summary																
General Information						Intersection Information										
Agency	CDM Smith					Duration, h	0.25									
Analyst	DBZ	Analysis Date	Jan 7, 2016			Area Type	Other									
Jurisdiction		Time Period	AM Peak			PHF	0.87									
Urban Street	Billtown Road		Analysis Year	2015		Analysis Period	1> 7:00									
Intersection	Gellhaus Lane		File Name	Billtown AM 15.xus												
Project Description	Billtown Center															
Demand Information				EB			WB			NB			SB			
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	
Demand (v), veh/h				256		158				330	376		181	498		
Signal Information																
Cycle, s	93.7	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	8.2	47.2	19.5	0.0	0.0	0.0						
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.5	4.3	3.5	0.0	0.0	0.0						
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.8	1.9	2.8	0.0	0.0	0.0						
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT					
Assigned Phase								4	2		1	6				
Case Number								9.0	8.3		1.0	4.0				
Phase Duration, s								25.8	53.4		14.5	67.9				
Change Period (Y+R), s								6.3	6.2		6.3	6.2				
Max Allow Headway (MAH), s								3.2	4.1		4.1	4.1				
Queue Clearance Time (g _s), s								18.4	45.4		7.5	16.2				
Green Extension Time (g _e), s								0.9	1.6		0.6	7.3				
Phase Call Probability								1.00	1.00		1.00	1.00				
Max Out Probability								0.00	0.96		0.00	0.04				
Movement Group Results				EB			WB			NB			SB			
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R	
Assigned Movement				7		14			2	12			1		6	
Adjusted Flow Rate (v), veh/h				294	182			811			208	572				
Adjusted Saturation Flow Rate (s), veh/hln				1630	1491			1683			1707	1863				
Queue Service Time (g _s), s				16.4	10.3			43.4			5.5	14.2				
Cycle Queue Clearance Time (g _c), s				16.4	10.3			43.4			5.5	14.2				
Green Ratio (g/C)				0.21	0.21			0.50			0.62	0.66				
Capacity (c), veh/h				339	310			848			253	1228				
Volume-to-Capacity Ratio (X)				0.869	0.586			0.957			0.823	0.466				
Available Capacity (c _a), veh/h				693	634			895			555	1228				
Back of Queue (Q), veh/ln (95 th percentile)				10.8	6.6			27.5			4.8	8.5				
Queue Storage Ratio (RQ) (95 th percentile)				1.07	0.64			0.70			0.42	0.48				
Uniform Delay (d ₁), s/veh				36.0	33.6			22.4			22.3	7.9				
Incremental Delay (d ₂), s/veh				2.7	0.7			19.8			6.6	0.3				
Initial Queue Delay (d ₃), s/veh				0.0	0.0			0.0			0.0	0.0				
Control Delay (d), s/veh				38.7	34.3			42.2			28.9	8.2				
Level of Service (LOS)				D	C			D			C	A				
Approach Delay, s/veh / LOS	0.0			37.0			D	42.2		D	13.7		B			
Intersection Delay, s/veh / LOS				30.2			C									
Multimodal Results				EB			WB			NB			SB			
Pedestrian LOS Score / LOS	2.1			B	2.3			B	2.3		B	0.7		A		
Bicycle LOS Score / LOS				F			1.8			A		1.8		A		

HCS 2010 Signalized Intersection Results Summary															
General Information							Intersection Information								
Agency	CDM Smith						Duration, h	0.25							
Analyst	DBZ			Analysis Date	Jan 7, 2016			Area Type	Other						
Jurisdiction				Time Period	AM Peak			PHF	0.87						
Urban Street	Billtown Road			Analysis Year	2017 No Build			Analysis Period	1> 7:00						
Intersection	Gellhaus Lane			File Name	Billtown AM 17 NB.xus										
Project Description	Billtown Center														
Demand Information				EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R			
Demand (v), veh/h				268		165	346	394	190	522					
Signal Information															
Cycle, s	101.4	Reference Phase	2												
Offset, s	0	Reference Point	End	Green	11.0	50.0	21.6	0.0	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.5	4.3	3.5	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.8	1.9	2.8	0.0	0.0	0.0					
Timer Results				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase							4	2			1	6			
Case Number							9.0	8.3			1.0	4.0			
Phase Duration, s							27.9	56.2			17.3	73.5			
Change Period (Y+R), s							6.3	6.2			6.3	6.2			
Max Allow Headway (MAH), s							3.2	4.1			4.1	4.1			
Queue Clearance Time (g _s), s							20.6	52.0			10.4	18.2			
Green Extension Time (g _e), s							1.0	0.0			0.6	7.9			
Phase Call Probability							1.00	1.00			1.00	1.00			
Max Out Probability							0.00	1.00			0.00	0.06			
Movement Group Results				EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R			
Assigned Movement				7		14	2		12	1		6			
Adjusted Flow Rate (v), veh/h				308	190			851	218			600			
Adjusted Saturation Flow Rate (s), veh/h/ln				1630	1491			1683	1707			1863			
Queue Service Time (g _s), s				18.6	11.6			50.0	8.4			16.2			
Cycle Queue Clearance Time (g _c), s				18.6	11.6			50.0	8.4			16.2			
Green Ratio (g/C)				0.21	0.21			0.49	0.62			0.66			
Capacity (c), veh/h				347	317			830	256			1237			
Volume-to-Capacity Ratio (X)				0.888	0.598			1.025	0.852			0.485			
Available Capacity (c _a), veh/h				643	588			830	492			1237			
Back of Queue (Q), veh/ln (95 th percentile)				12.1	7.6			36.2	9.7			9.6			
Queue Storage Ratio (RQ) (95 th percentile)				1.19	0.73			0.93	0.85			0.54			
Uniform Delay (d ₁), s/veh				38.7	36.0			25.7	30.2			8.4			
Incremental Delay (d ₂), s/veh				3.1	0.7			37.6	7.8			0.3			
Initial Queue Delay (d ₃), s/veh				0.0	0.0			0.0	0.0			0.0			
Control Delay (d), s/veh				41.8	36.7			63.3	38.0			8.7			
Level of Service (LOS)				D	D			F	D			A			
Approach Delay, s/veh / LOS	0.0			39.9			D	63.3			E	16.5			
Intersection Delay, s/veh / LOS				40.3							D				
Multimodal Results				EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.1			B			2.3			B			0.7		
Bicycle LOS Score / LOS							F			1.9			A		

HCS 2010 Signalized Intersection Results Summary													
General Information						Intersection Information							
Agency	CDM Smith			Duration, h	0.25								
Analyst	DBZ	Analysis Date	Jan 7, 2016	Area Type	Other								
Jurisdiction		Time Period	AM Peak	PHF	0.87								
Urban Street	Billtown Road	Analysis Year	2017 Build	Analysis Period	1> 7:00								
Intersection	Gellhaus Lane	File Name	Billtown AM 17 B.xus										
Project Description	Billtown Center												
Demand Information													
			EB			WB			NB		SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R	
Demand (v), veh/h				292		165		407	380	239	541		
Signal Information													
Cycle, s	109.3	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On	Green	15.6	50.0	24.9	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.5	4.3	3.5	0.0	0.0	0.0			
				Red	2.8	1.9	2.8	0.0	0.0	0.0			
Timer Results													
			EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT			
Assigned Phase						4		2	1	6			
Case Number						9.0		8.3	1.0	4.0			
Phase Duration, s						31.2		56.2	21.9	78.1			
Change Period (Y+R), s						6.3		6.2	6.3	6.2			
Max Allow Headway (MAH), s						3.2		4.1	4.1	4.1			
Queue Clearance Time (g*), s						23.9		52.0	14.9	20.7			
Green Extension Time (g*), s						1.0		0.0	0.7	8.4			
Phase Call Probability						1.00		1.00	1.00	1.00			
Max Out Probability						0.00		1.00	0.03	0.11			
Movement Group Results													
			EB			WB			NB		SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R	
Assigned Movement				7		14		2	12	1		6	
Adjusted Flow Rate (v), veh/h				336	190			905		275	622		
Adjusted Saturation Flow Rate (s), veh/h/ln				1630	1491			1697		1707	1863		
Queue Service Time (g*), s				21.9	12.3			50.0		12.9	18.7		
Cycle Queue Clearance Time (g*), s				21.9	12.3			50.0		12.9	18.7		
Green Ratio (g/C)				0.23	0.23			0.46		0.62	0.66		
Capacity (c), veh/h				371	340			776		310	1225		
Volume-to-Capacity Ratio (X)				0.904	0.559			1.165		0.887	0.507		
Available Capacity (c*), veh/h				596	546			776		456	1225		
Back of Queue (Q), veh/ln (95 th percentile)				14.4	7.9			53.9		13.0	11.2		
Queue Storage Ratio (RQ) (95 th percentile)				1.43	0.77			1.38		1.13	0.63		
Uniform Delay (d1), s/veh				41.1	37.3			29.7		34.2	9.6		
Incremental Delay (d2), s/veh				7.6	0.5			88.2		13.5	0.3		
Initial Queue Delay (d3), s/veh				0.0	0.0			0.0		0.0	0.0		
Control Delay (d), s/veh				48.6	37.9			117.9		47.7	9.9		
Level of Service (LOS)				D	D			F		D	A		
Approach Delay, s/veh / LOS	0.0			44.8		D	117.9		F	21.5		C	
Intersection Delay, s/veh / LOS				64.2						E			
Multimodal Results													
			EB			WB			NB		SB		
Pedestrian LOS Score / LOS	2.2		B	2.3		B	2.3		B	0.7		A	
Bicycle LOS Score / LOS						F	2.0		A	2.0		A	

HCS 2010 Signalized Intersection Results Summary														
General Information						Intersection Information								
Agency	CDM Smith					Duration, h	0.25							
Analyst	DBZ		Analysis Date	Jan 7, 2016		Area Type	Other							
Jurisdiction			Time Period	AM Peak		PHF	0.87							
Urban Street	Billtown Road		Analysis Year	2017 Build Imp		Analysis Period	1> 7:00							
Intersection	Gellhaus Lane		File Name	Billtown AM 17 B nb right.xus										
Project Description	Billtown Center													
Demand Information														
			EB			WB			NB			SB		
Approach Movement			L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h						308		165	400	394	219	550		
Signal Information														
Cycle, s	73.9	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On		Green	8.9	27.7	18.6	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On		Yellow	3.5	4.3	3.5	0.0	0.0	0.0			
					Red	2.8	1.9	2.8	0.0	0.0	0.0			
Timer Results														
			EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase						4		2	1	6				
Case Number						9.0		7.3	1.0	4.0				
Phase Duration, s						24.9		33.9	15.2	49.1				
Change Period (Y+R ₀), s						6.3		6.2	6.3	6.2				
Max Allow Headway (MAH), s						3.2		4.1	4.1	4.1				
Queue Clearance Time (g _s), s						17.4		20.1	8.1	18.0				
Green Extension Time (g _e), s						1.1		7.4	0.8	7.5				
Phase Call Probability						1.00		1.00	0.99	1.00				
Max Out Probability						0.00		0.08	0.00	0.06				
Movement Group Results														
			EB			WB			NB			SB		
Approach Movement			L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement						7		14	2	12	1	6		
Adjusted Flow Rate (v), veh/h						354		190	460	453	252	632		
Adjusted Saturation Flow Rate (s), veh/h/ln						1630		1491	1845	1610	1707	1863		
Queue Service Time (g _s), s						15.4		8.1	15.4	18.1	6.1	16.0		
Cycle Queue Clearance Time (g _c), s						15.4		8.1	15.4	18.1	6.1	16.0		
Green Ratio (g/C)						0.25		0.25	0.37	0.37	0.52	0.58		
Capacity (c), veh/h						410		375	691	603	452	1080		
Volume-to-Capacity Ratio (X)						0.863		0.506	0.665	0.751	0.557	0.585		
Available Capacity (c _a), veh/h						879		804	1244	1086	822	1256		
Back of Queue (Q), veh/ln (95 th percentile)						9.8		4.9	10.3	10.6	3.8	9.3		
Queue Storage Ratio (RQ) (95 th percentile)						0.96		0.47	0.26	0.27	0.33	0.52		
Uniform Delay (d ₁), s/veh						26.5		23.8	19.3	20.2	12.8	9.9		
Incremental Delay (d ₂), s/veh						2.2		0.4	1.1	1.9	1.1	0.5		
Initial Queue Delay (d ₃), s/veh						0.0		0.0	0.0	0.0	0.0	0.0		
Control Delay (d), s/veh						28.7		24.2	20.4	22.1	13.9	10.4		
Level of Service (LOS)						C		C	C	C	B	B		
Approach Delay, s/veh / LOS			0.0			27.1		C	21.3		C	11.4		B
Intersection Delay, s/veh / LOS			18.9					B						
Multimodal Results														
			EB			WB			NB			SB		
Pedestrian LOS Score / LOS			2.3		B	2.3		B	2.3		B	0.7		A
Bicycle LOS Score / LOS								F	2.0		A	1.9		A

HCS 2010 Signalized Intersection Results Summary															
General Information										Intersection Information					
Agency	CDM Smith			Duration, h	0.25			Area Type	Other						
Analyst	DBZ			Analysis Date	Jan 7, 2016			PHF	0.93						
Jurisdiction				Time Period	PM Peak			Analysis Period	> 5:00						
Urban Street	Billtown Road			File Name	Billtown PM 15.xus										
Intersection	Gellhaus Lane														
Project Description	Billtown Center														
Demand Information															
				EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				561			107			454	108	93	606		
Signal Information															
Cycle, s	97.0	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	Yes	Simult. Gap E/W	On	Green	5.7	38.1	34.4	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.5	4.3	3.5	0.0	0.0	0.0					
				Red	2.8	1.9	2.8	0.0	0.0	0.0					
Timer Results															
				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase							4		2	1	6				
Case Number							9.0		8.3	1.0	4.0				
Phase Duration, s							40.7		44.3	12.0	56.3				
Change Period, (Y+R), s							6.3		6.2	6.3	6.2				
Max Allow Headway (MAH), s							3.2		4.1	4.1	4.1				
Queue Clearance Time (g _a), s							33.3		33.1	5.8	27.7				
Green Extension Time (g _e), s							1.1		4.4	0.3	5.5				
Phase Call Probability							1.00		1.00	0.93	1.00				
Max Out Probability							0.22		0.17	0.00	0.08				
Movement Group Results															
				EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				7		14			2	12	1	6			
Adjusted Flow Rate (v), veh/h				603			115			604			100 652		
Adjusted Saturation Flow Rate (s), veh/h/ln				1810			1610			1749			1448 1845		
Queue Service Time (g _s), s				31.3			4.8			31.1			3.8 25.7		
Cycle Queue Clearance Time (g _a), s				31.3			4.8			31.1			3.8 25.7		
Green Ratio (g/C)				0.35			0.35			0.39			0.47 0.52		
Capacity (c), veh/h				643			572			687			206 952		
Volume-to-Capacity Ratio (X)				0.939			0.201			0.879			0.485 0.684		
Available Capacity (c _a), veh/h				745			663			901			494 952		
Back of Queue (Q), veh/ln (95 th percentile)				22.6			3.2			19.9			2.3 15.9		
Queue Storage Ratio (RQ) (95 th percentile)				2.05			0.29			0.52			0.23 0.90		
Uniform Delay (d ₁), s/veh				30.3			21.7			27.3			21.2 17.6		
Incremental Delay (d ₂), s/veh				17.2			0.1			8.1			1.8 2.0		
Initial Queue Delay (d ₃), s/veh				0.0			0.0			0.0			0.0 0.0		
Control Delay (d), s/veh				47.5			21.8			35.4			23.0 19.6		
Level of Service (LOS)				D			C			D			C B		
Approach Delay, s/veh / LOS	0.0			43.4			D			35.4	D	20.1	C		
Intersection Delay, s/veh / LOS				32.6						C					
Multimodal Results															
				EB			WB			NB			SB		
Pedestrian LOS Score / LOS	2.1	B		2.3	B		2.3	B		0.7	A				
Bicycle LOS Score / LOS							F	1.5	A	1.7	A				

HCS 2010 Signalized Intersection Results Summary														
General Information						Intersection Information								
Agency	CDM Smith					Duration, h	0.25							
Analyst	DBZ		Analysis Date	Jan 7, 2016		Area Type	Other							
Jurisdiction			Time Period	PM Peak		PHF	0.93							
Urban Street	Billtown Road		Analysis Year	2017 No Build		Analysis Period	1> 5:00							
Intersection	Gellhaus Lane		File Name	Billtown PM 17 NB.xus										
Project Description	Billtown Center													
Demand Information														
			EB			WB			NB			SB		
Approach Movement			L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h						587		112	475	113		97	635	
Signal Information														
Cycle, s	102.3	Reference Phase	2											
Offset, s	0	Reference Point	End											
Uncoordinated	Yes	Simult. Gap E/W	On		Green	6.2	39.8	37.5	0.0	0.0	0.0			
					Yellow	3.5	4.3	3.5	0.0	0.0	0.0			
Force Mode	Fixed	Simult. Gap N/S	On		Red	2.8	1.9	2.8	0.0	0.0	0.0			
Timer Results														
			EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT				
Assigned Phase						4		2	1	6				
Case Number						9.0		8.3	1.0	4.0				
Phase Duration, s						43.8		46.0	12.5	58.5				
Change Period (Y+R ₀), s						6.3		6.2	6.3	6.2				
Max Allow Headway (MAH), s						3.2		4.1	4.1	4.1				
Queue Clearance Time (g _s), s						36.7		37.4	6.2	31.5				
Green Extension Time (g _e), s						0.7		2.2	0.3	5.5				
Phase Call Probability						1.00		1.00	0.95	1.00				
Max Out Probability						0.96		0.34	0.00	0.16				
Movement Group Results														
			EB			WB			NB			SB		
Approach Movement			L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement						7		14	2	12		1		6
Adjusted Flow Rate (v), veh/h						631		120	632		104		683	
Adjusted Saturation Flow Rate (s), veh/h/ln						1810		1610	1749		1448		1845	
Queue Service Time (g _s), s						34.7		5.2	35.4		4.2		29.5	
Cycle Queue Clearance Time (g _c), s						34.7		5.2	35.4		4.2		29.5	
Green Ratio (g/C)						0.37		0.37	0.39		0.47		0.51	
Capacity (c), veh/h						664		591	680		185		942	
Volume-to-Capacity Ratio (X)						0.950		0.204	0.929		0.563		0.725	
Available Capacity (c _a), veh/h						706		629	853		451		942	
Back of Queue (Q), veh/ln (95 th percentile)						25.4		3.5	23.6		2.7		18.3	
Queue Storage Ratio (RQ) (95 th percentile)						2.31		0.32	0.61		0.27		1.04	
Uniform Delay (d ₁), s/veh						31.5		22.2	30.0		23.5		19.5	
Incremental Delay (d ₂), s/veh						21.3		0.1	14.2		2.7		2.8	
Initial Queue Delay (d ₃), s/veh						0.0		0.0	0.0		0.0		0.0	
Control Delay (d), s/veh						52.8		22.2	44.2		26.2		22.2	
Level of Service (LOS)						D		C	D		C		C	
Approach Delay, s/veh / LOS			0.0			47.8		D	44.2		D	22.8		C
Intersection Delay, s/veh / LOS			37.7						D					
Multimodal Results														
			EB			WB			NB			SB		
Pedestrian LOS Score / LOS			2.2	B		2.3	B		2.3	B		0.7	A	
Bicycle LOS Score / LOS						F			1.5	A		1.8	A	

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information			
Agency	CDM Smith			Duration, h	0.25		
Analyst	DBZ	Analysis Date	Jan 7, 2016	Area Type	Other		
Jurisdiction		Time Period	PM Peak	PHF	0.93		
Urban Street	Billtown Road		Analysis Year	2017 Build	Analysis Period		1> 5:00
Intersection	Gellhaus Lane		File Name	Billtown PM 17 B.xus			
Project Description	Billtown Center						

Demand Information	EB			WB			NB		SB			
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				606		112	536	113	139	637		

Signal Information				Signal Timing											
Cycle, s	115.3	Reference Phase	2												
Offset, s	0	Reference Point	End												
Uncoordinated	Yes	Simult. Gap E/W	On	Green	8.9	47.7	40.0	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.5	4.3	3.5	0.0	0.0	0.0					
				Red	2.8	1.9	2.8	0.0	0.0	0.0					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				4		2	1	6
Case Number				9.0		8.3	1.0	4.0
Phase Duration, s				46.3		53.9	15.2	69.0
Change Period (Y+R _c), s				6.3		6.2	6.3	6.2
Max Allow Headway (MAH), s				3.2		4.1	4.1	4.1
Queue Clearance Time (g _a), s				42.0		46.7	8.5	33.0
Green Extension Time (g _e), s				0.0		1.0	0.4	5.7
Phase Call Probability				1.00		1.00	0.99	1.00
Max Out Probability				1.00		1.00	0.00	0.22

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				7		14		2	12	1		6
Adjusted Flow Rate (v), veh/h				652		120		698		149		685
Adjusted Saturation Flow Rate (s), veh/h/ln				1810		1610		1755		1448		1845
Queue Service Time (g _a), s				40.0		6.1		44.7		6.5		31.0
Cycle Queue Clearance Time (g _c), s				40.0		6.1		44.7		6.5		31.0
Green Ratio (g/C)				0.35		0.35		0.41		0.51		0.54
Capacity (c), veh/h				627		558		725		189		1005
Volume-to-Capacity Ratio (X)				1.038		0.216		0.962		0.789		0.681
Available Capacity (c _a), veh/h				627		558		761		392		1005
Back of Queue (Q), veh/ln (95 th percentile)				34.3		4.2		30.7		4.5		19.0
Queue Storage Ratio (RQ) (95 th percentile)				3.12		0.38		0.80		0.45		1.08
Uniform Delay (d ₁), s/veh				37.7		26.6		33.0		26.1		19.0
Incremental Delay (d ₂), s/veh				46.3		0.1		23.2		7.1		1.9
Initial Queue Delay (d ₃), s/veh				0.0		0.0		0.0		0.0		0.0
Control Delay (d), s/veh				84.0		26.7		56.2		33.3		20.9
Level of Service (LOS)				F		C		E		C		C
Approach Delay, s/veh / LOS	0.0			75.0		E	56.2	E		23.1		C
Intersection Delay, s/veh / LOS	50.5						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.3	B	2.3	B	0.7	A
Bicycle LOS Score / LOS				F	1.6	A	1.9	A

HCS 2010 Signalized Intersection Results Summary													
General Information						Intersection Information							
Agency	CDM Smith					Duration, h	0.25						
Analyst	DBZ	Analysis Date	Jan 7, 2016			Area Type	Other						
Jurisdiction		Time Period	PM Peak			PHF	0.93						
Urban Street	Billtown Road		Analysis Year	2017 Build Imp		Analysis Period	1 > 5:00						
Intersection	Gelhaus Lane		File Name	Billtown PM 17 B nb right.xus									
Project Description	Billtown Center												
Demand Information													
				EB			WB			NB		SB	
Approach Movement				L	T	R	L	T	R	L	T	R	
Demand (v), veh/h							606	112		536	113	139	637
Signal Information													
Cycle, s	102.8	Reference Phase	2										
Offset, s	0	Reference Point	End										
Uncoordinated	Yes	Simult. Gap E/W	On										
Force Mode	Fixed	Simult. Gap N/S	On										
		Green	8.7	36.7	38.6	0.0	0.0	0.0					
		Yellow	3.5	4.3	3.5	0.0	0.0	0.0					
		Red	2.8	1.9	2.8	0.0	0.0	0.0					
Timer Results													
				EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT		
Assigned Phase							4		2	1	6		
Case Number							9.0		7.3	1.0	4.0		
Phase Duration, s							44.9		42.9	15.0	57.9		
Change Period (Y+R), s							6.3		6.2	6.3	6.2		
Max Allow Headway (MAH), s							3.2		4.1	4.1	4.1		
Queue Clearance Time (g _s), s							38.1		32.9	8.4	32.2		
Green Extension Time (g _e), s							0.5		3.3	0.4	5.6		
Phase Call Probability							1.00		1.00	0.99	1.00		
Max Out Probability							1.00		0.21	0.00	0.19		
Movement Group Results													
				EB			WB			NB		SB	
Approach Movement				L	T	R	L	T	R	L	T	R	
Assigned Movement							7	14		2	12	1	6
Adjusted Flow Rate (v), veh/h							652	120		576	122	149	685
Adjusted Saturation Flow Rate (s), veh/h/ln							1810	1610		1810	1610	1448	1845
Queue Service Time (g _s), s							36.1	5.2		30.9	5.4	6.4	30.2
Cycle Queue Clearance Time (g _c), s							36.1	5.2		30.9	5.4	6.4	30.2
Green Ratio (g/C)							0.38	0.38		0.36	0.36	0.46	0.50
Capacity (c), veh/h							680	605		646	575	230	927
Volume-to-Capacity Ratio (X)							0.958	0.199		0.892	0.211	0.649	0.739
Available Capacity (c _a), veh/h							703	626		879	782	460	927
Back of Queue (Q), veh/ln (95 th percentile)							26.6	3.5		20.8	3.7	4.0	18.8
Queue Storage Ratio (RQ) (95 th percentile)							2.42	0.31		0.54	0.10	0.40	1.07
Uniform Delay (d _u), s/veh							31.3	21.7		31.2	23.0	23.2	20.2
Incremental Delay (d _i), s/veh							23.4	0.1		8.9	0.2	3.1	3.2
Initial Queue Delay (d _s), s/veh							0.0	0.0		0.0	0.0	0.0	0.0
Control Delay (d), s/veh							54.7	21.7		40.1	23.2	26.3	23.4
Level of Service (LOS)							D	C		D	C	C	C
Approach Delay, s/veh / LOS				0.0			49.6	D	37.2	D	23.9	C	
Intersection Delay, s/veh / LOS				36.5				D					
Multimodal Results													
				EB			WB			NB		SB	
Pedestrian LOS Score / LOS				2.3	B		2.3	B		2.3	B	0.7	A
Bicycle LOS Score / LOS							F			A	1.9	A	

HCS 2010 Two-Way Stop Control Summary Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Gellhaus at Longview Farm							
Agency/Co.	CDM Smith							Jurisdiction								
Date Performed	1/11/2016							East/West Street	Gellhaus Lane							
Analysis Year	2015							North/South Street	Longview Farm Dr/School							
Time Analyzed	AM Peak							Peak Hour Factor	0.78							
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25							
Project Description	Billtown Center															
Lanes																
<p style="text-align: center;">Major Street: East-West</p>																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1		0	1	0	
Configuration		L		TR		L		TR	LT		R			LTR		
Volume (veh/h)		2	296	274		39	131	4		247	11	57		31	53	13
Percent Heavy Vehicles		0				1				1	0	0		0	0	0
Proportion Time Blocked		0.500	0.000	0.000		0.000	0.000	0.000		0.000	0.000	0.000		0.000	0.000	0.000
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															
Delay, Queue Length, and Level of Service																
Flow Rate (veh/h)		3				50				331		73			125	
Capacity		818				878				306		536			775	
v/c Ratio		0.00				0.06				1.08		0.14			0.16	
95% Queue Length		0.0				0.2				12.8		0.5			0.6	
Control Delay (s/veh)		9.4				9.3				113.1		12.8			10.5	
Level of Service (LOS)		A				A				F		B			B	
Approach Delay (s/veh)	0.0				2.1				96.6				10.5			
Approach LOS	A				A				F				B			

HCS 2010 Two-Way Stop Control Summary Report																
General Information								Site Information								
Analyst	D8Z							Intersection	Gellhaus at Longview Farm							
Agency/Co.	CDM Smith							Jurisdiction								
Date Performed	1/11/2016							East/West Street	Gellhaus Lane							
Analysis Year	2017							North/South Street	Longview Farm Dr/School							
Time Analyzed	AM Peak No Build							Peak Hour Factor	0.78							
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25							
Project Description	Billtown Center															
Lanes																
<p style="text-align: center;">Major Street: East-West</p>																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1		0	1	0	
Configuration		L		TR		L		TR		LT		R			LTR	
Volume (veh/h)		2	308	274		39	173	4		247	11	57		31	53	13
Percent Heavy Vehicles		0				1				1	0	0		0	0	0
Proportion Time Blocked		0.500	0.000	0.000		0.000	0.000	0.000		0.000	0.000	0.000		0.000	0.000	0.000
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															
Delay, Queue Length, and Level of Service																
Flow Rate (veh/h)		3				50				331		73				125
Capacity		818				866				285		525				734
v/c Ratio		0.00				0.06				1.16		0.14				0.17
95% Queue Length		0.0				0.2				14.4		0.5				0.6
Control Delay (s/veh)		9.4				9.4				143.3		13.0				10.9
Level of Service (LOS)		A				A				F		B				B
Approach Delay (s/veh)	0.0				1.7				121.4				10.9			
Approach LOS	A				A				F				B			

HCS 2010 Two-Way Stop Control Summary Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Gellhaus at Longview Farm							
Agency/Co.	CDM Smith							Jurisdiction								
Date Performed	1/11/2016							East/West Street	Gellhaus Lane							
Analysis Year	2017							North/South Street	Longview Farm Dr/School							
Time Analyzed	AM Peak Build							Peak Hour Factor	0.78							
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25							
Project Description	Billtown Center															
Lanes																
<p>Major Street: East-West</p>																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1		0	1	0	
Configuration		L		TR		L		TR	LT		R			LTR		
Volume (veh/h)		20	312	274		39	177	4		247	11	57		31	53	33
Percent Heavy Vehicles		0				1				1	0	0		0	0	0
Proportion Time Blocked		0.500	0.000	0.000		0.000	0.000	0.000		0.000	0.000	0.000		0.000	0.000	0.000
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															
Delay, Queue Length, and Level of Service																
Flow Rate (veh/h)		26				50				331		73			150	
Capacity		818				863				243		521			695	
v/c Ratio		0.03				0.06				1.36		0.14			0.22	
95% Queue Length		0.1				0.2				18.0		0.5			0.8	
Control Delay (s/veh)		9.5				9.4				227.8		13.0			11.6	
Level of Service (LOS)		A				A				F		B			B	
Approach Delay (s/veh)	0.3				1.7				190.7				11.6			
Approach LOS	A				A				F				B			

HCS 2010 Two-Way Stop Control Summary Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Gellhaus at Longview Farm							
Agency/Co.	CDM Smith							Jurisdiction								
Date Performed	1/11/2016							East/West Street	Gellhaus Lane							
Analysis Year	2017							North/South Street	Longview Farm Dr/School							
Time Analyzed	AM Peak Build Imp							Peak Hour Factor	0.78							
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25							
Project Description	Billtown Center															
Lanes																
<p style="text-align: center;">Major Street: East-West</p>																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Number of Lanes	0	1	1	1	0	1	1	0	0	1	1		0	1	0	
Configuration		L	T	R		L		TR		LT		R			LTR	
Volume (veh/h)		20	312	274		39	177	4		247	11	57		31	53	33
Percent Heavy Vehicles		0				1				1	0	0		0	0	0
Proportion Time Blocked		0.500	0.000	0.000		0.000	0.000	0.000		0.000	0.000	0.000		0.000	0.000	0.000
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															
Delay, Queue Length, and Level of Service																
Flow Rate (veh/h)		26				50				331	73			150		
Capacity		818				863				315	654			834		
v/c Ratio		0.03				0.06				1.05	0.11			0.18		
95% Queue Length		0.1				0.2				12.2	0.4			0.7		
Control Delay (s/veh)		9.5				9.4				102.7	11.2			10.3		
Level of Service (LOS)		A				A				F	B			B		
Approach Delay (s/veh)	0.3				1.7				87.8				10.3			
Approach LOS	A				A				F				B			

HCS 2010 Two-Way Stop Control Summary Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Gellhaus at Longview Farm							
Agency/Co.	CDM Smith							Jurisdiction								
Date Performed	1/11/2016							East/West Street	Gellhaus Lane							
Analysis Year	2015							North/South Street	Longview Farm Dr/School							
Time Analyzed	PM Peak							Peak Hour Factor	0.94							
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25							
Project Description	Biltown Center															
Lanes																
<p>Major Street: East-West</p>																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1		0	1	0	
Configuration		L		TR		L		TR	LT		R			LTR		
Volume (veh/h)		17	163	12		4	668	40		24	3	6		6	1	7
Percent Heavy Vehicles		0				0				0	0	0		17	0	0
Proportion Time Blocked		0.000				0.000				0.000	0.000	0.000		0.000	0.000	0.000
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															
Delay, Queue Length, and Level of Service																
Flow Rate (veh/h)		18				4				29		6			14	
Capacity		865				1394				354		868			406	
v/c Ratio		0.02				0.00				0.08		0.01			0.03	
95% Queue Length		0.1				0.0				0.3		0.0			0.1	
Control Delay (s/veh)		9.2				7.6				16.1		9.2			14.2	
Level of Service (LOS)		A				A				C		A			B	
Approach Delay (s/veh)	0.8				0.0				15.8				14.2			
Approach LOS	A				A				C				B			

HCS 2010 Two-Way Stop Control Summary Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Gellhaus at Longview Farm							
Agency/Co.	CDM Smith							Jurisdiction								
Date Performed	1/11/2016							East/West Street	Gellhaus Lane							
Analysis Year	2017							North/South Street	Longview Farm Dr/School							
Time Analyzed	PM Peak No Build							Peak Hour Factor	0.94							
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25							
Project Description	Billtown Center															
Lanes																
<p style="text-align: center;">Major Street: East-West</p>																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1		0	1	0	
Configuration		L		TR		L		TR		LT		R			LTR	
Volume (veh/h)		17	181	12		4	699	40		24	3	6		6	1	7
Percent Heavy Vehicles		0				0				0	0	0		17	0	0
Proportion Time Blocked		0.000	0.000	0.000		0.000	0.000	0.000		0.000	0.000	0.000		0.000	0.000	0.000
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															
Delay, Queue Length, and Level of Service																
Flow Rate (veh/h)		18				4				29		6			14	
Capacity		841				1371				336		846			387	
v/c Ratio		0.02				0.00				0.09		0.01			0.04	
95% Queue Length		0.1				0.0				0.3		0.0			0.1	
Control Delay (s/veh)		9.4				7.6				16.7		9.3			14.7	
Level of Service (LOS)		A				A				C		A			B	
Approach Delay (s/veh)	0.8				0.0				16.5				14.7			
Approach LOS	A				A				C				B			

HCS 2010 Two-Way Stop Control Summary Report																	
General Information								Site Information									
Analyst	DBZ							Intersection	Gellhaus at Longview Farm								
Agency/Co.	CDM Smith							Jurisdiction									
Date Performed	1/11/2016							East/West Street	Gellhaus Lane								
Analysis Year	2017							North/South Street	Longview Farm Dr/School								
Time Analyzed	PM Peak Build							Peak Hour Factor	0.94								
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25								
Project Description	Billtown Center																
Lanes																	
<p style="text-align: center;">Major Street: East-West</p>																	
Vehicle Volumes and Adjustments																	
Approach	Eastbound				Westbound				Northbound				Southbound				
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	
Priority	1U	1	2	3	4U	4	5	6			7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0			0	1	1		0	1	0
Configuration		L		TR		L		TR			LT		R			LTR	
Volume (veh/h)		34	198	12		4	701	40			24	3	6		6	1	24
Percent Heavy Vehicles		0				0					0	0	0		17	0	0
Proportion Time Blocked		0.000	0.000	0.000		0.000	0.000	0.000			0.000	0.000	0.000		0.000	0.000	0.000
Right Turn Channelized	No				No				No				No				
Median Type	Left Only																
Median Storage	1																
Delay, Queue Length, and Level of Service																	
Flow Rate (veh/h)		36				4					29		6				33
Capacity		840				1350					296		827				393
v/c Ratio		0.04				0.00					0.10		0.01				0.08
95% Queue Length		0.1				0.0					0.3		0.0				0.3
Control Delay (s/veh)		9.5				7.7					18.5		9.4				15.0
Level of Service (LOS)		A				A					C		A				B
Approach Delay (s/veh)	1.3				0.0				18.1				15.0				
Approach LOS	A				A				C				B				

HCS 2010 Two-Way Stop Control Summary Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Gellhaus at Longview Farm							
Agency/Co.	CDM Smith							Jurisdiction								
Date Performed	1/11/2016							East/West Street	Gellhaus Lane							
Analysis Year	2017							North/South Street	Longview Farm Dr/School							
Time Analyzed	PM Peak Build Imp							Peak Hour Factor	0.94							
Intersection Orientation	East-West							Analysis Time Period (hrs)	0.25							
Project Description	Billtown Center															
Lanes																
<p style="text-align: center;">Major Street: East-West</p>																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6	7	8	9		10	11	12	
Number of Lanes	0	1	1	1	0	1	1	0	0	1	1		0	1	0	
Configuration		L	T	R		L		TR	LT		R				LTR	
Volume (veh/h)		34	198	12		4	701	40		24	3	6		6	1	24
Percent Heavy Vehicles		0				0				0	0	0		17	0	0
Proportion Time Blocked		0.000	0.000	0.000		0.000	0.000	0.000		0.000	0.000	0.000		0.000	0.000	0.000
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															
Delay, Queue Length, and Level of Service																
Flow Rate (veh/h)		36				4				29		6			33	
Capacity		840				1350				297		834			393	
v/c Ratio		0.04				0.00				0.10		0.01			0.08	
95% Queue Length		0.1				0.0				0.3		0.0			0.3	
Control Delay (s/veh)		9.5				7.7				18.5		9.3			15.0	
Level of Service (LOS)		A				A				C		A			B	
Approach Delay (s/veh)	1.3				0.0				18.0				15.0			
Approach LOS	A				A				C				B			

HCS 2010 Two-Way Stop Control Summary Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Billtown at Entrance							
Agency/Co.	CDM Smith							Jurisdiction								
Date Performed	1/11/2016							East/West Street	Entrance							
Analysis Year	2017							North/South Street	Billtown Road							
Time Analyzed	AM Peak Build							Peak Hour Factor	0.87							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Billtown Center															
Lanes																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	0	1	0	0	1	1	0
Configuration						L		R				TR		L	T	
Volume (veh/h)						54		90			697	57		89	744	
Percent Heavy Vehicles						0		0						0		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															
Delay, Queue Length, and Level of Service																
Flow Rate (veh/h)						62		103							102	
Capacity						160		371							785	
v/c Ratio						0.39		0.28							0.13	
95% Queue Length						1.7		1.1							0.4	
Control Delay (s/veh)						40.9		18.4							10.3	
Level of Service (LOS)						E		C							B	
Approach Delay (s/veh)					26.9								1.1			
Approach LOS					D								A			

HCS 2010 Two-Way Stop Control Summary Report																
General Information								Site Information								
Analyst	DBZ							Intersection	Billtown at Entrance							
Agency/Co.	CDM Smith							Jurisdiction								
Date Performed	1/11/2016							East/West Street	Entrance							
Analysis Year	2017							North/South Street	Billtown Road							
Time Analyzed	PM Peak Build							Peak Hour Factor	0.93							
Intersection Orientation	North-South							Analysis Time Period (hrs)	0.25							
Project Description	Billtown Center															
Lanes																
<p>Major Street: North-South</p>																
Vehicle Volumes and Adjustments																
Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		1	0	1	0	0	1	0	0	1	1	0
Configuration						L		R				TR		L	T	
Volume (veh/h)						50		84			565	51		76	1167	
Percent Heavy Vehicles						0		0						0		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															
Delay, Queue Length, and Level of Service																
Flow Rate (veh/h)						54		90							82	
Capacity						118		482							935	
v/c Ratio						0.46		0.19							0.09	
95% Queue Length						2.0		0.7							0.3	
Control Delay (s/veh)						59.3		14.2							9.2	
Level of Service (LOS)						F		B							A	
Approach Delay (s/veh)					31.1								0.6			
Approach LOS					D								A			

