final report

January 26, 2015
Revised April 7, 2015

Traffic Impact Study

Ashton Park Phase II
Beulah Church Road
Louisville, KY

Prepared for

Metro Public Works

JACOBS

11940 US 42
Goshen, KY 40026
502-228-0393

Table of Contents

INTRODUCTION

The development plan for Ashton Park Phase II on Beulah Church Road shows 28 single family lots and 106 apartment units. **Figure1** displays a map of the site. Access to the development will be from Beulah Church Road, Appleview Lane, and Appletree Way. The purpose of this study is to examine the traffic impacts of the development upon the adjacent highway system. For this study the impact area was defined to be the Beulah Church Road intersection with Zelma Fields Avenue at the proposed entrance, Apple Valley Drive at Outerloop and Fegenbush Lane at Beulah Church Road..

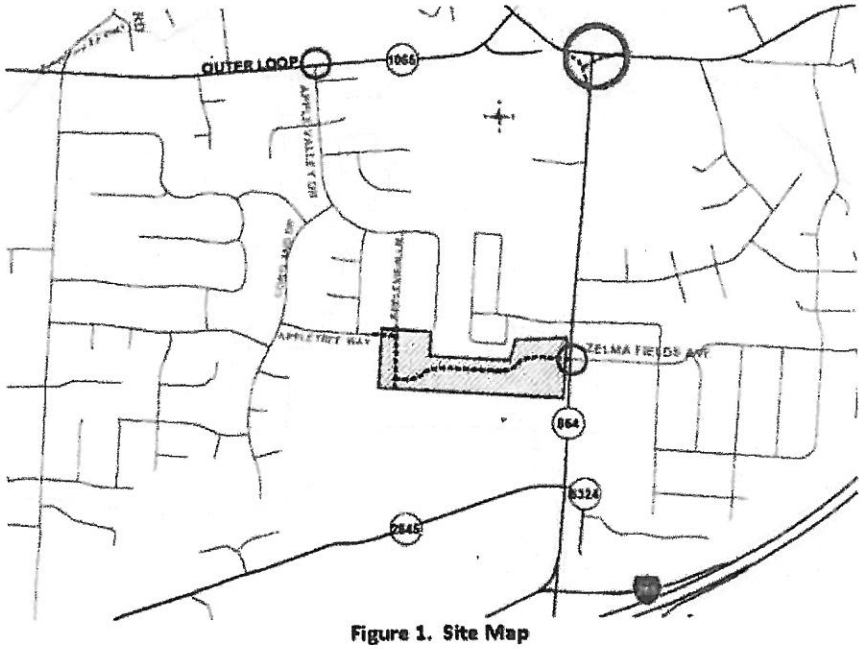


Figure 1. Site Map

EXISTING CONDITIONS

Beulah Church Road, KY 864, is a state maintained road with an estimated 2015 ADT of 15,000 vehicles per day between I 265 and the Outer Loop (KY 1065), as provided by the Kentucky Transportation Cabinet at station 296. The road is a three-lane highway with twelve-foot lanes, eight foot paved shoulders (provided by the Kentucky Transportation Cabinet). The speed limit is 45 mph. There is a sidewalk on the east side of Beulah Church Road. The intersection with Zelma Fields Road is controlled with a stop sign. There is a two-way left turn lane. TARC does not provide service along Beulah Church Road.

Jacobs Engineering Group collected a.m. and p.m. peak hour turning movement counts for the intersection of Beulah Church Road and Zelma Field Avenue, on January 13 and 14, 2015. The a.m. peak occurred between 7:00 and

8:00 and the p.m. peak hour occurred between 4:30 and 5:30 p.m. For the Outerloop intersection with Apple Valley Drive a 5/28/09 count was used. The thru volumes on Outerloop were increased by two percent per year. Metro Public Works provided a count made on 5/5/10 for the intersection of Beulah Church Road and Fegenbush Lane. All volumes at the intersection were increased by two percent per year. **Figure 2** illustrates the 2015 peak hour traffic volumes.

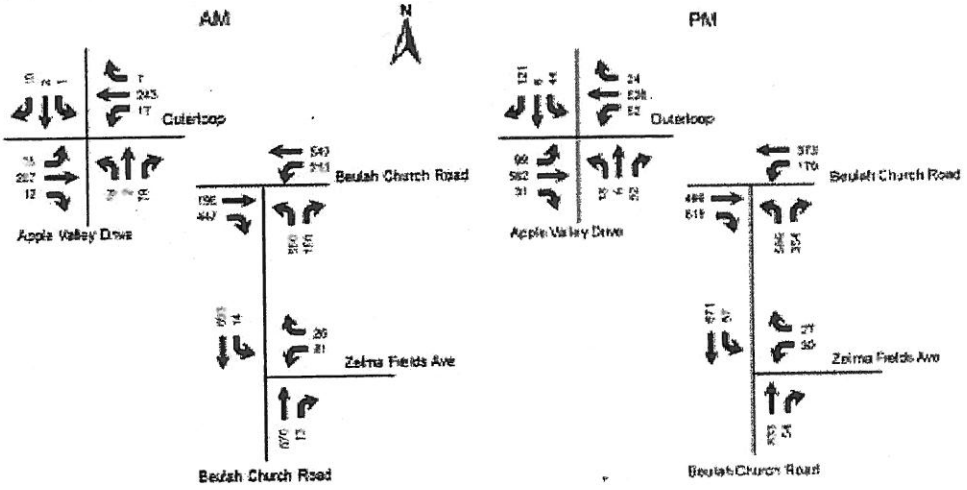


Figure 2. 2015 Peak Hour Volumes

FUTURE CONDITIONS

The projected completion year for this project is 2018, so the analysis year for this study is 2018. To predict traffic conditions in 2018, two and one third percent annual growth in traffic was added to the 2015 volumes on Beulah Church Road, Outerloop and Fegenbush Lane. This growth is Metro Louisville's standard rate. **Figure 3** displays the 2018 No build volumes.

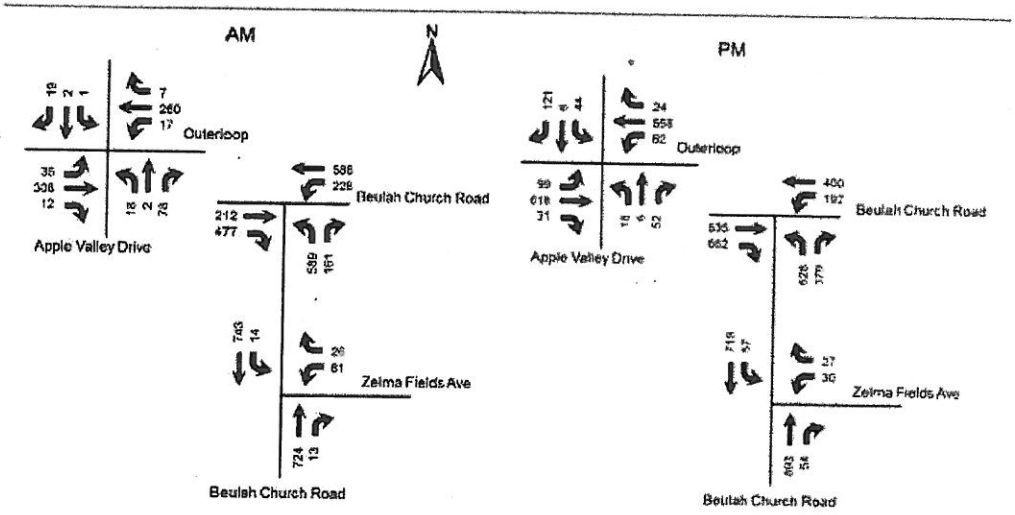


Figure 3. 2018 Peak Hour No Build

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 "Apartments" and "Single-Family Detached Housing" were reviewed and determined to be the best match. The trip generation results are listed in **Table 1**. The results of the trip generation analysis are that this development will generate 85 a.m. peak hour trips and 109 p.m. peak hour trips. The trips were assigned to the highway network with the percentages shown in **Figure 4**. Additionally, forty percent of the traffic to/from Apple Valley and Outerloop east was assumed to be diverted thru Ashton Park. **Figure 5** shows the trips generated by this development and distributed throughout the road network for the year 2018 during the peak hours. **Figure 6** displays the individual turning movements for the year 2018 for the peak hours when the development is completed.

Table 1. Peak Hour Trips Generated by Site

	A.M. Peak Hour					P.M. Peak Hour				
Land Use	Trips	% In	% OUT	IN	OUT	Trips	% In	% OUT	IN	OUT
Apartments	56	20	80	11	45	76	65	35	49	27
Single Family	29	25	75	7	22	33	63	37	21	12
TOTAL	85			18	67	109			70	39

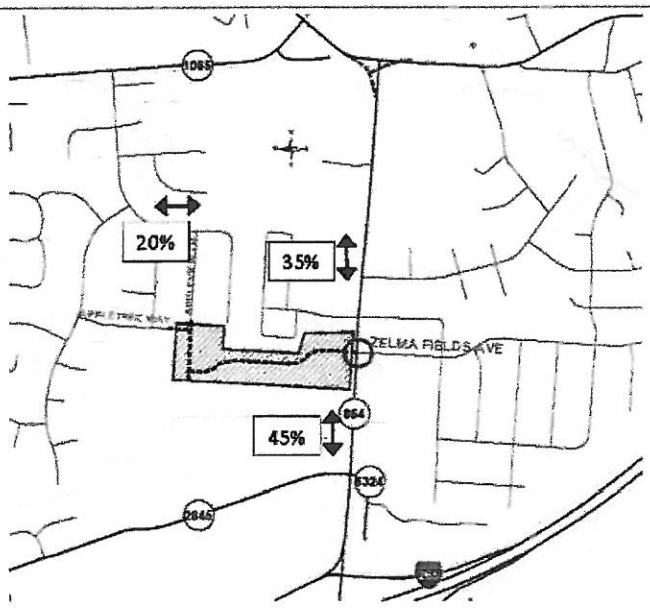


Figure 4. Trips Distribution Percentages

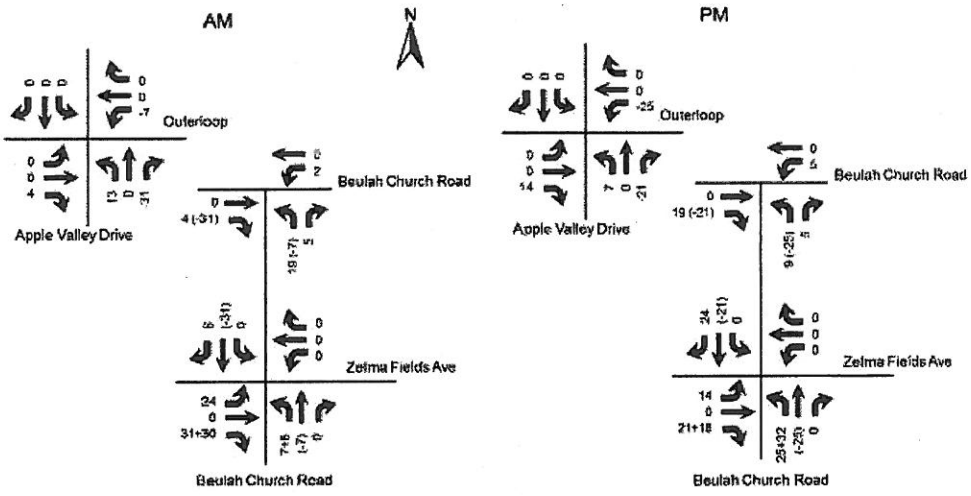


Figure 5. Peak Hour Trips Generated by Site

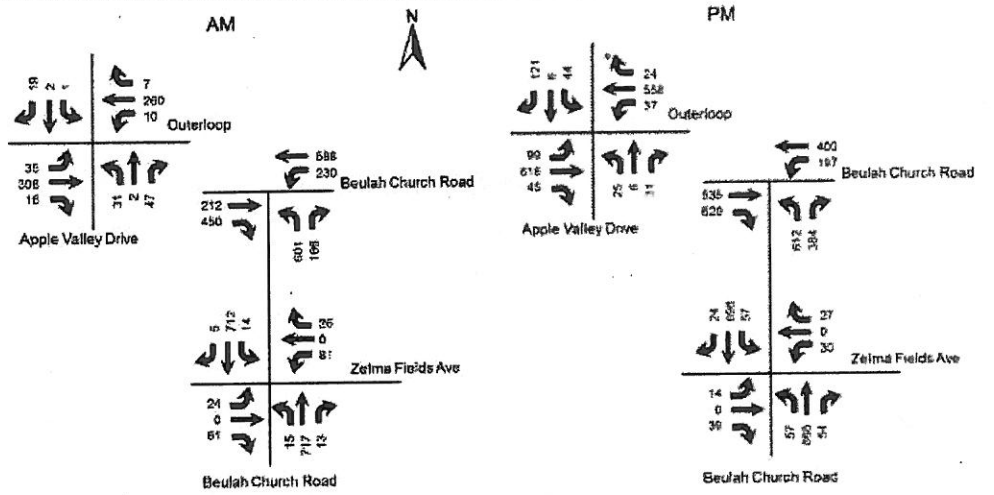


Figure 6. 2018 Peak Hour Build

ANALYSIS

The qualitative measure of traffic operations 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, "A" is the best operating condition and "F" is the worst. LOS results depend upon the facility that is analyzed. In this case, the LOS is based upon the total delay experienced at an intersection.

To evaluate the impact of the proposed development, the average vehicle delays at the intersection were determined using procedures detailed in the Highway Capacity Manual, 2010 edition. Future delay and LOS were determined for the intersections using the Highway Capacity Software HCS 2010 Streets (version 6.65) and HCS+ (version 5.6).

Table 2. Peak Hour Level of Service

Approach	A.M.			P.M.		
	2014 Existing	2018 No Build	2018 Build	2014 Existing	2018 No Build	2018 Build
Beulah Church Road at Zelma Fields Ave						
Beulah Church Road Northbound	NA	NA	A 9.4	NA	NA	A 9.5
Beulah Church Road Southbound	A 9.3	A 9.5	A 9.4	B 10.3	B 10.6	B 10.4
Zelma Fields Ave Westbound	D 25.6	D 28.4	E 46.9	C 22.2	C 24.1	D 34.2
Entrance Eastbound			C 22.3			C 23.0
Beulah Church Road at Fegenbush Lane	**B 19.0**	**C 22.6**	**C 22.2**	**C 26.5**	**C 32.2**	**C 29.3**
Beulah Church Road Eastbound	C 24.5	C 27.4	C 27.4	C 27.6	C 31.6	C 30.1
Fegenbush Lane Westbound	B 14.8	B 17.2	B 17.7	B 15.5	B 17.6	B 17.1
Beulah Church Road Northbound	C 20.5	C 25.7	C 24.3	C 32.1	D 41.2	D 36.1
Outerloop at Apple Valley Drive	**B 15.3**	**B 18.0**	**B 18.3**	**B 17.2**	**B 18.9**	**B 19.6**
Outerloop Eastbound	A 7.6	A 7.8	A 7.2	B 13.1	B 13.8	B 13.5
Outerloop Westbound	B 15.5	B 19.1	C 20.2	B 16.7	B 18.6	C 20.5
Apple Valley Northbound	D 35.3	D 39.7	D 40.3	C 28.4	C 31.6	C 33.1
Outerloop Plaza Southbound	C 31.4	D 35.2	D 36.8	C 32.0	D 35.6	D 36.9

Key: Level of Service, Delay in seconds per vehicle

The Kentucky Transportation Cabinet (KYTC) evaluates the need for turn lanes using Highway Design Memorandum No. 03-09 dated July 28, 2009. The volumes for the 2018 Build condition does not meet the warrants for a southbound right turn on Beulah Church Road at the entrance.

KYTC has the intersection of Beulah Church Road and Fegenbush Lane scheduled for construction beginning in 2016. The completed project should fully operational in 2017. The project will relocate the intersection to the west and make the Fegenbush Lane to Beulah Church Road south the through movement. Beulah Church Road east will become the side road. Fegenbush Lane will be widened to four lanes through the Outerloop/Watterson Trail intersection.

CONCLUSIONS

Based upon the volume of traffic generated by the development and the amount of traffic forecasted for the year 2018, there will be manageable impact to the existing highway network. The delays experienced will increase, but will continue to operate at an acceptable Level of Service. Zelma Fields Avenue will experience Level of Service E during the a.m. peak. However, a review of the volume to capacity ratio indicates in both scenarios the ratio is less than 0.6, indicating an additional lane is not needed on the approach.

APPENDIX

Traffic Counts

JACOBS
11940 Highway 42, Suite 1
Goshen, KY 40026

Counted by: Andy Wolak

File Name : Beulah ChurchAM
Site Code : 00011415
Start Date : 1/14/2015
Page No : 1

Groups Printed- Unshifted

	Beulah Church Road From North				Zelma Fields Avenue From East				Beulah Church Road From South				From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	3	171	0	174	28	0	12	40	0	127	0	127	0	0	0	0	341
07:15 AM	1	166	0	167	13	0	9	22	0	177	4	181	0	0	0	0	370
07:30 AM	4	183	0	187	23	0	2	25	0	196	4	200	0	0	0	0	412
07:45 AM	6	171	0	179	17	0	3	20	0	176	5	181	0	0	0	0	380
Total	14	691	0	707	81	0	26	107	0	676	13	689	0	0	0	0	1503
08:00 AM	1	149	0	150	20	0	12	32	0	133	4	137	0	0	0	0	319
08:15 AM	1	111	0	112	12	0	5	17	0	105	3	108	0	0	0	0	237
08:30 AM	3	120	0	123	17	0	11	28	0	96	1	109	0	0	0	0	260
08:45 AM	2	120	0	122	8	0	4	12	0	112	2	114	0	0	0	0	248
Total	7	500	0	507	57	0	32	89	0	446	10	456	0	0	0	0	1064
Grand Total	21	1191	0	1262	138	0	58	197	0	1122	23	1145	0	0	0	0	2567
Approch %	1.7	94.3	0		70.6	0	29.4		0	97.9	2.0		0	0	0	0	
Total %	0.8	46.4	0	47.1	5.4	0	2.3	7.7	0	44.2	1	45.1	0	0	0	0	

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	3	171	0	174	28	0	12	40	0	127	0	127	0	0	0	0	341
07:15 AM	1	166	0	167	13	0	9	22	0	177	4	181	0	0	0	0	370
07:30 AM	4	183	0	187	23	0	2	25	0	196	4	200	0	0	0	0	412
07:45 AM	6	171	0	179	17	0	3	20	0	176	5	181	0	0	0	0	380
Total Volume	14	691	0	707	81	0	26	107	0	676	13	689	0	0	0	0	1503
% App. Total	2	98	0		75.7	0	24.3		0	98.1	1.9		0	0	0	0	
PHF	.583	.943	.000	.945	.721	.000	.542	.669	.000	.862	.650	.861	.000	.000	.000	.000	.912

JACOBS
11940 Highway 42, Suite 1
Goshen, KY 40026

Counted by: Andy Wolak

File Name : Beulah Church PM
Site Code : 00011315
Start Date : 1/13/2015
Page No : 1

Groups Printed- Unshifted

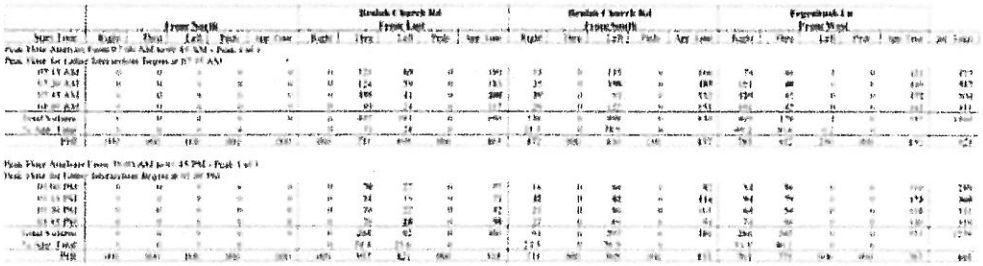
	Beulah Church Road From North				Zaima Fields Ave From East				Beulah Church Road From South				From West				Int. Total
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
04:00 PM	7	146	0	153	7	0	10	17	0	171	15	186	0	0	0	0	356
04:15 PM	10	164	0	174	6	0	9	15	0	197	16	213	0	0	0	0	402
04:30 PM	10	165	0	175	9	0	17	26	0	201	19	220	0	0	0	0	421
04:45 PM	11	170	0	181	6	0	7	13	0	203	18	221	0	0	0	0	415
Total	38	645	0	683	28	0	43	71	0	772	68	840	0	0	0	0	1594
05:00 PM	18	160	0	178	3	0	2	5	0	215	8	223	0	0	0	0	406
05:15 PM	16	176	0	192	12	0	7	19	0	214	9	223	0	0	0	0	434
05:30 PM	4	185	0	189	10	0	5	15	0	186	14	200	0	0	0	0	404
05:45 PM	8	163	0	171	10	0	4	14	0	213	13	226	0	0	0	0	411
Total	46	684	0	730	35	0	18	53	0	828	44	872	0	0	0	0	1655
Grand Total	84	1329	0	1413	63	0	61	124	0	1600	112	1712	0	0	0	0	3249
Apprch %	5.9	94.1	0		50.8	0	49.2		0	93.5	6.5		0	0	0	0	
Total %	2.6	40.9	0	43.5	1.9	0	1.9	3.8	0	49.2	3.4	52.7	0	0	0	0	

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 04:30 PM

04:30 PM	10	165	0	175	9	0	17	26	0	201	19	220	0	0	0	0	421
04:45 PM	11	170	0	181	6	0	7	13	0	203	18	221	0	0	0	0	415
05:00 PM	18	160	0	178	3	0	2	5	0	215	8	223	0	0	0	0	406
05:15 PM	16	176	0	192	12	0	7	19	0	214	9	223	0	0	0	0	434
Total Volume	55	671	0	726	30	0	33	63	0	833	54	887	0	0	0	0	1676
% App. Total	7.6	92.4	0		47.6	0	52.4		0	93.9	6.1		0	0	0	0	
PHF	.792	.953	.000	.945	.625	.000	.825	.606	.000	.965	.711	.958	.000	.000	.000	.000	.965

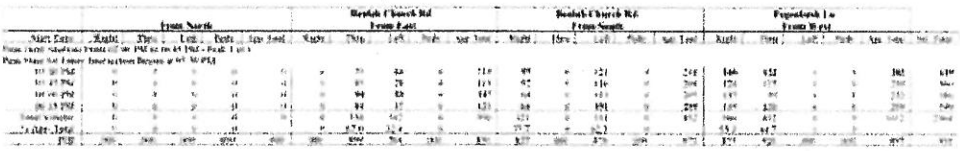
Louisville Metro
Traffic Engineering
601 W Jefferson St
Louisville, 40202

File Name : Beulah Church Rd & Fegenbush Ln (2)
Site Code : 05050234
Start Date : 5/5/2010
Page No : 6



Louisville Metro
Traffic Engineering
601 W Jefferson St
Louisville, 40202

File Name : Beulah Church Rd & Fegenbush Ln (2)
Site Code : 05050234
Start Date : 5/5/2010
Page No : 7



Traffic Counts
5/28/09

Interval Start Time	OuterLoop Plaza			Outer Loop			AppleValley			Outer Loop				
	From North			From East			From South			From West				
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Total	Hour
7:00	0	1	3	3	44	0	6	2	15	4	28	2	108	
7:15	0	2	2	3	48	0	3	0	23	6	64	3	154	
7:30	0	0	8	6	66	1	4	0	27	9	74	2	197	
7:45	0	0	4	2	57	0	6	1	13	13	60	3	159	618
8:00	1	0	5	6	45	6	5	1	15	7	57	4	152	662
8:15	2	0	9	1	46	4	9	0	11	16	39	3	140	648
8:30	3	0	9	0	44	6	7	0	13	9	55	0	146	597
8:45	3	2	15	3	55	4	6	0	7	14	49	1	159	597
16:00	12	3	32	22	120	8	6	0	6	28	134	12	383	
16:15	11	3	37	20	107	2	5	5	13	20	87	8	318	
16:30	5	2	29	15	116	5	4	2	12	27	112	5	334	
16:45	6	1	33	14	120	5	3	0	17	24	110	7	340	1375
17:00	11	2	39	20	108	7	3	2	7	14	105	8	326	1318
17:15	8	0	23	15	142	9	7	1	12	34	139	5	395	1395
17:30	20	1	23	11	109	3	4	1	18	27	143	10	370	1431
17:45	5	3	36	16	108	5	4	2	15	24	130	8	356	1447

AM PEAK

7:15	0	2	2	3	48	0	3	0	23	6	64	3	154
7:30	0	0	8	6	66	1	4	0	27	9	74	2	197
7:45	0	0	4	2	57	0	6	1	13	13	60	3	159
8:00	1	0	5	6	45	6	5	1	15	7	57	4	152
	1	2	19	17	216	7	18	2	78	35	255	12	662

PM PEAK

17:00	11	2	39	20	108	7	3	2	7	14	105	8	326
17:15	8	0	23	15	142	9	7	1	12	34	139	5	395
17:30	20	1	23	11	109	3	4	1	18	27	143	10	370
17:45	5	3	36	16	108	5	4	2	15	24	130	8	356
	44	6	121	62	467	24	18	6	52	99	517	31	1447

HCS Reports

TWO-WAY STOP CONTROL SUMMARY			
General Information		**Site Information**	
Analyst	DBZ	Intersection	
Agency/Co.	Jacobs	Jurisdiction	
Date Performed	1/26/2015	Analysis Year	2015
Analysis Time Period	AM Peak		
Project Description	Ashton Park		
East/West Street:	Zelma Fields Ave	North/South Street:	Beulah Church Road
Intersection Orientation:	North-South	Study Period (hrs):	0.25

Vehicle Volumes and Adjustments						
Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		676	13	14	693	
Peak-Hour Factor, PHF	1.00	0.91	0.91	0.91	0.91	1.00
Hourly Flow Rate, HFR (veh/h)	0	742	14	15	761	0
Percent Heavy Vehicles	0	--	--	1	--	--
Median Type	Two Way Left Turn Lane					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	
Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				81		26
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.91	1.00	0.91
Hourly Flow Rate, HFR (veh/h)	0	0	0	89	0	28
Percent Heavy Vehicles	0	0	0	1	0	1
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service									
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		15		117				
C (m) (veh/h)		859		290				
v/c		0.02		0.40				
95% queue length		0.05		1.87				
Control Delay (s/veh)		9.3		25.6				
LOS		A		D				
Approach Delay (s/veh)	--	--	25.6					
Approach LOS	--	--	D					

 HCS+™ Version 5.6 Generated: 1/26/2015 3:34 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	DBZ	Intersection	
Agency/Co.	Jacobs	Jurisdiction	
Date Performed	1/26/2015	Analysis Year	2018 No Build
Analysis Time Period	AM Peak		

Project Description	Ashton Park
East/West Street:	Zelma Fields Ave
North/South Street:	Beulah Church Road
Intersection Orientation:	North-South
Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		724	13	14	743	
Peak-Hour Factor, PHF	1.00	0.91	0.91	0.91	0.91	1.00
Hourly Flow Rate, HFR (veh/h)	0	795	14	15	816	0
Percent Heavy Vehicles	0	--	--	1	--	--
Median Type	Two Way Left Turn Lane					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				81		26
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.91	1.00	0.91
Hourly Flow Rate, HFR (veh/h)	0	0	0	89	0	28
Percent Heavy Vehicles	0	0	0	1	0	1
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		15		117				
C (m) (veh/h)		821		268				
v/c		0.02		0.44				
95% queue length		0.06		2.09				
Control Delay (s/veh)		9.5		28.4				
LOS		A		D				
Approach Delay (s/veh)	--	--	28.4					
Approach LOS	--	--	D					

 HCS+™ Version 5.6 Generated: 1/26/2015 3:36 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	DBZ	Intersection	
Agency/Co.	Jacobs	Jurisdiction	
Date Performed	4/2/2015	Analysis Year	2018 Build
Analysis Time Period	AM Peak		

Project Description	Ashton Park		
East/West Street:	Zelma Fields Ave	North/South Street	Beulah Church Road
Intersection Orientation:	North-South	Study Period (hrs)	0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	15	717	13	14	712	6
Peak-Hour Factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Hourly Flow Rate, HFR (veh/h)	16	787	14	15	782	6
Percent Heavy Vehicles	1	--	--	1	--	--
Median Type	Two Way Left Turn Lane					
RT Channelized			0			0
Lanes	1	1	0	1	1	0
Configuration	L		TR	L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	24	0	61	81	0	26
Peak-Hour Factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Hourly Flow Rate, HFR (veh/h)	26	0	67	89	0	28
Percent Heavy Vehicles	1	0	1	1	0	1
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			1	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR			LTR	
v (veh/h)	16	15		117			93	
C (m) (veh/h)	836	827		197			300	
v/c	0.02	0.02		0.59			0.31	
95% queue length	0.06	0.06		3.30			1.28	
Control Delay (s/veh)	9.4	9.4		46.9			22.3	
LOS	A	A		E			C	
Approach Delay (s/veh)	--	--	46.9			22.3		
Approach LOS	--	--	E			C		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	DBZ	Intersection	
Agency/Co.	Jacobs	Jurisdiction	
Date Performed	1/26/2015	Analysis Year	2015
Analysis Time Period	PM Peak		

Project Description	Ashton Park
East/West Street:	Zelma Fields Ave
Intersection Orientation:	North-South
North/South Street:	Beulah Church Road
Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		833	54	57	671	
Peak-Hour Factor, PHF	1.00	0.96	0.96	0.96	0.96	1.00
Hourly Flow Rate, HFR (veh/h)	0	867	56	59	698	0
Percent Heavy Vehicles	0	--	--	1	--	--
Median Type	Two Way Left Turn Lane					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				30		27
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.96	1.00	0.96
Hourly Flow Rate, HFR (veh/h)	0	0	0	31	0	28
Percent Heavy Vehicles	0	0	0	1	0	1
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		59		59				
C (m) (veh/h)		744		268				
v/c		0.08		0.22				
95% queue length		0.26		0.82				
Control Delay (s/veh)		10.3		22.2				
LOS		B		C				
Approach Delay (s/veh)	--	--	22.2					
Approach LOS	--	--	C					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	DBZ	Intersection	
Agency/Co.	Jacobs	Jurisdiction	
Date Performed	1/26/2015	Analysis Year	2018 No Build
Analysis Time Period	PM Peak		

Project Description	Ashton Park		
East/West Street:	Zelma Fields Ave	North/South Street:	Beulah Church Road
Intersection Orientation:	North-South	Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		893	54	57	719	
Peak-Hour Factor, PHF	1.00	0.96	0.96	0.96	0.96	1.00
Hourly Flow Rate, HFR (veh/h)	0	930	56	59	748	0
Percent Heavy Vehicles	0	--	--	1	--	--
Median Type	Two Way Left Turn Lane					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				30		27
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.96	1.00	0.96
Hourly Flow Rate, HFR (veh/h)	0	0	0	31	0	28
Percent Heavy Vehicles	0	0	0	1	0	1
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		59		59				
C (m) (veh/h)		705		247				
v/c		0.08		0.24				
95% queue length		0.27		0.91				
Control Delay (s/veh)		10.6		24.1				
LOS		B		C				
Approach Delay (s/veh)	--	--	24.1					
Approach LOS	--	--	C					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	DBZ	Intersection	
Agency/Co.	Jacobs	Jurisdiction	
Date Performed	4/2/2015	Analysis Year	2018 Build
Analysis Time Period	PM Peak		

Project Description	Ashton Park
East/West Street:	Zelma Fields Ave
Intersection Orientation:	North-South
North/South Street:	Beulah Church Road
Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	57	868	54	57	698	24
Peak-Hour Factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Hourly Flow Rate, HFR (veh/h)	59	904	56	59	727	25
Percent Heavy Vehicles	0	--	--	1	--	--
Median Type	Two Way Left Turn Lane					
RT Channelized			0			0
Lanes	1	1	0	1	1	0
Configuration	L		TR	L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	14	0	39	30	0	27
Peak-Hour Factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Hourly Flow Rate, HFR (veh/h)	14	0	40	31	0	28
Percent Heavy Vehicles	1	0	1	1	0	1
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		1			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR			LTR	
v (veh/h)	59	59		59			54	
C (m) (veh/h)	867	721		181			253	
v/c	0.07	0.08		0.33			0.21	
95% queue length	0.22	0.27		1.33			0.79	
Control Delay (s/veh)	9.5	10.4		34.2			23.0	
LOS	A	B		D			C	
Approach Delay (s/veh)	--	--	34.2			23.0		
Approach LOS	--	--	D			C		

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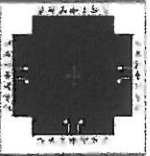
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Jacobs			Duration, h	0.25
Analyst	DBZ	Analysis Date	Apr 2, 2015	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.92
Intersection	Beulah Church Road	Analysis Year	2015	Analysis Period	1> 7:00
File Name	15 AM.xus				
Project Description	Ashton Park II				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h		198	447	213	549		550		150			

Signal Information				EB			WB			NB			SB		
Cycle, s	86.0	Reference Phase	2												
Offset, s	0	Reference Point	End	Green	8.3	17.9		24.3	0.0	0.0	0.0				
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.5	3.6		3.5	0.0	0.0	0.0				
Force Mode	Fixed	Simult. Gap N/S	Off	Red	2.0	1.5		1.5	0.0	0.0	0.0				

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		7.3	1.0	4.0		9.0		
Phase Duration, s		23.0	13.0	36.8		29.3		
Change Period, (Y+Rc), s		5.6	5.5	5.6		5.0		
Max Allow Headway (MAH), s		6.2	4.5	5.9		3.1		
Queue Clearance Time (g_s), s		13.3	7.6	18.0		22.7		
Green Extension Time (g_e), s		4.0	0.7	5.9		1.5		
Phase Call Probability		1.00	0.99	1.00		1.00		
Max Out Probability		0.00	0.01	0.02		0.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate (v), veh/h		194	302	232	597		598		163			
Adjusted Saturation Flow Rate (s), veh/h/ln		1900	1610	1810	1900		1810		1610			
Queue Service Time (g_s), s		3.7	11.3	5.6	16.0		20.7		3.8			
Cycle Queue Clearance Time (g_c), s		3.7	11.3	5.6	16.0		20.7		3.8			
Green Ratio (g/C)		0.26	0.26	0.42	0.47		0.37		0.49			
Capacity (c), veh/h		500	424	603	897		666		795			
Volume-to-Capacity Ratio (X)		0.267	0.712	0.384	0.665		0.898		0.205			
Available Capacity (c_a), veh/h		1434	1215	922	1434		1092		1175			
Back of Queue (Q), veh/ln (95th percentile)		2.7	7.5	3.5	9.7		12.5		1.9			
Queue Storage Ratio (RQ) (95th percentile)		0.11	0.62	0.25	0.49		0.62		0.09			
Uniform Delay (d_1), s/veh		19.3	22.1	13.1	13.5		19.8		9.5			
Incremental Delay (d_2), s/veh		0.6	4.4	0.5	1.8		3.7		0.0			
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0		0.0			
Control Delay (d), s/veh		19.9	26.5	13.6	15.3		23.5		9.5			
Level of Service (LOS)		B	C	B	B		C		A			
Approach Delay, s/veh / LOS	24.5		C	14.8		B	20.5		C	0.0		
Intersection Delay, s/veh / LOS	19.0						B					

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

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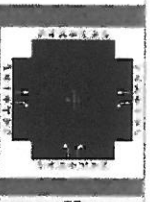
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Jacobs			Duration, h	0.25
Analyst	DBZ	Analysis Date	Apr 3, 2015	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.92
Intersection	Beulah Church Road	Analysis Year	2018 No Build	Analysis Period	1> 7.00
File Name	18 AM NB.xus				
Project Description	Ashton Park II				



Demand Information	EB			WB			NB			SB		
Approach Movement	-	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h		212	477	228	588		589		161			

Signal Information									
Cycle, s	74.0	Reference Phase	2						
Offset, s	0	Reference Point	End						
Uncoordinated	Yes	Simult. Gap E/W	On	Green	9.5	20.3	28.6	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	Off	Yellow	3.5	3.0	3.5	0.0	0.0	0.0
				Red	2.0	1.5	1.5	0.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		7.3	1.0	4.0		9.0		
Phase Duration, s		25.4	15.0	40.4		33.6		
Change Period, (Y+R_c), s		5.5	5.5	5.5		5.0		
Max Allow Headway (MAH), s		0.2	4.6	5.9		3.1		
Queue Clearance Time (g_s), s		15.4	8.8	21.9		28.9		
Green Extension Time (g_e), s		4.3	0.8	8.2		1.5		
Phase Call Probability		1.00	0.99	1.00		1.00		
Max Out Probability		0.00	0.03	0.04		0.02		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate (v), veh/h		142	319	248	639		640		175			
Adjusted Saturation Flow Rate (s), veh/h/ln		1900	1610	1810	1900		1810		1610			
Queue Service Time (g_s), s		4.4	13.4	6.8	19.9		24.9		4.4			
Cycle Queue Clearance Time (g_c), s		4.4	13.4	6.8	19.9		24.9		4.4			
Green Ratio (g/C)		0.27	0.27	0.47	0.47		0.39		0.52			
Capacity (c), veh/h		508	431	596	894		700		830			
Volume-to-Capacity Ratio (X)		0.279	0.741	0.416	0.715		0.915		0.211			
Available Capacity (c_a), veh/h		1280	1084	850	1280		975		1075			
Back of Queue (Q), veh/ln (95th percentile)		3.3	8.0	4.5	12.2		16.0		2.3			
Queue Storage Ratio (RQ) (95th percentile)		0.14	0.73	0.32	0.61		0.80		0.11			
Uniform Delay (d_1), s/veh		21.6	24.8	14.6	15.7		21.6		9.8			
Incremental Delay (d_2), s/veh		0.6	4.9	0.6	2.3		8.4		0.0			
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0		0.0			
Control Delay (d), s/veh		22.1	29.7	15.2	18.0		30.0		9.8			
Level of Service (LOS)		C	C	B	B		C		A			
Approach Delay, s/veh / LOS	27.4		C	17.2		B	25.7		C	0.0		
Intersection Delay, s/veh / LOS	22.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	0.7	A	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.7	A	2.0	A		F		

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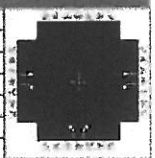
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Jacobs			Duration, h	0.25
Analyst	DBZ	Analysis Date	Apr 3, 2015	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.92
Intersection	Beulah Church Road	Analysis Year	2018 Build	Analysis Period	1> 7:00
File Name	18 AM B.xus				
Project Description	Ashton Park II				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h		212	450	230	588		601		166			

Signal Information					EB		WB			NB			SB		
Cycle, s	71.7	Reference Phase	2		L	T	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	9.6	18.2	28.3	0.0	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.5	3.6	3.5	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	Off	Red	2.0	1.5	1.5	0.0	0.0	0.0					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		7.3	1.0	4.0		9.0		
Phase Duration, s		23.3	15.1	38.4		33.3		
Change Period, (Y+Rc), s		5.6	5.5	5.6		5.0		
Max Allow Headway (MAH), s		6.2	4.5	5.9		3.1		
Queue Clearance Time (g_s), s		13.8	8.8	21.8		28.6		
Green Extension Time (g_e), s		3.9	0.8	8.2		1.6		
Phase Call Probability		1.00	0.99	1.00		1.00		
Max Out Probability		0.00	0.03	0.04		0.02		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate (v), veh/h		136	288	250	639		653		180			
Adjusted Saturation Flow Rate (s), veh/h/ln		1900	1610	1810	1900		1810		1610			
Queue Service Time (g_s), s		4.2	11.8	6.8	19.8		24.8		4.3			
Cycle Queue Clearance Time (g_c), s		4.2	11.8	6.8	19.8		24.6		4.3			
Green Ratio (g/C)		0.25	0.25	0.41	0.46		0.30		0.53			
Capacity (c), veh/h		471	399	585	870		715		851			
Volume-to-Capacity Ratio (X)		0.288	0.722	0.427	0.735		0.914		0.212			
Available Capacity (c_a), veh/h		1321	1119	846	1321		1006		1110			
Back of Queue (Q), veh/ln (95th percentile)		3.2	8.0	4.5	12.2		15.8		2.1			
Queue Storage Ratio (RQ) (95th percentile)		0.13	0.67	0.32	0.61		0.70		0.11			
Uniform Delay (d_1), s/veh		21.9	24.8	14.9	15.9		20.6		9.0			
Incremental Delay (d_2), s/veh		0.7	4.9	0.6	2.6		7.9		0.0			
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0		0.0			
Control Delay (d), s/veh		22.6	29.7	15.5	18.5		28.5		9.1			
Level of Service (LOS)		C	C	B	B		C		A			
Approach Delay, s/veh / LOS	27.4		C	17.7		B	24.3		C	0.0		
Intersection Delay, s/veh / LOS	22.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	0.7	A	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.7	A	2.0	A		F		

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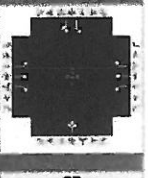
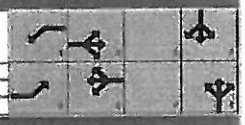
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Jacobs			Duration, h	0.25
Analyst	DBZ	Analysis Date	Apr 3, 2015	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.84
Intersection	Apple Valley Drive	Analysis Year	2015	Analysis Period	1> 7:00
File Name	15 PM.xus				
Project Description	Ashton Park II				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	99	582	31	62	526	24	10	6	52	44	6	121

Signal Information					EB			WB			NB			SB		
Cycle, s	76.3	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	3.7	0.3		41.0	13.0	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.6	0.0		4.3	3.6	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0		2.0	2.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	3.0	1.1	3.0		8.0		6.0
Phase Duration, s	9.5	48.5	9.2	48.2		10.6		10.6
Change Period, (Y+Rc), s	5.6	6.3	5.5	6.3		5.6		5.6
Max Allow Headway (MAH), s	4.0	3.9	4.0	3.9		5.2		5.2
Queue Clearance Time (g_s), s	4.1	22.2	3.9	33.9		9.6		11.6
Green Extension Time (g_e), s	0.2	8.7	0.2	8.1		1.4		1.3
Phase Call Probability	0.92	1.00	0.89	1.00		1.00		1.00
Max Out Probability	0.00	0.05	0.00	0.14		0.01		0.04

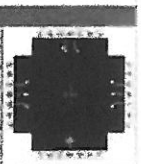
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	116	693	37	100	890	41		90		52	151	
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1863	1610	1810	1863	1610		1456		1353	1622	
Queue Service Time (g_s), s	2.1	20.2	0.8	1.9	31.9	0.9		0.1		2.8	6.5	
Cycle Queue Clearance Time (g_c), s	2.1	20.2	0.8	1.9	31.9	0.9		6.6		9.6	6.5	
Green Ratio (g/C)	0.00	0.55	0.55	0.60	0.55	0.55		0.17		0.17	0.17	
Capacity (c), veh/h	271	1030	890	390	1022	893		308		206	278	
Volume-to-Capacity Ratio (X)	0.435	0.673	0.041	0.278	0.877	0.046		0.294		0.255	0.544	
Available Capacity (c_a), veh/h	532	1465	1267	649	1465	1267		547		417	532	
Back of Queue (Q), veh/ln (95th percentile)	1.5	11.0	0.4	1.9	15.6	0.5		2.5		1.7	4.5	
Queue Storage Ratio (RQ) (95th percentile)	0.09	0.28	0.01	0.21	0.39	0.03		0.63		0.52	0.57	
Uniform Delay (d_1), s/veh	14.7	12.1	7.8	10.3	15.0	8.0		27.7		33.4	28.9	
Incremental Delay (d_2), s/veh	1.1	0.8	0.0	0.2	2.8	0.0		0.7		0.9	2.4	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Control Delay (d), s/veh	15.8	12.9	7.8	10.5	17.8	8.0		28.4		34.3	31.2	
Level of Service (LOS)	B	B	A	B	B	A		C		C	C	
Approach Delay, s/veh / LOS	13.1		B	10.7		B	28.4		C	32.0		C
Intersection Delay, s/veh / LOS	17.2						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.2	B	2.4	B	2.4	B
Bicycle LOS Score / LOS	1.9	A	1.7	A	0.6	A	0.8	A

 HCS 2010™ Streets Version 6.65 Generated: 4/7/2015 9:35:30 AM

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Jacobs			Duration, h	0.25
Analyst	DBZ	Analysis Date	Apr 7, 2015	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.84
Intersection	Apple Valley Drive	Analysis Year	2018 No Build	Analysis Period	1> 7:00
File Name	18 PM NB.xus				
Project Description	Ashton Park II				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	99	618	31	62	559	24	18	6	52	44	6	121

Signal Information					EB			WB			NB			SB		
Cycle, s	84.1	Reference Phase	2													
Offset, s	0	Reference Point	End	Green	3.8	0.3		46.5	14.0	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.5	0.0		4.3	3.6	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0		2.0	2.0	0.0	0.0					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	3.0	1.1	3.0		8.0		8.0
Phase Duration, s	9.6	55.1	9.3	54.8		19.6		19.6
Change Period, (Y+R_c), s	5.5	6.3	5.5	6.3		5.6		5.6
Max Allow Headway (MAH), s	4.0	3.9	4.0	3.9		5.7		5.7
Queue Clearance Time (g_s), s	4.2	25.1	4.0	40.5		9.4		12.7
Green Extension Time (g_e), s	0.2	9.8	0.2	8.1		1.4		1.2
Phase Call Probability	0.94	1.00	0.92	1.00		1.00		1.00
Max Out Probability	0.00	0.10	0.00	0.31		0.02		0.00

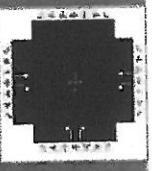
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	118	736	37	106	968	42		90		52	151	
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1863	1610	1810	1863	1610		1400		1359	1622	
Queue Service Time (g_s), s	2.2	23.1	0.8	2.0	38.5	0.9		9.1		3.1	7.2	
Cycle Queue Clearance Time (g_c), s	2.2	23.1	0.8	2.0	38.5	0.9		7.4		10.7	7.2	
Green Ratio (g/C)	0.62	0.58	0.58	0.62	0.58	0.58		0.17		0.17	0.17	
Capacity (c), veh/h	244	1079	933	374	1073	926		268		190	272	
Volume-to-Capacity Ratio (X)	0.483	0.682	0.040	0.288	0.902	0.045		0.314		0.275	0.556	
Available Capacity (c_a), veh/h	479	1331	1150	614	1331	1150		488		388	483	
Back of Queue (Q), veh/ln (95th percentile)	2.1	12.6	0.4	1.1	18.7	0.5		2.9		1.9	5.1	
Queue Storage Ratio (RQ) (95th percentile)	0.10	0.32	0.07	0.22	0.47	0.04		0.71		0.58	0.64	
Uniform Delay (d_1), s/veh	17.3	12.3	7.6	10.7	15.7	7.7		30.8		37.2	32.1	
Incremental Delay (d_2), s/veh	1.5	1.1	0.0	0.2	4.4	0.0		0.9		1.1	2.5	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Control Delay (d), s/veh	18.8	13.3	7.6	10.9	20.2	7.8		31.6		38.3	34.6	
Level of Service (LOS)	B	B	A	B	C	A		C		D	C	
Approach Delay, s/veh / LOS	13.5		B	16.6		B	31.6		C	35.6		D
Intersection Delay, s/veh / LOS	16.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.2	B	2.4	B	2.4	B
Bicycle LOS Score / LOS	2.0	A	1.8	A	0.6	A	0.8	A

 HCS 2010™ Streets Version 6.5 Generated: 4/7/2015 9:38:14 AM

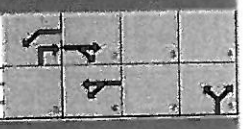
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Jacobs	Analysis Date	Apr 3, 2015	Duration, h	0.25
Analyst	DBZ	Time Period	PM Peak	Area Type	Other
Jurisdiction		Analysis Year	2010 Build	PHF	0.92
Intersection	Beulah Church Road			Analysis Period	1> 7:00
File Name	18 PM B.xus				
Project Description	Ashton Park II				



Demand Information	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Demand (v), veh/h		535	620	197	400		612		384			

Signal Information					EB		WB			NB			SB		
Cycle, s	96.3	Reference Phase	2												
Offset, s	0	Reference Point	End	Green	9.5	33.7	37.4	0.0	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.5	3.6	3.5	0.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	Off	Red	2.0	1.5	1.5	0.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		7.3	1.0	4.0		9.0		
Phase Duration, s		38.8	15.0	53.6		42.4		
Change Period, (Y+Rc), s		5.6	5.5	5.6		5.0		
Max Allow Headway (MAH), s		6.1	4.5	5.9		3.1		
Queue Clearance Time (gs), s		25.7	8.9	16.3		36.2		
Green Extension Time (ge), s		7.5	0.6	3.9		1.1		
Phase Call Probability		1.00	1.00	1.00		1.00		
Max Out Probability		0.16	0.02	0.00		0.92		

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement		2	12	1	6		3		18			
Assigned Movement		379	439	214	435		665		417			
Adjusted Flow Rate (v), veh/h		1900	1810	1810	1900		1810		1810			
Adjusted Saturation Flow Rate (s), veh/h/ln		15.7	23.7	6.9	14.3		34.2		17.3			
Queue Service Time (gs), s		15.7	23.7	6.9	14.3		34.2		17.3			
Cycle Queue Clearance Time (gc), s		0.34	0.34	0.47	0.50		0.39		0.49			
Green Ratio (g/C)		655	655	439	952		704		786			
Capacity (c), veh/h		0.578	0.790	0.467	0.457		0.945		0.531			
Volume-to-Capacity Ratio (X)		985	835	636	985		751		828			
Available Capacity (cA), veh/h		10.5	13.4	4.9	9.6		24.1		9.7			
Back of Queue (Q), veh/ln (95th percentile)		0.44	1.11	0.35	0.48		1.20		0.48			
Queue Storage Ratio (RQ) (95th percentile)		25.8	28.4	17.7	15.6		28.6		17.1			
Uniform Delay (d1), s/veh		1.3	4.3	1.0	0.7		19.5		0.2			
Incremental Delay (d2), s/veh		0.0	0.0	0.0	0.0		0.0		0.0			
Initial Queue Delay (d3), s/veh		27.1	32.7	18.7	16.3		47.9		17.3			
Control Delay (d), s/veh		C	C	B	B		D		B			
Level of Service (LOS)	30.1	C		17.1	B		36.1	D		0.0		
Approach Delay, s/veh / LOS	29.3						C					
Intersection Delay, s/veh / LOS												

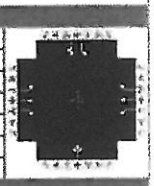
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	0.7	A	2.3	B	2.3	B
Bicycle LOS Score / LOS	2.6	B	1.6	A		F		

HCS 2010™ Streets Version 6.60

Generated: 4/3/2015 10:40:07 AM

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Jacobs	Analysis Date	Apr 2 2015	Duration, h	0.25
Analyst	DBZ	Time Period	AM Peak	Area Type	Other
Jurisdiction		Analysis Year	2015	PHF	0.84
Intersection	Apple Valley Drive			Analysis Period	1> 7.00
File Name	15 AM.xus				
Project Description	Ashton Park II				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	35	297	12	17	243	7	18	2	78	1	2	19

Signal Information					EB		WB		NB		SB	
Cycle, s	74.4	Reference Phase	2									
Offset, s	0	Reference Point	End	Green	2.3	0.9	46.3	7.5	0.0	0.0		
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.5	0.0	4.3	3.6	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0	2.0	2.0	0.0	0.0		

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	3.0	1.1	3.0		8.0		6.0
Phase Duration, s	7.8	52.6	8.7	53.5		13.1		13.1
Change Period, (Y+R_c), s	5.5	6.3	5.5	6.3		5.6		5.6
Max Allow Headway (*MAH*), s	4.0	3.9	4.0	3.9		5.2		5.2
Queue Clearance Time (g_s), s	2.6	8.3	3.1	40.1		7.2		7.3
Green Extension Time (g_e), s	0.1	8.4	0.1	7.0		0.6		0.6
Phase Call Probability	0.58	1.00	0.79	1.00		0.95		0.95
Max Out Probability	0.00	0.01	0.00	0.20		0.00		0.00

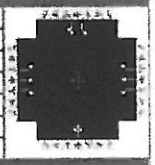
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	42	342	14	76	1087	31		117		1	25	
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1863	1610	1810	1863	1610		1603		1321	1634	
Queue Service Time (g_s), s	0.6	6.3	0.3	1.1	38.1	0.5		2.7		0.1	1.0	
Cycle Queue Clearance Time (g_c), s	0.6	6.3	0.3	1.1	38.1	0.5		5.2		5.3	1.0	
Green Ratio (g/C)	0.05	0.62	0.62	0.67	0.03	0.03		0.10		0.10	0.10	
Capacity (c), veh/h	204	1161	1003	744	1182	1022		218		137	164	
Volume-to-Capacity Ratio (X)	0.205	0.294	0.014	0.102	0.920	0.031		0.534		0.009	0.152	
Available Capacity (c_a), veh/h	512	1501	1297	1032	1501	1297		588		448	549	
Back of Queue (Q), veh/ln (95th percentile)	0.6	3.3	0.1	0.5	16.1	0.2		3.7		0.0	0.7	
Queue Storage Ratio (RQ) (95th percentile)	0.03	0.08	0.02	0.10	0.41	0.02		0.93		0.01	0.09	
Uniform Delay (d_1), s/veh	15.8	6.5	5.3	4.6	11.9	5.1		32.4		35.0	30.6	
Incremental Delay (d_2), s/veh	0.5	0.1	0.0	0.0	4.7	0.0		2.9		0.0	0.6	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Control Delay (d), s/veh	16.3	6.6	5.3	4.6	16.6	5.1		35.3		35.0	31.2	
Level of Service (LOS)	B	A	A	A	B	A		D		D	C	
Approach Delay, s/veh / LOS	7.6	A		15.5	B		35.3	D		31.4	C	
Intersection Delay, s/veh / LOS	15.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.2	B	2.4	B	2.4	B
Bicycle LOS Score / LOS	1.1	A	1.0	A	0.7	A	0.5	A

 HCS 2010™ Streets Version 6.65 Generated: 4/3/2015 10:40:07 AM

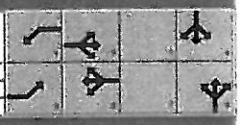
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Jacobs	Analysis Date	Apr 3, 2015	Duration, h	0.25
Analyst	DBZ	Time Period	AM Peak	Area Type	Other
Jurisdiction		Analysis Year	2018 No Build	PHF	0.84
Intersection	Apple Valley Drive			Analysis Period	1> 7.00
File Name	18 AM NB.xus				
Project Description	Ashton Park II				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	35	309	12	17	260	7	18	2	78	1	2	19

Signal Information					EB			WB			NB			SB		
Cycle, s	83.3	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	2.5	0.8		54.3	8.2	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.5	0.0		4.3	3.0	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0		2.0	2.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	3.0	1.1	3.0		8.0		8.0
Phase Duration, s	8.0	60.6	8.8	61.5		13.8		13.8
Change Period, (Y+Rc), s	5.5	6.3	5.5	6.3		5.6		5.6
Max Allow Headway (MAH), s	4.0	3.9	4.0	3.9		5.2		5.2
Queue Clearance Time (g_s), s	2.6	9.1	3.1	49.6		7.8		7.9
Green Extension Time (g_e), s	0.1	10.0	0.1	5.0		0.6		0.6
Phase Call Probability	0.62	1.00	0.83	1.00		0.96		0.96
Max Out Probability	0.00	0.02	0.00	0.68		0.00		0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	42	367	14	77	1171	32		117		1	25	
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1863	1810	1810	1863	1810		1803		1321	1634	
Queue Service Time (g_s), s	0.6	7.1	0.3	1.1	47.6	0.6		3.1		0.1	1.2	
Cycle Queue Clearance Time (g_c), s	0.6	7.1	0.3	1.1	47.6	0.6		5.8		5.9	1.2	
Green Ratio (g/C)	0.68	0.65	0.65	0.69	0.66	0.66		0.10		0.10	0.10	
Capacity (c), veh/h	173	1216	1051	745	1234	1067		209		124	161	
Volume-to-Capacity Ratio (X)	0.240	0.302	0.014	0.103	0.949	0.030		0.558		0.010	0.155	
Available Capacity (c_a), veh/h	445	1342	1160	999	1342	1160		526		390	490	
Back of Queue (Q), veh/ln (95th percentile)	0.9	3.8	0.1	0.5	29.0	0.2		4.3		0.0	0.8	
Queue Storage Ratio (RQ) (95th percentile)	0.04	0.10	0.02	0.10	0.52	0.02		1.06		0.01	0.11	
Uniform Delay (d_1), s/veh	10.0	6.3	5.1	4.4	12.8	4.8		36.4		39.4	34.4	
Incremental Delay (d_2), s/veh	0.7	0.1	0.0	0.0	7.7	0.0		3.3		0.0	0.6	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Control Delay (d), s/veh	20.6	6.4	5.1	4.5	20.4	4.8		39.7		39.4	35.0	
Level of Service (LOS)	C	A	A	A	C	A		D		D	C	
Approach Delay, s/veh / LOS	7.8	A		19.1	B		39.7	D		35.2	D	
Intersection Delay, s/veh / LOS	18.0						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.2	B	2.6	B	2.5	B
Bicycle LOS Score / LOS	1.2	A	1.0	A	0.7	A	0.5	A

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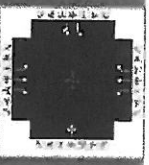
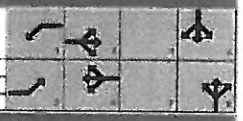
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Jacobs			Duration, h	0.25
Analyst	DBZ	Analysis Date	Apr 3, 2015	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.84
Intersection	Apple Valley Drive	Analysis Year	2018 Build	Analysis Period	1> 7.00
File Name	18 AM B.xus				
Project Description	Ashton Park II				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	35	308	16	10	260	7	31	2	47	1	2	19

Signal Information					EB			WB			NB			SB		
Cycle, s	84.0	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	2.5	0.2		56.0	7.1	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.5	0.0		4.3	3.6	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0		2.0	2.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	3.0	1.1	3.0		8.0		6.0
Phase Duration, s	8.0	63.1	8.2	63.3		12.7		12.7
Change Period, (Y+Rc), s	5.5	6.3	5.5	6.3		5.6		5.6
Max Allow Headway (MAH), s	4.0	3.9	4.0	3.9		5.2		5.2
Queue Clearance Time (g_s), s	2.6	8.6	2.6	52.3		6.8		7.0
Green Extension Time (g_e), s	0.1	10.9	0.1	4.7		0.5		0.5
Phase Call Probability	0.62	1.00	0.66	1.00		0.04		0.04
Max Out Probability	0.00	0.03	0.00	0.75		0.00		0.00

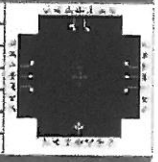
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	42	367	19	47	1213	33		95		1	25	
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1863	1610	1810	1863	1610		1583		1366	1634	
Queue Service Time (g_s), s	0.6	6.6	0.3	0.6	50.3	0.6		3.7		0.1	1.2	
Cycle Queue Clearance Time (g_c), s	0.6	6.6	0.3	0.6	50.3	0.6		4.9		5.0	1.2	
Green Ratio (g/C)	0.71	0.68	0.68	0.71	0.68	0.68		0.08		0.08	0.08	
Capacity (c), veh/h	166	1261	1090	760	1265	1093		191		120	137	
Volume-to-Capacity Ratio (X)	0.251	0.291	0.017	0.061	0.959	0.030		0.499		0.010	0.182	
Available Capacity (c_a), veh/h	435	1331	1150	1026	1331	1150		519		412	466	
Back of Queue (Q), veh/ln (95th percentile)	1.0	3.4	0.1	0.3	21.3	0.2		3.5		0.0	0.9	
Queue Storage Ratio (RQ) (95th percentile)	0.05	0.09	0.02	0.06	0.54	0.02		0.88		0.01	0.11	
Uniform Delay (d1), s/veh	21.5	5.5	4.4	3.9	12.4	4.4		37.4		39.9	35.8	
Incremental Delay (d2), s/veh	0.8	0.1	0.0	0.0	8.8	0.0		2.9		0.0	0.9	
Initial Queue Delay (d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Control Delay (d), s/veh	22.2	5.6	4.4	3.9	21.2	4.4		40.3		40.0	36.7	
Level of Service (LOS)	C	A	A	A	C	A		D		D	D	
Approach Delay, s/veh / LOS	7.2	A		20.2	C		40.3	D		36.8	D	
Intersection Delay, s/veh / LOS	18.4						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.0	B	2.2	B	2.5	B	2.5	B
Bicycle LOS Score / LOS	1.2	A	1.0	A	0.8	A	0.5	A

 HCS 2010™ Streets Version 6.65 Generated: 4/3/2015 10:40:07 AM

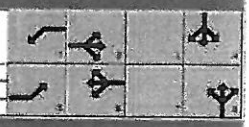
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Jacobs			Duration, h	0.25
Analyst	DBZ	Analysis Date	Apr 3, 2015	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.84
Intersection	Apple Valley Drive	Analysis Year	2015	Analysis Period	1> 7:00
File Name	15 PM.xus				
Project Description	Ashton Park II				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	99	562	31	62	526	24	18	6	52	44	6	121

Signal Information				EB			WB			NB			SB		
Cycle, s	70.3	Reference Phase	2												
Offset, s	0	Reference Point	End	Green	3.7	0.3	41.9	13.0	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.5	0.0	4.3	3.8	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0	2.6	2.0	0.0	0.0					



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	3.0	1.1	3.0		8.0		8.0
Phase Duration, s	9.5	40.5	9.2	40.2		18.6		18.6
Change Period, (Y+Rc), s	5.5	6.3	5.5	6.3		5.6		5.6
Max Allow Headway (MAH), s	4.0	3.9	4.0	3.9		5.2		5.2
Queue Clearance Time (g_s), s	4.1	22.2	3.9	33.9		8.6		11.6
Green Extension Time (g_e), s	0.2	8.7	0.2	8.1		1.4		1.3
Phase Call Probability	0.92	1.00	0.89	1.00		1.00		1.00
Max Out Probability	0.00	0.05	0.00	0.14		0.01		0.04

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	118	693	37	106	896	41		90		52	151	
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1863	1610	1810	1863	1610		1456		1353	1622	
Queue Service Time (g_s), s	2.1	20.2	0.8	1.9	31.9	0.9		0.1		2.8	6.6	
Cycle Queue Clearance Time (g_c), s	2.1	20.2	0.8	1.9	31.9	0.9		6.6		9.6	6.5	
Green Ratio (g/C)	0.60	0.55	0.55	0.60	0.55	0.55		0.17		0.17	0.17	
Capacity (c), veh/h	271	1030	890	380	1022	883		308		206	278	
Volume to Capacity Ratio (X)	0.435	0.673	0.041	0.278	0.877	0.046		0.294		0.255	0.544	
Available Capacity (c_a), veh/h	532	1465	1267	649	1465	1267		547		417	532	
Back of Queue (Q), veh/ln (95th percentile)	1.5	11.0	0.4	1.0	15.5	0.5		2.5		1.7	4.6	
Queue Storage Ratio (RQ) (95th percentile)	0.08	0.28	0.07	0.21	0.39	0.03		0.63		0.62	0.57	
Uniform Delay (d_1), s/veh	14.7	12.1	7.8	10.3	15.0	8.0		27.7		33.4	28.9	
Incremental Delay (d_2), s/veh	1.1	0.8	0.0	0.2	2.8	0.0		0.7		0.9	2.4	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Control Delay (d), s/veh	15.8	12.9	7.8	10.5	17.8	8.0		28.4		34.3	31.2	
Level of Service (LOS)	B	B	A	B	B	A		C		C	C	
Approach Delay, s/veh / LOS	13.1	B		16.7	B		28.4	C		32.0	C	
Intersection Delay, s/veh / LOS	17.2						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.2	B	2.4	B	2.4	B
Bicycle LOS Score / LOS	1.9	A	1.7	A	0.6	A	0.8	A

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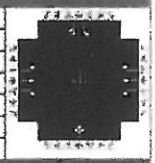
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Jacobs			Duration, h	0.25
Analyst	DBZ	Analysis Date	Apr 7, 2015	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.84
Intersection	Apple Valley Drive	Analysis Year	2018 No Build	Analysis Period	1> 7.00
File Name	18 PM NB.xus				
Project Description	Ashton Park II				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	09	618	31	62	558	24	18	6	52	44	6	121

Signal Information				EB			WB			NB			SB		
Cycle, s	84.1	Reference Phase	2												
Offset, s	0	Reference Point	End	Green	3.9	0.3	48.5	14.0	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.6	0.0	4.3	3.6	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0	2.0	2.0	0.0	0.0					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	3.0	1.1	3.0		8.0		6.0
Phase Duration, s	9.6	55.1	9.3	54.8		19.6		19.6
Change Period, (Y+Rc), s	5.5	6.3	5.5	6.3		5.6		5.6
Max Allow Headway (MAH), s	4.0	3.9	4.0	3.9		5.2		5.2
Queue Clearance Time (g_s), s	4.2	25.1	4.0	40.5		9.4		12.7
Green Extension Time (g_e), s	0.2	9.8	0.2	8.1		1.4		1.2
Phase Call Probability	0.94	1.00	0.92	1.00		1.00		1.00
Max Out Probability	0.00	0.10	0.00	0.31		0.02		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	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	118	736	37	108	968	42		90		52	151	
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1863	1810	1810	1863	1810		1400		1353	1622	
Queue Service Time (g_s), s	2.2	23.1	0.8	2.0	38.5	0.9		0.1		3.1	7.2	
Cycle Queue Clearance Time (g_c), s	2.2	23.1	0.8	2.0	38.5	0.9		7.4		10.7	7.2	
Green Ratio (g/C)	0.62	0.58	0.58	0.62	0.58	0.58		0.17		0.17	0.17	
Capacity (c), veh/h	244	1079	933	374	1073	928		288		190	272	
Volume-to-Capacity Ratio (X)	0.483	0.682	0.040	0.288	0.902	0.045		0.314		0.275	0.556	
Available Capacity (c_a), veh/h	479	1331	1150	614	1331	1150		486		366	483	
Back of Queue (Q), veh/ln (95th percentile)	2.1	12.6	0.4	1.1	10.7	0.5		2.9		1.9	5.1	
Queue Storage Ratio (RQ) (95th percentile)	0.10	0.32	0.07	0.22	0.47	0.04		0.71		0.58	0.64	
Uniform Delay (d_1), s/veh	17.3	12.3	7.6	10.7	15.7	7.7		30.8		37.2	32.1	
Incremental Delay (d_2), s/veh	1.5	1.1	0.0	0.2	4.4	0.0		0.9		1.1	2.5	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Control Delay (d), s/veh	18.8	13.3	7.6	10.9	20.2	7.6		31.6		38.3	34.6	
Level of Service (LOS)	B	B	A	B	C	A		C		D	C	
Approach Delay, s/veh / LOS	13.8		B	18.8		B	31.6		C	35.6		D
Intersection Delay, s/veh / LOS	18.9						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.2	B	2.4	B	2.4	B
Bicycle LOS Score / LOS	2.0	A	1.8	A	0.6	A	0.8	A

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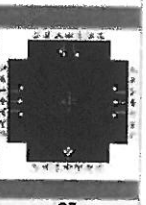
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Jacobs			Duration, h	0.25
Analyst	DBZ	Analysis Date	Apr 7, 2015	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.84
Intersection	Apple Valley Drive	Analysis Year	2018 Build	Analysis Period	1> 7.00
File Name	1S PM B.xus				
Project Description	Ashton Park II				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	99	618	45	37	558	24	25	6	31	44	6	121

Signal Information					EB			WB			NB			SB		
Cycle, s	87.3	Reference Phase	2		L	T	R	L	T	R	L	T	R	L	T	R
Offset, s	0	Reference Point	End	Green	3.2	1.0		51.1	14.6	0.0	0.0					
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	3.5	0.0		4.3	3.6	0.0	0.0					
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0		2.0	2.0	0.0	0.0					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.1	3.0	1.1	3.0		8.0		6.0
Phase Duration, s	9.7	59.4	8.7	57.4		20.2		20.2
Change Period, ($Y+R_c$), s	5.5	6.3	5.5	6.3		5.6		5.6
Max Allow Headway (MAH), s	4.0	3.9	4.0	3.9		5.2		5.2
Queue Clearance Time (g_s), s	4.2	25.1	3.2	43.4		10.1		13.5
Green Extension Time (g_e), s	0.2	10.2	0.1	7.8		1.3		1.1
Phase Call Probability	0.94	1.00	0.80	1.00		1.00		1.00
Max Out Probability	0.00	0.11	0.00	0.41		0.02		0.07

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	118	736	54	66	992	43		74		52	151	
Adjusted Saturation Flow Rate (s), veh/h/ln	1810	1863	1610	1810	1863	1610		1065		1384	1622	
Queue Service Time (g_s), s	2.2	23.1	1.2	1.2	41.4	1.0		0.0		3.2	7.5	
Cycle Queue Clearance Time (g_c), s	2.2	23.1	1.2	1.2	41.4	1.0		8.1		11.5	7.5	
Green Ratio (g/C)	0.63	0.60	0.60	0.62	0.58	0.58		0.17		0.17	0.17	
Capacity (c), veh/h	233	1109	959	373	1088	940		238		185	274	
Volume-to-Capacity Ratio (X)	0.507	0.663	0.056	0.178	0.912	0.045		0.311		0.283	0.552	
Available Capacity (c_a), veh/h	457	1280	1106	518	1280	1106		410		347	464	
Back of Queue (Q), veh/ln (95th percentile)	2.3	12.5	0.6	0.7	20.4	0.5		2.4		2.0	5.3	
Queue Storage Ratio (RQ) (95th percentile)	0.12	0.32	0.11	0.14	0.52	0.04		0.61		0.61	0.66	
Uniform Delay (d_1), s/veh	18.6	11.8	7.4	10.2	16.2	7.8		32.0		38.8	33.3	
Incremental Delay (d_2), s/veh	1.7	1.1	0.0	0.1	5.6	0.0		1.0		1.2	2.5	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Control Delay (d), s/veh	20.3	12.9	7.4	10.3	21.7	7.8		33.1		40.1	35.7	
Level of Service (LOS)	C	B	A	B	C	A		C		D	D	
Approach Delay, s/veh / LOS	13.5	B		20.5	C		33.1	C		36.9	D	
Intersection Delay, s/veh / LOS	19.8						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.2	B	2.4	B	2.4	B
Bicycle LOS Score / LOS	2.0	A	1.7	A	0.6	A	0.8	A

 HCS 2010™ Streets Version 6.65 Generated: 4/7/2015 9:41:50 AM

final report

January 26, 2015

Traffic Impact Study

Ashton Park Phase II
Beulah Church Road
Louisville, KY

Prepared for

Metro Public Works

JACOBS

11940 US 42
Goshen, KY 40026
502-228-0393

Table of Contents

INTRODUCTION

The development plan for Ashton Park Phase II on Beulah Church Road shows 28 single family lots and 106 apartment units. **Figure 1** displays a map of the site. Access to the development will be from Beulah Church Road, Appleview Lane, and Appletree Way. The purpose of this study is to examine the traffic impacts of the development upon the adjacent highway system. For this study the impact area was defined to be the Beulah Church intersection with Zelma Fields Avenue at the proposed entrance.

Figure 1. Site Map

EXISTING CONDITIONS

Beulah Church Road, KY 864, is a state maintained road with an estimated 2015 ADT of 15,000 vehicles per day between I 265 and the Outer Loop (KY 1065), as provided by the Kentucky Transportation Cabinet at station 296. The road is a three-lane highway with twelve-foot lanes, eight foot paved shoulders (provided by the Kentucky Transportation Cabinet). The speed limit is 45 mph. There is a sidewalk on the east side of Beulah Church Road. The intersection with Zelma Fields Road is controlled with a stop sign. There is a two-way left turn lane. TARC does not provide service along Beulah Church Road.

Jacobs Engineering Group collected a.m. and p.m. peak hour turning movement counts for the intersection of Beulah Church Road and Zelma Field Avenue, on January 13 and 14, 2015. The a.m. peak occurred between 7:00 and 8:00 and the p.m. peak hour occurred between 4:30 and 5:30 p.m. **Figure 2** illustrates the 2015 peak hour traffic volumes.

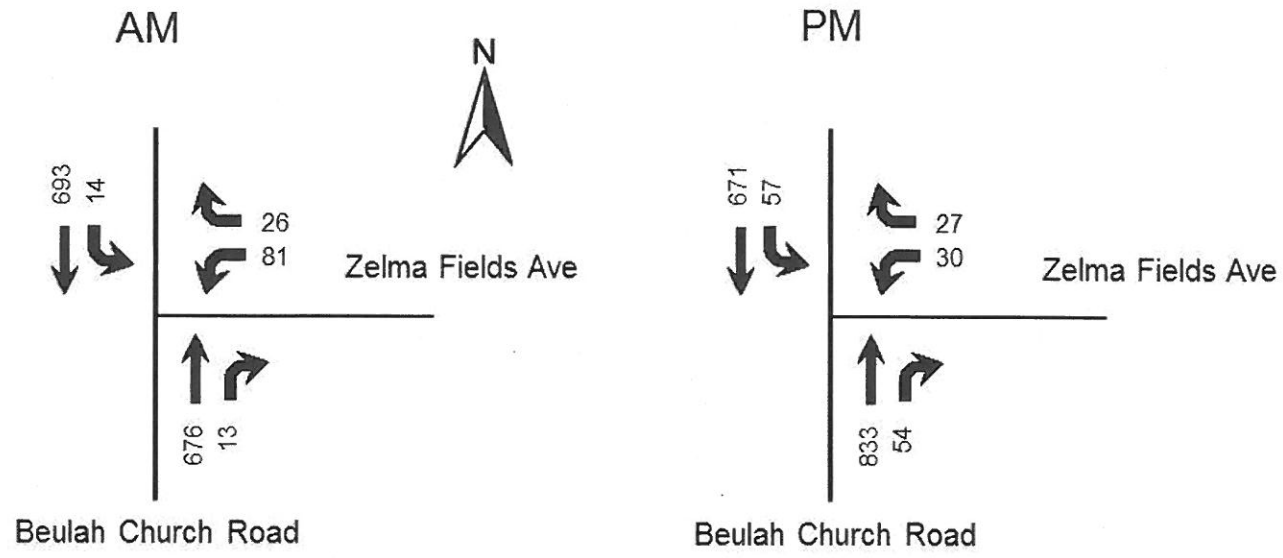


Figure 2. 2015 Peak Hour Volumes

FUTURE CONDITIONS

The projected completion year for this project is 2018, so the analysis year for this study is 2018. To predict traffic conditions in 2018, two and one third percent annual growth in traffic was added to the 2015 volumes on Beulah Church Road. This growth is Metro Louisville's standard rate. **Figure 3** displays the 2018 No build volumes.

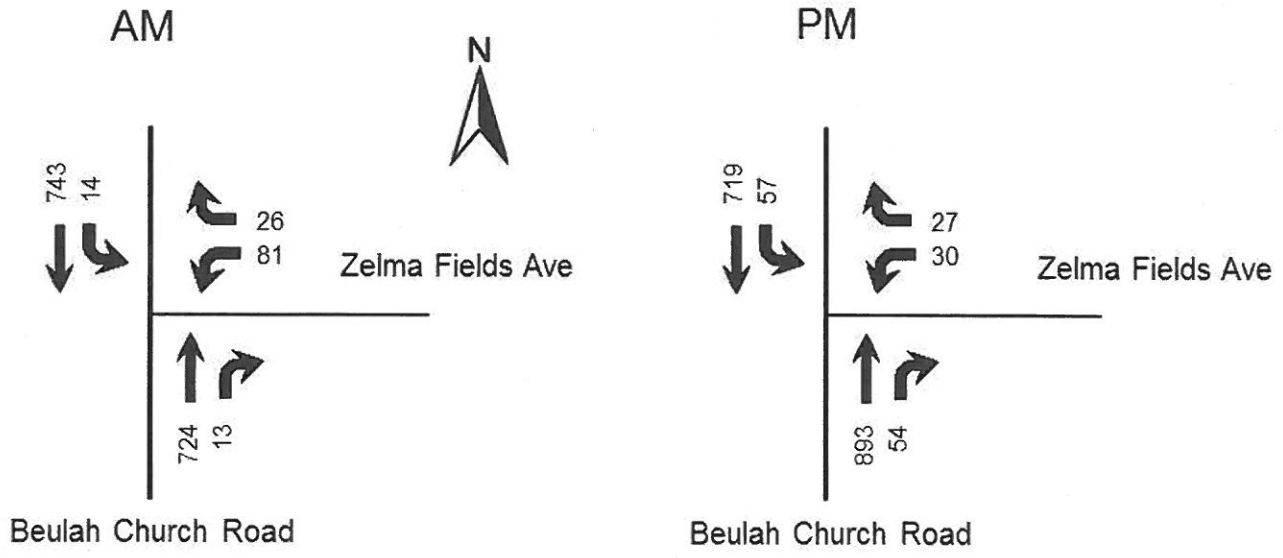


Figure 3. 2018 Peak Hour No Build

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 "Apartments" and "Single-Family Detached Housing" were reviewed and determined to be the best match. The trip generation results are listed in **Table 1**. The results of the trip generation analysis are that this development will generate 85 a.m. peak hour trips and 109 p.m. peak hour trips. The trips were assigned to the highway network with the percentages shown in **Figure 4**. **Figure 5** shows the trips generated by this development and distributed throughout the road network for the year 2018 during the peak hours. **Figure 6** displays the individual turning movements for the year 2018 for the peak hours when the development is completed.

Table 1. Peak Hour Trips Generated by Site

	A.M. Peak Hour					P.M. Peak Hour				
Land Use	Trips	% In	% OUT	IN	OUT	Trips	% In	% OUT	IN	OUT
Apartments	56	20	80	11	45	76	65	35	49	27
Single Family	29	25	75	7	22	33	63	37	21	12
TOTAL	**85**			**18**	**67**	**109**			**70**	**39**

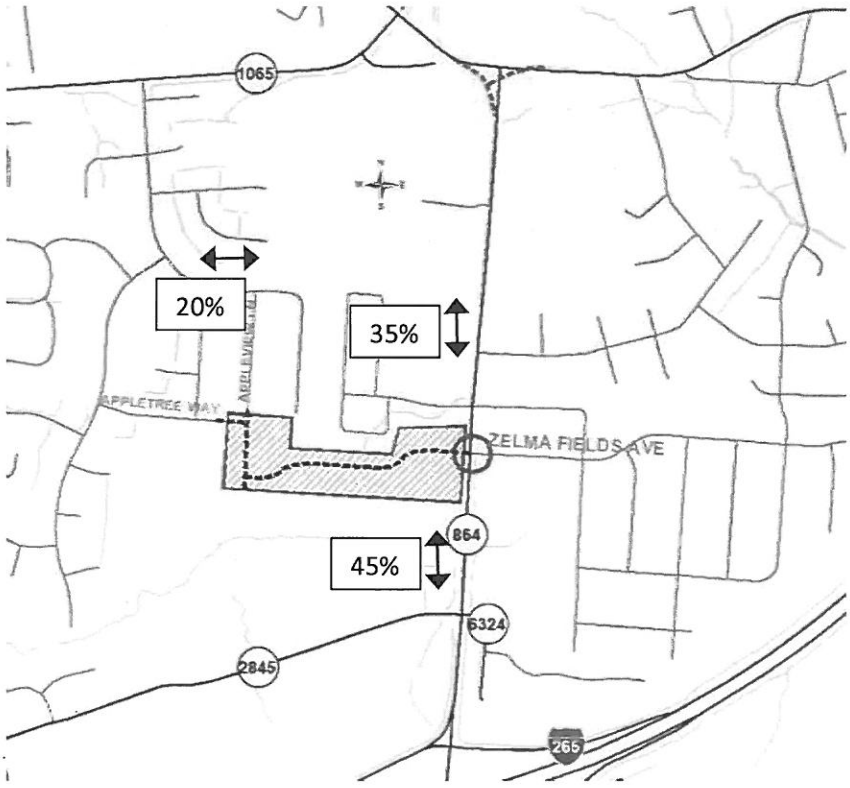


Figure 4. Trips Distribution Percentages

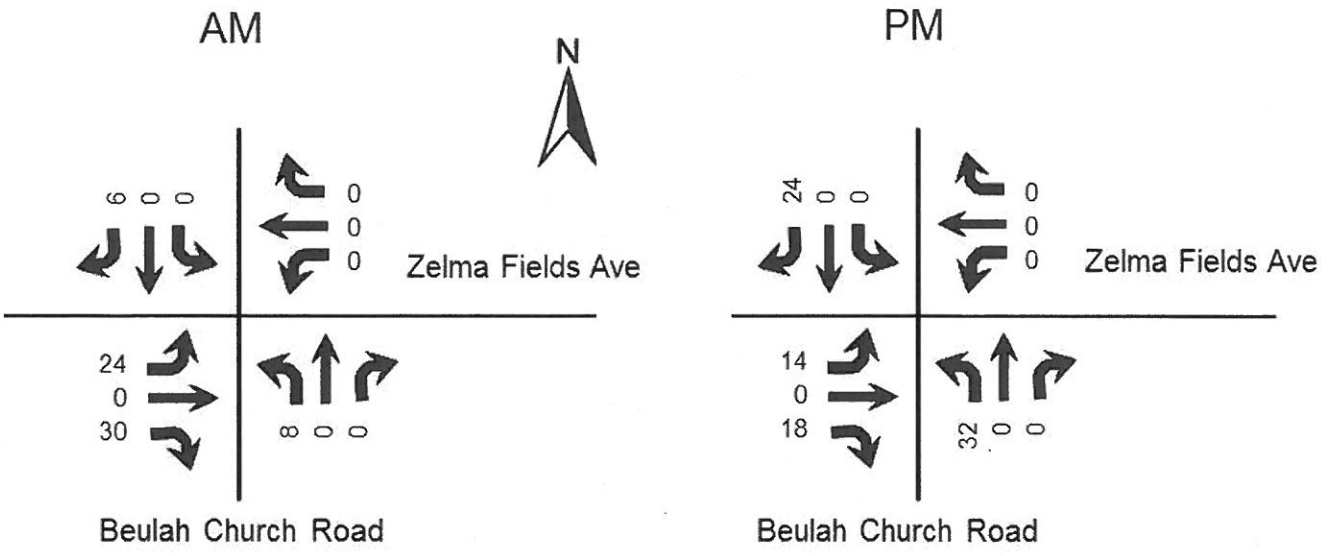


Figure 5. Peak Hour Trips Generated by Site

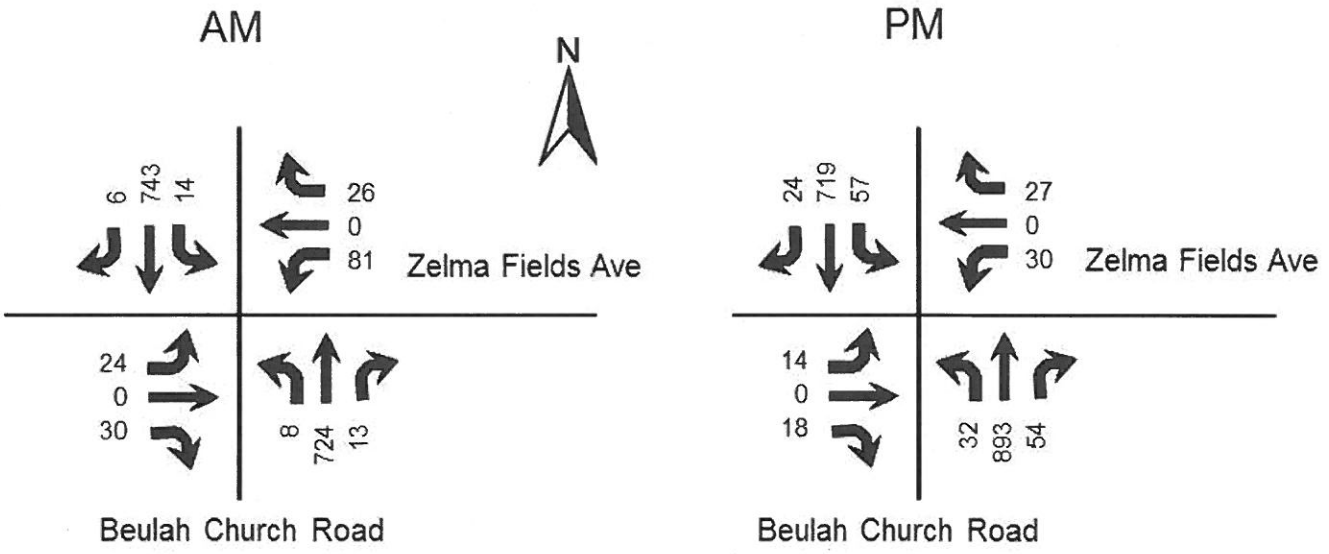


Figure 6. 2018 Peak Hour Build

ANALYSIS

The qualitative measure of traffic operations 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, "A" is the best operating condition and "F" is the worst. LOS results depend upon the facility that is analyzed. In this case, the LOS is based upon the total delay experienced at an intersection.

To evaluate the impact of the proposed development, the average vehicle delays at the intersection were determined using procedures detailed in the Highway Capacity Manual, 2010 edition. Future delay and LOS were determined for the intersections using the Highway Capacity Software HCS 2010 Streets (version 6.65) and HCS+ (version 5.6).

Table 2. Peak Hour Level of Service

	A.M.			P.M.		
Approach	2014 Existing	2018 No Build	2018 Build	2014 Existing	2018 No Build	2018 Build
Beulah Church Road at Zelma Fields Ave						
Beulah Church Road Northbound	NA	NA	A 9.5	NA	NA	A 9.4
Beulah Church Road Southbound	A 9.3	A 9.5	A 9.5	B 10.3	B 10.6	B 10.6
Zelma Fields Ave Westbound	D 25.6	D 28.4	E 42.1	C 22.2	C 24.1	D 32.5
Entrance Eastbound			C 23.1			F 81.6

Key: Level of Service, Delay in seconds per vehicle

The Kentucky Transportation Cabinet evaluates the need for turn lanes using Highway Design Memorandum No. 03-09 dated July 28, 2009. The volumes for the 2018 Build condition does not meet the warrants for a northbound right turn on Beulah Church Road at the entrance.

CONCLUSIONS

Based upon the volume of traffic generated by the development and the amount of traffic forecasted for the year 2018, there will be manageable impact to the existing highway network. The delays experienced will increase, but will continue to operate at an acceptable Level of Service. The side streets of Zelma Fields Avenue and the proposed entrance will experience Level of Service E and F. However, a review of the volume to capacity ratio indicates in both scenarios the ratio is less than 0.6, indicating additional lanes are not needed on the approaches.

Traffic Counts

JACOBS
11940 Highway 42, Suite 1
Goshen, KY 40026

Counted by: Andy Wolak

File Name : Beulah ChurchAM
Site Code : 00011415
Start Date : 1/14/2015
Page No : 1

Groups Printed- Unshifted

	Beulah Church Road From North				Zelma Fields Avenue From East				Beulah Church Road From South				From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	3	171	0	174	28	0	12	40	0	127	0	127	0	0	0	0	341
07:15 AM	1	166	0	167	13	0	9	22	0	177	4	181	0	0	0	0	370
07:30 AM	4	183	0	187	23	0	2	25	0	196	4	200	0	0	0	0	412
07:45 AM	6	173	0	179	17	0	3	20	0	176	5	181	0	0	0	0	380
Total	14	693	0	707	81	0	26	107	0	676	13	689	0	0	0	0	1503
08:00 AM	1	149	0	150	20	0	12	32	0	133	4	137	0	0	0	0	319
08:15 AM	1	111	0	112	12	0	5	17	0	105	3	108	0	0	0	0	237
08:30 AM	3	120	0	123	17	0	11	28	0	96	5	101	0	0	0	0	252
08:45 AM	2	108	0	110	9	0	4	13	0	114	2	116	0	0	0	0	239
Total	7	488	0	495	58	0	32	90	0	450	12	462	0	0	0	0	1047
Grand Total	21	1181	0	1202	139	0	58	197	0	1126	25	1151	0	0	0	0	2550
Apprch %	1.7	98.3	0		70.6	0	29.4		0	97.8	2.2		0	0	0		
Total %	0.8	46.3	0	47.1	5.5	0	2.3	7.7	0	44.2	1	45.1	0	0	0	0	

	Beulah Church Road From North				Zelma Fields Avenue From East				Beulah Church Road From South				From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	3	171	0	174	**28**	0	**12**	**40**	0	127	0	127	0	0	0	0	341
07:15 AM	1	166	0	167	13	0	9	22	0	177	4	181	0	0	0	0	370
07:30 AM	4	**183**	0	**187**	23	0	2	25	0	**196**	4	**200**	0	0	0	0	**412**
07:45 AM	**6**	173	0	179	17	0	3	20	0	176	**5**	181	0	0	0	0	380
Total Volume	14	693	0	707	81	0	26	107	0	676	13	689	0	0	0	0	1503
% App. Total	2	98	0		75.7	0	24.3		0	98.1	1.9		0	0	0		
PHF	.583	.947	.000	.945	.723	.000	.542	.669	.000	.862	.650	.861	.000	.000	.000	.000	.912

JACOBS
11940 Highway 42, Suite 1
Goshen, KY 40026

Counted by: Andy Wolak

File Name : Beulah Church PM
Site Code : 00011315
Start Date : 1/13/2015
Page No : 1

Groups Printed- Unshifted

	Beulah Church Road From North				Zelma Fields Ave From East				Beulah Church Road From South				From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	7	146	0	153	7	0	10	17	0	173	13	186	0	0	0	0	356
04:15 PM	10	164	0	174	6	0	9	15	0	197	16	213	0	0	0	0	402
04:30 PM	10	165	0	175	9	0	11	20	0	201	19	220	0	0	0	0	415
04:45 PM	11	170	0	181	6	0	7	13	0	203	18	221	0	0	0	0	415
Total	38	645	0	683	28	0	37	65	0	774	66	840	0	0	0	0	1588
05:00 PM	18	160	0	178	3	0	2	5	0	215	8	223	0	0	0	0	406
05:15 PM	18	176	0	194	12	0	7	19	0	214	9	223	0	0	0	0	436
05:30 PM	4	185	0	189	10	0	5	15	0	186	14	202	0	0	0	0	406
05:45 PM	8	160	0	168	10	0	4	14	0	213	13	226	0	0	0	0	408
Total	48	681	0	729	35	0	18	53	0	830	44	874	0	0	0	0	1656
Grand Total	86	1326	0	1412	63	0	55	118	0	1604	110	1714	0	0	0	0	3244
Apprch %	6.1	93.9	0		53.4	0	46.6		0	93.6	6.4		0	0	0		
Total %	2.7	40.9	0	43.5	1.9	0	1.7	3.6	0	49.4	3.4	52.8	0	0	0	0	

	Beulah Church Road From North				Zelma Fields Ave From East				Beulah Church Road From South				From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	10	165	0	175	9	0	**11**	**20**	0	201	**19**	220	0	0	0	0	415
04:45 PM	11	170	0	181	6	0	7	13	0	203	18	221	0	0	0	0	415
05:00 PM	**18**	160	0	178	3	0	2	5	0	**215**	8	**223**	0	0	0	0	406
05:15 PM	18	**176**	0	**194**	**12**	0	7	19	0	214	9	223	0	0	0	0	**436**
Total Volume	57	671	0	728	30	0	27	57	0	833	54	887	0	0	0	0	1672
% App. Total	7.8	92.2	0		52.6	0	47.4		0	93.9	6.1		0	0	0		
PHF	.792	.953	.000	.938	.625	.000	.614	.713	.000	.969	.711	.994	.000	.000	.000	.000	.959

HCS Reports

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DBZ*	Intersection	
Agency/Co.	*Jacobs*	Jurisdiction	
Date Performed	*1/26/2015*	Analysis Year	*2015*
Analysis Time Period	*AM Peak*		
Project Description	*Ashton Park*		
East/West Street:	*Zelma Fields Ave*	North/South Street:	*Beulah Church Road*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*676*	*13*	*14*	*693*	
Peak-Hour Factor, PHF	*1.00*	*0.91*	*0.91*	*0.91*	*0.91*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*742*	*14*	*15*	*761*	*0*
Percent Heavy Vehicles	*0*	--	--	*1*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*81*		*26*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.91*	*1.00*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*89*	*0*	*28*
Percent Heavy Vehicles	*0*	*0*	*0*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*15*		*117*				
C (m) (veh/h)		*859*		*290*				
v/c		*0.02*		*0.40*				
95% queue length		*0.05*		*1.87*				
Control Delay (s/veh)		*9.3*		*25.6*				
LOS		*A*		*D*				
Approach Delay (s/veh)	--	--	*25.6*					
Approach LOS	--	--	*D*					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DBZ*	Intersection	
Agency/Co.	*Jacobs*	Jurisdiction	
Date Performed	*1/26/2015*	Analysis Year	*2018 No Build*
Analysis Time Period	*AM Peak*		

Project Description *Ashton Park*	
East/West Street: *Zelma Fields Ave*	North/South Street: *Beulah Church Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*724*	*13*	*14*	*743*	
Peak-Hour Factor, PHF	*1.00*	*0.91*	*0.91*	*0.91*	*0.91*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*795*	*14*	*15*	*816*	*0*
Percent Heavy Vehicles	*0*	--	--	*1*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*81*		*26*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.91*	*1.00*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*89*	*0*	*28*
Percent Heavy Vehicles	*0*	*0*	*0*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*15*		*117*				
C (m) (veh/h)		*821*		*268*				
v/c		*0.02*		*0.44*				
95% queue length		*0.06*		*2.09*				
Control Delay (s/veh)		*9.5*		*28.4*				
LOS		*A*		*D*				
Approach Delay (s/veh)	--	--	*28.4*					
Approach LOS	--	--	*D*					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DBZ*	Intersection	
Agency/Co.	*Jacobs*	Jurisdiction	
Date Performed	*1/26/2015*	Analysis Year	*2018 Build*
Analysis Time Period	*AM Peak*		

Project Description	*Ashton Park*
East/West Street:	*Zelma Fields Ave*
North/South Street:	*Beulah Church Road*
Intersection Orientation:	*North-South*
Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*8*	*724*	*13*	*14*	*743*	*6*
Peak-Hour Factor, PHF	*0.91*	*0.91*	*0.91*	*0.91*	*0.91*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*8*	*795*	*14*	*15*	*816*	*6*
Percent Heavy Vehicles	*1*	--	--	*1*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*1*	*1*	*0*
Configuration	*L*		*TR*	*L*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*24*	*0*	*30*	*81*	*0*	*26*
Peak-Hour Factor, PHF	*0.91*	*0.91*	*0.91*	*0.91*	*0.91*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*26*	*0*	*32*	*89*	*0*	*28*
Percent Heavy Vehicles	*1*	*0*	*1*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*1*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*8*	*15*		*117*			*58*	
C (m) (veh/h)	*812*	*821*		*209*			*256*	
v/c	*0.01*	*0.02*		*0.56*			*0.23*	
95% queue length	*0.03*	*0.06*		*3.02*			*0.85*	
Control Delay (s/veh)	*9.5*	*9.5*		*42.1*			*23.1*	
LOS	*A*	*A*		*E*			*C*	
Approach Delay (s/veh)	--	--	*42.1*			*23.1*		
Approach LOS	--	--	*E*			*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DBZ*	Intersection	
Agency/Co.	*Jacobs*	Jurisdiction	
Date Performed	*1/26/2015*	Analysis Year	*2015*
Analysis Time Period	*PM Peak*		
Project Description	*Ashton Park*		
East/West Street:	*Zelma Fields Ave*	North/South Street:	*Beulah Church Road*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*833*	*54*	*57*	*671*	
Peak-Hour Factor, PHF	*1.00*	*0.96*	*0.96*	*0.96*	*0.96*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*867*	*56*	*59*	*698*	*0*
Percent Heavy Vehicles	*0*	--	--	*1*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*30*		*27*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.96*	*1.00*	*0.96*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*31*	*0*	*28*
Percent Heavy Vehicles	*0*	*0*	*0*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*59*		*59*				
C (m) (veh/h)		*744*		*268*				
v/c		*0.08*		*0.22*				
95% queue length		*0.26*		*0.82*				
Control Delay (s/veh)		*10.3*		*22.2*				
LOS		*B*		*C*				
Approach Delay (s/veh)	--	--	*22.2*					
Approach LOS	--	--	*C*					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DBZ*	Intersection	
Agency/Co.	*Jacobs*	Jurisdiction	
Date Performed	*1/26/2015*	Analysis Year	*2018 No Build*
Analysis Time Period	*PM Peak*		

Project Description	*Ashton Park*
East/West Street:	*Zelma Fields Ave*
North/South Street:	*Beulah Church Road*
Intersection Orientation:	*North-South*
Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*893*	*54*	*57*	*719*	
Peak-Hour Factor, PHF	*1.00*	*0.96*	*0.96*	*0.96*	*0.96*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*930*	*56*	*59*	*748*	*0*
Percent Heavy Vehicles	*0*	--	--	*1*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*30*		*27*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.96*	*1.00*	*0.96*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*31*	*0*	*28*
Percent Heavy Vehicles	*0*	*0*	*0*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*59*		*59*				
C (m) (veh/h)		*705*		*247*				
v/c		*0.08*		*0.24*				
95% queue length		*0.27*		*0.91*				
Control Delay (s/veh)		*10.6*		*24.1*				
LOS		*B*		*C*				
Approach Delay (s/veh)	--	--		*24.1*				
Approach LOS	--	--		*C*				

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DBZ*	Intersection	
Agency/Co.	*Jacobs*	Jurisdiction	
Date Performed	*1/26/2015*	Analysis Year	*2018 Build*
Analysis Time Period	*PM Peak*		

Project Description	*Ashton Park*
East/West Street:	*Zelma Fields Ave*
North/South Street:	*Beulah Church Road*
Intersection Orientation:	*North-South*
Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*32*	*893*	*54*	*57*	*719*	*24*
Peak-Hour Factor, PHF	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*
Hourly Flow Rate, HFR (veh/h)	*33*	*930*	*56*	*59*	*748*	*25*
Percent Heavy Vehicles	*0*	–	–	*1*	–	–
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*1*	*1*	*0*
Configuration	*L*		*TR*	*L*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*14*	*18*	*0*	*30*	*0*	*27*
Peak-Hour Factor, PHF	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*
Hourly Flow Rate, HFR (veh/h)	*14*	*18*	*0*	*31*	*0*	*28*
Percent Heavy Vehicles	*1*	*0*	*1*	*1*	*0*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*1*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*33*	*59*		*59*			*32*	
C (m) (veh/h)	*851*	*705*		*189*			*77*	
v/c	*0.04*	*0.08*		*0.31*			*0.42*	
95% queue length	*0.12*	*0.27*		*1.26*			*1.65*	
Control Delay (s/veh)	*9.4*	*10.6*		*32.5*			*81.6*	
LOS	*A*	*B*		*D*			*F*	
Approach Delay (s/veh)	–	–	*32.5*			*81.6*		
Approach LOS	–	–	*D*			*F*		

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