REPORT

Pope Lick Station, LLC
14005 Taylorsville Road
Louisville, KY

Traffic Impact Study

Louisville Metro Planning Commission

June 28, 2016

CDM Smith

Table of Contents

List of Figures

List of Tables

Appendices

Introduction

The proposed retail center by Pope Lick Station LLC is located on Taylorsville Road between South Pope Lick Road and Hatmaker Trail in Louisville, KY. The center will have three buildings with 27,000 square feet of retail and restaurant space. **Figure 1** displays a map of the site. Access to the site will be from an entrance on Taylorsville Road opposite Hatmaker Trail. 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 intersection of Taylorsville Road at South Pope Lick Road.

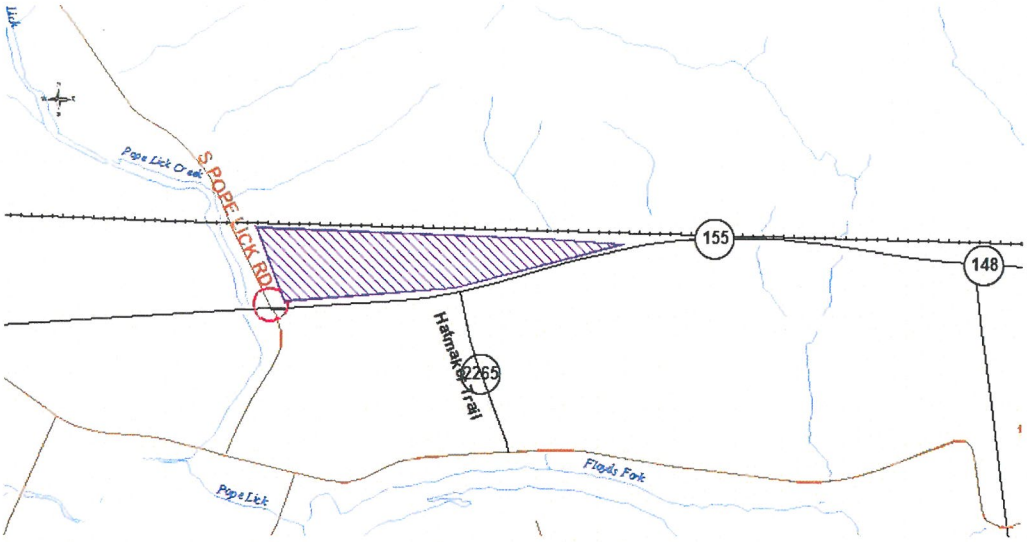


Figure 1
Site Location

Existing Conditions

Taylorsville Road, KY 155, is maintained by the Kentucky Transportation Cabinet with an estimated 2016 ADT of 19,500 vehicles per day between I 265 and Pope Lick Road, as estimated from the Kentucky Transportation Cabinet (KYTC) 2015 count at station 996. The road is a two-lane highway with 11 foot lanes, four foot shoulders (measurements provided by KYTC). The speed limit is 55 mph. There are no sidewalks. The intersections with Pope Lick Road and Hatmaker Trail are controlled with stop signs, on the side street.

A.m. and p.m. peak hour traffic counts were obtained at the intersection on June 2, 2016 (see Appendix A). The a.m. peak hour occurred between 7:15 and 8:15 and the p.m. peak hour occurred between 4:15 and 5:15 p.m. **Figure 2** illustrates the existing peak hour traffic volumes.

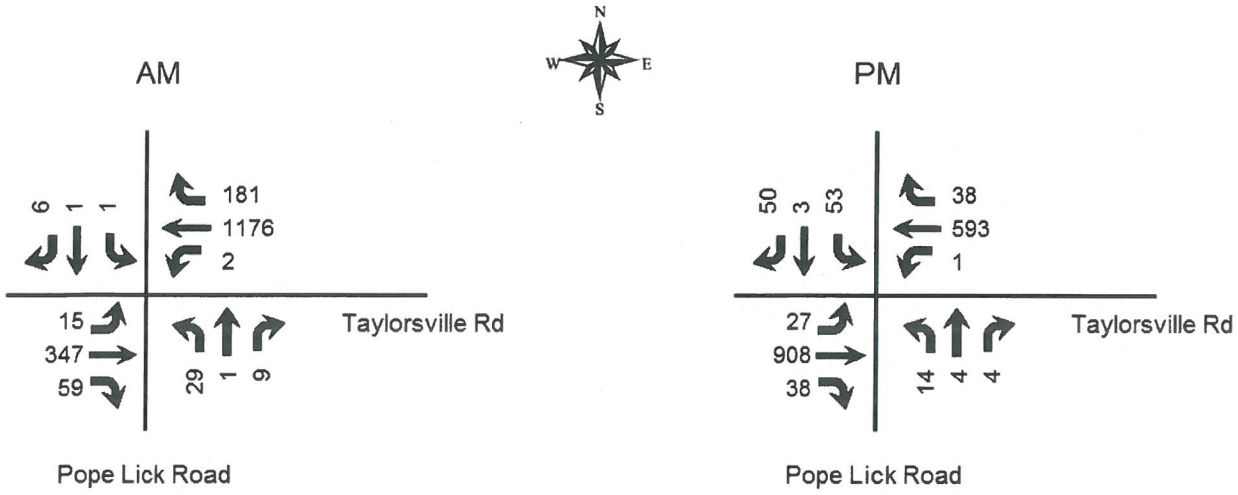


Figure 2
2016 Peak Hour Counts

Future Conditions

The projected completion year for this development is 2018, so the analysis year for this study is 2018. To predict traffic conditions in 2018, one percent annual growth in traffic was added. This growth is based upon a review of the historical count data at the Kentucky Transportation Cabinet count station 996. **Figure 3** displays the 2018 No Build volumes.

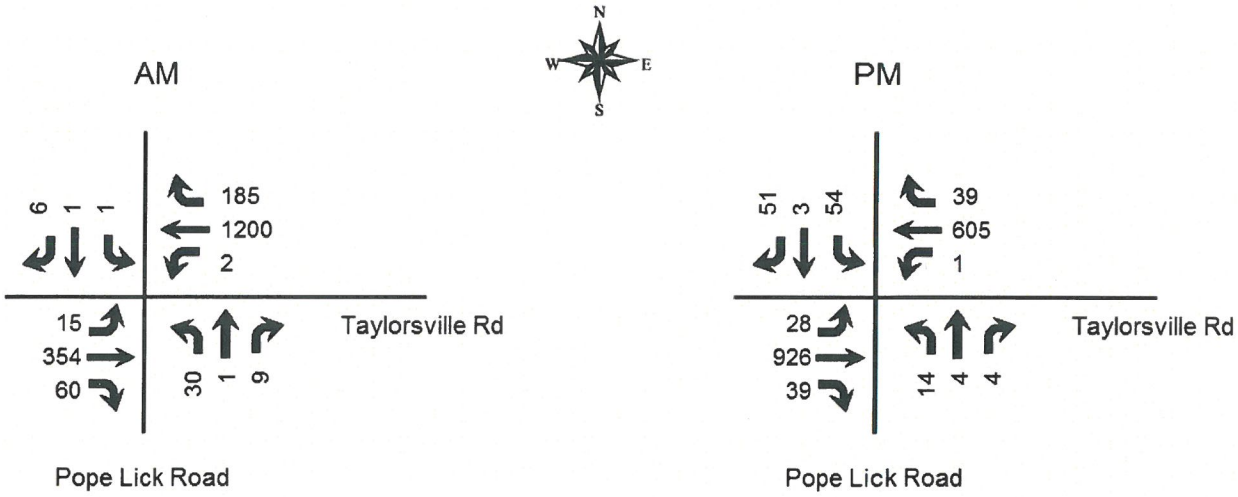


Figure 3
2018 No Build Peak Hour Volumes

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 "Specialty Retail" (826), "High-Turnover Sit-Down Restaurant" (932) and "Fast-Food Restaurant with Drive-Through Window" (934) best describe this development. The trip generation results are listed in **Table 1**. The results of the trip generation analysis are that this development will generate 156 a.m. peak hour trips and 191 p.m. peak hour trips. The trips were assigned to the highway network with 50 percent to/from the west 50 percent to/from the east. Both "Fast-Food" and "High-Turnover" restaurants have pass-by trip data. Pass-by trips are trips that are already on the adjacent highway that will visit the site. **Figure 4** shows the trips generated by this development and distributed throughout the road network for the year 2018 during the peak hours. The pass-by trips are shown in parenthesis. **Figure 5** displays the individual turning movements for the year 2018 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
Specialty Retail (19,000 sq ft)	Not Open				67	29	38	
High-Turnover Restaurant (6,000 sq ft)	65	36	29		59	35	24	-15
Fast-Food Restaurant (2,000 sq ft)	91	46	45	-23	65	34	31	-17
TOTAL	**156**	**82**	**74**	**-23**	**191**	**98**	**93**	**-32**

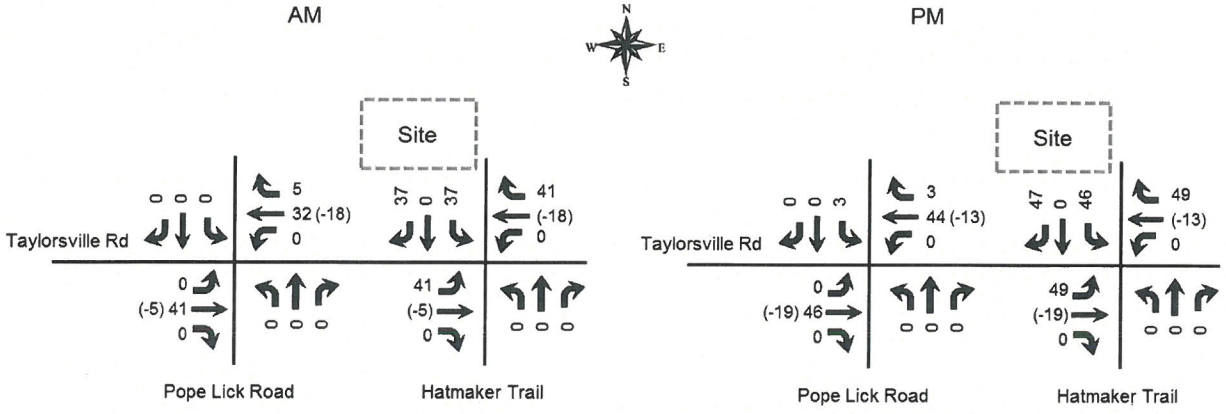


Figure 4
Trip Distribution for Site

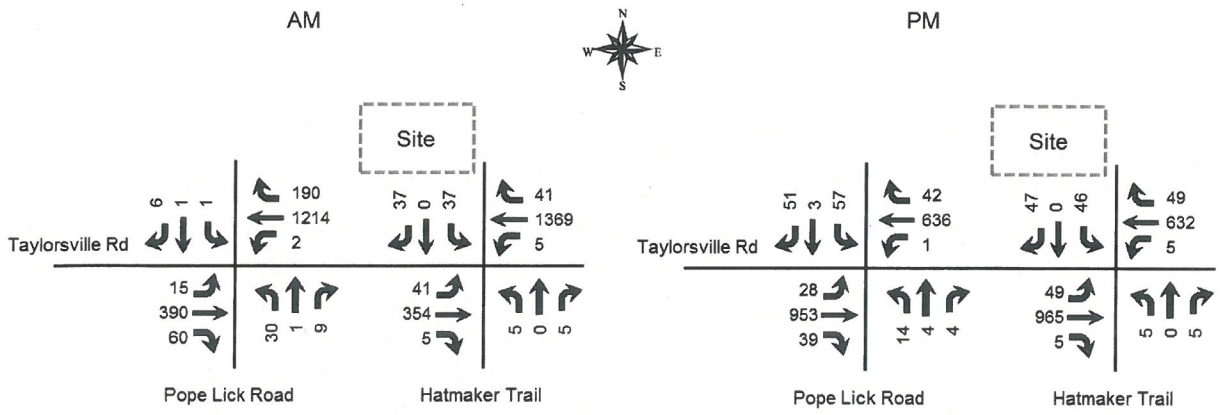


Figure 5
2018 Build Peak Hour Volumes

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 software (version 6.80). **Table 2** shows the results of the analysis for the three scenarios analyzed. The full printouts are included in Appendix B.

Table 2 - Level of Service Results

	AM Peak Hour			PM Peak Hour		
	2016 Existing	2018 No Build	2018 Build	2016 Existing	2018 No Build	2018 Build
Taylorsville Road at Pope Lick Road						
Taylorsville Road Eastbound (left)	B 13.8	B 14.1	B 14.2	A 9.0	A 9.1	A 9.2
Taylorsville Road Westbound (left)	A 8.2	A 8.2	A 8.3	A 10.0	B 10.0	B 10.2
Pope Lick Road Northbound	F 100.0	F 114.2	F 134.9	F 61.0	F 65.7	F 75.2
Pope Lick Road Southbound	C 21.0	C 21.6	C 22.1	F 96.7	F 113.6	F 163.6

	AM Peak Hour			PM Peak Hour		
Taylorsville Road at Entrance						
Taylorsville Road Eastbound (left)			B 13.8			A 9.2
Taylorsville Road Westbound (left)			A 8.1			B 10.2
Hatmaker Trail Northbound			E 37.4			D 33.6
Entrance Southbound			E 40.0			F 88.0

Note: Level of Service, delay in seconds

Using the Kentucky Transportation Cabinet Auxiliary Turn Lane Policy dated 7/20/2009 and the volumes in **Figure 5**, the volumes at the entrance meet the warrants for an eastbound left turn lane and a westbound right turn lane on Taylorsville Road.

Conclusions

Based upon the volume of traffic generated by the development and the amount of traffic forecasted for the year 2018, there will be an impact to the existing highway network. The proposed entrance will require an eastbound left turn lane and a westbound right turn lane.

Appendix A

Traffic Counts

Study Name Taylorsville Rd & S Pope Lick Rd
Start Date 06/02/2016
Start Time 7:00 AM
Site Code

	Pope Lick Road Southbound				Taylorsville Road Westbound				Pope Lick Road Northbound				Taylorsville Road Eastbound				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Total
7:00 AM	1	0	0	0	35	291	0	0	1	1	4	0	11	60	3	0	407
7:15 AM	3	0	0	0	58	273	1	0	2	1	5	0	10	81	6	0	440
7:30 AM	1	1	1	0	46	313	0	0	3	0	2	0	14	75	4	0	460
7:45 AM	0	0	0	0	35	305	1	0	0	0	10	0	21	106	2	2	482
8:00 AM	2	0	0	0	42	285	0	0	4	0	12	0	14	85	1	0	445
8:15 AM	1	1	0	0	41	289	1	1	1	0	6	0	14	77	3	0	435
8:30 AM	0	0	1	0	51	255	2	0	2	0	6	0	8	88	4	0	417
8:45 AM	1	0	0	0	40	232	1	0	1	0	3	0	7	85	9	0	379
4:00 PM	4	0	8	0	2	111	1	0	2	0	2	0	16	232	4	0	382
4:15 PM	9	2	13	0	10	134	0	0	1	1	5	0	13	241	1	0	430
4:30 PM	17	0	7	0	8	156	0	0	1	3	2	0	6	234	4	0	438
4:45 PM	9	0	15	0	12	162	0	0	1	0	4	0	7	210	6	0	426
5:00 PM	15	1	18	0	8	141	1	0	1	0	3	0	12	223	16	0	439
5:15 PM	19	1	24	0	17	62	2	0	2	1	4	0	8	147	8	0	295
5:30 PM	12	6	17	0	9	23	0	0	3	6	4	0	7	124	13	0	224
5:45 PM	9	1	17	0	28	195	0	0	2	0	4	0	6	217	11	0	490

	Pope Lick Road Southbound				Taylorsville Road Westbound				Pope Lick Road Northbound				Taylorsville Road Eastbound				
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Total
7:15 AM	3	0	0	0	58	273	1	0	2	1	5	0	10	81	6	0	440
7:30 AM	1	1	1	0	46	313	0	0	3	0	2	0	14	75	4	0	460
7:45 AM	0	0	0	0	35	305	1	0	0	0	10	0	21	106	2	2	482
8:00 AM	2	0	0	0	42	285	0	0	4	0	12	0	14	85	1	0	445
TOTAL	**6**	**1**	**1**	**0**	**181**	**1176**	**2**	**0**	**9**	**1**	**29**	**0**	**59**	**347**	**13**	**2**	**1827**
4:15 PM	9	2	13	0	10	134	0	0	1	1	5	0	13	241	1	0	430
4:30 PM	17	0	7	0	8	156	0	0	1	3	2	0	6	234	4	0	438
4:45 PM	9	0	15	0	12	162	0	0	1	0	4	0	7	210	6	0	426
5:00 PM	15	1	18	0	8	141	1	0	1	0	3	0	12	223	16	0	439
TOTAL	**50**	**3**	**53**	**0**	**38**	**593**	**1**	**0**	**4**	**4**	**14**	**0**	**38**	**908**	**27**	**0**	**1733**

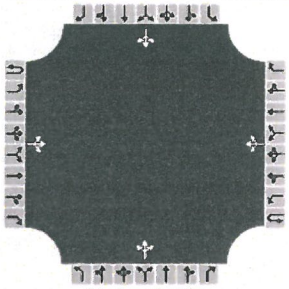
Appendix B

HCS Reports

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	DBZ	Intersection	Taylorsville Rd at Pope L
Agency/Co.	CDM Smith	Jurisdiction	
Date Performed	6/23/2016	East/West Street	Taylorsville Rd
Analysis Year	2016	North/South Street	Pope Lick Road
Time Analyzed	AM Peak	Peak Hour Factor	0.95
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Pope Lick Station		

Lanes



Major Street: East-West

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	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		15	347	59		2	1176	181		29	1	9		1	1	6
Percent Heavy Vehicles		20				0				3	3	3		0	0	17
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

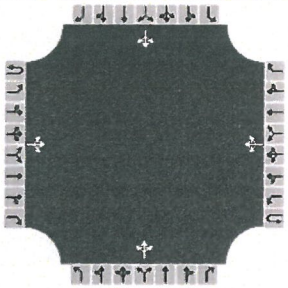
Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		16				2					41				8	
Capacity		424				1143					75				233	
v/c Ratio		0.04				0.00					0.55				0.03	
95% Queue Length		0.1				0.0					2.3				0.1	
Control Delay (s/veh)		13.8				8.2					100.0				21.0	
Level of Service (LOS)		B				A					F				C	
Approach Delay (s/veh)	1.2				0.1				100.0				21.0			
Approach LOS									F				C			

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	DBZ	Intersection	Taylorsville Rd at Pope L
Agency/Co.	CDM Smith	Jurisdiction	
Date Performed	6/23/2016	East/West Street	Taylorsville Rd
Analysis Year	2018	North/South Street	Pope Lick Road
Time Analyzed	AM Peak No Build	Peak Hour Factor	0.95
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Pope Lick Station		

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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		15	354	60		2	1200	185		30	1	9		1	1	6
Percent Heavy Vehicles		20				0				3	3	3		0	0	17
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		16				2					42				8	
Capacity		413				1135					70				224	
v/c Ratio		0.04				0.00					0.60				0.04	
95% Queue Length		0.1				0.0					2.6				0.1	
Control Delay (s/veh)		14.1				8.2					114.2				21.6	
Level of Service (LOS)		B				A					F				C	
Approach Delay (s/veh)	1.2				0.1				114.2				21.6			
Approach LOS									F				C			

HCS 2010 Two-Way Stop Control Summary Report

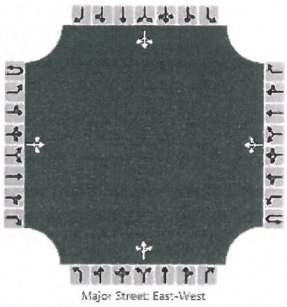
General Information

Analyst	DBZ
Agency/Co.	CDM Smith
Date Performed	6/23/2016
Analysis Year	2018
Time Analyzed	AM Peak Build
Intersection Orientation	East-West
Project Description	Pope Lick Station

Site Information

Intersection	Taylorsville Rd at Pope L
Jurisdiction	
East/West Street	Taylorsville Rd
North/South Street	Pope Lick Road
Peak Hour Factor	0.95
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

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	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		15	390	60		2	1214	190		30	1	9		1	1	6
Percent Heavy Vehicles		20				0				3	3	3		0	0	17
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		16				2					42				8	
Capacity		406				1099					64				219	
v/c Ratio		0.04				0.00					0.66				0.04	
95% Queue Length		0.1				0.0					2.8				0.1	
Control Delay (s/veh)		14.2				8.3					134.9				22.1	
Level of Service (LOS)		B				A					F				C	
Approach Delay (s/veh)	1.2				0.1				134.9				22.1			
Approach LOS									F				C			

HCS 2010™ TWSC Version 6.80
AM 18 B.xtw

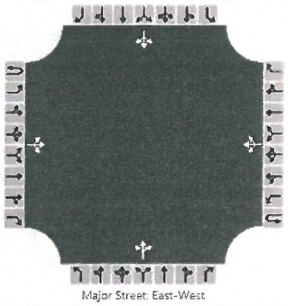
Generated: 6/23/2016 3:34:47 PM

CDM Smith

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	DBZ	Intersection	Taylorsville Rd at Pope L
Agency/Co.	CDM Smith	Jurisdiction	
Date Performed	6/23/2016	East/West Street	Taylorsville Rd
Analysis Year	2016	North/South Street	Pope Lick Road
Time Analyzed	PM Peak	Peak Hour Factor	0.99
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Pope Lick Station		

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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		27	908	38		1	593	38		14	4	4		53	3	50
Percent Heavy Vehicles		7				0				7	3	3		2	0	0
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		27				1					22				108	
Capacity		924				728					86				134	
v/c Ratio		0.03				0.00					0.26				0.81	
95% Queue Length		0.1				0.0					0.9				5.0	
Control Delay (s/veh)		9.0				10.0					61.0				96.7	
Level of Service (LOS)		A				A					F				F	
Approach Delay (s/veh)	0.8				0.0				61.0				96.7			
Approach LOS									F				F			

HCS 2010™ TWSC Version 6.80
PM 16.xtw

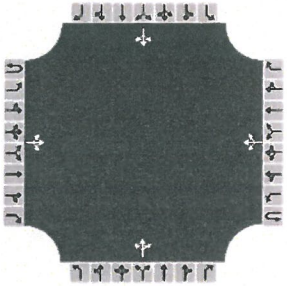
Generated: 6/23/2016 3:05:49 PM

CDM Smith

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	DBZ	Intersection	Taylorsville Rd at Pope L
Agency/Co.	CDM Smith	Jurisdiction	
Date Performed	6/23/2016	East/West Street	Taylorsville Rd
Analysis Year	2018	North/South Street	Pope Lick Road
Time Analyzed	PM Peak No Build	Peak Hour Factor	0.99
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Pope Lick Station		

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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		28	926	39		1	605	39		14	4	4		54	3	51
Percent Heavy Vehicles		7				0				7	3	3		2	0	0
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

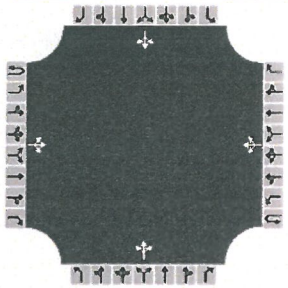
Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		28				1					22				110	
Capacity		914				716					81				127	
v/c Ratio		0.03				0.00					0.27				0.87	
95% Queue Length		0.1				0.0					1.0				5.5	
Control Delay (s/veh)		9.1				10.0					65.7				113.6	
Level of Service (LOS)		A				B					F				F	
Approach Delay (s/veh)	0.8				0.0				65.7				113.6			
Approach LOS									F				F			

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	DBZ	Intersection	Taylorsville Rd at Pope L
Agency/Co.	CDM Smith	Jurisdiction	
Date Performed	6/23/2016	East/West Street	Taylorsville Rd
Analysis Year	2018	North/South Street	Pope Lick Road
Time Analyzed	PM Peak Build	Peak Hour Factor	0.99
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Pope Lick Station		

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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		28	953	39		1	636	42		14	4	4		57	3	51
Percent Heavy Vehicles		7				0				7	3	3		2	0	0
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		28				1					22				113	
Capacity		887				699					72				111	
v/c Ratio		0.03				0.00					0.30				1.02	
95% Queue Length		0.1				0.0					1.1				6.6	
Control Delay (s/veh)		9.2				10.2					75.2				163.6	
Level of Service (LOS)		A				B					F				F	
Approach Delay (s/veh)	0.9				0.0				75.2				163.6			
Approach LOS									F				F			

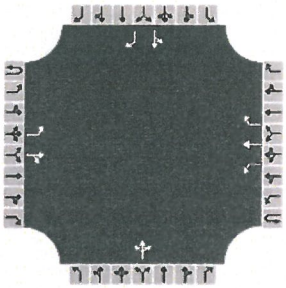
HCS 2010™ TWSC Version 6.80
PM 18 B.xtw

Generated: 6/23/2016 3:53:25 PM

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	DBZ	Intersection	Taylorsville at entrance
Agency/Co.	CDM Smith	Jurisdiction	
Date Performed	6/23/2016	East/West Street	Taylorsville Rd
Analysis Year	2018	North/South Street	Entrance/Hatmaker Tr
Time Analyzed	AM Peak	Peak Hour Factor	0.95
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Pope Lick Station		

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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	1		0	1	0		0	1	1
Configuration		L		TR		L	T	R			LTR			LT		R
Volume (veh/h)		41	354	5		5	1369	41		5	0	5		37	0	37
Percent Heavy Vehicles		3				3				3	3	3		3	3	3
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)		43				5					10			39		39
Capacity		450				1174					121			126		162
v/c Ratio		0.10				0.00					0.08			0.31		0.24
95% Queue Length		0.3				0.0					0.3			1.2		0.9
Control Delay (s/veh)		13.8				8.1					37.4			45.7		34.2
Level of Service (LOS)		B				A					E			E		D
Approach Delay (s/veh)	1.4				0.0				37.4				40.0			
Approach LOS									E				E			

HCS 2010™ TWSC Version 6.80
Entrance AM.xtw

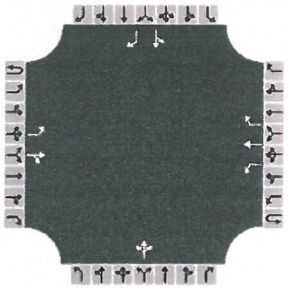
Generated: 6/23/2016 3:54:18 PM

CDM Smith

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	DBZ	Intersection	Taylorsville at entrance
Agency/Co.	CDM Smith	Jurisdiction	
Date Performed	6/23/2016	East/West Street	Taylorsville Rd
Analysis Year	2018	North/South Street	Entrance/Hatmaker Tr
Time Analyzed	PM Peak	Peak Hour Factor	0.99
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	Pope Lick Station		

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	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	1		0	1	0		0	1	1
Configuration		L		TR		L	T	R			LTR			LT		R
Volume (veh/h)		49	965	5		5	632	49		5	0	5		46	47	37
Percent Heavy Vehicles		3				3				3	3	3		3	3	3
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)		49				5					10			93		37
Capacity		901				700					136			111		475
v/c Ratio		0.05				0.01					0.07			0.84		0.08
95% Queue Length		0.2				0.0					0.2			4.9		0.3
Control Delay (s/veh)		9.2				10.2					33.6			117.7		13.2
Level of Service (LOS)		A				B					D			F		B
Approach Delay (s/veh)	0.4				0.1				33.6				88.0			
Approach LOS									D				F			

HCS 2010™ TWSC Version 6.80
Entrance PM.xtw

Generated: 6/23/2016 3:55:05 PM

CDM Smith