

final report

July 16, 2018

## Traffic Impact Study

Topgolf at Oxmoor Center  
7900 Shelbyville Road  
Louisville, KY

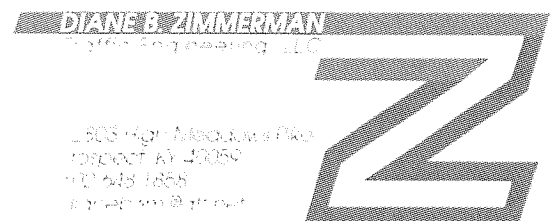
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Prepared for

Louisville Metro Planning Commission  
Kentucky Transportation Cabinet



## Table of Contents

INTRODUCTION .....	2
Figure 1. Site Map.....	2
EXISTING CONDITIONS .....	2
Figure 2. 2018 Peak Hour Volumes .....	4
FUTURE CONDITIONS .....	4
Figure 3. 2020 No Build Peak Hour Volumes.....	5
TRIP GENERATION .....	6
Table 1. Peak Hour Trips Generated by Site.....	6
Figure 4. Trip Distribution Percentages.....	6
Figure 5. Peak Hour Trips Generated by Site.....	7
Figure 6. 2020 Build Peak Hour Volumes .....	8
Table 2. Trips Generation Comparison.....	9
ANALYSIS .....	9
Table 3. Peak Hour Level of Service.....	9
CONCLUSIONS .....	12
APPENDIX .....	13

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## INTRODUCTION

The development plan for Topgolf at Oxmoor Center (Mall), 7900 Shelbyville Road, in Louisville, KY shows an entertainment golf venue with 102 hitting bays. **Figure 1** displays a map of the site. The facility will face Oxmoor Lane and is the site of the former Sears store. The Sears store and a section of the center will be demolished. Access to the Topgolf site will be from Oxmoor Lane and Christian Way. The purpose of this study is to examine the traffic impacts of the development upon the adjacent street system. For this study, the impact area was defined to be the intersections along Shelbyville Road of New La Grange Road, Oxmoor Lane, Christian Way, Toyota, and Lyndon Lane; and the intersections along Oxmoor Lane with Oxmoor Ford/Oxmoor Center, Bullitt Lane, and the Sears access road; and the intersections of Christian Way with the Sears access road, and Lyndon Lane.

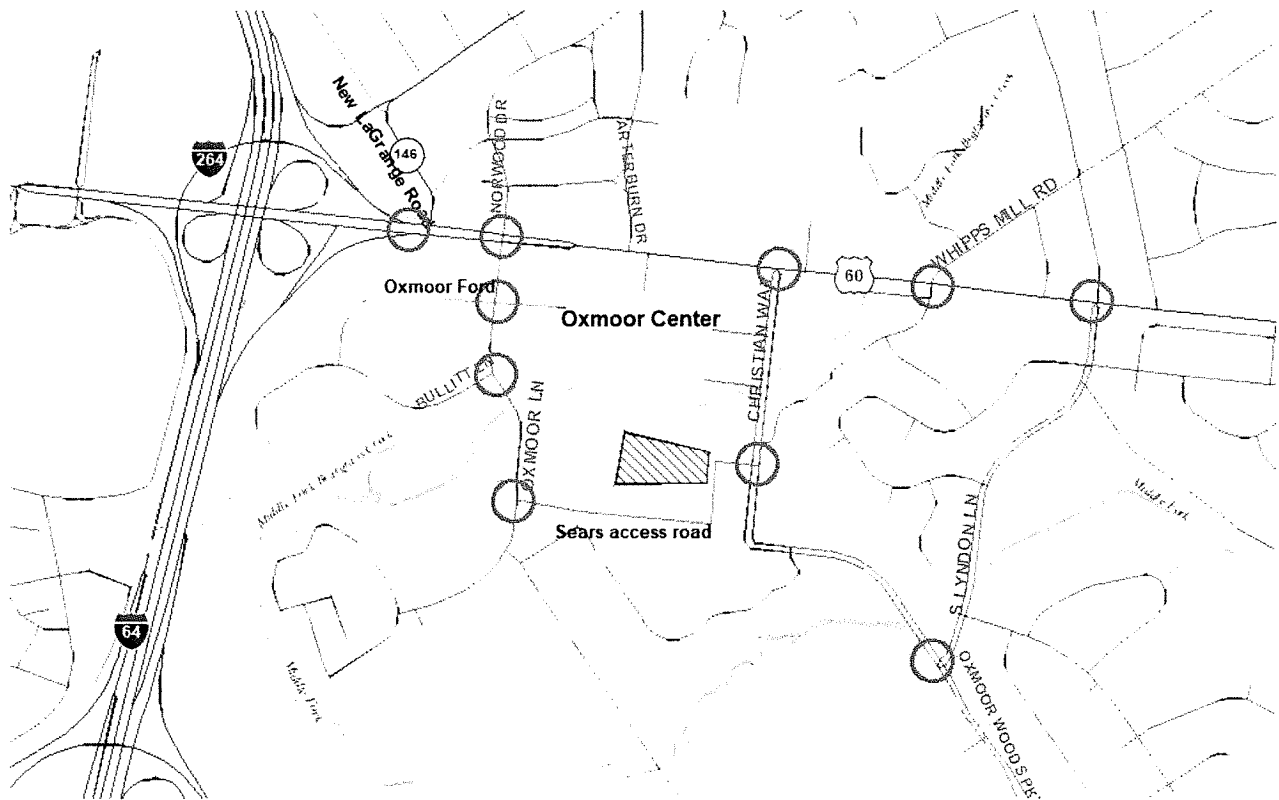


Figure 1. Site Map

## EXISTING CONDITIONS

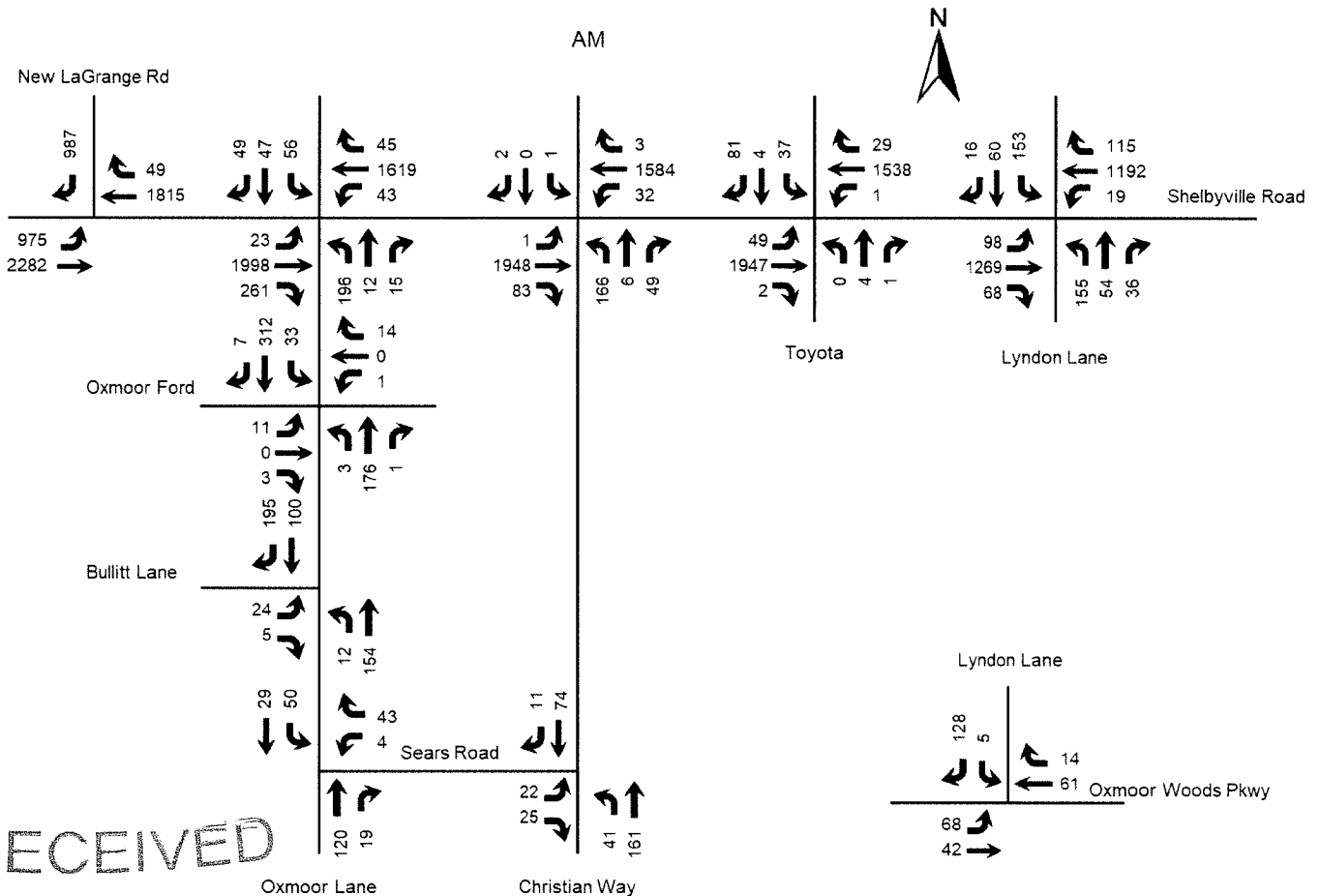
Shelbyville Road is maintained by the Kentucky Transportation Cabinet (US 60) with an estimated 2018 Average Annual Daily Traffic (AADT) of 63,800 vehicles per day between the New La Grange Road and Oxmoor Lane, as estimated from counts made for this study. The road is a six-lane highway with twelve-foot lanes. The road narrows to four lanes at approximately Arterburn Drive. The speed limit is 45 mph. There are no sidewalks. The intersections with New La Grange Road, Oxmoor Lane, Christian Way, Toyota, and Lyndon Lane are controlled with a traffic signal. There is TARC service along Shelbyville Road and through the center.

Topgolf  
 7900 Shelbyville Road  
 Traffic Impact Study

Oxmoor Lane is maintained by Louisville Metro. The road has four lanes with a thirty-two-foot median with an estimated 2018 AADT of 17,000 vehicles per day. There is a sidewalk on both sides except near Beargrass Creek. The speed limit is 25 mph. The intersection with Bullitt Lane is controlled with a stop sign on Bullitt Lane. There is a traffic signal at the entrance to the mall/car dealership.

Christian Way is maintained by Louisville Metro. The road has four lanes with a twenty-two-foot median with an estimated 2018 AADT of 8,500 vehicles per day. There is a sidewalk on the east side between Shelbyville Road and Christian Court. The speed limit is 25 mph. The intersection with Lyndon Lane and Oxmoor Woods Parkway is controlled as an all-way stop.

Peak hour traffic counts for the intersections adjacent to Oxmoor Center were obtained on May 17, 2018. The peak hours selected for analysis are 7:30 to 8:30 a.m. and 5:00 to 6:00 p.m. **Figure 2** illustrate the 2018 a.m. and p.m. peak hour traffic volumes. The other Shelbyville Road intersections were factored to match the new counts.



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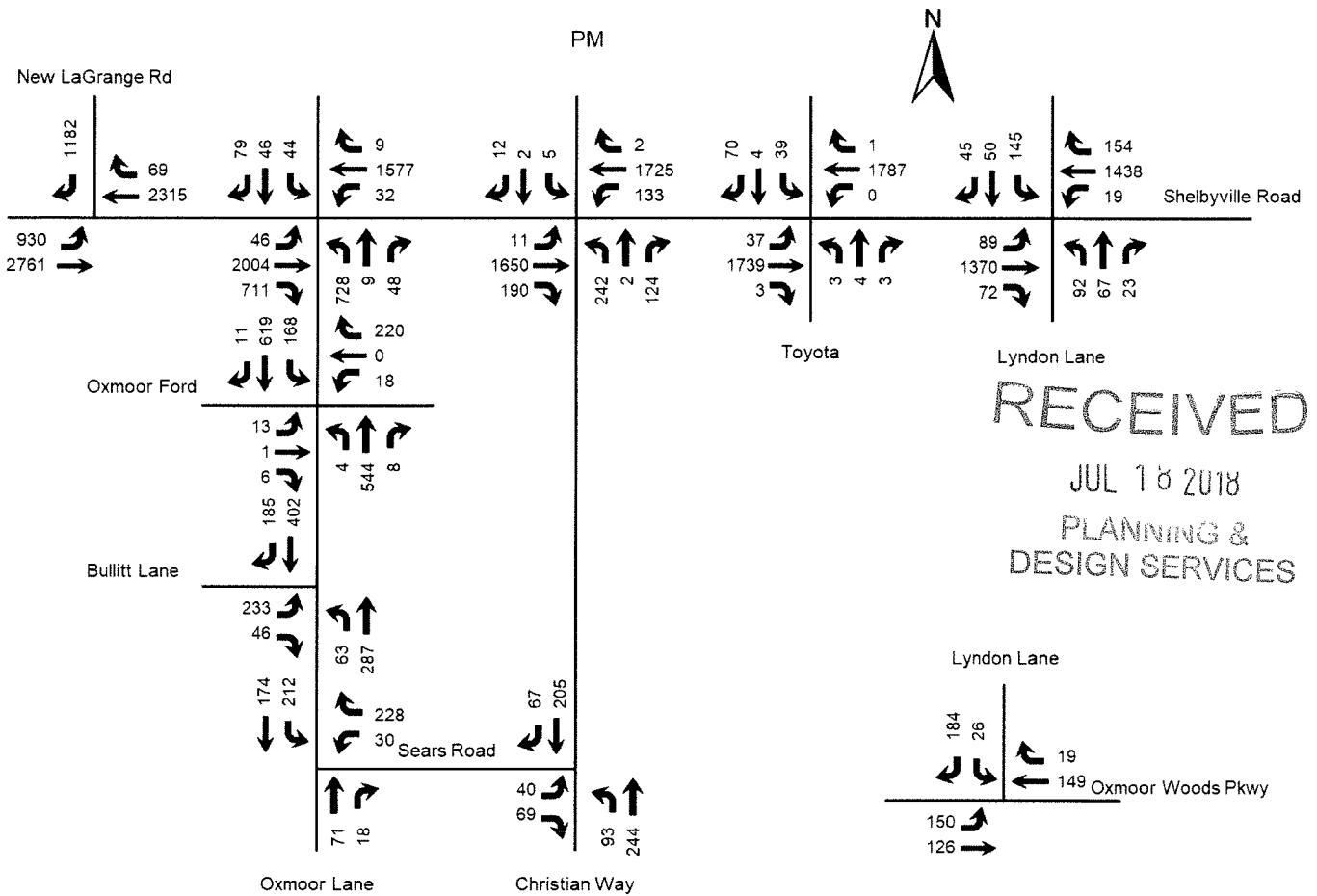


Figure 2. 2018 Peak Hour Volumes

### FUTURE CONDITIONS

The estimated project completion date is 2020. The traffic study for proposed apartments at 202 Oxmoor Lane (prepared by Diane B. Zimmerman Traffic Engineering, LLC dated November 8, 2017) determined the annual growth rate for the area to be 0.5%. The same annual growth rate is used for this study. Additionally, trip generation for the 110-room hotel currently under construction on Bullitt Lane was also included. The Oxmoor Farm will be developed in stages and each stage will be required to submit a traffic study reflecting the current traffic and the development proposed. Therefore, additional traffic from the Oxmoor Farm has not been included. The No Build volumes are shown in Figure 3.

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Traffic Impact Study

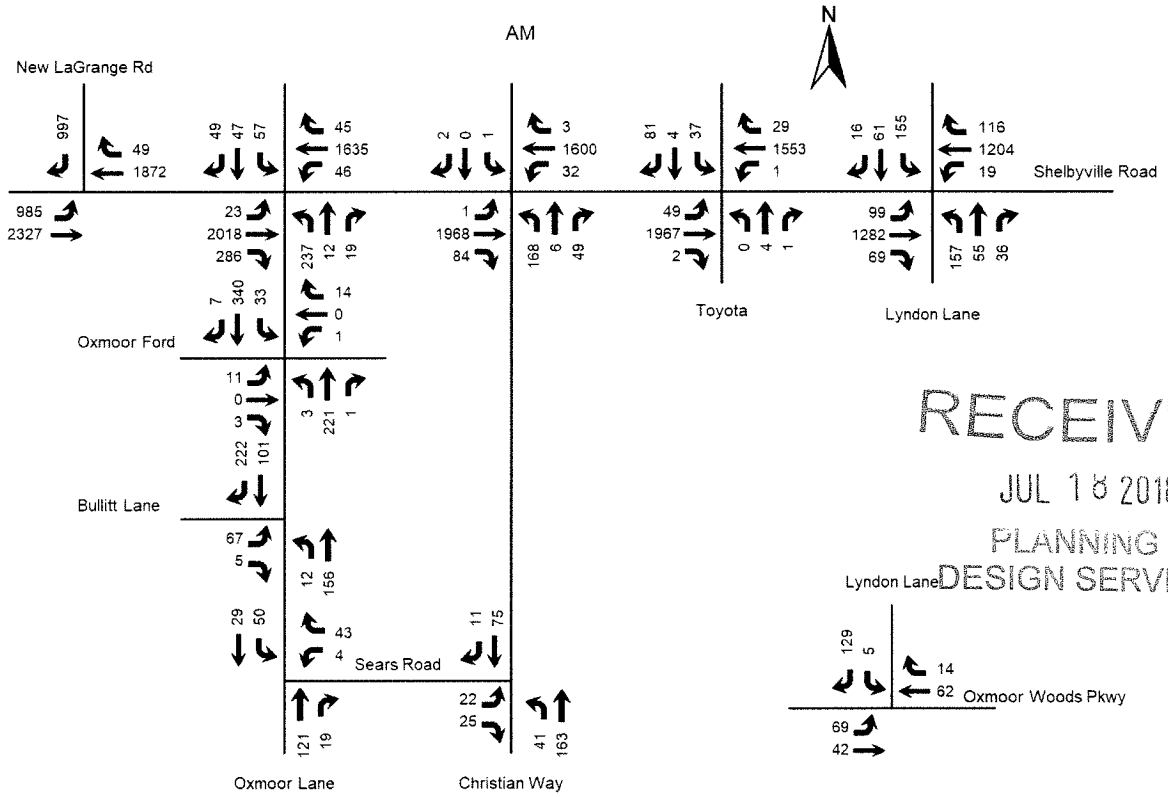


Figure 3. 2020 No Build Peak Hour Volumes

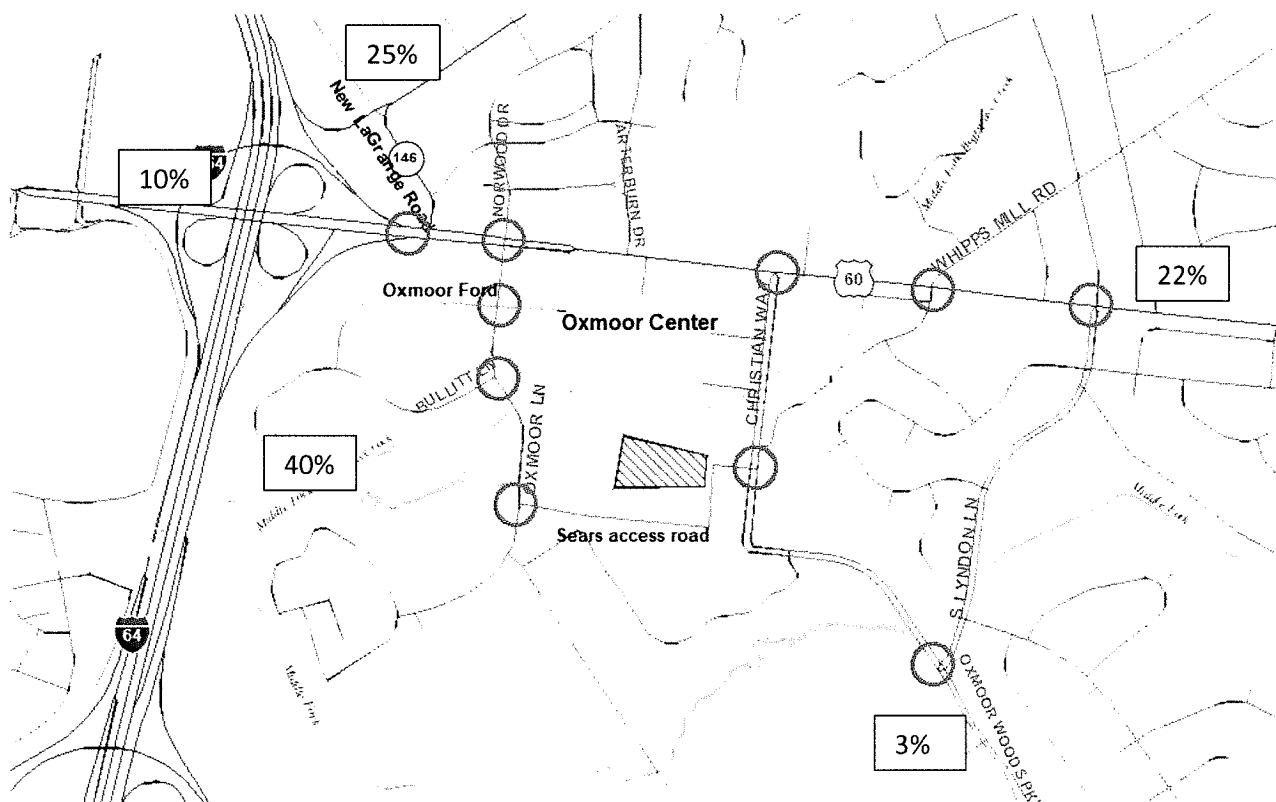
## TRIP GENERATION

The Institute of Transportation Engineers Trip Generation Manual, 10<sup>th</sup> Edition contains trip generation rates for a wide range of land uses, however the golf entertainment site land use was not included. Therefore, trip generation data was collected at a similar Topgolf site in Scottsdale, Arizona. The trip generation results are listed in **Table 1**. The new 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 during the peak hours. **Figure 6** displays the individual turning movements for the peak hours when the development is completed.

**Table 1. Peak Hour Trips Generated by Site**

Land Use	A.M. Peak Hour			P.M. Peak Hour		
	Trips	In	Out	Trips	In	Out
Golf Entertainment 102 bays	32	28	4	183	91	92

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**Figure 4. Trip Distribution Percentages**

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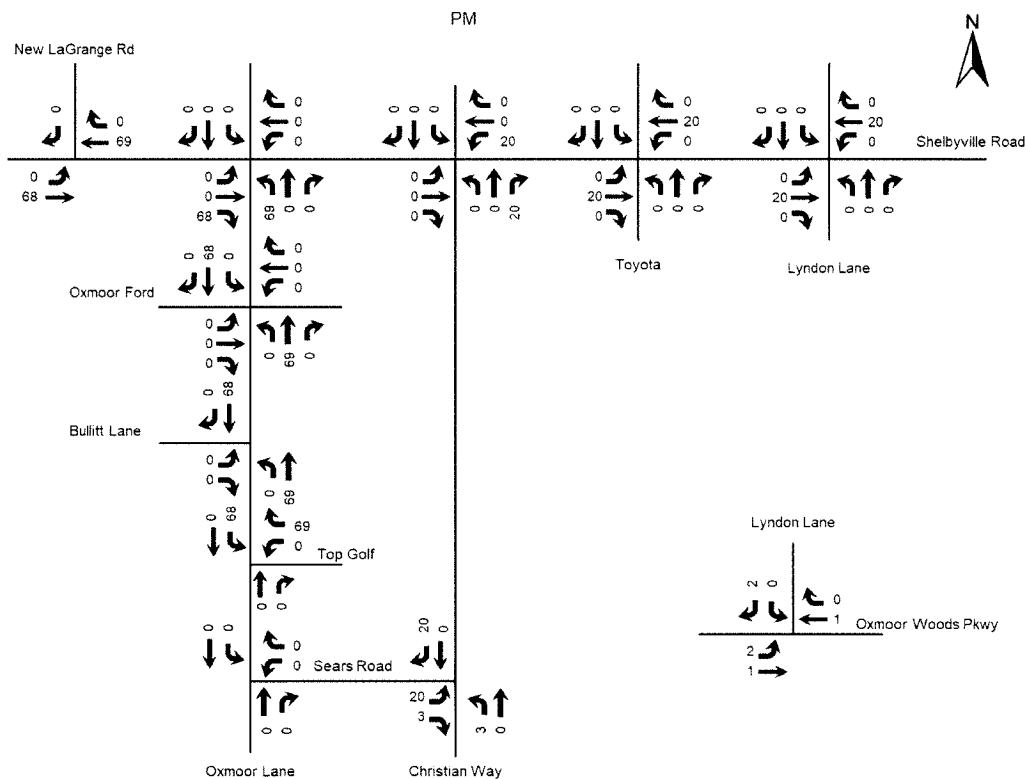
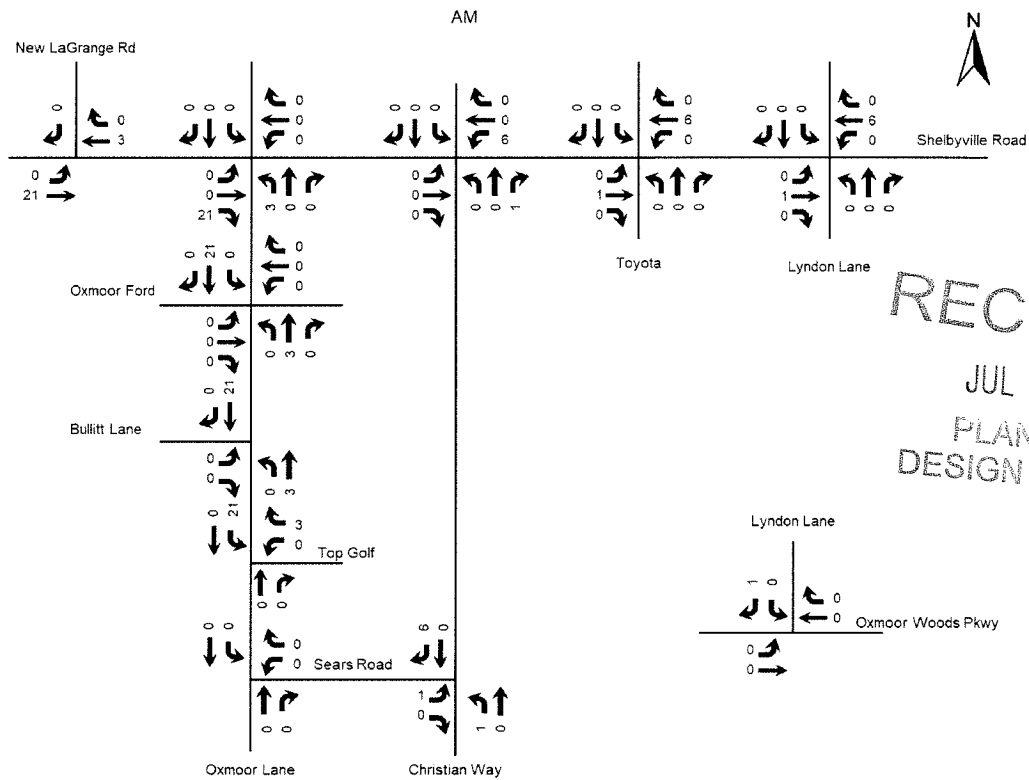


Figure 5. Peak Hour Trips Generated by Site





Comparing trip generation for a fully occupied shopping center with the trip generation associated with the revised center and a Topgolf site is an additional measure to evaluate the impact of the proposed development. The current Gross Leasable Area (GLA) of Oxmoor Center is 930,334 square feet. The proposed changes will total 783,003 square feet, plus the Topgolf site. The Topgolf site is not included in the GLA of the new center for this comparison. The proposed plan will generate 4.4 percent less traffic on a typical day. **Table 2** summarizes this comparison.

**Table 2. Trips Generation Comparison**

	A.M. Peak Hour	P.M. Peak Hour	Daily
Shopping Center GLA 930,334 sf	617	2,831	27,396
Proposed Center GLA 783,003 sf + Topgolf 102 bays	575	2,675	26,202
Percent change	-6.8%	-5.5%	-4.4%

## ANALYSIS

The qualitative measure of operation for a roadway facility or intersection is evaluated by assigning a “Level of Service”. Level of Service is a ranking scale from A through F, “A” is the best operating condition and “F” is the worst. Level of Service results depend upon the facility that is analyzed. In this case, the Level of Service is based upon the total delay experienced at an intersection.

To evaluate the impact of the proposed development, the vehicle delays at the intersections were determined using procedures detailed in the Highway Capacity Manual. Future Level of Service and seconds of delay were determined for the intersections using the Synchro (version 10) software. The Level of Service and seconds of delay are summarized in **Table 3**.

**Table 3. Peak Hour Level of Service**

Approach	A.M.			P.M.		
	2018	2020 No Build	2020 Build	2018	2020 No Build	2020 Build
<b>Shelbyville Road at New LaGrange Road</b>	<b>C</b> 24.7	<b>C</b> 24.3	<b>C</b> 24.4	<b>C</b> 26.3	<b>C</b> 27.0	<b>C</b> 27.4
Shelbyville Road Eastbound (Left)	C 33.0	C 32.0	C 31.3	C 27.8	C 28.0	C 27.9
Shelbyville Road Westbound	D 44.3	D 44.2	D 44.5	C 27.9	C 28.5	C 30.2
New LaGrange Road Southbound	D 36.2	D 36.0	D 36.1	F 83.0	F 86.9	F 86.6

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Approach	A.M.			P.M.		
	2018	2020 No Build	2020 Build	2018	2020 No Build	2020 Build
<b>Shelbyville Road at Oxmoor Lane</b>	<b>C</b> <b>25.5</b>	<b>C</b> <b>27.0</b>	<b>C</b> <b>27.0</b>	<b>D</b> <b>45.3</b>	<b>D</b> <b>49.1</b>	<b>D</b> <b>54.0</b>
Shelbyville Road Eastbound	B 14.3	B 15.8	B 15.9	D 40.1	D 46.7	E 55.1
Shelbyville Road Westbound	D 32.8	C 33.9	C 33.9	D 45.3	D 46.5	D 47.5
Oxmoor Lane Northbound	E 58.4	E 58.5	E 58.5	E 56.7	E 56.4	E 55.5
Norwood Drive Southbound	E 63.4	E 62.9	E 62.9	E 76.2	E 78.5	F 89.6
<b>Shelbyville Road at Christian Way</b>	<b>B</b> <b>19.2</b>	<b>C</b> <b>20.8</b>	<b>C</b> <b>22.1</b>	<b>C</b> <b>23.5</b>	<b>C</b> <b>23.9</b>	<b>C</b> <b>23.5</b>
Shelbyville Road Eastbound	C 20.6	C 23.4	C 25.8	B 13.6	B 14.3	B 12.4
Shelbyville Road Westbound	B 12.1	B 12.4	B 12.6	C 24.7	C 25.0	C 25.4
Christian Way Northbound	E 57.4	E 57.4	E 57.4	E 65.2	E 65.1	E 64.6
Entrance Southbound	E 63.5	E 63.5	E 63.5	E 71.7	E 71.7	E 71.7
<b>Shelbyville Road at Toyota</b>	<b>A</b> <b>8.5</b>	<b>A</b> <b>8.4</b>	<b>A</b> <b>8.4</b>	<b>B</b> <b>15.0</b>	<b>B</b> <b>15.3</b>	<b>B</b> <b>15.8</b>
Shelbyville Road Eastbound	A 7.2	A 7.1	A 7.1	A 5.3	A 5.5	A 6.0
Shelbyville Road Westbound	A 6.0	A 6.0	A 6.0	C 20.8	C 21.3	C 21.9
Entrance Northbound	D 53.5	D 53.5	D 53.5	E 62.3	E 62.3	E 62.3
Entrance Southbound	E 59.1	E 59.1	E 59.1	E 70.6	E 70.6	E 70.6
<b>Shelbyville Road at Lyndon Lane</b>	<b>C</b> <b>27.9</b>	<b>C</b> <b>27.9</b>	<b>C</b> <b>27.9</b>	<b>C</b> <b>24.5</b>	<b>C</b> <b>24.8</b>	<b>C</b> <b>25.2</b>
Shelbyville Road Eastbound	C 24.1	C 23.9	C 23.9	A 9.8	B 10.2	B 10.6
Shelbyville Road Westbound	C 21.6	C 21.7	C 21.8	C 27.2	C 27.8	C 28.2
Lyndon Laney Northbound	D 48.2	C 48.2	D 48.2	D 49.7	D 49.4	D 49.4
Lyndon Lane Southbound	E 67.7	E 67.7	E 67.7	F 80.5	F 80.2	F 80.2

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Approach	A.M.			P.M.		
	2018	2020 No Build	2020 Build	2018	2020 No Build	2020 Build
<b>Oxmoor Lane at Mall/Car Dealership</b>	<b>A 8.8</b>	<b>A 8.1</b>	<b>A 7.9</b>	<b>C 20.7</b>	<b>C 20.3</b>	<b>B 19.5</b>
Car Dealership Eastbound	E 72.3	E 72.3	E 72.3	E 73.5	E 73.9	E 73.9
Mall Westbound	E 68.3	E 68.3	E 68.3	E 60.2	E 60.4	E 60.5
Oxmoor Lane Northbound	A 3.2	A 3.3	A 3.3	B 10.2	B 10.4	B 10.7
Oxmoor Lane Southbound	A 6.7	A 6.3	A 6.0	B 14.9	B 14.6	B 13.7
<b>Oxmoor Lane at Bullitt Lane</b>						
Bullitt Lane Eastbound	B 10.6	B 11.1	B 11.6	D 27.1	E 35.6	F 63.4
Oxmoor Lane Northbound (left)	A 7.9	A 8.0	A 8.1	A 9.1	A 9.3	B 10.5
<b>Oxmoor Lane at Mall Road</b>						
Mall Road (Sears) Westbound	A 9.0	A 9.0	A 9.0	B 11.7	B 11.7	B 11.7
Oxmoor Lane Southbound (left)	A 7.6	A 7.6	A 7.6	A 7.8	A 7.9	A 7.9
<b>Oxmoor Lane at Top Golf Entrance</b>						
Entrance Westbound			A 8.8			A 9.9
Oxmoor Lane Southbound (left)			A 7.6			A 8.3
<b>Christian Way at Sears Entrance</b>						
Sears Entrance Eastbound	A 9.5	A 9.5	A 9.6	B 11.6	B 11.6	B 12.7
Christian Way Northbound (left)	A 7.5	A 7.5	A 7.5	A 8.1	A 8.1	A 8.2
<b>Lyndon Lane at Oxmoor Woods Parkway</b>	<b>A 8.5</b>	<b>A 8.5</b>	<b>A 8.5</b>	<b>A 9.6</b>	<b>A 9.7</b>	<b>A 10.0</b>
Oxmoor Woods Parkway Eastbound	A 8.9	A 9.0	A 9.0	A 9.9	A 9.9	A 10.0
Oxmoor Woods Parkway Westbound	A 8.4	A 8.4	A 8.4	A 9.5	A 9.5	A 9.6
Lyndon Lane Southbound	A 8.2	A 8.2	A 8.2	A 9.4	A 9.4	A 9.5

Key: Level of Service, Delay in seconds per vehicle

## CONCLUSIONS

Based upon the volume of traffic generated by the proposed development and the amount of traffic forecasted for the year 2020, there will be a manageable impact to the existing highway network, with Levels of Service remaining within acceptable limits. The delays experienced in the area will increase within acceptable limits, thus no improvements to the roadway system are recommended.

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**APPENDIX**

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Topgolf  
7900 Shelbyville Road  
Traffic Impact Study

Traffic Counts

Jefferson County, KY  
Classified Turn Movement Count



**Marr Traffic**  
Transportation Data Collection

Site 1 of 11  
US-60 Shelbyville Rd (West)  
US-60 Shelbyville Rd (East)  
Oxmoor Ln  
Norwood Dr

41 Peabody Street, Nashville, TN 37210  
1 (615) 431-6750  
1 (800) 615-3765

Lat/Long  
38.249405°, -85.613315°

Date  
Thursday 17 May 2018

Weather  
Cloudy  
Temp: 24°C

	Eastbound				Westbound				Northbound				Southbound					
	US-60 Shelbyville Rd (West)				US-60 Shelbyville Rd (East)				Oxmoor Ln				Norwood Dr					
	Left	Thru	Right	App	Left	Thru	Right	App	Left	Thru	Right	App	U-Turn	Left	Thru	Right	App	Int
0700 - 0715	2	312	42	356	5	369	3	377	31	1	4	36	0	4	1	6	11	780
0715 - 0730	14	379	30	423	7	454	9	470	39	1	3	43	0	12	10	10	32	968
0730 - 0745	8	460	46	514	4	494	16	514	45	2	6	53	0	13	10	12	35	1116
0745 - 0800	6	473	87	566	11	429	13	453	48	1	6	55	0	16	8	10	34	1108
0800 - 0815	6	532	66	604	15	331	10	356	54	3	3	60	0	19	17	17	53	1073
0815 - 0830	3	533	62	598	13	365	6	384	49	6	0	55	0	8	12	10	30	1067
0830 - 0845	8	526	56	590	12	386	6	404	39	1	7	47	0	13	17	11	41	1082
0845 - 0900	4	504	94	602	9	360	6	375	33	2	5	40	0	4	7	5	17	1034
1600 - 1615	11	381	114	506	13	482	3	498	155	0	25	180	0	5	8	13	26	1210
1615 - 1630	14	431	106	551	10	484	8	502	154	0	20	174	0	14	6	11	31	1258
1630 - 1645	16	480	107	603	18	473	9	500	115	2	21	138	0	11	7	25	43	1284
1645 - 1700	10	486	130	626	10	459	1	470	138	5	15	158	0	15	7	15	37	1291
1700 - 1715	21	480	138	639	9	463	4	476	187	3	16	206	0	9	5	15	29	1350
1715 - 1730	8	523	155	686	6	335	1	342	179	1	18	198	0	17	11	14	43	1269
1730 - 1745	8	520	185	713	9	398	2	409	184	0	5	189	0	10	17	28	57	1368
1745 - 1800	9	481	233	723	8	381	2	391	178	5	9	192	0	8	13	22	44	1350
													0					
0730 - 0745	8	460	46	514	4	494	16	514	45	2	6	53	0	13	10	12	35	1116
0745 - 0800	6	473	87	566	11	429	13	453	48	1	6	55	0	16	8	10	34	1108
0800 - 0815	6	532	66	604	15	331	10	356	54	3	3	60	0	19	17	17	53	1073
0815 - 0830	3	533	62	598	13	365	6	384	49	6	0	55	0	8	12	10	30	1067
<b>AM Peak</b>	<b>23</b>	<b>1998</b>	<b>261</b>	<b>2282</b>	<b>43</b>	<b>1619</b>	<b>45</b>	<b>1707</b>	<b>196</b>	<b>12</b>	<b>15</b>	<b>223</b>	<b>0</b>	<b>56</b>	<b>47</b>	<b>49</b>	<b>152</b>	<b>4364</b>
1700 - 1715	21	480	138	639	9	463	4	476	187	3	16	206	0	9	5	15	29	1350
1715 - 1730	8	523	155	686	6	335	1	342	179	1	18	198	0	17	11	14	43	1269
1730 - 1745	8	520	185	713	9	398	2	409	184	0	5	189	0	10	17	28	57	1368
1745 - 1800	9	481	233	723	8	381	2	391	178	5	9	192	0	8	13	22	44	1350
<b>PM Peak</b>	<b>46</b>	<b>2004</b>	<b>711</b>	<b>2761</b>	<b>32</b>	<b>1577</b>	<b>9</b>	<b>1618</b>	<b>728</b>	<b>9</b>	<b>48</b>	<b>785</b>	<b>0</b>	<b>44</b>	<b>46</b>	<b>79</b>	<b>173</b>	<b>5337</b>

Topgolf  
7900 Shelbyville Road  
Traffic Impact Study

Jefferson County, KY  
Classified Turn Movement Count



**Marr Traffic**  
Transportation Data Collection

Site 2 of 11  
Local Access (West)  
Local Access (East)  
Oxmoor Ln (South)  
Oxmoor Ln (North)

41 Peabody Street, Nashville, TN 37210  
1 (615) 431-6750  
1 (800) 615-3765

Lat/Long  
38.248182°, -85.613490°

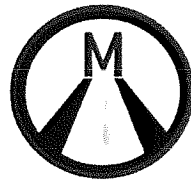
Date  
Thursday 17 May 2018

Weather  
Cloudy  
Temp: 24°C

	Eastbound				Westbound				Northbound					Southbound					
	Local Access (West)				Local Access (East)				Oxmoor Ln (South)					Oxmoor Ln (North)					
	Left	Thru	Right	App	Left	Thru	Right	App	Left	Thru	Right	Peds	App	U-Turn	Left	Thru	Right	App	Int
0700 - 0715	1	0	1	2	0	0	1	2	0	38	0	0	38	1	1	41	3	46	88
0715 - 0730	3	0	0	3	0	0	3	3	0	39	1	0	40	0	3	48	0	51	97
0730 - 0745	1	0	1	2	1	0	3	6	1	50	0	3	54	1	5	49	2	57	119
0745 - 0800	3	0	1	4	0	0	7	7	1	36	0	1	38	1	12	93	2	108	157
0800 - 0815	1	0	0	1	0	0	3	4	1	50	0	0	51	4	4	87	1	96	152
0815 - 0830	6	0	1	7	0	0	1	1	0	40	1	0	41	2	4	83	2	91	140
0830 - 0845	2	0	4	6	0	0	4	4	2	41	0	0	43	2	2	75	3	82	135
0845 - 0900	7	0	5	12	0	0	4	5	4	29	0	1	34	3	18	88	5	114	165
1600 - 1615	11	1	1	13	1	0	50	53	0	125	1	0	126	3	47	80	4	134	326
1615 - 1630	4	0	2	6	2	0	63	68	0	97	4	1	102	2	36	81	5	124	300
1630 - 1645	4	0	2	6	4	1	37	42	0	95	4	0	99	0	45	87	3	135	282
1645 - 1700	7	0	2	9	4	1	54	60	0	93	4	0	97	0	37	109	2	148	314
1700 - 1715	6	0	1	7	4	0	49	53	0	149	0	0	149	4	39	109	3	155	364
1715 - 1730	2	1	2	5	3	0	59	64	1	135	3	0	139	0	24	152	2	178	386
1730 - 1745	1	0	1	2	5	0	60	65	3	126	2	0	131	2	42	166	2	212	410
1745 - 1800	4	0	2	6	6	0	52	58	0	134	3	0	137	1	56	192	4	253	454
0730 - 0745	1	0	1	2	1	0	3	6	1	50	0	3	54	1	5	49	2	57	119
0745 - 0800	3	0	1	4	0	0	7	7	1	36	0	1	38	1	12	93	2	108	157
0800 - 0815	1	0	0	1	0	0	3	4	1	50	0	0	51	4	4	87	1	96	152
0815 - 0830	6	0	1	7	0	0	1	1	0	40	1	0	41	2	4	83	2	91	140
AM PEAK	11	0	3	14	1	0	14	18	3	176	1	4	184	8	25	312	7	352	568
1700 - 1715	6	0	1	7	4	0	49	53	0	149	0	0	149	4	39	109	3	155	364
1715 - 1730	2	1	2	5	3	0	59	64	1	135	3	0	139	0	24	152	2	178	386
1730 - 1745	1	0	1	2	5	0	60	65	3	126	2	0	131	2	42	166	2	212	410
1745 - 1800	4	0	2	6	6	0	52	58	0	134	3	0	137	1	56	192	4	253	454
PM PEAK	13	1	6	20	18	0	220	240	4	544	8	0	556	7	161	619	11	798	1614



Jefferson County, KY  
Classified Turn Movement Count



**Marr Traffic**  
Transportation Data Collection

Site 3 of 11

Bullitt Ln  
Oxmoor Ln (South)  
Oxmoor Ln (North)

41 Peabody Street, Nashville, TN 37210  
1 (615) 431-6750  
1 (800) 615-3765

Lat/Long  
38.246776°, -85.613669°

Date  
Thursday 17 May 2018

Weather  
Cloudy  
Temp: 24°C

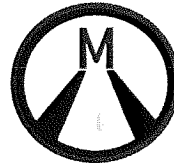
	Eastbound				Northbound				Southbound				Int
	Bullitt Ln				Oxmoor Ln (South)				Oxmoor Ln (North)				
	U-Tum	Left	Right	App	U-Tum	Left	Thru	App	U-Tum	Thru	Right	App	
0700 - 0715	0	1	1	2	0	2	38	40	1	15	23	39	81
0715 - 0730	0	5	2	7	0	1	33	34	0	14	33	47	88
0730 - 0745	0	8	0	8	0	1	42	43	0	22	25	47	98
0745 - 0800	0	0	0	0	0	1	37	38	1	40	45	86	124
0800 - 0815	0	6	3	9	0	5	42	47	2	20	62	84	140
0815 - 0830	0	10	2	12	0	5	33	38	1	14	63	78	128
0830 - 0845	0	10	1	11	0	12	33	45	0	21	52	73	129
0845 - 0900	1	9	2	12	0	6	22	28	2	24	63	89	129
1600 - 1615	0	74	12	86	1	2	35	38	16	47	27	90	214
1615 - 1630	0	58	13	71	0	6	37	43	7	46	24	77	191
1630 - 1645	0	67	7	74	0	5	27	32	7	39	38	84	190
1645 - 1700	0	57	12	69	0	9	31	40	8	66	38	112	221
1700 - 1715	0	76	9	85	0	13	61	74	10	71	32	113	272
1715 - 1730	0	58	9	67	0	9	67	76	10	104	37	151	294
1730 - 1745	0	44	13	57	0	16	84	100	5	104	50	159	316
1745 - 1800	0	55	15	70	0	25	75	100	8	123	66	197	367

0730 - 0745	0	8	0	8	0	1	42	43	0	22	25	47	98
0745 - 0800	0	0	0	0	0	1	37	38	1	40	45	86	124
0800 - 0815	0	6	3	9	0	5	42	47	2	20	62	84	140
0815 - 0830	0	10	2	12	0	5	33	38	1	14	63	78	128
<b>AM Peak</b>	<b>0</b>	<b>24</b>	<b>5</b>	<b>29</b>	<b>0</b>	<b>12</b>	<b>154</b>	<b>166</b>	<b>4</b>	<b>96</b>	<b>195</b>	<b>295</b>	<b>490</b>
1700 - 1715	0	76	9	85	0	13	61	74	10	71	32	113	272
1715 - 1730	0	58	9	67	0	9	67	76	10	104	37	151	294
1730 - 1745	0	44	13	57	0	16	84	100	5	104	50	159	316
1745 - 1800	0	55	15	70	0	25	75	100	8	123	66	197	367
<b>PM Peak</b>	<b>0</b>	<b>233</b>	<b>46</b>	<b>279</b>	<b>0</b>	<b>63</b>	<b>287</b>	<b>350</b>	<b>33</b>	<b>402</b>	<b>185</b>	<b>620</b>	<b>1249</b>

Topgolf  
7900 Shelbyville Road  
Traffic Impact Study

Jefferson County, KY  
Classified Turn Movement Count

Site 5 of 11  
Local Access  
Oxmoor Ln (South)  
Oxmoor Ln (North)



**Marr Traffic**  
Transportation Data Collect

41 Peabody Street, Nashville, TN 37210  
1 (615) 431-6750  
1 (800) 615-3765

Lat/Long  
38.244386°, -85.612856°

Date  
Thursday 17 May 2018

Weather  
Cloudy  
Temp: 24°C

	Westbound				Northbound				Southbound				Int
	Local Access				Oxmoor Ln (South)				Oxmoor Ln (North)				
	U-Turn	Left	Thru	App	U-Turn	Thru	Right	App	U-Turn	Left	Thru	App	
0700 - 0715	0	0	5	5	0	33	7	40	0	5	5	10	55
0715 - 0730	0	1	5	6	0	30	3	33	0	7	7	14	53
0730 - 0745	0	0	10	10	0	33	9	42	0	9	8	17	69
0745 - 0800	0	3	13	16	0	25	5	30	0	24	6	30	76
0800 - 0815	0	1	10	12	0	37	2	39	0	9	11	20	71
0815 - 0830	0	0	10	10	0	25	3	28	0	8	4	12	50
0830 - 0845	0	0	12	14	0	31	2	33	0	10	9	19	66
0845 - 0900	0	1	11	15	0	15	3	18	0	12	3	15	48
1600 - 1615	0	3	11	14	0	9	4	13	1	24	24	50	77
1615 - 1630	0	3	10	14	0	20	3	23	0	35	18	53	90
1630 - 1645	0	3	16	24	0	8	6	14	0	16	24	40	78
1645 - 1700	0	5	20	28	0	13	1	14	0	27	25	52	94
1700 - 1715	0	2	37	39	0	10	4	14	0	38	30	68	121
1715 - 1730	0	4	58	62	0	13	4	17	0	57	41	98	177
1730 - 1745	0	11	63	74	1	23	5	29	0	68	36	104	207
1745 - 1800	0	13	70	83	0	24	5	29	0	49	67	116	228

0730 - 0745	0	0	10	10	0	33	9	42	0	9	8	17	69
0745 - 0800	0	3	13	16	0	25	5	30	0	24	6	30	76
0800 - 0815	0	1	10	12	0	37	2	39	0	9	11	20	71
0815 - 0830	0	0	10	10	0	25	3	28	0	8	4	12	50
<b>AM Peak</b>	<b>0</b>	<b>4</b>	<b>43</b>	<b>48</b>	<b>0</b>	<b>120</b>	<b>19</b>	<b>139</b>	<b>0</b>	<b>50</b>	<b>29</b>	<b>79</b>	<b>266</b>
1700 - 1715	0	2	37	39	0	10	4	14	0	38	30	68	121
1715 - 1730	0	4	58	62	0	13	4	17	0	57	41	98	177
1730 - 1745	0	11	63	74	1	23	5	29	0	68	36	104	207
1745 - 1800	0	13	70	83	0	24	5	29	0	49	67	116	228
<b>PM Peak</b>	<b>0</b>	<b>30</b>	<b>228</b>	<b>258</b>	<b>1</b>	<b>70</b>	<b>18</b>	<b>89</b>	<b>0</b>	<b>212</b>	<b>174</b>	<b>386</b>	<b>733</b>

Topgolf  
7900 Shelbyville Road  
Traffic Impact Study

Jefferson County, KY  
Classified Turn Movement Count



**Marr Traffic**  
Transportation Data Collection

Site 6 of 11  
US-60 Shelbyville Rd (West)  
US-60 Shelbyville Rd (East)  
Christian Way  
Local Access

41 Peabody Street, Nashville, TN 37210  
1 (615) 431-6750  
1 (800) 615-3765

Lat/Long  
38.248835°, -85.606704°

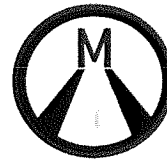
Date  
Thursday 17 May 2018

Weather  
Cloudy  
Temp: 24°C

	Eastbound					Westbound					Northbound					Southbound					Int
	US-60 Shelbyville Rd (West)					US-60 Shelbyville Rd (East)					Christian Way					Local Access					
	Left	Thru	Right	Peds	App	Left	Thru	Right	Peds	App	Left	Thru	Right	Peds	App	Left	Thru	Right	Peds	App	
0700 - 0715	0	307	13	0	320	2	359	1	0	362	16	1	6	0	23	0	0	1	0	1	706
0715 - 0730	2	362	13	0	377	5	427	1	0	433	36	0	5	0	41	3	0	1	0	4	855
0730 - 0745	1	419	14	0	434	9	478	0	0	487	46	1	5	0	52	0	0	1	0	1	974
0745 - 0800	0	465	31	0	496	9	403	1	0	413	70	3	19	0	92	1	0	1	0	2	1003
0800 - 0815	0	547	17	0	564	7	346	1	0	354	19	2	15	0	36	0	0	0	0	0	954
0815 - 0830	0	517	21	0	538	7	357	1	0	365	31	0	10	0	41	0	0	0	0	0	944
0830 - 0845	0	522	13	0	535	15	392	1	0	408	22	0	6	0	28	1	0	2	0	3	974
0845 - 0900	0	488	19	1	508	12	346	1	0	359	31	2	5	0	38	1	1	4	2	8	913
1600 - 1615	3	376	38	0	417	19	440	2	0	461	51	0	35	0	86	1	2	4	0	7	971
1615 - 1630	5	379	45	1	430	32	392	0	0	424	67	0	25	0	92	2	1	1	0	4	950
1630 - 1645	5	418	39	1	463	44	466	1	0	511	47	1	31	0	79	1	1	4	2	8	1061
1645 - 1700	0	439	43	0	482	34	458	1	0	493	51	1	29	0	81	1	0	1	0	2	1058
1700 - 1715	1	414	63	0	478	23	409	0	0	432	77	0	39	0	116	1	0	6	0	7	1033
1715 - 1730	3	408	66	0	477	15	251	1	0	267	77	1	30	0	108	1	1	3	0	5	857
1730 - 1745	1	429	56	0	486	28	301	0	0	329	99	1	24	0	124	2	0	2	0	4	943
1745 - 1800	2	369	89	0	460	35	296	1	0	332	102	1	37	1	141	1	0	5	0	6	939
<b>0730 - 0745</b>	<b>1</b>	<b>419</b>	<b>14</b>	<b>0</b>	<b>434</b>	<b>9</b>	<b>478</b>	<b>0</b>	<b>0</b>	<b>487</b>	<b>46</b>	<b>1</b>	<b>5</b>	<b>0</b>	<b>52</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>974</b>
<b>0745 - 0800</b>	<b>0</b>	<b>465</b>	<b>31</b>	<b>0</b>	<b>496</b>	<b>9</b>	<b>403</b>	<b>1</b>	<b>0</b>	<b>413</b>	<b>70</b>	<b>3</b>	<b>19</b>	<b>0</b>	<b>92</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>1003</b>
<b>0800 - 0815</b>	<b>0</b>	<b>547</b>	<b>17</b>	<b>0</b>	<b>564</b>	<b>7</b>	<b>346</b>	<b>1</b>	<b>0</b>	<b>354</b>	<b>19</b>	<b>2</b>	<b>15</b>	<b>0</b>	<b>36</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>954</b>
<b>0815 - 0830</b>	<b>0</b>	<b>517</b>	<b>21</b>	<b>0</b>	<b>538</b>	<b>7</b>	<b>357</b>	<b>1</b>	<b>0</b>	<b>365</b>	<b>31</b>	<b>0</b>	<b>10</b>	<b>0</b>	<b>41</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>944</b>
<b>AM Peak</b>	<b>1</b>	<b>1948</b>	<b>83</b>	<b>0</b>	<b>2032</b>	<b>32</b>	<b>1584</b>	<b>3</b>	<b>0</b>	<b>1619</b>	<b>166</b>	<b>6</b>	<b>49</b>	<b>0</b>	<b>221</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>3</b>	<b>3875</b>
<b>1615 - 1630</b>	<b>5</b>	<b>379</b>	<b>45</b>	<b>1</b>	<b>430</b>	<b>32</b>	<b>392</b>	<b>0</b>	<b>0</b>	<b>424</b>	<b>67</b>	<b>0</b>	<b>25</b>	<b>0</b>	<b>92</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>950</b>
<b>1630 - 1645</b>	<b>5</b>	<b>418</b>	<b>39</b>	<b>1</b>	<b>463</b>	<b>44</b>	<b>466</b>	<b>1</b>	<b>0</b>	<b>511</b>	<b>47</b>	<b>1</b>	<b>31</b>	<b>0</b>	<b>79</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>2</b>	<b>8</b>	<b>1061</b>
<b>1645 - 1700</b>	<b>0</b>	<b>439</b>	<b>43</b>	<b>0</b>	<b>482</b>	<b>34</b>	<b>458</b>	<b>1</b>	<b>0</b>	<b>493</b>	<b>51</b>	<b>1</b>	<b>29</b>	<b>0</b>	<b>81</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>1058</b>
<b>1700 - 1715</b>	<b>1</b>	<b>414</b>	<b>63</b>	<b>0</b>	<b>478</b>	<b>23</b>	<b>409</b>	<b>0</b>	<b>0</b>	<b>432</b>	<b>77</b>	<b>0</b>	<b>39</b>	<b>0</b>	<b>116</b>	<b>1</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>7</b>	<b>1033</b>
<b>PM Peak</b>	<b>11</b>	<b>1650</b>	<b>190</b>	<b>2</b>	<b>1853</b>	<b>133</b>	<b>1725</b>	<b>2</b>	<b>0</b>	<b>1860</b>	<b>242</b>	<b>2</b>	<b>124</b>	<b>0</b>	<b>368</b>	<b>5</b>	<b>2</b>	<b>12</b>	<b>2</b>	<b>21</b>	<b>4102</b>

Topgolf  
7900 Shelbyville Road  
Traffic Impact Study

Jefferson County, KY  
Classified Turn Movement Count



**Marr Traffic**  
Transportation Data Collection

Site 9 of 11  
Local Access  
Christian Way (South)  
Christian Way (North)

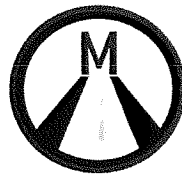
41 Peabody Street, Nashville, TN 37210  
1 (615) 431-6750  
1 (800) 615-3765

Lat/Long                      Date                      Weather  
38.244687°, -85.607481°      Thursday 17 May 2018      Cloudy  
Temp: 24°C

	Eastbound				Northbound					Southbound					Int Total
	Local Access				Christian Way (South)					Christian Way (North)					
	U-Turn	Left	Right	App	U-Turn	Left	Thru	Peds	App	U-Turn	Thru	Right	Peds	App	
0700 - 0715	0	3	4	7	0	1	18	0	19	0	11	1	0	12	38
0715 - 0730	0	1	1	2	0	3	37	0	40	0	14	0	0	14	56
0730 - 0745	0	7	6	13	0	7	48	0	55	0	11	2	0	13	81
0745 - 0800	0	7	13	20	0	14	63	0	77	0	34	2	0	36	133
0800 - 0815	0	4	5	9	0	11	20	1	32	0	18	2	0	20	61
0815 - 0830	0	4	1	5	0	9	30	0	39	0	11	5	0	16	60
0830 - 0845	0	3	2	5	0	12	33	0	45	0	12	2	0	14	64
0845 - 0900	0	12	5	17	0	7	17	0	24	0	16	6	0	22	63
1600 - 1615	0	16	17	33	0	9	17	0	26	0	29	7	0	36	95
1615 - 1630	0	9	13	22	0	9	15	0	24	0	37	3	0	40	86
1630 - 1645	0	11	15	26	0	12	19	0	31	0	38	8	0	46	103
1645 - 1700	0	9	19	28	0	19	19	0	38	0	42	9	2	53	119
1700 - 1715	0	8	21	29	0	26	51	0	77	0	44	12	15	71	177
1715 - 1730	0	13	13	26	0	37	56	0	93	0	36	31	44	111	230
1730 - 1745	0	10	21	31	0	13	72	6	91	0	43	13	26	82	204
1745 - 1800	0	9	14	23	0	17	65	0	82	0	82	11	10	103	208

0730 - 0745	0	7	6	13	0	7	48	0	55	0	11	2	0	13	81
0745 - 0800	0	7	13	20	0	14	63	0	77	0	34	2	0	36	133
0800 - 0815	0	4	5	9	0	11	20	1	32	0	18	2	0	20	61
0815 - 0830	0	4	1	5	0	9	30	0	39	0	11	5	0	16	60
<b>AM Peak</b>	<b>0</b>	<b>22</b>	<b>25</b>	<b>47</b>	<b>0</b>	<b>41</b>	<b>161</b>	<b>1</b>	<b>203</b>	<b>0</b>	<b>74</b>	<b>11</b>	<b>0</b>	<b>85</b>	<b>335</b>
1700 - 1715	0	8	21	29	0	26	51	0	77	0	44	12	15	71	177
1715 - 1730	0	13	13	26	0	37	56	0	93	0	36	31	44	111	230
1730 - 1745	0	10	21	31	0	13	72	6	91	0	43	13	26	82	204
1745 - 1800	0	9	14	23	0	17	65	0	82	0	82	11	10	103	208
<b>PM Peak</b>	<b>0</b>	<b>40</b>	<b>69</b>	<b>109</b>	<b>0</b>	<b>93</b>	<b>244</b>	<b>6</b>	<b>343</b>	<b>0</b>	<b>205</b>	<b>67</b>	<b>95</b>	<b>367</b>	<b>819</b>

Jefferson County, KY  
Classified Turn Movement Count



**Marr Traffic**  
Transportation Data Collection

Site 10 of 11  
S Lyndon Ln  
Christian Way (South)  
Christian Way (North)

41 Peabody Street, Nashville, TN 37210  
1 (615) 431-6750  
1 (800) 615-3765

Lat/Long  
38.241302°, -85.602628°

Date  
Thursday 17 May 2018

Weather  
Cloudy  
Temp: 24°C

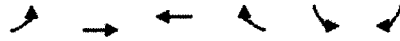
	Eastbound				Northbound				Southbound				Int
	S Lyndon Ln				Christian Way (South)				Christian Way (North)				
	U-Turn	Left	Thru	App	U-Turn	Thru	Right	App	U-Turn	Left	Thru	App	
0700 - 0715	0	0	11	11	0	12	1	13	0	3	7	10	34
0715 - 0730	0	0	29	29	0	17	1	18	0	11	5	16	63
0730 - 0745	1	0	35	36	0	17	6	23	0	8	12	20	79
0745 - 0800	1	0	52	53	0	17	3	20	1	23	22	46	119
0800 - 0815	0	1	16	17	0	11	4	16	0	21	5	29	62
0815 - 0830	1	1	25	27	0	16	1	17	0	15	3	18	62
0830 - 0845	0	0	19	19	0	24	5	29	0	11	2	13	61
0845 - 0900	0	2	16	18	0	13	6	19	0	15	3	19	56
1600 - 1615	0	2	17	19	0	5	0	5	0	19	21	40	64
1615 - 1630	0	4	15	19	0	15	7	22	0	44	17	61	102
1630 - 1645	0	5	23	28	0	13	7	20	0	22	27	49	97
1645 - 1700	0	2	25	27	0	11	4	15	0	34	25	59	101
1700 - 1715	0	2	39	41	0	26	4	31	0	31	34	65	137
1715 - 1730	0	8	48	56	0	38	4	42	0	39	32	71	169
1730 - 1745	0	8	53	61	0	44	7	51	0	36	26	62	174
1745 - 1800	0	8	44	52	0	41	4	45	0	44	34	78	175

0730 - 0745	1	0	35	36	0	17	6	23	0	8	12	20	79
0745 - 0800	1	0	52	53	0	17	3	20	1	23	22	46	119
0800 - 0815	0	1	16	17	0	11	4	15	0	21	5	29	61
0815 - 0830	1	1	25	27	0	16	1	17	0	15	3	18	62
<b>AM Peak</b>	<b>3</b>	<b>2</b>	<b>128</b>	<b>133</b>	<b>0</b>	<b>61</b>	<b>14</b>	<b>75</b>	<b>1</b>	<b>67</b>	<b>42</b>	<b>113</b>	<b>321</b>
1700 - 1715	0	2	39	41	0	26	4	31	0	31	34	65	137
1715 - 1730	0	8	48	56	0	38	4	42	0	39	32	71	169
1730 - 1745	0	8	53	61	0	44	7	51	0	36	26	62	174
1745 - 1800	0	8	44	52	0	41	4	45	0	44	34	78	175
<b>PM Peak</b>	<b>0</b>	<b>26</b>	<b>184</b>	<b>210</b>	<b>0</b>	<b>149</b>	<b>19</b>	<b>169</b>	<b>0</b>	<b>150</b>	<b>126</b>	<b>276</b>	<b>655</b>

Synchro Reports

HCM Signalized Intersection Capacity Analysis  
38: New LaGrange Rd

06/14/2018



























Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↵↵	↑↑↑	↑↑↑			↵↵
Traffic Volume (vph)	975	2282	1815	49	0	987
Future Volume (vph)	975	2282	1815	49	0	987
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8	5.8			4.0
Lane Util. Factor	0.97	0.91	0.86			0.88
Fr't	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Sat'd Flow (prot)	3433	5085	6383			2787
Flt Permitted	0.95	1.00	1.00			1.00
Sat'd Flow (perm)	3433	5085	6383			2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1060	2480	1973	53	0	1073
RTOR Reduction (vph)	0	0	3	0	0	2
Lane Group Flow (vph)	1060	2480	2023	0	0	1071
Turn Type	Prot	NA	NA			Over
Protected Phases	1	6	2			1
Permitted Phases						
Actuated Green, G (s)	59.5	130.0	60.7			59.5
Effective Green, g (s)	59.5	130.0	60.7			59.5
Actuated g/C Ratio	0.46	1.00	0.47			0.46
Clearance Time (s)	4.0	5.8	5.8			4.0
Vehicle Extension (s)	3.0	4.0	4.0			3.0
Lane Grp Cap (vph)	1571	5085	2980			1275
v/s Ratio Prot	0.31	0.49	c0.32			c0.38
v/s Ratio Perm						
v/c Ratio	0.67	0.49	0.68			0.84
Uniform Delay, d1	27.7	0.0	27.0			31.1
Progression Factor	1.16	1.00	1.60			1.00
Incremental Delay, d2	0.8	0.1	1.0			5.2
Delay (s)	33.0	0.1	44.3			36.2
Level of Service	C	A	D			D
Approach Delay (s)		10.0	44.3		36.2	
Approach LOS		A	D		D	
<b>Intersection Summary</b>						
HCM 2000 Control Delay			24.7		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.76			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	9.8
Intersection Capacity Utilization			69.8%		ICU Level of Service	C
Analysis Period (min)			15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
40: Oxmoor Ln/Norwood Dr

























06/14/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	1998	261	43	1619	45	196	12	15	56	47	49
Future Volume (vph)	23	1998	261	43	1619	45	196	12	15	56	47	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.8	6.8	6.3	6.8		6.3	6.3			6.3	
Lane Util. Factor	1.00	0.81	0.81	1.00	0.91		0.91	0.91			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.97			0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.97			0.98	
Satd. Flow (prot)	1770	6024	1282	1770	5065		3221	1593			1750	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.97			0.98	
Satd. Flow (perm)	1770	6024	1282	1770	5065		3221	1593			1750	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	2172	284	47	1760	49	213	13	16	61	51	53
RTOR Reduction (vph)	0	1	90	0	2	0	0	8	0	0	13	0
Lane Group Flow (vph)	25	2199	166	47	1807	0	162	72	0	0	152	0
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases			6									
Actuated Green, G (s)	5.0	68.1	68.1	7.7	70.8		12.1	12.1			16.4	
Effective Green, g (s)	5.0	68.1	68.1	7.7	70.8		12.1	12.1			16.4	
Actuated g/C Ratio	0.04	0.52	0.52	0.06	0.54		0.09	0.09			0.13	
Clearance Time (s)	6.3	6.8	6.8	6.3	6.8		6.3	6.3			6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	68	3155	671	104	2758		299	148			220	
v/s Ratio Prot	0.01	c0.37		c0.03	c0.36		c0.05	0.05			c0.09	
v/s Ratio Perm			0.13									
v/c Ratio	0.37	0.70	0.25	0.45	0.66		0.54	0.49			0.69	
Uniform Delay, d1	61.0	23.2	16.9	59.1	21.0		56.3	56.0			54.4	
Progression Factor	1.26	0.62	0.10	0.76	1.50		1.00	1.00			1.00	
Incremental Delay, d2	3.0	0.6	0.2	2.5	1.0		2.0	2.5			9.0	
Delay (s)	79.7	15.0	1.8	47.6	32.4		58.3	58.5			63.4	
Level of Service	E	B	A	D	C		E	E			E	
Approach Delay (s)		14.3			32.8			58.4			63.4	
Approach LOS		B			C			E			E	
<b>Intersection Summary</b>												
HCM 2000 Control Delay	25.5		HCM 2000 Level of Service					C				
HCM 2000 Volume to Capacity ratio	0.66											
Actuated Cycle Length (s)	130.0		Sum of lost time (s)					25.7				
Intersection Capacity Utilization	61.9%		ICU Level of Service					B				
Analysis Period (min)	15											

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
43: Christian Way/Car Lot Ent

06/14/2018




















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	1948	83	32	1584	3	166	6	49	1	0	2
Future Volume (vph)	1	1948	83	32	1584	3	166	6	49	1	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.7	6.7	6.3	6.7		6.3	6.3	6.3			6.3
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00			1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85			0.91
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00			0.98
Satd. Flow (prot)	1770	3539	1583	1770	3538		1681	1691	1583			1667
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00			0.98
Satd. Flow (perm)	1770	3539	1583	1770	3538		1681	1691	1583			1667
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	2117	90	35	1722	3	180	7	53	1	0	2
RTOR Reduction (vph)	0	0	33	0	0	0	0	0	47	0	3	0
Lane Group Flow (vph)	1	2117	57	35	1725	0	94	93	6	0	0	0
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot	Split	NA	
Protected Phases	1	6		5	2		8	8	8	4	4	
Permitted Phases			6									
Actuated Green, G (s)	1.4	82.9	82.9	6.2	87.7		13.7	13.7	13.7			1.6
Effective Green, g (s)	1.4	82.9	82.9	6.2	87.7		13.7	13.7	13.7			1.6
Actuated g/C Ratio	0.01	0.64	0.64	0.05	0.67		0.11	0.11	0.11			0.01
Clearance Time (s)	6.3	6.7	6.7	6.3	6.7		6.3	6.3	6.3			6.3
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0			4.0
Lane Grp Cap (vph)	19	2256	1009	84	2386		177	178	166			20
v/s Ratio Prot	0.00	c0.60		c0.02	c0.49		c0.06	0.05	0.00			c0.00
v/s Ratio Perm			0.04									
v/c Ratio	0.05	0.94	0.06	0.42	0.72		0.53	0.52	0.03			0.00
Uniform Delay, d1	63.6	21.2	8.9	60.1	13.4		55.1	55.1	52.2			63.4
Progression Factor	1.45	0.71	0.00	0.99	0.72		1.00	1.00	1.00			1.00
Incremental Delay, d2	1.1	6.5	0.0	3.4	1.4		3.9	3.6	0.1			0.0
Delay (s)	93.4	21.4	0.0	62.8	11.1		59.0	58.6	52.3			63.5
Level of Service	F	C	A	E	B		E	E	D			E
Approach Delay (s)		20.6			12.1			57.4				63.5
Approach LOS		C			B			E				E
<b>Intersection Summary</b>												
HCM 2000 Control Delay			19.2	HCM 2000 Level of Service				B				
HCM 2000 Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			130.0	Sum of lost time (s)				25.6				
Intersection Capacity Utilization			83.3%	ICU Level of Service				E				
Analysis Period (min)			15									

c Critical Lane Group



HCM Signalized Intersection Capacity Analysis  
 49: 8-Mile Ctr






















06/14/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	1947	2	1	1538	29	0	4	1	37	4	81
Future Volume (vph)	49	1947	2	1	1538	29	0	4	1	37	4	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	5.5		6.3	5.5			6.3			6.3	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.97			0.91	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1770	3539		1770	3529			1812			1670	
Flt Permitted	0.95	1.00		0.95	1.00			1.00			0.90	
Satd. Flow (perm)	1770	3539		1770	3529			1812			1519	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	53	2116	2	1	1672	32	0	4	1	40	4	88
RTOR Reduction (vph)	0	0	0	0	1	0	0	1	0	0	64	0
Lane Group Flow (vph)	53	2118	0	1	1703	0	0	4	0	0	68	0
Turn Type	Prot	NA		Prot	NA			NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	8.9	98.2		1.4	90.7			12.3			12.3	
Effective Green, g (s)	8.9	98.2		1.4	90.7			12.3			12.3	
Actuated g/C Ratio	0.07	0.76		0.01	0.70			0.09			0.09	
Clearance Time (s)	6.3	5.5		6.3	5.5			6.3			6.3	
Vehicle Extension (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	121	2673		19	2462			171			143	
v/s Ratio Prot	c0.03	c0.60		0.00	0.48			0.00				
v/s Ratio Perm											c0.04	
v/c Ratio	0.44	0.79		0.05	0.69			0.02			0.47	
Uniform Delay, d1	58.1	9.7		63.6	11.5			53.4			55.8	
Progression Factor	1.39	0.45		1.20	0.40			1.00			1.00	
Incremental Delay, d2	1.8	0.9		1.3	1.4			0.1			3.3	
Delay (s)	82.5	5.3		77.4	6.0			53.5			59.1	
Level of Service	F	A		E	A			D			E	
Approach Delay (s)		7.2			6.0			53.5			59.1	
Approach LOS		A			A			D			E	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			8.5	HCM 2000 Level of Service				A				
HCM 2000 Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			130.0	Sum of lost time (s)				18.1				
Intersection Capacity Utilization			77.6%	ICU Level of Service				D				
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
46: Lyndon Ln

06/14/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	1269	68	19	1192	115	155	54	36	153	60	16
Future Volume (vph)	98	1269	68	19	1192	115	155	54	36	153	60	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.9	5.6		5.9	5.6	5.6	5.2	5.2				5.2
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.94			0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.97	
Satd. Flow (prot)	1770	3512		1770	3539	1583	1770	1752			1786	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.64	1.00			0.72	
Satd. Flow (perm)	1770	3512		1770	3539	1583	1190	1752			1334	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	107	1379	74	21	1296	125	168	59	39	166	65	17
RTOR Reduction (vph)	0	2	0	0	0	30	0	20	0	0	2	0
Lane Group Flow (vph)	107	1451	0	21	1296	95	168	79	0	0	246	0
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4				8
Permitted Phases						2	4			8		
Actuated Green, G (s)	12.0	79.5		5.2	72.7	72.7	28.6	28.6				28.6
Effective Green, g (s)	12.0	79.5		5.2	72.7	72.7	28.6	28.6				28.6
Actuated g/C Ratio	0.09	0.61		0.04	0.56	0.56	0.22	0.22				0.22
Clearance Time (s)	5.9	5.6		5.9	5.6	5.6	5.2	5.2				5.2
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0				4.0
Lane Grp Cap (vph)	163	2147		70	1979	885	261	385				293
v/s Ratio Prot	c0.06	c0.41		0.01	0.37			0.04				
v/s Ratio Perm						0.06	0.14					c0.18
w/c Ratio	0.66	0.68		0.30	0.65	0.11	0.64	0.20				0.84
Uniform Delay, d1	57.0	16.7		60.6	19.9	13.4	46.1	41.4				48.5
Progression Factor	0.78	1.28		1.00	1.00	1.00	1.00	1.00				1.00
Incremental Delay, d2	6.7	0.6		3.3	1.7	0.2	6.0	0.4				19.2
Delay (s)	50.9	22.1		63.9	21.6	13.7	52.0	41.8				67.7
Level of Service	D	C		E	C	B	D	D				E
Approach Delay (s)		24.1			21.6			48.2				67.7
Approach LOS		C			C			D				E
<b>Intersection Summary</b>												
HCM 2000 Control Delay			27.9			HCM 2000 Level of Service					C	
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)					16.7	
Intersection Capacity Utilization			75.4%			ICU Level of Service					D	
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
 41: Oxmoor Lane/Oxmoor Ln & Oxmoor Ford/Mall

06/14/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↔			↔	↗		↔		↗	↔		
Traffic Volume (vph)	11	0	3	1	0	14	3	176	1	33	312	7	
Future Volume (vph)	11	0	3	1	0	14	3	176	1	33	312	7	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		6.6			6.6	6.3		5.9		6.3	5.9		
Lane Util. Factor		1.00			0.95	0.95		0.95		0.91	0.91		
Frt		0.97			0.87	0.85		1.00		1.00	1.00		
Flt Protected		0.96			0.99	1.00		1.00		0.95	1.00		
Satd. Flow (prot)		1743			1528	1504		3534		1610	3377		
Flt Permitted		1.00			0.95	1.00		0.95		0.95	0.95		
Satd. Flow (perm)		1812			1465	1504		3364		1610	3221		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	12	0	3	1	0	15	3	191	1	36	339	8	
RTOR Reduction (vph)	0	15	0	0	8	7	0	0	0	0	0	0	
Lane Group Flow (vph)	0	0	0	0	0	1	0	195	0	32	351	0	
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA		
Protected Phases		4			8	1		2		1	6		
Permitted Phases	4			8		8	2						
Actuated Green, G (s)		2.8			2.8	11.1		120.1		8.3	134.7		
Effective Green, g (s)		2.8			2.8	11.1		120.1		8.3	134.7		
Actuated g/C Ratio		0.02			0.02	0.07		0.80		0.06	0.90		
Clearance Time (s)		6.6			6.6	6.3		5.9		6.3	5.9		
Vehicle Extension (s)		3.0			3.0	3.0		3.0		3.0	3.0		
Lane Grp Cap (vph)		33			27	111		2693		89	2901		
v/s Ratio Prot						0.00				c0.02	0.01		
v/s Ratio Perm		c0.00			0.00	0.00		0.06			c0.10		
w/c Ratio		0.01			0.01	0.01		0.07		0.36	0.12		
Uniform Delay, d1		72.2			72.2	64.3		3.2		68.3	0.9		
Progression Factor		1.00			1.00	1.00		1.00		1.00	1.00		
Incremental Delay, d2		0.1			0.1	0.0		0.1		2.5	0.0		
Delay (s)		72.3			72.3	64.4		3.2		70.8	0.9		
Level of Service		E			E	E		A		E	A		
Approach Delay (s)		72.3			68.3			3.2			6.7		
Approach LOS		E			E			A			A		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			8.8									HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.14										
Actuated Cycle Length (s)			150.0									Sum of lost time (s)	18.8
Intersection Capacity Utilization			37.3%									ICU Level of Service	A
Analysis Period (min)			15										

c Critical Lane Group

HCM 6th TWSC  
 59: Oxmoor Lane & Bullitt Lane

06/14/2018

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↵	↶		↵↶	↶↵	
Traffic Vol, veh/h	24	5	12	154	100	195
Future Vol, veh/h	24	5	12	154	100	195
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	26	5	13	167	109	212

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	325	161	321	0	-	0
Stage 1	215	-	-	-	-	-
Stage 2	110	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pol Cap-1 Maneuver	644	855	1236	-	-	-
Stage 1	800	-	-	-	-	-
Stage 2	902	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	636	855	1236	-	-	-
Mov Cap-2 Maneuver	636	-	-	-	-	-
Stage 1	790	-	-	-	-	-
Stage 2	902	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.6	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1236	-	636	855	-	-
HCM Lane V/C Ratio	0.011	-	0.041	0.006	-	-
HCM Control Delay (s)	7.9	0	10.9	9.2	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	0	-	-

Topgolf  
 7900 Shelbyville Road  
 Traffic Impact Study

HCM 6th TWSC  
 61: Oxmoor Lane & Mall Road (Sears)

06/14/2018

Intersection						
Int Delay, s/veh	3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↵	↵	↵	↵	↵	↵
Traffic Vol, veh/h	4	43	120	19	50	29
Future Vol, veh/h	4	43	120	19	50	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	47	130	21	54	32

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	265	76	0
Stage 1	141	-	-
Stage 2	124	-	-
Critical Hdwy	6.84	6.94	4.14
Critical Hdwy Stg 1	5.84	-	-
Critical Hdwy Stg 2	5.84	-	-
Follow-up Hdwy	3.52	3.32	2.22
Pot Cap-1 Maneuver	702	970	1428
Stage 1	871	-	-
Stage 2	888	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	675	970	1428
Mov Cap-2 Maneuver	675	-	-
Stage 1	838	-	-
Stage 2	888	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	4.8
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	675	970	1428	-
HCM Lane V/C Ratio	-	-	0.006	0.048	0.038	-
HCM Control Delay (s)	-	-	10.4	8.9	7.6	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0.2	0.1	-

HCM 6th TWSC  
64: Christian Way

06/14/2018

Intersection						
Int Delay, s/veh	2.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↵	↶	↵	↑↑	↑↑	
Traffic Vol, veh/h	22	25	41	161	74	11
Future Vol, veh/h	22	25	41	161	74	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	27	45	175	80	12

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	264	46	92	0	-	0
Stage 1	86	-	-	-	-	-
Stage 2	178	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pol Cap-1 Maneuver	703	1014	1501	-	-	-
Stage 1	927	-	-	-	-	-
Stage 2	835	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	682	1014	1501	-	-	-
Mov Cap-2 Maneuver	682	-	-	-	-	-
Stage 1	899	-	-	-	-	-
Stage 2	835	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.5	1.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1501	-	682	1014	-	-
HCM Lane V/C Ratio	0.03	-	0.035	0.027	-	-
HCM Control Delay (s)	7.5	-	10.5	8.6	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %ile Q(veh)	0.1	-	0.1	0.1	-	-

HCS7 All-Way Stop Control Report												
General Information						Site Information						
Analyst	Diane Zimmerman					Intersection	Lyndon Ln at Oxmoor Woods					
Agency/Co.	Diane B. Zimmerman Traffic Engineeri...					Jurisdiction						
Date Performed	6/14/2018					East/West Street	Oxmoor Woods Pkwy					
Analysis Year	2018					North/South Street	Lyndon Lane					
Analysis Time Period (hrs)	0.25					Peak Hour Factor	0.67					
Time Analyzed	AM Peak											
Project Description	Top Golf											
Lanes												
Vehicle Volume and Adjustments												
Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	68	42			61	14				5		128
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	T		TR						LR		
Flow Rate, v (veh/h)	101	63			112					199		
Percent Heavy Vehicles	2	5			4					1		
Departure Headway and Service Time												
Initial Departure Headway, hd (s)	3.20	3.20			3.20					3.20		
Initial Degree of Utilization, x	0.090	0.056			0.100					0.176		
Final Departure Headway, hd (s)	5.57	5.12			4.61					4.03		
Final Degree of Utilization, x	0.157	0.089			0.143					0.222		
Move-Up Time, m (s)	2.3	2.3			2.0					2.0		
Service Time, ts (s)	3.27	2.82			2.61					2.03		
Capacity, Delay and Level of Service												
Flow Rate, v (veh/h)	101	63			112					199		
Capacity	646	703			781					894		
95% Queue Length, Q <sub>95</sub> (veh)	0.6	0.3			0.5					0.8		
Control Delay (s/veh)	9.3	8.3			8.4					8.2		
Level of Service, LOS	A	A			A					A		
Approach Delay (s/veh)	8.9			8.4						8.2		
Approach LOS	A			A						A		
Intersection Delay, s/veh   LOS	8.5						A					





HCM Signalized Intersection Capacity Analysis  
38: New LaGrange Rd

06/14/2018

























Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖↗	↑↑↑	↑↑↑↗			↖↗
Traffic Volume (vph)	930	2761	2315	69	0	1182
Future Volume (vph)	930	2761	2315	69	0	1182
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	5.8	5.8			6.3
Lane Util. Factor	0.97	0.91	0.86			0.88
Frt	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3433	5085	6380			2787
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3433	5085	6380			2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1011	3001	2516	75	0	1285
RTOR Reduction (vph)	0	0	3	0	0	1
Lane Group Flow (vph)	1011	3001	2588	0	0	1284
Turn Type	Prot	NA	NA			Over
Protected Phases	1	6	2			1
Permitted Phases						
Actuated Green, G (s)	65.7	150.0	72.2			65.7
Effective Green, g (s)	65.7	150.0	72.2			65.7
Actuated g/C Ratio	0.44	1.00	0.48			0.44
Clearance Time (s)	6.3	5.8	5.8			6.3
Vehicle Extension (s)	4.0	4.0	0.2			4.0
Lane Grp Cap (vph)	1503	5085	3070			1220
v/s Ratio Prot	0.29	0.59	c0.41			c0.46
v/s Ratio Perm						
v/c Ratio	0.67	0.59	0.84			1.05
Uniform Delay, d1	33.6	0.0	34.0			42.1
Progression Factor	0.76	1.00	0.76			1.00
Incremental Delay, d2	2.3	0.2	2.0			40.9
Delay (s)	27.8	0.2	27.9			83.0
Level of Service	C	A	C			F
Approach Delay (s)		7.2	27.9		83.0	
Approach LOS		A	C		F	
<b>Intersection Summary</b>						
HCM 2000 Control Delay			26.3		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.94			
Actuated Cycle Length (s)			150.0		Sum of lost time (s)	12.1
Intersection Capacity Utilization			86.1%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

Topgolf  
7900 Shelbyville Road  
Traffic Impact Study

HCM Signalized Intersection Capacity Analysis  
40: Oxmoor Ln/Norwood Dr

06/14/2018























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	2004	711	32	1577	9	728	9	48	44	46	79
Future Volume (vph)	46	2004	711	32	1577	9	728	9	48	44	46	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.8	6.8	6.3	6.8		6.4	6.4			6.4	
Lane Util. Factor	1.00	0.81	0.81	1.00	0.91		0.91	0.91			1.00	
Frt	1.00	0.98	0.85	1.00	1.00		1.00	0.97			0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96			0.99	
Satd. Flow (prot)	1770	5943	1282	1770	5081		3221	1586			1723	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96			0.99	
Satd. Flow (perm)	1770	5943	1282	1770	5081		3221	1586			1723	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	2178	773	35	1714	10	791	10	52	48	50	86
RTOR Reduction (vph)	0	11	253	0	1	0	0	5	0	0	20	0
Lane Group Flow (vph)	50	2414	273	35	1723	0	570	278	0	0	164	0
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases			6									
Actuated Green, G (s)	8.4	63.5	63.5	7.3	62.4		34.2	34.2			19.1	
Effective Green, g (s)	8.4	63.5	63.5	7.3	62.4		34.2	34.2			19.1	
Actuated g/C Ratio	0.06	0.42	0.42	0.05	0.42		0.23	0.23			0.13	
Clearance Time (s)	6.3	6.8	6.8	6.3	6.8		6.4	6.4			6.4	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	99	2515	542	86	2113		734	361			219	
v/s Ratio Prot	c0.03	c0.41		0.02	0.34		c0.18	0.17			c0.10	
v/s Ratio Perm			0.21									
v/c Ratio	0.51	0.96	0.50	0.41	0.82		0.78	0.77			0.75	
Uniform Delay, d1	68.8	42.0	31.7	69.2	38.7		54.3	54.2			63.1	
Progression Factor	1.15	0.83	0.46	1.04	1.09		0.93	0.92			1.00	
Incremental Delay, d2	3.3	9.2	2.7	2.1	2.5		5.1	9.3			13.1	
Delay (s)	82.5	44.1	17.4	74.3	44.7		55.4	59.3			76.2	
Level of Service	F	D	E	E	D		E	E			E	
Approach Delay (s)		40.1			45.3			56.7			76.2	
Approach LOS		D			D			E			E	

Intersection Summary

HCM 2000 Control Delay	45.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	25.9
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		
c	Critical Lane Group		

HCM Signalized Intersection Capacity Analysis  
43: Christian Way/Car Lot Ent

06/14/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	1650	190	133	1725	2	242	2	124	5	2	12
Future Volume (vph)	11	1650	190	133	1725	2	242	2	124	5	2	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.7	6.7	6.3	6.7		6.3	6.3	6.3		6.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (prot)	1770	3539	1583	3433	3539		1681	1687	1583		1678	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (perm)	1770	3539	1583	3433	3539		1681	1687	1583		1678	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	1793	207	145	1875	2	263	2	135	5	2	13
RTOR Reduction (vph)	0	0	67	0	0	0	0	0	118	0	13	0
Lane Group Flow (vph)	12	1793	140	145	1877	0	131	134	17	0	7	0
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot	Split	NA	
Protected Phases	1	6		5	2		8	8	8	4	4	
Permitted Phases			6									
Actuated Green, G (s)	3.5	87.8	87.8	12.6	96.9		18.9	18.9	18.9		5.1	
Effective Green, g (s)	3.5	87.8	87.8	12.6	96.9		18.9	18.9	18.9		5.1	
Actuated g/C Ratio	0.02	0.59	0.59	0.08	0.65		0.13	0.13	0.13		0.03	
Clearance Time (s)	6.3	6.7	6.7	6.3	6.7		6.3	6.3	6.3		6.3	
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Grp Cap (vph)	41	2071	926	288	2286		211	212	199		57	
v/s Ratio Prot	0.01	c0.51		c0.04	c0.53		0.08	c0.08	0.01		c0.00	
v/s Ratio Perm			0.09									
v/c Ratio	0.29	0.87	0.15	0.50	0.82		0.62	0.63	0.09		0.13	
Uniform Delay, d1	72.0	26.1	14.2	65.7	20.0		62.2	62.2	57.9		70.3	
Progression Factor	1.30	0.48	0.00	1.07	0.94		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.9	1.9	0.1	1.3	2.4		6.3	6.8	0.3		1.4	
Delay (s)	95.3	14.6	0.1	71.7	21.1		68.5	69.0	58.2		71.7	
Level of Service	F	B	A	E	C		E	E	E		E	
Approach Delay (s)		13.6			24.7			65.2			71.7	
Approach LOS		B			C			E			E	

Intersection Summary

HCM 2000 Control Delay	23.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	25.6
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
 49: 8-Mile Ctr

06/14/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	1739	3	1	1787	1	3	4	3	39	4	70
Future Volume (vph)	37	1739	3	1	1787	1	3	4	3	39	4	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	5.5		6.3	5.5			6.3			6.3	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.96			0.92	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.98	
Satd. Flow (prot)	1770	3538		1770	3539			1761			1677	
Flt Permitted	0.95	1.00		0.95	1.00			0.89			0.88	
Satd. Flow (perm)	1770	3538		1770	3539			1590			1504	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	40	1890	3	1	1942	1	3	4	3	42	4	76
RTOR Reduction (vph)	0	0	0	0	0	0	0	3	0	0	46	0
Lane Group Flow (vph)	40	1893	0	1	1943	0	0	7	0	0	76	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	8.5	116.7		1.4	109.6			13.8			13.8	
Effective Green, g (s)	8.5	116.7		1.4	109.6			13.8			13.8	
Actuated g/C Ratio	0.06	0.78		0.01	0.73			0.09			0.09	
Clearance Time (s)	6.3	5.5		6.3	5.5			6.3			6.3	
Vehicle Extension (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	100	2752		16	2585			146			138	
v/s Ratio Prot	c0.02	c0.53		0.00	c0.55						c0.05	
v/s Ratio Perm								0.00				
v/c Ratio	0.40	0.69		0.06	0.75			0.05			0.55	
Uniform Delay, d1	68.3	8.0		73.6	12.1			62.1			65.1	
Progression Factor	1.32	0.33		0.90	1.59			1.00			1.00	
Incremental Delay, d2	2.0	0.8		1.7	1.6			0.2			5.5	
Delay (s)	92.1	3.5		67.6	20.8			62.3			70.6	
Level of Service	F	A		E	C			E			E	
Approach Delay (s)		5.3			20.8			62.3			70.6	
Approach LOS		A			C			E			E	

Intersection Summary

HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
46: Lyndon Ln

06/14/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	1370	72	19	1438	154	92	67	23	145	50	45
Future Volume (vph)	89	1370	72	19	1438	154	92	67	23	145	50	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.9	5.6		5.9	5.6	5.6	5.2	5.2			5.2	
Lane Util Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.96			0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.97	
Satd Flow (prot)	1770	3513		1770	3539	1583	1770	1791			1762	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.60	1.00			0.72	
Satd Flow (perm)	1770	3513		1770	3539	1583	1121	1791			1314	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj Flow (vph)	97	1489	78	21	1563	167	100	73	25	158	54	49
RTOR Reduction (vph)	0	2	0	0	0	25	0	9	0	0	6	0
Lane Group Flow (vph)	97	1565	0	21	1563	142	100	89	0	0	255	0
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases						2	4			8		
Actuated Green, G (s)	14.4	94.3		5.6	85.5	85.5	33.4	33.4			33.4	
Effective Green, g (s)	14.4	94.3		5.6	85.5	85.5	33.4	33.4			33.4	
Actuated g/C Ratio	0.10	0.63		0.04	0.57	0.57	0.22	0.22			0.22	
Clearance Time (s)	5.9	5.6		5.9	5.6	5.6	5.2	5.2			5.2	
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Grp Cap (vph)	169	2208		66	2017	902	249	398			292	
v/s Ratio Prot	c0.05	c0.45		0.01	c0.44			0.05				
v/s Ratio Perm						0.09	0.09				c0.19	
v/c Ratio	0.57	0.71		0.32	0.77	0.16	0.40	0.22			0.87	
Uniform Delay, d1	64.9	18.7		70.3	24.8	15.2	49.8	47.7			56.2	
Progression Factor	1.30	0.19		1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2	4.2	1.5		3.8	3.0	0.4	1.4	0.4			24.3	
Delay (s)	88.5	5.0		74.1	27.8	15.6	51.2	48.1			80.5	
Level of Service	F	A		E	C	B	D	D			F	
Approach Delay (s)		9.8			27.2			49.7			80.5	
Approach LOS		A			C			D			F	

Intersection Summary

HCM 2000 Control Delay	24.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
41: Oxmoor Lane/Oxmoor Ln & Oxmoor Ford/Mall

06/14/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔		↔		↔	↔	
Traffic Volume (vph)	13	1	6	18	0	220	4	544	8	168	619	11
Future Volume (vph)	13	1	6	18	0	220	4	544	8	168	619	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.6			6.6	6.3		5.9		6.3	5.9	
Lane Util Factor		1.00			0.95	0.95		0.95		0.91	0.91	
Frt		0.96			0.87	0.85		1.00		1.00	1.00	
Flt Protected		0.97			0.99	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1728			1533	1504		3530		1610	3377	
Flt Permitted		0.35			0.94	1.00		0.95		0.95	0.93	
Satd. Flow (perm)		627			1454	1504		3359		1610	3159	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	1	7	20	0	239	4	591	9	183	673	12
RTOR Reduction (vph)	0	7	0	0	103	25	0	0	0	0	0	0
Lane Group Flow (vph)	0	15	0	0	27	104	0	604	0	165	703	0
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		9.6			9.6	30.6		100.6		21.0	127.9	
Effective Green, g (s)		9.6			9.6	30.6		100.6		21.0	127.9	
Actuated g/C Ratio		0.06			0.06	0.20		0.67		0.14	0.85	
Clearance Time (s)		6.6			6.6	6.3		5.9		6.3	5.9	
Vehicle Extension (s)		3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		40			93	306		2252		225	2724	
v/s Ratio Prot						0.05				c0.10	0.04	
v/s Ratio Perm		c0.02			0.02	0.02		c0.18			0.18	
v/c Ratio		0.39			0.29	0.34		0.27		0.73	0.26	
Uniform Delay, d1		67.4			67.0	51.0		9.9		61.8	2.1	
Progression Factor		1.00			1.00	1.00		1.00		1.01	0.84	
Incremental Delay, d2		6.1			1.7	0.7		0.3		8.2	0.0	
Delay (s)		73.5			68.7	51.7		10.2		70.6	1.8	
Level of Service		E			E	D		B		E	A	
Approach Delay (s)		73.5			60.2			10.2			14.9	
Approach LOS		E			E			B			B	

Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM 2010 TWSC  
55: Oxmoor Lane & Bullitt Lane

06/14/2018

Intersection						
Int Delay, s/veh	6.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗		↔↕	↕↔	
Traffic Vol, veh/h	233	46	63	287	402	185
Future Vol, veh/h	233	46	63	287	402	185
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	253	50	68	312	437	201

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	830	319	638
Stage 1	538	-	-
Stage 2	292	-	-
Critical Hdwy	6.82	6.92	4.12
Critical Hdwy Stg 1	5.82	-	-
Critical Hdwy Stg 2	5.82	-	-
Follow-up Hdwy	3.51	3.31	2.21
Pot Cap-1 Maneuver	310	680	949
Stage 1	552	-	-
Stage 2	735	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	283	680	949
Mov Cap-2 Maneuver	387	-	-
Stage 1	504	-	-
Stage 2	735	-	-

Approach	EB	NB	SB
HCM Control Delay, s	27.1	1.9	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	949	-	387	680	-	-
HCM Lane V/C Ratio	0.072	-	0.654	0.074	-	-
HCM Control Delay (s)	9.1	0.3	30.3	10.7	-	-
HCM Lane LOS	A	A	D	B	-	-
HCM 95th %tile Q(veh)	0.2	-	4.5	0.2	-	-

HCM 2010 TWSC  
 61: Oxmoor Lane

06/14/2018

**Intersection**

Int Delay, s/veh	6.4					
<b>Movement</b>	<b>WBL</b>	<b>WBR</b>	<b>NBT</b>	<b>NBR</b>	<b>SBL</b>	<b>SBT</b>
Lane Configurations	↖↗		↑↑			↖↗
Traffic Vol, veh/h	30	228	71	18	212	174
Future Vol, veh/h	30	228	71	18	212	174
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	248	77	20	230	189

<b>Major/Minor</b>	<b>Minor1</b>	<b>Major1</b>	<b>Major2</b>
Conflicting Flow All	642	49	0
Stage 1	87	-	-
Stage 2	555	-	-
Critical Hdwy	6.84	6.94	4.14
Critical Hdwy Stg 1	5.84	-	-
Critical Hdwy Stg 2	5.84	-	-
Follow-up Hdwy	3.52	3.32	2.22
Pot Cap-1 Maneuver	407	1009	1494
Stage 1	926	-	-
Stage 2	539	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	337	1009	1494
Mov Cap-2 Maneuver	337	-	-
Stage 1	767	-	-
Stage 2	539	-	-

<b>Approach</b>	<b>WB</b>	<b>NB</b>	<b>SB</b>
HCM Control Delay, s	11.7	0	4.4
HCM LOS	B		

<b>Minor Lane/Major Mvmt</b>	<b>NBT</b>	<b>NBRWBLn1</b>	<b>SBL</b>	<b>SBT</b>
Capacity (veh/h)	-	819	1494	-
HCM Lane V/C Ratio	-	0.342	0.154	-
HCM Control Delay (s)	-	11.7	7.8	0.2
HCM Lane LOS	-	B	A	A
HCM 95th %tile Q(veh)	-	1.5	0.5	-



HCM 6th TWSC  
64: Christian Way & Sears Mall Road

06/14/2018

Intersection						
Int Delay, s/veh	2.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↵	↵		↑↑	↑↑	
Traffic Vol, veh/h	40	69	93	244	205	67
Future Vol, veh/h	40	69	93	244	205	67
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized		None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	75	101	265	223	73

Major/Minor	Minor2	Major1	Major2		
Conflicting Flow All	595	148	296	0	0
Stage 1	280	-	-	-	-
Stage 2	335	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-
Pot Cap-1 Maneuver	436	872	1262	-	-
Stage 1	760	-	-	-	-
Stage 2	697	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	395	872	1262	-	-
Mov Cap-2 Maneuver	395	-	-	-	-
Stage 1	689	-	-	-	-
Stage 2	697	-	-	-	-











Approach	EB	NB	SB
HCM Control Delay, s	11.6	2.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1262	-	395	872	-	-
HCM Lane V/C Ratio	0.08	-	0.11	0.086	-	-
HCM Control Delay (s)	8.1	-	15.2	9.5	-	-
HCM Lane LOS	A	-	C	A	-	-
HCM 95th %tile Q(veh)	0.3	-	0.4	0.3	-	-

HCS7 All-Way Stop Control Report												
General Information						Site Information						
Analyst	Diane Zimmerman					Intersection	Lyndon Ln at Oxmoor Woods					
Agency/Co.	Diane B. Zimmerman Traffic Engineeri...					Jurisdiction						
Date Performed	6/14/2018					East/West Street	Oxmoor Woods Pkwy					
Analysis Year	2018					North/South Street	Lyndon Lane					
Analysis Time Period (hrs)	0.25					Peak Hour Factor	0.93					
Time Analyzed	PM Peak											
Project Description	Top Golf											
<b>Lanes</b>												
<b>Vehicle Volume and Adjustments</b>												
Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	150	126			149	19				26		184
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	T		TR						LR		
Flow Rate, v (veh/h)	161	135			181						226	
Percent Heavy Vehicles	0	0			2						1	
<b>Departure Headway and Service Time</b>												
Initial Departure Headway, hd (s)	3.20	3.20		3.20						3.20		
Initial Degree of Utilization, x	0.143	0.120		0.161						0.201		
Final Departure Headway, hd (s)	5.74	5.24		4.90						4.56		
Final Degree of Utilization, x	0.257	0.197		0.246						0.286		
Move-Up Time, m (s)	2.3	2.3		2.0						2.0		
Service Time, ts (s)	3.44	2.94		2.90						2.56		
<b>Capacity, Delay and Level of Service</b>												
Flow Rate, v (veh/h)	161	135		181						226		
Capacity	627	687		734						789		
95% Queue Length, Q <sub>95</sub> (veh)	1.0	0.7		1.0						1.2		
Control Delay (s/veh)	10.4	9.2		9.5						9.4		
Level of Service, LOS	B	A		A						A		
Approach Delay (s/veh)	9.9			9.5						9.4		
Approach LOS	A			A						A		
Intersection Delay, s/veh   LOS	9.6						A					

HCM Signalized Intersection Capacity Analysis  
38: New LaGrange Rd

06/14/2018

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	985	2327	1827	49	0	997
Future Volume (vph)	985	2327	1827	49	0	997
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8	5.8			4.0
Lane Util. Factor	0.97	0.91	0.86			0.88
Frt	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3433	5085	6383			2787
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3433	5085	6383			2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1071	2529	1986	53	0	1084
RTOR Reduction (vph)	0	0	3	0	0	2
Lane Group Flow (vph)	1071	2529	2036	0	0	1082
Turn Type	Prot	NA	NA			Over
Protected Phases	1	6	2			1
Permitted Phases						
Actuated Green, G (s)	60.0	130.0	60.2			60.0
Effective Green, g (s)	60.0	130.0	60.2			60.0
Actuated g/C Ratio	0.46	1.00	0.46			0.46
Clearance Time (s)	4.0	5.8	5.8			4.0
Vehicle Extension (s)	3.0	4.0	4.0			3.0
Lane Grp Cap (vph)	1584	5085	2955			1286
v/s Ratio Prot	0.31	0.50	c0.32			c0.39
v/s Ratio Perm						
v/c Ratio	0.68	0.50	0.69			0.84
Uniform Delay, d1	27.4	0.0	27.5			30.8
Progression Factor	1.14	1.00	1.57			1.00
Incremental Delay, d2	0.8	0.1	1.1			5.2
Delay (s)	32.0	0.1	44.2			36.0
Level of Service	C	A	D			D
Approach Delay (s)		9.6	44.2		36.0	
Approach LOS		A	D		D	
<b>Intersection Summary</b>						
HCM 2000 Control Delay			24.3		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.77			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	9.8
Intersection Capacity Utilization			70.3%		ICU Level of Service	C
Analysis Period (min)			15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
40: Oxmoor Ln/Norwood Dr

























06/14/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑	↗	↖	↑↑↑		↖↗	↕			↕	
Traffic Volume (vph)	23	2018	286	46	1635	45	237	12	19	57	47	49
Future Volume (vph)	23	2018	286	46	1635	45	237	12	19	57	47	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.8	6.8	6.3	6.8		6.3	6.3			6.3	
Lane Util. Factor	1.00	0.81	0.81	1.00	0.91		0.91	0.91			1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.97			0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.97			0.98	
Satd. Flow (prot)	1770	6023	1282	1770	5065		3221	1588			1750	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.97			0.98	
Satd. Flow (perm)	1770	6023	1282	1770	5065		3221	1588			1750	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	2193	311	50	1777	49	258	13	21	62	51	53
RTOR Reduction (vph)	0	1	101	0	1	0	0	9	0	0	13	0
Lane Group Flow (vph)	25	2223	179	50	1825	0	196	87	0	0	153	0
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases			6									
Actuated Green, G (s)	5.0	66.5	66.5	7.9	69.4		13.4	13.4			16.5	
Effective Green, g (s)	5.0	66.5	66.5	7.9	69.4		13.4	13.4			16.5	
Actuated g/C Ratio	0.04	0.51	0.51	0.06	0.53		0.10	0.10			0.13	
Clearance Time (s)	6.3	6.8	6.8	6.3	6.8		6.3	6.3			6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	68	3080	655	107	2703		332	163			222	
v/s Ratio Prot	0.01	c0.37		c0.03	c0.36		c0.06	0.05			c0.09	
v/s Ratio Perm			0.14									
v/c Ratio	0.37	0.72	0.27	0.47	0.68		0.59	0.53			0.69	
Uniform Delay, d1	61.0	24.6	18.0	59.0	22.1		55.7	55.3			54.3	
Progression Factor	1.27	0.65	0.13	0.77	1.47		1.00	1.00			1.00	
Incremental Delay, d2	3.0	0.8	0.2	2.5	1.1		2.8	3.3			8.6	
Delay (s)	80.3	16.8	2.6	48.1	33.5		58.5	58.7			62.9	
Level of Service	F	B	A	D	C		E	E			E	
Approach Delay (s)		15.8			33.9			58.5			62.9	
Approach LOS		B			C			E			E	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			27.0			HCM 2000 Level of Service		C				
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)		25.7				
Intersection Capacity Utilization			64.4%			ICU Level of Service		C				
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
43: Christian Way/Car Lot Ent

06/14/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	1968	84	32	1600	3	168	6	49	1	0	2
Future Volume (vph)	1	1968	84	32	1600	3	168	6	49	1	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.7	6.7	6.3	6.7		6.3	6.3	6.3		6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	
Satd. Flow (prot)	1770	3539	1583	1770	3538		1681	1691	1583		1667	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	
Satd. Flow (perm)	1770	3539	1583	1770	3538		1681	1691	1583		1667	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	2139	91	35	1739	3	183	7	53	1	0	2
RTOR Reduction (vph)	0	0	33	0	0	0	0	0	47	0	3	0
Lane Group Flow (vph)	1	2139	58	35	1742	0	95	95	6	0	0	0
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot	Split	NA	
Protected Phases	1	6		5	2		8	8	8	4	4	
Permitted Phases			6									
Actuated Green, G (s)	1.4	82.8	82.8	6.2	87.6		13.8	13.8	13.8		1.6	
Effective Green, g (s)	1.4	82.8	82.8	6.2	87.6		13.8	13.8	13.8		1.6	
Actuated g/C Ratio	0.01	0.64	0.64	0.05	0.67		0.11	0.11	0.11		0.01	
Clearance Time (s)	6.3	6.7	6.7	6.3	6.7		6.3	6.3	6.3		6.3	
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Grp Cap (vph)	19	2254	1008	84	2384		178	179	168		20	
v/s Ratio Prot	0.00	c0.60		c0.02	c0.49		c0.06	0.06	0.00		c0.00	
v/s Ratio Perm			0.04									
v/c Ratio	0.05	0.95	0.06	0.42	0.73		0.53	0.53	0.03		0.00	
Uniform Delay, d1	63.6	21.7	8.9	60.1	13.6		55.1	55.0	52.1		63.4	
Progression Factor	1.33	0.79	0.00	0.99	0.73		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.1	7.3	0.0	3.3	1.5		3.9	3.8	0.1		0.0	
Delay (s)	85.6	24.3	0.0	62.8	11.4		58.9	58.9	52.2		63.5	
Level of Service	F	C	A	E	B		E	E	D		E	
Approach Delay (s)		23.4			12.4			57.4			63.5	
Approach LOS		C			B			E			E	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			20.8			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)				25.6		
Intersection Capacity Utilization			83.8%			ICU Level of Service				E		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
 49: Toyota

06/14/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↵	↕		↵	↕			↕			↕	
Traffic Volume (vph)	49	1967	2	1	1553	29	0	4	1	37	4	81
Future Volume (vph)	49	1967	2	1	1553	29	0	4	1	37	4	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	5.5		6.3	5.5			6.3			6.3	
Lane Util Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.97			0.91	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1770	3539		1770	3529			1812			1670	
Flt Permitted	0.95	1.00		0.95	1.00			1.00			0.90	
Satd Flow (perm)	1770	3539		1770	3529			1812			1519	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	53	2138	2	1	1688	32	0	4	1	40	4	88
RTOR Reduction (vph)	0	0	0	0	1	0	0	1	0	0	64	0
Lane Group Flow (vph)	53	2140	0	1	1719	0	0	4	0	0	68	0
Turn Type	Prot	NA		Prot	NA			NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases												
Actuated Green, G (s)	8.9	98.2		1.4	90.7			12.3			12.3	
Effective Green, g (s)	8.9	98.2		1.4	90.7			12.3			12.3	
Actuated g/C Ratio	0.07	0.76		0.01	0.70			0.09			0.09	
Clearance Time (s)	6.3	5.5		6.3	5.5			6.3			6.3	
Vehicle Extension (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	121	2673		19	2462			171			143	
v/s Ratio Prot	c0.03	c0.60		0.00	0.49			0.00				
v/s Ratio Perm											c0.04	
v/c Ratio	0.44	0.80		0.05	0.70			0.02			0.47	
Uniform Delay, d1	58.1	9.8		63.6	11.6			53.4			55.8	
Progression Factor	1.37	0.44		1.20	0.39			1.00			1.00	
Incremental Delay, d2	1.7	1.0		1.3	1.4			0.1			3.3	
Delay (s)	81.7	5.3		77.6	6.0			53.5			59.1	
Level of Service	F	A		E	A			D			E	
Approach Delay (s)		7.1			6.0			53.5			59.1	
Approach LOS		A			A			D			E	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			8.4			HCM 2000 Level of Service					A	
HCM 2000 Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			130.0			Sum of lost time (s)					18.1	
Intersection Capacity Utilization			78.2%			ICU Level of Service					D	
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
46: Lyndon Ln

06/14/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	1282	68	19	1204	115	155	54	36	153	60	16
Future Volume (vph)	98	1282	68	19	1204	115	155	54	36	153	60	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.9	5.6		5.9	5.6	5.6	5.2	5.2			5.2	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.94			0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.97	
Satd. Flow (prot)	1770	3512		1770	3539	1583	1770	1752			1786	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.64	1.00			0.72	
Satd. Flow (perm)	1770	3512		1770	3539	1583	1190	1752			1334	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	107	1393	74	21	1309	125	168	59	39	166	65	17
RTOR Reduction (vph)	0	2	0	0	0	30	0	20	0	0	2	0
Lane Group Flow (vph)	107	1465	0	21	1309	95	168	79	0	0	246	0
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4				8
Permitted Phases						2	4			8		
Actuated Green, G (s)	12.0	79.5		5.2	72.7	72.7	28.6	28.6				28.6
Effective Green, g (s)	12.0	79.5		5.2	72.7	72.7	28.6	28.6				28.6
Actuated g/C Ratio	0.09	0.61		0.04	0.56	0.56	0.22	0.22				0.22
Clearance Time (s)	5.9	5.6		5.9	5.6	5.6	5.2	5.2				5.2
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0				4.0
Lane Grp Cap (vph)	163	2147		70	1979	885	261	385				293
v/s Ratio Prot	c0.06	c0.42		0.01	0.37			0.04				
v/s Ratio Perm						0.06	0.14					c0.18
v/c Ratio	0.66	0.68		0.30	0.66	0.11	0.64	0.20				0.84
Uniform Delay, d1	57.0	16.8		60.6	20.0	13.4	46.1	41.4				48.5
Progression Factor	0.78	1.27		1.00	1.00	1.00	1.00	1.00				1.00
Incremental Delay, d2	6.6	0.6		3.3	1.8	0.2	6.0	0.4				19.2
Delay (s)	51.3	22.0		63.9	21.8	13.7	52.0	41.8				67.7
Level of Service	D	C		E	C	B	D	D				E
Approach Delay (s)		23.9			21.7			48.2				67.7
Approach LOS		C			C			D				E
<b>Intersection Summary</b>												
HCM 2000 Control Delay			27.9									
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			130.0									
Intersection Capacity Utilization			75.8%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
41: Oxmoor Lane/Oxmoor Ln & Oxmoor Ford/Mall

06/14/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↗		↔		↗	↔	
Traffic Volume (vph)	11	0	3	1	0	14	3	221	1	33	340	7
Future Volume (vph)	11	0	3	1	0	14	3	221	1	33	340	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.6			6.6	6.3		5.9		6.3	5.9	
Lane Util. Factor		1.00			0.95	0.95		0.95		0.91	0.91	
Frt		0.97			0.87	0.85		1.00		1.00	1.00	
Frt Protected		0.96			0.99	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1743			1528	1504		3535		1610	3378	
Frt Permitted		1.00			0.95	1.00		0.95		0.95	0.95	
Satd. Flow (perm)		1812			1465	1504		3366		1610	3221	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	0	3	1	0	15	3	240	1	36	370	8
RTOR Reduction (vph)	0	15	0	0	8	7	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	0	1	0	244	0	32	382	0
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		2.8			2.8	11.1		120.1		8.3	134.7	
Effective Green, g (s)		2.8			2.8	11.1		120.1		8.3	134.7	
Actuated g/C Ratio		0.02			0.02	0.07		0.80		0.06	0.90	
Clearance Time (s)		6.6			6.6	6.3		5.9		6.3	5.9	
Vehicle Extension (s)		3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		33			27	111		2695		89	2901	
v/s Ratio Prot						0.00				c0.02	0.01	
v/s Ratio Perm		c0.00			0.00	0.00		0.07			c0.11	
v/c Ratio		0.01			0.01	0.01		0.09		0.36	0.13	
Uniform Delay, d1		72.2			72.2	64.3		3.2		68.3	0.9	
Progression Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.1	0.0		0.1		2.5	0.0	
Delay (s)		72.3			72.3	64.4		3.3		70.8	0.9	
Level of Service		E			E	E		A		E	A	
Approach Delay (s)		72.3			68.3			3.3			6.3	
Approach LOS		E			E			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			8.1				HCM 2000 Level of Service			A		
HCM 2000 Volume to Capacity ratio			0.15									
Actuated Cycle Length (s)			150.0				Sum of lost time (s)			18.8		
Intersection Capacity Utilization			38.4%				ICU Level of Service			A		
Analysis Period (min)			15									

c Critical Lane Group



Topgolf  
 7900 Shelbyville Road  
 Traffic Impact Study

HCM 2010 TWSC  
 59: Oxmoor Lane & Bullitt Lane

06/14/2018

Intersection						
Int Delay, s/veh	1.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↵	↶		↵↶	↶↵	
Traffic Vol, veh/h	67	5	12	156	101	222
Future Vol, veh/h	67	5	12	156	101	222
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	73	5	13	170	110	241

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	342	176	351	0	-	0
Stage 1	231	-	-	-	-	-
Stage 2	111	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	628	837	1204	-	-	-
Stage 1	785	-	-	-	-	-
Stage 2	901	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	620	837	1204	-	-	-
Mov Cap-2 Maneuver	656	-	-	-	-	-
Stage 1	776	-	-	-	-	-
Stage 2	901	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.1	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1204	-	656	837	-	-
HCM Lane V/C Ratio	0.011	-	0.111	0.006	-	-
HCM Control Delay (s)	8	0	11.2	9.3	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0	-	0.4	0	-	-

Topgolf  
7900 Shelbyville Road  
Traffic Impact Study

HCM 2010 TWSC  
61: Oxmoor Lane & Mall Road (Sears)

06/14/2018

Intersection						
Int Delay, s/veh	3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↵	↵	↑↑			↵↵
Traffic Vol, veh/h	4	43	121	19	50	29
Future Vol, veh/h	4	43	121	19	50	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	-	-	-	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	47	132	21	54	32

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	267	77	0 0 153 0
Stage 1	143	-	- - - -
Stage 2	124	-	- - - -
Critical Hdwy	6.84	6.94	- - 4.14 -
Critical Hdwy Stg 1	5.84	-	- - - -
Critical Hdwy Stg 2	5.84	-	- - - -
Follow-up Hdwy	3.52	3.32	- - 2.22 -
Pot Cap-1 Maneuver	700	968	- - 1425 -
Stage 1	869	-	- - - -
Stage 2	888	-	- - - -
Platoon blocked, %			- - - -
Mov Cap-1 Maneuver	673	968	- - 1425 -
Mov Cap-2 Maneuver	688	-	- - - -
Stage 1	835	-	- - - -
Stage 2	888	-	- - - -

Approach	WB	NB	SB
HCM Control Delay, s	9	0	4.8
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	688	968	1425	-
HCM Lane V/C Ratio	-	-	0.006	0.048	0.038	-
HCM Control Delay (s)	-	-	10.3	8.9	7.6	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0.2	0.1	-

HCM 2010 TWSC  
 64: Christian Way & Sears Mall Rd

06/14/2018

Intersection						
Int Delay, s/veh	2.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↵	↵	↵	↑↑	↑↑	↑↑
Traffic Vol, veh/h	22	25	41	163	75	11
Future Vol, veh/h	22	25	41	163	75	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	27	45	177	82	12

Major/Minor	Minor2	Major1	Major2		
Conflicting Flow All	267	47	94	0	-
Stage 1	88	-	-	-	-
Stage 2	179	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-
Pl Cap-1 Maneuver	700	1012	1498	-	-
Stage 1	925	-	-	-	-
Stage 2	834	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	679	1012	1498	-	-
Mov Cap-2 Maneuver	679	-	-	-	-
Stage 1	897	-	-	-	-
Stage 2	834	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.5	1.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1498	-	679	1012	-	-
HCM Lane V/C Ratio	0.03	-	0.035	0.027	-	-
HCM Control Delay (s)	7.5	-	10.5	8.7	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	0.1	-	-

HCS7 All-Way Stop Control Report												
General Information						Site Information						
Analyst	Diane Zimmerman					Intersection	Lyndon Ln at Oxmoor Woods					
Agency/Co.	Diane B. Zimmerman Traffic Engineeri...					Jurisdiction						
Date Performed	6/14/2018					East/West Street	Oxmoor Woods Pkwy					
Analysis Year	2020					North/South Street	Lyndon Lane					
Analysis Time Period (hrs)	0.25					Peak Hour Factor	0.67					
Time Analyzed	AM Peak No Build											
Project Description	Top Golf											
Lanes												
Vehicle Volume and Adjustments												
Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	69	42			62	14				5		129
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	T		TR						LR		
Flow Rate, v (veh/h)	103	63			113					200		
Percent Heavy Vehicles	2	5			4					1		
Departure Headway and Service Time												
Initial Departure Headway, hd (s)	3.20	3.20			3.20						3.20	
Initial Degree of Utilization, x	0.092	0.056			0.101						0.178	
Final Departure Headway, hd (s)	5.58	5.13			4.61						4.03	
Final Degree of Utilization, x	0.160	0.089			0.145						0.224	
Move-Up Time, m (s)	2.3	2.3			2.0						2.0	
Service Time, ts (s)	3.28	2.83			2.61						2.03	
Capacity, Delay and Level of Service												
Flow Rate, v (veh/h)	103	63			113						200	
Capacity	645	702			780						892	
95% Queue Length, Q <sub>95</sub> (veh)	0.6	0.3			0.5						0.9	
Control Delay (s/veh)	9.3	8.3			8.4						8.2	
Level of Service, LOS	A	A			A						A	
Approach Delay (s/veh)	9.0			8.4						8.2		
Approach LOS	A			A						A		
Intersection Delay, s/veh   LOS	8.5						A					

HCM Signalized Intersection Capacity Analysis  
38: New LaGrange Rd

06/14/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖↖	↑↑↑	↑↑↑	→	↙	↘↘
Traffic Volume (vph)	939	2819	2365	70	0	1194
Future Volume (vph)	939	2819	2365	70	0	1194
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	5.8	5.8			6.3
Lane Util Factor	0.97	0.91	0.86			0.88
Frt	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3433	5085	6380			2787
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3433	5085	6380			2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1021	3064	2571	76	0	1298
RTOR Reduction (vph)	0	0	3	0	0	1
Lane Group Flow (vph)	1021	3064	2644	0	0	1297
Turn Type	Prot	NA	NA			Over
Protected Phases	1	6	2			1
Permitted Phases						
Actuated Green, G (s)	65.7	150.0	72.2			65.7
Effective Green, g (s)	65.7	150.0	72.2			65.7
Actuated g/C Ratio	0.44	1.00	0.48			0.44
Clearance Time (s)	6.3	5.8	5.8			6.3
Vehicle Extension (s)	4.0	4.0	0.2			4.0
Lane Grp Cap (vph)	1503	5085	3070			1220
v/s Ratio Prot	0.30	0.60	c0.41			c0.47
v/s Ratio Perm						
v/c Ratio	0.68	0.60	0.86			1.06
Uniform Delay, d1	33.7	0.0	34.5			42.1
Progression Factor	0.76	1.00	0.76			1.00
Incremental Delay, d2	2.4	0.2	2.2			44.4
Delay (s)	28.0	0.2	28.5			86.6
Level of Service	C	A	C			F
Approach Delay (s)		7.2	28.5		86.6	
Approach LOS		A	C		F	
<b>Intersection Summary</b>						
HCM 2000 Control Delay			27.0		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.96			
Actuated Cycle Length (s)			150.0		Sum of lost time (s)	12.1
Intersection Capacity Utilization			87.3%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis  
 40: Oxmoor Ln/Norwood Dr

06/14/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↙	↑↑↑	↘	↙	↑↑↑	↘	↙	↑	↘	↙	↑	↘
Traffic Volume (vph)	46	2024	748	36	1593	9	762	9	48	44	46	80
Future Volume (vph)	46	2024	748	36	1593	9	762	9	48	44	46	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.8	6.8	6.3	6.8		6.4	6.4			6.4	
Lane Util Factor	1.00	0.81	0.81	1.00	0.91		0.91	0.91			1.00	
Frt	1.00	0.98	0.85	1.00	1.00		1.00	0.97			0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96			0.99	
Satd. Flow (prot)	1770	5934	1282	1770	5081		3221	1587			1722	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96			0.99	
Satd. Flow (perm)	1770	5934	1282	1770	5081		3221	1587			1722	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj Flow (vph)	50	2200	813	39	1732	10	828	10	52	48	50	87
RTOR Reduction (vph)	0	12	268	0	1	0	0	5	0	0	20	0
Lane Group Flow (vph)	50	2464	269	39	1741	0	596	289	0	0	165	0
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases			6									
Actuated Green, G (s)	8.4	62.5	62.5	7.6	61.7		35.2	35.2			18.8	
Effective Green, g (s)	8.4	62.5	62.5	7.6	61.7		35.2	35.2			18.8	
Actuated g/C Ratio	0.06	0.42	0.42	0.05	0.41		0.23	0.23			0.13	
Clearance Time (s)	6.3	6.8	6.8	6.3	6.8		6.4	6.4			6.4	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	99	2472	534	89	2089		755	372			215	
v/s Ratio Prot	c0.03	c0.42		0.02	0.34		c0.19	0.18			c0.10	
v/s Ratio Perm			0.21									
v/c Ratio	0.51	1.00	0.50	0.44	0.83		0.79	0.78			0.77	
Uniform Delay, d1	68.8	43.6	32.3	69.1	39.6		53.9	53.7			63.5	
Progression Factor	1.15	0.84	0.48	1.04	1.09		0.92	0.92			1.00	
Incremental Delay, d2	3.2	15.4	2.7	2.3	2.8		5.4	9.6			15.0	
Delay (s)	82.3	52.2	18.2	74.5	45.8		55.2	59.0			78.5	
Level of Service	F	D	B	E	D		E	E			E	
Approach Delay (s)		46.7			46.5			56.4			78.5	
Approach LOS		D			D			E			E	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			49.1			HCM 2000 Level of Service					D	
HCM 2000 Volume to Capacity ratio			0.88									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)		25.9				
Intersection Capacity Utilization			79.5%			ICU Level of Service		D				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
 43: Christian Way/Car Lot Ent


06/14/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	1667	192	134	1742	2	244	2	125	5	2	12
Future Volume (vph)	11	1667	192	134	1742	2	244	2	125	5	2	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.7	6.7	6.3	6.7		6.3	6.3	6.3		6.3	
Lane Util Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (prot)	1770	3539	1583	3433	3539		1681	1687	1583		1678	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (perm)	1770	3539	1583	3433	3539		1681	1687	1583		1678	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	1812	209	146	1893	2	265	2	136	5	2	13
RTOR Reduction (vph)	0	0	67	0	0	0	0	0	119	0	13	0
Lane Group Flow (vph)	12	1812	142	146	1895	0	132	135	17	0	7	0
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot	Split	NA	
Protected Phases	1	6		5	2		8	8	8	4	4	
Permitted Phases			6									
Actuated Green, G (s)	3.5	87.6	87.6	12.7	96.8		19.0	19.0	19.0		5.1	
Effective Green, g (s)	3.5	87.6	87.6	12.7	96.8		19.0	19.0	19.0		5.1	
Actuated g/C Ratio	0.02	0.58	0.58	0.08	0.65		0.13	0.13	0.13		0.03	
Clearance Time (s)	6.3	6.7	6.7	6.3	6.7		6.3	6.3	6.3		6.3	
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Grp Cap (vph)	41	2066	924	290	2283		212	213	200		57	
v/s Ratio Prot	0.01	c0.51		c0.04	c0.54		0.08	c0.08	0.01		c0.00	
v/s Ratio Perm			0.09									
v/c Ratio	0.29	0.88	0.15	0.50	0.83		0.62	0.63	0.09		0.13	
Uniform Delay, d1	72.0	26.6	14.3	65.6	20.3		62.1	62.2	57.8		70.3	
Progression Factor	1.29	0.51	0.00	1.07	0.93		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.6	1.8	0.1	1.2	2.5		6.3	6.8	0.3		1.4	
Delay (s)	94.7	15.4	0.1	71.6	21.4		68.4	69.0	58.1		71.7	
Level of Service	F	B	A	E	C		E	E	E		E	
Approach Delay (s)		14.3			25.0			65.1			71.7	
Approach LOS		B			C			E			E	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			23.9			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			150.0			Sum of lost time (s)			25.6			
Intersection Capacity Utilization			81.7%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Topgolf  
7900 Shelbyville Road  
Traffic Impact Study

HCM Signalized Intersection Capacity Analysis  
49: 8-Mile Ctr

06/14/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕	↗		↕	↗			↕			↘	↘
Traffic Volume (vph)	37	1756	3	1	1805	1	3	4	3	39	4	71
Future Volume (vph)	37	1756	3	1	1805	1	3	4	3	39	4	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	5.5		6.3	5.5			6.3			6.3	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.96			0.92	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.98	
Satd. Flow (prot)	1770	3538		1770	3539			1761			1677	
Flt Permitted	0.95	1.00		0.95	1.00			0.89			0.88	
Satd. Flow (perm)	1770	3538		1770	3539			1586			1505	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	40	1909	3	1	1962	1	3	4	3	42	4	77
RTOR Reduction (vph)	0	0	0	0	0	0	0	3	0	0	47	0
Lane Group Flow (vph)	40	1912	0	1	1963	0	0	7	0	0	76	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	8.5	116.7		1.4	109.6			13.8			13.8	
Effective Green, g (s)	8.5	116.7		1.4	109.6			13.8			13.8	
Actuated g/C Ratio	0.06	0.78		0.01	0.73			0.09			0.09	
Clearance Time (s)	6.3	5.5		6.3	5.5			6.3			6.3	
Vehicle Extension (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	100	2752		16	2585			145			138	
v/s Ratio Prot	c0.02	c0.54		0.00	c0.55							
v/s Ratio Perm								0.00			c0.05	
v/c Ratio	0.40	0.69		0.06	0.76			0.05			0.55	
Uniform Delay, d1	68.3	8.0		73.6	12.2			62.1			65.1	
Progression Factor	1.31	0.35		0.91	1.61			1.00			1.00	
Incremental Delay, d2	2.0	0.8		1.7	1.6			0.2			5.5	
Delay (s)	91.5	3.7		68.3	21.3			62.3			70.6	
Level of Service	F	A		E	C			E			E	
Approach Delay (s)		5.5			21.3			62.3			70.6	
Approach LOS		A			C			E			E	

Intersection Summary

HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



HCM Signalized Intersection Capacity Analysis

46: Lyndon Ln

06/14/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗	↖	↖	↖			↖↗	
Traffic Volume (vph)	90	1383	73	19	1452	156	93	67	23	146	51	45
Future Volume (vph)	90	1383	73	19	1452	156	93	67	23	146	51	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.9	5.6		5.9	5.6	5.6	5.2	5.2			5.2	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.96			0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.97	
Satd. Flow (prot)	1770	3513		1770	3539	1583	1770	1791			1763	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.60	1.00			0.72	
Satd. Flow (perm)	1770	3513		1770	3539	1583	1120	1791			1316	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	1503	79	21	1578	170	101	73	25	159	55	49
RTOR Reduction (vph)	0	2	0	0	0	25	0	9	0	0	5	0
Lane Group Flow (vph)	98	1580	0	21	1578	145	101	89	0	0	258	0
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases						2	4			8		
Actuated Green, G (s)	14.4	94.0		5.6	85.2	85.2	33.7	33.7			33.7	
Effective Green, g (s)	14.4	94.0		5.6	85.2	85.2	33.7	33.7			33.7	
Actuated g/C Ratio	0.10	0.63		0.04	0.57	0.57	0.22	0.22			0.22	
Clearance Time (s)	5.9	5.6		5.9	5.6	5.6	5.2	5.2			5.2	
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Grp Cap (vph)	169	2201		66	2010	899	251	402			295	
v/s Ratio Prot	c0.06	c0.45		0.01	c0.45			0.05				
v/s Ratio Perm						0.09	0.09				c0.20	
v/c Ratio	0.58	0.72		0.32	0.79	0.16	0.40	0.22			0.87	
Uniform Delay, d1	64.9	19.0		70.3	25.3	15.4	49.6	47.5			56.1	
Progression Factor	1.30	0.20		1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2	4.3	1.5		3.8	3.2	0.4	1.4	0.4			2.1	
Delay (s)	88.4	5.3		74.1	28.4	15.8	51.0	47.8			80.2	
Level of Service	F	A		E	C	B	D	D			F	
Approach Delay (s)		10.2			27.8			49.4			80.2	
Approach LOS		B			C			D			F	

Intersection Summary			
HCM 2000 Control Delay	24.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
41: Oxmoor Lane/Oxmoor Ln & Oxmoor Ford/Mall

06/14/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↗		↔		↖	↔	
Traffic Volume (vph)	13	1	6	18	0	222	4	579	8	170	659	11
Future Volume (vph)	13	1	6	18	0	222	4	579	8	170	659	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.6			6.6	6.3		5.9		6.3	5.9	
Lane Util. Factor		1.00			0.95	0.95		0.95		0.91	0.91	
Flt		0.96			0.87	0.85		1.00		1.00	1.00	
Flt Protected		0.97			0.99	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1728			1533	1504		3531		1610	3378	
Flt Permitted		0.34			0.94	1.00		0.95		0.95	0.93	
Satd. Flow (perm)		614			1454	1504		3359		1610	3152	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	1	7	20	0	241	4	629	9	185	716	12
RTOR Reduction (vph)	0	7	0	0	104	21	0	0	0	0	0	0
Lane Group Flow (vph)	0	15	0	0	27	109	0	642	0	166	747	0
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		9.6			9.6	30.6		100.6		21.0	127.9	
Effective Green, g (s)		9.6			9.6	30.6		100.6		21.0	127.9	
Actuated g/C Ratio		0.06			0.06	0.20		0.67		0.14	0.85	
Clearance Time (s)		6.6			6.6	6.3		5.9		6.3	5.9	
Vehicle Extension (s)		3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		39			93	306		2252		225	2719	
v/s Ratio Prot						0.05				c0.10	0.04	
v/s Ratio Perm		c0.03			0.02	0.02		c0.19			0.20	
v/c Ratio		0.40			0.29	0.36		0.28		0.74	0.27	
Uniform Delay, d1		67.4			67.0	51.3		10.1		61.9	2.1	
Progression Factor		1.00			1.00	1.00		1.00		1.03	0.87	
Incremental Delay, d2		6.5			1.7	0.7		0.3		8.0	0.0	
Delay (s)		73.9			68.7	52.0		10.4		71.6	1.9	
Level of Service		E			E	D		B		E	A	
Approach Delay (s)		73.9			60.4			10.4			14.6	
Approach LOS		E			E			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		20.3			HCM 2000 Level of Service					C		
HCM 2000 Volume to Capacity ratio		0.37										
Actuated Cycle Length (s)		150.0			Sum of lost time (s)					18.8		
Intersection Capacity Utilization		57.8%			ICU Level of Service					B		
Analysis Period (min)		15										
c Critical Lane Group												

Topgolf  
7900 Shelbyville Road  
Traffic Impact Study

HCM 2010 TWSC  
55: Oxmoor Lane & Bullitt Lane

06/14/2018

Intersection						
Int Delay, s/veh	9.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↵	↵		↕↕	↕↕	
Traffic Vol, veh/h	265	46	63	290	406	221
Future Vol, veh/h	265	46	63	290	406	221
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	288	50	68	315	441	240

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	855	341	681
Stage 1	561	-	-
Stage 2	294	-	-
Critical Hdwy	6.82	6.92	4.12
Critical Hdwy Stg 1	5.82	-	-
Critical Hdwy Stg 2	5.82	-	-
Follow-up Hdwy	3.51	3.31	2.21
Pot Cap-1 Maneuver	299	658	914
Stage 1	538	-	-
Stage 2	733	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	~ 272	658	914
Mov Cap-2 Maneuver	376	-	-
Stage 1	490	-	-
Stage 2	733	-	-

Approach	EB	NB	SB
HCM Control Delay, s	35.6	1.9	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	914	-	376	658	-	-
HCM Lane V/C Ratio	0.075	-	0.766	0.076	-	-
HCM Control Delay (s)	9.3	0.3	39.9	10.9	-	-
HCM Lane LOS	A	A	E	B	-	-
HCM 95th %tile Q(veh)	0.2	-	6.3	0.2	-	-

Notes  
 - Volume exceeds capacity    \$ Delay exceeds 300s    + Computation Not Defined    \*: All major volume in platoon

Topgolf  
7900 Shelbyville Road  
Traffic Impact Study

HCM 2010 TWSC  
61: Sears Mall Rd & Oxmoor Lane

06/14/2018

Intersection						
Int Delay, s/veh	6.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑↓		↑↑	
Traffic Vol, veh/h	30	230	72	18	214	176
Future Vol, veh/h	30	230	72	18	214	176
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	250	78	20	233	191

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	650	49	0
Stage 1	88	-	-
Stage 2	562	-	-
Critical Hdwy	6.84	6.94	4.14
Critical Hdwy Stg 1	5.84	-	-
Critical Hdwy Stg 2	5.84	-	-
Follow-up Hdwy	3.52	3.32	2.22
Pot Cap-1 Maneuver	402	1009	1493
Stage 1	925	-	-
Stage 2	534	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	332	1009	1493
Mov Cap-2 Maneuver	332	-	-
Stage 1	763	-	-
Stage 2	534	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	4.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	817	1493
HCM Lane V/C Ratio	-	-	0.346	0.156
HCM Control Delay (s)	-	-	11.7	7.9
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	1.6	0.6

Topgolf  
7900 Shelbyville Road  
Traffic Impact Study

HCM 2010 TWSC  
64: Christian Way & Sears Mall Road

06/14/2018

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↵	↶		↑↑	↑↑	
Traffic Vol, veh/h	40	70	94	246	207	68
Future Vol, veh/h	40	70	94	246	207	68
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	76	102	267	225	74

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	600	150	299
Stage 1	262	-	-
Stage 2	338	-	-
Critical Hdwy	6.84	6.94	4.14
Critical Hdwy Stg 1	5.84	-	-
Critical Hdwy Stg 2	5.84	-	-
Follow-up Hdwy	3.52	3.32	2.22
Pot Cap-1 Maneuver	432	870	1259
Stage 1	758	-	-
Stage 2	694	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	391	870	1259
Mov Cap-2 Maneuver	391	-	-
Stage 1	686	-	-
Stage 2	694	-	-













Approach	EB	NB	SB
HCM Control Delay, s	11.6	2.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1259	-	391	870	-	-
HCM Lane V/C Ratio	0.081	-	0.111	0.087	-	-
HCM Control Delay (s)	8.1	-	15.4	9.5	-	-
HCM Lane LOS	A	-	C	A	-	-
HCM 95th %tile Q(veh)	0.3	-	0.4	0.3	-	-

HCS7 All-Way Stop Control Report												
General Information						Site Information						
Analyst	Diane Zimmerman					Intersection	Lyndon Ln at Oxmoor Woods					
Agency/Co.	Diane B. Zimmerman Traffic Engineeri...					Jurisdiction						
Date Performed	6/14/2018					East/West Street	Oxmoor Woods Pkwy					
Analysis Year	2020					North/South Street	Lyndon Lane					
Analysis Time Period (hrs)	0.25					Peak Hour Factor	0.93					
Time Analyzed	PM Peak No Build											
Project Description	Top Golf											
<b>Lanes</b>												
<b>Vehicle Volume and Adjustments</b>												
Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	152	127			150	19				26		186
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	T		TR						LR		
Flow Rate, v (veh/h)	163	137			182					228		
Percent Heavy Vehicles	0	0			2					1		
<b>Departure Headway and Service Time</b>												
Initial Departure Headway, hd (s)	3.20	3.20			3.20					3.20		
Initial Degree of Utilization, x	0.145	0.121			0.162					0.203		
Final Departure Headway, hd (s)	5.75	5.25			4.92					4.57		
Final Degree of Utilization, x	0.261	0.199			0.248					0.289		
Move-Up Time, m (s)	2.3	2.3			2.0					2.0		
Service Time, ts (s)	3.45	2.95			2.92					2.57		
<b>Capacity, Delay and Level of Service</b>												
Flow Rate, v (veh/h)	163	137			182					228		
Capacity	626	686			732					787		
95% Queue Length, Q <sub>95</sub> (veh)	1.0	0.7			1.0					1.2		
Control Delay (s/veh)	10.5	9.2			9.5					9.4		
Level of Service, LOS	B	A			A					A		
Approach Delay (s/veh)	9.9			9.5						9.4		
Approach LOS	A			A						A		
Intersection Delay, s/veh   LOS	9.7						A					

HCM Signalized Intersection Capacity Analysis  
38: New LaGrange Rd

























06/14/2018

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	985	2348	1875	49	0	997
Future Volume (vph)	985	2348	1875	49	0	997
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.8	5.8			4.0
Lane Util. Factor	0.97	0.91	0.86			0.88
Fr't	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3433	5085	6383			2787
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3433	5085	6383			2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1071	2552	2038	53	0	1084
RTOR Reduction (vph)	0	0	3	0	0	1
Lane Group Flow (vph)	1071	2552	2088	0	0	1083
Turn Type	Prot	NA	NA			Over
Protected Phases	1	6	2			1
Permitted Phases						
Actuated Green, G (s)	59.9	130.0	60.3			59.9
Effective Green, g (s)	59.9	130.0	60.3			59.9
Actuated g/C Ratio	0.46	1.00	0.46			0.46
Clearance Time (s)	4.0	5.8	5.8			4.0
Vehicle Extension (s)	3.0	4.0	4.0			3.0
Lane Grp Cap (vph)	1581	5085	2960			1284
v/s Ratio Prot	0.31	0.50	c0.33			c0.39
v/s Ratio Perm						
v/c Ratio	0.68	0.50	0.71			0.84
Uniform Delay, d1	27.5	0.0	27.8			30.9
Progression Factor	1.11	1.00	1.56			1.00
Incremental Delay, d2	0.9	0.1	1.2			5.2
Delay (s)	31.3	0.1	44.5			36.1
Level of Service	C	A	D			D
Approach Delay (s)		9.3	44.5		36.1	
Approach LOS		A	D		D	
<b>Intersection Summary</b>						
HCM 2000 Control Delay			24.4		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.77			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	9.8
Intersection Capacity Utilization			71.0%		ICU Level of Service	C
Analysis Period (min)			15			

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
40: Oxmoor Ln/Norwood Dr

























06/14/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	2018	307	46	1635	45	240	12	19	57	47	49
Future Volume (vph)	23	2018	307	46	1635	45	240	12	19	57	47	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.8	6.8	6.3	6.8		6.3	6.3				6.3
Lane Util. Factor	1.00	0.81	0.81	1.00	0.91		0.91	0.91				1.00
Fr <sub>t</sub>	1.00	1.00	0.85	1.00	1.00		1.00	0.97				0.96
Fl <sub>t</sub> Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.97				0.98
Satd. Flow (prot)	1770	6022	1282	1770	5065		3221	1588				1750
Fl <sub>t</sub> Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.97				0.98
Satd. Flow (perm)	1770	6022	1282	1770	5065		3221	1588				1750
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	2193	334	50	1777	49	261	13	21	62	51	53
RTOR Reduction (vph)	0	1	109	0	1	0	0	9	0	0	13	0
Lane Group Flow (vph)	25	2225	192	50	1825	0	198	88	0	0	153	0
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases			6									
Actuated Green, G (s)	5.0	66.4	66.4	7.9	69.3		13.5	13.5				16.5
Effective Green, g (s)	5.0	66.4	66.4	7.9	69.3		13.5	13.5				16.5
Actuated g/C Ratio	0.04	0.51	0.51	0.06	0.53		0.10	0.10				0.13
Clearance Time (s)	6.3	6.8	6.8	6.3	6.8		6.3	6.3				6.3
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0				3.0
Lane Grp Cap (vph)	68	3075	654	107	2700		334	164				222
v/s Ratio Prot	0.01	c0.37		c0.03	c0.36		c0.06	0.06				c0.09
v/s Ratio Perm			0.15									
v/c Ratio	0.37	0.72	0.29	0.47	0.68		0.59	0.54				0.69
Uniform Delay, d <sub>1</sub>	61.0	24.7	18.3	59.0	22.2		55.6	55.3				54.3
Progression Factor	1.27	0.66	0.13	0.77	1.47		1.00	1.00				1.00
Incremental Delay, d <sub>2</sub>	2.9	0.8	0.2	2.5	1.1		2.8	3.4				8.6
Delay (s)	80.4	17.0	2.6	48.2	33.5		58.4	58.6				62.9
Level of Service	F	B	A	D	C		E	E				E
Approach Delay (s)		15.9			33.9			58.5				62.9
Approach LOS		B			C			E				E
<b>Intersection Summary</b>												
HCM 2000 Control Delay			27.0				HCM 2000 Level of Service					C
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)				25.7	
Intersection Capacity Utilization			64.4%				ICU Level of Service					C
Analysis Period (min)			15									
c Critical Lane Group												



HCM Signalized Intersection Capacity Analysis  
43: Christian Way/Car Lot Ent

06/14/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	1968	84	38	1600	3	168	6	50	1	0	2
Future Volume (vph)	1	1968	84	38	1600	3	168	6	50	1	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.7	6.7	6.3	6.7		6.3	6.3	6.3		6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	
Satd. Flow (prot)	1770	3539	1583	1770	3538		1681	1691	1583		1667	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00		0.98	
Satd. Flow (perm)	1770	3539	1583	1770	3538		1681	1691	1583		1667	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	2139	91	41	1739	3	183	7	54	1	0	2
RTOR Reduction (vph)	0	0	34	0	0	0	0	0	48	0	3	0
Lane Group Flow (vph)	1	2139	57	41	1742	0	95	95	6	0	0	0
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot	Split	NA	
Protected Phases	1	6		5	2		8	8	8	4	4	
Permitted Phases			6									
Actuated Green, G (s)	1.4	80.9	80.9	8.1	87.6		13.8	13.8	13.8		1.6	
Effective Green, g (s)	1.4	80.9	80.9	8.1	87.6		13.8	13.8	13.8		1.6	
Actuated g/C Ratio	0.01	0.62	0.62	0.06	0.67		0.11	0.11	0.11		0.01	
Clearance Time (s)	6.3	6.7	6.7	6.3	6.7		6.3	6.3	6.3		6.3	
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Grp Cap (vph)	19	2202	985	110	2384		178	179	168		20	
v/s Ratio Prot	0.00	c0.60		c0.02	c0.49		c0.06	0.06	0.00		c0.00	
v/s Ratio Perm			0.04									
v/c Ratio	0.05	0.97	0.06	0.37	0.73		0.53	0.53	0.03		0.00	
Uniform Delay, d1	63.6	23.4	9.6	58.5	13.6		55.1	55.0	52.1		63.4	
Progression Factor	1.33	0.71	0.00	0.98	0.74		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.1	10.3	0.0	2.1	1.5		3.9	3.8	0.1		0.0	
Delay (s)	85.4	26.9	0.0	59.5	11.5		58.9	58.9	52.2		63.5	
Level of Service	F	C	A	E	B		E	E	D		E	
Approach Delay (s)		25.8			12.6			57.4			63.5	
Approach LOS		C			B			E			E	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		22.1										
HCM 2000 Volume to Capacity ratio		0.87										
Actuated Cycle Length (s)		130.0							25.6			
Intersection Capacity Utilization		83.8%										
ICU Level of Service									E			
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

49: Toyota

06/14/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	1968	2	1	1559	29	0	4	1	37	4	81
Future Volume (vph)	49	1968	2	1	1559	29	0	4	1	37	4	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	5.5		6.3	5.5			6.3			6.3	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.97			0.91	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1770	3539		1770	3529			1812			1670	
Flt Permitted	0.95	1.00		0.95	1.00			1.00			0.90	
Satd. Flow (perm)	1770	3539		1770	3529			1812			1519	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	53	2139	2	1	1695	32	0	4	1	40	4	88
RTOR Reduction (vph)	0	0	0	0	1	0	0	1	0	0	64	0
Lane Group Flow (vph)	53	2141	0	1	1726	0	0	4	0	0	68	0
Turn Type	Prot	NA		Prot	NA			NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	8.9	98.2		1.4	90.7			12.3			12.3	
Effective Green, g (s)	8.9	98.2		1.4	90.7			12.3			12.3	
Actuated g/C Ratio	0.07	0.76		0.01	0.70			0.09			0.09	
Clearance Time (s)	6.3	5.5		6.3	5.5			6.3			6.3	
Vehicle Extension (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	121	2673		19	2462			171			143	
v/s Ratio Prot	c0.03	c0.61		0.00	0.49			0.00				
v/s Ratio Perm											c0.04	
v/c Ratio	0.44	0.80		0.05	0.70			0.02			0.47	
Uniform Delay, d1	58.1	9.8		63.6	11.6			53.4			55.8	
Progression Factor	1.38	0.45		1.10	0.39			1.00			1.00	
Incremental Delay, d2	1.5	0.9		1.3	1.4			0.1			3.3	
Delay (s)	81.5	5.3		71.4	6.0			53.5			59.1	
Level of Service	F	A		E	A			D			E	
Approach Delay (s)		7.1			6.0			53.5			59.1	
Approach LOS		A			A			D			E	























Intersection Summary

HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization	78.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
46: Lyndon Ln

06/14/2018













												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	1283	68	19	1210	115	155	54	36	153	60	16
Future Volume (vph)	98	1283	68	19	1210	115	155	54	36	153	60	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.9	5.6		5.9	5.6	5.6	5.2	5.2			5.2	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00			1.00	
Fr <sub>t</sub>	1.00	0.99		1.00	1.00	0.85	1.00	0.94			0.99	
Fl <sub>t</sub> Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.97	
Satd. Flow (prot)	1770	3512		1770	3539	1583	1770	1752			1786	
Fl <sub>t</sub> Permitted	0.95	1.00		0.95	1.00	1.00	0.64	1.00			0.72	
Satd. Flow (perm)	1770	3512		1770	3539	1583	1190	1752			1334	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	107	1395	74	21	1315	125	168	59	39	166	65	17
RTOR Reduction (vph)	0	2	0	0	0	30	0	20	0	0	2	0
Lane Group Flow (vph)	107	1467	0	21	1315	95	168	79	0	0	246	0
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases						2	4			8		
Actuated Green, G (s)	12.0	79.5		5.2	72.7	72.7	28.6	28.6			28.6	
Effective Green, g (s)	12.0	79.5		5.2	72.7	72.7	28.6	28.6			28.6	
Actuated g/C Ratio	0.09	0.61		0.04	0.56	0.56	0.22	0.22			0.22	
Clearance Time (s)	5.9	5.6		5.9	5.6	5.6	5.2	5.2			5.2	
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Grp Cap (vph)	163	2147		70	1979	885	261	385			293	
v/s Ratio Prot	c0.06	c0.42		0.01	0.37			0.04				
v/s Ratio Perm						0.06	0.14				c0.18	
v/c Ratio	0.66	0.68		0.30	0.66	0.11	0.64	0.20			0.84	
Uniform Delay, d1	57.0	16.8		60.6	20.1	13.4	46.1	41.4			48.5	
Progression Factor	0.78	1.27		1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2	6.6	0.6		3.3	1.8	0.2	6.0	0.4			19.2	
Delay (s)	51.2	21.9		63.9	21.9	13.7	52.0	41.8			67.7	
Level of Service	D	C		E	C	B	D	D			E	
Approach Delay (s)		23.9			21.8			48.2			67.7	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	27.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
41: Oxmoor Lane/Oxmoor Ln & Oxmoor Ford/Mall

06/14/2018

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↗		↔		↖	↔	
Traffic Volume (vph)	11	0	3	1	0	14	3	224	1	33	361	7
Future Volume (vph)	11	0	3	1	0	14	3	224	1	33	361	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.6			6.6	6.3		5.9		6.3	5.9	
Lane Util. Factor		1.00			0.95	0.95		0.95		0.91	0.91	
Frt		0.97			0.87	0.85		1.00		1.00	1.00	
Flt Protected		0.96			0.99	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1743			1528	1504		3535		1610	3378	
Flt Permitted		1.00			0.95	1.00		0.95		0.95	0.95	
Satd. Flow (perm)		1812			1465	1504		3366		1610	3222	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	0	3	1	0	15	3	243	1	36	392	8
RTOR Reduction (vph)	0	15	0	0	8	7	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	0	1	0	247	0	32	404	0
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		2.8			2.8	11.1		120.1		8.3	134.7	
Effective Green, g (s)		2.8			2.8	11.1		120.1		8.3	134.7	
Actuated g/C Ratio		0.02			0.02	0.07		0.80		0.06	0.90	
Clearance Time (s)		6.6			6.6	6.3		5.9		6.3	5.9	
Vehicle Extension (s)		3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		33			27	111		2695		89	2901	
v/s Ratio Prot						0.00				c0.02	0.01	
v/s Ratio Perm		c0.00			0.00	0.00		0.07			c0.12	
v/c Ratio		0.01			0.01	0.01		0.09		0.36	0.14	
Uniform Delay, d1		72.2			72.2	64.3		3.2		68.3	0.9	
Progression Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.1	0.0		0.1		2.5	0.0	
Delay (s)		72.3			72.3	64.4		3.3		70.8	0.9	
Level of Service		E			E	E		A		E	A	
Approach Delay (s)		72.3			68.3			3.3			6.0	
Approach LOS		E			E			A			A	

Intersection Summary		
HCM 2000 Control Delay	7.9	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.15	A
Actuated Cycle Length (s)	150.0	Sum of lost time (s)
Intersection Capacity Utilization	39.1%	18.8
Analysis Period (min)	15	ICU Level of Service
		A

c Critical Lane Group

HCM 6th TWSC  
59: Oxmoor Lane & Bullitt Lane

06/14/2018

Intersection						
Int Delay, s/veh	1.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↵	↵		↵↵	↵↵	
Traffic Vol, veh/h	67	5	12	156	122	222
Future Vol, veh/h	67	5	12	156	122	222
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	73	5	13	170	133	241

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	365	187	374	0	-	0
Stage 1	254	-	-	-	-	-
Stage 2	111	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	608	823	1181	-	-	-
Stage 1	765	-	-	-	-	-
Stage 2	901	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	601	823	1181	-	-	-
Mov Cap-2 Maneuver	601	-	-	-	-	-
Stage 1	756	-	-	-	-	-
Stage 2	901	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.6	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1181	-	601	823	-	-
HCM Lane V/C Ratio	0.011	-	0.121	0.007	-	-
HCM Control Delay (s)	8.1	0	11.8	9.4	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0	-	0.4	0	-	-

HCM 6th TWSC  
61: Oxmoor Lane & Mall Road (Sears)

06/14/2018

Intersection						
Int Delay, s/veh	3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↵	↵	↕↕			↕↕
Traffic Vol, veh/h	4	43	121	19	50	29
Future Vol, veh/h	4	43	121	19	50	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	47	132	21	54	32

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	267	77	0	0	153
Stage 1	143	-	-	-	-
Stage 2	124	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14
Critical Hdwy Stg 1	5.84	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22
Pol Cap-1 Maneuver	700	968	-	-	1425
Stage 1	869	-	-	-	-
Stage 2	888	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	673	968	-	-	1425
Mov Cap-2 Maneuver	673	-	-	-	-
Stage 1	835	-	-	-	-
Stage 2	888	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	4.8
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	673	968	1425	-
HCM Lane V/C Ratio	-	-	0.006	0.048	0.038	-
HCM Control Delay (s)	-	-	10.4	8.9	7.6	0
HCM Lane LOS	-	-	B	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0.2	0.1	-

HCM 6th TWSC  
65: Oxmoor Lane & Top Golf

06/14/2018

Intersection						
Int Delay, s/veh	0.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↵	↵	↕↕		↵	↕↕
Traffic Vol, veh/h	0	3	165	0	21	106
Future Vol, veh/h	0	3	165	0	21	106
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	3	179	0	23	115

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	283	90	0	0	179
Stage 1	179	-	-	-	-
Stage 2	104	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14
Critical Hdwy Stg 1	5.84	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22
Pot Cap-1 Maneuver	684	950	-	-	1394
Stage 1	834	-	-	-	-
Stage 2	909	-	-	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	673	950	-	-	1394
Mov Cap-2 Maneuver	673	-	-	-	-
Stage 1	821	-	-	-	-
Stage 2	909	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.8	0	1.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	-	950	1394
HCM Lane V/C Ratio	-	-	-	0.003	0.016
HCM Control Delay (s)	-	-	0	8.8	7.6
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	-	0	0.1

HCM 6th TWSC  
64: Christian Way & Sears Mall Rd

06/14/2018

Intersection						
Int Delay, s/veh	2.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↘	↗	↘	↑↑	↑↑	↗
Traffic Vol, veh/h	23	25	42	163	75	17
Future Vol, veh/h	23	25	42	163	75	17
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	125	0	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	27	46	177	82	18

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	272	50	100	0	-	0
Stage 1	91	-	-	-	-	-
Stage 2	181	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	695	1008	1490	-	-	-
Stage 1	922	-	-	-	-	-
Stage 2	832	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	673	1008	1490	-	-	-
Mov Cap-2 Maneuver	673	-	-	-	-	-
Stage 1	893	-	-	-	-	-
Stage 2	832	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.6	1.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1490	-	673	1008	-	-
HCM Lane V/C Ratio	0.031	-	0.037	0.027	-	-
HCM Control Delay (s)	7.5	-	10.6	8.7	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	0.1	-	-



HCS7 All-Way Stop Control Report												
General Information						Site Information						
Analyst	Diane Zimmerman					Intersection	Lyndon Ln at Oxmoor Woods					
Agency/Co.	Diane B. Zimmerman Traffic Engineeri...					Jurisdiction						
Date Performed	6/14/2018					East/West Street	Oxmoor Woods Pkwy					
Analysis Year	2020					North/South Street	Lyndon Lane					
Analysis Time Period (hrs)	0.25					Peak Hour Factor	0.67					
Time Analyzed	AM Peak Build											
Project Description	Top Golf											
Lanes												
Vehicle Volume and Adjustments												
Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	69	42			62	14				5		130
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	T		TR						LR		
Flow Rate, v (veh/h)	103	63			113					201		
Percent Heavy Vehicles	2	5			4					1		
Departure Headway and Service Time												
Initial Departure Headway, hd (s)	3.20	3.20		3.20						3.20		
Initial Degree of Utilization, x	0.092	0.056		0.101						0.179		
Final Departure Headway, hd (s)	5.58	5.13		4.62						4.03		
Final Degree of Utilization, x	0.160	0.089		0.146						0.226		
Move-Up Time, m (s)	2.3	2.3		2.0						2.0		
Service Time, ts (s)	3.28	2.83		2.62						2.03		
Capacity, Delay and Level of Service												
Flow Rate, v (veh/h)	103	63		113						201		
Capacity	645	702		780						892		
95% Queue Length, Q <sub>95</sub> (veh)	0.6	0.3		0.5						0.9		
Control Delay (s/veh)	9.3	8.3		8.4						8.2		
Level of Service, LOS	A	A		A						A		
Approach Delay (s/veh)	9.0			8.4						8.2		
Approach LOS	A			A						A		
Intersection Delay, s/veh   LOS	8.5						A					

HCM Signalized Intersection Capacity Analysis  
38: New LaGrange Rd

06/14/2018



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↙↘	↑↑↑	↑↑↑			↗↘
Traffic Volume (vph)	939	2887	2434	70	0	1194
Future Volume (vph)	939	2887	2434	70	0	1194
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	5.8	5.8			6.3
Lane Util Factor	0.97	0.91	0.86			0.88
Frt	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3433	5085	6381			2787
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3433	5085	6381			2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1021	3138	2646	76	0	1298
RTOR Reduction (vph)	0	0	3	0	0	1
Lane Group Flow (vph)	1021	3138	2719	0	0	1297
Turn Type	Prot	NA	NA			Over
Protected Phases	1	6	2			1
Permitted Phases						
Actuated Green, G (s)	65.7	150.0	72.2			65.7
Effective Green, g (s)	65.7	150.0	72.2			65.7
Actuated g/C Ratio	0.44	1.00	0.48			0.44
Clearance Time (s)	6.3	5.8	5.8			6.3
Vehicle Extension (s)	4.0	4.0	0.2			4.0
Lane Grp Cap (vph)	1503	5085	3071			1220
v/s Ratio Prot	0.30	0.62	c0.43			c0.47
v/s Ratio Perm						
v/c Ratio	0.68	0.62	0.89			1.06
Uniform Delay, d1	33.7	0.0	35.2			42.1
Progression Factor	0.76	1.00	0.79			1.00
Incremental Delay, d2	2.4	0.3	2.5			44.4
Delay (s)	27.9	0.3	30.2			86.6
Level of Service	C	A	C			F
Approach Delay (s)		7.0	30.2		86.6	
Approach LOS		A	C		F	

Intersection Summary				
HCM 2000 Control Delay		27.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio		0.97		
Actuated Cycle Length (s)		150.0	Sum of lost time (s)	12.1
Intersection Capacity Utilization		88.3%	ICU Level of Service	E
Analysis Period (min)		15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
40: Oxmoor Ln/Norwood Dr

06/14/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	2024	816	36	1593	9	831	9	48	44	46	80
Future Volume (vph)	46	2024	816	36	1593	9	831	9	48	44	46	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.8	6.8	6.3	6.8		6.4	6.4			6.4	
Lane Util. Factor	1.00	0.81	0.81	1.00	0.91		0.91	0.91			1.00	
Frt	1.00	0.98	0.85	1.00	1.00		1.00	0.98			0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96			0.99	
Satd. Flow (prot)	1770	5915	1282	1770	5081		3221	1589			1722	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96			0.99	
Satd. Flow (perm)	1770	5915	1282	1770	5081		3221	1589			1722	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	2200	887	39	1732	10	903	10	52	48	50	87
RTOR Reduction (vph)	0	17	302	0	1	0	0	5	0	0	20	0
Lane Group Flow (vph)	50	2520	248	39	1741	0	650	310	0	0	165	0
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases			6									
Actuated Green, G (s)	8.4	61.9	61.9	7.6	61.1		37.3	37.3			17.3	
Effective Green, g (s)	8.4	61.9	61.9	7.6	61.1		37.3	37.3			17.3	
Actuated g/C Ratio	0.06	0.41	0.41	0.05	0.41		0.25	0.25			0.12	
Clearance Time (s)	6.3	6.8	6.8	6.3	6.8		6.4	6.4			6.4	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	99	2440	529	89	2069		800	395			198	
v/s Ratio Prot	c0.03	c0.43		0.02	0.34		c0.20	0.19			c0.10	
v/s Ratio Perm			0.19									
v/c Ratio	0.51	1.03	0.47	0.44	0.84		0.81	0.78			0.83	
Uniform Delay, d1	68.8	44.0	32.1	69.1	40.1		53.1	52.6			64.9	
Progression Factor	1.14	0.85	0.46	1.05	1.10		0.91	0.91			1.00	
Incremental Delay, d2	3.2	25.4	2.3	2.3	3.0		6.1	9.6			24.7	
Delay (s)	81.8	62.9	17.0	74.7	46.9		54.6	57.4			89.6	
Level of Service	F	E	B	E	D		D	E			F	
Approach Delay (s)		55.1			47.5			55.5			89.6	
Approach LOS		E			D			E			F	

Intersection Summary				
HCM 2000 Control Delay		54.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio		0.91		
Actuated Cycle Length (s)		150.0	Sum of lost time (s)	25.9
Intersection Capacity Utilization		80.8%	ICU Level of Service	D
Analysis Period (min)		15		
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis  
43: Christian Way/Car Lot Ent

06/14/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	1667	192	154	1742	2	244	2	145	5	2	12
Future Volume (vph)	11	1667	192	154	1742	2	244	2	145	5	2	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	6.7	6.7	6.3	6.7		6.3	6.3	6.3		6.3	
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		0.95	0.95	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (prot)	1770	3539	1583	3433	3539		1681	1687	1583		1678	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (perm)	1770	3539	1583	3433	3539		1681	1687	1583		1678	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	1812	209	167	1893	2	265	2	158	5	2	13
RTOR Reduction (vph)	0	0	68	0	0	0	0	0	138	0	13	0
Lane Group Flow (vph)	12	1812	141	167	1895	0	132	135	20	0	7	0
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot	Split	NA	
Protected Phases	1	6		5	2		8	8	8	4	4	
Permitted Phases			6									
Actuated Green, G (s)	3.5	86.6	86.6	13.6	96.7		19.1	19.1	19.1		5.1	
Effective Green, g (s)	3.5	86.6	86.6	13.6	96.7		19.1	19.1	19.1		5.1	
Actuated g/C Ratio	0.02	0.58	0.58	0.09	0.64		0.13	0.13	0.13		0.03	
Clearance Time (s)	6.3	6.7	6.7	6.3	6.7		6.3	6.3	6.3		6.3	
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0		4.0	
Lane Grp Cap (vph)	41	2043	913	311	2281		214	214	201		57	
v/s Ratio Prot	0.01	c0.51		c0.05	c0.54		0.08	c0.08	0.01		c0.00	
v/s Ratio Perm			0.09									
v/c Ratio	0.29	0.89	0.15	0.54	0.83		0.62	0.63	0.10		0.13	
Uniform Delay, d1	72.0	27.5	14.7	65.2	20.4		62.0	62.1	57.9		70.3	
Progression Factor	1.30	0.46	0.00	1.09	0.93		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.5	0.6	0.0	1.5	2.4		5.9	6.7	0.3		1.4	
Delay (s)	94.1	13.3	0.0	72.2	21.3		67.9	68.8	58.2		71.7	
Level of Service	F	B	A	E	C		E	E	E		E	
Approach Delay (s)		12.4			25.4			64.6			71.7	
Approach LOS		B			C			E			E	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			23.5	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			150.0	Sum of lost time (s)				25.6				
Intersection Capacity Utilization			82.8%	ICU Level of Service				E				
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis  
49: 8-Mile Ctr

06/14/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↙	↕		↙	↕			↕			↕	↕
Traffic Volume (vph)	37	1776	3	1	1825	1	3	4	3	39	4	71
Future Volume (vph)	37	1776	3	1	1825	1	3	4	3	39	4	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.3	5.5		6.3	5.5			6.3			6.3	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.96			0.92	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.98	
Satd. Flow (prot)	1770	3538		1770	3539			1761			1677	
Flt Permitted	0.95	1.00		0.95	1.00			0.89			0.88	
Satd. Flow (perm)	1770	3538		1770	3539			1586			1505	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	40	1930	3	1	1984	1	3	4	3	42	4	77
RTOR Reduction (vph)	0	0	0	0	0	0	0	3	0	0	47	0
Lane Group Flow (vph)	40	1933	0	1	1985	0	0	7	0	0	76	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	8.5	116.7		1.4	109.6			13.8			13.8	
Effective Green, g (s)	8.5	116.7		1.4	109.6			13.8			13.8	
Actuated g/C Ratio	0.06	0.78		0.01	0.73			0.09			0.09	
Clearance Time (s)	6.3	5.5		6.3	5.5			6.3			6.3	
Vehicle Extension (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Grp Cap (vph)	100	2752		16	2585			145			138	
v/s Ratio Prot	c0.02	c0.55		0.00	c0.56							
v/s Ratio Perm								0.00			c0.05	
v/c Ratio	0.40	0.70		0.06	0.77			0.05			0.55	
Uniform Delay, d1	68.3	8.1		73.6	12.4			62.1			65.1	
Progression Factor	1.30	0.42		0.91	1.63			1.00			1.00	
Incremental Delay, d2	2.0	0.8		1.6	1.6			0.2			5.5	
Delay (s)	91.0	4.2		69.0	21.9			62.3			70.6	
Level of Service	F	A		E	C			E			E	
Approach Delay (s)		6.0			21.9			62.3			70.6	
Approach LOS		A			C			E			E	

Intersection Summary				
HCM 2000 Control Delay		15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio		0.74		
Actuated Cycle Length (s)		150.0	Sum of lost time (s)	18.1
Intersection Capacity Utilization		69.7%	ICU Level of Service	C
Analysis Period (min)		15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
 46: Lyndon Ln

06/14/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	1403	73	19	1472	156	93	67	23	146	51	45
Future Volume (vph)	90	1403	73	19	1472	156	93	67	23	146	51	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.9	5.6		5.9	5.6	5.6	5.2	5.2			5.2	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.96			0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.97	
Satd. Flow (prot)	1770	3513		1770	3539	1583	1770	1791			1763	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.60	1.00			0.72	
Satd. Flow (perm)	1770	3513		1770	3539	1583	1120	1791			1316	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	1525	79	21	1600	170	101	73	25	159	55	49
RTOR Reduction (vph)	0	2	0	0	0	25	0	9	0	0	5	0
Lane Group Flow (vph)	98	1602	0	21	1600	145	101	89	0	0	258	0
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases						2	4			8		
Actuated Green, G (s)	14.4	94.0		5.6	85.2	85.2	33.7	33.7			33.7	
Effective Green, g (s)	14.4	94.0		5.6	85.2	85.2	33.7	33.7			33.7	
Actuated g/C Ratio	0.10	0.63		0.04	0.57	0.57	0.22	0.22			0.22	
Clearance Time (s)	5.9	5.6		5.9	5.6	5.6	5.2	5.2			5.2	
Vehicle Extension (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Grp Cap (vph)	169	2201		66	2010	899	251	402			295	
v/s Ratio Prot	c0.06	c0.46		0.01	c0.45			0.05				
v/s Ratio Perm						0.09	0.09				c0.20	
w/c Ratio	0.58	0.73		0.32	0.80	0.16	0.40	0.22			0.87	
Uniform Delay, d1	64.9	19.2		70.3	25.5	15.4	49.6	47.5			56.1	
Progression Factor	1.30	0.22		1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2	4.2	1.6		3.8	3.4	0.4	1.4	0.4			24.1	
Delay (s)	88.7	5.8		74.1	28.9	15.8	51.0	47.8			80.2	
Level of Service	F	A		E	C	B	D	D			F	
Approach Delay (s)		10.6			28.2			49.4			80.2	
Approach LOS		B			C			D			F	

Intersection Summary			
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
 41: Oxmoor Lane/Oxmoor Ln & Oxmoor Ford/Mall

06/14/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↗		↔		↗	↔	
Traffic Volume (vph)	13	1	6	18	0	222	4	648	8	170	727	11
Future Volume (vph)	13	1	6	18	0	222	4	648	8	170	727	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.6			6.6	6.3		5.9		6.3	5.9	
Lane Util. Factor		1.00			0.95	0.95		0.95		0.91	0.91	
Fr't		0.96			0.87	0.85		1.00		1.00	1.00	
Flt Protected		0.97			0.99	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1728			1533	1504		3532		1610	3379	
Flt Permitted		0.34			0.94	1.00		0.95		0.95	0.93	
Satd. Flow (perm)		614			1454	1504		3360		1610	3150	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	1	7	20	0	241	4	704	9	185	790	12
RTOR Reduction (vph)	0	7	0	0	104	17	0	0	0	0	0	0
Lane Group Flow (vph)	0	15	0	0	27	113	0	717	0	186	821	0
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		9.6			9.6	30.6		100.6		21.0	127.9	
Effective Green, g (s)		9.6			9.6	30.6		100.6		21.0	127.9	
Actuated g/C Ratio		0.06			0.06	0.20		0.67		0.14	0.85	
Clearance Time (s)		6.6			6.6	6.3		5.9		6.3	5.9	
Vehicle Extension (s)		3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		39			93	306		2253		225	2717	
v/s Ratio Prot						0.05				c0.10	0.04	
v/s Ratio Perm		c0.03			0.02	0.02		c0.21			0.22	
v/c Ratio		0.40			0.29	0.37		0.32		0.74	0.30	
Uniform Delay, d1		67.4			67.0	51.4		10.3		61.9	2.2	
Progression Factor		1.00			1.00	1.00		1.00		1.04	0.88	
Incremental Delay, d2		6.5			1.7	0.8		0.4		7.7	0.0	
Delay (s)		73.9			68.7	52.2		10.7		71.9	2.0	
Level of Service		E			E	D		B		E	A	
Approach Delay (s)		73.9			60.5			10.7			13.7	
Approach LOS		E			E			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			19.5				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.39									
Actuated Cycle Length (s)			150.0				Sum of lost time (s)		18.8			
Intersection Capacity Utilization			61.6%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

Topgolf  
7900 Shelbyville Road  
Traffic Impact Study

HCM 2010 TWSC  
55: Oxmoor Lane & Bullitt Lane

06/14/2018

Intersection	
Int Delay, s/veh	12.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↘	↗		↕	↕	
Traffic Vol, veh/h	265	46	63	359	406	474
Future Vol, veh/h	265	46	63	359	406	474
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	288	50	68	390	441	515

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1030	478	956
Stage 1	699	-	-
Stage 2	331	-	-
Critical Hdwy	6.82	6.92	4.12
Critical Hdwy Stg 1	5.82	-	-
Critical Hdwy Stg 2	5.82	-	-
Follow-up Hdwy	3.51	3.31	2.21
Pot Cap-1 Maneuver	231	536	721
Stage 1	457	-	-
Stage 2	703	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	203	536	721
Mov Cap-2 Maneuver	310	-	-
Stage 1	402	-	-
Stage 2	703	-	-

Approach	EB	NB	SB
HCM Control Delay, s	63.4	2	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	721	-	310	536	-	-
HCM Lane V/C Ratio	0.095	-	0.929	0.093	-	-
HCM Control Delay (s)	10.5	0.5	72.2	12.4	-	-
HCM Lane LOS	B	A	F	B	-	-
HCM 95th %tile Q(veh)	0.3	-	9.1	0.3	-	-

**Notes**  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon



Topgolf  
7900 Shelbyville Road  
Traffic Impact Study

HCM 2010 TWSC  
61: Sears Mall Rd & Oxmoor Lane

06/14/2018

Intersection						
Int Delay, s/veh	6.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		↑↑			↑↑
Traffic Vol, veh/h	30	230	72	18	214	176
Future Vol, veh/h	30	230	72	18	214	176
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	None		None		None	
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	250	78	20	233	191

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	650	49	0	0	98
Stage 1	88	-	-	-	-
Stage 2	562	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14
Critical Hdwy Stg 1	5.84	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22
Pot Cap-1 Maneuver	402	1009	-	-	1493
Stage 1	925	-	-	-	-
Stage 2	534	-	-	-	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	332	1009	-	-	1493
Mov Cap-2 Maneuver	332	-	-	-	-
Stage 1	763	-	-	-	-
Stage 2	534	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	4.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	817	1493
HCM Lane V/C Ratio	-	-	0.346	0.156
HCM Control Delay (s)	-	-	11.7	7.9
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	1.6	0.6

Topgolf  
7900 Shelbyville Road  
Traffic Impact Study

HCM 2010 TWSC  
65: Oxmoor Lane & Top Golf

06/14/2018

Intersection	
Int Delay, s/veh	1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘	↗	↕	↕	↕	↕
Traffic Vol, veh/h	0	69	353	0	68	452
Future Vol, veh/h	0	69	353	0	68	452
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	75	384	0	74	491

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	778	192	0
Stage 1	384	-	-
Stage 2	394	-	-
Critical Hdwy	6.84	6.94	4.14
Critical Hdwy Stg 1	5.84	-	-
Critical Hdwy Stg 2	5.84	-	-
Follow-up Hdwy	3.52	3.32	2.22
Pot Cap-1 Maneuver	333	817	0
Stage 1	658	-	0
Stage 2	650	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	304	817	1171
Mov Cap-2 Maneuver	304	-	-
Stage 1	601	-	-
Stage 2	650	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.9	0	1.1
HCM LOS	A	-	-

Minor Lane/Major Mvmt	NBTWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	817	1171
HCM Lane V/C Ratio	-	-	0.092	0.063
HCM Control Delay (s)	-	0	9.9	8.3
HCM Lane LOS	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.2

HCM 2010 TWSC  
 64: Christian Way & Sears Mall Road

06/14/2018

Intersection						
Int Delay, s/veh	3.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↘	↗		↑↑	↑↑	
Traffic Vol, veh/h	60	73	97	246	207	88
Future Vol, veh/h	60	73	97	246	207	88
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized		None		None		None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	65	79	105	267	225	96

Major/Minor	Minor2	Major1	Major2		
Conflicting Flow All	617	161	321	0	0
Stage 1	273	-	-	-	-
Stage 2	344	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-
Pot Cap-1 Maneuver	422	855	1236	-	-
Stage 1	748	-	-	-	-
Stage 2	689	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	380	855	1236	-	-
Mov Cap-2 Maneuver	380	-	-	-	-
Stage 1	673	-	-	-	-
Stage 2	689	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.7	2.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1236	-	380	855	-	-
HCM Lane V/C Ratio	0.085	-	0.172	0.093	-	-
HCM Control Delay (s)	8.2	-	16.4	9.6	-	-
HCM Lane LOS	A	-	C	A	-	-
HCM 95th %tile Q(veh)	0.3	-	0.6	0.3	-	-

HCS7 All-Way Stop Control Report												
General Information						Site Information						
Analyst	Diane Zimmerman					Intersection	Lyndon Ln at Oxmoor Woods					
Agency/Co.	Diane B. Zimmerman Traffic Engineeri...					Jurisdiction						
Date Performed	6/14/2018					East/West Street	Oxmoor Woods Pkwy					
Analysis Year	2020					North/South Street	Lyndon Lane					
Analysis Time Period (hrs)	0.25					Peak Hour Factor	0.93					
Time Analyzed	PM Peak Build											
Project Description	Top Golf											
Lanes												
Vehicle Volume and Adjustments												
Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	154	128			151	19				26		188
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	T		TR						LR		
Flow Rate, v (veh/h)	166	138			183					230		
Percent Heavy Vehicles	0	0			2					1		
Departure Headway and Service Time												
Initial Departure Headway, hd (s)	3.20	3.20			3.20						3.20	
Initial Degree of Utilization, x	0.147	0.122			0.162						0.205	
Final Departure Headway, hd (s)	5.76	5.26			4.93						4.58	
Final Degree of Utilization, x	0.265	0.201			0.250						0.293	
Move-Up Time, m (s)	2.3	2.3			2.0						2.0	
Service Time, ts (s)	3.46	2.96			2.93						2.58	
Capacity, Delay and Level of Service												
Flow Rate, v (veh/h)	166	138			183						230	
Capacity	625	685			731						786	
95% Queue Length, Q <sub>95</sub> (veh)	1.1	0.7			1.0						1.2	
Control Delay (s/veh)	10.5	9.3			9.6						9.5	
Level of Service, LOS	B	A			A						A	
Approach Delay (s/veh)	10.0			9.6						9.5		
Approach LOS	A			A						A		
Intersection Delay, s/veh   LOS	9.7						A					