

Traffic Impact Study

Anderson Pointe



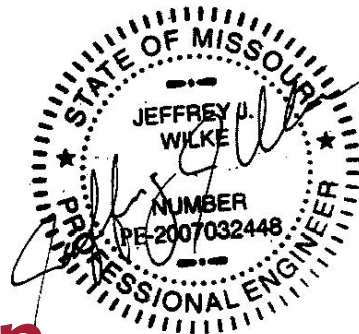
LEE'S SUMMIT, MISSOURI

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Contents

1.0 INTRODUCTION.....	5
1.1 REPORT PURPOSE AND OBJECTIVES.....	5
2.0 EXISTING CONDITIONS.....	6
2.1 STUDY AREA.....	6
2.2 STREET NETWORK.....	6
2.3 DATA COLLECTION.....	6
3.0 APPROVED DEVELOPMENTS.....	8
3.2 STAG'S FIELD.....	8
3.2 MONTICELLO 4 TH PLAT.....	8
3.3 APPROVED DEVELOPMENT TRAFFIC VOLUMES.....	8
4.0 PROPOSED DEVELOPMENT.....	9
4.1 SITE DESCRIPTION.....	9
4.2 SITE CIRCULATION.....	9
4.3 TRIP GENERATION.....	9
4.4 PROJECT TRIP DISTRIBUTION AND ASSIGNMENT.....	9
5.0 INTERSECTION CAPACITY ANALYSIS.....	11
5.1 LEVEL OF SERVICE OVERVIEW.....	11
5.2 EXISTING YEAR (2022) LEVEL OF SERVICE ANALYSIS.....	12
5.3 EXISTING + APPROVED DEVELOPMENT LEVEL OF SERVICE ANALYSIS.....	12
5.4 EXISTING + APPROVED + PROPOSED LEVEL OF SERVICE ANALYSIS.....	13
6.0 CONCLUSIONS AND RECOMMENDATIONS.....	15
APPENDIX.....	16

TABLES

TABLE 1: ANDERSON DRIVE DAILY TRAFFIC VOLUME.....	7
TABLE 2: PROPOSED DEVELOPMENT TRIP GENERATION.....	9
TABLE 3: PROPOSED DEVELOPMENT TRIP DISTRIBUTION.....	10
TABLE 4: LEVEL OF SERVICE.....	11
TABLE 5: EXISTING YEAR (2022) PEAK HOUR CONDITIONS.....	12
TABLE 6: EXISTING + APPROVED DEVELOPMENT PEAK HOUR CONDITIONS.....	13
TABLE 7: EXISTING + APPROVED + PROPOSED DEV. PEAK HOUR CONDITIONS.....	13

EXHIBITS (SEE APPENDIX A)

- EXHIBIT 1: PROJECT SITE LOCATION AND STUDY AREA
- EXHIBIT 2: EXISTING YEAR (2022) PEAK HOUR TRAFFIC VOLUMES
- EXHIBIT 3: EXISTING GEOMETRY AND INTERSECTION CONTROL
- EXHIBIT 4: EXISTING PLUS APPROVED DEVELOPMENT PEAK HOUR TRAFFIC
- EXHIBIT 5: PROPOSED DEVELOPMENT TRIP ASSIGNMENT
- EXHIBIT 6: EXISTING PLUS APPROVED PLUS PROPOSED DEVELOPMENT PEAK HOUR TRAFFIC

1.0 INTRODUCTION

This report serves as the traffic analysis for the Anderson Pointe residential development, located along the east side of Anderson Drive near Velie Road in Lee's Summit, Missouri. The location of the development is shown on **Exhibit 1** in **Appendix A**.

1.1 REPORT PURPOSE AND OBJECTIVES

The purpose of this study is to address traffic and transportation impacts of the proposed development on surrounding streets and intersections. This traffic impact study was prepared based on criteria listed in the City of Lee's Summit Access Management Code. The following information is provided:

- A description and map of the existing and proposed street network to be affected by the proposed development. This information includes existing and proposed roadway characteristics and existing year (2022) traffic volumes.
- Trip generation calculations based on the Institute of Traffic Engineers (ITE) Trip Generation Manual, 11th Edition, for the proposed development. In addition, projected trip distributions onto the street network are provided.
- Inclusion of traffic generated by the Monticello 4th Plat and Stag's Fields developments which are located near the proposed development site.
- Analysis of impacts of the traffic generated by the proposed development on the street network, including analysis of peak period levels of service (LOS), delay times, and queuing at study area intersections.
- Discussion of potential improvements and traffic management measures identified to mitigate operational concerns.

In summary, the study is to determine the trip generation of the Anderson Pointe development, assign new development trips to the street network, analyze various scenarios to determine the impacts of proposed site traffic, and identify potential mitigation measures needed to achieve acceptable operations at the study intersections.

2.0 EXISTING CONDITIONS

2.1 STUDY AREA

The development site is in the northern portion of Lee's Summit, near Anderson Drive and Velie Road. The nearly 25-acre site currently consists of undeveloped land. The south and west sides of the site are bounded by Anderson Drive, and the east side of the site is bounded by I-470. The Oaks Ridge Meadows residential subdivision is located to the north and west of the development site. Single-family homes in the Lakewood Oaks subdivision are located to the south of the site across Anderson Drive.

The following intersections were included within the study area for the traffic analysis. The list provides the existing intersection control for each of the study intersections.

- Anderson Drive and Lakewood Boulevard (Traffic Signal)
- Anderson Drive and Velie Road (Two-way Stop)

2.2 STREET NETWORK

The existing street network within the study area includes Anderson Drive, Lakewood Boulevard, and Velie Road. The following provides a summary of the existing street network within the study area:

Anderson Drive is a north-south residential roadway located along the west edge of the proposed development site. The roadway has two different cross sections within the study area. Adjacent to the site, Anderson Drive is a two-lane undivided roadway with curbs and gutters. The roadway is 36 feet wide, measured between the backs of curbs. North of Velie Road there is a sidewalk along the west side of Anderson Drive. To the north of the site, there is sidewalk along both sides of the road. The posted speed limit is 35 mph. Voy Spears Elementary School is located less than one mile north and west of the development site on Anderson Drive.

Roughly 250 feet south of Velie Road, the curb and gutter end along Anderson Drive. The roadway narrows to 24 feet in width, with turf shoulders and ditches along each side of the road. There are no sidewalks on Anderson Drive to the south of Velie Road. Near of Velie Road there are several horizontal curves on Anderson Drive. Winding road warning signs with 30 mph advisory speed plaques are posted for both directions of travel. South of the curves, the roadway straightens, and the speed limit increases to 45 mph. According to the City of Lee's Summit traffic volume map, Anderson Drive had a volume of 6,051 vehicles per day in 2018 between Lakewood Boulevard and Velie Road.

Lakewood Boulevard is an east-west minor arterial roadway. Lakewood Boulevard is a four-lane undivided roadway with curbs and gutters. West of Anderson Drive, the roadway narrows to two lanes with a wide median. East of Anderson Drive there is a diamond interchange with I-470. The posted speed limit on Lakewood Boulevard is 35 mph.

Velie Road is an east-west two-lane local street extending west from Anderson Drive. The street is 22 feet wide with no curbs, gutters, or shoulders. The posted speed limit is 25 mph. Velie Road provides access to several residential subdivisions.

2.3 DATA COLLECTION

Daily traffic volumes were collected on Anderson Drive north of Lakewood Boulevard on Tuesday, February 22nd, 2022. The count data was totaled in 15-minute increments and is included in **Appendix B**. The count

data shows some brief increases in traffic volume on Anderson Drive from 9:00 to 9:15 AM and from 4:00 to 4:30 PM. These increases are likely related to the arrival and dismissal times at nearby Voy Spears Elementary School. During these school peak periods, traffic volumes are higher than normal, but are not higher than the PM Peak hour (5:00 to 6:00 PM) which was used for the intersection analysis in later sections of this study. The 24-hour counts are summarized in **Table 1**.

The counts collected are approximately 9% lower than the 2018 traffic count on the City’s traffic volume map. The difference in counts could be related to the impacts of the COVID-19 pandemic and seasonal variations in traffic volumes.

TABLE 1: ANDERSON DRIVE DAILY TRAFFIC VOLUME

Location	Northbound Volume	Southbound Volume	Total Volume
Anderson Drive north of Lakewood Boulevard	2,781	2,708	5,489

Turning Movement Counts (TMCs) were collected the study intersections on Tuesday, February 22nd, 2022 and on Tuesday, March 1st, 2022. The turning movement count data collected is included in **Appendix B**. The AM peak hour occurred between 7:45 AM and 8:45 AM, and the PM peak hour occurred between 4:45 PM and 5:45 PM.

The counts collected were compared to counts from other traffic impact studies prepared in the area. The count volumes collected were found to be slightly lower than previous counts. Therefore, the count volumes were increased by 5% to 20% to align with previous count data. The adjusted existing conditions peak hour turning movement volumes are shown on **Exhibit 2**. The existing geometry with lane configurations and intersection control at the study intersections are shown in **Exhibit 3**.

3.0 APPROVED DEVELOPMENTS

There are several developments in the vicinity of the study area which have been approved in recent years but are not fully constructed and occupied at the time of this study. These developments are described in the following paragraphs and are shown on **Exhibit 1**.

3.2 STAG'S FIELD

Stag's Field includes mostly multifamily residential land uses and a few single-family homes. The Stag's Field site is located to the south and east of the I-470 and Lakewood Boulevard interchange. Construction has not yet begun on the Stag's Field site.

A traffic impact study for the development was prepared in July 2020. Most of the development traffic was projected to travel to/from I-470. Only 10% of development trips were estimated to travel to/from the west on Lakewood Boulevard. To mitigate the addition of development traffic, a southbound right-turn lane is required on the I-470 southbound exit ramp to Lakewood Boulevard.

3.2 MONTICELLO 4TH PLAT

Monticello is a single-family residential subdivision located just south of the Stag's Field development, to the south and east of the I-470 and Lakewood Boulevard interchange. The first three plats of the Monticello subdivision have been constructed and are mostly occupied. The 4th Plat includes 45 lots and is currently under construction.

A traffic impact study for the Monticello development was prepared in June 2015. The study did not evaluate the I-470 interchange or any intersections to the west of the interstate. No improvements were identified at any of the study intersections to mitigate traffic from the Monticello development.

3.3 APPROVED DEVELOPMENT TRAFFIC VOLUMES

Traffic from the Monticello 4th Plat and Stag's Field developments were included in the Existing plus Approved Development scenario. The development trips from the Stag's Field development were distributed through the study intersections based on the magnitude of existing turning movements at the intersections. Trip generation was calculated for the 45 remaining lots in the Monticello subdivision. The development trips were assigned to the study intersections following the same distributions as the Stag's Field trips. **Exhibit 4** provides the Existing plus Approved peak hour traffic volumes.

4.0 PROPOSED DEVELOPMENT

4.1 SITE DESCRIPTION

The proposed Anderson Pointe development includes 66 single-family homes and 20 duplex units. The proposed development site plan is included in **Appendix C** for reference.

4.2 SITE CIRCULATION

The proposed development will be accessed from two new streets that will intersect Anderson Drive. The two new streets will connect to a network of local streets with sidewalks internal to the development site.

4.3 TRIP GENERATION

Trip generation estimates were prepared using the *ITE Trip Generation Manual, 11th Edition*. **Table 2** shows the expected trips to be generated by the proposed development. The total trip generation is anticipated to be 832 daily trips, 61 trips during the AM peak hour (16 entering and 45 exiting), and 78 trips during the PM peak hour (48 entering and 30 exiting).

TABLE 2: PROPOSED DEVELOPMENT TRIP GENERATION

Land Use Description	ITE LUC	Intensity / Units	Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Single-Family Detached Housing	210	66 Dwelling Units	688	13	38	51	42	25	67
Single-Family Attached Housing	215	20 Dwelling Units	144	3	7	10	6	5	11
Total Proposed Development Trips			832	16	45	61	48	30	78

This is generally considered to be a low level of trip generation. During the peak hours, the trip generation equates to slightly more than one trip per minute. Since the trip generation is less than 100 trips during each peak hour, a traffic impact study is not required for this development, per the Access Management Code.

Appendix D provides the ITE Trip Generation Manual calculations used to determine the trip generation of the proposed development.

4.4 PROJECT TRIP DISTRIBUTION AND ASSIGNMENT

The estimated trips generated by the proposed development were assigned to the street network based on the trip distribution summarized in **Table 3**. This distribution is based on existing traffic patterns, commuter routes, and engineering judgment.

Exhibit 5 shows the development trip assignment through the study intersections. In general, commuter trips are expected to predominately be traveling to/from the east on Lakewood Boulevard to access the I-470 interchange.

The proposed development trip assignments were added to the existing conditions traffic volumes. **Exhibit 6** illustrates the Existing plus Approved plus Proposed Development peak hour traffic volumes.

TABLE 3: PROPOSED DEVELOPMENT TRIP DISTRIBUTION

Direction To/From	Percentage
North on Anderson Drive	25%
East on Lakewood Boulevard	65%
West on Lakewood Boulevard	10%
Total	100%

5.0 INTERSECTION CAPACITY ANALYSIS

5.1 LEVEL OF SERVICE OVERVIEW

Intersection capacity analysis was performed at the study intersections for the following three scenarios:

- Existing (Year 2022)
- Existing plus Proposed Development
- Existing plus Proposed plus Planned Development
- Horizon (Year 2042)

The capacity analysis was performed for the weekday AM and PM peak hours using Synchro traffic modeling software to determine intersection delay and level of service (LOS). Calculations were performed based on the methodologies outlined in the *Highway Capacity Manual (HCM)*, 6th Edition, which is published by the Transportation Research Board.

LOS is a quantitative measure used by traffic engineers to describe the operations of an intersection. It ranges from A to F, with A being the best and F being the worst level of operation. LOS A conditions are characterized by minimal vehicle delay and free-flow conditions, while LOS F is characterized by long vehicle delay – usually when demand exceeds available roadway capacity. **Table 4** shows the definition of LOS for unsignalized and signalized intersections.

TABLE 4: LEVEL OF SERVICE

Level of Service	Average Control Delay (seconds/vehicle) at:	
	Unsignalized Intersections	Signalized Intersections
A	0 – 10	0 – 10
B	> 10 – 15	> 10 – 20
C	> 15 – 25	> 20 – 35
D	> 25 – 35	> 35 – 55
E	> 35 – 50	> 55 – 80
F	> 50	> 80

Levels of service are evaluated based on the movement groupings which are required to yield to other traffic. Typically, these are left turns off the major street and the side street approaches for two-way stop-controlled intersections. For signalized intersections each movement grouping is evaluated, and LOS is evaluated for the intersection as a whole.

The City of Lee's Summit Level of Service policy has established LOS C as the minimum level of operation at an intersection. At unsignalized intersections LOS D, E, or even F may be considered acceptable for low to moderate traffic volumes where the installation of a traffic signal is not warranted by the conditions at the intersection, or the location has been deemed undesirable for signalization.

Traffic queues were also evaluated as part of the analyses. Long traffic queues which extend beyond the amount of storage available, either between intersections or within turn lanes, can have significant impacts on operations. The 95th percentile vehicular queues were analyzed to ensure the analyses are reflective of the physical constraints of the study intersections and to identify if additional storage is needed for turn lanes. The 95th percentile queue represents the queue length that has only a 5% chance of being exceeded during the analysis period.

5.2 EXISTING YEAR (2022) LEVEL OF SERVICE ANALYSIS

Capacity analysis was conducted for Existing Year (2022) traffic conditions at the study intersections to determine baseline conditions for the existing analysis year and to calibrate the models. The analysis was performed for weekday AM and PM peak hours and is based on the lane configurations, traffic controls, and traffic volumes shown in **Exhibits 2** and **3**.

Table 5 provides a summary of the capacity analysis at the study intersections. The Synchro reports are provided in **Appendix E**.

TABLE 5: EXISTING YEAR (2022) PEAK HOUR CONDITIONS

Intersection	Control	Approach	Operational Analysis Results					
			AM Peak Hour			PM Peak Hour		
			Delay (sec/veh)	LOS	95% Queue	Delay (sec/veh)	LOS	95% Queue
Lakewood Blvd. & Anderson Drive	Traffic Signal	EB LT	16.8	B	< 50'	17.1	B	< 50'
		EB RT/Thru	20.8	C	129'	19.3	B	106'
		WB LT	15.7	B	56'	15.5	B	67'
		WB Thru	17.4	B	151'	20.3	C	289'
		WB RT	18.6	B	< 50'	23.1	C	59'
		NB	24.9	C	< 50'	30.1	C	68'
		SB LT	15.7	B	168'	19.1	B	203'
		SB RT/Thru	9.7	A	< 50'	12.9	B	< 50'
		Intersection	18.2	B		20.8	C	
Anderson Drive & Velie Road	Two-Way Stop	NB LT	7.8	A	< 50'	8.0	A	< 50'
		EB	10.1	B	< 50'	11.8	B	< 50'

Based on the analysis, all study intersections currently operate at acceptable LOS. Most queue lengths are short and contained within their respective turn lanes. Some longer queues are present for the southbound left-turn movement at Lakewood Boulevard & Anderson Drive, but the queues are contained within the 350-foot storage length of the turn lane. During the PM peak hour, the queue of westbound through traffic extends back to the I-470 southbound ramp intersection. There is only 275 feet of storage available between the two intersections. It does appear that the stop line for the westbound through and right-turn lanes at the Lakewood Boulevard & Anderson Drive intersection could be moved at least 25 feet west to slightly increase the storage available between intersections. Signal timing adjustments could also be made to reduce queuing in the westbound direction if it becomes a concern.

5.3 EXISTING + APPROVED DEVELOPMENT LEVEL OF SERVICE ANALYSIS

Capacity analysis was conducted for Existing plus Approved Development traffic conditions at the study intersections to include traffic from approved developments in the surrounding area that are not yet built at the time of this study. The analysis was performed for weekday AM and PM peak hours and is based on the lane configurations, traffic controls, and traffic volumes shown in **Exhibits 4**.

Table 6 provides a summary of the capacity analysis at the study intersections. The Synchro reports are provided in **Appendix E**.

TABLE 6: EXISTING + APPROVED DEVELOPMENT PEAK HOUR CONDITIONS

Intersection	Control	Approach	Operational Analysis Results					
			AM Peak Hour			PM Peak Hour		
			Delay (sec/veh)	LOS	95% Queue	Delay (sec/veh)	LOS	95% Queue
Lakewood Blvd. & Anderson Drive	Traffic Signal	EB LT	16.9	B	< 50'	17.3	B	< 50'
		EB RT/Thru	20.9	C	129'	19.5	B	109'
		WB LT	15.8	B	55'	15.7	B	67'
		WB Thru	17.6	B	156'	20.5	C	293'
		WB RT	18.9	B	< 50'	23.6	C	59'
		NB	24.9	C	< 50'	30.7	C	68'
		SB LT	15.7	B	171'	19.3	B	210'
		SB RT/Thru	9.7	A	< 50'	13.1	B	< 50'
		Intersection	18.3	B		21.1	C	
Anderson Drive & Velie Road	Two-Way Stop	NB LT	7.8	A	< 50'	8.1	A	< 50'
		EB	10.1	B	< 50'	11.9	B	< 50'

Based on the analysis, all intersections are anticipated to continue operating at acceptable LOS. Several queue lengths slightly increase with the addition of approved development traffic, but no new operational concerns are identified at the study intersections.

5.4 EXISTING + APPROVED + PROPOSED LEVEL OF SERVICE ANALYSIS

Capacity analysis was conducted for Existing plus Approved plus Proposed Development traffic conditions at the study intersections to determine the impact of site traffic from the proposed development. The analysis was performed for weekday AM and PM peak hours and is based on the traffic volumes shown in **Exhibit 6**. The lane configurations and traffic controls for the analysis remain the same as in the Existing Year (2022) scenario, as shown on **Exhibit 3**.

Table 7 provides a summary of the capacity analysis at the study intersections. The Synchro reports are provided in **Appendix E**.

TABLE 7: EXISTING + APPROVED + PROPOSED DEV. PEAK HOUR CONDITIONS

Intersection	Control	Approach	Operational Analysis Results					
			AM Peak Hour			PM Peak Hour		
			Delay (sec/veh)	LOS	95% Queue	Delay (sec/veh)	LOS	95% Queue
Lakewood Blvd. & Anderson Drive	Traffic Signal	EB LT	17.5	B	< 50'	17.5	B	< 50'
		EB RT/Thru	21.8	C	129'	19.7	B	109'
		WB LT	16.5	B	55'	15.9	B	67'
		WB Thru	18.6	B	156'	21.0	C	293'
		WB RT	20.5	C	< 50'	27.4	C	61'
		NB	25.5	C	< 50'	33.2	C	68'
		SB LT	15.7	B	191'	21.0	C	226'
		SB RT/Thru	9.5	A	< 50'	14.1	B	< 50'
		Intersection	19.0	B		22.7	C	
Anderson Drive & Velie Road	Two-Way Stop	NB LT	7.9	A	< 50'	8.1	A	< 50'
		EB	10.3	B	< 50'	12.2	B	< 50'

The analysis results in **Table 7** indicate that the addition of development trips will have a nominal impact on the study intersections. All intersections are projected to continue operating at acceptable LOS. The addition of development trips is not projected increase the queue length for the westbound through movement at the Lakewood Boulevard & Anderson Drive intersection. The queue lengths for the southbound left-turn movement will increase but are projected to be contained within the storage length of the existing turn lane. Since operations are projected to be acceptable during the PM peak hour, acceptable operations are also expected during school peak times.

Analysis was not prepared for any of the intersections on Anderson Drive north of Velie Road. It should be noted that only 25% of development trips will travel to the north on Anderson Drive while 75% will travel south. Therefore, the development traffic will have a less significant impact on the intersections to the north.

Traffic volumes at the nearby intersections to the north of the site would be expected to similar or less than the volumes at Velie Road because these intersections provide access to fewer homes than Velie Road. Considering this, similar acceptable operations would be expected at the nearby intersections to the north of the site along Anderson Drive.

6.0 CONCLUSIONS AND RECOMMENDATIONS

A traffic impact study for the Anderson Pointe development has been prepared by Kimley-Horn. The proposed development site is located along the east side of Anderson Drive near Velie Road in Lee's Summit, Missouri. The purpose of this study was to assess the impact of the proposed development on the surrounding transportation system.

The following provides a summary of the analysis. Intersection capacity analysis was performed at the study intersections for the following three scenarios:

- Existing Year (2022)
- Existing plus Approved Development
- Existing plus Approved plus Proposed Development

Counts were collected in February and March 2022 to serve as the baseline for analysis. The count volumes were lower than previous counts collected in the study area, therefore the existing conditions volumes used for analysis were increased. All study intersections were found to currently be operating at acceptable levels of service.

There are several developments in the vicinity of the study area which have been approved in recent years but are not fully constructed and occupied at the time of this study. These developments include Stag's Field and Monticello 4th Plat. Traffic from these approved developments was added to the street network and all study intersections were projected to continue operating acceptably.

The proposed development is projected to generate be 832 daily trips, 61 trips during the AM peak hour, and 78 trips in the PM peak hour. This is generally considered to be a low level of trip generation, equating to slightly more than one trip per minute. The site trips were added to the street network, and all study intersections are projected to continue operating at acceptable levels of service. The addition of development traffic is projected to have a nominal impact on the study intersections. As such, no roadway improvements are identified to mitigate the addition of development traffic.

While not specifically studied, operations during school peak times and operations at other nearby intersections on Anderson Drive would also be expected to operate acceptably. This is because the volumes during school peak times and the volumes at other nearby intersections are similar, if not lower, than at the Anderson Drive & Velie Road intersection.