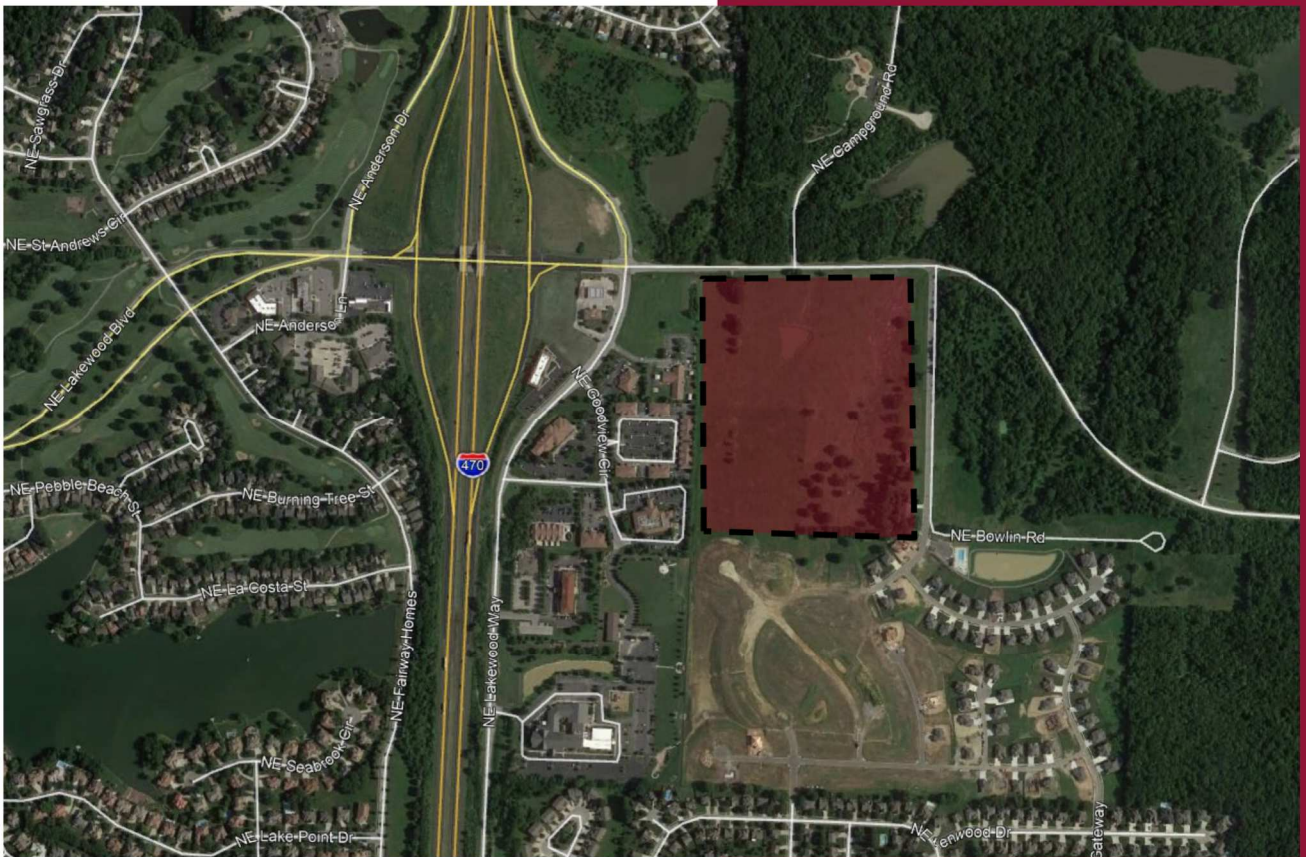


# Stags Bowlin Road Traffic Impact Study

Bowlin Road and Jamestown Drive  
Lee's Summit, Missouri



Prepared for:  
Stag Commercial

Prepared by TranSystems  
August 2020



**TranSystems**  
2400 Pershing Road  
Suite 400  
Kansas City, MO 64108  
Tel 816 329 8600  
Fax 816 329 8601  
  
www.transystems.com

August 20, 2020

Mr. Ryan Robertshaw  
Stag Commercial  
7021 Johnson Drive  
Mission, Kansas 66202

**RE: Stags Bowlin Road Traffic Impact Study  
Bowlin Road and Jamestown Drive  
Lee’s Summit, Missouri**

Dear Mr. Robertshaw:

In response to your request and authorization, TranSystems has completed a traffic impact study for the proposed residential development to be located generally south and west of the Bowlin Road and Jamestown Drive intersection in Lee’s Summit, Missouri. The purpose of this study was to assess the impact of the proposed development on the surrounding transportation system.


Included in this study is a discussion of the anticipated impacts of the proposed development on the adjacent street network for the following scenarios:

- ▶ Existing Conditions
- ▶ Existing plus Approved Development Conditions
- ▶ Existing plus Approved plus Proposed Development Conditions

We trust that the enclosed information proves beneficial to you and the City of Lee’s Summit in this phase of the development process. We appreciate the opportunity to be of service to you and will be available to review this study at your convenience.

Sincerely,  
**TRANSYSTEMS**

By:   
Jeffrey J. Wilke, PE, PTOE

By:   
Emma Martin, EIT

EHM:JJW/ehm/PI01200174

Enclosure

## Introduction

TranSystems has completed a traffic impact study for the proposed residential development to be located generally south and west of the Bowlin Road and Jamestown Drive intersection 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 location of the development site relative to the major streets in the area is shown on **Figure A-1** in **Appendix A**.

This study also contains a description of the proposed development and the surrounding transportation infrastructure along with trip generation estimates, trip distribution estimates, capacity analyses, and a summary of the findings.

## Proposed Development Plan

The proposed development includes several types of residential land uses. Apartments surround a U-shaped street network that extends south of Bowlin Road. A large apartment building containing 88 units, is located along the east side of Site Drive 1, just south of Bowlin Road. Farther to the south and west along site Drive 1 there are 14 smaller apartment buildings with 10 units each. There are 9 smaller apartment buildings with 16 units in each building along each side of Site Drive 2. There is a total of 372 proposed apartment units on the site. There are also 21 proposed single-family homes on a cul-de-sac street (Site Drive 3) accessed from Jamestown Drive.

Access for the apartments will be provided from two proposed site driveways on Bowlin Road. Site Drive 1 will be located 6000 feet east of Lakewood Way and 270 feet west of Campground Road. The second site drive (Site Drive 2) will be located 445 feet west of Jamestown Drive and 285 feet east of Campground Road. The single-family homes will be located directly off of Drive 3, which is accessed from Jamestown Drive. The intersection of Jamestown Drive and Drive 3 is roughly 1,100 feet south of Bowlin Road. A copy of the proposed site plan is included on **Figure A-2** in **Appendix A** for reference.

## Study Area

To assess the impacts of the proposed development, the intersections listed below were identified for study during the A.M. and P.M. periods.

- ▶ Bowlin Road and I-470 Southbound Ramps
- ▶ Bowlin Road and I-470 Northbound Ramps
- ▶ Bowlin Road and Lakewood Way
- ▶ Bowlin Road and Jamestown Drive
- ▶ Site Driveways

## Surrounding Land Uses and Street Network

The development site currently consists of undeveloped land used for agricultural purposes. There are several different land uses surrounding the site. The adjacent land to the north and east of the site is undeveloped. Much of this land is owned by the Corps of Engineers in the vicinity of Blue Springs Lake. There are several existing neighborhoods of single-family homes south of the site, including the

Monticello residential development. To the west of the site, there are several small office buildings, which are accessed from Lakewood Way.

Bowlin Road is a two-lane minor arterial street with a 22-foot wide asphalt surface and turf slopes to ditches. The posted speed limit is 35 m.p.h. West of the site, at the Lakewood Way intersection, Bowlin Road widens to include an eastbound left-turn lane. Bowlin Road is a four-lane undivided street with curbs and gutters and some turn lanes at intersections west of Lakewood Way. West of I-470, the street name changes from Bowlin Road to Lakewood Boulevard. There are no continuous sidewalks along Bowlin Road, but there are sidewalks along each side of Lakewood Boulevard to the west of the study area.

The segment of I-470 near the development site runs north/south and connects Independence to Lee's Summit. There is a diamond interchange on I-470 at Bowlin Road/Lakewood Boulevard. The northbound I-470 exit ramp at the interchange is 28 feet wide with two lanes with paved shoulders on each side. The northbound ramps intersection with Bowlin Road is signalized. The southbound I-470 exit ramp is a single 18-foot wide lane with paved shoulders on each side. At the southbound ramps intersection, the southbound exit ramp is stop sign controlled while Bowlin Road is uncontrolled. While not a study intersection for this study, there is also signalized intersection on Bowlin Road/Lakewood Boulevard at Anderson Drive, which is approximately 350 feet west of the I-470 southbound ramps intersection.

Lakewood Way serves as a frontage road along the east side of I-470. It is classified as a commercial/industrial collector with a posted speed limit of 45 m.p.h. At the Bowlin Road intersection, Lakewood Way has three lanes with a raised median and curbs and gutters on both the north and south side. The intersection of Lakewood Way and Bowlin Road is signalized. Farther to the north and south of the intersection with Bowlin Road, Lakewood Way narrows to a two-lane undivided roadway. There are no shoulders south of Bowlin Road, while there are segments of turf, aggregate, and paved shoulders to the north of Bowlin Road. There are no continuous sidewalks along Lakewood Way.

Jamestown Drive is a two-lane, 26-foot roadway with five foot paved shoulders to the south of Bowlin Road. The road was recently constructed with the Monticello development. The posted speed limit is 25 mph, and the road is classified as a residential collector street. There are no sidewalks along Jamestown Drive adjacent to the development site. In the Monticello development, Jamestown Drive is a 36-foot wide roadway, measured between the backs of curbs. There are sidewalks, either constructed or planned, along each side of Jamestown Drive within Monticello.

## Traffic Counts

Traffic counts were not collected at the time of this study due to the COVID-19 pandemic. The Governor of Missouri issued a Stay-At-Home order for the entire state from April 6, 2020 through May 3, 2020 to limit the spread of the virus. Schools and many businesses were closed. The closures have significantly altered traffic patterns, and will continue to do so as many businesses continue to operate on a somewhat limited basis and many professionals continue to work from home.

Turning movement counts for this study were obtained from a previous traffic impact study for the same site, completed by TranSystems in 2017. Turning-movement traffic volume counts were collected at the study intersections on Wednesday, March 8, 2017; Thursday, March 9, 2017 and Tuesday, March 14, 2017. The turning movement counts were collected at each intersection from 7:00 to 9:00 A.M. and from 4:00 to 6:00 P.M. The A.M. peak hour for all intersections occurred between 7:15 and 8:15 A.M., while the P.M. peak hour occurred between 5:00 and 6:00 P.M. To calibrate the 2017 counts to 2020 conditions, the traffic volumes were increased by one percent per year to account for background growth in the area. The existing lane configurations, traffic control devices, and peak hour traffic volumes used for this analysis have been illustrated on **Figure A-3**.

### Approved Development

The Monticello residential development was approved in 2015. Portions of the development have been completed, while others are currently under construction. At the time the traffic counts were collected in 2017, only a small number of the homes had been constructed and occupied. The approved development is located immediately to the south of the proposed development site. Monticello includes 160 lots for single-family homes. A traffic impact study was prepared for this development by TranSystems in 2015.

### Analysis

The scope of analysis for the assessment of the proposed development's impact on the surrounding transportation system is based in large part on the recommended practices of the Institute of Transportation Engineers (ITE), as outlined in their Traffic Engineering Handbook. ITE is a nationally-recognized organization of transportation professionals with members from both private and public sectors. The analysis of the proposed development's impact included development of trip generation and trip distribution estimates as well as a traffic operations assessment for each study scenario. Each of the analysis methodologies and findings are described in the subsequent sections.

### Trip Generation

Trip generation estimates were prepared using the Institute of Transportation Engineer's Trip Generation, 10th Edition. **Table 1** shows the expected trips to be generated by the proposed development.

Land Use	Intensity	ITE Code	Average Weekday	A.M. Peak Hour			P.M. Peak Hour		
				Total	In	Out	Total	In	Out
Low-Rise Apartments	372 units	220	2,772	167	38	129	191	120	71
Single-Family Detached Housing	21 units	210	248	20	5	15	23	14	9
<b>Total New Development Trips</b>			<b>3,020</b>	<b>187</b>	<b>43</b>	<b>144</b>	<b>214</b>	<b>135</b>	<b>79</b>

## Trip Distribution

The estimated trips generated by the proposed development were distributed onto the street system based on the trip distributions summarized in **Table 2**. These distributions are based on existing traffic patterns and engineering judgment. The detailed distribution patterns through the study intersections are shown in **Appendix B**.

Table 2 Trip Distribution	
Direction To/From	Percentage
West on Bowlin Road/Lakewood Blvd.	10%
South on I-470	25%
North on I-470	35%
South on Lakewood Way	15%
North on Lakewood Way	10%
South on Jamestown Drive	5%
<b>Total</b>	<b>100%</b>

## Traffic Operation Assessment

An assessment of traffic operations was made for the scenarios listed below. These scenarios allowed for comparison of the before and after impacts of the proposed development on the street network.

- ▶ Existing Conditions
- ▶ Existing plus Approved Development Conditions
- ▶ Existing plus Approved plus Proposed Development Conditions

The study intersections were evaluated using the Synchro traffic analysis software package. Calculations were performed based on the methodologies outlined in the Highway Capacity Manual (HCM), 2000 Edition, which is published by the Transportation Research Board. The operating conditions at an intersection are graded by the “level of service” experienced by drivers. Level of service (LOS) describes the quality of traffic operating conditions and is rated from “A” to “F”. LOS A represents the least congested condition with free-flow movement of traffic and minimal delays. LOS F generally indicates severely congested conditions with excessive delays to motorists. Intermediate grades of B, C, D, and E reflect incremental increases in the average delay per stopped vehicle. Delay is measured in seconds per vehicle. **Table 3** on the next page shows the upper limit of delay associated with each level of service for signalized and unsignalized intersections.

While LOS measurements apply to both signalized and unsignalized intersections, there are significant differences between how these intersections operate and how they are evaluated. LOS for signalized intersections reflects the operation of the intersection as a whole.

<b>Level of Service (LOS)</b>	<b>Signalized</b>	<b>Unsignalized</b>
A	≤ 10 Seconds	≤ 10 Seconds
B	≤ 20 Seconds	≤ 15 Seconds
C	≤ 35 Seconds	≤ 25 Seconds
D	≤ 55 Seconds	≤ 35 Seconds
E	≤ 80 Seconds	≤ 50 Seconds
F	> 80 Seconds	> 50 Seconds

Unsignalized intersections, in contrast, are evaluated based on the movement groupings which are required to yield to other traffic. Typically, these are the left turns off of the major street and the side-street approaches for two-way stop-controlled intersections. At unsignalized intersections lower LOS ratings (D, E and F) do not, in themselves, indicate the need for additional improvements. Many times there are convenient alternative paths to avoid the longer delays. Other times the volumes on the unsignalized approaches are relatively minor when compared to the major street traffic, and traffic signal installation may increase the average delay to all users of the intersection.

The LOS rating deemed acceptable varies by community, facility type and traffic control device. In Lee's Summit, LOS C has been identified as the minimum desirable goal for signalized intersections. At unsignalized intersections LOS D, E, and F are often accepted for low to moderate traffic volumes where the installation of a traffic signal is not warranted by the conditions at the intersection or location has been deemed undesirable for signalization for other reasons, e.g. the close proximity of an existing traffic signal or the presence of a convenient alternative path.

### Existing Conditions

The traffic volume counts used for a baseline analysis were obtained from the previous TranSystems study of the same intersections in 2017. The traffic volumes were grown by one percent per year to account for increases in background traffic since 2017. The study intersections were evaluated with the lane configurations, traffic volumes, and traffic control devices shown on **Figure A-3**. The results of the Existing Conditions intersection analyses are summarized on the next page in **Table 4** and on **Figure A-4** in **Appendix A**. The Synchro output files are included in **Appendix C**.

As shown **Table 4**, most movements at the study intersections currently operate within acceptable levels of service during the peak hours. The one exception is the southbound left-turn movement at the Bowlin Road and I-470 southbound ramps. The analysis indicates that this movement operates at LOS F during both peak hours.

**Table 4**  
**Intersection Operational Analysis**  
**Existing Conditions**

Intersection	Movement	A.M. Peak Hour		P.M. Peak Hour	
		LOS <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>1</sup>	Delay <sup>2</sup>
<b>Bowlin Road and I-470 SB Ramps</b>	<i>Westbound Left-Turn</i>	A	9.2	A	9.6
	<i>Southbound Right-Turn</i>	B	10.5	<b>D</b>	<b>27.9</b>
	<i>Southbound Left-Turn</i>	<b>F</b>	<b>&gt;100</b>	<b>F</b>	<b>&gt;100</b>
<b>Bowlin Road and I-470 NB Ramps</b>	<i>Traffic Signal</i>	B	13.7	B	19.1
<b>Bowlin Road and Lakewood Way</b>	<i>Traffic Signal</i>	C	29.1	C	30.1

1 – Level of Service

2 – Delay in seconds per vehicle

Due to lengthy delays for the southbound left-turn movement at the Bowlin Road and I-470 southbound ramps, a stop delay study was performed to compare the analysis results to actual conditions. The study was completed as part of the previous TranSystems traffic study during the P.M. peak hour (5:00 to 6:00 P.M.) on March 21, 2017. The results of the delay study are shown in **Table 5**.

**Table 5**  
**Delay Study Results**  
**Bowlin Road and I-470 SB Ramps**

Time Period	Movement	Average Delay per Vehicle	Average Queue	Maximum Queue
P.M. Peak Hour	Southbound Left-Turn	24.4 seconds	2 Vehicles	7 Vehicles

Based on the results of the stop delay study, the southbound left-turn movement at the Bowlin Road and I-470 southbound ramps intersection was found to operate with an average stop delay of 24.4 seconds per vehicle which corresponds to LOS C conditions instead of the LOS F conditions obtained from the Synchro analysis program.

Several factors could explain the difference between the Synchro analysis results and observed conditions. One factor is the close proximity of the signalized Anderson Drive intersection to the west, which creates gaps and platoons in the flow of traffic that are not accounted for in the Synchro analysis. Another factor is the gap time that southbound left-turn drivers are accepting to complete their maneuvers. The Synchro analysis program uses the Highway Capacity Manual default values for critical gaps. The critical gap is the minimum length of time between vehicles traveling on the major street that allows entry for drivers on the minor street approach. The default critical gap time for a left-turn onto a four-lane major street is 7.5 seconds. During the stop delay study, drivers were observed to routinely accept gaps smaller than the default critical gap time.



Calibrating the Synchro models to actual conditions for the southbound left-turn movement results in a critical gap time of 3.0 seconds. Adjusting the critical gap time in the Synchro analysis to reflect observed conditions reduces delays for the southbound left-turn movement as shown in **Table 6**.

<b>Table 6</b>					
<b>Intersection Operational Analysis with Critical Gap Time Adjusted</b>					
<b>Existing Conditions</b>					
<b>Intersection</b>	<b>Movement</b>	<b>A.M. Peak Hour</b>		<b>P.M. Peak Hour</b>	
		<b>LOS<sup>1</sup></b>	<b>Delay<sup>2</sup></b>	<b>LOS<sup>1</sup></b>	<b>Delay<sup>2</sup></b>
<b>Bowlin Road and I-470 SB Ramps</b>	<i>Southbound Left-Turn</i>	<i>B</i>	<i>14.8</i>	<i>D</i>	<i>27.0</i>

1 – Level of Service  
 2 – Delay in seconds per vehicle

Given the lower level of service at the Bowlin Road and I-470 southbound ramps intersection, the Existing Conditions traffic volumes evaluated for traffic signal installation. The peak hour traffic signal warrant analysis is shown in **Appendix C**. Southbound right-turn volumes were excluded from the minor street volumes in the analysis because right-turn traffic is not delayed by left-turning vehicles. The Manual on Uniform Traffic Control Devices (MUTCD) states that the right-turn volume should not be included if the movement enters the major street with minimal conflict. The eastbound right-turn volume is also excluded from the analysis, as it does not conflict with southbound left-turn movement. Existing traffic volumes for the A.M. and P.M. peak hours are below the minimum traffic volumes thresholds for the peak hour warrant. As such, it is unlikely that a traffic signal is currently warranted at the Bowlin Road and I-470 southbound ramps intersection.

### Existing plus Approved Development Conditions

In the Existing plus Approved Development Conditions scenario, the development trips generated by the approved Monticello development were added to the street network to determine the effects of traffic from the approved development which had just started construction at the time when the traffic counts were collected in 2017. The results of the Existing plus Approved Development Conditions intersection analyses are summarized on the next page in **Table 7** and on **Figures A-8** and **A-9**. The study intersections were evaluated with the lane configurations, traffic volumes, and traffic control devices shown on **Figures A-5** through **A-7**. The Synchro output files are included in **Appendix C**. The critical gap time at the Bowlin Road and I-470 Southbound ramps intersection was adjusted per the calibration from the stop delay study.

As shown in **Table 7**, all intersections are projected to operate at an acceptable level of service with the exception of the I-470 southbound ramps intersection. The southbound movement left-turn movement at the Bowlin Road and I-470 southbound ramps is projected to continue operating at LOS D during the P.M. peak hour with the addition of traffic from the Monticello subdivision. The southbound the southbound right-turn is projected to operate at LOS D in this scenario. The peak hour signal warrant analysis in **Appendix C** indicates that traffic volumes are projected to be at the minimum threshold to warrant a signal in this scenario.

**Table 7**  
**Intersection Operational Analysis**  
**Existing plus Approved Development Conditions**

Intersection	Movement	A.M. Peak Hour		P.M. Peak Hour	
		LOS <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>1</sup>	Delay <sup>2</sup>
<b>Bowlin Road and I-470 SB Ramps</b>					
	Westbound Left-Turn	B	11.2	B	11.8
	Southbound Right-Turn	B	10.0	D	28.8
	Southbound Left-Turn	C	16.6	D	29.1
<b>Bowlin Road and I-470 NB Ramps</b>					
	Traffic Signal	B	12.5	B	19.1
<b>Bowlin Road and Lakewood Way</b>					
	Traffic Signal	C	29.1	C	31.7
<b>Bowlin Road and Jamestown Drive</b>					
	Northbound	A	9.3	A	9.6

1 – Level of Service

2 – Delay in seconds per vehicle

### Existing plus Approved plus Proposed Development Conditions

The results of the Existing plus Approved plus Proposed Development conditions intersection analyses are summarized in **Table 8** and on **Figures A-13** and **A-14**. This study scenario assessed the street system with the additional traffic generated by the proposed development. The study intersections were evaluated with the lane configurations, traffic volumes, and traffic control devices shown on **Figures A-10** through **A-12**. The Synchro output files are included in **Appendix C**. The critical gap time at the Bowlin Road and I-470 Southbound ramps intersection was adjusted to the calibration from the stop delay study.

**Table 8**  
**Intersection Operational Analysis**  
**Existing plus Approved plus Proposed Development Conditions**

Intersection	Movement	A.M. Peak Hour		P.M. Peak Hour	
		LOS <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>1</sup>	Delay <sup>2</sup>
<b>Bowlin Road and I-470 SB Ramps</b>					
	Westbound Left-Turn	B	11.9	B	12.5
	Southbound Right-Turn	B	10.8	D	29.6
	Southbound Left-Turn	C	23.9	F	52.5
<b>Bowlin Road and I-470 NB Ramps</b>					
	Traffic Signal	B	12.7	B	19.8
<b>Bowlin Road and Lakewood Way</b>					
	Traffic Signal	C	28.5	C	34.6
<b>Bowlin Road and Site Drive 1</b>					
	Northbound	B	10.6	B	11.0
<b>Bowlin Road and Site Drive 2</b>					
	Northbound	B	10.0	B	10.6
<b>Bowlin Road and Jamestown Drive</b>					
	Northbound	A	9.4	A	9.8

1 – Level of Service

2 – Delay in seconds per vehicle

**Table 8** indicates that most intersections are projected to operate with acceptable levels of service. The southbound left-turn movement at the Bowlin Road and I-470 southbound ramps is projected to operate at LOS F with 52.5 seconds of delay during the P.M. peak hour. The queue length is projected to extend 175 feet. The southbound right-turn movement is projected to continue operating at LOS D in this scenario. All other intersections are projected to operate within acceptable levels of service. All projected queues can be contained within the storage length of the existing turn lanes.

The traffic volume projections at the Bowlin Road and I-470 southbound ramps intersection exceed the minimum volume thresholds for the peak hour traffic signal warrant. Typically, the peak hour signal warrant is used to justify a traffic signal installation in unusual cases such as at facilities that attract or discharge a large number of vehicles over a short time. As such, the peak hour warrant is likely not applicable at this location. However, the peak hour warrant does provide an indication of the potential need for future signalization or other traffic control improvements.

Given the close spacing to the signalized intersection with Anderson Drive, the Bowlin Road and I-470 southbound ramps intersection is not a desirable location for a traffic signal installation. Generally signals are to be spaced at least one-quarter mile apart to provide adequate distance for queuing, lane changing maneuvers, and signal coordination. If the southbound ramps intersection was signalized there would be potential for queues to extend through the two closely spaced intersections. There is also potential for eastbound and westbound drivers on Bowlin Road/Lakewood Boulevard approaching the first intersection to observe signal indications that are intended for the upstream intersection. In light of these safety and operational concerns, other traffic control or geometric improvement alternatives should be considered for this intersection as development continues in the area.

The addition of development traffic is projected to slightly increase traffic on Lakewood Way. Development traffic is projected to add as many as 29 vehicles during the A.M. peak hour, and 32 vehicles during the P.M. peak hour to Lakewood Way. This correlates to an increase in traffic volume of roughly 3% during the peak hours. Queue lengths and levels of service on Lakewood Way are projected to be nominally impacted by the addition of development traffic.

### **Access Management Code**

The City's Access Management Code provides guidance for traffic elements including turn lanes, connection spacings, and throat lengths of driveways, based on a roadway's classification. According to the City's classification map, Bowlin Road is a minor arterial roadway. Given the low volume of traffic projected and street characteristics, Bowlin Road to the east of Lakewood Way will function as a commercial collector street, instead of an arterial street.

As a commercial collector, a westbound left-turn lane is not warranted at either of the two site driveway intersections along Bowlin Road due to low volumes of left-turning traffic. The eastbound right-turn volumes are also projected to fall below the minimum volume threshold, therefore neither of the site driveways on Bowlin Road warrant any right-turn lanes. Turn lanes are also not warranted at Drive 3 and Jamestown Drive.

The Access Management Code provides minimum spacings between connections. Along residential collector streets, the minimum spacing between connections is 300 feet. The site driveways on Bowlin Road nearly satisfy the minimum spacing guidelines. Site Drive 1 is 270 feet from Campground Road and Site Drive 2 is 285 feet from Campground Road. It is worth noting that the driveways are spaced outside the functional area of the Bowlin Road and Campground Road intersection. The upstream and downstream functional areas of the intersection are both 250 feet, since no lateral shift into a turn lane is required. Therefore, the Site Driveway intersections are located outside the influence area of the adjacent intersections.

Adequate throat lengths are to be provided on each site driveway to provide space for vehicles to queue without adversely impacting circulation. Based on the driveway volumes and street classifications, the Access Management Code indicates that each driveway should have a minimum throat depth of 75 feet. The site plan indicates that Site Drives 1 and 2 exceed the minimum throat lengths.

### Sight Distance

Sight distances and methods for measurement are provided in A Policy on Geometric Design of Highways and Streets (7th Edition), also referred to as the AASHTO Green Book published by the American Association of State Highway and Transportation Officials (AASHTO). Intersection sight distance is provided at intersections to allow the drivers of stopped vehicles to depart from their approach and enter or cross the uncontrolled street. These distances are generous, allowing enough distance for the stopped driver to complete their turning or crossing maneuver without requiring through traffic on the uncontrolled street to reduce their speed. Stopping sight distance is the minimum distance required to allow for a vehicle to stop before reaching a stationary object in its path.

Sight distances were measured in the field at each proposed site driveway intersection. The measurements and AASHTO recommended sight distances for each direction of travel are shown in **Table 9**.

<b>Location</b>	<b>Direction Looking</b>	<b>Measured Sight Distance, feet</b>	<b>Recommended Intersection Sight Distance, feet</b>	<b>Recommended Stopping Sight Distance, feet</b>
Bowlin Road at Site Drive 1	East	>500	390	250
	West	>500	335	250
Bowlin Road at Site Drive 2	East	>500	390	250
	West	>500	335	250
Jamestown Drive at Drive 3	North	340	280	155
	South	330	240	155

The sight distance measurements indicate that sight distances are adequate for the posted speed limits at each of the proposed site driveway intersections.

## Unimproved Road Policy

The City has adopted an Unimproved Road Policy to provide direction for staff when considering proposed developments impacting roadways that are not improved to urban standards. Per the policy, Bowlin Road east of Lakewood Way would be considered an unimproved road. Jamestown Drive from Bowlin Road to the Monticello development would be considered an interim road. Portions of Lakewood Way would also be considered unimproved roads, however the addition of development traffic is projected to have a negligible impact on Lakewood Way. Therefore, the Unimproved Road Policy is not applicable to Lakewood Way for the proposed development.

The policy states that no residential subdivisions will be permitted on unimproved roads. As such, Bowlin Road is to be improved to urban standards (i.e. curb and gutters with sidewalks) when the apartments and site driveways are constructed along the south side of the road. Likewise, Jamestown Drive is to be improved to urban standards when the single-family residences and Site Drive 3 are constructed along the west side of the road. Improving these streets to urban standards will enhance mobility for vehicular traffic as well as pedestrians and bicyclists.

## Summary

TranSystems has completed a traffic impact study for the proposed residential development to be located generally south and west of the Bowlin Road and Jamestown Drive intersection 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 proposed development is projected to generate 187 new trips during the A.M. peak hour and 214 new trips during the P.M. peak hour. The apartments will be accessed from two proposed site driveways on Bowlin Road, and the single-family homes will be accessed from a proposed cul-de-sac street along Jamestown Drive. Sight distances are adequate where each of the three proposed site drives intersect the existing street network.

Bowlin Road and Jamestown Drive will be improved to urban standards when the portions of the proposed development adjacent to these roadways are constructed. Improving these streets to urban standards will enhance mobility for vehicular traffic as well as pedestrians and bicyclists. No capacity improvements are identified to mitigate the addition of development traffic to the street network.

All intersections are projected to operate at an acceptable level of service with the addition of development traffic, except for the Bowlin Road and I-470 southbound ramps intersection. The southbound left-turn movement at the intersection is projected to operate at LOS F during the P.M. peak hour. A traffic signal may be warranted at the intersection, however, the ramp is located a short distance from the existing traffic signal at the intersection with Anderson Drive. Closely spaced signalized intersections can result in operational and safety concerns. Therefore, other traffic control or geometric improvement alternatives should be considered for this intersection as development continues in the area.

## Appendix A - Figures

Figure A-1	Location Map
Figure A-2	Site Plan
Figure A-3	Existing Lane Configurations and Peak Hour Traffic Volumes
Figure A-4	Existing Conditions Peak Hour Operational Analysis Results
Figure A-5	Existing plus Approved Development A.M. Peak Hour Traffic Volumes
Figure A-6	Existing plus Approved Development P.M. Peak Hour Traffic Volumes
Figure A-7	Existing plus Approved Development Lane Configurations
Figure A-8	Existing plus Approved Development A.M. Peak Hour Operational Analysis Results
Figure A-9	Existing plus Approved Development P.M. Peak Hour Operational Analysis Results
Figure A-10	Existing plus Approved plus Proposed Development A.M. Peak Hour Traffic Volumes
Figure A-11	Existing plus Approved plus Proposed Development P.M. Peak Hour Traffic Volumes
Figure A-12	Existing plus Approved plus Proposed Development Lane Configurations
Figure A-13	Existing plus Approved plus Proposed Development A.M. Peak Hour Operational Analysis Results
Figure A-14	Existing plus Approved plus Proposed Development P.M. Peak Hour Operational Analysis Results

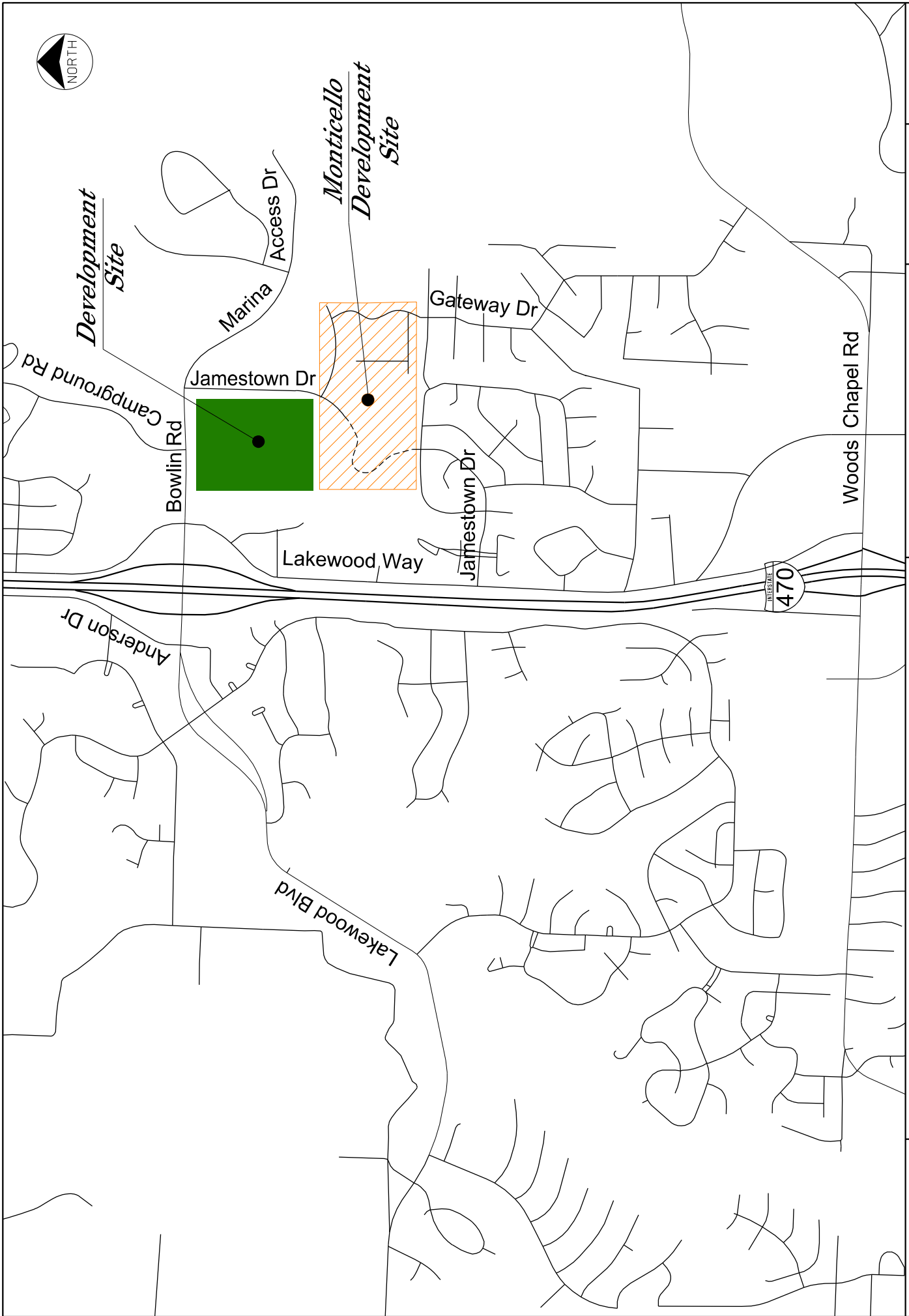


Figure A-1

August 2020

No Scale

Stags Bowlin Road  
Traffic Impact Study  
Lee's Summit, Missouri

LOCATION MAP





Site Drive 1

Bowlin Rd

Site Drive 2

N. LINE OF SW 1/4 SEC. 4

Jamestown Drive

Site Drive 3



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August 2020

No Scale

Stags Bowlin Road  
Traffic Impact Study  
Lee's Summit, Missouri

SITE PLAN

Figure A-2

