2-SB-23-C / 2-C-23-SU TIS Version 4 3/29/2023

BUFFAT MILL ESTATES Transportation Impact Analysis 5233 McIntyre Road Knoxville, TN

A Transportation Impact Analysis for the Buffat Mill Estates Subdivision

Submitted to

City of Knoxville Department of Engineering

Revised March 29, 2023 January 9, 2023 FMA Project No. 720.001



Submitted By:





2160 LAKESIDE CENTRE WAY, SUITE 201 KNOXVILLE, TN 37922 T 865.690.6419 F 865.690.6448 www.ardurra.com

TAB	BLE OF CONTENTS
EXE	CUTIVE SUMMARY
1	INTRODUCTION
	1.1 Project Description
	1.2 Study Area
	TABLE 1.2-1 BUFFAT MILL ESTATES STUDY AREA 1.3 Existing Site Conditions 8
	TABLE 1.3-1 BUFFAT MILL ESTATES EXISTING SITE CONDITIONS 1.4 TRANSIT NETWORK 9
	1.5 Pedestrian/Bicycle Network
2	Existing Traffic Volumes
3	BACKGROUND GROWTH
4	TRIP GENERATION AND TRIP DISTRIBUTION
5	Table 4-1 Buffat Mill Estates Study Area Projected Capacity and Level of Service 23
	Table 5-1 Level of Service (LOS) Index Table 5-2 Intersection Analysis Level of Service (LOS) Summary
6	TURN LANE WARRANT ANALYSIS
7	CONCLUSIONS AND RECOMMENDATIONS
	7.1 Spring Hill Road at Buffat Mill Road
	7.2 LOVES CREEK ROAD AT BUFFAT MILL ROAD
	7.3 Spring Hill Road at McIntyre Road
	7.4 Loves Creek Road at McIntyre Road
	7.5 Spring Hill Road at Monte Vista Road
	7.6 BUFFAT MILL ROAD AT ROADWAY CONNECTION
	7.7 McIntyre Road at Roadway Connection

FIGURES_

1	LOCATION MAP	6
2	Site Plan	7
3	2022 Existing Peak Hour Traffic	. 12
4	2027 Background Peak Hour Traffic	. 14
5	Residential Peak Hour Trip Distribution – Roadway Connections	17
6	Residential Peak Hour Trip Distribution	. 18
7	Residential Peak Hour Site Trips – Roadway Connections	. 19
8	Residential Peak Hour Site Trips	. 20
9	2027 Full Buildout Peak Hour Traffic – Roadway Connections	21
10	2027 Full Buildout Peak Hour Traffic	22

ATTACHMENTS

- 1 AERIAL PHOTOS
- 2 TRAFFIC COUNTS
- 3 TRANSIT & BICYCLE NETWORK
- 4 ADT TRENDS
- 5 TRIP GENERATION
- 6 INTERSECTION WORKSHEETS EXISTING AM/PM PEAKS
- 7 INTERSECTION WORKSHEETS BACKGROUND AM/PM PEAKS
- 8 INTERSECTION WORKSHEETS FULL BUILDOUT AM/PM PEAKS
- 9 TURN LANE WARRANT ANALYSIS
- 10 SIGHT DISTANCE

Executive Summary

Rand Partners, LLC is proposing a residential development with single-family lots within the City of Knoxville limits. The project is located west of Interstate 640 between Buffat Mill Road and McIntyre Road and near Spring Hill Elementary School. The full buildout of the development will consist of 288 single-family lots with amenities including a clubhouse, swimming pool, dog park and wash station and pickleball court. Construction is proposed to take place this year and this study assumes full build out for the development will occur in 2027.

Buffat Mill Estates has two proposed roadway connections. The main connection is a boulevard entrance with access to Buffat Mill Road and is located approximately 190 feet west of Locarno Drive and approximately 1,590 feet east of Spring Hill Road. The second roadway connection accesses McIntyre Road and is located approximately 405 feet west of Ross Road and approximately 1,000 feet east of Payne Road.

In order to maintain or provide an acceptable level-of-service for each of the intersections studied, some recommendations are presented.

Spring Hill Road at Buffat Mill Road

After the completion of the Buffat Mill Estates residential development the stopcontrolled intersection of Spring Hill Road at Buffat Mill Road will operate at a LOS B or better for all approaches during both the AM and PM peak hours.

The result of the queue analysis is that the existing storage for the northbound, eastbound and westbound approaches are adequate and there are no recommended improvements to the intersection of Spring Hill Road at Buffat Mill Road.

Loves Creek Road at Buffat Mill Road

After the completion of the Buffat Mill Estates residential development the stopcontrolled intersection of Loves Creek Road at Buffat Mill Road will operate at an acceptable LOS A for the northbound approach (Loves Creek Road). The eastbound approach (Buffat Mill Road) will continue to experience a LOS D during the PM peak hour. A LOS D is generally considered the minimum acceptable delay for an urban area.

A northbound left turn lane at the intersection of Buffat Mill Road at Loves Creek Road is met during existing, background and full buildout conditions. The warrant for a northbound left turn lane is an existing condition that is only marginally impacted by the new vehicle trips from the Buffat Mill Estates residential development. The result of the queue analysis is that the eastbound approach (Buffat Mill Road) will queue approximately five vehicles during the PM peak hour but will not block the closest intersection at Kinzel Way. There are no recommended improvements to the intersection of Loves Creek Road at Buffat Mill Road.

Spring Hill Road at McIntyre Road

After the completion of the Buffat Mill Estates residential development the stopcontrolled intersection of Spring Hill Road at McIntyre Road will operate at a LOS B or better during both the AM and PM peak hours.

The result of the queue analysis is that the existing storage for the eastbound approach (McIntyre Road) is adequate and there are no recommended improvements to the intersection of Spring Hill Road at McIntyre Road.

Loves Creek Road at McIntyre Road

After the completion of the Buffat Mill Estates residential development the stopcontrolled intersection of Loves Creek Road at McIntyre Road will operate at a LOS B or better during both the AM and PM peak hours.

The result of the queue analysis is that the existing storage for the westbound approach (McIntyre Road) is adequate and there are no recommended improvements to the intersection of Loves Creek Road at McIntyre Road.

Spring Hill Road at Monte Vista Road

After the completion of the Buffat Mill Estates residential development the stopcontrolled intersection of Spring Hill Road at Monte Vista Road will operate at a LOS A during both the AM and PM peak hours.

The result of the queue analysis is that the existing storage for the westbound approach (McIntyre Road) is adequate and there are no recommended improvements to the intersection of Spring Hill Road at Monte Vista Road.

Roadway Connections

After the completion of the Buffat Mill Estates residential development the stopcontrolled intersection of Buffat Mill Road at the roadway connection (Road "A) and McIntyre Road at the roadway connection (Road "F") will operate at a LOS B or better during both the AM and PM peak hours.

A variance will need to be requested at the intersection of Buffat Mill Road at the Roadway Connection (Road "A") to allow a reduction in the required 300 foot intersection spacing on a Collector. The property frontage is limited and shifting the entrance further away from Locarno Drive is not an option.

1 Introduction

1.1 Project Description

This report provides a summary of a transportation impact analysis that was performed for the Buffat Mill Estates. The Buffat Mill Estates residential development proposes 288 single-family lots with amenities including a clubhouse, swimming pool, dog park and wash station and pickleball court. The project is located west of Interstate 640 between Buffat Mill Road and McIntyre Road and inside the city limits for Knoxville, Tennessee. The location of the site is shown in Figure 1.

Construction is proposed to take place this year and this study assumes full build out for the development will occur in 2027.

Buffat Mill Estates has two proposed roadway connections. The main connection is a boulevard entrance with access to Buffat Mill Road and is located approximately 190 feet west of Locarno Drive and approximately 1,590 feet east of Spring Hill Road. The second roadway connection accesses McIntyre Road and is located approximately 405 feet west of Ross Road and approximately 1,000 feet east of Payne Road.

Knox County Schools provides free bus transportation except for students that live in the Parent Responsibility Zone (PRZ). Students who live in the PRZ are not eligible for transportation services. The PRZ for Grades K-5 is "an area of one (1) mile from the school, by the shortest route" and the PRZ for Grades 6-12 is "an area of one and one-half (1 ½) miles from the school, by the shortest route". The distance measurements for transportation purposes shall include only publicly maintained roads.

The proposed Buffat Mill Estates will be located within the Parent Responsibility Zone (PRZ) of Spring Hill Elementary School but will be eligible for bus services for the nearby Holston Middle School.

The proposed site layout is shown in Figure 2.

Buffat Mill Estates Transportation Impact Analysis March 29, 2023



Figure 1: Location Map

Buffat Mill Estates Transportation Impact Analysis March 29, 2023



Figure 2: Site Plan

1.2 Study Area

The purpose of this study is to evaluate the impacts to the traffic conditions caused by the proposed development. Buffat Mill Road, McIntyre Road and Monte Vista Road are considered east-west oriented roadways and Spring Hill Road and Loves Creek Road are considered north-south oriented roadways. The existing intersections and existing traffic control are summarized in Table 1.2-1 Study Area.

Table 1.2-1
Buffat Mill Estates
Study Area

Intersection	Existing Traffic Control
Buffat Mill Road at Spring Hill Road	Stop Controlled
Buffat Mill Road at Loves Creek Road	Stop Controlled
McIntyre Road at Spring Hill Road	Stop Controlled
McIntyre Road at Loves Creek Road	Stop Controlled
Spring Hill Road at Monte Vista Road	Stop Controlled

1.3 Existing Site Conditions

Roadway geometry and posted speed limits were obtained by field observations. Functional classifications for the roadways were obtained from Knoxville-Knox County Planning "2018 Major Road Plan" dated October 23, 2018. This information is summarized in Table 1.3-1 Existing Site Conditions.

The speed limit on a roadway with no posted limit is 25 mph per City of Knoxville ordinance.

Table 1.3-1				
Buffat Mill Estates				
Existing Site Conditions				

Roadway	Speed Lanes Limit	Road Width	Major Road Plan	ROW
Spring Hill Road	30 mph 2	~20 feet	Minor Collector	50 feet
Loves Creek Road	30 mph 2	∼22 feet	Major Collector	60 feet
Buffat Mill Road	30 mph 2	~19-20 feet	Major Collector	60 feet
McIntyre Road	25 mph 2	~19-24 feet	Not Classified (Local)	
Monte Vista Road	25 mph 2	~15 feet	Not Classified (Local)	

Aerial photos of the existing intersections are included in Attachment 1.

1.4 Transit Network

The Knoxville Area Transit (KAT) operates in the vicinity of the proposed development. There are no bus routes that operate on Buffat Mill Road.

Route 23 (Millertown) stops include Knoxville Station, Broadway Tower Apartments and Walmart (Millertown Pike). The nearest KAT stop to the development along Route 23 is currently located at the intersection of Millertown Pike at Spring Hill Road and approximately 2,850 feet from the proposed roadway connection (Road "A") to Buffat Mill Road. This route provides headways of approximately 60 minutes on Weekdays and Saturdays.

Route 33 (MLK Jr. Avenue) stops include Knoxville Station, Austin East High School, Kirkwood Street Superstop and Target (Washington Pike). The nearest KAT stop to the development along Route 33 is currently located at Washington Pike at Green Meadow Lane and approximately 5,850 feet from the proposed roadway connection (Road "A") to Buffat Mill Road. This route provides headways of approximately 60 minutes on Weekdays and Saturdays.

A copy of the KAT Bus map for Route 23 (Millertown) and Route 33 (MLK Jr. Avenue) are included in Attachment 3.

1.5 Pedestrian/Bicycle Network

There are no existing sidewalks on Buffat Mill Road, Spring Hill Road, McIntyre Road, Monte Vista Road or Loves Creek Road. In the vicinity of the proposed development there is an existing sidewalk on the north side of Mildred Drive which connects Spring Hill Road to Spring Hill Elementary School.

The concept plan shows proposed sidewalks throughout the site including a connection to Buffat Mill Road and McIntyre Road. The concept plan also shows a natural hiking path on the east side of the site and as a connection between the clubhouse, pickleball court and Road "D". There is no proposed sidewalk or natural hiking path connection to the existing Monte Vista Road.

The "Knoxville Bicycle Map 2017" classifies Buffat Mill Road as a comfortable bike route with a steep slope of greater than 10% near the proposed roadway connection (Road "A") and Spring Hill Road and Loves Creek Road as collector streets with expected higher traffic speeds and volumes.

Loves Creek Greenway is also located in the vicinity of the proposed development east of Interstate 640.

A copy of the Knoxville Bicycle Map 2017 is included in Attachment 3.

2 Existing Traffic Volumes

Ardurra conducted a peak hour turning movement count at the unsignalized intersection of Spring Hill Road at Buffat Mill Road on Tuesday October 4, 2022. The AM peak hour occurred between 7:00 a.m. and 8:00 a.m. with an AM PHF of 0.76. The PM peak hour occurred between 2:15 p.m. and 3:15 p.m. with a PM PHF of 0.90.

Ardurra conducted a peak hour turning movement count at the intersection of Loves Creek Road at Buffat Mill Road on Wednesday October 5, 2022. The AM peak hour occurred between 7:30 a.m. and 8:30 a.m. with an AM PHF of 0.84. The PM peak hour occurred between 4:45 p.m. and 5:45 p.m. with a PM PHF of 0.97.

Ardurra conducted a peak hour turning movement count at the intersection of Spring Hill Road at McIntyre Road on Thursday October 6, 2022. The AM peak hour occurred between 7:00 a.m. and 8:00 a.m. with an AM PHF of 0.90. The PM peak hour occurred between 4:30 p.m. and 5:30 p.m. with a PM PHF of 0.86.

Ardurra conducted a peak hour turning movement count at the intersection of Loves Creek Road at McIntyre Road on Thursday October 6, 2022. The AM peak hour occurred between 7:30 a.m. and 8:30 a.m. with an AM PHF of 0.90. The PM peak hour occurred between 5:00 p.m. and 6:00 p.m. with a PM PHF of 0.93.

Ardurra conducted a peak hour turning movement count at the intersection of Spring Hill Road at Monte Vista Road on Wednesday October 5, 2022. The AM peak hour occurred between 7:15 a.m. and 8:15 a.m. with an AM PHF of 0.92. The PM peak hour occurred between 5:15 p.m. and 6:15 p.m. with a PM PHF of 0.86.

The existing volumes including the AM and PM peak hour traffic volumes at the count locations are shown in Figure 3, and the count data collected is included in Attachment 2.

The turning movement counts did include existing pedestrian and/or bicycle counts; however, there was not any pedestrian and/or bicycle traffic during the AM or PM peak hours for the intersections of Spring Hill Road at Buffat Mill, Loves Creek Road at Buffat Mill Road, Spring Hill Road at McIntyre Road or Loves Creek Road at McIntyre Road and one southbound pedestrian was recorded during the AM peak hour at the intersection of Spring Hill Road at Monte Vista Road.



Figure 3: 2022 Existing Peak Hour Traffic

3 Background Growth

The Tennessee Department of Transportation (TDOT) maintains count stations in the vicinity of the proposed development.

TDOT count station ID 47000056 is located on Rutledge Pike (SR 1) west of the Interstate I-640. The annual growth rate for this station over the last twenty years is approximately 0.97%. The 2021 ADT was 21,875 vehicles per day.

TDOT count station ID 47000388 is located on Loves Creek Road north of the intersection of Buffat Mill Road at Loves Creek Road. The annual growth rate for this station over the last twenty years is approximately 0.01%. The 2021 ADT was 5,056 vehicles per day.

TDOT count station ID 47000265 is located on Millertown Pike near the intersection of Milltertown Pike at Spring Hill Road. The annual growth rate for this station over the last twenty years is approximately 0.61%. The 2021 ADT was 7,033 vehicles per day.

For the purpose of this study, an annual growth rate of 1.0% was assumed for traffic at the studied intersections of until full occupancy is reached in 2027. Attachment 4 shows the trend line growth charts for the TDOT count stations.

Figure 4 demonstrates the projected background peak hour volumes at the studied intersections after applying the background growth rate to the existing conditions.



Figure 4: 2027 Background Peak Hour Traffic

4 Trip Generation and Trip Distribution

The Buffat Mill Estates residential development proposes 288 single-family lots with amenities including a clubhouse, swimming pool, dog park and wash station and pickleball court. The on-site amenities are intended for use by the residents of Buffat Mill Estates and are not open to the general public.

Single-Family Detached Housing or Land Use 210 was used to calculate site trips for the development using the fitted curve equations from the Trip Generation, 11th Edition, published by the Institute of Transportation Engineers. The land use worksheets are included in Attachment 5.

The total combined new trips generated by the Buffat Mill Estates residential development were estimated to be 2,670 daily trips. The estimated trips are 195 trips during the AM peak hour and 269 trips during the PM peak hour.

Table 4-1 Buffat Mill Estates Trip Generation Summary					
Land Use	Density	Daily Trips	AM Peak Hour Enter Exit	PM Peak Hour Enter Exit	
Single-Family Detached Housing (LUC 210)	288 Lots	2,670	49 146	169 100	

A trip generation summary is shown in Table 4-1.

Buffat Mill Road at the intersection with the proposed driveway connection has an existing trip distribution of 40% eastbound and 60% westbound during the AM peak hour and 55% eastbound and 45% westbound during the PM peak hour.

The directional distribution of the traffic generated by the Buffat Mill Estates was determined using the existing traffic volumes at the intersection of Buffat Mill Road at Spring Hill Road in combination with the concept plan layout. The entering and exiting traffic was assumed to be 15% Loves Creek southbound, 5% Loves Creek northbound, 10% Buffat Mill Road westbound, 25% Spring Hill Road northbound and 45% Spring Hill Road southbound.

Ardurra assumed that 50% of traffic would enter/exit the development to/from Buffat Mill Road at the main roadway connection (Road "A") and that 50% of traffic would enter/exit the development to/from McIntyre Road at the second roadway connection (Road "F").

Figures 5 and 6 show the residential peak hour trip distribution for the driveway and the roadway network. Figures 7 and 8 show the residential peak hour site trips for the driveway and roadway network.

Figures 9 and 10 show the 2027 full buildout peak hour combined traffic including the background traffic and the peak hour site trips from the Buffat Mill Estates for the driveway and the roadway network.



Figure 5: Residential Peak Hour Trip Distribution - Roadway Connections



Figure 6: Residential Peak Hour Trip Distribution



Figure 7: Residential Peak Hour Site Trips - Roadway Connections



Figure 8: Residential Peak Hour Site Trips



Figure 9: 2027 Full Buildout Peak Hour Traffic - Roadway Connections



Figure 10: 2027 Full Buildout Peak Hour Traffic

5 **Projected Capacity and Level of Service**

The existing intersection of Spring Hill Road at Buffat Mill Road is a four-legged intersection with existing stop signs on Buffat Mill Road and on the northbound approach of Spring Hill Road. The southbound approach of Spring Hill Road does not stop. The existing intersection of Loves Creek Road at Buffat Mill Road, Spring Hill Road at McIntyre Road, Loves Creek Road at McIntyre Road, Spring Hill Road at Monte Vista Road and the proposed roadway connections to Buffat Mill Road and McIntyre Road are three-legged intersections with stop control on the minor approaches.

Unsignalized intersection capacity analyses were performed using the Highway Capacity Software (HCS7) for the AM and PM peak hours to evaluate the existing, background and full buildout traffic conditions at the intersections of Spring Hill Road at Buffat Mill Road, Loves Creek Road at Buffat Mill Road, Spring Hill Road at McIntyre Road, Loves Creek Road at McIntyre Road, Spring Hill Road at Monte Vista Road and the proposed roadway connections to Buffat Mill Road and McIntyre Road.

The results from the analyses are expressed with a term "level of service" (LOS), which is based on the amount of delay experienced at the intersection. The LOS index ranges from LOS A, indicating excellent traffic conditions with minimal delay, to LOS F indicating very congested conditions with excessive delay. LOS D generally is considered the minimum acceptable condition in urban areas. Table 5-1 shows the LOS index range for signalized and unsignalized intersections as defined by the Highway Capacity Manual (HCM).

Level of Service (LOS) Index					
Level of Service	Signalized Intersection	Unsignalized Intersection			
LOS A	\leq 10 sec	\leq 10 sec			
LOS B	10 – 20 sec	10 – 15 sec			
LOS C	20 – 35 sec	15 – 25 sec			
LOS D	35 – 55 sec	25 – 35 sec			
LOS E	55 – 80 sec	35 – 50 sec			
LOS F	> 80 sec	> 50 sec			

Table 5-1 Level of Service (LOS) Index

The HCS7 worksheets are included in Attachments 6, 7, and 8. Table 5-2 shows the results of the capacity analyses.

Intersection Analysis Level of Service (LOS) Summary					
Intersection	Time Period	Year 2022 Existing (Delay/LOS)	Year 2027 Background (Delay/LOS)	Year 2027 Full Buildout (Delay/LOS)	
Spring Hill Road @	AM Peak				
Buffat Mill Road	EB Approach	9.4 / A	9.7 / A	10.4 / B	
	WB Approach	9.1 / A	9.3 / A	10.6 / A	
	NB Approach PM Peak	9.0 / A	9.2 / A	9.9 / A	
	EB Approach	10.1 / B	10.5 / B	11.7 / B	
	WB Approach	9.2 / A	9.4 / A	10.5 / B	
	NB Approach	9.5 / A	9.8 / A	10.7 / B	
Loves Creek Road @	AM Peak				
Buffat Mill Road	EB Approach	11.3 / B	11.6 / B	12.1 / B	
	NB Approach	7.9 / A	8.0 / A	8.0 / A	
	PM Peak	aa a / a			
	EB Approach	22.2 / C	25.6 / D	28.7 / D	
	NB Approach	8.1 / A	8.1 / A	8.2 / A	
Spring Hill Road @	AM Peak				
McIntyre Road	WB Approach	9.2 / A	9.2 / A	10.2 / B	
	SB Approach	7.5 / A	7.5 / A	7.5 / A	
	WB Approach	97/A	98/A	113/B	
	SB Approach	7.5 / A	7.5 / A	7.7 / A	
Loves Creek Road @	AM Peak				
McIntyre Road	EB Approach	10.4 / B	11.0 / B	10.5 / B	
,	NB Approach	7.7 / A	7.9 / A	7.8 / A	
	PM Peak				
	EB Approach	12.9 / B	14.3 / B	13.4 / B	
	NB Approach	8.1 / A	8.3 / A	8.2 / A	
Spring Hill Road @	AM Peak				
Monte Vista Road	WB Approach	9.1 / A	9.1 / A	9.2 / A	
	SB Approach	7.5 / A	7.5 / A	7.5 / A	
	WB Approach	94/A	94/A	96/A	
	SB Approach	7.5 / A	7.5 / A	7.6 / A	

Table 5-2

Buffat Mill Road @ Roadway Connection (Road "A")	AM Peak WB Approach NB Approach PM Peak WB Approach NB Approach	7.4 / A 10.2 / B 7.7 / A 10.8 / B
McIntyre Road @ Roadway Connection (Road "F")	AM Peak EB Approach SB Approach PM Peak EB Approach SB Approach	7.3 / A 9.0 / A 7.4 / A 9.1 / A

6 Turn Lane Warrant Analysis

The intersection of Buffat Mill Road at Loves Creek Road was evaluated to determine if a northbound left turn lane or a southbound right turn lane are warranted and the intersection of Buffat Mill Road at the proposed roadway connection (Road "A") was evaluated to determine if an eastbound right turn lane or a westbound left turn lane are warranted.

The intersection of McIntyre Road at Loves Creek Road was evaluated to determine if a northbound left turn lane or a southbound right turn lane are warranted and the intersection of McIntyre Road at the proposed roadway connection (Road "F") was evaluated to determine if an eastbound left turn lane or a westbound right turn lane are warranted.

The Knox County Department of Engineering and Public Works handbook, "Access Control and Driveway Design Policy," was used to analyze the information.

At the intersection of Buffat Mill Road at Loves Creek a southbound right turn lane is not warranted during either the AM or PM peak hour and a northbound left turn lane is warranted during the PM peak hour. A warrant for the northbound left turn lane at the intersection of Buffat Mill Road at Loves Creek Road is met during existing, background and full buildout conditions.

There are no turn lanes warranted at the intersection of McIntyre Road at Loves Creek Road, Buffat Mill Road at the proposed roadway connection (Road "A") and McIntyre Road at the proposed roadway connection (Road "F") during either the AM or PM peak hours after the full buildout of the Buffat Mill Estates residential development.

The turn lane warrant worksheets and analysis are included in Attachment 9.

7 Conclusions and Recommendations

7.1 Spring Hill Road at Buffat Mill Road

The existing, background and full buildout conditions at the unsignalized intersection of Spring Hill Road at Buffat Mill Road were analyzed using the Highway Capacity Software (HCS7). Spring Hill Road at Buffat Mill Road is a four-legged intersection with existing stop signs on Buffat Mill Road and on the northbound approach of Spring Hill Road. The southbound approach of Spring Hill Road does not stop. The Highway Capacity Software (HCS7) does not calculate delay for an intersection in which only one approach does not stop; therefore, the intersection was analyzed as an all-way stop controlled intersection as a conservative estimate of delay.

The existing and background traffic conditions for the intersection of Spring Hill Road at Buffat Mill Road operate at a LOS B or better for all approaches during both the AM and PM peak hour.

After the completion of the full buildout of the Buffat Mill Estates the traffic conditions for the intersection of Spring Hill Road at Buffat Mill Road will continue to operate at a LOS B or better for all four approaches during both the AM and PM peak hours.

The 95% queue length is defined as the queue length that has only a 5-percent probability of being exceeded during the analysis time period. The 95% queue length is typically used to determine the length of turning lanes in order to minimize the risk of blockage.

The all-way stop controlled intersection capacity analysis shows the full buildout 95% queue length for the northbound approach (Spring Hill Road) and eastbound and westbound approaches (Buffat Mill Road) of less than two vehicles during both the AM peak hour and PM peak hours.

The existing storage lengths for the northbound approach (Spring Hill Road) and eastbound and westbound approaches (Buffat Mill Road) are adequate and no additional improvements are necessary in order to accommodate the Buffat Mill Estates residential development.

7.2 Loves Creek Road at Buffat Mill Road

The existing, background and full buildout conditions at the unsignalized intersection of Loves Creek at Buffat Mill Road were analyzed using the Highway Capacity Software (HCS7). Loves Creek Road at Buffat Mill Road is a three-legged intersection with an existing stop sign on eastbound Buffat Mill Road.

The existing traffic conditions for the eastbound approach (Buffat Mill Road) operate at a LOS B during the AM peak hour and a LOS C during the PM peak hour and the northbound approach (Loves Creek Road) operates at a LOS A during both the AM and PM peak hours.

The background traffic conditions for the eastbound approach (Buffat Mill Road) operate at a LOS B during the AM peak hour and a LOS D during the PM peak hour and the northbound approach (Loves Creek Road) operates at a LOS A during both the AM and PM peak hours.

After the completion of the full buildout of the Buffat Mill Estates the traffic conditions for the intersection of Buffat Mill Road at Loves Creek Road will operate as follows. The eastbound approach (Buffat Mill Road) will operate at a LOS B during the AM peak hour and a LOS D during the PM peak hour. The northbound approach (Loves Creek Road) will operate at a LOS A during both the AM and PM peak hours.

The 95% queue length is defined as the queue length that has only a 5-percent probability of being exceeded during the analysis time period. The 95% queue length is typically used to determine the length of turning lanes in order to minimize the risk of blockage.

Buffat Mill Road at the intersection with Loves Creek Road is located approximately 300 feet east of the intersection of Kinzel Way with an available storage of 15 vehicles before the queue from the stop-controlled intersection would block the connection to Kinzel Way.

The unsignalized intersection capacity analysis shows the full buildout 95% queue length for the eastbound approach (Buffat Mill Road) of less than one vehicle (approximately 25 feet) during the AM peak hour and 4.6 vehicles (approximately 125 feet) during the PM peak hour; therefore, the existing storage at the intersection is adequate and no improvements are necessary in order to accommodate the Buffat Mill Estates residential development.

At the intersection of Buffat Mill Road at Loves Creek a southbound right turn lane is not warranted during either the AM or PM peak hour and a northbound left turn lane is warranted during the PM peak hour per the Knox County Department of Engineering and Public Works handbook, "Access Control and Driveway Design Policy." A northbound left turn lane at the intersection of Buffat Mill Road at Loves Creek Road is met during existing, background and full buildout conditions. The warrant for a northbound left turn lane is an existing condition that is only marginally impacted by the new vehicle trips from the Buffat Mill Estates residential development.

Any future improvements to the intersection or the various traffic management infrastructure, would need to be reviewed, coordinated, and approved by the City of Knoxville Department of Engineering.

7.3 Spring Hill Road at McIntyre Road

The existing, background and full buildout conditions at the unsignalized intersection of Spring Hill Road at McIntyre Road were analyzed using the Highway Capacity Software (HCS7). Spring Hill Road at McIntyre Road is a three-legged intersection with an existing stop sign on westbound McIntyre Road.

The existing and background traffic conditions for the westbound approach (McIntyre Road) operate at a LOS A during the AM and PM peak hours and the southbound approach (Spring Hill Road) operate at a LOS A during both the AM and PM peak hours.

After the completion of the full buildout of the Buffat Mill Estates the traffic conditions for the intersection of Spring Hill Road at McIntyre Road will operate as follows. The westbound approach (McIntyre Road) will operate at a LOS B during both the AM and PM peak hours. The southbound approach (Loves Creek Road) will continue to operate at a LOS A during both the AM and PM peak hours.

The unsignalized intersection capacity analysis shows a 95% queue length at the full buildout for westbound McIntyre Road of less than one car length during both the AM and PM peak hours; therefore, the existing storage is adequate, and no improvements are necessary in order to accommodate the Buffat Mill Estates residential development.

7.4 Loves Creek Road at McIntyre Road

The existing, background and full buildout conditions at the unsignalized intersection of Loves Creek Road at McIntyre Road were analyzed using the Highway Capacity Software (HCS7). Loves Creek Road at McIntyre Road is a three-legged intersection with an existing stop sign on eastbound McIntyre Road.

The existing and background traffic conditions for the eastbound approach (McIntyre Road) operate at a LOS B during both the AM and PM peak hours and the

northbound approach (Loves Creek Road) operate at a LOS A during both the AM and PM peak hours.

After the completion of the full buildout of the Buffat Mill Estates the traffic conditions for the intersection of Loves Creek Road at McIntyre Road will operate as follows. The eastbound approach (McIntyre Road) will operate at a LOS B during both the AM and PM peak hours. The northbound approach (Loves Creek Road) will continue to operate at a LOS A during both the AM and PM peak hours.

The unsignalized intersection capacity analysis shows a 95% queue length at the full buildout for eastbound McIntyre Road of less than one car length during both the AM and PM peak hours; therefore, the existing storage is adequate, and no improvements are necessary in order to accommodate the Buffat Mill Estates.

7.5 Spring Hill Road at Monte Vista Road

The existing, background and full buildout conditions at the unsignalized intersection of Spring Hill Road at Monte Vista Road were analyzed using the Highway Capacity Software (HCS7). Spring Hill Road at Monte Vista Road is a three-legged intersection with an existing stop sign on westbound Monte Vista Road.

The existing and background traffic conditions for the westbound approach (Monte Vista Road) operate at a LOS A during both the AM and PM peak hours and the southbound approach (Spring Hill Road) operates at a LOS A during both the AM and PM peak hours.

After the completion of the full buildout of the Buffat Mill Estates the traffic conditions for the intersection of Spring Hill Road at Monte Vista Road will operate as follows. The westbound approach (Monte Vista Road) will continue to operate at a LOS A during both the AM and PM peak hours. The southbound approach (Spring Hill Road) will continue to operate at a LOS A during both the AM and PM peak hours.

The unsignalized intersection capacity analysis shows a 95% queue length at the full buildout for westbound Monte Vista Road of less than one car length during both the AM and PM peak hours; therefore, the existing storage is adequate, and no improvements are necessary in order to accommodate the Buffat Mill Estates.

7.6 Buffat Mill Road at Roadway Connection (Road "A")

The proposed full buildout conditions at the unsignalized intersection of Buffat Mill Road at the roadway connection (Road "A") were analyzed using the Highway Capacity Software (HCS7). Buffat Mill Road at the proposed roadway connection (Road "A") is a three-legged intersection with a proposed stop sign on the northbound roadway connection (Road "A").

After the completion of the full buildout of the Buffat Mill Estates the traffic conditions for the intersection of Buffat Mill Road at the roadway connection (Road "A") will operate as follows. The westbound approach (Buffat Mill Road) will operate at a LOS A during both the AM and PM peak hours. The northbound approach (Road "A") will operate at a LOS B during both the AM and PM peak hours.

The width of Buffat Mill Road at the proposed roadway connection (Road "A") is approximately 19-20 feet. The minimum recommended pavement width standard is 20 feet wide. The City of Knoxville has reviewed the pavement width in the vicinity of the Buffat Mill Estates and is not requiring any road widening improvements.

Buffat Mill Road is classified as a Major Collector by the Major Road Plan. The minimum intersection spacing required on a collector street is 300 feet per the "Knoxville-Knox County Subdivision Regulations" amended through October 6, 2022. The main roadway connection (Road "A") is located approximately 190 feet west of Locarno Drive and approximately 1,590 feet east of Spring Hill Road; therefore, the minimum required separation on a collector street is not met.

The Buffat Mill Estates residential development will need to request a variance to allow the intersection spacing to be less than the required 300 feet. The property frontage along Buffat Mill Road is limited and shifting the entrance further away from Locarno Drive is not an option.

The unsignalized intersection capacity analysis shows a 95% queue length at the full buildout for westbound Buffat Mill Road of less than one car length during both the AM and PM peak hours; therefore, westbound vehicles turning left onto Road "A" are not expected to back up or interfere with the traffic operations at the intersection of Buffat Mill Road at Locarno Drive.

An eastbound right turn lane and a westbound left turn lane on Buffat Mill Road are not warranted during either the AM or PM peak hours per the Knox County Department of Engineering and Public Works handbook, "Access Control and Driveway Design Policy."

The minimum required stopping sight distance and intersection sight distance for the intersection of Buffat Mill Road at the proposed roadway connection (Road "A") was determined using the AASHTO "Geometric Design of Highways and Streets". The required stopping sight distance is 200 feet for a road with a 30 mph design speed; 184 feet for a 6% upgrade and 215 feet for a 6% downgrade. The required

intersection sight distance for a road with a 30 mph design speed is 290 feet for a right turn from stop and 335 feet for a left turn from stop.

The existing vegetation and slope in the right-of-way did not allow a clear field measurement at 15 feet from the edge of pavement to determine the intersection sight distance for Buffat Mill Road at the proposed roadway connection (Road "A").

A site line profile using the 335 foot minimum required intersection sight distance shows that the intersection sight distance can be achieved at the proposed intersection. The proposed grading work is located in the right-of-way to allow for construction of the boulevard entrance. There is no proposed or necessary grading work on Buffat Mill Road.

Ardurra recommends that the intersection sight distance be certified by a land surveyor prior to construction in order to verify that Buffat Mill Road has adequate intersection sight distance at the proposed roadway connection (Road "A") to comply with City of Knoxville and AASHTO requirements. No sight distance easement will be needed.

Attachment 10 includes the intersection sight triangles, pictures of the existing intersection sight distance and sight line profiles at the intersection of Buffat Mill Road at the proposed roadway connection (Road "A").

The intersection sight triangles at the intersection of Buffat Mill Road at the Roadway Connection (Road "A") do not show that any easements will be required from the adjoining properties. Any required sight distance easements for the internal subdivision intersections should be coordinated with the City of Knoxville Department of Engineering and included on the final design drawings prior to construction of the residential development.

Ardurra recommends that the signs and pavement markings be installed in accordance with the standards provided in the *Manual on Uniform Traffic Control Devices* (MUTCD).

The Buffat Mill Estates residential development will be located in the Parent Responsibility Zone (PRZ) for Spring Hill Elementary School. Given the lack of existing sidewalk connectivity in the area and low numbers of existing pedestrians on the roadway network included on the traffic counts it is expected that the majority of students will have to reach the elementary school by vehicle.

7.7 McIntyre Road at Roadway Connection (Road "F")

The proposed full buildout conditions at the unsignalized intersection of McIntyre Road at the roadway connection (Road "F") were analyzed using the Highway

Capacity Software (HCS7). McIntyre Road at the proposed roadway connection (Road "F") is a three-legged intersection with a proposed stop sign on the southbound roadway connection (Road "F").

After the completion of the full buildout of the Buffat Mill Estates the traffic conditions for the intersection of McIntyre Road at the roadway connection (Road "F") will operate as follows. The eastbound approach (McIntyre Road) will operate at a LOS A during both the AM and PM peak hours. The southbound approach (Road "F") will operate at a LOS A during both the AM and PM peak hours

The width of McIntyre Road at the proposed roadway connection (Road "F") is approximately 19-24 feet. The minimum recommended pavement width standard is 20 feet wide. The City of Knoxville has reviewed the pavement width in the vicinity of the Buffat Mill Estates and is not requiring any road widening improvements.

McIntyre Road is not classified by the Major Road Plan; therefore, it is considered a local street. The minimum intersection spacing required on a local street is 125 feet per the "Knoxville-Knox County Subdivision Regulations" amended through October 6, 2022. The second roadway connection (Road "F") is located approximately 405 feet west of Ross Road and approximately 1,000 feet east of Payne Road.; therefore, the minimum separation on a local street is met and no change is necessary.

An eastbound left turn lane and a westbound right turn lane on McIntyre Road are not warranted during either the AM or PM peak hours per the Knox County Department of Engineering and Public Works handbook, "Access Control and Driveway Design Policy."

The minimum required stopping sight distance and intersection sight distance for the intersection of McIntyre Road at the proposed roadway connection (Road "F") was determined using the AASHTO "Geometric Design of Highways and Streets". The required stopping sight distance is 155 feet for a road with a 25 mph design speed. The required intersection sight distance for a road with a 25 mph design speed is 240 feet for a right turn from stop and 280 feet for a left turn from stop.

At 15 feet from the edge of pavement the intersection sight distance is greater than 350 feet looking eastbound and westbound. A site line profile using the 280 foot minimum required intersection sight distance shows that the intersection sight distance can be achieved at the proposed intersection.

Ardurra recommends that the intersection sight distance be certified by a land surveyor prior to construction in order to verify that McIntyre Road has adequate intersection sight distance at the proposed roadway connection to comply with City of Knoxville and AASHTO requirements.

Attachment 10 includes intersection sight triangles, pictures of the existing intersection sight distance and sight line profiles at the intersection of McIntyre Road at the proposed roadway connection (Road "F").

The intersection sight triangles at the intersection of McIntyre Road at the Roadway Connection (Road "F") do not show that any easements will be required from the adjoining properties.

Attachment 1	
Aerial Photos	



Spring Hill Road at Buffat Mill Road



Loves Creek Road at Buffat Mill Road


Spring Hill Road at McIntyre Road



Loves Creek Road at McIntyre Road



Spring Hill Road at Monte Vista Road



Buffat Mill Road at Driveway Connection

Att	achment 2
Tra	ffic Count

Project: 720.001 - Buffat Mill Estates Subdivision Intersection: Buffat Mill Road at Loves Creek Road Date Conducted: Wednesday October 5, 2022

	Loves	Greek F	Road	Loves Creek Road				at Mill R	oad	
	So	uthboun	id	No	orthbour	nd	E	astbound	k	
Start	Thru	Right	Total	Left	Thru	Total	Left	Right	Total	Int. Total
7:00 AM	25	5	30	14	16	30	4	8	12	72
7:15 AM	32	10	42	18	24	42	4	14	18	102
7:30 AM	21	17	38	28	29	57	6	8	14	109
7:45 AM	46	6	52	34	41	75	5	16	21	148
Total	124	38	162	94	110	204	19	46	65	431
										1
8:00 AM	35	5	40	28	32	60	6	19	25	125
8:15 AM	38	3	41	24	26	50	5	17	22	113
8:30 AM	21	10	31	23	27	50	3	11	14	95
8:45 AM	6	10	16	14	20	34	9	12	21	71
lotal	100	28	128	89	105	194	23	59	82	404
11.00 444	2.2	-	27	20	40	71	-	1 7	22	1 120
11:00 AM	32	5	3/	29	42		5	17	22	130
11:13 AM	33 27	5	30 41	29	37	72	2	20	22	120
11:30 AM 11:45 AM	27 29	4	41	29	43	72	2	24	20	139
Total	140	19	159	115	171	286	12	87	99	544
Total	140	15	155	115	171	2001	12	07	55	J
12:00 PM	52	8	60	39	53	92	9	36	45	197
12:15 PM	45	7	52	20	50	70	9	29	38	160
12:30 PM	49	8	57	33	48	81	9	22	31	169
12:45 PM	40	8	48	27	36	63	2	26	28	139
Total	186	31	217	119	187	306	29	113	142	665
			•							•
2:00 PM	38	3	41	45	55	100	11	33	44	185
2:15 PM	41	9	50	33	48	81	5	34	39	170
2:30 PM	41	10	51	35	42	77	6	43	49	177
2:45 PM	49	10	59	54	45	99	6	45	51	209
Total	169	32	201	167	190	357	28	155	183	741
	47	10	1	16	50	مدا	10	42	-	200
3:00 PM	4/	10	57	46	50	96	13	43	56	209
3:15 PM	38	19	57	3/	62	99	23	30	59	215
3:30 PM	30 45	13	49 50	27	60 55	0/	10	31	40	102
	166	47	213	1/3	227	370	23	135	200	792
TOtal	100	47	213	145	221	3701	/4	155	209	792
4:00 PM	58	12	70	36	57	93	16	19	35	198
4:15 PM	54	8	62	38	60	98	16	40	56	216
4:30 PM	49	7	56	29	65	94	22	27	49	199
4:45 PM	40	8	48	55	70	125	26	30	56	229
Total	201	35	236	158	252	410	80	116	196	842
5:00 PM	58	6	64	34	79	113	28	32	60	237
5:15 PM	42	11	53	33	88	121	24	48	72	246
5:30 PM	48	7	55	40	89	129	23	34	57	241
5:45 PM	45	11	56	34	71	105	10	33	43	204
Total	193	35	228	141	327	468	85	147	232	928
Crond Total	1070		1 - a a l	1000	1500	محمحا	250	050	1200	E 2 4 7
Approach %	12/9 820	200 170	1344	1020 30 F	1009 60 E	2090	300	000 71 0	1208	3347
Total %	02.0 23.0	5.0	28.0	19.5	20.5 20.2	48 5	29.0 65	16.0	22.6	
		5.0	-0.7		-2.5		5.5		0	1

Project: 720.001 - Buffat Mill Estates Subdivision Intersection: Buffat Mill Road at Loves Creek Road Date Conducted: Wednesday October 5, 2022

AM Peak Hour	7:30 AM - 8:30 AM	495
PM Peak Hour	4:45 PM - 5:45 PM	953

	Love	s Creek	Road	Loves	GCreek	Road	Buff	at Mill R	oad	
	So	uthboui	nd	No	orthbour	nd	E	astboun	d	
Start	Thru	Right	Total	Left	Thru	Total	Left	Right	Total	Int. Total
Peak Hour Analysis from 2	7:00 AM	to 9:00 /	١M							
AM Peak Hour begins at 7	':30 AM									
7:30 AM	21	17	38	28	29	57	6	8	14	109
7:45 AM	46	6	52	34	41	75	5	16	21	148
8:00 AM	35	5	40	28	32	60	6	19	25	125
8:15 AM	38	3	41	24	26	50	5	17	22	113
Total Volume	140	31	171	114	128	242	22	60	82	495
Future (1% over 5 yrs)	147	33		120	135		23	63	-	520
PHF	0.76	0.46		0.84	0.78		0.92	0.79		0.84
Peak Hour Analysis from 2	2:00 PM	to 6:00 F	ΡM							
PM Peak Hour begins at 4	:45 PM									
4:45 PM	40	8	48	55	70	125	26	30	56	229
5:00 PM	58	6	64	34	79	113	28	32	60	237
5:15 PM	42	11	53	33	88	121	24	48	72	246
5:30 PM	48	7	55	40	89	129	23	34	57	241
Total Volume	188	32	220	162	326	488	101	144	245	953
Future (1% over 5 yrs)	198	34	-	170	343		106	151		1002
PHF	0.81	0.73		0.74	0.92		0.90	0.75		0.97

Project: 720.001 - Buffat Mill Estates Subdivision Intersection: Buffat Mill Road at Spring Hill Road Date Conducted: Tuesday October 4, 2022

	Sp	oring H	ill Road	k	В	uffat M	ill Roac	k	Spring Hill Road Buffat Mill Road								
	-	Southb	ound			Westb	ound			Northk	ound			Eastb	ound		
Start	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Int. Total
7:00 AM	3	13	1	17	8	14	2	24	3	9	3	15	3	7	8	18	74
7:15 AM	1	34	14	49	6	12	12	30	8	16	2	26	6	15	20	41	146
7:30 AM	3	38	9	50	0	20	9	29	8	11	3	22	20	18	27	65	166
7:45 AM	2	18	8	28	6	14	13	33	5	18	5	28	8	17	3	28	117
Total	9	103	32	144	20	60	36	116	24	54	13	91	37	57	58	152	503
8:00 AM	0	14	4	18	2	7	10	19	1	21	2	24	3	7	2	12	73
8:15 AM	4	18	2	24	3	7	9	19	0	10	1	11	5	7	4	16	70
8:30 AM	2	28	2	32	2	9	8	19	3	23	2	28	2	6	2	10	89
8:45 AM	2	1/	4	23	0	8	9	1/	1	19	3	23	4	6	0	10	/3
Total	8	//	12	97	/	31	36	74	5	/3	8	86	14	26	8	48	305
11.00 414	1	10	5	16	2	7	2	12	0	17	2	201	5	12	1	10	67
11.00 AM	3	17	5	26	2	6	7	15	4	17	2	20	10	6	2	19	84
11.13 AM	2	17 Q	11	20	2	4	3	13	4	15	0	16	7	7	2 1	10	62
11:45 AM	5	20	8	33	2	13	10	26	0	18	5	23	8	10	4	22	104
Total	11	56	30	97	9	30	23	62	4	64	16	84	30	36	8	74	317
. otu		50	50	571	5		_0	0-1	-	0.		0.1	50	00	0		5.7
12:00 PM	3	19	7	29	5	8	10	23	2	23	5	30	6	18	4	28	110
12:15 PM	6	17	4	27	5	10	6	21	3	13	5	21	6	7	0	13	82
12:30 PM	2	15	8	25	6	9	4	19	3	18	2	23	7	10	2	19	86
12:45 PM	7	22	7	36	3	9	5	17	3	17	4	24	6	6	5	17	94
Total	18	73	26	117	19	36	25	80	11	71	16	98	25	41	11	77	372
2:00 PM	6	29	13	48	6	15	10	31	1	11	6	18	7	12	3	22	119
2:15 PM	7	41	6	54	6	14	9	29	2	46	7	55	10	11	5	26	164
2:30 PM	8	39	3	50	3	12	8	23	2	28	8	38	12	18	8	38	149
2:45 PM	5	49	12	66	8	12	13	33	4	22	5	31	17	25	10	52	182
lotal	26	158	34	218	23	53	40	116	9	107	26	142	46	66	26	138	614
2.00 DM	2	20	-	10	4	15	(251	1	17	2	21	10	26	15	60	161
3:00 PM	2 7	39	Б	40 25	4	10	0	25	1	17	3	21	10	20	15	69 40	140
3:13 F/M	2 8	23	2	21	5	10	5 8	20	3 1	25	9	37	13	35	5	49	149
3:45 PM	8	31	9	48	8	18	7	33	1	20	12	33	7	34	4	45	159
Total	25	114	21	160	23	61	26	110	6	87	33	126	52	136	30	218	614
. otu	20				20	0.	20		0	07	00	.20	5-		00	2.0	0.1
4:00 PM	10	34	6	50	5	22	9	36	3	24	14	41	7	34	5	46	173
4:15 PM	5	26	2	33	1	13	8	22	1	24	19	44	7	43	6	56	155
4:30 PM	9	28	5	42	6	13	4	23	3	26	6	35	13	39	5	57	157
4:45 PM	13	36	7	56	4	17	5	26	5	29	9	43	8	30	4	42	167
Total	37	124	20	181	16	65	26	107	12	103	48	163	35	146	20	201	652
5:00 PM	6	35	6	47	4	23	6	33	1	20	7	28	11	45	4	60	168
5:15 PM	17	29	4	50	10	14	10	34	2	18	4	24	9	27	4	40	148
5:30 PM	11	18	6	35	1	18	11	30	3	14	8	25	8	32	7	47	137
5:45 PM	7	24	6	37	2	13	6	21	2	23	10	35	10	13	3	26	119
Iotal	41	106	22	169	17	68	33	118	8	75	29	112	38	117	18	173	572
Grand Total	175	811	107	1192	124	404	245	793	70	634	190	002	277	625	170	1091	39/0
Annroach %	1/9	68.6	167	1105	171	404 51 6	∠40 313	/03	/9 8.8	70.3	21.0	902 I	2//	020 57.8	1/9		5749
Total %	4.0	20.5	5.0	30.0	3.4	10.2	62	19.8	2.0	16.1	4.8	22.8	7.0	15.8	4 5	274	
		-0.0	5.0	55.5	5.1		5.2		2.0		1.0	-2.01	7.0	. 5.0		-/. *	

Project: 720.001 - Buffat Mill Estates Subdivision Intersection: Buffat Mill Road at Spring Hill Road Date Conducted: Tuesday October 4, 2022

AM Peak Hour	7:00 AM - 8:00 AM	503
PM Peak Hour	2:15 PM - 3:15 PM	656

	Sp	Spring Hill Road Buffat Mill Road					S	pring H	iill Roa	d	Buffat Mill Road			ן			
		South	bound			Westb	ound			North	bound			Eastb	ound		
Start	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Int. Total
Peak Hour Analysis from	7:00 AN	1 to 9:0	0 AM		•				•								
AM Peak Hour begins at	7:00 AM	I															
7:00 AM	3	13	1	17	8	14	2	24	3	9	3	15	3	7	8	18	74
7:15 AM	1	34	14	49	6	12	12	30	8	16	2	26	6	15	20	41	146
7:30 AM	3	38	9	50	0	20	9	29	8	11	3	22	20	18	27	65	166
7:45 AM	2	18	8	28	6	14	13	33	5	18	5	28	8	17	3	28	117
Total Volume	9	103	32	144	20	60	36	116	24	54	13	91	37	57	58	152	503
Future (1% over 5 yrs)	9	108	34		21	63	38		25	57	14		39	60	61		529
PHF	0.75	0.68	0.57		0.63	0.75	0.69		0.75	0.75	0.65		0.46	0.79	0.54		0.76
Peak Hour Analysis from	2:00 PM	1 to 6:00	0 PM														
PM Peak Hour begins at	2:15 PM																
2:15 PM	7	41	6	54	6	14	9	29	2	46	7	55	10	11	5	26	164
2:30 PM	8	39	3	50	3	12	8	23	2	28	8	38	12	18	8	38	149
2:45 PM	5	49	12	66	8	12	13	33	4	22	5	31	17	25	10	52	182
3:00 PM	2	39	5	46	4	15	6	25	1	17	3	21	18	36	15	69	161
Total Volume	22	168	26	216	21	53	36	110	9	113	23	145	57	90	38	185	656
Future (1% over 5 yrs)	23	176	27		22	55	38		9	118	24	•	60	94	40		686
PHF	0.69	0.86	0.54		0.66	0.88	0.69		0.56	0.61	0.72		0.79	0.63	0.63		0.90

Project: 720.001 - Buffat Mill Estates Subdivision Intersection: McIntyre Road at Loves Creek Road Date Conducted: Thursday October 6, 2022

	Loves	Creek I	Road	Loves Creek Road			Mc	ntyre Ro	bad	
	So	uthbour	nd	No	orthbour	nd	E	astbound	b	
Start	Thru	Right	Total	Left	Thru	Total	Left	Right	Total	Int. Total
7:00 AM	40	3	43	4	51	55	0	7	7	105
7:15 AM	41	1	42	9	49	58	4	6	10	110
7:30 AM	44	0	44	11	74	85	2	5	7	136
7:45 AM	52	0	52	7	71	78	5	9	14	144
Total	177	4	181	31	245	276	11	27	38	495
										1
8:00 AM	48	4	52	3	55	58	0	8	8	118
8:15 AM	45	1	46	7	56	63	2	12	14	123
8:30 AM	32	2	34	3	45	48	0	7	7	89
8:45 AM	42	0	42	2	33	35	1	3	4	81
lotal	167	7	174	15	189	204	3	30	33	411
11.00 414		-	40	4	70	مما	2	2	-	1.20
11:00 AM	44	5	49	4	/8	82	3	2	5	136
11:15 AM	51	I -	52	0	50	50	4	4	0	110
11:30 AM	52	с С	۲C د ۹	2	60 64	60	2	3	C 11	130
Total	213	13	226	<u> </u>	258	267	<u> </u>	15	20	522
TOtal	215	15	220	9	250	207	14	15	29	522
12.00 PM	75	4	79	4	94	98	3	2	5	182
12:00 PM	85	4	89	2	75	77	1	3	4	170
12:10 PM	74	2	76	1	64	65	2	3	5	146
12:45 PM	99	1	100	4	82	86	2	2	4	190
Total	333	11	344	11	315	326	8	10	18	688
			'			•				1
2:00 PM	69	1	70	8	67	75	3	8	11	156
2:15 PM	69	2	71	4	51	55	2	5	7	133
2:30 PM	63	3	66	1	69	70	1	2	3	139
2:45 PM	76	1	77	10	61	71	5	1	6	154
Total	277	7	284	23	248	271	11	16	27	582
	1									1
3:00 PM	73	3	76	2	77	79	3	7	10	165
3:15 PM	85	1	86	7	74	81	3	5	8	175
3:30 PM	76	6	82	7	103	110	2	7	9	201
3:45 PM	66	3	69	9	93	102	4	8	12	183
Total	300	13	313	25	347	372	12	27	39	/24
4.00 PM	83	5	88	6	90	96	1	6	7	191
4.00 PM	68	3 4	72	5	89	94	5	9	14	180
4·30 PM	69	3	72	4	110	114	5	4	9	195
4:45 PM	77	2	79	4	106	110	4	. 8	12	201
Total	297	14	311	19	395	414	15	27	42	767
			•							1
5:00 PM	92	4	96	4	91	95	3	8	11	202
5:15 PM	84	7	91	6	116	122	3	9	12	225
5:30 PM	85	4	89	3	102	105	2	6	8	202
5:45 PM	78	2	80	6	106	112	5	7	12	204
Total	339	17	356	19	415	434	13	30	43	833
						a 1				l
Grand Total	2103	86	2189	152	2412	2564	87	182	269	5022
Approach %	96.1	3.9	10.6	5.9	94.1	- 4 - 1	32.3	67.7		
iotal %	41.9	1./	43.6	3.0	48.0	51.1	1.7	3.6	5.4	

Project: 720.001 - Buffat Mill Estates Subdivision Intersection: McIntyre Road at Loves Creek Road Date Conducted: Thursday October 6, 2022

AM Peak Hour	7:30 AM - 8:30 AM	522
PM Peak Hour	5:00 PM - 6:00 PM	833

	Love	s Creek	Road	Loves	s Creek	Road	Mc	Intyre Ro	bad	
	So	uthboui	nd	No	orthbour	nd	E	astboun	d	
Start	Thru	Right	Total	Left	Thru	Total	Left	Right	Total	Int. Total
Peak Hour Analysis from 2	7:00 AM	to 9:00 /	١M							
AM Peak Hour begins at 7	7:30 AM									
7:30 AM	44	0	44	11	74	85	2	5	7	136
7:45 AM	52	0	52	7	71	78	5	9	14	144
8:00 AM	48	4	52	3	55	58	0	8	8	118
8:15 AM	45	1	46	7	56	63	2	12	14	123
Total Volume	189	5	194	28	256	284	9	34	43	521
Future (1% over 5 yrs)	199	5	-	29	269		9	36		548
PHF	0.91	0.31		0.64	0.86		0.45	0.71		0.90
Peak Hour Analysis from 2	2:00 PM	to 6:00 F	ΡM							
PM Peak Hour begins at 5	:00 PM									
5:00 PM	92	4	96	4	91	95	3	8	11	202
5:15 PM	84	7	91	6	116	122	3	9	12	225
5:30 PM	85	4	89	3	102	105	2	6	8	202
5:45 PM	78	2	80	6	106	112	5	7	12	204
Total Volume	339	17	356	19	415	434	13	30	43	833
Future (1% over 5 yrs)	356	18		20	436		14	32		875
PHF	0.92	0.61		0.79	0.89		0.65	0.83		0.93

Project: 720.001 - Buffat Mill Estates Subdivision Intersection: McIntyre Road at Spring Hill Road Date Conducted: Thursday October 6, 2022

	Sprir	ng Hill R	oad	Mc	Intyre Ro	bad	Sprir	ng Hill R	load	
	So	uthboun	nd	W	/estboun	d	No	orthbour	nd	
Start	Left	Thru	Total	Left	Right	Total	Thru	Right	Total	Int. Total
7:00 AM	4	9	13	0	4	4	28	0	28	45
7:15 AM	4	12	16	1	11	12	29	1	30	58
7:30 AM	1	14	15	1	12	13	23	5	28	56
7:45 AM	5	19	24	6	6	12	13	1	14	50
Total	14	54	68	8	33	41	93	7	100	209
	1									1
8:00 AM	5	14	19	5	6	11	13	2	15	45
8:15 AM	6	21	27	3	7	10	8	3	11	48
8:30 AM	2	26	28	4	3	7	23	3	26	61
8:45 AM	4	14	18	3	1	4	21	0	21	43
Total	17	/5	92	15	17	32	65	8	/3	197
11.00 414	l 1	20	21	2	4	دا	17	0	17	I 44
11:00 AM	1	20	21	2	4	0	17	0	17	44
11:15 AM 11:20 AM	1 2	14	15	0	1	1	21	3 2	24	40
11:30 AM 11:45 AM	2	15	20	3 1	1 2	4	16	2	24 19	43 51
Total	9	73	29	6	9	15	76	7	83	180
Total	5	75	021	0	5	1.51	70	,	05	100
12:00 PM	2	11	13	4	2	6	20	0	20	39
12:15 PM	- 1	13	14	1	- 1	2	12	1	13	29
12:30 PM	1	23	24	0	2	2	15	0	15	41
12:45 PM	3	13	16	1	5	6	15	2	17	39
Total	7	60	67	6	10	16	62	3	65	148
			•							•
2:00 PM	3	21	24	3	3	6	13	0	13	43
2:15 PM	4	19	23	2	5	7	35	4	39	69
2:30 PM	2	16	18	2	5	7	22	2	24	49
2:45 PM	4	14	18	1	11	12	26	2	28	58
Total	13	70	83	8	24	32	96	8	104	219
			. –1			_1				I – -
3:00 PM	7	10	17	1	4	5	21	7	28	50
3:15 PM	4	29	33	1	3	4	16	2	18	55
3:30 PM	4	21	25	2	4	6	13	2	15	46
3:45 PM	5	21	26	3	3	6	18	2	20	52
Total	20	81	101	/	14	21	68	13	81	203
4.00 PM	5	25	301	3	1	41	25	2	27	61
4.00 FM	3	25 17	20	5 1	1	4	23	2	27	47
4.13 FM	5	20	20	2	1	2	22	7	20	57
4:45 PM	12	16	23	5	3	8	22	, 0	23	57
Total	25	78	103	11	6	17	90	12	102	222
. ota					Ũ	., 1	50			
5:00 PM	7	23	30	3	1	4	23	6	29	63
5:15 PM	9	33	42	2	7	9	20	1	21	72
5:30 PM	7	16	23	2	4	6	20	5	25	54
5:45 PM	8	14	22	2	3	5	20	6	26	53
Total	31	86	117	9	15	24	83	18	101	242
			•							
Grand Total	136	577	713	70	128	198	633	76	709	1620
Approach %	19.1	80.9		35.4	64.6		89.3	10.7		
Total %	8.4	35.6	44.0	4.3	7.9	12.2	39.1	4.7	43.8	

Project: 720.001 - Buffat Mill Estates Subdivision Intersection: McIntyre Road at Spring Hill Road Date Conducted: Thursday October 6, 2022

AM Peak Hour	7:00 AM - 8:00 AM	209
PM Peak Hour	4:30 PM - 5:30 PM	249

	Spring Hill Road		Mc	Intyre Ro	bad	Sprir	g Hill Road			
	So	uthbour	nd	W	estboun/	d	No	orthbour	nd	
Start	Left	Thru	Total	Left	Right	Total	Thru	Right	Total	Int. Total
Peak Hour Analysis from 2	١M									
AM Peak Hour begins at 7	7:00 AM									
7:00 AM	4	9	13	0	4	4	28	0	28	45
7:15 AM	4	12	16	1	11	12	29	1	30	58
7:30 AM	1	14	15	1	12	13	23	5	28	56
7:45 AM	5	19	24	6	6	12	13	1	14	50
Total Volume	14	54	68	8	33	41	93	7	100	209
Future (1% over 5 yrs)	15	57	-	8	35	-	98	7	-	220
PHF	0.70	0.71		0.33	0.69		0.80	0.35		0.90
Peak Hour Analysis from 2	2:00 PM	to 6:00 F	ΡM							
PM Peak Hour begins at 4	:30 PM									
4:30 PM	5	20	25	2	1	3	22	7	29	57
4:45 PM	12	16	28	5	3	8	21	0	21	57
5:00 PM	7	23	30	3	1	4	23	6	29	63
5:15 PM	9	33	42	2	7	9	20	1	21	72
Total Volume	33	92	125	12	12	24	86	14	100	249
Future (1% over 5 yrs)	35	97	-	13	13		90	15		262
PHF	0.69	0.70		0.60	0.43		0.93	0.50		0.86

Project: 720.001 - Buffat Mill Estates Subdivision Intersection: Spring Hill Road at Monte Vista Road Date Conducted: Wednesday October 5, 2022

	Spring Hill Road			Mont	e Vista R	Road	Spring Hill Road			
	So	uthboun	d	W	estboun	d	Northbound			
Start	Left	Thru	Total	Left	Right	Total	Thru	Right	Total	Int. Total
7:00 AM	2	10	12	0	2	2	16	1	17	31
7:15 AM	0	13	13	0	5	5	31	0	31	49
7:30 AM	1	9	10	1	6	7	34	0	34	51
7:45 AM	2	11	13	1	5	6	24	0	24	43
Total	5	43	48	2	18	20	105	1	106	174
	_		1							I
8:00 AM	3	15	18	3	1	4	22	0	22	44
8:15 AM	0	20	20	0	3	3	15	0	15	38
8:30 AM	1	18	19	2	1	3	12	0	12	34
8:45 AM	0	11	11	1	3	4	9	0	9	24
lotal	4	64	68	6	8	14	58	0	58	140
11.00 444	C	16	10	0	C	٦	17	Э	10	20
11.1E AM	2	10	10	0	ے 1	2 1	1/	ے 1	19	39
11.10 AM	1	10	10	0	1	1	20	1	20	42
11:30 AM	1	10	19	1	4 2	4	20	0	20	43
Total	1	62	66	1		10	70	3	73	1/0
TOtal	4	02	001	1	9	10	70	5	73	149
12:00 PM	7	17	24	1	2	3	21	0	21	48
12:15 PM	, 3	19	22	0	2	2	20	2	22	46
12:30 PM	2	25	27	2	4	6	18	1	19	52
12:45 PM	1	24	25	0	4	4	14	0	14	43
Total	13	85	98	3	12	15	73	3	76	189
						-				
2:00 PM	3	16	19	1	1	2	27	0	27	48
2:15 PM	1	18	19	1	2	3	28	1	29	51
2:30 PM	1	17	18	0	0	0	21	0	21	39
2:45 PM	5	22	27	0	2	2	28	0	28	57
Total	10	73	83	2	5	7	104	1	105	195
2.00 PM		20	221	0	2	ما	24	0	24	
3:00 PM	4	29	33	0	2	2	31	0	31	66
3:15 PM	0	43	43	0	I	1	21	0	21	65
3:30 PM	1	22	23	0	0	0	21	0	21	44
3:45 PM	<u> </u>	21	121	0	3	3	23	0	23	48
Totai	0	115	121	0	0	0	96	0	96	223
4:00 PM	7	29	36	1	2	3	26	0	26	65
4:15 PM	1	22	23	0	2	2	25	4	29	54
4:30 PM	0	36	36	0	5	5	29	0	29	70
4:45 PM	2	36	38	0	1	1	26	3	29	68
Total	10	123	133	1	10	11	106	7	113	257
5:00 PM	2	19	21	0	1	1	25	0	25	47
5:15 PM	5	33	38	1	4	5	34	2	36	79
5:30 PM	1	29	30	0	4	4	31	4	35	69
5:45 PM	2	24	26	2	3	5	26	3	29	60
Total	10	105	115	3	12	15	116	9	125	255
6:00 PM	4	30	34	1	.3	4	25	0	25	63
6:15 PM	3	50	53	1	0	1	22	1	23	77
6:30 PM	2	32	34	0	0	0	17	1	18	52
6:45 PM	3	21	24	2	1	3	20	2	22	49
Total	12	133	145	4	4	8	84	4	88	241
ľ			'			I				
Grand Total	74	803	877	22	84	106	812	28	840	1823
Approach %	8.4	91.6		20.8	79.2		96.7	3.3		
Total %	4.1	44.0	48.1	1.2	4.6	5.8	44.5	1.5	46.1	l

Project: 720.001 - Buffat Mill Estates Subdivision Intersection: Spring Hill Road at Monte Vista Road Date Conducted: Wednesday October 5, 2022

AM Peak Hour	7:15 AM - 8:15 AM	187
PM Peak Hour	5:15 PM - 6:15 PM	271

	Spring Hill Road			Mont	te Vista I	Road	Spring Hill Road			
	So	uthboui	nd	W	/estboun	d	No	orthbour	nd	
Start	Left	Thru	Total	Left	Right	Total	Thru	Right	Total	Int. Total
Peak Hour Analysis from 7:00 AM to 9:00 AM										
AM Peak Hour begins at 7	7:15 AM									
7:15 AM	0	13	13	0	5	5	31	0	31	49
7:30 AM	1	9	10	1	6	7	34	0	34	51
7:45 AM	2	11	13	1	5	6	24	0	24	43
8:00 AM	3	15	18	3	1	4	22	0	22	44
Total Volume	6	48	54	5	17	22	111	0	111	187
Future (1% over 5 yrs)	6	50	-	5	18		117	0		197
PHF	0.50	0.80		0.42	0.71		0.82	-		0.92
Peak Hour Analysis from 2	2:00 PM	to 6:00 F	ΡM							
PM Peak Hour begins at 5	:15 PM									
5:15 PM	5	33	38	1	4	5	34	2	36	79
5:30 PM	1	29	30	0	4	4	31	4	35	69
5:45 PM	2	24	26	2	3	5	26	3	29	60
6:00 PM	4	30	34	1	3	4	25	0	25	63
Total Volume	12	116	128	4	14	18	116	9	125	271
Future (1% over 5 yrs)	13	122	-	4	15		122	9		285
PHF	0.60	0.88		0.50	0.88		0.85	0.56		0.86



KAT Route 33 (MLK Jr. Avenue)



Map Features

	Bike lanes
***	Climbing bike lane – one-way uphill
00000	Signed bike routes
	Comfortable routes
	Connections - use caution
	Local/neighborhood streets – generally comfortable for biking
	Collector streets — expect higher traffic speeds and volumes
	Arterial streets – not recommended
->	One-way street
*****	Steep slopes greater than 10% grade
	Paved greenways
~	Multi-use unpaved trails
	Public restrooms
0	Parking for trailheads and bike routes
0	Transit station & superstops - all KAT buses & trolleys have bike racks
5	Skateparks with BMX biking allowed
1	School
Ø	Bike Repair Stand

Attachment 4 ADT Trends

		Adjusted Average
	Year	Daily Traffic
1	2001	17641
2	2002	17599
3	2003	17296
4	2004	18044
5	2005	19094
6	2006	18333
7	2007	18015
8	2008	19003
9	2009	18973
10	2010	16679
11	2011	16632
12	2012	18312
13	2013	18226
14	2014	19466
15	2015	22301
16	2016	22744
17	2017	24782
18	2018	21224
19	2019	20613
20	2020	18313
21	2021	21875



Most Recent Trend Line Growth							
Year	· ADT						
2001	17641						
2021	21875						

Annual Percent Growth

0.97%

		Adjusted
		Average Dail
	Year	Traffic
1	2001	6406
2	2002	5050
3	2003	5088
4	2004	5241
5	2005	4868
6	2006	5222
7	2007	4953
8	2008	4821
9	2009	4665
10	2010	4721
11	2011	4220
12	2012	4368
13	2013	4278
14	2014	4261
15	2015	4304
16	2016	5073
17	2017	5209
18	2018	5226
19	2019	5023
20	2020	4451
21	2021	5056



Most Recent Trend Line Growth

Year	ADT
2002	5050
2021	5056

Annual Percent Growth

0.01%

		Adjusted
		Average Daily
	Year	Traffic
1	2001	6178
2	2002	5907
3	2003	6823
4	2004	6576
5	2005	7262
6	2006	7781
7	2007	7764
8	2008	7517
9	2009	7184
10	2010	7034
11	2011	6765
12	2012	7179
13	2013	6994
14	2014	6886
15	2015	7799
16	2016	7538
17	2017	7705
18	2018	7466
19	2019	7032
20	2020	6698
21	2021	7033



Most Recent Trend Line Growth

Year	ADT
2001	6178
2021	7033

Annual Percent Growth

0.61%

Project: Buffat Mill Estates Date Conducted: 3/13/2023

Single-Family Detached Housing (LUC 210) 288 Single Family Lots

Average Daily Traffic

Ln(T) = 0.92Ln(X) + 2.68 Ln(T) = 0.92Ln(288) + 2.68T = 2670

Peak Hour of Adjacent Street Traffic

One Hour Between 7 and 9 a.m.

Ln(T) = 0.91Ln(X) + 0.12Ln(T) = 0.91Ln(288) + 0.12 T = 195

Peak Hour of Adjacent Street Traffic One Hour Between 4 and 6 p.m.

Ln(T) = 0.94Ln(X) + 0.27 Ln(T) = 0.94Ln(288) + 0.27T = 269

		Per	cent	Number		
Time Period	Total Trips	Enter	Exit	Enter	Exit	
Weekday (24 hours)	2670	50%	50%	1335	1335	
AM Peak Hour	195	25%	75%	49	146	
PM Peak Hour	269	63%	37%	169	100	

Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units

On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 174

Avg. Num. of Dwelling Units: 246

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.43	4.45 - 22.61	2.13

Data Plot and Equation



Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dw	velling Units
On a: We	eekday,
Pe	ak Hour of Adjacent Street Traffic,
On	ne Hour Between 7 and 9 a.m.
Setting/Location: Ge	eneral Urban/Suburban
Number of Studies: 19	2
Avg. Num. of Dwelling Units: 22	6
Directional Distribution: 26	% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.70	0.27 - 2.27	0.24

Data Plot and Equation





Single-Family Detached Housing (210)

Vehicle Trip Ends vs: Dwelling Units	
On a: Weekday,	
Peak Hour of Adjacent Street Traffic	
One Hour Between 4 and 6 p.m.	
Setting/Location: General Urban/Suburban	
Number of Studies: 208	
Avg. Num. of Dwelling Units: 248	
Directional Distribution: 63% entering, 37% exiting	

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.94	0.35 - 2.98	0.31

Data Plot and Equation



HCS7 All-Way Stop Control Report										
General Information		Site Information								
Analyst	Addie Kirkham	Intersection	Spring Hill at Buffat							
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville							
Date Performed	10/14/2022	East/West Street	Buffat Mill Road							
Analysis Year	2022	North/South Street	Spring Hill Road							
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.76							
Time Analyzed	Existing AM Peak									
Project Description	720.001 - Buffat Mill Estates									
Lanes										



Vehicle Volume and Adjustments

Approach		Eastbound		,	Westbound	4	Northbound				Southbound		
Approach			_						u 				
Movement	L	T	R	L	T	R	L	Т	R	L	T	R	
Volume	37	57	58	20	60	36	24	54	13	9	103	32	
% Thrus in Shared Lane													
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	
Configuration	LTR			LTR			LTR			LTR			
Flow Rate, v (veh/h)	200			153			120			189			
Percent Heavy Vehicles	2			2			2			2			
Departure Headway and Se	rvice Ti	ime		-	-				-		-		
Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20			
Initial Degree of Utilization, x	0.178			0.136			0.106			0.168			
Final Departure Headway, hd (s)	4.75			4.84			5.04			4.85			
Final Degree of Utilization, x	0.264			0.205			0.168			0.255			
Move-Up Time, m (s)	2.0			2.0			2.0			2.0			
Service Time, ts (s)	2.75			2.84			3.04			2.85			
Capacity, Delay and Level o	f Servic	e											
Flow Rate, v (veh/h)	200			153			120			189			
Capacity	758			744			715			742			
95% Queue Length, Q ₉₅ (veh)	1.1			0.8			0.6			1.0			
Control Delay (s/veh)	9.4			9.1			9.0			9.5			
Level of Service, LOS	A			А			A			A			
Approach Delay (s/veh)		9.4			9.1		9.0			9.5			
Approach LOS		А			А		A				А		
Intersection Delay, s/veh LOS			9	.3						A			

Copyright © 2022 University of Florida. All Rights Reserved.

HCS7 All-Way Stop Control Report										
General Information		Site Information								
Analyst	Addie Kirkham	Intersection	Spring Hill at Buffat							
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville							
Date Performed	10/14/2022	East/West Street	Buffat Mill Road							
Analysis Year	2022	North/South Street	Spring Hill Road							
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.90							
Time Analyzed	Existing PM Peak									
Project Description	720.001 - Buffat Mill Estates									
Lanes										



Vehicle Volume and Adjustments

Approach		Eastbound			Westbound			Northboun	d	Southbound			
Movement	L	Т	R	L	Т	R	L	Т	R	L	Т	R	
Volume	57	90	38	21	53	36	9	113	23	22	168	26	
% Thrus in Shared Lane													
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	
Configuration	LTR			LTR			LTR			LTR			
Flow Rate, v (veh/h)	206			122			161			240			
Percent Heavy Vehicles	2			2			2			2			
Departure Headway and Se	rvice Ti	ime											
Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20			
Initial Degree of Utilization, x	0.183			0.109			0.143			0.213			
Final Departure Headway, hd (s)	5.08			5.12			5.05			4.97			
Final Degree of Utilization, x	0.290			0.174			0.226			0.331			
Move-Up Time, m (s)	2.0			2.0			2.0			2.0			
Service Time, ts (s)	3.08			3.12			3.05			2.97			
Capacity, Delay and Level o	f Servic	e											
Flow Rate, v (veh/h)	206			122			161			240			
Capacity	708			704			712			724			
95% Queue Length, Q ₉₅ (veh)	1.2			0.6			0.9			1.5			
Control Delay (s/veh)	10.1			9.2			9.5			10.4			
Level of Service, LOS	В			A			А			В			
Approach Delay (s/veh)		10.1			9.2		9.5			10.4			
Approach LOS		В			А			А			В		
Intersection Delay, s/veh LOS			9	.9			A						

	HCS7 Two-Way Stor	o-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Loves Creek at Buffat Mil
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville
Date Performed	10/14/2022	East/West Street	Buffat Mill Road
Analysis Year	2022	North/South Street	Loves Creek Road
Time Analyzed	Existing AM Peak	Peak Hour Factor	0.84
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	720.001 - Buffat Mill Estates		
Lanes			
		U , , , , , , , , , , , , , , , , , , ,	



			•				
1	ior	Ctro	ot N	lort	h Sc	u+b	
IVIA		JUE	21. P	NOLL	11-30	uur	

Vehicle Volumes and Adj	ustme	ents														
Approach		Eastb	ound			West	oound		Northbound				Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume, V (veh/h)		22		60						114	128				140	31
Percent Heavy Vehicles (%)		2		2						2						
Proportion Time Blocked																
Percent Grade (%)			0													
Right Turn Channelized		Ν	10			Ν	lo			Ν	ю			Ν	lo	
Median Type/Storage		Undivided														
Critical and Follow-up He	eadwa	iys														
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.42		6.22						4.12						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.52		3.32						2.22						
Delay, Queue Length, and	d Leve	el of S	ervice	9												
Flow Rate, v (veh/h)			97							136						
Capacity, c (veh/h)			664							1367						
v/c Ratio			0.15							0.10						
95% Queue Length, Q ₉₅ (veh)			0.5							0.3						
Control Delay (s/veh)			11.3							7.9						
Level of Service, LOS			В							А						
Approach Delay (s/veh)		1'	1.3						4.2							
Approach LOS			В													

HCS7 Two-Way Stop-Control Report											
General Information		Site Information									
Analyst	Addie Kirkham	Intersection	Loves Creek at Buffat Mil								
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville								
Date Performed	10/14/2022	East/West Street	Buffat Mill Road								
Analysis Year	2022	North/South Street	Loves Creek Road								
Time Analyzed	Existing PM Peak	Peak Hour Factor	0.97								
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25								
Project Description	720.001 - Buffat Mill Estates										
Lanes											



Vehicle Volumes and Adju	ustme	ents														
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	U L T		
Priority		10	11	12		7	8	9	10	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume, V (veh/h)		101		144						162	326				188	32
Percent Heavy Vehicles (%)		2		2						2						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No No					No No									
Median Type/Storage	Undivided															
Critical and Follow-up Headways																
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.42		6.22						4.12						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.52		3.32						2.22						
Delay, Queue Length, and	d Leve	el of S	ervice	9												
Flow Rate, v (veh/h)			252							167						
Capacity, c (veh/h)			456							1340						
v/c Ratio			0.55							0.12						
95% Queue Length, Q ₉₅ (veh)			3.3							0.4						
Control Delay (s/veh)			22.2							8.1						
Level of Service, LOS			С							A						
Approach Delay (s/veh)		22	2.2						3.5							
Approach LOS		(C													

HCS7 Two-Way Stop-Control Report											
General Information		Site Information									
Analyst	Addie Kirkham	Intersection	Spring Hill at McIntyre								
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville								
Date Performed	10/14/2022	East/West Street	McIntyre Road								
Analysis Year	2022	North/South Street	Spring Hill Road								
Time Analyzed	Existing AM Peak	Peak Hour Factor	0.90								
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25								
Project Description	720.001 - Buffat Mill Estates										
Lanes											

	_	_			-	
			4			
_						K
→ -						€ -
¥ →					>	-≻ ∻
-						*
						ĸ
	ብኘ	₹ †	ר זיץ ז	4	ſ	
	Majo	r Stree	t: North-	South		

					-											
Vehicle Volumes and Adj	ustme	ents														
Approach		Eastb	ound		Westbound				Northbound					South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	U L T		
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						8		33			93	7		14	54	
Percent Heavy Vehicles (%)						2		2						2		
Proportion Time Blocked																
Percent Grade (%)							0									
Right Turn Channelized		No					10		No				No			
Median Type/Storage		Undivided														
Critical and Follow-up Headways																
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.42		6.22						4.12		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.22		
Delay, Queue Length, and	d Leve	el of S	ervice	e												
Flow Rate, v (veh/h)							46							16		
Capacity, c (veh/h)							909							1478		
v/c Ratio							0.05							0.01		
95% Queue Length, Q ₉₅ (veh)							0.2							0.0		
Control Delay (s/veh)							9.2							7.5		
Level of Service, LOS							A							A		
Approach Delay (s/veh)					9.2							1.6				
Approach LOS		А														

HCS7 Two-Way Stop-Control Report											
General Information		Site Information									
Analyst	Addie Kirkham	Intersection	Spring Hill at McIntyre								
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville								
Date Performed	10/14/2022	East/West Street	McIntyre Road								
Analysis Year	2022	North/South Street	Spring Hill Road								
Time Analyzed	Existing PM Peak	Peak Hour Factor	0.86								
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25								
Project Description	720.001 - Buffat Mill Estates										
Lanes											
4 4 4											



Vehicle Volumes and Ad	justme	ents														
Approach	Τ	Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						12		12			86	14		33	92	
Percent Heavy Vehicles (%)						2		2						2		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized		No No					No No									
Median Type/Storage	Undivided															
Critical and Follow-up H	eadwa	ays														
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.42		6.22						4.12		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.22		
Delay, Queue Length, an	d Leve	el of S	ervice	9												
Flow Rate, v (veh/h)							28							38		
Capacity, c (veh/h)							792							1472		
v/c Ratio							0.04							0.03		
95% Queue Length, Q_{95} (veh)							0.1							0.1		
Control Delay (s/veh)							9.7							7.5		
Level of Service, LOS							A							A		
Approach Delay (s/veh)					9.7						2.1					
Approach LOS		А														

		Н	CS7	Two-	Way	Stop	o-Co	ntrol	Rep	ort						
General Information							Site	Infor	natio	n						
Analyst	Addie	e Kirkhar	n				Inters	ection			McIntyre at Loves Creek					
Agency/Co.	Ardu	rra					Jurisd	liction			City c	f Knoxvi	lle			
Date Performed	10/14	4/2022					East/	West Str	eet		McIn	yre Roa	d			
Analysis Year	2022						North	n/South	Street		Loves	Creek F	Road			
Time Analyzed	Existi	ng AM P	eak				Peak	Hour Fa	ctor		0.90					
Intersection Orientation	North	n-South					Analy	sis Time	Period	(hrs)	0.25					
Project Description	720.0	720.001 - Buffat Mill Estates														
Lanes																
Image: State of the state o																
Vehicle Volumes and Adj	ustme	ents														
Approach		Eastb	ound			West	bound			North	bound		Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	10	1	2	3	4U	4	5	6

0

No

0

0

0

0

LT

28

2

No

1

256

0

0

0

1

189

No

0

TR

5

Number of Lanes Configuration

Volume, V (veh/h)

Percent Heavy Vehicles (%)

Proportion Time Blocked Percent Grade (%)

Right Turn Channelized

Median Type/Storage

0

9

2

0

No

1

LR

0

34

2

Undivided

Cirtical and Follow-up freadways															
Base Critical Headway (sec)		7.1		6.2						4.1					
Critical Headway (sec)		6.42		6.22						4.12					
Base Follow-Up Headway (sec)		3.5		3.3						2.2					
Follow-Up Headway (sec)		3.52		3.32						2.22					
Delay, Queue Length, and Level of Service															
Flow Rate, v (veh/h)			48							31					
Capacity, c (veh/h)			718							1353					
v/c Ratio			0.07							0.02					
95% Queue Length, Q ₉₅ (veh)			0.2							0.1					
Control Delay (s/veh)			10.4							7.7					
Level of Service, LOS			В							А					
Approach Delay (s/veh)		10).4					0.9							
Approach LOS			3												

HCS7100 TWSC Version 7.2.1

HCS7 Two-Way Stop-Control Report											
General Information		Site Information									
Analyst	Addie Kirkham	Intersection	McIntyre at Loves Creek								
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville								
Date Performed	10/14/2022	East/West Street	McIntyre Road								
Analysis Year	2022	North/South Street	Loves Creek Road								
Time Analyzed	Existing PM Peak	Peak Hour Factor	0.93								
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25								
Project Description	720.001 - Buffat Mill Estates										
Lanes											
	1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4										

-	_					_
Ν	Aaior	Street	No	rth-	Soi	ıth

Vehicle Volumes and Adju	ustme	ents																
Approach	Eastbound Westbound					oound			North	bound		Southbound						
Movement	U	L	Т	R	U L T R				U	L	Т	R	U	L	Т	R		
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6		
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0		
Configuration			LR							LT						TR		
Volume, V (veh/h)		13		30						19	415				339	17		
Percent Heavy Vehicles (%)		2		2						2								
Proportion Time Blocked																		
Percent Grade (%)	0																	
Right Turn Channelized	No					Ν	lo			Ν	lo		No					
Median Type/Storage	Undivided																	
Critical and Follow-up He	eadwa	iys																
Base Critical Headway (sec)		7.1		6.2						4.1								
Critical Headway (sec)		6.42		6.22						4.12								
Base Follow-Up Headway (sec)		3.5		3.3						2.2								
Follow-Up Headway (sec)		3.52		3.32						2.22								
Delay, Queue Length, and	d Leve	el of S	ervice	9														
Flow Rate, v (veh/h)			46							20								
Capacity, c (veh/h)			504							1175								
v/c Ratio			0.09							0.02								
95% Queue Length, Q ₉₅ (veh)			0.3							0.1								
Control Delay (s/veh)			12.9							8.1								
Level of Service, LOS			В							А								
Approach Delay (s/veh)		12	2.9							0	.5							
Approach LOS	В																	

. ...

HCS7 Two-Way Stop-Control Report											
General Information		Site Information									
Analyst	Addie Kirkham	Intersection	Spring Hill at Monte Vist								
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville								
Date Performed	10/14/2022	East/West Street	Monte Vista Road								
Analysis Year	2022	North/South Street	Spring Hill Road								
Time Analyzed	Existing AM Peak	Peak Hour Factor	0.92								
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25								
Project Description	720.001 - Buffat Mill Estates										
Lanes											
 ノ 4 4 人本 ト L U 本											



Vehicle Volumes and Ad	justme	ents																
Approach	Τ	Eastb	ound		Westbound					North	bound		Southbound					
Movement	U	L	Т	R	U L T R					L	Т	R	U	L	Т	R		
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6		
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0		
Configuration							LR					TR		LT				
Volume, V (veh/h)						5		17			111	0		6	48			
Percent Heavy Vehicles (%)						2		2						2				
Proportion Time Blocked																		
Percent Grade (%)							0											
Right Turn Channelized	No				No					Ν	10		No					
Median Type/Storage		Undivided																
Critical and Follow-up H	eadwa	iys																
Base Critical Headway (sec)						7.1		6.2						4.1				
Critical Headway (sec)						6.42		6.22						4.12				
Base Follow-Up Headway (sec)						3.5		3.3						2.2				
Follow-Up Headway (sec)						3.52		3.32						2.22				
Delay, Queue Length, an	d Leve	el of S	ervice	e														
Flow Rate, v (veh/h)							23							7				
Capacity, c (veh/h)							898							1465				
v/c Ratio							0.03							0.00				
95% Queue Length, Q ₉₅ (veh)							0.1							0.0				
Control Delay (s/veh)	Ι						9.1							7.5				
Level of Service, LOS							A							А				
Approach Delay (s/veh)					9.1								0.9					
Approach LOS					A													

Copyright $\ensuremath{\mathbb{C}}$ 2022 University of Florida. All Rights Reserved.

HCS711 TWSC Version 7.2.1

Existing AM Peak_Spring Hill Road at Monte Vista.xtw

	HCS7 Two-Way Stop	o-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Spring Hill at Monte Vist
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville
Date Performed	10/14/2022	East/West Street	Monte Vista Road
Analysis Year	2022	North/South Street	Spring Hill Road
Time Analyzed	Existing PM Peak	Peak Hour Factor	0.86
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	720.001 - Buffat Mill Estates		
HCS7 Two-Way Stop-Control ReportGeneral InformationSite InformationAnalystAddie KirkhamIntersectionSpring Hill at Monte VistAgency/Co.ArdurraJurisdictionCity of KnoxvilleDate Performed10/14/2022East/West StreetMonte Vista RoadAnalysis Year2022North/South StreetSpring Hill RoadTime AnalyzedExisting PM PeakPeak Hour Factor0.86Intersection OrientationNorth-SouthAnalysis Time Period (hrs)0.25Project DescriptionTateet Street			
		024	



Vehicle Volumes and Ad	justme	ents																
Approach		Eastb	ound		Westbound					North	bound		Southbound					
Movement	U	L	Т	T R U L T R U L T R							U	L	Т	R				
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6		
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0		
Configuration							LR					TR		LT				
Volume, V (veh/h)						4		14			116	9		12	116			
Percent Heavy Vehicles (%)						2		2						2				
Proportion Time Blocked																		
Percent Grade (%)		<u> </u>					0											
Right Turn Channelized		No				No				١	lo		No					
Median Type/Storage		Undivided																
Critical and Follow-up H	eadwa	ays																
Base Critical Headway (sec)						7.1		6.2						4.1				
Critical Headway (sec)						6.42		6.22						4.12				
Base Follow-Up Headway (sec)						3.5		3.3						2.2				
Follow-Up Headway (sec)						3.52		3.32						2.22				
Delay, Queue Length, an	d Leve	el of S	ervic	e														
Flow Rate, v (veh/h)							21							14				
Capacity, c (veh/h)							841							1436				
v/c Ratio							0.02							0.01				
95% Queue Length, Q ₉₅ (veh)							0.1							0.0				
Control Delay (s/veh)							9.4							7.5				
Level of Service, LOS							A							A				
Approach Delay (s/veh)						9	.4						0.8					
Approach LOS	A																	

Copyright $\ensuremath{\mathbb{C}}$ 2022 University of Florida. All Rights Reserved.

ed. HCS7 III TWSC Version 7.2.1 Existing PM Peak_Spring Hill Road at Monte Vista.xtw
Attachment 7 Intersection Worksheets – Background AM/PM Peaks

	HCS7 All-Way Sto	op Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Spring Hill at Buffat
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville
Date Performed	10/14/2022	East/West Street	Buffat Mill Road
Analysis Year	2027	North/South Street	Spring Hill Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.76
Time Analyzed	Background AM Peak		
Project Description	720.001 - Buffat Mill Estates		
Lanes			



Vehicle Volume and Adjustments

Approach		Eastbound		, , , , , , , , , , , , , , , , , , ,	Westbound	ł	1	Northboun	d	9	Southboun	d
Movement	L	Т	R	L	Т	R	L	Т	R	L	Т	R
Volume	39	60	61	21	63	38	25	57	14	9	108	34
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	211			161			126			199		
Percent Heavy Vehicles	2			2			2			2		
Departure Headway and Se	rvice Ti	ime										
Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.187			0.143			0.112			0.177		
Final Departure Headway, hd (s)	4.81			4.91			5.11			4.92		
Final Degree of Utilization, x	0.281			0.219			0.179			0.272		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	2.81			2.91			3.11			2.92		
Capacity, Delay and Level o	f Servic	e										
Flow Rate, v (veh/h)	211			161			126			199		
Capacity	748			734			705			732		
95% Queue Length, Q ₉₅ (veh)	1.2			0.8			0.6			1.1		
Control Delay (s/veh)	9.7			9.3			9.2			9.7		
Level of Service, LOS	А			А			А			A		
Approach Delay (s/veh)		9.7			9.3			9.2			9.7	
Approach LOS		А			А			А			А	
Intersection Delay, s/veh LOS			9	.5						A		

	HCS7 All-Way Sto	op Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Spring Hill at Buffat
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville
Date Performed	10/14/2022	East/West Street	Buffat Mill Road
Analysis Year	2027	North/South Street	Spring Hill Road
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.90
Time Analyzed	Background PM Peak		
Project Description	720.001 - Buffat Mill Estates		
Lanes			



Vehicle Volume and Adjustments

Approach		Eastbound		· ·	Westbound	k	1	Northboun	d	Southbound		
Movement	L	Т	R	L	Т	R	L	Т	R	L	Т	R
Volume	60	94	40	22	55	38	9	118	24	23	176	27
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	216			128			168			251		
Percent Heavy Vehicles	2			2			2			2		
Departure Headway and Se	rvice Ti	ime		-				-	-			
Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.192			0.114			0.149			0.223		
Final Departure Headway, hd (s)	5.18			5.23			5.16			5.07		
Final Degree of Utilization, x	0.310			0.186			0.240			0.353		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	3.18			3.23			3.16			3.07		
Capacity, Delay and Level of	f Servic	e										
Flow Rate, v (veh/h)	216			128			168			251		
Capacity	695			689			698			711		
95% Queue Length, Q ₉₅ (veh)	1.3			0.7			0.9			1.6		
Control Delay (s/veh)	10.5			9.4			9.8			10.8		
Level of Service, LOS	В			А			A			В		
Approach Delay (s/veh)	10.5				9.4			9.8		10.8		
Approach LOS	B			A			A			В		
Intersection Delay, s/veh LOS			1().3						В		

	HCS7 Two-Way Stop	o-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Loves Creek at Buffat Mil
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville
Date Performed	10/14/2022	East/West Street	Buffat Mill Road
Analysis Year	2027	North/South Street	Loves Creek Road
Time Analyzed	Background AM Peak	Peak Hour Factor	0.84
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	720.001 - Buffat Mill Estates		
Lanes			
	→ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	л т † Г М † † Г	

イ ハ ヽ オ ヤ Y ↑ ト バ Major Street: North-South

L

7

0

Westbound

Т

8

0

R

9

0

U

1U

0

∲ ∳

Northbound

L

1

0

LT

120

2

4.12 2.2 2.22

No

Т

2

1

135

R

3

0

U

4U

0

Percent Grade (%)		(
Right Turn Channelized		Ν		No				
Median Type/Storage				Undi	vided			
Critical and Follow-up He	adwa	ys						
Base Critical Headway (sec)		7.1		6.2				
Critical Headway (sec)		6.42		6.22				
Base Follow-Up Headway (sec)		3.5		3.3				
Follow-Up Headway (sec)		3.52		3.32				

U

Eastbound

Т

11

1

LR

R

12

0

63

2

U

L

10

0

23

2

Delay, Queue Length, and Level of Service

Vehicle Volumes and Adjustments

Approach Movement

Priority

Number of Lanes

Volume, V (veh/h)

Percent Heavy Vehicles (%) Proportion Time Blocked

Configuration

Flow Rate, v (veh/h)		102				143				
Capacity, c (veh/h)		648				1355				
v/c Ratio		0.16				0.11				
95% Queue Length, Q ₉₅ (veh)		0.6				0.4				
Control Delay (s/veh)		11.6				8.0				
Level of Service, LOS		В				А				
Approach Delay (s/veh)	11	.6				4	.2			
Approach LOS	E	3								

Southbound

Т

5

1

147

No

R

6

0

TR

33

L

4

0

	HCS7 Two-Way Sto	p-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Loves Creek at Buffat Mil
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville
Date Performed	10/14/2022	East/West Street	Buffat Mill Road
Analysis Year	2027	North/South Street	Loves Creek Road
Time Analyzed	Background PM Peak	Peak Hour Factor	0.97
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	720.001 - Buffat Mill Estates		
Lanes			
		Image: South South	

Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume, V (veh/h)		106		151						170	343				198	34
Percent Heavy Vehicles (%)		2		2						2						
Proportion Time Blocked																
Percent Grade (%)		(C													
Right Turn Channelized		Ν	lo			Ν	lo			Ν	ю			Ν	lo	
Median Type/Storage				Undi	vided											
Critical and Follow-up He	eadwa	iys														
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.42		6.22						4.12						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.52		3.32						2.22						
Delay, Queue Length, and	d Leve	el of S	ervice	9												
Flow Rate, v (veh/h)			265							175						
Capacity, c (veh/h)			433							1327						
v/c Ratio			0.61							0.13						
95% Queue Length, Q ₉₅ (veh)			4.0							0.5						
Control Delay (s/veh)			25.6							8.1						
Level of Service, LOS			D							A						
Approach Delay (s/veh)		25	5.6							3	.6					
Approach LOS		[2													

Copyright $\ensuremath{\mathbb{C}}$ 2022 University of Florida. All Rights Reserved.

HCS7TM TWSC Version 7.2.1 Background PM Peak_Loves Creek at Buffat.xtw

	HCS7 Two-Way Stop	p-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Spring Hill at McIntyre
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville
Date Performed	10/14/2022	East/West Street	McIntyre Road
Analysis Year	2027	North/South Street	Spring Hill Road
Time Analyzed	Background AM Peak	Peak Hour Factor	0.90
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	720.001 - Buffat Mill Estates		
Lanes			
		U J 4	

*	14	+	A 44	L U	
			ļ.		
_*					R
-≯ -∻					 →
					≻≻
4					* *
			7		
ŧ	1	Ϋ Ψ	$\uparrow \uparrow$	<u> 1</u> M	
	Majo	r Street	North-S	South	

Vehicle Volumes and Adj	ustme	ents														
Approach		Eastb	ound		Westbound				Northbound				Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						8		35			98	7		15	57	
Percent Heavy Vehicles (%)						2		2						2		
Proportion Time Blocked																
Percent Grade (%)						0										
Right Turn Channelized		No				No			No				No			
Median Type/Storage		Undi														
Critical and Follow-up Ho	eadwa	iys														
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.42		6.22						4.12		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.22		
Delay, Queue Length, and	d Leve	el of S	ervice	9												
Flow Rate, v (veh/h)							48							17		
Capacity, c (veh/h)							902							1470		
v/c Ratio							0.05							0.01		
95% Queue Length, Q ₉₅ (veh)							0.2							0.0		
Control Delay (s/veh)							9.2							7.5		
Level of Service, LOS							A							А		
Approach Delay (s/veh)			9.2					1.7								
Approach LOS						A										

Copyright $\ensuremath{\mathbb{C}}$ 2022 University of Florida. All Rights Reserved.

HCS7TM TWSC Version 7.2.1

Background AM Peak_Spring Hill Road at McIntyre.xtw

HCS7 Two-Way Stop-Control Report											
General Information		Site Information									
Analyst	Addie Kirkham	Intersection	Spring Hill at McIntyre								
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville								
Date Performed	10/14/2022	East/West Street	McIntyre Road								
Analysis Year	2027	North/South Street	Spring Hill Road								
Time Analyzed	Background PM Peak	Peak Hour Factor	0.86								
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25								
Project Description	720.001 - Buffat Mill Estates										
Lanes											
	4 + X 4 + +	4 4 4 4 7 4 4 7 4 4 7 4									

1 <u>በጎተቀዮሶ</u>

Maior	Street:	North-South

Vehicle Volumes and Adjustments																
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						13		13			90	15		35	97	
Percent Heavy Vehicles (%)						2		2						2		
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		No No							Ν	lo			N	lo		
Median Type/Storage				Undi	vided											
Critical and Follow-up He	eadwa	lways														
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.42		6.22						4.12		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.22		
Delay, Queue Length, and	d Leve	el of S	ervice	•												
Flow Rate, v (veh/h)							30							41		
Capacity, c (veh/h)							778							1464		
v/c Ratio							0.04							0.03		
95% Queue Length, Q ₉₅ (veh)							0.1							0.1		
Control Delay (s/veh)		9.8												7.5		
Level of Service, LOS		A A											А			
Approach Delay (s/veh)						9	.8						2.2			
Approach LOS						1	Ą									

Copyright $\ensuremath{\mathbb{C}}$ 2022 University of Florida. All Rights Reserved.

red. HCS7100 TWSC Version 7.2.1 Background PM Peak_Spring Hill Road at McIntyre.xtw

HCS7 Two-Way Stop-Control Report																
General Information							Site	Infor	natio	n						
Analyst	Addie	e Kirkhar	n				Inters	section			McInt	tyre at L	oves Cre	ek		
Agency/Co.	Ardu	rra					Jurisc	liction			City c	of Knoxv	ille			
Date Performed	10/14	1/2022					East/	West Str	eet		McInt	tyre Roa	d			
Analysis Year	2027						North	n/South	Street		Loves	Creek F	Road			
Time Analyzed	Full B	uildout	AM Peak	(Peak	Hour Fac	ctor		0.90					
Intersection Orientation	North	n-South					Analy	vsis Time	Period	(hrs)	0.25					
Project Description	720.0	01 - Buf	fat Mill E	states												
Lanes																
T T T																
Vehicle Volumes and Adj	ustme	ents														
Approach	Eastbound Westbound Northbound Southbound															
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	10	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			IR							IT						TR

ConfigurationIII <t< th=""><th></th><th></th><th>-</th><th></th><th>-</th><th></th><th>-</th><th>-</th><th></th><th>-</th><th></th><th>-</th><th>-</th><th></th><th>-</th></t<>			-		-		-	-		-		-	-		-
Volume, V (veh/h)II <thi< th="">IIII<td>Configuration</td><td></td><td></td><td>LR</td><td></td><td></td><td></td><td></td><td></td><td>LT</td><td></td><td></td><td></td><td></td><td>TR</td></thi<>	Configuration			LR						LT					TR
Percent Heavy Vehicles (%) I <thi< th=""> I I <thi< <="" td=""><td>Volume, V (veh/h)</td><td></td><td>9</td><td></td><td>36</td><td></td><td></td><td></td><td></td><td>29</td><td>284</td><td></td><td></td><td>254</td><td>5</td></thi<></thi<>	Volume, V (veh/h)		9		36					29	284			254	5
Proportion Time BlockedII<	Percent Heavy Vehicles (%)		2		2					2					
Percent Grade (%) Image:	Proportion Time Blocked														
Neght Turn ChannelizedImage: TopologyImage:	Percent Grade (%)			0											
Median Type/StorageImage: Strate	Right Turn Channelized		Ν	lo			Ν	10		N	lo		Ν	lo	
Critical Headway (sec)7.17.16.2 <td>Median Type/Storage</td> <td></td> <td></td> <td></td> <td>Undi</td> <td>vided</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Median Type/Storage				Undi	vided									
Base Critical Headway (sec)II <td>Critical and Follow-up He</td> <td>eadwa</td> <td>iys</td> <td></td>	Critical and Follow-up He	eadwa	iys												
Critical Headway (sec)Image: second seco	Base Critical Headway (sec)		7.1		6.2					4.1					
Base Follow-Up Headway (sec) Image: second sec	Critical Headway (sec)		6.42		6.22					4.12					
Follow-Up Headway (sec)3.52I3.32III2.22IIIIIIDelay, Queue Length, and Lew Unitation (Sec)Solution (Sec)Solution (Sec)Solution (Sec)Solution (Sec)ISolution (Sec)Solution (Sec)Solu	Base Follow-Up Headway (sec)		3.5		3.3					2.2					
Delay, Queue Length, and Leve Jest-Vest-Vest-Vest-Vest-Vest-Vest-Vest-V	Follow-Up Headway (sec)		3.52		3.32					2.22					
Flow Rate, v (veh/h) Image: sector sect	Delay, Queue Length, and	d Leve	el of S	ervice	•										
Capacity, c (veh/h) Image: mark definition of the symbol definitity and th	Flow Rate, v (veh/h)			50						32					
v/c Ratio Image: Marking Sector	Capacity, c (veh/h)			648						1273					
95% Queue Length, Q95 (veh) 0. 0.3 0.0 0.0 0.1 0.0 <	v/c Ratio			0.08						0.03					
Control Delay (s/veh) Image: Second seco	95% Queue Length, Q ₉₅ (veh)			0.3						0.1					
Level of Service, LOS B B I A A I I I Approach Delay (s/veh) 11.0 I <	Control Delay (s/veh)			11.0						7.9					
Approach Delay (s/veh) 11.0 0.9 Approach LOS B 6 6	Level of Service, LOS			В						А					
Approach LOS B	Approach Delay (s/veh)		1'	1.0	0.9										
	Approach LOS			В											

HCS7100 TWSC Version 7.2.1

	HCS7 Two-Way Stop-Control Report															
General Information							Site	Infor	matio	n						
Analyst	Addie	e Kirkhar	n				Inters	section			McIn	tyre at L	oves Cre	ek		
Agency/Co.	Ardu	rra					Juriso	diction			City c	of Knoxv	ille			
Date Performed	10/14	4/2022					East/	West Str	eet		McIn	tyre Roa	d			
Analysis Year	2027						North	n/South	Street		Loves	Creek F	Road			
Time Analyzed	Full B	uildout	PM Peak	(Peak	Hour Fa	ctor		0.93					
Intersection Orientation	North	n-South					Analy	/sis Time	Period ((hrs)	0.25					
Project Description	720.0	01 - Buf	fat Mill E	states												
Lanes																
Vehicle Volumes and Adi	t Major Street: North-South															
Approach		Facth	ound			Wost	bound			North	bound			South	bound	
Movement	U		т	R			т	R	U		т	R			т	R
Priority		10	11	12		7	8	9	10	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration																
Volume, V (veh/h)		14		32						20	491				401	18
Percent Heavy Vehicles (%)		2		2						2						
Proportion Time Blocked																
Percent Grade (%))													
Right Turn Channelized		Ν	lo			Ν	٩o			Ν	lo			Ν	10	
Median Type/Storage			No No No No													

Critical and Follow-up Headways

Critical and Follow-up readways														
Base Critical Headway (sec)		7.1		6.2						4.1				
Critical Headway (sec)		6.42		6.22						4.12				
Base Follow-Up Headway (sec)		3.5		3.3						2.2				
Follow-Up Headway (sec)		3.52		3.32						2.22				
Delay, Queue Length, and	d Leve	l of S	ervice)										
Flow Rate, v (veh/h)			49							22				
Capacity, c (veh/h)			434							1110				
v/c Ratio			0.11							0.02				
95% Queue Length, Q ₉₅ (veh)			0.4							0.1				
Control Delay (s/veh)			14.3							8.3				
Level of Service, LOS			В							А				
Approach Delay (s/veh)		14	1.3							0	.6			
Approach LOS		В												

HCS7100 TWSC Version 7.2.1

HCS7 Two-Way Stop-Control Report												
General Information		Site Information										
Analyst	Addie Kirkham	Intersection	Spring Hill at Monte Vist									
Agency/Co. Ardurra Jurisdiction City of Knoxville												
Date Performed 10/14/2022 East/West Street Monte Vista Road												
Analysis Year	2027	North/South Street	Spring Hill Road									
Time Analyzed	Background AM Peak	Peak Hour Factor	0.92									
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25									
Project Description	720.001 - Buffat Mill Estates											
Lanes												
4 U J J A ANT P C												



Vehicle Volumes and Adjustments																
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						5		18			117	0		6	50	
Percent Heavy Vehicles (%)						2		2						2		
Proportion Time Blocked																
Percent Grade (%)							0									
Right Turn Channelized		No No							١	lo			Ν	lo		
Median Type/Storage				Undi	Undivided											
Critical and Follow-up H	eadwa	dways														
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.42		6.22						4.12		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.22		
Delay, Queue Length, an	d Leve	el of S	ervice	e												
Flow Rate, v (veh/h)							25							7		
Capacity, c (veh/h)							893							1458		
v/c Ratio							0.03							0.00		
95% Queue Length, Q ₉₅ (veh)							0.1							0.0		
Control Delay (s/veh)			9.1											7.5		
Level of Service, LOS				A										A		
Approach Delay (s/veh)						9	.1						0.9			
Approach LOS							A									

Copyright © 2022 University of Florida. All Rights Reserved. HCS7700 TWSC Version 7.2.1 Background AM Peak_Spring Hill Road at Monte Vista.xtw

HCS7 Two-Way Stop-Control Report												
General Information		Site Information										
Analyst	Addie Kirkham	Intersection	Spring Hill at Monte Vist									
Agency/Co. Ardurra Jurisdiction City of Knoxville												
Date Performed 10/14/2022 East/West Street Monte Vista Road												
Analysis Year 2027 North/South Street Spring Hill Road												
Time Analyzed	Background PM Peak	Peak Hour Factor	0.86									
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25									
Project Description	720.001 - Buffat Mill Estates											
Lanes												



iviajoi sueet, norti-soutii																
Vehicle Volumes and Adjustments																
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						4		15			122	9		13	122	
Percent Heavy Vehicles (%)						2		2						2		
Proportion Time Blocked																
Percent Grade (%)							0									
Right Turn Channelized		No No								Ν	lo			N	lo	
Median Type/Storage				Undi	ivided											
Critical and Follow-up H	eadwa	adways														
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.42		6.22						4.12		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.22		
Delay, Queue Length, an	d Leve	el of S	ervic	e												
Flow Rate, v (veh/h)							22							15		
Capacity, c (veh/h)							834							1428		
v/c Ratio							0.03							0.01		
95% Queue Length, Q ₉₅ (veh)				0.1										0.0		
Control Delay (s/veh)		9.4										7.5				
Level of Service, LOS		A A A														
Approach Delay (s/veh)						9	.4		0.8							
Approach LOS		A														

Copyright $\ensuremath{\mathbb{C}}$ 2022 University of Florida. All Rights Reserved.

HCS7100 TWSC Version 7.2.1

Background PM Peak_Spring Hill Road at Monte Vista.xtw

Attachment 8 Intersection Worksheets – Full Buildout AM/PM Peaks

HCS7 All-Way Stop Control Report											
General Information		Site Information									
Analyst	Addie Kirkham	Intersection	Spring Hill at Buffat								
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville								
Date Performed	3/15/2023	East/West Street	Buffat Mill Road								
Analysis Year	2027	North/South Street	Spring Hill Road								
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.76								
Time Analyzed Full Buildout AM Peak											
Project Description 720.001 - Buffat Mill Estates											
Lanes	Lanes										



Vehicle Volume and Adjustments

Approach		Eastbound	l	· ·	Westbound	ł	1	lorthboun	d	9	Southboun	d
Movement	L	Т	R	L	Т	R	L	Т	R	L	Т	R
Volume	39	65	61	35	78	67	25	64	19	19	110	34
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	217			237			142			214		
Percent Heavy Vehicles	2			2			2			2		
Departure Headway and Se	rvice Ti	ime										
Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.193			0.211			0.126			0.191		
Final Departure Headway, hd (s)	5.10			5.06			5.42			5.26		
Final Degree of Utilization, x	0.308			0.333			0.214			0.313		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	3.10			3.06			3.42			3.26		
Capacity, Delay and Level o	f Servic	e										
Flow Rate, v (veh/h)	217			237			142			214		
Capacity	706			711			664			685		
95% Queue Length, Q ₉₅ (veh)	1.3			1.5			0.8			1.3		
Control Delay (s/veh)	10.4			10.6			9.9			10.6		
Level of Service, LOS	В			В			А			В		
Approach Delay (s/veh)		10.4			10.6			9.9			10.6	
Approach LOS		В			В			А			В	
Intersection Delay, s/veh LOS			1().4						В		

	HCS7 All-Way Sto	op Control Report							
General Information		Site Information							
Analyst	Addie Kirkham	Intersection	Spring Hill at Buffat						
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville						
Date Performed	3/15/2023	East/West Street	Buffat Mill Road						
Analysis Year	2027	North/South Street	Spring Hill Road						
Analysis Time Period (hrs)	0.25	Peak Hour Factor	0.90						
Time Analyzed	Full Buildout PM Peak								
Project Description 720.001 - Buffat Mill Estates									
Lanes									



Vehicle Volume and Adjustments

Approach		Eastbound		, , , , , , , , , , , , , , , , , , ,	Westbound	k	1	Northboun	d	9	Southboun	d
Movement	L	Т	R	L	Т	R	L	Т	R	L	Т	R
Volume	60	111	40	32	65	58	9	123	41	57	184	27
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	LTR			LTR			LTR			LTR		
Flow Rate, v (veh/h)	234			172			192			298		
Percent Heavy Vehicles	2			2			2			2		
Departure Headway and Se	rvice Ti	ime										
Initial Departure Headway, hd (s)	3.20			3.20			3.20			3.20		
Initial Degree of Utilization, x	0.208			0.153			0.171			0.265		
Final Departure Headway, hd (s)	5.55			5.54			5.47			5.40		
Final Degree of Utilization, x	0.361			0.265			0.292			0.447		
Move-Up Time, m (s)	2.0			2.0			2.0			2.0		
Service Time, ts (s)	3.55			3.54			3.47			3.40		
Capacity, Delay and Level o	f Servic	e										
Flow Rate, v (veh/h)	234			172			192			298		
Capacity	649			649			658			666		
95% Queue Length, Q ₉₅ (veh)	1.6			1.1			1.2			2.3		
Control Delay (s/veh)	11.7			10.5			10.7			12.7		
Level of Service, LOS	В			В			В			В		
Approach Delay (s/veh)		11.7			10.5			10.7			12.7	
Approach LOS		В			В			В			В	
Intersection Delay, s/veh LOS			1.	1.6						В		

LICCZ Two Way Stop Control Depart											
Concernel Information											
General Information		Site Information									
Analyst	Addie Kirkham	Intersection	Loves Creek at Buffat Mil								
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville								
Date Performed	3/15/2023	East/West Street	Buffat Mill Road								
Analysis Year	2027	North/South Street	Loves Creek Road								
Time Analyzed	Full Buildout AM Peak	Peak Hour Factor	0.84								
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25								
Project Description	720.001 - Buffat Mill Estates										
Lanes											
		Image: Second									

venicle volumes and Adj	ustme	ents														
Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume, V (veh/h)		30		71						123	135				147	35
Percent Heavy Vehicles (%)		2		2						2						
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		Ν	lo			Ν	10			Ν	0			Ν	lo	
Median Type/Storage				Undi	vided											
Critical and Follow-up He	eadwa	iys														
Base Critical Headway (sec)		7.1		6.2						4.1						
Critical Headway (sec)		6.42		6.22						4.12						
Base Follow-Up Headway (sec)		3.5		3.3						2.2						
Follow-Up Headway (sec)		3.52		3.32						2.22						
Delay, Queue Length, and	d Leve	el of S	ervice	9												
Flow Rate, v (veh/h)			121							146						
Capacity, c (veh/h)			625							1352						
v/c Ratio			0.19							0.11						
95% Queue Length, Q ₉₅ (veh)			0.7							0.4						
Control Delay (s/veh)			12.1							8.0						
Level of Service, LOS			В							А						
Approach Delay (s/veh)		12	2.1						4.3							
Approach LOS			3													

F			
	HCS7 Two-Way Sto	p-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Loves Creek at Buffat Mil
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville
Date Performed	3/15/2023	East/West Street	Buffat Mill Road
Analysis Year	2027	North/South Street	Loves Creek Road
Time Analyzed	Full Buildout PM Peak	Peak Hour Factor	0.97
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	720.001 - Buffat Mill Estates		
Lanes			
		Image: South	

Vehicle Volumes and Adju	ustme	ents															
Approach		Eastb	ound			West	oound			North	bound			South	bound		
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R	
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6	
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0	
Configuration			LR							LT						TR	
Volume, V (veh/h)		111		156						179	343				198	42	
Percent Heavy Vehicles (%)		2		2						2							
Proportion Time Blocked																	
Percent Grade (%)	0																
Right Turn Channelized	No No						Ν	lo			Ν	10					
Median Type/Storage		Undivided															
Critical and Follow-up He	eadwa	dways															
Base Critical Headway (sec)		7.1		6.2						4.1							
Critical Headway (sec)		6.42		6.22						4.12							
Base Follow-Up Headway (sec)		3.5		3.3						2.2							
Follow-Up Headway (sec)		3.52		3.32						2.22							
Delay, Queue Length, and	d Leve	el of S	ervice	9													
Flow Rate, v (veh/h)			275							185							
Capacity, c (veh/h)			418							1318							
v/c Ratio			0.66							0.14							
95% Queue Length, Q ₉₅ (veh)			4.6							0.5							
Control Delay (s/veh)			28.7							8.2							
Level of Service, LOS			D							A							
Approach Delay (s/veh)		28	3.7							3.7							
Approach LOS	D																

HCS7100 TWSC Version 7.2.1

	HCS7 Two-Way Stop	o-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Spring Hill at McIntyre
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville
Date Performed	3/15/2023	East/West Street	McIntyre Road
Analysis Year	2027	North/South Street	Spring Hill Road
Time Analyzed	Full Buildout AM Peak	Peak Hour Factor	0.90
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	720.001 - Buffat Mill Estates		
Lanes			
	→ ↓ ↓ ↑ ↑ ↑ ↑ ↑ ↑	7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	

	1	

114 * Y 1 F C Major Street: North-South

Vehicle Volumes and Adj	ustme	ents														
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						59		42			103	24		17	71	
Percent Heavy Vehicles (%)						2		2						2		
Proportion Time Blocked																
Percent Grade (%)							0									
Right Turn Channelized		No				Ν	10		No				No			
Median Type/Storage		Undivided														
Critical and Follow-up H	eadwa	iys														
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.42		6.22						4.12		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.22		
Delay, Queue Length, an	d Leve	el of S	ervice	9												
Flow Rate, v (veh/h)							113							19		
Capacity, c (veh/h)							802							1441		
v/c Ratio							0.14							0.01		
95% Queue Length, Q_{95} (veh)							0.5							0.0		
Control Delay (s/veh)							10.2							7.5		
Level of Service, LOS							В							А		
Approach Delay (s/veh)	10.2										1.5					
Approach LOS	В															

Copyright $\ensuremath{\mathbb{C}}$ 2023 University of Florida. All Rights Reserved.

HCS7700 TWSC Version 7.2.1

Full Buildout AM Peak_Spring Hill Road at McIntyre.xtw

	HCS7 Two-Way Stop	p-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Spring Hill at McIntyre
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville
Date Performed	3/15/2023	East/West Street	McIntyre Road
Analysis Year	2027	North/South Street	Spring Hill Road
Time Analyzed	Full Buildout PM Peak	Peak Hour Factor	0.86
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	720.001 - Buffat Mill Estates		
Lanes			
Vehicle Volumes and Adj	ustments		

Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						48		18			107	74		43	107	
Percent Heavy Vehicles (%)						2		2						2		
Proportion Time Blocked																
Percent Grade (%)		0														
Right Turn Channelized		Ν	lo			Ν	lo			Ν	о			Ν	lo	
Median Type/Storage				Undi	vided											
Critical and Follow-up He	eadwa	ys														
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.42		6.22						4.12		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.22		
Delay, Queue Length, and	d Leve	el of S	ervice	e												
Flow Rate, v (veh/h)							77							50		
Capacity, c (veh/h)							648							1360		
v/c Ratio							0.12							0.04		
95% Queue Length, Q ₉₅ (veh)							0.4							0.1		
Control Delay (s/veh)							11.3							7.7		
Level of Service, LOS							В							А		
Approach Delay (s/veh)				11.3									2.4			
Approach LOS							В									

Copyright $\ensuremath{\mathbb{C}}$ 2023 University of Florida. All Rights Reserved.

HCS7100 TWSC Version 7.2.1

Full Buildout PM Peak_Spring Hill Road at McIntyre.xtw

			<u> </u>	_		<u> </u>	6						_	_		
		Н	CS/	Iwo-	Way	' Stoj	o-Co	ntro	Кер	ort						
General Information							Site	Infor	natio	n						
Analyst	Addie	e Kirkhar	n				Inters	section			McIn	tyre at L	oves Cre	ek		
Agency/Co.	Ardu	rra					Jurisc	diction			City c	of Knoxv	ille			
Date Performed	3/15/	2023					East/	West Str	eet		McIn	tyre Roa	d			
Analysis Year	2027						North	n/South	Street		Loves	Greek F	Road			
Time Analyzed	Full B	uildout	AM Peak	(Peak	Hour Fa	ctor		0.90					
Intersection Orientation	North	n-South					Analy	/sis Time	Period	(hrs)	0.25					
Project Description	720.0	01 - Buf	fat Mill E	states												
Lanes																
Image: Street North-South																
Vehicle Volumes and Adj	ustme	ents														
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	10	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume, V (veh/h)		9		51						34	272				207	5
Percent Heavy Vehicles (%)		2		2						2						
Proportion Time Blocked																
Percent Grade (%)			0													
Right Turn Channelized		Ν	lo			Ν	10			Ν	lo			Ν	lo	

Critical and Follow-up Headways

Median Type/Storage

Critical and Follow-up He	auwa	ys									
Base Critical Headway (sec)		7.1		6.2			4.1				
Critical Headway (sec)		6.42		6.22			4.12				
Base Follow-Up Headway (sec)		3.5		3.3			2.2				
Follow-Up Headway (sec)		3.52		3.32			2.22				
Delay, Queue Length, and	d Leve	l of S	ervice)							
Flow Rate, v (veh/h)			67				38				
Capacity, c (veh/h)			718				1330				
v/c Ratio			0.09				0.03				
95% Queue Length, Q ₉₅ (veh)			0.3				0.1				
Control Delay (s/veh)			10.5				7.8				
Level of Service, LOS			В				А				
Approach Delay (s/veh)		10).5				1	.1			
Approach LOS		E	3								

Undivided

		Н	CS7	Two-	Way	' Stoj	p-Co	ntrol	l Rep	ort						
General Information		_	_	_	_	_	Site	Infor	matio	n	_	_	_	_		
Analyst	Addie	e Kirkhar	n				Inter	section			McIn	tyre at Lo	oves Cre	ek		
Agency/Co.	Ardu	rra					Juriso	liction			City o	of Knoxv	ille			
Date Performed	3/15/	2023					East/	West Str	eet		McIn	tyre Roa	d			
Analysis Year	2027						North	n/South	Street		Loves	Creek F	Road			
Time Analyzed	Full B	uildout	PM Peak	(Peak	Hour Fa	ctor		0.93					
Intersection Orientation	North	n-South					Analy	vsis Time	Period	(hrs)	0.25					
Project Description	720.0	01 - Buf	fat Mill I	states												
Lanes																
Vehicle Volumes and Adj	ustme	ents														
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	0	0	0	0	1	0	0	0	1	0
Configuration			LR							LT						TR
Volume, V (veh/h)		14		42						37	445				361	18
Percent Heavy Vehicles (%)		2		2						2						
Proportion Time Blocked																
Percent Grade (%)			0													

Critical and Follow-up Headways

No

Right Turn Channelized

Median Type/Storage

Critical and Follow-up He	auwa	ys									
Base Critical Headway (sec)		7.1		6.2			4.1				
Critical Headway (sec)		6.42		6.22			4.12				
Base Follow-Up Headway (sec)		3.5		3.3			2.2				
Follow-Up Headway (sec)		3.52		3.32			2.22				
Delay, Queue Length, and	d Leve	l of S	ervice)							
Flow Rate, v (veh/h)			60				40				
Capacity, c (veh/h)			486				1151				
v/c Ratio			0.12				0.03				
95% Queue Length, Q ₉₅ (veh)			0.4				0.1				
Control Delay (s/veh)			13.4				8.2				
Level of Service, LOS			В				А				
Approach Delay (s/veh)		13	3.4				1	.0			
Approach LOS			В								

No

Undivided

No

HCS7 IM TWSC Version 7.2.1

No

	HCS7 Two-Way Stop	o-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Spring Hill at Monte Vist
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville
Date Performed	3/15/2023	East/West Street	Monte Vista Road
Analysis Year	2027	North/South Street	Spring Hill Road
Time Analyzed	Full Buildout AM Peak	Peak Hour Factor	0.92
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	720.001 - Buffat Mill Estates		
Lanes			
		년 <i>- 1</i> 	

	⊿ 4	+ 🗛 🏘	• ₽• S	∎ U	
NUSTRIES.					a contraction of the second
_*					×
4					<u>*</u>
- ↔					←
\prec					\succ
					*
4					1
_					✓
		+_			
	and the second	s r			
	۱	<u> ተ</u> ቀ ነ	111	• •	
	Maio	r Street: No	orth-Sou	th	

Vehicle Volumes and Ad	justme	ents														
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						5		18			122	0		6	64	
Percent Heavy Vehicles (%)						2		2						2		
Proportion Time Blocked																
Percent Grade (%)							0									
Right Turn Channelized		Ν	lo			Ν	10			Ν	10			Ν	lo	
Median Type/Storage				Undi	vided											
Critical and Follow-up H	eadwa	adways														
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.42		6.22						4.12		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.22		
Delay, Queue Length, ar	d Leve	el of S	ervice	e												
Flow Rate, v (veh/h)							25							7		
Capacity, c (veh/h)							882							1451		
v/c Ratio							0.03							0.00		
95% Queue Length, Q ₉₅ (veh)							0.1							0.0		
Control Delay (s/veh)							9.2							7.5		
Level of Service, LOS							A							A		
Approach Delay (s/veh)						9	.2							0	.7	
Approach LOS						,	A									

Copyright © 2023 University of Florida. All Rights Reserved. HCS7 III TWSC Version 7.2.1 Full Buildout AM Peak_Spring Hill Road at Monte Vista.xtw

	HCS7 Two-Way Stop	o-Control Report	
General Information		Site Information	
Analyst	Addie Kirkham	Intersection	Spring Hill at Monte Vist
Agency/Co.	Ardurra	Jurisdiction	City of Knoxville
Date Performed	3/15/2023	East/West Street	Monte Vista Road
Analysis Year	2027	North/South Street	Spring Hill Road
Time Analyzed	Full Buildout PM Peak	Peak Hour Factor	0.86
Intersection Orientation	North-South	Analysis Time Period (hrs)	0.25
Project Description	720.001 - Buffat Mill Estates		
Lanes			



					Major	Street: No	rth-South									
Vehicle Volumes and Adju	ustme	ents														
Approach		Eastb	ound			Westł	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	1	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume, V (veh/h)						4		15			139	9		13	132	
Percent Heavy Vehicles (%)						2		2						2		
Proportion Time Blocked																
Percent Grade (%)						(0									
Right Turn Channelized		N	lo			N	lo			Ν	lo			N	ю	
Median Type/Storage				Undi	vided											
Critical and Follow-up He	eadwa	iys														
Base Critical Headway (sec)						7.1		6.2						4.1		
Critical Headway (sec)						6.42		6.22						4.12		
Base Follow-Up Headway (sec)						3.5		3.3						2.2		
Follow-Up Headway (sec)						3.52		3.32						2.22		
Delay, Queue Length, and	d Leve	l of S	ervice	e												
Flow Rate, v (veh/h)							22							15		
Capacity, c (veh/h)							809							1404		
v/c Ratio							0.03							0.01		
95% Queue Length, Q ₉₅ (veh)							0.1							0.0		
Control Delay (s/veh)							9.6							7.6		
Level of Service, LOS							А							А		
Approach Delay (s/veh)						9	.6							0	.8	
Approach LOS						1	Α									

Copyright © 2023 University of Florida. All Rights Reserved.

HCS7700 TWSC Version 7.2.1

Generated: 3/15/2023 11:59:41 AM

Full Buildout PM Peak_Spring Hill Road at Monte Vista.xtw

		Н	CS7	Two-	-Way	' Stoj	o-Co	ntrol	l Rep	ort						
General Information							Site	Infor	matio	n						
Analyst	Addie	e Kirkhai	n				Inters	ection			Buffa	t Mill at	Drivewa	y		
Agency/Co.	Ardu	rra					Jurisc	liction			City o	of Knoxv	ille			
Date Performed	3/15/	2023					East/	West Str	eet		Buffa	t Mill Ro	ad			
Analysis Year	2027						North	n/South	Street		Drive	way Cor	nection			
Time Analyzed	Full B	uildout	AM Peal	<			Peak	Hour Fa	ctor		0.92					
Intersection Orientation	East-	West					Analy	vsis Time	Period	(hrs)	0.25					
Project Description	720.0	01 - But	fat Mill I	Estates												
Lanes																
				2 4 1 7 4 F L D 4	n Mair Mair	۲ ۲ ۲ ۲ ۲ ۲	ast-West									
Intrinciple Street: Fast-West Vehicle Volumes and Adjustments Approach Eastbound Westbound Northbound Southbound																
Approach		Eastk	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume, V (veh/h)			83	20		5	122			58		15				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)											0					
Right Turn Channelized		١	10			Ν	10			Ν	10			Ν	10	
Median Type/Storage				Undi	vided											
Critical and Follow-up H	eadwa	iys														
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				6.42		6.22				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.52		3.32				
Delay, Queue Length, an	d Leve	el of S	ervic	e												
Flow Rate, v (veh/h)						5					79					<u> </u>
Capacity, c (veh/h)						1477					777					
v/c Ratio						0.00					0.10					
95% Queue Length, Q ₉₅ (veh)						0.0					0.3					
Control Delay (s/veh)						7.4					10.2					
Level of Service, LOS						А					В					
Approach Delay (s/veh)						0	.3			1	0.2					
Approach LOS											В					

Copyright $\ensuremath{\mathbb{C}}$ 2023 University of Florida. All Rights Reserved.

HCS7 IM TWSC Version 7.2.1

		Н	CS7	Two	-Way	' Stoj	o-Co	ntro	l Rep	ort						
General Information							Site	Infor	matio	n						
Analyst	Addie	e Kirkha	m				Inters	ection			Buffa	t Mill at	Drivewa	IY		
Agency/Co.	Ardu	rra					Jurisc	liction			City o	of Knoxv	ille			
Date Performed	3/15/	/2023					East/	West Str	eet		Buffa	t Mill Ro	ad			
Analysis Year	2027						North	n/South	Street		Drive	way Cor	nnection			
Time Analyzed	Full B	uildout	PM Peak	(Peak	Hour Fa	ctor		0.92					
Intersection Orientation	East-	West					Analy	vsis Time	Period	(hrs)	0.25					
Project Description	720.0	01 - But	ffat Mill I	Estates												
Lanes																
				1417470 147470	n t Majc	۲ ۴۲ ۲ Street: Ea	↑ ↑ ↑ ast-West									
Vehicle Volumes and Adjustments Approach																
Approach		Eastl		South	bound											
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume, V (veh/h)			141	68		17	115			40		10				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)											0					
Right Turn Channelized		1	٥V			Ν	10			٩	10			Ν	10	
Median Type/Storage				Undi	ivided											
Critical and Follow-up H	eadwa	iys														
Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				6.42		6.22				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.52		3.32				
Delay, Queue Length, an	d Leve	el of S	ervic	e												
Flow Rate, v (veh/h)						18					54					
Capacity, c (veh/h)						1340					672					
v/c Ratio						0.01					0.08					
95% Queue Length, Q ₉₅ (veh)						0.0					0.3					
Control Delay (s/veh)						7.7					10.8					
Level of Service, LOS						А					В					
Approach Delay (s/veh)		-				1	.1			1	0.8				-	
Approach LOS											В					

Copyright © 2023 University of Florida. All Rights Reserved.

HCS7 TM TWSC Version 7.2.1

		Н	CS7	Two	-Way	' Sto	p-Co	ntro	l Rep	ort						
General Information							Site	Infor	matio	n						
Analyst	Addi	e Kirkhaı	m				Inter	section			McIn	tyre at D	Driveway			
Agency/Co.	Ardu	rra					Juriso	diction			City o	of Knoxv	rille			
Date Performed	3/15,	/2023					East/	West Str	eet		Buffa	t Mill Rc	bad			
Analysis Year	2027						Nort	h/South	Street		Drive	way Cor	nnection			
Time Analyzed	Full E	Buildout	AM Peal	k			Peak	Hour Fa	ctor		0.92					
Intersection Orientation	East-	West					Analy	/sis Time	e Period	(hrs)	0.25					
Project Description	720.0)01 - Buf	fat Mill	Estates												
Lanes																
					n f	۲ ۲ Street: E	t t t t t t t t t t t t t t t t t t t	~								
Vehicle Volumes and Adj	and Adjustments															
Approach		Eastb	bound			West	bound			North	bound			South	bound	
Movement	U	L	T	R	U	L	Т	R	U	L	T	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume, V (veh/h)		19	45				34	5						15		58
Percent Heavy Vehicles (%)		2												2		2
Proportion Time Blocked																
Percent Grade (%)															0	
Right Turn Channelized		١	١o			1	٩o			١	10			Ν	lo	
Median Type/Storage				Undi	ivided											
Critical and Follow-up H	eadwa	ays														
Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.12												6.42		6.22
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.22												3.52		3.32
Delay, Queue Length, an	d Leve	el of S	ervic	e												
Flow Rate, v (veh/h)	<u> </u>	21								T					79	
Capacity, c (veh/h)		1566													989	
v/c Ratio		0.01													0.08	
95% Queue Length, Q ₉₅ (veh)		0.0													0.3	
Control Delay (s/veh)		7.3													9.0	
Level of Service, LOS		A													A	
Approach Delay (s/veh)		2	2.3											9	.0	
Approach LOS															4	

		Н	CS7	Two	-Way	' Sto	p-Co	ntro	l Rep	ort									
General Information							Site	Infor	matio	n									
Analyst	Addi	e Kirkhaı	m				Inter	section			McIn	tyre at D	Driveway						
Agency/Co.	Ardu	rra					Juriso	diction			City o	of Knoxv	rille						
Date Performed	3/15,	/2023					East/	West Str	eet		Buffa	t Mill Rc	bad						
Analysis Year	2027						Nort	h/South	Street		Drive	way Cor	nnection						
Time Analyzed	Full E	Buildout	PM Peal	<			Peak	Hour Fa	ctor		0.92								
Intersection Orientation	East-	West					Analy	/sis Time	e Period	(hrs)	0.25								
Project Description	720.0)01 - Buf	fat Mill	Estates															
Lanes																			
				J 4 4 4 4 4 4	ň ¶ _{Majc}	۲ r Street: E	t t t t t t t t t t t t t t t t t t t												
Vehicle Volumes and Adj	justme	ents																	
Approach		Eastb	bound			West	bound			North	bound			South	bound				
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R			
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12			
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0			
Configuration		LT						TR							LR				
Volume, V (veh/h)		67	46				38	17						10		40			
Percent Heavy Vehicles (%)		2												2		2			
Proportion Time Blocked																			
Percent Grade (%)															0				
Right Turn Channelized		٩	١o			١	٩o			١	10			Ν	lo				
Median Type/Storage				Undi	ivided														
Critical and Follow-up H	eadwa	ays																	
Base Critical Headway (sec)		4.1												7.1		6.2			
Critical Headway (sec)		4.12												6.42		6.22			
Base Follow-Up Headway (sec)		2.2												3.5		3.3			
Follow-Up Headway (sec)		2.22												3.52		3.32			
Delay, Queue Length, an	d Leve	el of S	ervic	e															
Flow Rate, v (veh/h)	<u> </u>	73								T					54				
Capacity, c (veh/h)		1544													934				
v/c Ratio		0.05													0.06				
95% Queue Length, Q ₉₅ (veh)		0.1													0.2				
Control Delay (s/veh)		7.4													9.1				
Level of Service, LOS		A													A				
Approach Delay (s/veh)		4	1.6											9	.1				
Approach LOS														A					

Attachment 9 Turn Lane Warrant Analysis

Project: Buffat Mill Estates

Existing Conditions 2022

Buffat Mill Road at Loves Creek Road

Buffat Mill Road at Loves Creek Road	VOLUMES				
LEFT TURN	Opposing	Thru	LT	LT MAX	Warrant Met
AM	171	128	114	245	NO
PM	220	326	162	100	YES
Buffat Mill Road	VOLUMES				
at Loves Creek Road					
RIGHT TURN		Thru	RT	RT MAX	Warrant Met
AM		140	31	499	NO
PM		188	32	499	NO
McIntyre Road at Loves Creek	Road				
McIntyre Road	VOLUMES				
at Loves Creek Road					
LEFT TURN	Opposing	Thru	LT	LT MAX	Warrant Met
AM	194	256	28	130	NO
PM	356	415	19	55	NO
McIntyre Road	VOLUMES				
at Loves Creek Road					
RIGHT TURN	_	Thru	RT	RT MAX	Warrant Met
AM		189	5	499	NO
PM		339	17	299	NO

Project: Buffat Mill Estates

Background Conditions 2027

Buffat Mill Road at Loves Creek Road

Buffat Mill Road	VOLUMES				
LEFT TURN	Opposing	Thru	LT	LT MAX	Warrant Met
AM	180	135	120	245	NO
PM	232	343	170	100	YES
Buffat Mill Road	VOLUMES				
at Loves Creek Road					
RIGHT TURN		Thru	RT	RT MAX	Warrant Met
AM		147	33	499	NO
PM		198	34	499	NO
McIntyre Road at Loves Creek	Road				
McIntyre Road	VOLUMES				
at Loves Creek Road					
LEFT TURN	Opposing	Thru	LT	LT MAX	Warrant Met
AM	204	269	29	115	NO
PM	374	436	20	55	NO
McIntyre Road	VOLUMES				
at Loves Creek Road					
RIGHT TURN		Thru	RT	RT MAX	Warrant Met
AM		199	5	499	NO
PM		356	18	299	NO

Project: Buffat Mill Estates

Full Buildout Conditions 2027

Buffat Mill Road at Loves Creek Road

Buffat Mill Road	VOLUMES				
at Loves Creek Road					
LEFT TURN	Opposing	Thru	LT	LT MAX	Warrant Met
AM	182	135	123	245	NO
PM	240	343	179	100	YES
Buffat Mill Road	VOLUMES				
at Loves Creek Road					
RIGHT TURN		Thru	RT	RT MAX	Warrant Met
AM		147	35	499	NO
PM		198	42	499	NO
Buffat Mill Road at Driveway	Connection				
Buffat Mill Road	VOLUMES				
at Driveway Connection					
LEFT TURN	Opposing	Thru	LT	LT MAX	Warrant Met
AM	103	122	5	300	NO
PM	209	115	17	205	NO
Buffat Mill Road	VOLUMES				
at Driveway Connection					
RIGHT TURN		Thru	RT	RT MAX	Warrant Met
AM	_	83	20	599	NO
PM		141	68	499	NO
McIntvre Road at Loves Creek	Road				
McIntyre Road	VOLUMES				
at Loves Creek Road	1 O E O MES				
	Opposing	Thru	IТ	Ι Τ ΜΑΧ	Warrant Met
AM	212	272	34	115	NO
PM	379	445	37	55	NO
McIntyre Road	VOLUMES				
at Loves Creek Road	1 O L O M L O				
RIGHT TURN		Thru	RT	RT MAX	Warrant Met
AM	_	207	5	399	NO
PM		361	18	249	NO
Molntyre Road at Driveway C	onnection	501	10	215	110
Melnture Road	VOLUMES				
at Drivoway Connection	VOLUMLS				
	Opposing	Thru	IТ		Marrant Mot
		45	 10	200	
PM	59 55	45 46	19 67	300	NO
McIntyre Koad	VOLUMES				
at Driveway Connection		-	57	DTAINS	
RIGHTTURN		Ihru	RT	RIMAX	Warrant Met
AM		34	5	599	NO
PM		38	17	599	NO

TABLE 4A

LEFT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

OPPOSING	THROUG	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *								
VOLUME	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399				
100 - 149 150 - 199	300 AM	Peak 123 LT	185 160	145 130	120 110	100 90				
200 - 249	205	170	140	115	100	80				
250 - 299	175	150	121 PM I	Peak 179 L	T 91	70				
300 - 349	155	135	110	95	\$0	65				
350 - 309		120	100	85	70	60				
400 - 419	120	105	90	75	65	55				
	105	90	80	71)	60	50				
500 - 549	95	S0	70	65	55	50				
	85	70	65	60	50	45				
600 - 649	75	65	60	55	45	40				
650 - 699	70	60	55	50	40	35				
700 - 749	65	55	50	45	35	30				
750 or Marr	60	50	45	40	35	30				

(If the left-turn volume exceeds the table value a left -turn lane is needed)

OPPOSING	THROU	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *									
VOLUME	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= 1 > 600					
100 - 149 150 - 199	100	80 75	70 65	60 55	55 50	50 45					
200 - 249 250 - 299	80 70	72 65	460	55 50	50 45	45 40					
300 - 349	65 60	60 55	50 50	50 45	45 40	40 40					
400 - 449	55	50 45	45 45	45 40	40 35	35 35					
500 - 549	50 45		40 40 40	40 35	35 35	35 35					
600 - 649 650 - 699	40 35	35 35	35 35	35 30	35 30	30 30					
700 - 749	30	30	30 30	30 30	30 30	30 30					

* Or through volume only if a right-turn lane exists.

TABLE 4B

RIGHT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

RIGHT-TURN	THRO	UGH VOLUM	E PLUS LEF	T-TURN	VOLUME	; * -
VOLUME	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25 25 - 49 50 - 99	AM Peak 3	5 RT 8 PM	Peak 42 RT			
108 - 149 150 - 199						
200 - 249 250 - 299						Yes
300 - 349 350 - 399				Yes	Yes Yes	Yes Yes
400 - 449 450 - 499			Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599		Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

RIGHT-TURN	THRO	THROUGH VOLUME PLUS LEFT-TURN VOLUME *								
VOLUME	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600				
Fewer Than 25 25 - 49 50 - 99					Yes	Yes Yes				
100 - 149 150 - 199			Yes	Yes Yes	Yes Yes	Yes Yes				
200 - 249 250 - 299	Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes				
300 - 349 350 - 399	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes				
400 - 449 450 - 499	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes				
500 - 549 550 - 599	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes . Yes				
600 or More	Yes	Yes	Yes	Yes	Yes	Yes				

L

* Or through volume only if a left-turn lane exists.

TABLE 4A

LEFT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

OPPOSING	THROU	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *								
VOLUME	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399				
100 - 149 150 - 199	300 AM	Peak 5 LT	185 160	145 130	120 110	100 90				
200 - 249	205 PM F	Peak 17 LT	140 125	115 105	100 90	80 70				
300 - 349 350 - 309	155	135 120	110 100	95 85 ·	\$0 70	65 60				
409 - 419	120	105 90	90 80	75 70	65 60	55 50				
500 - 549	95 83	S0 70	70 65	65 60	55 50	50 45				
600 - 649 650 - 699	75 70	65 60	60 55	55 50	45 40	40 35				
700 - 749 750 or Marc		55 50	50 45	45 40	35 35	30 30				

(If the left-turn volume exceeds the table value a left -turn lane is needed)

OPPOSING	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *								
VOLUME	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= 1 > 600			
100 - 149	100	80 75	70 65	60 55	55 50	50 45			
200 - 249 250 - 299	80 70	72 65	460 55	55 50	50 45	45 40			
300 - 349 350 - 399	65 60	60 55	50 50	50 45	45 40	40 40			
400 - 449	55 50	50 45	45 45	45 40	40 35	35 35			
500 - 549	50 45	45 40	40 40 40	40 35	35 35	35 35			
600 - 649 650 - 699	40	35 35	35 35	35 30	35 30	30 30			
700 - 749 750 or Murr	30	30 30	30 30	30 30	30 30	30 30			

* Or through volume only if a right-turn lane exists.

TABLE 4B

RIGHT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

RIGHT-TURN	THROU	THROUGH VOLUME PLUS LEFT-TURN VOLUME *									
VOLUME	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399					
Fewer Than 25 25 - 49 50 - 99	O Peak 20 RT		Peak 68 RT								
108 - 149 150 - 199											
200 - 249 250 - 299						Yes					
300 - 349 350 - 399				Yes	Yes Yes	Yes Yes					
400 - 449 450 - 499			Yes Yes	Yes Yes	Yes Yes	Yes Yes					
500 - 549 550 - 599		Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes					
600 or More	Yes	Yes	Yes	Yes	Yes	Yes					

RIGHT-TURN	THROUGH VOLUME PLUS LEFT-TURN VOLUME *									
VOLUME	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600				
Fewer Than 25 25 - 49 50 - 99					Yes	Yes Yes				
100 - 149 150 - 199			Yes	Yes Yes	Yes Yes	Yes Yes				
200 - 249 250 - 299	Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes				
300 - 349 350 - 399	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes				
400 - 449 450 - 499	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes				
500 - 549 550 - 599	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes . Yes				
600 or More	Yes	Yes	Yes	Yes	Yes	Yes				

111

L

* Or through volume only if a left-turn lane exists.

TABLE 4A

LEFT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

OPPOSING	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
VOLUME	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149	300 245	235 200	185 160)45 130	120 110	100 90
200 - 249	205	170 150	140 125	115 105	AM Peak 3	4 LT
300 - 349	155	135 120	110 100	95 85	\$0 70	65 60
409 - 419	120	105 90	90 80	75 70	65 60	55 50
500 - 549	95 85	\$0 70	70 65	65 60	55 50	50 45
600 - 649 650 - 699	75 70	65 60	60 55	55 50	45 40	40 35
700 - 749 750 or Marr	65 60	55 50	50 45	45 40	35 35	30 30

(If the left-turn volume exceeds the table value a left -turn lane is needed)

OPPOSING	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
VOLUME	350 - 399	460 - 449	450 - 499	500 - 549	550 - 599	= 1 > 600
100 - 149	100	80	70	60	55	50
150 - 199		75	65	55	50	45
200 - 249	80	72	460	55	50	45
250 - 299	70	65	55	50	45	40
300 - 349 350 - 399	65 60	60 PM	Peak 37 LT	50 45	45 40	40 40
400 - 449	55	50	45	45	40	35
450 - 499		45	45	40	35	35
500 - 549	50	45 40	40 40 40	40 35	35 35	35 35
600 - 649	40	35	35	35	35	30
650 - 699		35	35	30	30	30
700 - 749	30	30	30	30	30	30
750 or Mure	30	30	30	30	30	30

* Or through volume only if a right-turn lane exists.

TABLE 4B

RIGHT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

RIGHT-TURN	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
VOLUME	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25 25 - 49 50 - 99				M Peak 5 R	T PM Peak	(18 RT
108 - 149 150 - 199					 	
200 - 249 250 - 299						Yes
300 - 349 350 - 399				Yes	Yes Yes	Yes Yes
400 - 449 450 - 499			Yes Yes	Yes Yes	Y'es Y'es	Yes Yes
500 - 549 550 - 599		Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

RIGHT-TURN	THROUGH VOLUME PLUS LEFT-TURN VOLUME *						
VOLUME	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600	
Fewer Than 25 25 - 49 50 - 99					Yes	Yes Yes	
100 - 149 150 - 199			Yes	Yes Yes	Yes Yes	Yes Yes	
200 - 249 250 - 299	Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	
300 - 349 350 - 399	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	
400 - 449 450 - 499	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	
500 - 549 550 - 599	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes - Yes	
600 or More	Yes	Yes	Yes	Yes	Yes	Yes	

-

l

* Or through volume only if a left-turn lane exists.
TABLE 4A

LEFT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

OPPOSING	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
VOLUME	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149	300 AM	Peak 19 LT	185 160)45 130	120 110	100 90
200 - 249	205 175	170 150	140 125	115 105	100 90	80 70
300 - 349	155	135 120	110 100	95 85 ·	\$0 70	65 60
409 - 419	120	105 90	90 80	75 70	65 60	55 50
500 - 549	95 85	S0 70	70 65	65 60	55 50	50 45
600 - 649 650 - 699	75 70	65 60	60 55	55 50	45 40	40 35
700 - 749		55 50	50 45	45 40	35 35	30 30

(If the left-turn volume exceeds the table value a left -turn lane is needed)

OPPOSING	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *						
VOLUME	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= 1 > 600	
100 - 149 150 - 199	100	80 75	70 65	60 55	55 50	50 45	
200 - 249 250 - 299	80 70	72 65	460 55	55 50	50 45	45 40	
300 - 349 350 - 399	65 60	60 55	50 50	50 45	45 40	40 40	
400 - 449	55	50 45	45	45 40	40 35	35 35	
500 - 549	50 45	45 40	40 40	40 35	35 35	35 35	
500 - 649 650 - 699	40	35 35	35 35	35 30	35 30	30 30	
700 - 749	30	30	30	30 30	30 30	30 30	

* Or through volume only if a right-turn lane exists.

TABLE 4B

RIGHT-TURN LANE VOLUME THRESHOLDS FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

.

L

RIGHT-TURN	THROUGH VOLUME PLUS LEFT-TURN VOLUME *						
VOLUME	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399	
Fewer Than 25 25 - 49 50 - 99		/ Peak 5 RT / Peak 17 RT					
100 - 149 150 - 199							
200 - 249 250 - 299					<u> </u>	Yes	
300 - 349 350 - 399		 		Yes	Yes Yes	Yes Yes	
400 - 449 450 - 499			Yes Yes	Yes Yes	Y'es Y'es	Yes Yes	
500 - 549 550 - 599		Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	
600 or More	Yes	Yes	Yes	Yes	Yes	Yes	

RIGHT-TURN	THROUGH VOLUME PLUS LEFT-TURN VOLUME *						
VOLUME	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600	
Fewer Than 25 25 - 49 50 - 99					Yes	Yes Yes	
100 - 149 150 - 199			Yes	Yes Yes	Yes Yes	Yes Yes	
200 - 249 250 - 299	Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	
300 - 349 350 - 399	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	
400 - 449 450 - 499	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	
500 - 549 550 - 599	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes . Yes	
600 or More	Yes	Yes	Yes	Yes	Yes	Yes	

* Or through volume only if a left-turn lane exists.

Attachment 10 Sight Distance



Buffat Mill Road at Roadway Connection (Road "A") Intersection Sight Triangles



Buffat Mill Road at Roadway Connection (Road "A") – Looking Left



Buffat Mill Road at Roadway Connection (Road "A") – Looking Right



SCALE: 1"=50' HORIZ 1"=5' VERT





McIntyre Road at Roadway Connection (Road "F")

Intersection Sight Triangles



McIntyre Road at Roadway Connection (Road "F) – Looking Left



McIntyre Road at Roadway Connection (Road "F") – Looking Right











March 29, 2023

Mike Conger Knoxville-Knox County Planning 400 Main Street, Suite 403 Knoxville, TN 37902

Re: Buffat Mill Estates TIS Comments (2-SB-23-C / 2-C-23-SU)

Dear Mr. Conger:

The following comment response letter is submitted to address comments dated January 20, 2023 and additional comments dated March 24, 2023 and March 27, 2023:

1. Reviewer Comment: Page 1 – The table of contents page reference for section 7.7 appears to have a typo, it should instead be 31.

<u>Response:</u> Updated to the correct page numbers on the table of contents for all sections.

- 2. Reviewer Comment: Page 3
 - a. The proposed roadway connections are referred to as driveways. Please revise throughout document.

<u>Response:</u> Revised the word "driveway" to "roadway" throughout the report.

b. The site is noted as being east of I-640. Please revise through document.

Response: Revised to state "west of I-640".

c. It may be beneficial to change the terminology reference of the units. Perhaps indicating "180 duplexes proposed for a total of 360 units" would be clearer.

<u>Response</u>: The concept plan has been revised to include single-family lots instead of duplex units. The TIA has been updated the reflect the changes to the concept plan.

3. Reviewer Comment: Page 10 – Please indicate that sidewalks are proposed within the development.

<u>Response:</u> Added a description of the proposed sidewalks and the natural hiking path to Section 1.5 Pedestrian/Bicycle Network.

- 4. Reviewer Comment: Page 15
 - a. Please add a clarification statement that the amenities are solely intended for residents of this development, otherwise if open to the general public then additional trips should be included in the report.

<u>Response:</u> Added the following statement to Page 15 "The on-site amenities are intended for use by the residents of Buffat Mill Estates and are not open to the general public."

b. Please provide additional background/justification for review regarding the assumed trip distribution percentages for further consideration. The reviewing agencies were expecting potentially greater distribution towards Spring Hill Rd from the Buffat Mill Rd access instead of Loves Creek Rd which leads to heavy traffic and a signal at Millerstown to the north, and a signal and narrow railroad underpass at Rutledge Pike to the south causing greater travel time for traffic desiring to go to the interstate. In looking at Google maps for most major interstate ramp locations, Spring Hill Rd was the preferred route on all locations. Please expound on the trip distribution assumptions for our review and approval, which may impact other parts of the study if it is determined that the trip distribution should be modified.

<u>Response:</u> Submitted a DRAFT of the revised trip distribution for the City of Knoxville to review and updated the assumptions as follows: "The entering and exiting traffic was assumed to be 15% Loves Creek southbound, 5% Loves Creek northbound, 10% Buffat Mill Road westbound, 25% Spring Hill Road northbound and 45% Spring Hill Road southbound."

5. Reviewer Comment: Page 24 – It appears the background year referenced in Table 5-2 should be 2027. Please revise.

<u>Response:</u> Updated the background year in Table 5-2 to 2027.

6. **Reviewer Comment:** Page 28 – The study does not indicate whether or not the NB left turn lane determined to be warranted on Loves Creek Rd at Buffat Mill Rd should be installed with this development. Please further explain the impact at this location and whether or not this should be included with the development (This comment may not be applicable if item b on page 15 above causes changes to the trip distribution).

<u>Response:</u> Added the following statement to the report. "The warrant for a northbound left turn lane is an existing condition that is only marginally impacted by the new vehicle trips from the Buffat Mill Estates residential development."

7. **Reviewer Comment:** Page 30 – Depending on the outcome of the modifications to the concept plan, sidewalks may be connected to Monte Vista Rd. This may or may not impact the TIA info.

<u>Response</u>: Added a statement to Section 1.5 Pedestrian/Bicycle Network on page 10 that "There is no proposed sidewalk or natural hiking path connection to the existing Monte Vista Road."

8. **Reviewer Comment:** Attachment 9 – Please provide turn lane warrant analyses for all scenarios that were studied (existing, background and buildout and clearly label each.

<u>Response:</u> Added existing and background turn lane warrant analysis for the intersections of Loves Creek at Buffat Mill Road and Loves Creek at McIntyre Road.

9. Reviewer Comment: The City of Knoxville is further reviewing the road widths in the area however the study should add discussion that the general minimum width standard is 20 feet wide and any roads narrower than this may need to be widened based on a case-by-case evaluation.

<u>Response</u>: Added a discussion regarding road widths to section 7.6 Buffat Mill Road at Roadway Connection (Road "A") and to section 7.7 McIntyre Road at Roadway Connection (Road "F").

10. Reviewer Comment: The TIS needs to report the required intersection spacing distances per the Subdivision Regulations and provide justification/assurance that safe operations can be provided along with any variances required. This specifically applies to the entrance at Buffat Mill Rd which requires a 300' spacing distance since it is a Collector Road.

<u>Response:</u> Added a discussion regarding intersection spacing to section 7.6 Buffat Mill Road at Roadway Connection (Road "A") and to section 7.7 McIntyre Road at Roadway Connection (Road "F").

11. Reviewer Comment: The sight distance triangles shown for the proposed intersections need to be revised. In the case of left turns, the sight distance in both directions should be met for the left turn movements. This number is greater than the required for right turns, so the left turn requirement controls. Please see first paragraph of AASHTO green book section 9.5.3.2.1 for info regarding this.

<u>Response:</u> Revised the intersection sight distance figures to show the left turn requirement for both directions. Attachment 10 includes pictures of the existing intersection sight distance and sight line profiles at the proposed roadway connections.

12. Reviewer Comment: The posted speed limit on McIntyre is 25 mph. The study uses 30 mph, which is conservative and acceptable.

<u>Response:</u> Updated the Section 7.7 McIntyre Road at Roadway Connection (Road "F) and Attachment 10 to reflect a 25 mph speed limit.

Additional Comments Dated March 24, 2023 and March 27, 2023.

1. Reviewer Comment: Sight Distance was not properly evaluated and certified. It needs to be based on: intersection sight distance, proper AASHTO case (for right or left turns), sight triangles shown, and a field survey. Additionally, the determination of whether or not easements are needed from adjoining properties needs to be evaluated.

<u>Response:</u> Updated the sight distance evaluation. The intersection sight triangles do not show that any easements will be required from the adjoining properties.

a. The sight triangles were provided in the original TIS but removed from the revised version – please update these based on the prior comment regarding required distances per AASHTO and include in the revised version.

<u>Response:</u> Updated the sight triangles per the required AASHTO lengths and included them in Attachment 10.

b. Please clarify the labelling or include appropriate discussion about the apparent road profile adjustments needed for Buffat Mill Rd in the sight profiles included in Attachment 10. These appear to show grading work being necessary on the Buffat Mill Rd itself to achieve sight distance based on how "Existing Grade" and "Proposed Grade" are being shown.

<u>Response:</u> The proposed grading work is located in the right-of-way to allow for the construction of the boulevard entrance. There is no proposed or necessary grading work on Buffat Mill Road.

c. Stopping sight distance can be denoted and included in the TIS however Intersection Sight Distance is the controlling design factor for this review. The stopping sight distance is able to measured regardless of site topography since it is based on the view down the roadway towards an object so please update this analysis if it is kept in the revised TIS.

<u>Response:</u> Revised the stopping sight distance analysis and recommendation.

2. Reviewer Comment: A variance for the intersection spacing distance at the proposed Buffat Mill Rd access has been noted as being required in the revised TIS however no discussion/assurance has been provided to indicate why the variance

should be supported in terms of an engineering assessment of the acceptable safety and operations that will still be able to be provided if the variance is granted. Please provide this information to support the variance request.

Response: Updated the report with the following statement.

"The Buffat Mill Estates residential development will need to request a variance to allow the intersection spacing to be less than the required 300 feet. The property frontage along Buffat Mill Road is limited and shifting the entrance further away from Locarno Drive is not an option.

The unsignalized intersection capacity analysis shows a 95% queue length at the full buildout for westbound Buffat Mill Road of less than one car length during both the AM and PM peak hours; therefore, westbound vehicles turning left onto Road "A" are not expected to back up or interfere with the traffic operations at the intersection of Buffat Mill Road at Locarno Drive."

- **3. Reviewer Comment:** There is no need to make the 50% entering/exiting from each entrance assumption (this could be more accurately based on final exit routes not routes into the development). That being said, the final distribution used looks good/realistic. No changes needed.
- **4. Reviewer Comment:** Page 17, 19, 21: Figures 5, 7 and 9 refer to the street entrances as Driveways. Please revise this.

<u>Response:</u> Updated the word "Driveways" to "Roadway Connections" on Page 2 and on Figures 5, 7 and 9.

5. Reviewer Comment: Page 25: In Table 5-2 under the "McIntyre Road @ Roadway Connection (Road "F") row, it looks like the delay and LOS numbers may not have been updated since the last report. Please check this and revise if necessary.

<u>Response:</u> Updated the numbers in Table 5-2 for the intersection of McIntyre Road @ Roadway Connection (Road "F") to reflect the updated report.

I hope that this is helpful. Please contact me if you have any questions.

Thank you,

Addie Kirkham, P.E.

