BRACKETT ROAD SUBDIVISION

Transportation Impact Analysis Brackett Road Knoxville, TN

A Transportation Impact Analysis for the Brackett Road Subdivision

Submitted to

Knoxville-Knox County Planning

October 28, 2024 Ardurra Project No. 592.019

Submitted By:



12-SE-24-C / 12-H-24-DP

TIS Version 1 10/28/2024 With attached Addendum for reduced lot count, rec'd on 11/11/2024

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

TAE	BLE OF CONTENTS
EXE	CUTIVE SUMMARY
1	INTRODUCTION
	1.1 Project Description
	1.2 Study Area
	TABLE 1.2-1 BRACKETT ROAD SUBDIVISION STUDY AREA 1.3 EXISTING SITE CONDITIONS 8
2	TABLE 1.3-1 BRACKETT ROAD SUBDIVISION EXISTING SITE CONDITIONS EXISTING TRAFFIC VOLUMES 9
3	BACKGROUND GROWTH
	3.1 Isabel Estates Subdivision
4	TABLE 3.1-1 ISABEL ESTATES SUBDIVISION TRIP GENERATION SUMMARY TRIP GENERATION AND TRIP DISTRIBUTION 16
5	TABLE 4-1 BRACKETT ROAD SUBDIVISION TRIP GENERATION SUMMARY PROJECTED CAPACITY AND LEVEL OF SERVICE 20
	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 E Emory Road (SR 131) at Brackett Road
	7.2 BRACKETT ROAD AT ROADWAY CONNECTION (ROAD "A")
	7.3 Brackett Road

FIGURES

1	LOCATION MAP	6
2	Site Plan	7
3	2024 Existing Peak Hour Traffic	10
4	Isabel Estates Undeveloped Peak Hour Site Trips	14
5	2027 Background Peak Hour Traffic	15
6	Subdivision Peak Hour Trip Distribution	17
7	Subdivision Peak Hour Site Trips	18
8	2027 Full Buildout Peak Hour Traffic	19

ATTACHMENTS

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

Executive Summary

Ball Homes, LLC is proposing a residential development. The Brackett Road Subdivision proposes 88 single-family residential lots. The project is located north of the intersection of E Emory Road (SR 131) and Brackett Road in Knox County, Tennessee. Construction is proposed to take place this year and this study assumes full build out for the development will occur in 2027.

The Brackett Road Subdivision has a proposed single roadway connection to Brackett Road.

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

E Emory Road (SR 131) at Brackett Road

After the completion of the full buildout of the Brackett Road Subdivision the intersection of E Emory Road (SR 131) at Brackett Road will operate as follows. The eastbound approach (E Emory Road) will operate at a LOS A during both the AM and PM peak hours and the southbound approach (Brackett Road) will operate at a LOS D during both the AM and PM peak hours.

An eastbound left turn lane is warranted during the background and full buildout conditions. The warrant for an eastbound left turn lane is an existing condition and not a result of the Brackett Road Subdivision. The construction of the eastbound left turn lane on E Emory Road (SR 131) was a condition of the full buildout of the Isabel Estates Subdivision located at the intersection of Brackett Road at Tall Shadow Lane.

Brackett Road at Roadway Connection (Road "A")

The intersection sight distance at the intersection of Brackett Road at Roadway Connection (Road "A") exceeds the minimum requirement of 250 feet for a roadway with a speed limit of 25 mph in accordance with the "Knoxville-Knox County Subdivision Regulations" amended through June 13, 2024; therefore, there are no recommended changes to the location of the Roadway Connection (Road "A").

Ardurra recommends that consideration be made to converting the proposed intersection of Brackett Road at Roadway Connection (Road "A") into a three-legged all-way stop-controlled intersection due to the sharp horizontal curve in the vicinity of the proposed roadway connection.

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).

Any future improvements to the intersection or the various traffic management infrastructure, would need to be reviewed, coordinated, and approved by Knox County Engineering and Public Works.

Brackett Road

Ardurra measured the approximate width of Brackett Road between Tall Shadow Lane and the proposed Roadway Connection (Road "A"). The result was the width varies between 17-19 feet with an overall average of 18 feet.

Ardurra recommends any improvements on Brackett Road between Tall Shadow Lane and the proposed Roadway Connection (Road "A") including road widening resurfacing, striping plan etc. be coordinated with Knox County Engineering and Public Works.

1 Introduction

1.1 Project Description

This report provides a summary of a transportation impact analysis that was performed for the Brackett Road Subdivision residential development. The Brackett Road Subdivision proposes 88 single-family residential lots. The project is located north of the intersection of E Emory Road (SR 131) and Brackett Road in Knox County, 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 subdivision will occur in 2027.

The Brackett Road Subdivision has a proposed single roadway connection to Brackett Road.

The proposed site layout is shown in Figure 2.



Figure 1: Location Map

Brackett Road Subdivision Transportation Impact Analysis October 28, 2024



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. Brackett Road is considered a north-south orientated roadway and E Emory Road (SR 131) and Tall Shadow Lane are considered eastwest oriented roadways. The existing intersections and existing traffic control are summarized in Table 1.2-1 Study Area.

Table 1.2-1 Brackett Road Subdivision Study Area								
Intersection	Existing Traffic Control							
E Emory Road (SR 131) at Brackett Road	TWSC							
Brackett Road at Tall Shadow Lane	TWSC							

1.3 Existing Site Conditions

Roadway geometry and posted speed limits were obtained by field observations. The Knoxville-Knox County Planning "2018 Major Road Plan" was used to determine road classification. This information is summarized in Table 1.3-1 Existing Site Conditions.

Table 1.3-1 Brackett Road Subdivision Existing Site Conditions											
Roadway	Speed Limit	Lanes	Road Width	Major Road Plan							
E Emory Road	45 mph	2	∼20 feet	Major Arterial							
Brackett Road	25 mph	2	∼18 feet	Local Street							
Tall Shadow Lane	25 mph	2		Local Street							

The intersection of E Emory Road at Brackett Road is a two-way stop-controlled intersection. The Knoxville-Knox County Planning classifies E Emory Road (SR 131) as a Major Arterial with a 100-foot right-of-way at the intersection with Brackett Road. There are no existing turn lanes at the intersection.

The intersection of Brackett Road at Tall Shadow Lane is a two-way stop-controlled intersection and the entrance to the Isabel Estates Subdivision. Tall Shadow Lane is

located approximately 2,230 feet north of the intersection of E Emory Road (SR 131). There are no existing turn lanes at the intersection.

Brackett Road between E Emory Road (SR 131) and Bell Road has a sharp horizontal curve that results in an approximate 90-degree turn.

Ardurra measured the approximate width of Brackett Road between Tall Shadow Lane and the proposed Roadway Connection (Road "A"). The result was the width varies between 17-19 feet with an overall average of 18 feet.

There are no sidewalks or bike infrastructure in the vicinity of the proposed development.

An aerial photo of the intersection of E Emory Road (SR 131) at Brackett Road, Brackett Road at Tall Shadow Lane, and E Emory Road at the proposed roadway connection are included in Attachment 1.

2 Existing Traffic Volumes

Ardurra conducted a peak hour turning movement count at the two-way stopcontrolled intersection of Brackett Road at Tall Shadow Lane on Wednesday October 16, 2024. The AM peak hour occurred between 7:15 a.m. and 8:15 a.m. with an AM PHF of 0.81 and an hourly volume of 52 vehicles. The PM peak hour occurred between 2:00 p.m. and 3:00 p.m. with a PM PHF of 0.79 and an hourly volume of 38 vehicles.

Ardurra conducted a peak hour turning movement count at the two-way stopcontrolled intersection of E Emory Road (SR 131) at Brackett Road on Wednesday October 16, 2024. The AM peak hour occurred between 7:15 a.m. and 8:15 a.m. with an AM PHF of 0.89 and an hourly volume of 1,038 vehicles. The PM peak hour occurred between 4:45 p.m. and 5:45 p.m. with a PM PHF of 0.95 and an hourly volume of 1,216 vehicles.

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.



Figure 3: 2024 Existing Peak Hour Traffic

3 Background Growth

The Tennessee Department of Transportation (TDOT) and the Knoxville Regional Transportation Organization (TPO) maintain count stations in the vicinity of the proposed development.

TDOT count station ID 47000019 is located on E Emory Road (SR 131) east of the intersection of Maynardville Pike at E Emory Road (SR 131) in Knoxville, TN. The annual growth rate for this station over the last ten years is approximately 2.33%. The 2023 ADT was 14,087 vehicles per day.

TDOT count station ID 47000009 is located on E Emory Road (SR 131) east of the intersection of Tazewell Pike at E Emory Road in Knoxville, TN. The annual growth rate for this station over the last ten years is approximately 1.62%. The 2023 ADT was 6,155 vehicles per day.

TPO count station ID 093M407 is located on E Emory Road (SR 131) east of the intersection of E Emory Road (SR 131) at Thompson School Road in Knoxville, TN. The 2022 ADT was 9,780 vehicles per day and the 2023 ADT was 1,650 vehicles per day. There are not enough data points at this location to establish an average growth rate.

For the purpose of this study, an annual growth rate of 2.0% was assumed for traffic at the studied intersections until full occupancy is reached in 2027. Attachment 3 shows the trend line growth charts for the TDOT count stations.

3.1 Isabel Estates Subdivision

The existing Isabel Estates Subdivision is a residential development with an approved Concept Plan 10-SC-21-C for 90 single-family residential lots. The Subdivision Concept Plan application was heard at the Planning Commission Meeting on October 14, 2021.

Fulghum, MacIndoe & Associates conducted a traffic study for this development "Isabel Estates Transportation Impact Analysis" revised September 23, 2021. The TIA recommended "that no more than 66 single family lots be built before reevaluating the warrant for a left turn lane (E Emory Road / SR 131). The need for a left turn lane will be mitigated as long as the TDOT road widening project on E Emory Road (SR 131) remains active and on schedule.

Staff recommended that the maximum of 66 lots be platted before the turn lane is installed or TDOT completes the E Emory Road (SR 131) improvements.

The Final Plat for the Isabel Estates Subdivision was approved at the Planning Commission Meeting on November 9, 2023 for 66 residential lots with the additional 24 lots to be built after the completion of a northbound left turn lane at the intersection of E Emory Road (SR 131) at Brackett Road or after the completion of the TDOT widening project. Discussion regarding intersection improvements at E Emory Road (SR 131) at Brackett Road are still ongoing.

Ardurra assumed that the initial 66 lots of the Isabel Estates Subdivision are built and occupied. In addition to the background growth, the trips from the remaining lots of the Isabel Estates Subdivision were calculated and included in the projected background peak hour traffic.

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.

Ine	land narv i	use is sho	worksheets wn in Table	are	Included	IN	Attachment	4	and	а	trip	generation
summary is shown in Table 3.1-1.												

Isabel Estates – Undeveloped Trip Generation Summary											
Land Use	Density	Daily Trips	AM Pea Enter	ak Hour Exit	PM Pea Enter	ak Hour Exit					
Single Family Detached Housing (LUC	24 Lots	272	5	15	16	10					

The total combined trips generated by the Isabel Estates undeveloped lots were estimated to be 272 daily trips. The estimated trips are 20 trips during the AM peak hour and 26 trips during the PM peak hour.

The directional distribution of the traffic generated by the Isabel Estates Subdivision was determined using the existing traffic volumes in combination with the site plan layout. The entering/exiting traffic was assumed to be 10% Brackett Road northbound, 54% E Emory Road (SR 131) eastbound and 36% E Emory Road (SR 131) westbound.

Figures 4 shows the Isabel Estates Subdivision site trips from the undeveloped lots.

Figure 5 demonstrates the projected background peak hour volumes at the studied intersection including the background growth and the additional site trips from the undeveloped lots from the Isabel Estates Subdivision.



Figure 4: Isabel Estates Undeveloped Peak Hour Site Trips



Figure 5: 2027 Background Peak Hour Traffic

4 Trip Generation and Trip Distribution

Brackett Road Subdivision proposes 88 single-family residential lots. 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 4. A trip generation summary is shown in Table 4-1.

Table 4-1 Brackett Road Subdivision Trip Generation Summary										
Land Use	Density	Daily Trips	AM Peak Hour Enter Exit	PM Peak Hour Enter Exit						
Single Family Detached Housing (LUC	88 Lots	897	16 50	55 33						

The total new trips generated by the Brackett Road Subdivision were estimated to be 897 daily trips. The estimated trips are 66 trips during the AM peak hour and 88 trips during the PM peak hour.

E Emory Road (SR 131) at the intersection with Brackett Road has an existing trip distribution of 40% eastbound and 60% westbound during the AM peak hour and 65% eastbound and 35% westbound during the PM peak hour.

The directional distribution of the traffic generated by the Brackett Road Subdivision was determined using the existing traffic volumes in combination with the concept plan layout. The entering/exiting traffic was assumed to be 10% Brackett Road northbound, 54% E Emory Road (SR 131) eastbound and 36% E Emory Road (SR 131) westbound.

Figure 6 and Figure 7 show the Brackett Road Subdivision peak hour trip distribution and subdivision peak hour site trips. Figure 8 shows the 2027 full buildout peak hour traffic including the background growth and the peak hour site trips from both the undeveloped lots from the Isabel Estates Subdivision and the proposed lots from the Brackett Road Subdivision.



Figure 6: Subdivision Peak Hour Trip Distribution



Figure 7: Subdivision Peak Hour Site Trips



Figure 8: 2027 Full Buildout Peak Hour Traffic

Projected Capacity and Level of Service 5

Intersection capacity analyses were performed using the Highway Capacity Software 2024 at the two-way stop-controlled intersection in order to evaluate the AM and PM peak hours for existing, background and full buildout conditions.

Level of Service

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	≤ 10 sec	≤ 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

The HCS2024 worksheets are included in Attachments 5, 6, and 7. Table 5-2 shows the results of the capacity analyses.

Intersection	Time Period	Year 2024 Existing (Delay/LOS)	Year 2027 Background (Delay/LOS)	Year 2027 Full Buildout (Delay/LOS)
E Emory Road (SR 131) @ Brackett Road	AM Peak EB Left Turn SB Approach PM Peak EB Left Turn SB Approach	9.1 / A 20.5 / C 8.2 / A 18.8 / C	9.2 / A 23.1 / C 8.3 / A 22.0 / C	9.3 / A 29.1 / D 8.5 / A 28.8 / D

Table 5-2 Level of Service (LOS) Summary

Notes:

1. Whole intersection weighted average control delay expressed in second per vehicle for signalized intersections and all-way stop controlled intersections.

6 Turn Lane Warrant Analysis

The intersection of E Emory Road (SR 131) at Brackett Road was evaluated to determine if an eastbound left turn lane or a westbound right turn lane are warranted. The TDOT Highway System Access Manual (HSAM) Volume 3: Geometric Design Criteria dated April 2021 was used to analyze the information. TDOT recommends that a turn lane be installed at an intersection when the turn lane warrants are met during both the AM and PM peak hours.

In order to evaluate a right turn lane warrant, the Major-Road Volume, (one direction), veh/h and Right-Turn Volume, veh/h were reference from Figure 5: 2027 Background Peak Hour Traffic and Figure 8: 2027 Full Buildout Peak Hour Traffic. Per Figure 3-18: Right-Turn Warrant along Two-Lane Roadway (Unsignalized Intersection with Two-Way Stop-Control) the background and full buildout conditions at the intersection of E Emory Road (SR 131) at Brackett Road will only warrant a right turn lane during the AM peak hour; therefore, a southbound right turn lane on E Emory Road (SR 131) is not recommended.

In order to evaluate a left turn lane warrant, the Major Highway Volume (veh/h/ln) and the Left-Turn Volume (veh/h) were referenced from Figure 5: 2027 Background Peak Hour Traffic and Figure 8: 2027 Full Buildout Peak Hour Traffic. Per Figure 3-15: Left-Turn Lane Warrant for Urban and Suburban Arterials (Unsignalized) the background conditions and full buildout conditions at the intersection of E Emory Road (SR 131) at Brackett Road will warrant an eastbound left turn lane during both the AM and PM peak hours.

An eastbound left turn lane is warranted during the background and full buildout conditions. Per the TDOT HSAM "The volume-based warrants indicate situations where a left-turn would help mitigate traffic conflicts, not necessarily situations where a left-turn lane is required or must be constructed."

Per the TDOT HSAM Table 3-11: Lane Change and Deceleration Distance the recommended lane change and deceleration distance for a roadway with a speed limit of 45 mph is 340 feet and the minimum queue storage length for a turn lane is 50 feet. Therefore, the total recommended turn lane length is 390 feet.

The turn lane worksheets and TDOT Highway System Access Manual Figures are included in Attachment 8.

7 Conclusions and Recommendations

7.1 E Emory Road (SR 131) at Brackett Road

The existing intersection of E Emory Road (SR 131) at Brackett Road is three-legged two-way stop-controlled intersection with the stop sign located on southbound approach (Brackett Road).

Under the existing and 2027 background conditions the intersection of E Emory Road (SR 131) at Brackett Road operates as follows. The eastbound approach (E Emory Road) will operate at a LOS A during both the AM and PM peak hours and the southbound approach (Brackett Road) will operate at a LOS C during both the AM and PM peak hours.

After the completion of the full buildout of the Brackett Road Subdivision the intersection of E Emory Road (SR 131) at Brackett Road will operate as follows. The eastbound approach (E Emory Road) will operate at a LOS A during both the AM and PM peak hours and the southbound approach (Brackett Road) will operate at a LOS D 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 southbound approach (Brackett Road) has an existing storage length of 80 feet before the vehicle queue would block the closest residential driveway access. The unsignalized intersection capacity analysis shows the full buildout 95% queue length for Brackett Road of two vehicles (43.2 feet) during the AM peak hour and

two vehicles (27.9 feet) during the PM peak hour; therefore, the queue is not expected to block access to the residential driveways along Brackett Road.

An eastbound left turn lane is warranted during the background and full buildout conditions. The warrant for an eastbound left turn lane is an existing condition and not a result of the Brackett Road Subdivision. The construction of the eastbound left turn lane on E Emory Road (SR 131) was a condition of the full buildout of the Isabel Estates Subdivision located at Brackett Road at Tall Shadow Lane.

Any future improvements to the intersection or the various traffic management infrastructure, would need to be reviewed, coordinated, and approved by both Tennessee Department of Transportation and Knox County Engineering and Public Works.

7.2 Brackett Road at Roadway Connection (Road "A")

The proposed intersection of Brackett Road at Roadway Connection (Road "A") is three-legged intersection.

Brackett Road is not classified per the Major Road Plan; therefore, it is considered a local road. The minimum intersection spacing required on a local street is 125 feet per the "Knoxville-Knox County Subdivision Regulations" amended through June 13, 2024. The proposed Roadway Connection (Road "A") is located approximately 650 feet north of Tall Shadow Lane and approximately 3,600 feet east of Bell Road; therefore, the minimum separation on a local road is met and no change is necessary.

The minimum required sight distance for a road with a posted speed limit of 25 mph is 250 feet in each direction in accordance with the "Knoxville-Knox County Subdivision Regulations" amended through June 13, 2024.

Ardurra measured the intersection sight distance in August 2024 at the proposed intersection of Brackett Road at Roadway Connection (Road "A"). At 15 feet from the edge of pavement the intersection sight distance is approximately 866 feet looking left (southbound) and approximately 296 feet looking right (westbound). Attachment 9 includes pictures of the intersection sight distance.

Ardurra recommends that the intersection sight distance be certified by a land surveyor prior to construction in order to verify that Brackett Road has adequate intersection sight distance at the existing subdivision entrance to comply with Knox County Engineering and Public Works guidelines. Ardurra recommends that consideration be made to converting the proposed intersection of Brackett Road at Roadway Connection (Road "A") into a three-legged all-way stop-controlled intersection due to the sharp horizontal curve in the vicinity of the proposed roadway connection.

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).

Any future improvements to the intersection or the various traffic management infrastructure, would need to be reviewed, coordinated, and approved by Knox County Engineering and Public Works.

7.3 Brackett Road

Ardurra measured the approximate width of Brackett Road between Tall Shadow Lane and the proposed Roadway Connection (Road "A"). The result was the width varies between 17-19 feet with an overall average of 18 feet.

Ardurra recommends any improvements on Brackett Road between Tall Shadow Lane and the proposed Roadway Connection (Road "A") including road widening resurfacing, striping plan etc. be coordinated with Knox County Engineering and Public Works.

Attachment 1	
Aerial Photos	







Attachment 2 Traffic Counts

Project: 592.019 Brackett Road Subdivision Intersection: Brackett Road at Tall Shadow Lane Date Conducted: Wednesday October 16, 2024

	I	Bracket	t Road		Ta	II Shado	ow Lan	e	E	Bracket	t Road]	
		Southb	ound			Westb	ound			Northb	ound			
Start	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Int. Total	
7:00 AM	1	1	0	2	2	0	0	2	0	1	4	5	9	
7:15 AM	1	2	0	3	2	0	1	3	0	1	9	10	16	
7:30 AM	0	1	0		2	0	0	2	0	1	5	6 11	9 15	
7:45 AM	0	0	0	0	10	0	1	4	0	1	10	11	15	—
Total	2	4	0	6	10	0	1	111	0	4	20	32	49	
8.00 444	0	2	0	21	2	0	0	2	0	0	6	6	1 1 2	
8.15 AM	0	1	0	1	3	0	1	5	0	1	2	2	12	
8.20 AM	0	1	0	1	-+	0	0	2	0	0	2 1	1	3	
8.45 AM	0	0	0		2	0	0	2	0	1	1 2	1	4	
Total	0	5	0	5	12	0	1	13	0	2	12	14	32	—
Total	0	5	0	51	12	0		15	0	2	12	14	52	
9.00 AM	0	0	0	ام	1	0	0	1	0	0	1	1	2	
9.15 AM	0	0	0	ő	3	0	0	3	0	0	4	4	7	
9.30 AM	0	0	0	ő	0	0	1	1	0	0	1	1	2	
9.45 AM	1	1	0	2	1	0	0	1	0	0	0	0	3	
Total	1	1	0	2	5	0	1	6	0	0	6	6	14	—
Total	1	1	0	-1	5	0		0	0	0	0	0	14	
10.00 ANA	0	0	0	ام	1	0	1	b	Ο	1	0	1	3	
10.15 AM	0	0	0		י ג	0	0	2	0	0	1	1		
10.30 ΔΛΛ	0	0	0		1	0	0	1	0	0	1	1	2	
10:45 414	0	0	0		2	0	0	2	0	0	6	6	2 0	
Total	0	0	0	0	<u>د</u> و	0	1	о 0	0	1	0 8	0	18	—
TOID	0	U	0	0	U	0	I	9	U	I	U	9	10	
11.00 ANA	0	0	0	ام	2	0	0	2	Ο	1	2	Л	7	
11.00 AM	0	0	0	0	2	0	1	2	0	1	2	4	7	
11.10 AM	1	0	0	1	4	0	0	1	0	0	5		11	
11.30 AM	0	0	0		-+	0	0	-4	0	0	5	5	10	
Total	1	0	0	1	1/	0	1	15	0	2	17	10	35	—
TOtal	I	0	0	11	14	0	1	15	0	2	17	19	33	
12.00 PM	0	0	0	ام	4	0	1	Б	0	Э	0	Э	7	
12:00 FM	0	0	0	0	4	0	1	5	0	2	1	2	5	
12.13 FM	2	0	0	2	5	0	0	-4	0	0	6	6	14	
12:30 FM	5	1	0	3	2	0	0	2	0	0	0	0	14	
T2:45 F/M	0	1	0	1	14	0	2	16	0	2	11	12	22	—
TOLAT	5	1	0	41	14	0	2	10	0	2		15	33	
1.00 PM	1	2	0	əl	5	0	0	Б	0	Э	2	5	1 12	
1.15 DA4	1	1	0	1	2	0	1	1	0	2	2	2	13	
1:15 F/M	0	1	0	1	3	0	1	4	0	1	3	5	12	
1.30 TM	0	1	0	1		0	1	5	0	0		1	11	
T.45 F/M	1	6	0	7	17	0	2	20	0	2	14	17	44	—
TOtal	1	0	0	1	17	0	5	20	0	5	14	17	44	
2.00 PM	0	2	0	21	2	0	0	əl	0	2	Э	5	10	
2.00 P/M	1	5 1	0	2	2	0	0	2	0	د ۵	∠ 5	с Г	10	
2.13 F/M 2.30 PM	1	1	0	2	Л	0	0	э 1	0	0	5	с 6	10	
2.50 P/M 2.45 DM	0	1	0	∠ 1	4 2	0	0 2	4	0	0	1	1	6	
Z.4J F/N Total	2	6	0	ا و	∠ 11	0	2	12	0	2	1/	17	28	_
rotal	2	0	U	0	11	0	2	13	0	3	14	17	30	
3.00 DV4 1	0	0	0	ما	э	0	1	ا ۸	0	Э	р	Л	<u>ه</u>	
3.00 F/M	0	0	0		3 1	0	1	4	0	∠ 1	∠ 1	4	0 2	
3.13 P/M 3.30 DM	1	1	0	2	1 2	0	0	1	0	1	1 2	2	د ۵	
3.30 F/M	0	1	0	2 1	с 2	0	0	3 2	0	1	∠ 5	3 F	0	
J.43 FM Total	1	<u> </u>	0	1	10	0	1	3 11	0	4	2 10	C ۱ /	20	-
rotal	1	2	U	3	10	U	I	11	U	4	10	14	20	
4.00 DAA 1	0	1	0	11	1	0	0	1	0	р	0	Э	1 4	
4.00 P/VI	1	1	0	1	1	0	0		0	2 1	1	2	4	
4:15 PM		1	0	2	1	0	0	0	0	1	1	2	4	
4:50 PM	1	0	0	0	1 -	0	0	1	0	1	2	3	4	
4:45 PM	1	0	0	1	5	0	0	5	0	-	5	10	12	_
rotal	2	2	0	4	/	U	U	/	0	5	ŏ	13	24	
5.00 DAA	0	1	0	11	р	0	0	Ы	0	0	1	1	1 4	
5:00 PM	0	1	0	1	2	0	0	2	0	0	1	I	4	
5:15 PM		0	0		I	0	0	1	0	0	0	0	2	
5:30 PM	0	0	0	0	4	0	1	5	0	0	2	2	/ -	
5:45 PM	1	1	0	0	10	0	1	14	0	0	1	1	20	_
Total		I	U	2	13	0	I	14	U	0	4	4	20	
rand Total I	1.4	20	0	اد⊿	101	0	14	10 E	0	26	120	1 5 0	22F	
anu iolai	22.2	20 66 7	0	42	121 80.4	0	10 4	100	0	20 16 F	1.02 2.0 =	100	555	
opioacii //	 _/ ⊃	ου./ ρ /	0.0	125	36.1	0.0	10.4	10.2	0.0	7.9	30.4	47.2		
nai /0	4.2	0.4	0.0	12.5	50.1	0.0	+.∠	40.5	0.0	7.0	59.4	4/.2	1	

Project: 592.019 Brackett Road Subdivision Intersection: Brackett Road at Tall Shadow Lane Date Conducted: Wednesday October 16, 2024

AM Peak Hour	7:15 AM - 8:15 AM	52
PM Peak Hour	2:00 PM - 3:00 PM	38

	Brackett Road			Ta	all Shad	Shadow Lane			Brackett Road				
		South	bound			Westb	ound			North	bound		
Start	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Int. Total
Peak Hour Analysis from 2	7:00 AM	to 9:00	AM		-								
AM Peak Hour begins at 7	:15 AM												
7:15 AM	1	2	0	3	2	0	1	3	0	1	9	10	16
7:30 AM	0	1	0	1	2	0	0	2	0	1	5	6	9
7:45 AM	0	0	0	0	4	0	0	4	0	1	10	11	15
8:00 AM	0	3	0	3	3	0	0	3	0	0	6	6	12
Total Volume	1	6	0	7	11	0	1	12	0	3	30	33	52
Future (2.0% over 3 yrs)	1	6	0		12	0	1		0	3	32		55
PHF	0.27	0.50	-		0.69	-	0.25		-	0.75	0.75		0.81
Peak Hour Analysis from 2	2:00 PM	to 6:00	PM										
PM Peak Hour begins at 2	:00 PM												
2:00 PM	0	3	0	3	2	0	0	2	0	3	2	5	10
2:15 PM	1	1	0	2	3	0	0	3	0	0	5	5	10
2:30 PM	1	1	0	2	4	0	0	4	0	0	6	6	12
2:45 PM	0	1	0	1	2	0	2	4	0	0	1	1	6
Total Volume	2	6	0	8	11	0	2	13	0	3	14	17	38
Future (2.0% over 3 yrs)	2	6	0		12	0	2		0	3	15		40
PHF	0.50	0.50	-	0.67	0.69	-	0.25		-	0.25	0.58		0.79

Project: 592.019 Brackett Road Subdivision Intersection: E Emory Road (SR 131) at Brackett Road Date Conducted: Wednesday October 16, 2024

	1	Bracket	t Road		1	E Emor	y Road			E Emor	y Road		
		Southb	ound			Westb	ound			Eastb	ound		
Start	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Int. Total
7:00 AM	3	0	1	4	0	118	4	122	0	79	0	79 120	205
7:30 AM	- 2	0	2	4	0	166	6	172	1	87	0	88	264
7:45 AM	2	0	2	4	0	158	11	169	2	95	0	97	270
Total	11	0	7	18	0	599	29	628	6	378	0	384	1030
8:00 AM	8	0	0	8	0	117	4	121	1	83	0	84	213
8:15 AM	2	0	4	6	0	104	3	107	0	64	0	64	177
8:30 AM	2	0	4	6	0	98	0	98		68 52	0	69 55	1/3
Total	13	0	12	25	0	420	9	429	4	268	0	272	726
		-	. –	1	-		-				-		
9:00 AM	0	0	1	1	0	80	0	80	3	52	0	55	136
9:15 AM	3	0	3	6	0	110	2	112	2	53	0	55	173
9:30 AM	0	0	0	0	0	87	0	87	2	68	0	70	157
9:45 AM	0	0	1	1	0	87	0	87	0	245	0	72	160
TOLAT	3	0	5	0	0	364	2	300	/	245	0	252	626
10:00 AM	2	0	1	3	0	66	2	68	0	65	0	65	136
10:15 AM	1	0	2	3	0	90	1	91	2	52	0	54	148
10:30 AM	1	0	2	3	0	79	0	79	1	73	0	74	156
10:45 AM	0	0	3	3	0	85	4	89	3	76	0	79	171
Total	4	0	8	12	0	320	7	327	6	266	0	272	611
11.00 444	2	0	1	2	0	72	2	74	1	77	0	78	155
11:15 AM	2	0	1	4	0	73	3	74	1	71	0	70	152
11:30 AM	1	0	2	3	0	100	5	105	3	79	0	82	190
11:45 AM	3	0	4	7	0	84	2	86	3	78	0	81	174
Total	9	0	8	17	0	329	12	341	8	305	0	313	671
12.00 PM	2	0		4	0	00	2	101	I 1	0.0	0	07	202
12:00 PM	3 1	0	1	4	0	99	2	101	1	96	0	97	202
12:10 PM	2	0	4	6	0	80	3	83	4	85	0	89	178
12:45 PM	2	Ő	1	3	0	88	3	91	1	95	0	96	190
Total	8	0	7	15	0	362	8	370	7	369	0	376	761
	_			_1									
1:00 PM	5	0	2	7	0	88	3	91 70	5	81	0	86	184
1:15 PM	2	0	5	/ 7	0	/9 76	0	/9	3	66 01	0	69	155
1:30 FM	1	0	5	6	0	20	4	84	2	91	0	93	188
Total	14	0	13	27	0	323	12	335	11	335	0	346	708
				'									
2:00 PM	3	0	3	6	0	81	3	84	0	89	0	89	179
2:15 PM	5	0	1	6	0	75	2	77	4	124	0	128	211
2:30 PM	0	0	4	4	0	69 79	4	73	5	109	0	114	191
Total	9	0	12	21	0	303	9	312	11	448	0	459	792
	-	-	. –	1	-		-				-		
3:00 PM	1	0	3	4	0	100	4	104	2	111	0	113	221
3:15 PM	1	0	0	1	0	96	0	96	1	122	0	123	220
3:30 PM	3	0	2	5	0	108	3	111	2	157	0	159	275
	3	0	- 2	5	0	435	13	448	2	556	0	563	1026
- otul	0	U	,		Ū	100				550	0	505	1020
4:00 PM	5	0	2	7	0	136	3	139	0	152	0	152	298
4:15 PM	0	0	0	0	0	110	1	111	1	161	0	162	273
4:30 PM	0	0	0	0	0	113	4	117	1	166	0	167	284
4:45 PM	2	0	2	10	0	97	12	101	1	6 79	0	200	304
TOLA	/	0	3	10	0	450	12	400	5	070	0	001	1159
5:00 PM	2	0	4	6	0	112	4	116	1	196	0	197	319
5:15 PM	2	0	1	3	0	79	0	79	0	190	0	190	272
5:30 PM	3	0	2	5	0	116	2	118	1	197	0	198	321
5:45 PM	2	0	5	7	0	97	1	98	0	180	0	180	285
Total	9	0	12	21	0	404	/	411	2	/63	0	/65	1197
6:00 PM	7	0	5	12	0	104	2	106	1	170	0	171	289
6:15 PM	1	0	0	1	0	99	0	99	3	201	0	204	304
6:30 PM	2	0	1	3	0	65	2	67	3	182	0	185	255
6:45 PM	4	0	4	8	0	78	1	79	1	127	0	128	215
Total	14	0	10	24	0	346	5	351	8	680	0	688	1063
Grand Total	109	0	104	213	0	4661	125	4786	80	5291	0	5371	10370
Approach %	51.2	0.0	48.8		0.0	97.4	2.6		1.5	98.5	0.0		
Total %	1.1	0.0	1.0	2.1	0.0	44.9	1.2	46.2	0.8	51.0	0.0	51.8	

Project: 592.019 Brackett Road Subdivision Intersection: E Emory Road (SR 131) at Brackett Road Date Conducted: Wednesday October 16, 2024

AM Peak Hour	7:15 AM - 8:15 AM	1038
PM Peak Hour	4:45 PM - 5:45 PM	1216

		Bracke	tt Road			E Emor	y Road			E Emor	y Road]
		South	bound			Westb	ound			Eastb	ound		
Start	Left	Thru	Right	Total	Left	Thru	Right	Total	Left	Thru	Right	Total	Int. Total
Peak Hour Analysis from	7:00 AN	A to 9:0	0 AM										
AM Peak Hour begins at	7:15 AN	٨											_
7:15 AM	4	0	2	6	0	157	8	165	3	117	0	120	291
7:30 AM	2	0	2	4	0	166	6	172	1	87	0	88	264
7:45 AM	2	0	2	4	0	158	11	169	2	95	0	97	270
8:00 AM	8	0	0	8	0	117	4	121	1	83	0	84	213
Total Volume	16	0	6	22	0	598	29	627	7	382	0	389	1038
Future (2.0% over 3 yrs)	17	0	6		0	635	31		7	405	0		1102
PHF	0.53	-	0.75		-	0.90	0.66		0.58	0.82	-		0.89
Peak Hour Analysis from	3:00 PN	A to 6:0	0 PM										
PM Peak Hour begins at	4:45 PN	۱											_
4:45 PM	2	0	1	3	0	97	4	101	1	199	0	200	304
5:00 PM	2	0	4	6	0	112	4	116	1	196	0	197	319
5:15 PM	2	0	1	3	0	79	0	79	0	190	0	190	272
5:30 PM	3	0	2	5	0	116	2	118	1	197	0	198	321
Total Volume	9	0	8	17	0	404	10	414	3	782	0	785	1216
Future (2.0% over 3 yrs)	10	0	8		0	429	11		3	830	0		1290
PHF	0.75	-	0.50		-	0.87	0.63		0.75	0.98	-		0.95

Attac	hment	3
ADT	Trend	S

Adjusted Average
Daily Traffic
12829
11236
12105
12600
12267
11770
10909
11236
11112
10728
11406
10403
10806
10363
12727
12299
12222
11976
12604
11106
12226
12625
14087



Most Recent Trend Line Growth Year ADT 2013 10806 2023 14087

Annual Percent Growth

2.33%

	Adjusted Average								
Year	Daily Traffic								
2001	5250								
2002	5122		AD	DT Trend	TDOT S	Station I	D: 4700)0009	
2003	5276		E	Emory R	oad - Ha	arbison	Cross R	oads	
2004	5429	7000							
2005	5761	7000						•	
2006	5222	6000			•		•	• • •	
2007	4998	5000		•••	•••				
2008	5104	4000				-	-		
2009	4729	2000							
2010	5249	3000							
2011	5430	2000							
2012	5208	1000							
2013	5156	0							
2014	4749	19	95 2	000 2	005	2010	2015	2020	2025
2015	5072								
2016	5480								
2017	5180								
2018	5905								
2019	6312								
2020	5526								
2021	5630								
2022	6155								
2025	0133								
	Most Recent	Trend I	Line Growt	h					

Most Recent Trend Line Growth Year ADT

rcar	AD1
2013	5156
2023	6155

Annual Percent Growth

1.62%

Project: Isabel Estates - Undeveloped Date Conducted: 10/23/2024

> Single-Family Detached Housing (LUC 210) 24 Lots - Undeveloped

Average Daily Traffic

Ln(T) = 0.92 Ln(X) + 2.68Ln(T) = 0.92 Ln(24) + 2.68T = 272

Peak Hour of Adjacent Street Traffic

One Hour Between 7 and 9 a.m. Ln(T) = 0.91 Ln(X) + 0.12 Ln(T) = 0.91 Ln(24) + 0.12T = 20

Peak Hour of Adjacent Street Traffic

One Hour Between 4 and 6 p.m.

Ln(T) = 0.94 Ln(X) + 0.27 Ln(T) = 0.94 Ln(24) + 0.27T = 26

		Per	cent	Nun	nber
Time Period	Total Trips	Enter	Exit	Enter	Exit
Weekday (24 hours)	272	50%	50%	136	136
AM Peak Hour	20	25%	75%	5	15
PM Peak Hour	26	63%	37%	16	10

Project: Brackett Road Subdivision Date Conducted: 10/22/2024

Single-Family Detached Housing (LUC 210) 88 Lots

Average Daily Traffic

 $\label{eq:Ln(T) = 0.92 Ln(X) + 2.68} \\ Ln(T) = 0.92 Ln(88) + 2.68 \\ T = 897 \\$

Peak Hour of Adjacent Street Traffic

One Hour Between 7 and 9 a.m. Ln(T) = 0.91 Ln(X) + 0.12 Ln(T) = 0.91 Ln(88) + 0.12T = 66

Peak Hour of Adjacent Street Traffic

One Hour Between 4 and 6 p.m.

 $\begin{array}{l} Ln(T) \ = \ 0.94 \ Ln(X) \ + \ 0.27 \\ Ln(T) \ = \ 0.94 \ Ln(88) \ + \ 0.27 \\ T \ = \ 88 \end{array}$

		Per	cent	Nun	nber
Time Period	Total Trips	Enter	Exit	Enter	Exit
Weekday (24 hours)	897	50%	50%	449	449
AM Peak Hour	66	25%	75%	16	50
PM Peak Hour	88	63%	37%	55	33

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



		ŀ	ICS 1	[wo-'	Wav	Stop	-Cor	trol	Repo	ort						
Concerting	-						Cito				-	-	-	-	-	
General Information							Site	Intorr	ηατιοι	n						
Analyst	Addie	e Kirkhar	n				Inters	ection			E Emo	ory Road	at Brack	kett Road	t t	
Agency/Co.	Ardur	ra					Jurisd	iction			Knox	County				
Date Performed	10/23	8/2024					East/\	Vest Stre	eet		E Emo	ory Road				
Analysis Year	2024						North	/South S	Street		Brack	ett Road				
Time Analyzed	Existi	ng AM P	eak				Peak	Hour Fac	tor		0.89					
Intersection Orientation	East-	West					Analy	sis Time	Period (hrs)	0.25					
Project Description	592.0	19 Brack	et Road	Subdivis	sion											
Lanes																
				2 4 4 4 4 4 6 6 4		↔ ↑ 1 or Street: Ea	t P C st-West	1 4 1 X 4 1 U								
Vehicle Volumes and Adju	istme	nts														
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	1	2	3	40	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 (veh/h)		7	382				598	29						16		6
Percent Heavy Vehicles (%)		2												2		2
Proportion Time Blocked																
Percent Grade (%)														()	
Right Turn Channelized																
Median Type Storage				Undi	vided											
Critical and Follow-up He	adwa	ys														
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, and	Leve	l of Se	ervice													
Flow Rate, v (veh/h)		8													25	

Delay, Queue Lengen, and										
Flow Rate, v (veh/h)	8								25	
Capacity, c (veh/h)	893								257	
v/c Ratio	0.01								0.10	
95% Queue Length, Q ₉₅ (veh)	0.0								0.3	
95% Queue Length, Q ₉₅ (ft)	0.0								7.6	
Control Delay (s/veh)	9.1	0.1							20.5	
Level of Service (LOS)	А	A							С	
Approach Delay (s/veh)	0	.3						20).5	
Approach LOS		Ą						(2	

		ŀ	ICS 1	Гwo-'	Way	Stop	-Cor	ntrol	Repo	ort						
General Information	_	_	_	-			Sito	Inform	natio	n	-	-	-	_	-	
Analyst	Addia	. Kirkhan					Jators	action	natio		E Ema	an (Dood	l at Brad	eatt Door	1	
Analyst	Addle		n				Inters	liction			EEmo		at Braci	kett Road	1	
Agency/Co.	Ardui	11a					Junso	Nost Str	t				1			
	2024	5/2024					North	/South	Stroot		Brack	ott Popo				
Time Applyzed	ZUZ4	na DM D	oak				Book		stor							
	Exist		eak				Apply		Poriod (hrc)	0.93					
Project Description	592.0	19 Brack	et Road	Subdivia	ion		Analy	313 11110	Tenou (1113)	0.23					
	552.0	I Diack		Suburvis	sion											
Lanes																
				$J \neq \downarrow A \Rightarrow \downarrow L$		or Street: Ea	t t≁ r ist-West	4 4 4 4 4 4 4 4								
Vehicle Volumes and Adju	ustme	nts														
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	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 (veh/h)		3	782				404	10						9		8
Percent Heavy Vehicles (%)		2												2		2
Proportion Time Blocked																
Percent Grade (%)														()	
Right Turn Channelized																
Median Type Storage				Undi	vided											
Critical and Follow-up He	eadwa	ys														
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, and	l Leve	l of Se	ervice													
Flow Rate, v (veh/h)		3													18	
Capacity, c (veh/h)		1124													279	
v/c Ratio		0.00													0.06	

0.0

0.0

8.2

А

0.1

А

0.0

А

95% Queue Length, Q₉₅ (veh)

95% Queue Length, Q_{95} (ft)

Control Delay (s/veh)

Level of Service (LOS)

Approach LOS

Approach Delay (s/veh)

18.8

0.2

5.1

18.8

С

Attachment 6 Intersection Worksheets – Background AM/PM Peaks

		L				Stor	Cor	tral	Done	\rt						
			103	100-	vvay	διομ			керс							
General Information							Site	Inforr	natio	n						
Analyst	Addie	Kirkhar	n				Inters	ection			E Emo	ory Road	at Brack	ett Road	ł	
Agency/Co.	Ardur	ra					Jurisd	liction			Knox	County				
Date Performed	10/23	/2024					East/	West Stre	eet		E Emo	ory Road				
Analysis Year	2027						North	n/South S	Street		Brack	ett Road				
Time Analyzed	Backg	round A	M Peak				Peak	Hour Fac	ctor		0.89					
Intersection Orientation	East-\	Vest					Analy	sis Time	Period (hrs)	0.25					
Project Description	592.0	19 Brack	et Road	Subdivis	sion											
Lanes																
Vehicle Volumes and Adju	ıstme	nts		J 4 + X 4 + C G		↓ ↓.* ↓ ↓ • • • • • • • •	b b ⊾	ン 4 ↓ ム 本 お L b ~								
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	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 (veh/h)		9	405				635	34						25		12
Percent Heavy Vehicles (%)		2												2		2
Proportion Time Blocked																
Percent Grade (%)							°							()	
Right Turn Channelized																
Median Type Storage				Undi	vided											
Critical and Follow-up He	adwa	ys														
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, and	Leve	l of Se	ervice													

Delay, Queue Length, and	Leve	10136	rvice								
Flow Rate, v (veh/h)		10								42	
Capacity, c (veh/h)		858								240	
v/c Ratio		0.01								0.17	
95% Queue Length, Q ₉₅ (veh)		0.0								0.6	
95% Queue Length, Q ₉₅ (ft)		0.0								15.2	
Control Delay (s/veh)		9.2	0.1							23.1	
Level of Service (LOS)		А	А							С	
Approach Delay (s/veh)		0	.3						23	3.1	
Approach LOS			4						(2	

		ŀ	ICS 1	ſwo-'	Way	Stop	-Cor	ntrol	Repo	ort						
General Information							Site	Inforr	natio	n						
Analyst	Addie	e Kirkhar	n				Inters	ection			E Emo	ory Road	l at Bracl	kett Road	ł	
Agency/Co.	Ardur	ra					Jurisc	liction			Knox	County				
Date Performed	10/23	3/2024					East/	West Stre	eet		E Emo	ory Road				
Analysis Year	2027						North	n/South S	Street		Brack	ett Road	1			
Time Analyzed	Backg	ground P	'M Peak				Peak	Hour Fac	tor		0.95					
Intersection Orientation	East-	West					Analy	sis Time	Period (hrs)	0.25					
Project Description	592.0	19 Brack	et Road	Subdivis	sion											
Lanes																
Vehicle Volumes and Adjustments																
Approach		Easth	ound			Wost	bound			North	bound			South	bound	
Movement			т	R		I	т	R			т	R		1	т	R
Priority	10	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 (veh/h)		9	830				429	19						15		12
Percent Heavy Vehicles (%)		2												2		2
Proportion Time Blocked																
Percent Grade (%)						1								. ()	
Right Turn Channelized																
Median Type Storage				Undi	vided											
Critical and Follow-up He	adwa	ys														
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, and	Leve	l of Se	ervice													
Flow Rate, v (veh/h)		9													28	

Delay, Queue Lengen, and	. 0. 50									
Flow Rate, v (veh/h)	9								28	
Capacity, c (veh/h)	1090								240	
v/c Ratio	0.01								0.12	
95% Queue Length, Q ₉₅ (veh)	0.0								0.4	
95% Queue Length, Q ₉₅ (ft)	0.0								10.2	
Control Delay (s/veh)	8.3	0.1							22.0	
Level of Service (LOS)	А	A							С	
Approach Delay (s/veh)	0	.2						22	2.0	
Approach LOS		4						(2	

Attachment 7 Intersection Worksheets – Full Buildout AM/PM Peaks

		ŀ	ICS 1	Гwo-	Way	Stop	-Cor	ntrol	Repo	ort						
General Information							Site	Inforr	natio	n						
Analyst	Addie	e Kirkhar	n				Inters	ection			E Emo	orv Road	l at Brac	kett Road		
Agency/Co.	Ardur	ra					Jurisc	liction			Knox	County				
Date Performed	10/23	3/2024					East/	West Str	eet		E Emo	ory Road				
Analysis Year	2027						North	n/South :	Street		Brack	ett Roac	1			
Time Analyzed	Full B	uildout	AM Peak				Peak	Hour Fac	ctor		0.89					
Intersection Orientation	East-	West					Analy	sis Time	Period (hrs)	0.25					
Project Description	592.0	19 Brack	et Road	Subdivis	sion											
Lanes																
				<u> </u>	h 1 Maj	or Street: Ea	t t T	244X4450								
Vehicle Volumes and Adj	ustme	nts														
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	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 (veh/h)		15	405				635	42						52		30
Percent Heavy Vehicles (%)		2												2		2
Proportion Time Blocked																
Percent Grade (%))	
Right Turn Channelized																
Median Type Storage				Undi	vided											
Critical and Follow-up He	eadwa	ys														
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, and	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)		17													92	
Capacity, c (veh/h)		851													239	
v/c Ratio		0.02													0.38	
95% Queue Length, Q ₉₅ (veh)		0.1													1.7	
95% Queue Length, Q ₉₅ (ft)		2.5													43.2	

9.3

А

0.6

А

0.2

А

Control Delay (s/veh)

Level of Service (LOS)

Approach LOS

Approach Delay (s/veh)

29.1

29.1

D

		ŀ	ICS 1	Гwo-'	Way	Stop	-Cor	ntrol	Repo	ort						
General Information							Site	Infor	natio	n						
Analyst	Addie	e Kirkhar	n				Inters	ection			E Em	ory Road	l at Bracl	kett Road	Ł	
Agency/Co.	Ardu	ra					Jurisc	liction			Knox	County				
Date Performed	10/23	3/2024					East/	West Str	eet		E Em	ory Road	1			
Analysis Year	2027						North	n/South	Street		Brack	ett Roac	ł			
Time Analyzed	Full B	uildout I	PM Peak				Peak	Hour Fa	ctor		0.95					
Intersection Orientation	East-	West					Analy	sis Time	Period ((hrs)	0.25					
Project Description	592.0	19 Brack	et Road	Subdivis	sion											
Lanes																
				7 4 7 7 4 P 7		or Street: Ea	t to the state of	4 4 X 4 4 U								
Vehicle Volumes and Adju	ıstme	nts														
Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	T	R	U	L	Т	R
Priority	10	1	2	3	40	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
	<u> </u>	LI	020	<u> </u>			120							22	LR	24
Volume (ven/n)		29	830				429	49						33		24
Percent Heavy vehicles (%)		2		<u> </u>										2		2
Proportion Time Blocked																
Pight Turn Channelized															, 	
Modian Type Storage				Undi	vidad											
Critical and Follow-up He	adwa	vc		ondi	viaca											
		ys	1			1	1	1	1		1	1	1	7 1		6.2
Gritical Headway (sec)		4.1		<u> </u>										6.42		6.2
Pasa Follow Lip Headway (sec)		4.12												0.42		0.22
Follow Up Headway (sec)		2.2												2.5		222
Follow-Op Headway (sec)	<u> </u>	2.22	•											5.52		5.52
Delay, Queue Length, and	l Leve	l of Se	ervice													
Flow Rate, v (veh/h)		31													60	
Capacity, c (veh/h)		1061													211	
v/c Ratio		0.03													0.28	
95% Queue Length, Q ₉₅ (veh)		0.1													1.1	
55% Queue Length, Q₀5 (tt)		2.5 0.5	0.5												27.9	
Control Delay (s/ven)		0.5	0.5												28.8	

А

0.7

А

А

Level of Service (LOS)

Approach LOS

Approach Delay (s/veh)

28.8

D

Attachment 8 Turn Lane Warrants



Figure 3-18: Right-Turn Lane Warrant along Two-Lane Roadway (Unsignalized Intersection with Two-Way Stop-Control)²⁴



Figure 3-15: Left-Turn Lane Warrant for Urban and Suburban Arterials (Unsignalized)20, 21

E Emory Road (SR 131) at Brackett Road Full Buildout Conditions



Figure 3-18: Right-Turn Lane Warrant along Two-Lane Roadway (Unsignalized Intersection with Two-Way Stop-Control)²⁴



Figure 3-15: Left-Turn Lane Warrant for Urban and Suburban Arterials (Unsignalized)20, 21

Attachment 9 Sight Distance



Brackett Road at Roadway Connection – Looking Right (Westbound)



Brackett Road at Roadway Connection – Looking Left (Southbound)



November 11, 2024

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

Re: Updated Trip Generation Letter for Brackett Road Subdivision

Dear Mr. Conger:

Knoxville-Knox County Planning requested a traffic letter to update the trip generation based on the revised concept plan for the Brackett Road Subdivision dated October 31, 2024. The proposed single-family subdivision lots were updated from 88 single-family detached homes to 69 single-family detached homes.

Ardurra submitted the "Brackett Road Subdivision Transportation Impact Analysis" dated October 28, 2024, with the following Trip Generation assumptions.

Trip Generation

Brackett Road Subdivision proposes 88 single-family residential lots. 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.

Table 1 Brackett Road Subdivision – 88 Lots Trip Generation Summary								
Land Use	Density	Daily Trips	AM Peak Hour Enter Exit	PM Peak Hour Enter Exit				
Single Family Detached Housing (LUC	88 Lots	897	16 50	55 33				

Updated Trip Generation

Brackett Road Subdivision proposes 69 single-family residential lots per the updated Concept Plan dated October 31, 2024. 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 the attachments.

Brackett Road Subdivision – 69 Lots Trip Generation Summary									
Land Use	Density	Daily Trips	AM Peak Hour Enter Exit	PM Peak Hour Enter Exit					
Single Family Detached Housing (LUC	69 Lots	717	14 39	44 26					

The total new trips generated by the Brackett Road Subdivision were estimated to be 717 daily trips. The estimated trips are 53 trips during the AM peak hour and 70 trips during the PM peak hour.

Conclusion and Recommendations

The result of the updated trip generation calculations is that the reduction in proposed single-family detached housing lots from 88 lots to 69 lots will reduce the expected trip generation for the Brackett Road Subdivision by 180 daily trips, 13 trips during the AM peak hour and 18 trips during the PM peak hour.

Since the updated Brackett Road Subdivision concept plan dated October 31, 2024, results in a reduction in projected daily, AM, and PM peak hour vehicles trips, the recommendations stated in the "Brackett Road Subdivision Transportation Impact Analysis" dated October 28, 2024 will remain the same.

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

Thank you,



Enclosure: Attachments

Project: Brackett Road Subdivision Date Conducted: 11/11/2024

Single-Family Detached Housing (LUC 210) 69 Lots

Average Daily Traffic

Ln(T) = 0.92 Ln(X) + 2.68Ln(T) = 0.92 Ln(69) + 2.68T = 717

Peak Hour of Adjacent Street Traffic

One Hour Between 7 and 9 a.m. Ln(T) = 0.91 Ln(X) + 0.12 Ln(T) = 0.91 Ln(69) + 0.12T = 53

Peak Hour of Adjacent Street Traffic

One Hour Between 4 and 6 p.m.

Ln(T) = 0.94 Ln(X) + 0.27 Ln(T) = 0.94 Ln(69) + 0.27T = 70

		Percent		Number	
Time Period	Total Trips	Enter	Exit	Enter	Exit
Weekday (24 hours)	717	50%	50%	359	359
AM Peak Hour	53	26%	74%	14	39
PM Peak Hour	70	63%	37%	44	26