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THOMPSON MEADOWS SUBDIVISION

Transportation Impact Analysis

7921 & 7923 Thompson School Road

Knox County, TN

A Transportation Impact Analysis for the Thompson Meadows Subdivision

Submitted to

Knox County Engineering and Public Works

Updated December 14, 2022
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FMA Project No. 588.014

Submitted By:

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Executive Summary

I-75 Land Partners, LLC is proposing a residential development (Thompson Meadows Subdivision) with two independent neighborhoods with their own access points and no internal connectivity. The project is located northwest of the intersection of Tazewell Pike at E Emory Road near Gibbs Elementary, Middle and High Schools in Knox County, Tennessee. The full buildout of the development will consist of 313 residential lots. Construction is proposed to take place this year and this study assumes full build out for the development will occur in 2027.

The subdivision south of Clear Spring proposes 35 townhome lots and 65 single-family lots for a total of 100 residential lots and a single access to Thompson School Road at Access #1.

The subdivision north of Clear Spring proposes 95 townhome lots and 118 single-family lots for a total of 213 residential lots.

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

Thompson School Road at Karnes Drive
After the completion of the full buildout of the Thompson Meadows Subdivision the existing stop-controlled intersection of Thompson School Road at Karnes Drive 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 westbound approach (Karnes Drive) is adequate and there are no recommended improvements to the intersection.

A northbound right turn lane and a southbound left turn lane on Thompson School 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 width of Karnes Drive varies between 15.5 feet and 16 feet. The minimum recommended pavement width for a local road with a 30 mph design speed and a low volume ADT is 18 feet per AASHTO's A Policy on Geometric Design of Highways and Street. FMA did not identify any locations where spot improvements might be necessary, but the existing roadway width does not meet the minimum recommended pavement width.

Thompson School Road at Driveway Access #1
After the completion of the full buildout of the Thompson Meadows Subdivision the proposed stop-controlled intersection of Thompson School Road at driveway Access #1 will operate will operate at a LOS A for all approaches during both the AM and PM peak hours.

A northbound left turn lane and a southbound right turn lane on Thompson School 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."

Thompson School Road at Driveway Access #2
After the completion of the full buildout of the Thompson Meadows Subdivision the proposed stop-controlled intersection of Thompson School Road at driveway Access #2 will operate will operate at a LOS A for all approaches during both the AM and PM peak hours.

A northbound left turn lane and a southbound right turn lane on Thompson School 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 standard practice for a residential subdivision with 150 or more lots is to require at least two access points to provide alternative access opportunities in the event that one access is blocked by a fallen tree, crash, or other. The Thompson Meadows Subdivision north of Clear Spring proposed 213 residential lots. The concept plan shows a single entry/exit lane onto Thompson School Road at the driveway Access #2; therefore, consideration should be made to adding a boulevard entrance in order to provide an alternate means of access if one side is blocked. A boulevard section is typically required to extend to the first major internal intersection in order to provide alternate travel paths.

1 Introduction

1.1 Project Description

This report provides a summary of a transportation impact analysis that was performed for the Thompson Meadows Subdivision. The Thompson Meadows Subdivision residential development proposes two independent neighborhoods with their own access points and no internal connectivity. The project is located northwest of the intersection of Tazewell Pike at E Emory Road near Gibbs Elementary, Middle and High Schools 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 development will occur in 2027.

The subdivision south of Clear Spring proposes 35 townhome lots and 65 single-family lots for a total of 100 residential lots and a single access to Thompson School Road at Access #1. The driveway connection (Access #1) is located approximately 1,160 feet north of Karnes Drive and 590 feet south of the driveway connection (Access #2).

The subdivision north of Clear Spring proposes 95 townhome lots and 118 single-family lots for a total of 213 residential lots. The driveway connection (Access #2) is located approximately 1,160 feet south of Lett Road and approximately 590 feet north of the driveway connection (Access #1).

The standard practice for a residential subdivision with 150 or more lots is to require at least two access points to provide alternative access opportunities in the event that one access is blocked by a fallen tree, crash, or other.

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 Thompson Meadows Subdivision will be eligible for bus services for the nearby Gibbs Elementary, Middle and High Schools.

The proposed site layout is shown in Figure 2.

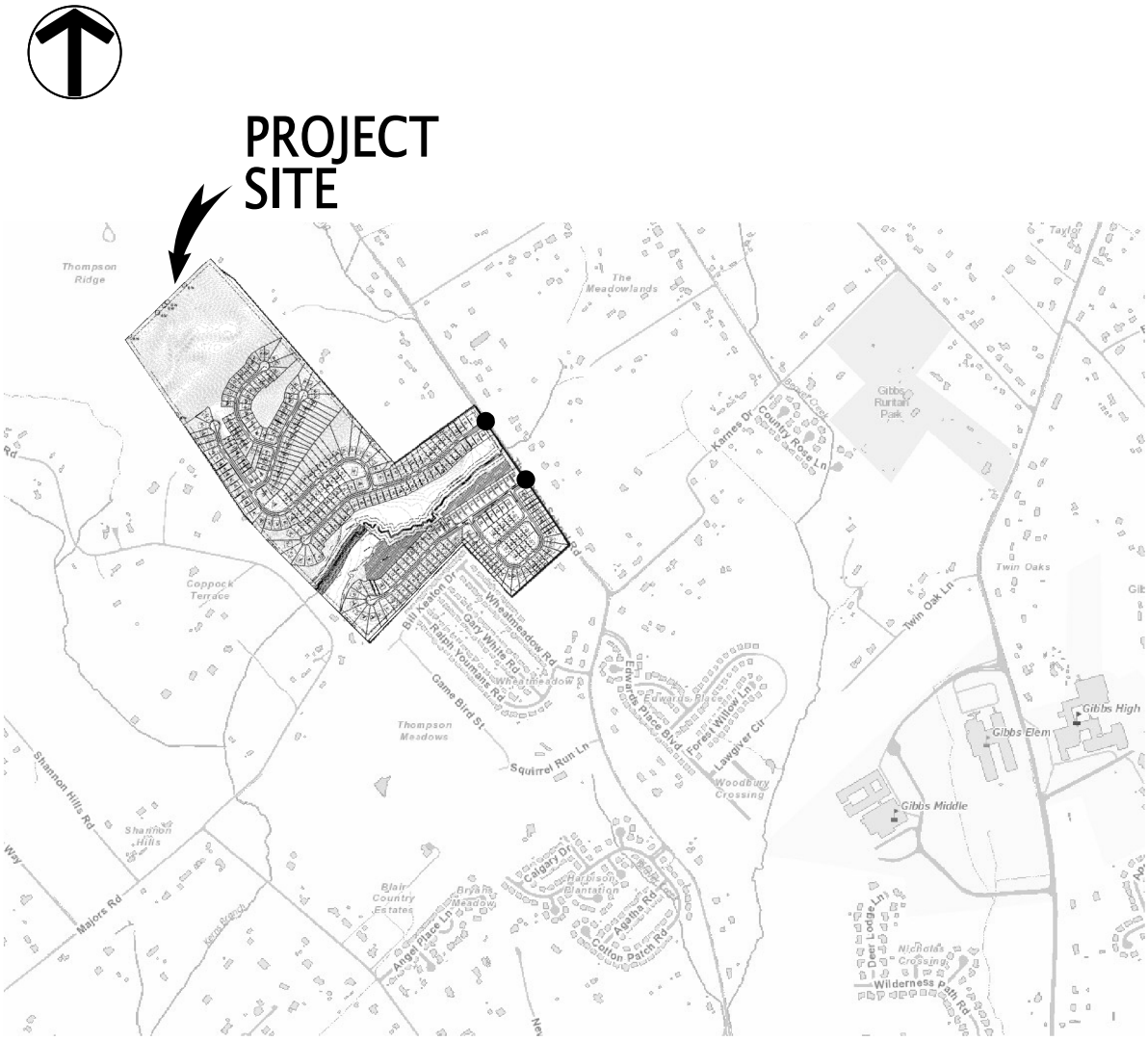


Figure 1: Location Map

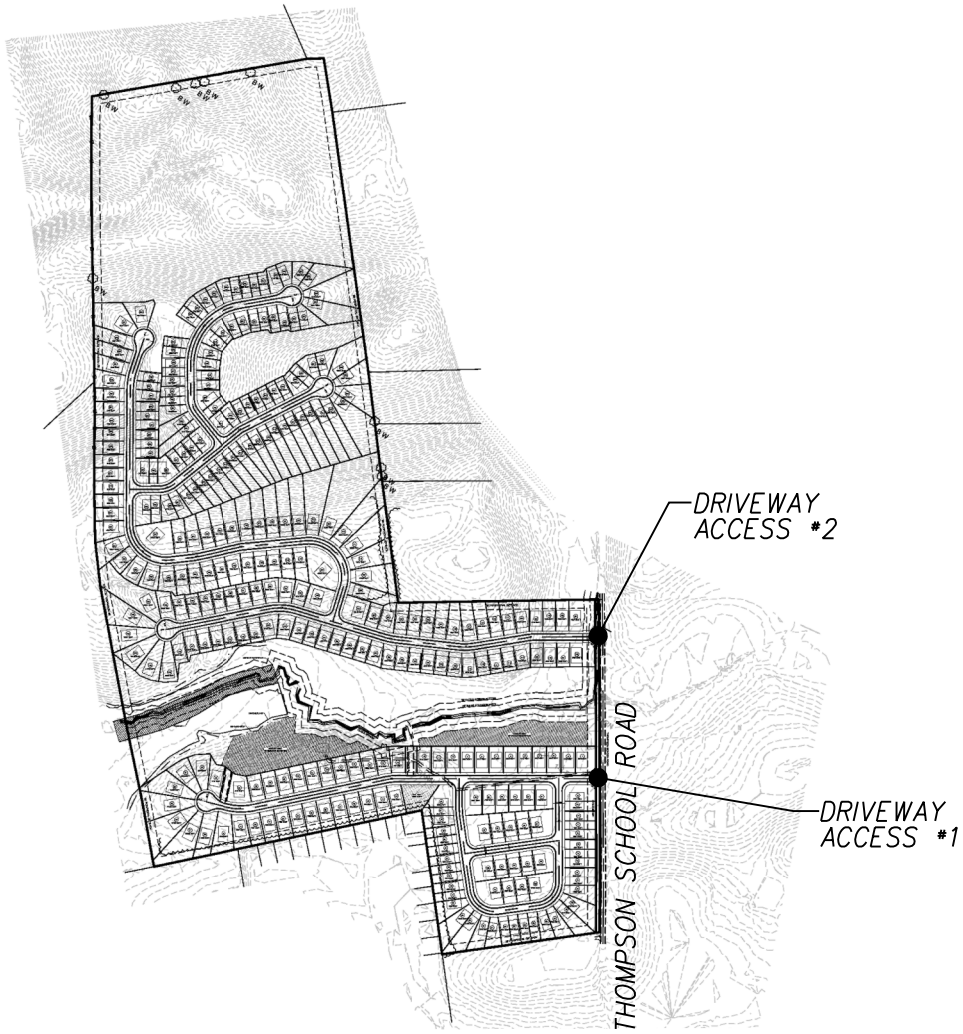


Figure 2: Site Plan

1.2 Existing Site Conditions

Thompson School Road is a two-lane road. The road width was measured by Knox County Engineering and Public Works and varies between 19 and 20 feet between the property line and Karnes Drive. The Knoxville-Knox County Planning Commission classifies Thompson School Road between Wood Road and E. Emory Road as a Major Collector with a 60 feet right-of-way per the Major Road Plan. The posted speed limit on Thompson School Road is 30 mph. Thompson School Road has no existing sidewalks or designated bike lanes in the vicinity of the proposed development.

Karnes Drive is a two-lane road that provides access to residential properties. The road width was measured by Knox County Engineering and Public Works and varies between 15.5 feet and 16 feet between Barker Road and Thompson School Road. The Knoxville-Knox County Planning Commission does not classify Karnes Drive; therefore, it is considered a local street. The posted speed limit on Karnes Drive is 30 mph.

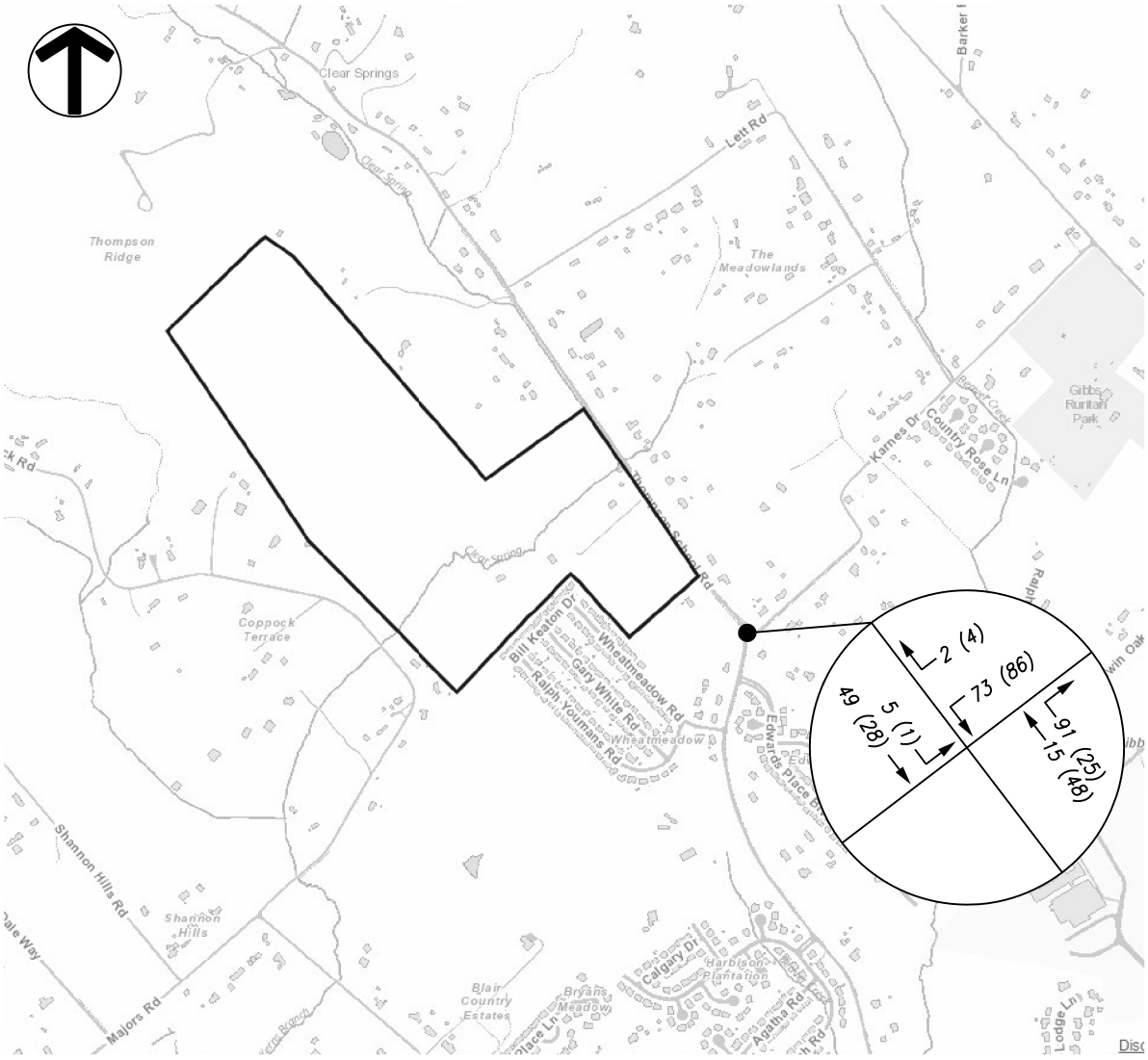
The Knoxville Area Transit (KAT) does not operate in the vicinity of the proposed development.

Aerial photos of the existing intersection of Thompson School Road at Karnes Drive and a copy of the road width measurements performed by Knox County Engineering and Public Works Staff are included in the Attachment 1.

2 Existing Traffic Volumes

FMA conducted a peak hour turning movement count at the unsignalized intersection of Thompson School Road and Karnes Drive on Wednesday February 16, 2022. The AM peak hour occurred between 7:00 a.m. and 8:00 a.m. with an AM PHF (peak hour factor) of 0.86. The PM peak hour occurred between 3:30 p.m. and 4:30 p.m. with a PM PHF of 0.80. The traffic data collected is included in the attachments.

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.



LEGEND:

← 5 (16) TURNING MOVEMENT VOLUME AM (PM)

Figure 3: 2022 Existing Peak Hour Traffic

3 Background Growth

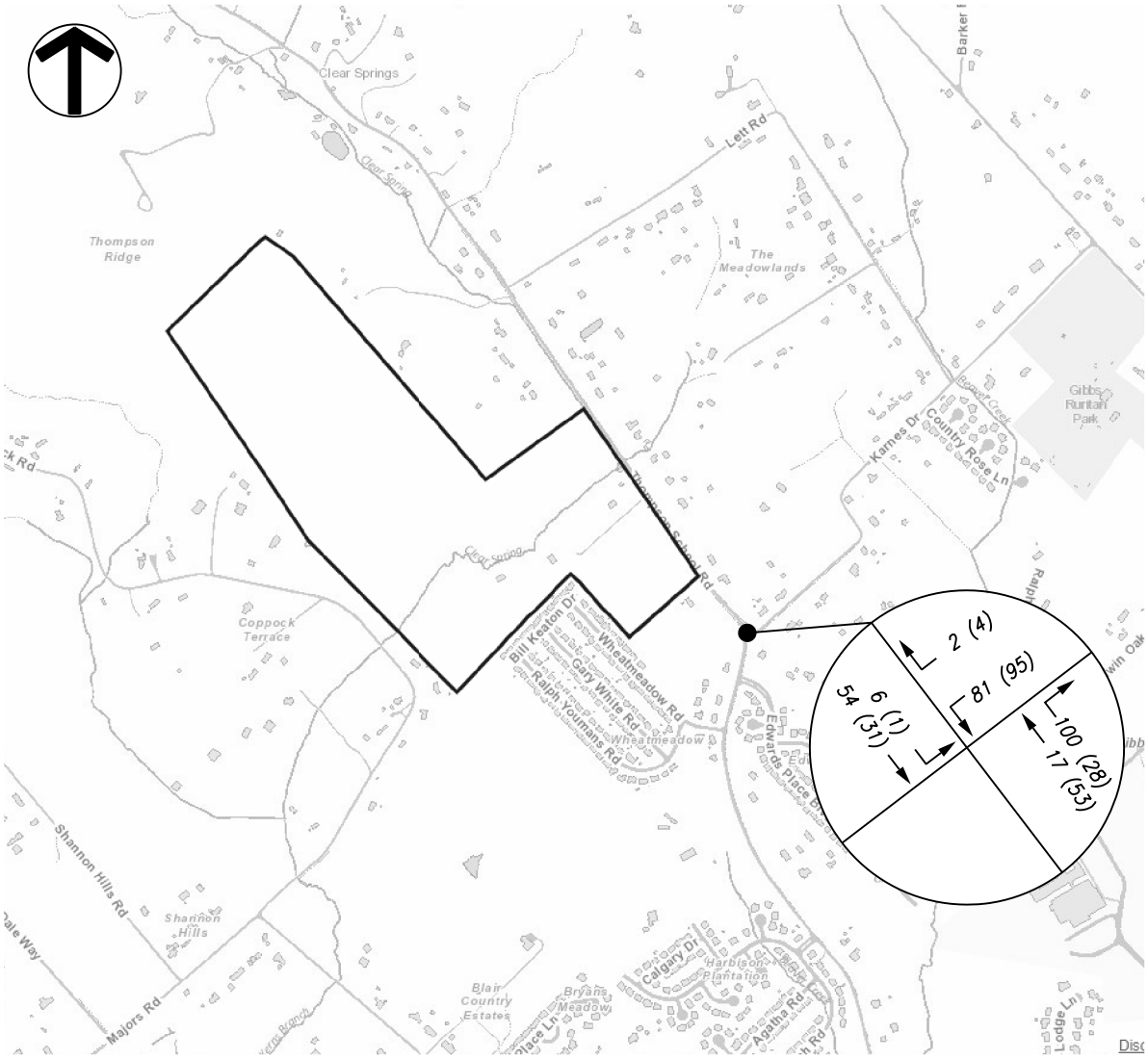
The Tennessee Department of Transportation (TDOT) maintains a count station in the vicinity of the proposed development.

TDOT count station #47000519 is located on Thompson School Road south of the existing Harbison Plantation Subdivision and north of E Emory Road (SR 131). The annual growth rate for this station over the last five years is approximately – 2.55%. The 2021 ADT was 2,865 vehicles per day.

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

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

The Tennessee Department of Transportation is currently in the preliminary engineering stage on a road widening project between East Emory Road (SR-33) to near SR-331. The scope of work includes adding two lanes with a median or center turn lane, including bicycle and pedestrian facilities. This project had a proposed letting date of the 4th quarter of 2026.



LEGEND:

← 5 (16) TURNING MOVEMENT VOLUME AM (PM)

Figure 4: 2027 Background Peak Hour Traffic

4 Trip Generation and Trip Distribution

The Thompson Meadows Subdivision residential development proposes two independent neighborhoods with their own access points and no internal connectivity. The subdivision south of Clear Spring proposes 35 townhome lots and 65 single-family lots for a total of 100 residential lots and a single access to Thompson School Road at Access #1. The subdivision north of Clear Spring proposes 95 townhome lots and 118 single-family lots for a total of 213 residential lots and a separate single access to Thompson School Road at Access #2.

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. Land use worksheets are included in the Attachment 4.

The total combined new trips generated by the Thompson Meadows Subdivision residential development were estimated to be 3,032 daily trips. The estimated trips are 224 trips during the AM peak hour and 301 trips during the PM peak hour.

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

Table 4-1
Thompson Meadows Subdivision
Trip Generation Summary

Land Use	Density	Daily Trips	AM Peak Hour Enter	AM Peak Hour Exit	PM Peak Hour Enter	PM Peak Hour Exit
Access #1 (LUC 210)	100 Lots	1,009	20	56	62	37
Access #2 (LUC 210)	213 Lots	2,023	38	110	127	75
Total New Trips		3,032	58	166	189	112

Thompson School Road in the vicinity of the proposed development has an existing trip distribution of 25% northbound and 75% southbound during the AM peak hour and 65% northbound and 35% southbound during the PM peak hour.

The existing traffic count at the intersection of Thompson School Road at Karnes Drive shows evidence that traffic in the area is using Karnes Drive as a "cut-thru" to access Tazewell Pike (SR 131) and the Gibbs Schools. The trip distribution estimated that 20% of the subdivision traffic would enter/exit using Karnes Drive,

adding approximately 44 trips during the AM peak hour and 59 trips during the PM peak hour to Karnes Drive.

The directional distribution of the new trips generated by the proposed Thompson Meadows Subdivision was determined using existing traffic volumes at the intersection of Thompson School Road at Karnes Drive. FMA assumed that 70% of traffic would enter/exit from E Emory Road (SR 33), 20% of traffic would enter/exit from Karnes Drive towards Gibbs Schools and 10% would enter/exit from Thompson School Road north of the subdivision.

Figures 5 and 6 show the residential peak hour trip distribution for the driveway Access #1 and driveway Access #2. Figures 7 and 8 show the residential peak hour site trips for the driveway Access #1 and driveway Access #2.

Figure 9 shows the 2027 full buildout peak hour combined traffic including the background traffic and the peak hour site trips from both Access #1 and driveway Access #2 for the Thompson Meadows Subdivision.

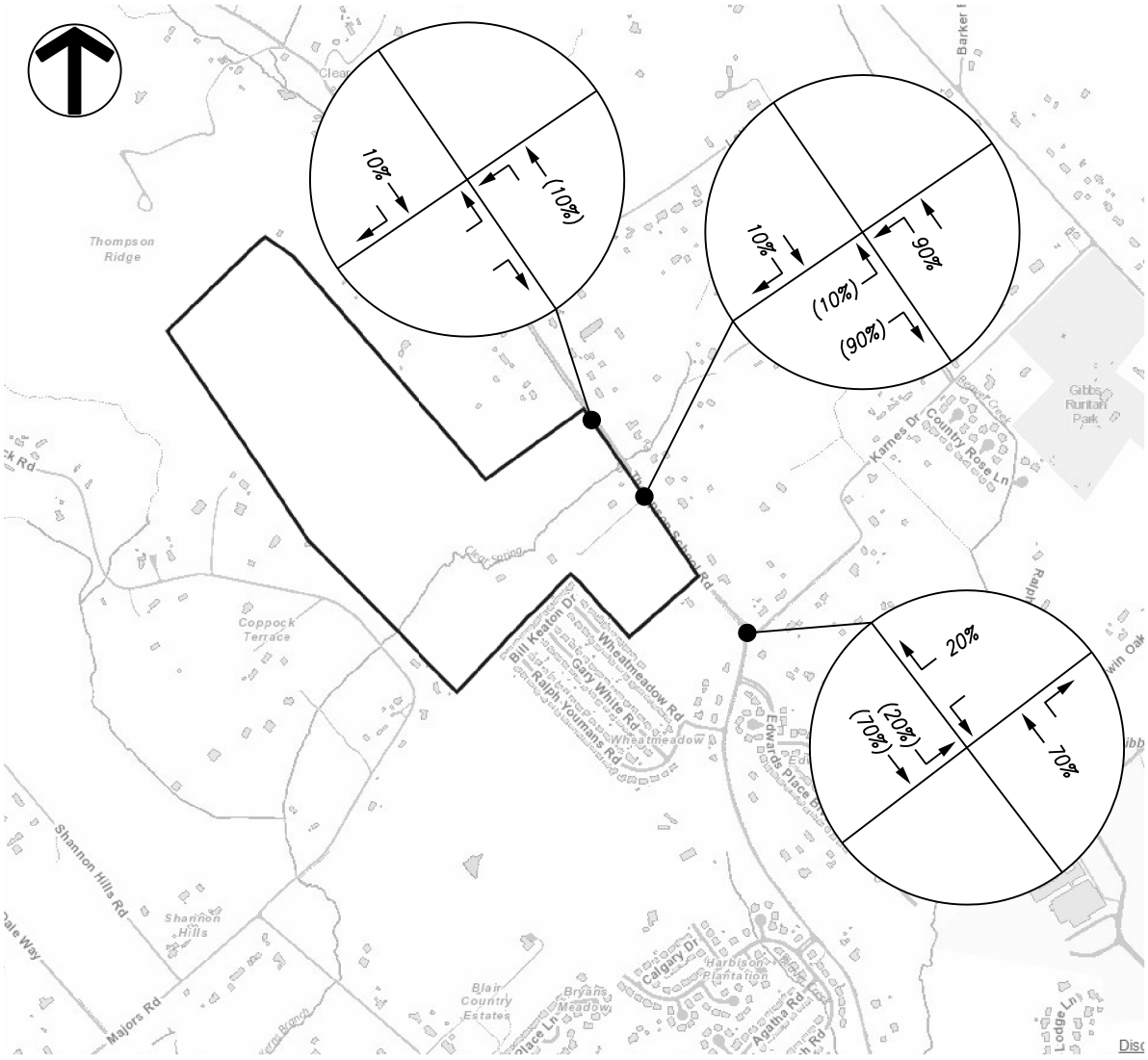
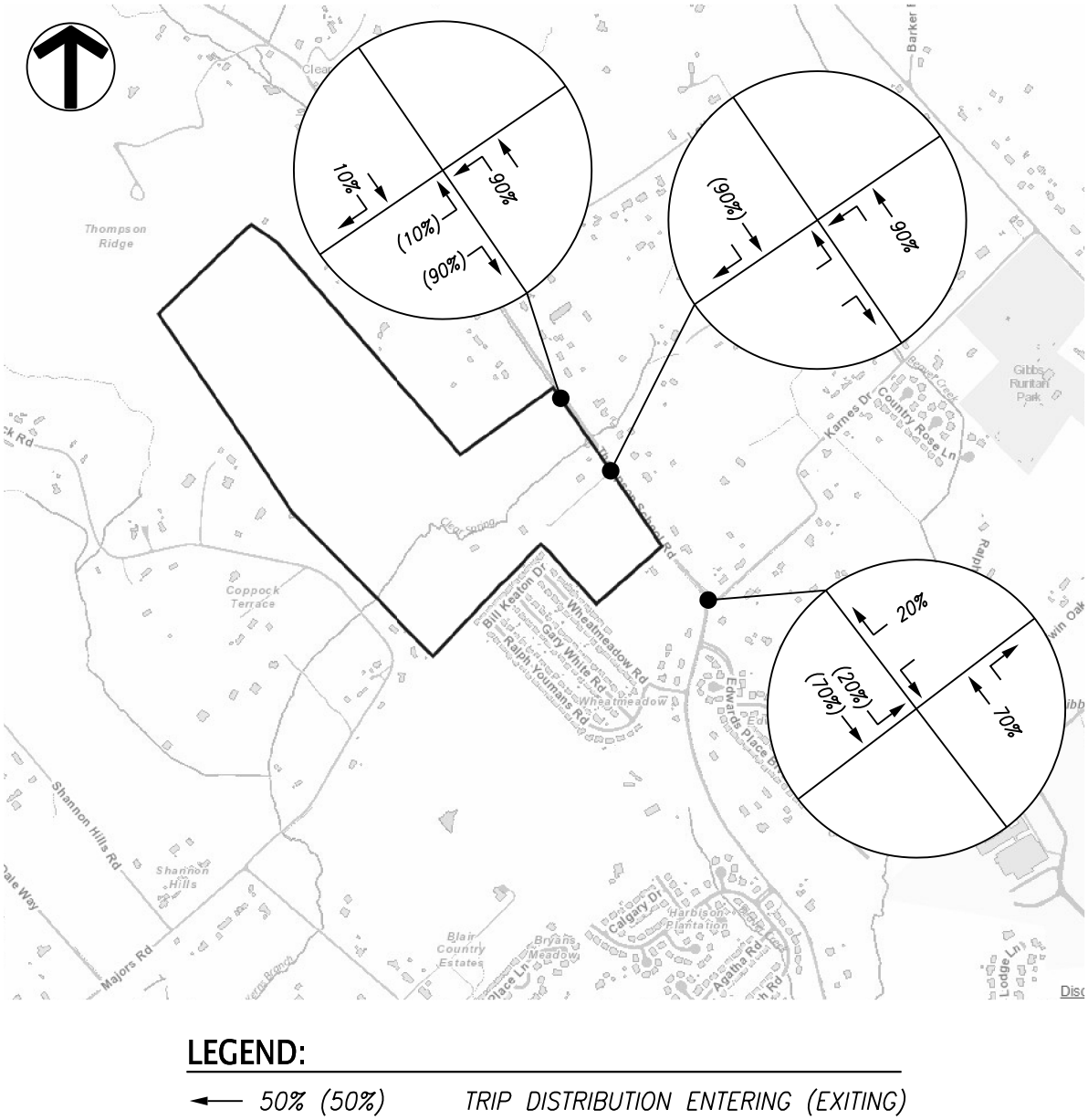


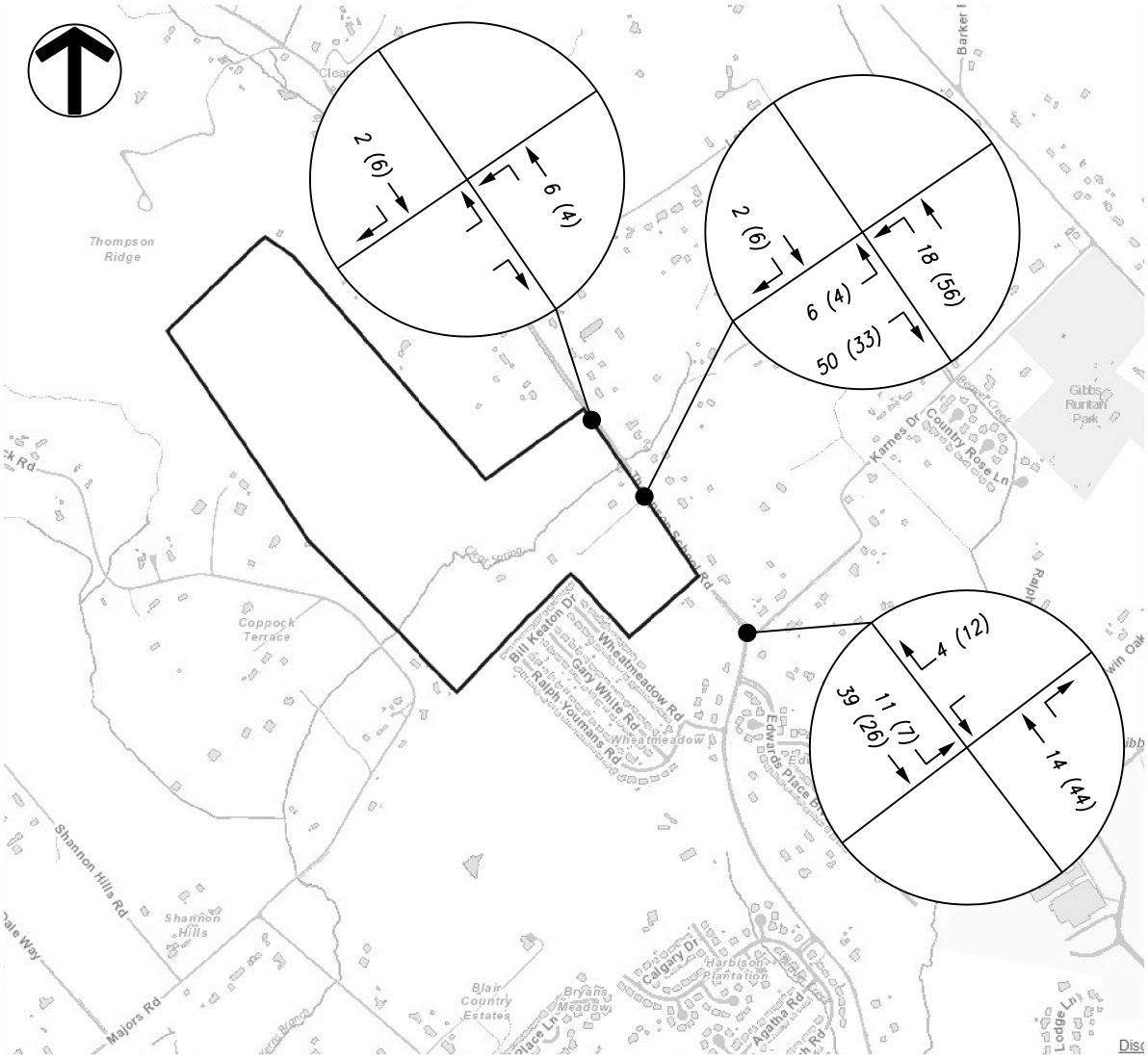
Figure 5: Peak Hour Trip Distribution - Access #1



LEGEND:

← 50% (50%) TRIP DISTRIBUTION ENTERING (EXITING)

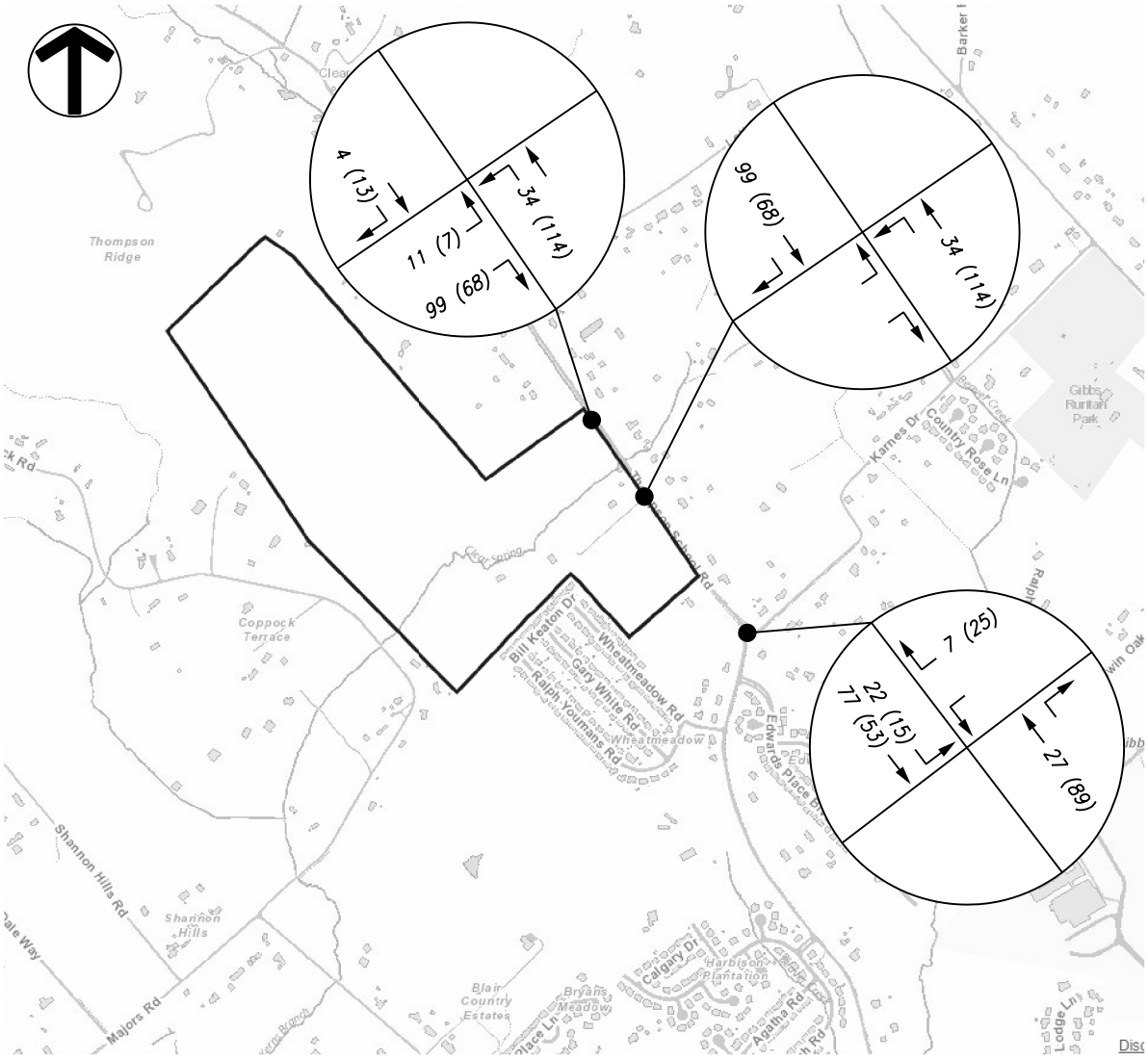
Figure 6: Peak Hour Trip Distribution - Access #2



LEGEND:

← 5 (16) TURNING MOVEMENT VOLUME AM (PM)

Figure 7: Peak Hour Site Trips - Access #1



LEGEND:

← 5 (16) TURNING MOVEMENT VOLUME AM (PM)

Figure 8: Peak Hour Site Trips - Access #2

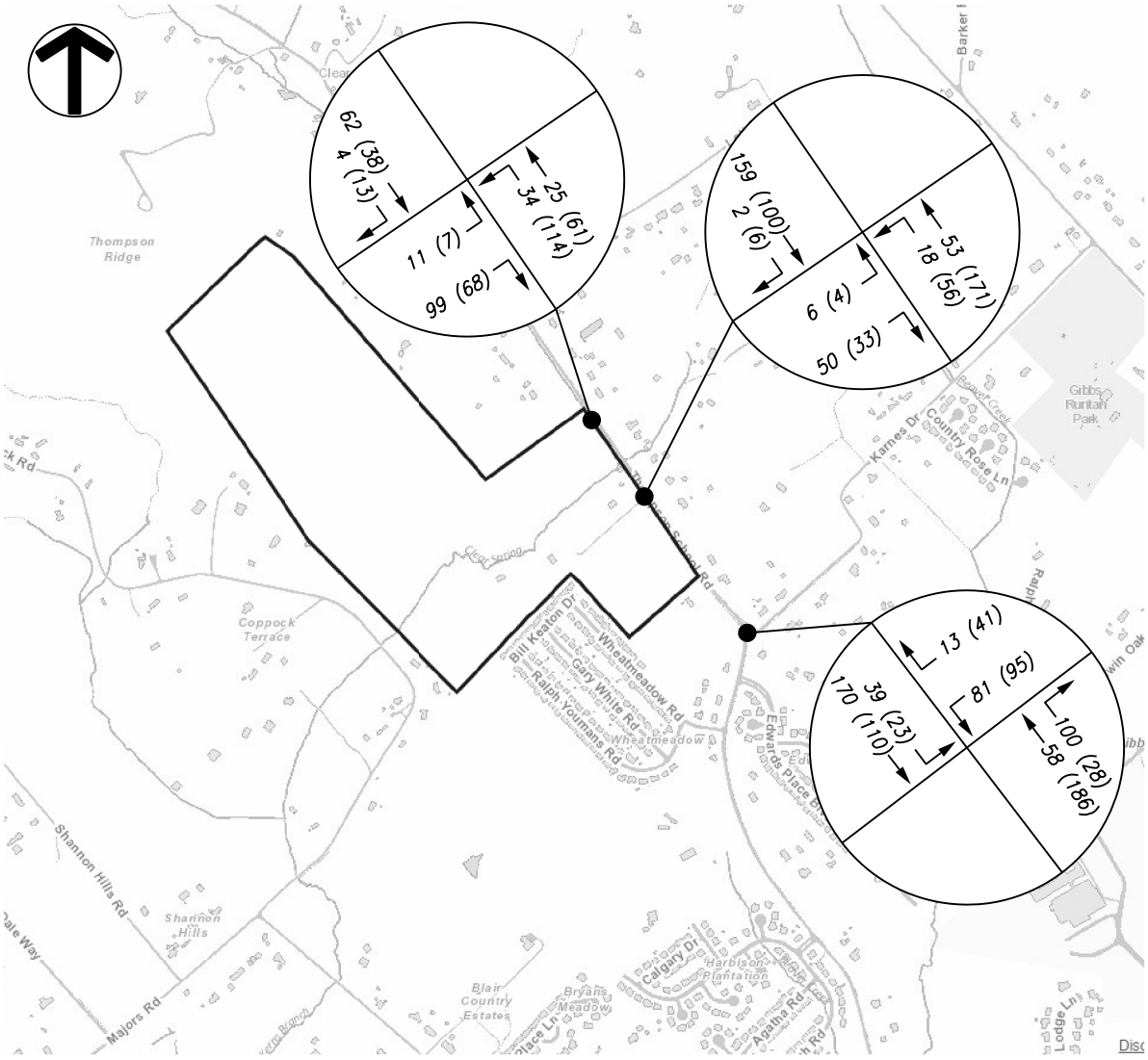


Figure 9: 2027 Full Buildout Peak Hour Traffic

5 Projected Capacity and Level of Service

The existing intersection of Thompson School Road at Karnes Drive is a three-legged intersection with an existing stop sign on the westbound approach (Karnes Drive). The proposed driveway connections at the intersection of Thompson School Road at Access #1 and Thompson School Road at Access #2 are two-way stop-controlled intersections.

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 Thompson School Road at Karnes Drive and the driveway connections to Thompson School 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).

Table 5-1
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

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

Table 5-2
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)
Thompson School Road @ Karnes Drive	**AM Peak**			
	WB Approach	9.7 / A	9.9 / A	12.2 / B
	SB Approach	7.5 / A	7.5 / A	7.7 / A
	PM Peak			
	WB Approach	9.6 / A	9.8 / A	13.2 / B
	SB Approach	7.4 / A	7.4 / A	7.8 / A
Thompson School Road @ Driveway Access #1	**AM Peak**			
	EB Approach			9.6 / A
	NB Approach			7.6 / A
	PM Peak			
	EB Approach			9.3 / A
	NB Approach			7.6 / A
Thompson School Road @ Driveway Access #2	**AM Peak**			
	EB Approach			9.2 / A
	NB Approach			7.4 / A
	PM Peak			
	EB Approach			9.1 / A
	NB Approach			7.5 / A

6 Turn Lane Warrant Analysis

The intersections of Thompson School Road at Karnes Drive and Thompson School Road at both driveway connections were evaluated to determine if a right turn lane or a left 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.

There are no turn lanes warranted at the intersections of Thompson School Road at Karnes Drive, Thompson School Road at the proposed driveway Access #1 and Thompson School Road at the proposed driveway Access #2 during either the AM or PM peak hours after the full buildout of the Thompson Meadows Subdivision residential development.

The turn lane warrant worksheets and analysis are included in Attachment 8.

7 Conclusions and Recommendations

7.1 Thompson School Road at Karnes Drive

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

The existing and background traffic conditions for the westbound approach (Karnes Drive) operate at a LOS A during both the AM and PM peak hours and the southbound approach (Thompson School Road) operates at a LOS A during both the AM and PM peak hours.

After the completion of the full buildout of the Thompson Meadows Subdivision the traffic conditions for the intersection of Thompson School Road at Karnes Drive will operate as follows. The westbound approach (Karnes Drive) will operate at a LOS B during both the AM and PM peak hours. The southbound approach (Thompson School 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.

The unsignalized intersection capacity analysis shows the full buildout 95% queue length for the westbound approach (Karnes Drive) of less than one vehicle during the AM peak hour and 1.1 vehicles (approximately 50 feet) during the PM peak hour. The existing storage lengths at the intersection of Thompson School Road at Karnes Drive are adequate and no additional improvements are necessary in order to accommodate the Thompson Meadows Subdivision residential development.

A northbound right turn lane and a southbound left turn lane on Thompson School 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 width of Karnes Drive varies between 15.5 feet and 16 feet. The minimum recommended pavement width for a local road with a 30 mph design speed and a low volume ADT is 18 feet per AASHTO's A Policy on Geometric Design of Highways and Street. FMA did not identify any locations where spot improvements might be necessary, but the existing roadway width does not meet the minimum recommended pavement width.

The existing signage on Karnes Drive includes a speed limit sign in each direction and a "W1-6" horizontal rectangular sign with a large horizontal arrow pointing to the left for eastbound traffic approaching the horizontal curve. FMA recommends any improvements to Karnes Drive between Thompson School Road and Barker Road including road/shoulder widening, resurfacing, increased signage, etc. be coordinated with Knox County Engineering and Public Works.

7.2 Thompson School Road at Driveway Access #1

Thompson School 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 driveway connection (Access #1) is located approximately 1,160 feet north of Karnes Drive and 590 feet south of the driveway connection (Access #2). The driveway Access #1 exceeds the typical minimum separation on a collector street; therefore, no change is necessary.

The full buildout conditions at the unsignalized intersection of Thompson School Road at driveway Access #1 were analyzed using the Highway Capacity Software (HCS7). The proposed driveway connection is a three-legged intersection with a stop sign at driveway Access #1.

After the completion of the full buildout of the Thompson Meadows Subdivision the traffic conditions for the intersection of Thompson School Road at driveway Access #1 will operate as follows. The eastbound approach (Access #1) will operate at a

LOS A during both the AM and PM peak hours. The northbound approach (Thompson School Road) will operate at a LOS A during both the AM and PM peak hours.

A northbound left turn lane and a southbound right turn lane on Thompson School 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 sight distance for a road with a posted speed limit of 30 mph is 300 feet in each direction in accordance with the "Knoxville-Knox County Subdivision Regulations" amended through October 6, 2022. FMA measured the sight distance at the proposed intersection of Thompson School Road at the driveway Access #1 in November 2022. At 15 feet from the edge of pavement the sight distance at the proposed intersection is greater than 500 feet looking to the north and greater than 500 feet looking to the south.

Any required sight distance easements for the internal subdivision intersections should be coordinated with Knox County Engineering and Public Works and included on the final design drawings prior to construction of the subdivision.

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

7.3 Thompson School Road at Driveway Access #2

Thompson School 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 driveway connection (Access #2) is located approximately 1,160 feet south of Lett Road and approximately 590 feet north of the driveway connection (Access #1). The driveway Access #2 exceeds the typical minimum separation on a collector street; therefore, no change is necessary.

The full buildout conditions at the unsignalized intersection of Thompson School Road at driveway Access #2 were analyzed using the Highway Capacity Software (HCS7). The proposed driveway connection is a three-legged intersection with a stop sign at driveway Access #2.

After the completion of the full buildout of the Thompson Meadows Subdivision the traffic conditions for the intersection of Thompson School Road at driveway Access #2 will operate as follows. The eastbound approach (Access #2) will operate at a LOS A during both the AM and PM peak hours. The northbound approach

(Thompson School Road) will operate at a LOS A during both the AM and PM peak hours.

A northbound left turn lane and a southbound right turn lane on Thompson School 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 sight distance for a road with a posted speed limit of 30 mph is 300 feet in each direction in accordance with the "Knoxville-Knox County Subdivision Regulations" amended through October 6, 2022. FMA measured the sight distance at the proposed intersection of Thompson School Road at the driveway Access #2 in November 2022. At 15 feet from the edge of pavement the sight distance at the proposed intersection is greater than 500 feet looking to the north and greater than 500 feet looking to the south.

Any required sight distance easements for the internal subdivision intersections should be coordinated with Knox County Engineering and Public Works and included on the final design drawings prior to construction of the subdivision.

FMA 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 standard practice for a residential subdivision with 150 or more lots is to require at least two access points to provide alternative access opportunities in the event that one access is blocked by a fallen tree, crash, or other. The subdivision north of Clear Spring proposes 95 townhome lots and 118 single-family lots for a total of 213 residential lots. The concept plan shows a single entry/exit lane onto Thompson School Road at the driveway Access #2; therefore, consideration should be made to adding a boulevard entrance in order to provide an alternate means of access if one side is blocked. A boulevard section is typically required to extend to the first major internal intersection in order to provide alternate travel paths.

7.4 Traffic Impact Letter

A Traffic Impact Letter evaluation was completed by Fulghum, MacIndoe & Associates in March 2022 for the Thompson Meadows Subdivision residential development during the rezoning process. The total expected area of development was 95 acres and was rezoned from A (Agricultural and Estate) to PR (Planned Residential) with an estimated density of 3.2 units/acre or approximately 300 single family lots.

The TIL calculated the trip generation based on 300 single family lots with an estimated 2,772 new daily trips, 202 trips during the AM peak hour and 279 trips during the PM peak hour.

The TIL estimated that 20% of the subdivision traffic would enter/exit using Karnes Drive as a "cut-thru" to access Tazewell Pike (SR 131) and the Gibbs Schools and that the subdivision would add approximately 41 trips during the AM peak hour and 56 trips during the PM peak hour to Karnes Drive.

The submitted concept plan has a total of 313 lots with a proposed combination of townhome and single family lots. The total combined new trips generated by the Thompson Meadows Subdivision residential development were estimated to be 3,032 daily trips. The estimated trips are 224 trips during the AM peak hour and 301 trips during the PM peak hour.

Using the same 20% estimate for traffic entering/exiting using Karnes Drive as a "cut-thru" to access Tazewell Pike (SR 131) and the Gibbs Schools the Thompson Meadows Subdivision will add approximately 44 trips during the AM peak hour and 59 trips during the PM peak hour to Karnes Drive.

The difference between the estimated development during the rezoning process and the submitted concept plan was an increase of 13 lots resulting in an expected increase of 260 daily trips, 22 trips during the AM peak hour and 22 trips during the PM peak hour. And a resulting increase to the traffic entering/exiting Karnes Drive of an additional 3 trips during the AM peak hour and 3 trips during the PM peak hour.

Attachment 1
Aerial Photos

Thompson School Road at Karnes Drive

Knoxville - Knox County - KUB Geographic Information System

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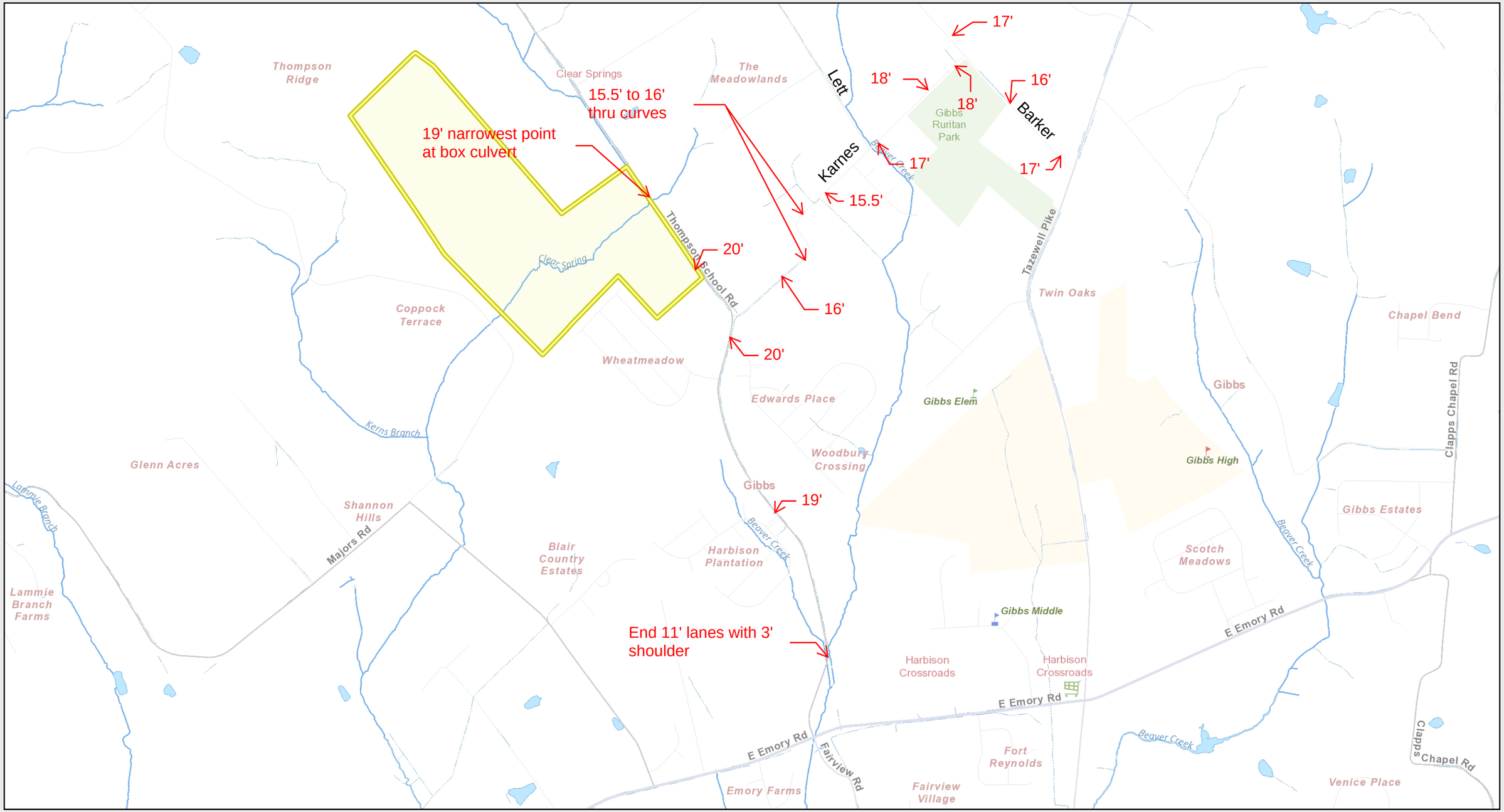

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Attachment 2
Traffic Count

Project: Thompson School Road Subdivison
Intersection: Thompson School Road at Karnes Drive
Date Conducted: Wednesday February 16, 2022

	Thompson School Road Southbound			Karnes Drive Westbound			Thompson School Road Northbound			
Start	Left	Thru	Total	Left	Right	Total	Thru	Right	Total	Int. Total
7:00 AM	0	14	14	7	0	7	2	19	21	42
7:15 AM	2	18	20	10	0	10	2	36	38	68
7:30 AM	2	12	14	15	0	15	6	25	31	60
7:45 AM	1	5	6	41	2	43	5	11	16	65
Total	5	49	54	73	2	75	15	91	106	235
8:00 AM	1	7	8	9	0	9	3	22	25	42
8:15 AM	0	7	7	17	2	19	1	8	9	35
8:30 AM	0	8	8	7	0	7	2	4	6	21
8:45 AM	0	6	6	4	1	5	3	2	5	16
Total	1	28	29	37	3	40	9	36	45	114
2:00 PM	0	3	3	3	0	3	4	2	6	12
2:15 PM	1	7	8	3	0	3	4	7	11	22
2:30 PM	2	7	9	5	0	5	6	7	13	27
2:45 PM	1	1	2	4	0	4	11	10	21	27
Total	4	18	22	15	0	15	25	26	51	88
3:00 PM	1	6	7	4	2	6	7	6	13	26
3:15 PM	0	5	5	7	1	8	8	5	13	26
3:30 PM	0	10	10	36	0	36	10	4	14	60
3:45 PM	0	4	4	37	0	37	8	8	16	57
Total	1	25	26	84	3	87	33	23	56	169
4:00 PM	1	8	9	9	2	11	17	4	21	41
4:15 PM	0	6	6	4	2	6	13	9	22	34
4:30 PM	1	4	5	2	1	3	16	5	21	29
4:45 PM	1	9	10	0	0	0	8	5	13	23
Total	3	27	30	15	5	20	54	23	77	127
5:00 PM	1	8	9	5	0	5	17	4	21	35
5:15 PM	0	8	8	7	1	8	7	5	12	28
5:30 PM	0	9	9	4	0	4	18	7	25	38
5:45 PM	1	7	8	5	0	5	18	4	22	35
Total	2	32	34	21	1	22	60	20	80	136
Grand Total	16	179	195	245	14	259	196	219	415	869
Approach %	8.2	91.8		94.6	5.4		47.2	52.8		
Total %	1.8	20.6	22.4	28.2	1.6	29.8	22.6	25.2	47.8	

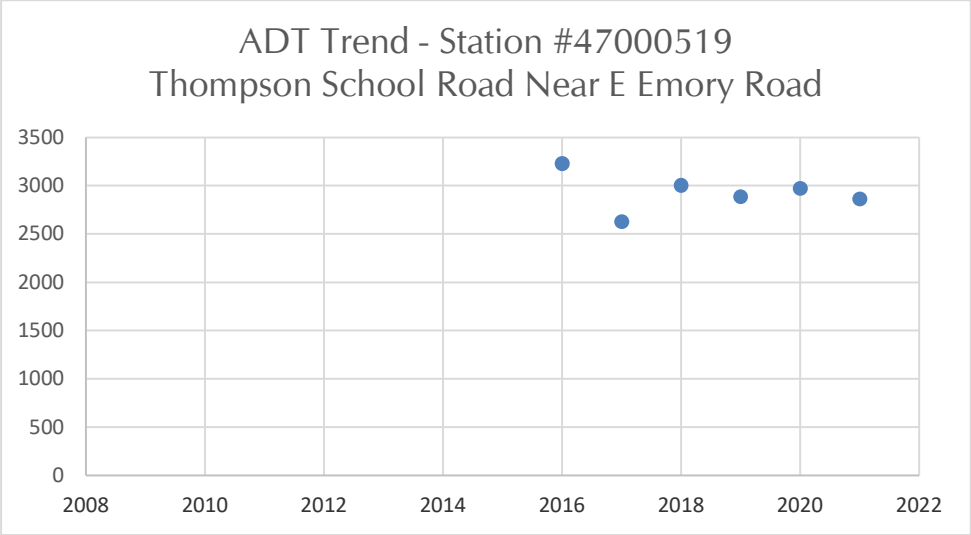
Project: Thompson School Road Subdivision
Intersection: Thompson School Road at Karnes Drive
Date Conducted: Wednesday February 16, 2022

AM Peak Hour	7:00 AM - 8:00 AM	235
PM Peak Hour	3:30 PM - 4:30 PM	192

	Thompson School Road Southbound			Karnes Drive Westbound			Thompson School Road Northbound			
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 7:00 AM										
7:00 AM	0	14	14	7	0	7	2	19	21	42
7:15 AM	2	**18**	20	10	0	10	2	**36**	38	**68**
7:30 AM	**2**	12	14	15	0	15	**6**	25	31	60
7:45 AM	1	5	6	**41**	**2**	43	5	11	16	65
Total Volume	5	49	54	73	2	75	15	91	106	235
Future (2% over 5 yrs)	6	54		81	2		17	100		259
PHF	0.63	0.68		0.45	0.25		0.63	0.63		0.86
Peak Hour Analysis from 2:00 PM to 6:00 PM										
PM Peak Hour begins at 3:30 PM										
3:30 PM	0	**10**	10	36	0	36	10	4	14	**60**
3:45 PM	0	4	4	**37**	0	37	8	8	16	57
4:00 PM	**1**	8	9	9	**2**	11	**17**	4	21	41
4:15 PM	0	6	6	4	2	6	13	**9**	22	34
Total Volume	1	28	29	86	4	90	48	25	73	192
Future (2% over 5 yrs)	1	31		95	4		53	28		212
PHF	0.25	0.70		0.58	0.50		0.71	0.69		0.80

Attachment 3
ADT Trends

Year	Adjusted Average Daily Traffic
2010	
2011	
2012	
2013	
2014	
2015	
2016	3231
2017	2630
2018	3004
2019	2885
2020	2972
2021	2865



Most Recent Trend Line Growth

Year	ADT
2016	3231
2021	2865

Annual Percent Growth	**-2.55%**

Attachment 4
Trip Generation

Project: Thompson Meadows Subdivision
Date Conducted: 11/21/2022

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

Average Daily Traffic
$Ln(T) = 0.92Ln(X) + 2.68$
$Ln(T) = 0.92Ln(100) + 2.68$
$T = 1009$

Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.
$Ln(T) = 0.91Ln(X) + 0.12$
$Ln(T) = 0.91Ln(100) + 0.12$
$T = 75$

Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.
$Ln(T) = 0.94Ln(X) + 0.27$
$Ln(T) = 0.94Ln(100) + 0.27$
$T = 99$

		Percent		Number	
Time Period	Total Trips	Enter	Exit	Enter	Exit
Weekday (24 hours)	1009	50%	50%	505	505
AM Peak Hour	75	26%	74%	20	56
PM Peak Hour	99	63%	37%	62	37

Project: Thompson Meadows Subdivision
Date Conducted: 11/21/2022

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

Average Daily Traffic
$Ln(T) = 0.92Ln(X) + 2.68$
$Ln(T) = 0.92Ln(213) + 2.68$
$T = 2023$

Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.
$Ln(T) = 0.91Ln(X) + 0.12$
$Ln(T) = 0.91Ln(213) + 0.12$
$T = 148$

Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.
$Ln(T) = 0.94Ln(X) + 0.27$
$Ln(T) = 0.94Ln(213) + 0.27$
$T = 202$

		Percent		Number	
Time Period	Total Trips	Enter	Exit	Enter	Exit
Weekday (24 hours)	2023	50%	50%	1012	1012
AM Peak Hour	148	26%	74%	38	110
PM Peak Hour	202	63%	37%	127	75

Single-Family Detached Housing
(210)

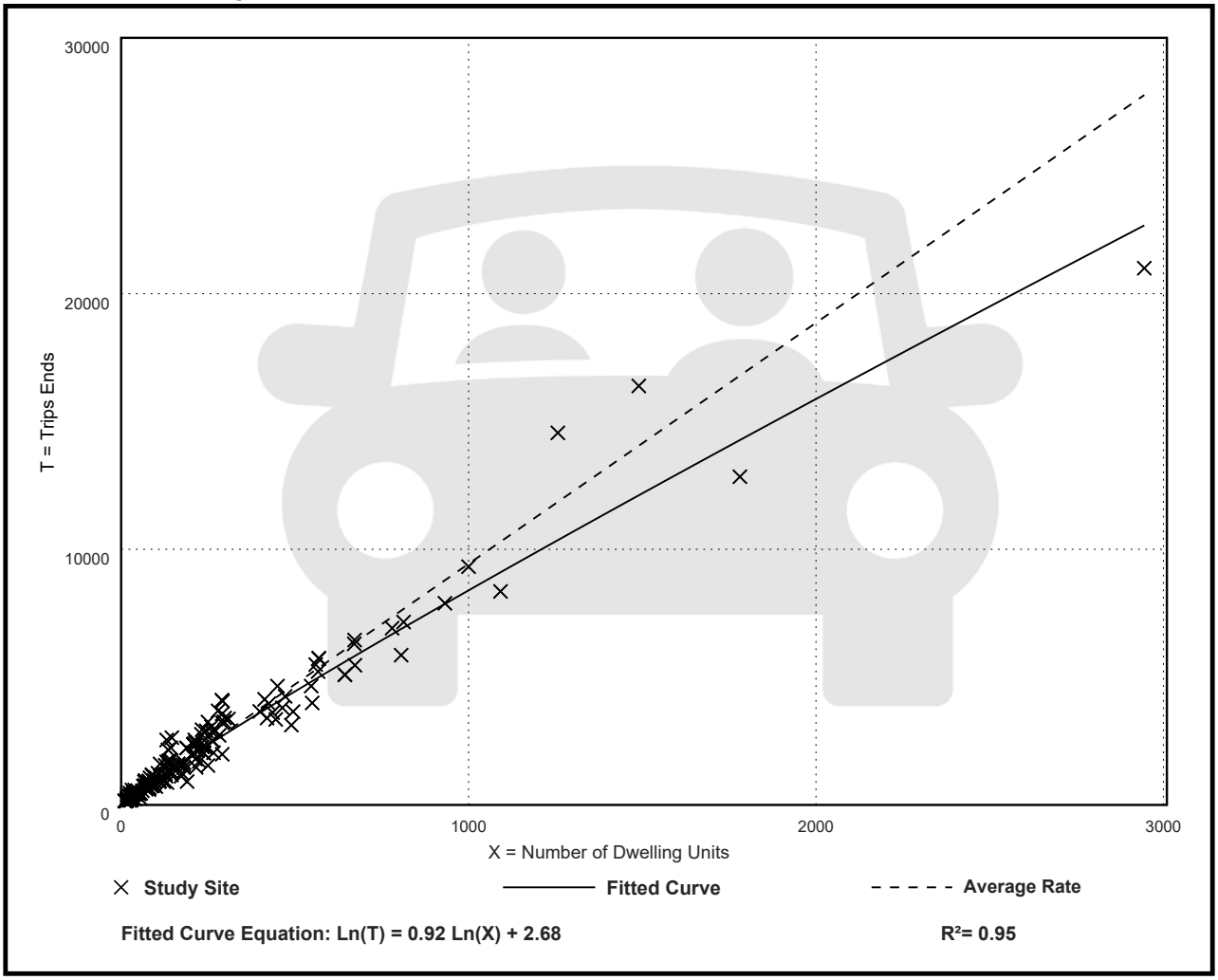
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

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



Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.68

R^2= 0.95

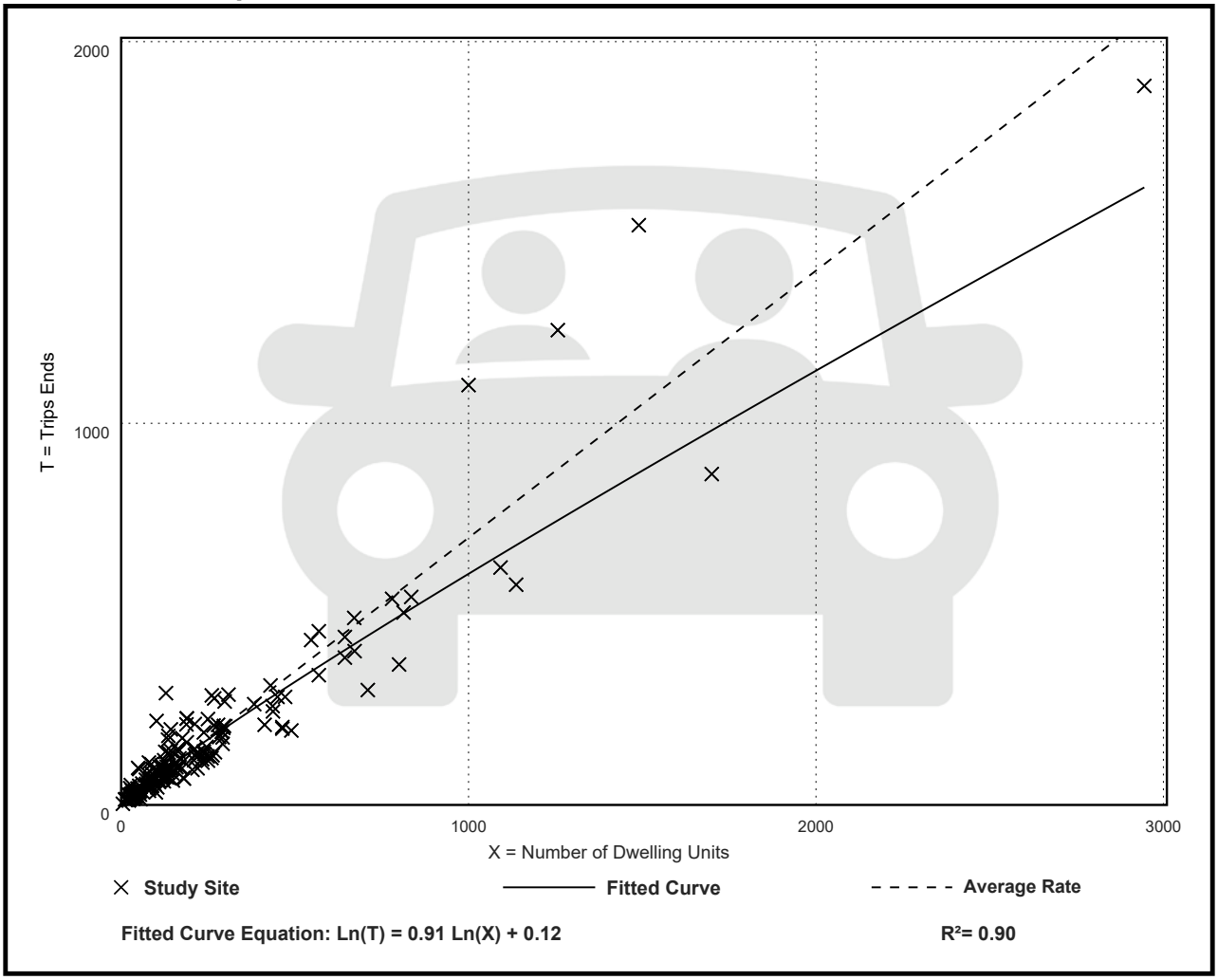
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 192
Avg. Num. of Dwelling Units: 226
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



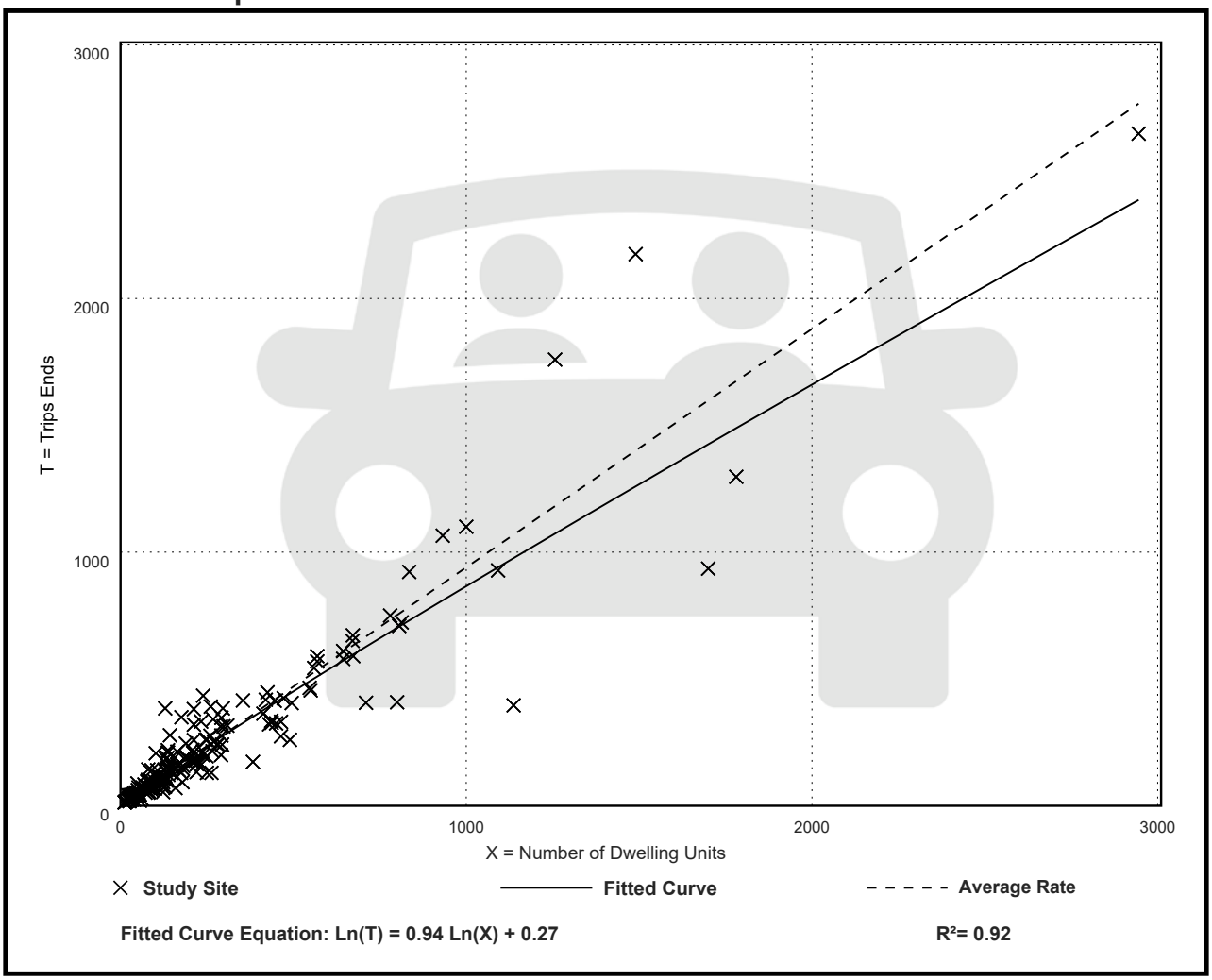
Single-Family Detached Housing
(210)

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



Attachment 5
Intersection Worksheets – Existing AM/PM Peaks

HCS7 Two-Way Stop-Control Report

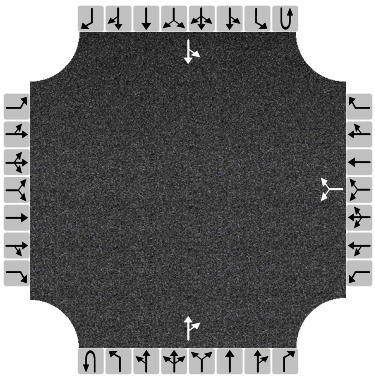
General Information

Analyst	Addie Kirkham
Agency/Co.	Ardurra
Date Performed	11/23/2022
Analysis Year	2022
Time Analyzed	Existing AM Peak
Intersection Orientation	North-South
Project Description	588.014 - Thompson Meadows Subdivision

Site Information

Intersection	Thompson School at Karnes
Jurisdiction	Knox County
East/West Street	Karnes Drive
North/South Street	Thompson School Road
Peak Hour Factor	0.86
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	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)						73		2			15	91		5	49	
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 Level of Service

Flow Rate, v (veh/h)							87							6		
Capacity, c (veh/h)							853							1463		
v/c Ratio							0.10							0.00		
95% Queue Length, Q_{95} (veh)							0.3							0.0		
Control Delay (s/veh)							9.7							7.5		
Level of Service, LOS							A							A		
Approach Delay (s/veh)						9.7								0.7		
Approach LOS						A										

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HCS7 Two-Way Stop-Control Report

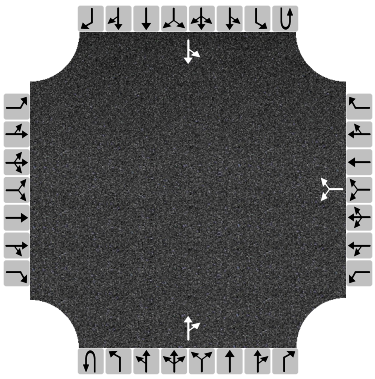
General Information

Analyst	Addie Kirkham
Agency/Co.	Ardurra
Date Performed	11/23/2022
Analysis Year	2022
Time Analyzed	Existing PM Peak
Intersection Orientation	North-South
Project Description	588.014 - Thompson Meadows Subdivision

Site Information

Intersection	Thompson School at Karnes
Jurisdiction	Knox County
East/West Street	Karnes Drive
North/South Street	Thompson School Road
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	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)						86		4			48	25		1	28	
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 Level of Service

Flow Rate, v (veh/h)							113							1		
Capacity, c (veh/h)							888							1503		
v/c Ratio							0.13							0.00		
95% Queue Length, Q_{95} (veh)							0.4							0.0		
Control Delay (s/veh)							9.6							7.4		
Level of Service, LOS							A							A		
Approach Delay (s/veh)						9.6								0.2		
Approach LOS						A										

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Attachment 6
Intersection Worksheets – Background AM/PM Peaks

HCS7 Two-Way Stop-Control Report

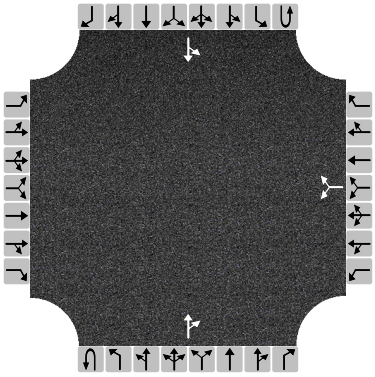
General Information

Analyst	Addie Kirkham
Agency/Co.	Ardurra
Date Performed	11/23/2022
Analysis Year	2027
Time Analyzed	Background AM Peak
Intersection Orientation	North-South
Project Description	588.014 - Thompson Meadows Subdivision

Site Information

Intersection	Thompson School at Karnes
Jurisdiction	Knox County
East/West Street	Karnes Drive
North/South Street	Thompson School Road
Peak Hour Factor	0.86
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	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)						81		2			17	100		6	54	
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 Level of Service

Flow Rate, v (veh/h)							96							7		
Capacity, c (veh/h)							835							1447		
v/c Ratio							0.12							0.00		
95% Queue Length, Q_{95} (veh)							0.4							0.0		
Control Delay (s/veh)							9.9							7.5		
Level of Service, LOS							A							A		
Approach Delay (s/veh)						9.9								0.8		
Approach LOS						A										

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HCS7 Two-Way Stop-Control Report

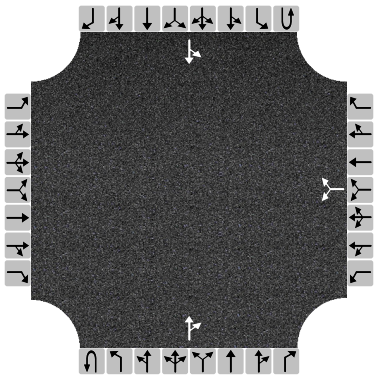
General Information

Analyst	Addie Kirkham
Agency/Co.	Ardurra
Date Performed	11/23/2022
Analysis Year	2027
Time Analyzed	Background PM Peak
Intersection Orientation	North-South
Project Description	588.014 - Thompson Meadows Subdivision

Site Information

Intersection	Thompson School at Karnes
Jurisdiction	Knox County
East/West Street	Karnes Drive
North/South Street	Thompson School Road
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	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)						95		4			53	28		1	31	
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 Level of Service

Flow Rate, v (veh/h)							124							1		
Capacity, c (veh/h)							874							1490		
v/c Ratio							0.14							0.00		
95% Queue Length, Q_{95} (veh)							0.5							0.0		
Control Delay (s/veh)							9.8							7.4		
Level of Service, LOS							A							A		
Approach Delay (s/veh)						9.8								0.2		
Approach LOS						A										

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Attachment 7
Intersection Worksheets – Full Buildout AM/PM Peaks

HCS7 Two-Way Stop-Control Report

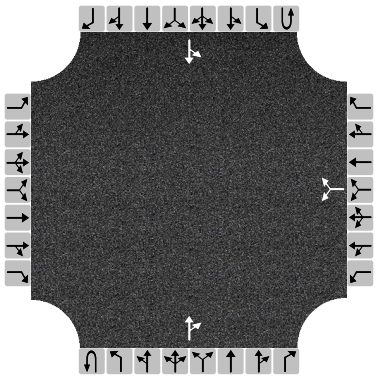
General Information

Analyst	Addie Kirkham
Agency/Co.	Ardurra
Date Performed	11/23/2022
Analysis Year	2027
Time Analyzed	Full Buildout AM Peak
Intersection Orientation	North-South
Project Description	588.014 - Thompson Meadows Subdivision

Site Information

Intersection	Thompson School at Karnes
Jurisdiction	Knox County
East/West Street	Karnes Drive
North/South Street	Thompson School Road
Peak Hour Factor	0.86
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	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)						81		13			58	100		39	170	
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 Level of Service

Flow Rate, v (veh/h)							109							45		
Capacity, c (veh/h)							608							1391		
v/c Ratio							0.18							0.03		
95% Queue Length, Q_{95} (veh)							0.6							0.1		
Control Delay (s/veh)							12.2							7.7		
Level of Service, LOS							B							A		
Approach Delay (s/veh)						12.2								1.6		
Approach LOS						B										

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HCS7 Two-Way Stop-Control Report

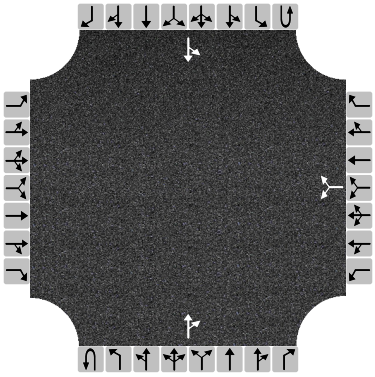
General Information

Analyst	Addie Kirkham
Agency/Co.	Ardurra
Date Performed	11/23/2022
Analysis Year	2027
Time Analyzed	Full Buildout PM Peak
Intersection Orientation	North-South
Project Description	588.014 - Thompson Meadows Subdivision

Site Information

Intersection	Thompson School at Karnes
Jurisdiction	Knox County
East/West Street	Karnes Drive
North/South Street	Thompson School Road
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	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)						95		41			186	28		23	110	
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 Level of Service

Flow Rate, v (veh/h)							170							29		
Capacity, c (veh/h)							611							1296		
v/c Ratio							0.28							0.02		
95% Queue Length, Q_{95} (veh)							1.1							0.1		
Control Delay (s/veh)							13.2							7.8		
Level of Service, LOS							B							A		
Approach Delay (s/veh)						13.2								1.5		
Approach LOS						B										

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HCS7 Two-Way Stop-Control Report

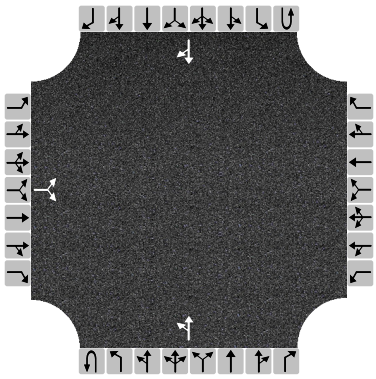
General Information

Analyst	Addie Kirkham
Agency/Co.	Ardurra
Date Performed	11/23/2022
Analysis Year	2027
Time Analyzed	Full Buildout AM Peak
Intersection Orientation	North-South
Project Description	588.014 - Thompson Meadows Subdivision

Site Information

Intersection	Thompson at Access #1
Jurisdiction	Knox County
East/West Street	Driveway Access #1
North/South Street	Thompson School Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	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)		6		50						18	53				159	2
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 Level of Service

Flow Rate, v (veh/h)			61							20						
Capacity, c (veh/h)			847							1400						
v/c Ratio			0.07							0.01						
95% Queue Length, Q_{95} (veh)			0.2							0.0						
Control Delay (s/veh)			9.6							7.6						
Level of Service, LOS			A							A						
Approach Delay (s/veh)		9.6								2.0						
Approach LOS		A														

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HCS7 Two-Way Stop-Control Report

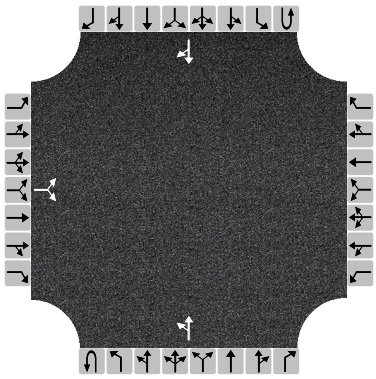
General Information

Analyst	Addie Kirkham
Agency/Co.	Ardurra
Date Performed	11/23/2022
Analysis Year	2027
Time Analyzed	Full Buildout PM Peak
Intersection Orientation	North-South
Project Description	588.014 - Thompson Meadows Subdivision

Site Information

Intersection	Thompson at Access #1
Jurisdiction	Knox County
East/West Street	Driveway Access #1
North/South Street	Thompson School Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	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)		4		33						56	171				100	6
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 Level of Service

Flow Rate, v (veh/h)			40							61						
Capacity, c (veh/h)			882							1472						
v/c Ratio			0.05							0.04						
95% Queue Length, Q_{95} (veh)			0.1							0.1						
Control Delay (s/veh)			9.3							7.6						
Level of Service, LOS			A							A						
Approach Delay (s/veh)		9.3								2.1						
Approach LOS		A														

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HCS7 Two-Way Stop-Control Report

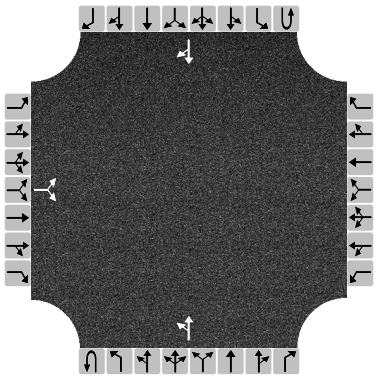
General Information

Analyst	Addie Kirkham
Agency/Co.	Ardurra
Date Performed	12/14/2022
Analysis Year	2027
Time Analyzed	Full Buildout AM Peak
Intersection Orientation	North-South
Project Description	588.014 - Thompson Meadows Subdivision

Site Information

Intersection	Thompson at Access #2
Jurisdiction	Knox County
East/West Street	Driveway Access #2
North/South Street	Thompson School Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	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)		11		99						34	25				62	4
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 Level of Service

Flow Rate, v (veh/h)			120							37						
Capacity, c (veh/h)			970							1528						
v/c Ratio			0.12							0.02						
95% Queue Length, Q_{95} (veh)			0.4							0.1						
Control Delay (s/veh)			9.2							7.4						
Level of Service, LOS			A							A						
Approach Delay (s/veh)		9.2								4.4						
Approach LOS		A														

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HCS7 Two-Way Stop-Control Report

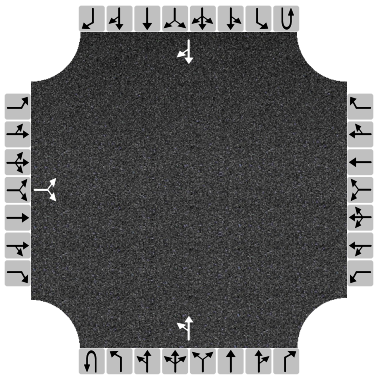
General Information

Analyst	Addie Kirkham
Agency/Co.	Ardurra
Date Performed	12/14/2022
Analysis Year	2027
Time Analyzed	Full Buildout PM Peak
Intersection Orientation	North-South
Project Description	588.014 - Thompson Meadows Subdivision

Site Information

Intersection	Thompson at Access #2
Jurisdiction	Knox County
East/West Street	Driveway Access #2
North/South Street	Thompson School Road
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	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)		7		68						114	61				38	13
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 Level of Service

Flow Rate, v (veh/h)			82							124						
Capacity, c (veh/h)			952							1549						
v/c Ratio			0.09							0.08						
95% Queue Length, Q_{95} (veh)			0.3							0.3						
Control Delay (s/veh)			9.1							7.5						
Level of Service, LOS			A							A						
Approach Delay (s/veh)		9.1								5.1						
Approach LOS		A														

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Attachment 8
Turn Lane Warrant Analysis

Project: Thompson Meadows Subdivision

Thompson School Road at Karnes Drive

Thompson School Road at Karnes Drive VOLUMES

LEFT TURN	Opposing	Thru	LT	LT MAX	Warrant Met
AM	158	170	39	200	NO
PM	214	110	23	205	NO

Thompson School Road at Karnes Drive VOLUMES

RIGHT TURN	Thru	RT	RT MAX	Warrant Met
AM	58	100	599	NO
PM	186	28	499	NO

Thompson School Road at Access #1

Thompson School Road at Driveway Access #1 VOLUMES

LEFT TURN	Opposing	Thru	LT	LT MAX	Warrant Met
AM	161	53	18	245	NO
PM	106	171	56	235	NO

Thompson School Road at Driveway Access #1 VOLUMES

RIGHT TURN	Thru	RT	RT MAX	Warrant Met
AM	159	2	499	NO
PM	100	6	499	NO

Thompson School Road at Access #2

Thompson School Road at Driveway Access #2 VOLUMES

LEFT TURN	Opposing	Thru	LT	LT MAX	Warrant Met
AM	66	25	34	300	NO
PM	51	61	114	300	NO

Thompson School Road at Driveway Access #2 VOLUMES

RIGHT TURN	Thru	RT	RT MAX	Warrant Met
AM	62	4	599	NO
PM	38	13	599	NO

TABLE 4A

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

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

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149 150 - 199	300 245	235 200	185	145 130	120 110	100 90
200 - 249 250 - 299	205 175	170	140 125	115 105	100 90	80 70
300 - 349 350 - 399	155 135	135 120	110 100	95 85	80 70	65 60
400 - 449 450 - 499	120 105	105 90	90 80	75 70	65 60	55 50
500 - 549 550 - 599	95 85	80 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 More	65 60	55 50	50 45	45 40	35 35	30 30

AM Peak 39 LT

PM Peak 23 LT

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
100 - 149 150 - 199	100 90	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 - 449 450 - 499	55 50	50 45	45 45	45 40	40 35	35 35
500 - 549 550 - 599	50 45	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 - 749 750 or More	30 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 VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25 25 - 49 50 - 99		PM Peak 28 RT				
100 - 149 150 - 199	AM Peak 100 RT					
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 VOLUME	THROUGH VOLUME PLUS LEFT-TURN 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.

TABLE 4A

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

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

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149 150 - 199	300 245	235 200		145 130	120 110	100 90
200 - 249 250 - 299	205 175	150	140 125	115 105	100 90	80 70
300 - 349 350 - 399	155 135	135 120	110 100	95 85	80 70	65 60
400 - 449 450 - 499	120 105	105 90	90 80	75 70	65 60	55 50
500 - 549 550 - 599	95 85	80 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 More	65 60	55 50	50 45	45 40	35 35	30 30

PM Peak 56 LT

AM Peak 18 LT

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
100 - 149 150 - 199	100 90	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 - 449 450 - 499	55 50	50 45	45 45	45 40	40 35	35 35
500 - 549 550 - 599	50 45	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 - 749 750 or More	30 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 VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25 25 - 49 50 - 99		AM Peak 2 RT PM Peak 6 RT				
100 - 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 VOLUME	THROUGH VOLUME PLUS LEFT-TURN 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.

TABLE 4A

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

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

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149 150 - 199	300 245	AM Peak 34 LT PM Peak 114 LT	185 160	145 130	120 110	100 90
200 - 249 250 - 299	205 175	170 150	140 125	115 105	100 90	80 70
300 - 349 350 - 399	155 135	135 120	110 100	95 85	80 70	65 60
400 - 449 450 - 499	120 105	105 90	90 80	75 70	65 60	55 50
500 - 549 550 - 599	95 85	80 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 More	65 60	55 50	50 45	45 40	35 35	30 30

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
100 - 149 150 - 199	100 90	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 - 449 450 - 499	55 50	50 45	45 45	45 40	40 35	35 35
500 - 549 550 - 599	50 45	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 - 749 750 or More	30 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 VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	<100	100 - 199	200 - 249	250 - 299	300 - 349	350 - 399
Fewer Than 25 25 - 49 50 - 99	AM Peak 4 RT PM Peak 13 RT					
100 - 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 VOLUME	THROUGH VOLUME PLUS LEFT-TURN 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.

Date: December 14, 2022

Project Name: Thompson Meadows Subdivision TIS

To: Knoxville-Knox County Planning

Subject: Thompson Meadows Subdivision TIS Comments (1-SG-23-C/1-F-23-UR)

Dear Knoxville-Knox County Planning staff,

The following comment response document is submitted to address comments dated December 12, 2022:

1. **Reviewer Comment:** Please provide a brief reference to the previously completed TIL for this site to compare the projected traffic from the TIL stage with the actual development at the Concept Plan stage and to estimate the before/after daily traffic volume for Karnes Drive as per the TIA pre-submittal scoping form.

   Response: Added "Section 7.4 Traffic Impact Letter" to the conclusions and recommendations at the end of the report to provide a statement to compare the TIL trip generation and Concept Plan trip generation and the subsequent affect to Karnes Drive.

2. **Reviewer Comment:** On page 18 in Figure 9, the PM southbound through traffic at Access #2 is shown to be 32 vehicles, but it should be 38 vehicles to include the trips associated with Access #1. Please edit all affected worksheets accordingly.

   Response: Updated Figure 9, the HCS7 worksheets and the turn lane warrants for the intersection of Thompson School Road at Driveway Access #2.

3. **Reviewer Comment:** On page 21, the approach labels for Access #2 should be EB and NB instead of WB and SB, respectively.

   Response: Updated the approach labels for Thompson School Road at Driveway Access #2 on page 21.

4. **Reviewer Comment:** On page 25, in regard to the requirement for a boulevard entrance in lieu of a second access, please expand on this description to note that the boulevard section is typically required to extend to the first major internal intersection to provide alternate travel paths.

Response: Added the following statement to the Section 7.3 Thompson School Road at Driveway Access #2. "A boulevard section is typically required to extend to the first major internal intersection in order to provide alternate travel paths."

Sincerely,

Addie Kirkham, P.E.