Revised October 27, 2025

TRAFFIC IMPACT ANALYSIS FOR THE PROPOSED SCHAAD ROAD APARTMENTS

8007 Ball Camp Pike

Knoxville, Knox County, Tennessee

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FOR THE PROPOSED
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Knoxville, Knox County, Tennessee
EXECUTIVE SUMMARY

General Overview of the Development

- Development to occur on the southeast side of Schaad Road between Bakertown Road and Ball Camp Pike within the Knox County, Tennessee.
- Development to consist of the construction of a 300 unit, multifamily residential complex.
- Access to the development proposed via the construction of one (1) site driveways:
    - The proposed site driveway to Schaad Road, the centerline of which will be located approximately 1,400 feet south of the centerline of the intersection with Bakertown Road. This driveway will provide ingress and egress for site traffic.
    - The proposed site plan proposes a throat length of approximately 100' to 125' (with two egress lanes).
    - A gated emergency only access which will cross over existing railroad tracks is also proposed to be located along Ball Camp Pike on the northeast corner of the property.

List of Study Intersections

- Schaad Road with Proposed Site Driveway (proposed unsignalized).

Trip Generation and Distribution

- Trip generation of the proposed development was determined using rates and equations published by Knoxville-Knox County Planning, December 1999:
    - *Local Apartment - Trip Generation Study*, was used to determine the trip generation of the proposed 300 unit, multifamily residential development;
- Anticipated Peak Hour Trip Generation:

  <u>300 Unit Local Apartment</u>
    - AM Peak Hour = 147 Trips (32 Entering/115 Exiting)
    - PM Peak Hour = 211 Trips (116 Entering/95 Exiting)
- Trip distribution for the proposed development was determined based on reviewing the existing peak hour traffic patterns for residential commuters heading to work during the A.M. Peak hour and return from work during the P.M. peak hour. The following trip distribution for primary trips was calculated:
    - To/from north via Schaad Road: 35%
    - To/from south via Schaad Road: 60%
    - To/from east via Bakertown Road: 5%

Mitigation Measures to be Constructed Concurrent with Development

- Construct the proposed site driveway to Schaad Road to provide one (1) lane for ingress traffic and two (2) lanes for egress traffic. The driveway should be controlled by a Stop sign on the westbound site driveway approach to the Schaad Road.
- Construct a 295' northbound right turn lane along Schaad Road at the proposed site driveway. The northbound right turn lane shall be constructed with 145' of bay taper and 150' of storage.
- The proposed site driveway should be constructed to provide sight triangles that are free of sight obstructions, such as parked vehicles, buildings, walls, hedges, bushes, low growing trees, etc., to maintain a clear line of sight to potential conflicting vehicles.

TRAFFIC IMPACT ANALYSIS
FOR THE PROPOSED
SCHAAD ROAD APARTMENTS
Knoxville, Knox County, Tennessee

Civil & Environmental Consultants, Inc. (CEC) has completed this Traffic Impact Analysis for the proposed Schaad Road Apartments, which are to be located on the southeast side of Schaad Road between Bakertown Road and Ball Camp Pike within Knox County, Tennessee

The following sections of this report contain a project description, data collection, site traffic generation and distribution, projected traffic volumes, analysis, and conclusions and recommendations.

PROJECT DESCRIPTION/DATA COLLECTION/EXISTING CONDITIONS

PROJECT DESCRIPTION

The proposed development to consist of the construction of a 300 unit, multi-building apartment complex. The site location is shown in Figure 1.

Access to the development proposed via the construction of two (2) site driveways:

- The proposed site driveway to Schaad Road, the centerline of which will be located approximately 1400 feet south of the centerline of Bakertown Road. This driveway will provide one lane (1) for ingress and two (2) lanes for egress for site traffic.
- The proposed site plan proposes a throat length of approximately 100’ to 125’ (with two egress lanes).
- A gated emergency only access, which will cross over existing railroad tracks is also proposed to be located along Ball Camp Pike on the northeast corner of the property.

A copy of the proposed site plan for the development has been included with this report as Figure 2.

As per the Knoxville Knox County Planning TIA Scope Determination Form, a TIA analysis was required following a Level 1 Study criteria. Therefore, capacity analyses were provided for the proposed site access to Schaad Road. A copy of the scoping determination form is included in Appendix A.

DATA COLLECTION

In order to determine existing traffic volumes along Schaad Road, turning movement counts were performed at the adjacent intersections to the development. This included the intersection of Schaad Road with Ball Camp Pike and Schaad Road with Bakertown Road. Counts were performed on Tuesday, September 9, 2025, from 7:00 A.M. to 9:00 A.M. and from 4:00 P.M. to 6:00 P.M. These time periods are assumed to include the weekday A.M. and weekday P.M. peak hours of vehicular traffic within the study area. The results of the turning movement counts are presented in Figure 4.

The overall peak hours determined from these counts are as follows:

- A.M. Peak Hour – 7:30 A.M. to 8:30 A.M.
- P.M. Peak Hour – 4:45 P.M. to 5:45 P.M.

Summaries of the data collected during the turning movement counts at the study intersections have been included in Appendix B to this report.

EXISTING CONDITIONS

A field reconnaissance of the study area was conducted by CEC to obtain information such as roadway widths, roadway grades, and posted speed limits within the environs of the study intersections. A description of the study roadways is as follows:

Schaad Road – According to TDOT functional classification mapping, Schaad Road is classified as a minor arterial. Within the study area, Schaad Road is a four lane divided roadway providing two-lanes of travel in each direction. At the location of the proposed site access driveway, a southbound auxiliary left turn lane has already been constructed. This turn lane provides approximately 150 feet of vehicular storage with approximately 150 feet of taper. Due to the new construction and lack of updated street imagery, speed limit of Schaad Road in the study area was assumed to be 45 miles per hour. This speed limit was verified with Knoxville Knox County Planning.

Knoxville Area Transit (KAT) does not currently provide service within the immediate vicinity of the proposed development.

Greenways - The nearest greenway to the development is the Karns Valley Greenway, located at the Karns Business Park. This is roughly 5 miles to the north west of the site.

FORECASTED OPENING YEAR 2027 NO-BUILD (BASE) PEAK HOUR TRAFFIC VOLUMES

Opening year traffic volumes were developed for each of the study intersections. The proposed development is anticipated to be completed and fully occupied in 2027. Therefore, opening year traffic volumes were projected for forecasted 2027 conditions.

A background traffic growth rate for the study area was calculated by CEC based on historical Average Annual Daily Traffic (AADT) volumes available from the TDOT Transportation Data Management System. This background traffic growth rate was calculated using AADT volumes for calendar years 2018 -2024 for the following locations:

- Bakertown Rd. W. of Knoxville (Count Station ID # 47000569);
- Ball Camp Pike SW of Bakertown Rd (Count Station ID #47000578)
- Bakertown Rd. NE of Knoxville (Count Station ID #47000468)

Using this methodology, a background traffic growth rate of 4.00% percent per year, linear, was calculated for the study area. A copy of the calculations performed in order to determine the background traffic growth rate has been included in Appendix C to this report.

Forecasted opening year 2027 no-build (base) traffic volumes for each of the peak periods analyzed were determined by applying this background traffic growth rate to the Existing 2025 peak hour traffic volumes (Figure 4). The resultant forecasted opening year 2027 no-build (base) peak hour traffic volumes during the weekday A.M. and weekday P.M. peak hours are presented in Figure 5.

SITE TRIP GENERATION AND DISTRIBUTION

VEHICULAR TRIP GENERATION

Vehicular trip generation for the proposed development was projected based upon data published by the Knoxville-Knox County Planning, December 1999. Using this methodology, the proposed development can be anticipated to generate a total of 2,562 trips on a typical weekday with approximately 147 of these trips (32 trips entering/115 trips exiting) occurring during the weekday A.M. peak hour and approximately 211 of these trips (116 trips entering/95 trips exiting) occurring during the weekday P.M. peak hour.

The site-generated trips for the proposed Schaad Road Apartments are summarized in Table 3 and presented in Figure 7. Copies of the trip generation calculations have been included in Appendix D to this report.

SITE TRAFFIC DISTRIBUTION

Trip distribution for the proposed development was determined based on reviewing the existing peak hour traffic patterns for how residential commuters would head to work during the A.M. Peak hour and return from work during the P.M. peak hour. The following trip distribution for primary trips was calculated:

- To/from north via Schaad Road: 35%
- To/from south via Schaad Road: 60%
- To/from east via Bakertown Road: 5%

The anticipated trip distribution for the proposed development is presented in Figure 6. The forecasted trips to be added to the study intersections by the proposed development are presented in Figure 7.

FORECASTED OPENING YEAR 2027 BUILD (WITH DEVELOPMENT) PEAK HOUR TRAFFIC VOLUMES

The forecasted opening year 2027 build condition (with the proposed development) peak hour volumes were determined by adding the forecasted site generated trips to the study intersections (Figure 7) to the forecasted opening year 2027 no-build (base) condition peak hour volumes

(Figure 5). The resultant forecasted opening year 2027 build (with development) condition peak hour volumes are presented in Figure 8.

FORECASTED OPENING YEAR 2027 BUILD (WITH DEVELOPMENT) PEAK HOUR CAPACITY CALCULATIONS

Capacity calculations were performed for the study intersections using the methodologies published in the *Highway Capacity Manual*, 7th Edition, by the Transportation Research Board, 2023. This methodology determines how well an intersection, approach to an intersection, or movement at an intersection operates, and assigns to it a Level of Service (LOS) A through F, with LOS A representing the best operating conditions and LOS F, the worst. Detailed definitions of LOS have been included in Appendix E to this report.

Capacity calculations were performed for the proposed site driveway intersection using forecasted opening year 2027 build condition (with development) peak hour volumes. The results of the capacity calculations performed are summarized in Table 1 and Table 2 for the weekday A.M. peak hour and the weekday P.M. peak hour, respectively.

Copies of the capacity calculations performed using forecasted opening year 2027 build (with development) peak hour volumes are included in Appendix F to this report.

ADDITIONAL ANALYSES

Additional analyses performed include a traffic signal warrants evaluation, an auxiliary turn lane warrants evaluation, queuing analysis, and a sight distance analysis.

TRAFFIC SIGNAL WARRANTS EVALUATION

Traffic volumes at the intersections of Schaad Road and the proposed site driveway were compared with warrants for the installation of traffic signal control. These warrants for the installation of traffic signal control are found in the Federal Highway Administration (FHWA) publication, *Manual of Uniform Traffic Control Devices (MUTCD)*, 2023. The MUTCD explicitly states that a traffic control signal should not be installed unless one or more of the manual's signal warrants are met. However, the satisfaction of a warrant does not entirely in itself justify the need for a traffic signal. Sometimes, further engineering studies and judgments must be applied before justifying the need for a traffic signal installation. For analysis purpose, signal warrant criteria was evaluated for the four hour warrants. It should also be noted that per MUTCD guidelines, the study should consider the effects of the right-turn vehicles from the minor-street approaches. Engineering judgment should be used to determine what, if any, portion of the right-turn traffic is subtracted from the minor-street traffic count when evaluating the count against the signal warrants. Considering that the subject study intersections provide separate turning lanes for the minor street approaches, the volume of right turns to be included in the signal warrant analysis was adjusted using pagones theorem. For minor street approaches with an exclusive right turn lane, the volume of right turns can be reduced by 75% for signal warrant analysis.

At the intersection of Schaad Road with the proposed site driveway, signal warrant criteria for the four-hour volume warrants were evaluated. Based on the results of the analysis, the intersection does not satisfy the criteria for installation of a traffic signal.

Copies of the charts and graphs used to verify warrants for the installation of traffic signal control are included in Appendix G to this report.

AUXILIARY TURN LANE WARRANTS EVALUATION

The need for auxiliary right turn lanes at the proposed Site Driveway with Schaad Road was evaluated based on the Right-Turn Lane (Table 6B) Volume Thresholds for Two-Lane Roadways with a Prevailing Speed of 46 to 55 MPH, published in the *Knox County Access Control and Driveway Design Policy*, 1996. Further, as per the *Knox County Access Control and Driveway Design Policy*, 1996, the need for deceleration and storage lanes on multi-lane roadways shall be determined by multiplying the average through volume per lane by 1.05 and using the calculated volume as the through volume for the evaluation.

Warrant criteria for the construction of a northbound auxiliary right turn lane on Schaad Road are forecasted to be satisfied at its intersection with the proposed site driveway.

Although, based on the results of the analyses, the need for this right turn lane is not justified based on capacity, the County reviewers have requested a right turn lane be provided. Therefore, the length of this northbound auxiliary right run lane along Schaad Road at the proposed site driveway shall follow TDOT HSAM Volume 3; "*for both right- and left-turn lanes should be a minimum of 50 feet on urban core, urban, suburban, and rural town roads and 100 feet on rural roads*" and follow table 3-12. Further, Figure 3-21 states that an 8:1 (Length: Width) Minimum Taper Rate for low speeds and a 15:1 (Length: Width) Maximum Taper Rate for higher speeds. Under these aforementioned criteria, a 295' northbound right turn lane would be recommended; 145' of taper and 150' of storage.

Since a southbound auxiliary left turn lane on Schaad Road at the proposed site driveway exists, warrants were not evaluated.

Copies of the worksheets used to evaluate the guidelines for the consideration of the auxiliary right turn lane have been included in Appendix H to this report.

QUEUING ANALYSIS

Traffic volumes at the study intersection were used to perform queuing analyses. These queuing analyses were reported as the 95th percentile queue obtained from the results of the Synchro 12 capacity analyses using an assumed 25-foot vehicle length. The results of these queuing analyses are summarized in Table 4 and Table 5 for the weekday A.M. peak hour and weekday P.M. peak hour, respectively.

As shown in the tables, the existing southbound left turn lane on Schaad Road at the proposed site driveway is of sufficient length to accommodate the projected 95th percentile queues. Furthermore, the proposed site plan proposes a throat length of approximately 100' to 125' (with two egress lanes), which can accommodate the projected maximum 95th percentile queue length of 40' during the peak hours. Therefore, at this time, no queueing issues are anticipated with the proposed development.

SIGHT DISTANCE CALCULATION

Measurements were performed to verify the available sight distance at the proposed site driveway intersection with Schaad Road. The measurements were performed in accordance with the Knoxville-Knox County Minimum Subdivision Regulations. According to the subdivision regulations, intersection sight distance is calculated as 10 times the posted speed. Therefore, for Schaad Road, the intersection sight distance was calculated to be 450 feet.

A summary of the available and the required intersection sight distances at the proposed driveway intersection locations are presented in Table 4. As shown in the table, the available sight distance exceeds the required intersection sight distance at the proposed driveway intersection location.

CONCLUSIONS/RECOMMENDATIONS

This study has concluded that the construction of the proposed Schaad Road Apartments will have no significant impact on the operation of the adjacent study intersections.

Therefore, CEC recommends the following:

- Construct the proposed site driveway to Schaad Road to provide one (1) lane for ingress traffic and two (2) lanes for egress traffic. The driveway should be controlled by a Stop sign on the westbound site driveway approach to the Schaad Road.
- Construct a 295' northbound right turn lane along Schaad Road at the proposed site driveway. The northbound right turn lane shall be constructed with 145' of taper and 150' of storage.
- The proposed site driveway should be constructed to provide sight triangles that are free of sight obstructions, such as parked vehicles, buildings, walls, hedges, bushes, low growing trees, etc., to maintain a clear line of sight to potential conflicting vehicles.

This report includes a Technical Appendix containing all counts, analyses, and calculations.

TABLES

TABLE 1

LEVEL OF SERVICE - WEEKDAY A.M. PEAK HOUR FORECASTED 2027 CONDITIONS [1]

Traffic Impact Analysis for the Proposed Schaad Road Apartments

Knoxville, Knox County, Tennessee

Intersection / Direction	Approach / Movement	2027 Opening Year Build (With Development)			
		LOS	Delay (sec/veh)	v/c	95th% Queue (feet)
INTERSECTION	**SCHAAD ROAD WITH PROPOSED SITE DRIVEWAY**				
PROPOSED SITE DRIVEWAY WESTBOUND	**Left Turn**	C	(17.1)	0.20	18
	Right Turn	B	(10.3)	0.07	5
	Approach	B	(14.4)	--	--
SCHAAD ROAD NORTHBOUND	**Through**	A	(0.0)	0.00	0
	Right Turn	A	(0.0)	0.00	0
	Approach	A	(0.0)	--	--
SCHAAD ROAD SOUTHBOUND	**Left Turn**	A	(8.5)	0.01	0
	Through/Right Turn	A	(0.0)	0.00	0
	Approach	A	(0.1)	--	--

(1) Level of Service and vehicular delay calculated using methodologies published by the Transportation Research Board in their Highway Capacity Manual. Synchro 12 software was utilized for the calculations.

TABLE 2

LEVEL OF SERVICE - WEEKDAY P.M. PEAK HOUR FORECASTED 2027 CONDITIONS [1]

Traffic Impact Analysis for the Proposed Schaad Road Apartments

Knoxville, Knox County, Tennessee

Intersection / Direction	Approach / Movement	2027 Opening Year Build (With Development)			
		LOS	Delay (sec/veh)	v/c	95th% Queue (feet)
INTERSECTION	**SCHAAD ROAD WITH PROPOSED SITE DRIVEWAY**				
PROPOSED SITE DRIVEWAY WESTBOUND	**Left Turn**	E	(38.9)	0.37	40
	Right Turn	B	(15.0)	0.10	8
	Approach	D	(29.4)	--	--
SCHAAD ROAD NORTHBOUND	**Through**	A	(0.0)	0.00	0
	Right Turn	A	(0.0)	0.00	0
	Approach	A	(0.0)	--	--
SCHAAD ROAD SOUTHBOUND	**Left Turn**	B	(12.8)	0.10	8
	Through/Right Turn	A	(0.0)	0.00	0
	Approach	A	(0.8)	--	--

(1) Level of Service and vehicular delay calculated using methodologies published by the Transportation Research Board in their Highway Capacity Manual. Synchro 12 software was utilized for the calculations.

TABLE 3

ANTICIPATED TRIP GENERATION [1]
Traffic Impact Analysis for the Proposed Schaad Road Apartments
Knoxville, Knox County, Tennessee

Land Use Code	Description	Size	Trip Generation [1]					
			Weekday 24-Hour	Weekday A.M. Peak Hour			Weekday P.M. Peak Hour	
				Enter	Exit	Total	Enter	Exit	Total
N/A	Local Apartment - Trip Generation Study	300 units	2,562	32	115	147	116	95	211

(1) Anticipated trip generation calculated based on the rates published by Knoxville/Knox Co. MPC, December 1999.

TABLE 4

SIGHT DISTANCE SUMMARY [1]

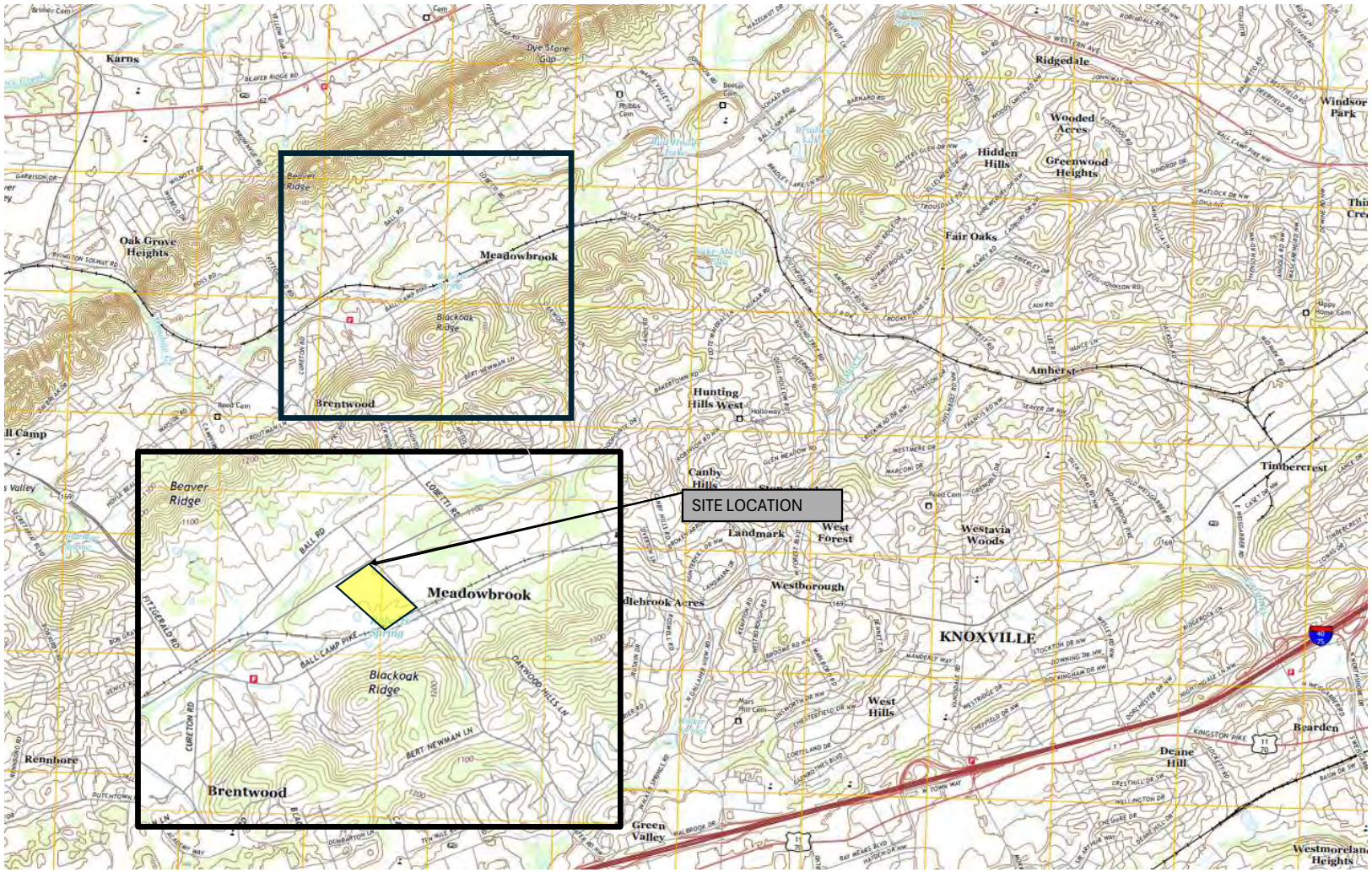
Traffic Impact Analysis for the Proposed Schaad Road Apartments

Knoxville, Knox County, Tennessee

Location	Measured Sight Distance (feet)	Required Sight Distance (feet)	Sight Distance Acceptable (Yes/No)
SCHAAD ROAD AND PROPOSED SITE DRIVEWAY-45 MPH			
Looking Left from Driveway	500'+	450'	YES
Looking Right from Driveway	500+'	450'	YES

(1) Source: intersection sight distance for Cornerstone road calculated as 10 times the posted speed limit (45 mph) as per Knoxville-Knox County Minimum Subdivision Regulations.

FIGURES



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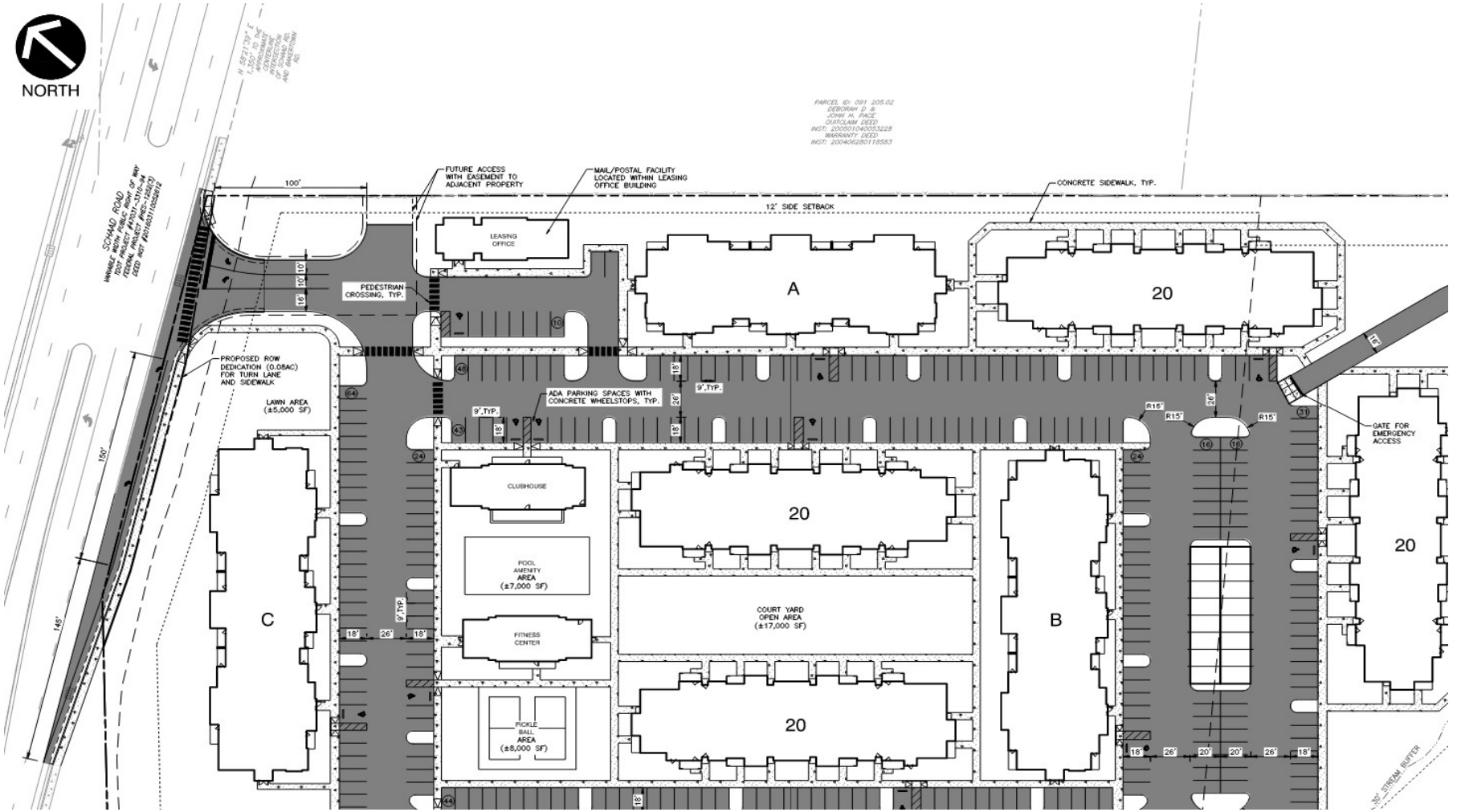
Proposed Schadd Road Apartments
Traffic Impact Analysis
Knoxville, Knox County, Tennessee

Site Location

DRAWN BY: ANL	CHECKED BY: CAD	APPROVED BY: CAD	FIGURE NO.: 1
DATE: September 2025	DWG SCALE: NTS	PROJECT NO: 352-580	



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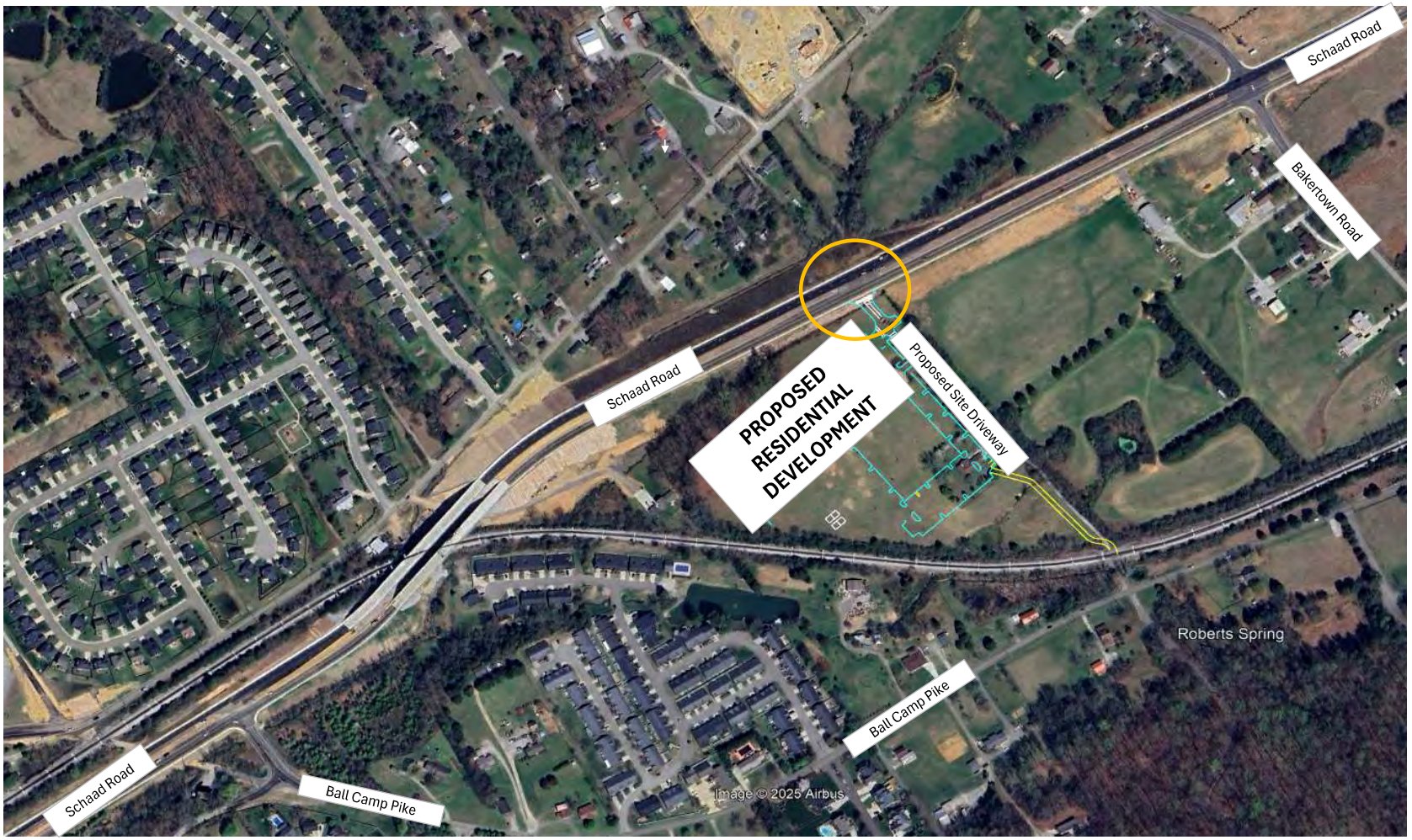
Proposed Schadd Road Apartments
Traffic Impact Analysis
Knoxville, Knox County, Tennessee

Site Plan

DRAWN BY: ANL	CHECKED BY: CAD	APPROVED BY: CAD	FIGURE NO.: 2
DATE: October 2025	DWG SCALE: NTS	PROJECT NO: 352-580	

NORTH



Study Intersection

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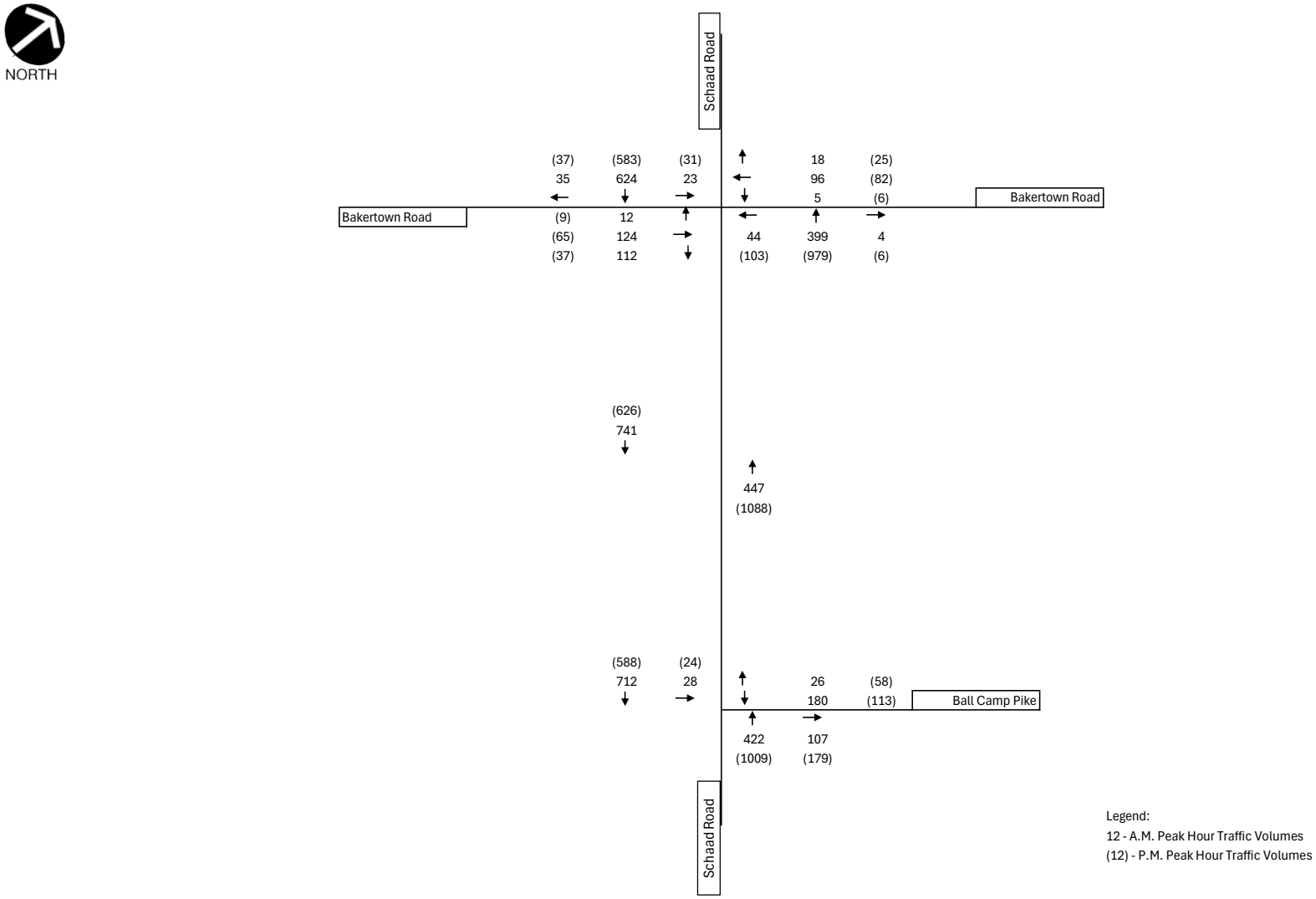
Traffic Impact Analysis
Knoxville, Knox County, Tennessee

Study Intersections

DRAWN BY: ANL	CHECKED BY: CAD	APPROVED BY: CAD	FIGURE NO.: 3
DATE: September 2025	DWG SCALE: NTS	PROJECT NO: 352-580	



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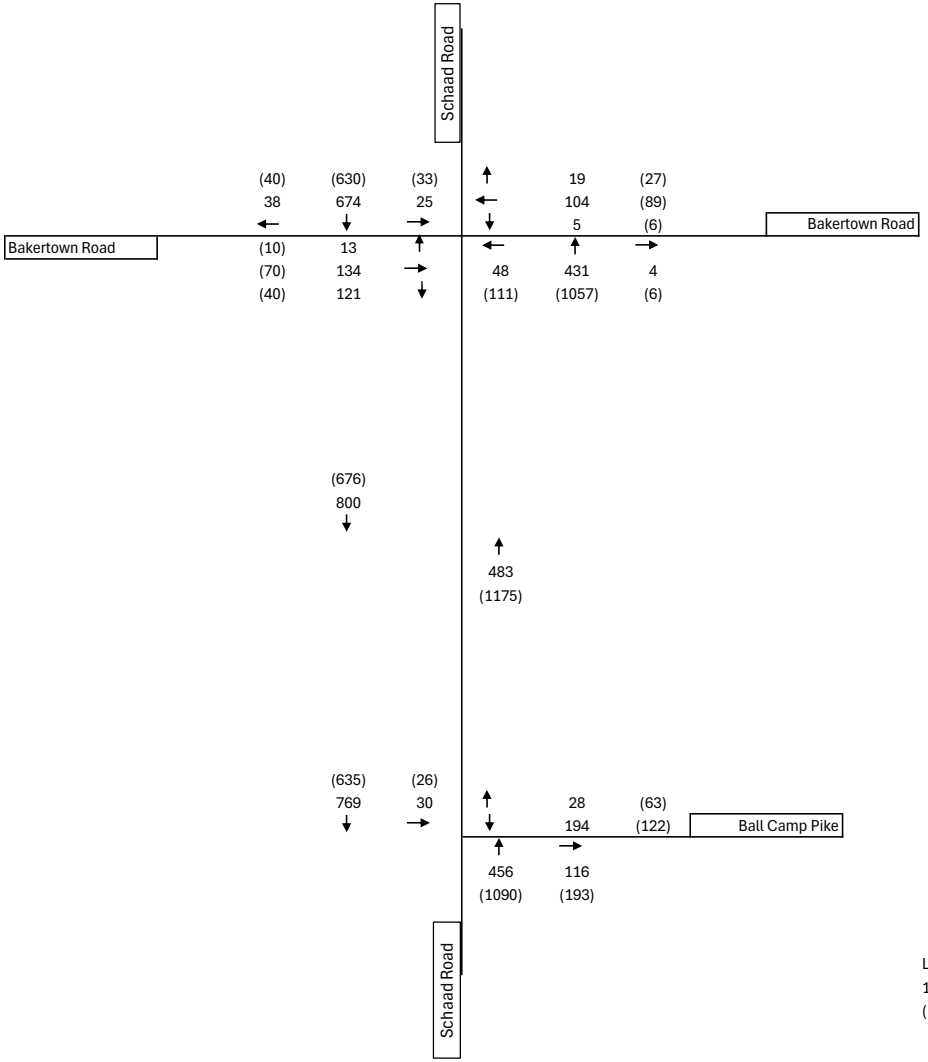
Proposed Schadd Road Apartments
Traffic Impact Analysis
Knoxville, Knox County, Tennessee

Existing 2025 Peak Hour Traffic Volumes

DRAWN BY: ANL	CHECKED BY: CAD	APPROVED BY: CAD	FIGURE NO.: 4
DATE: September 2025	DWG SCALE: NTS	PROJECT NO: 352-580	



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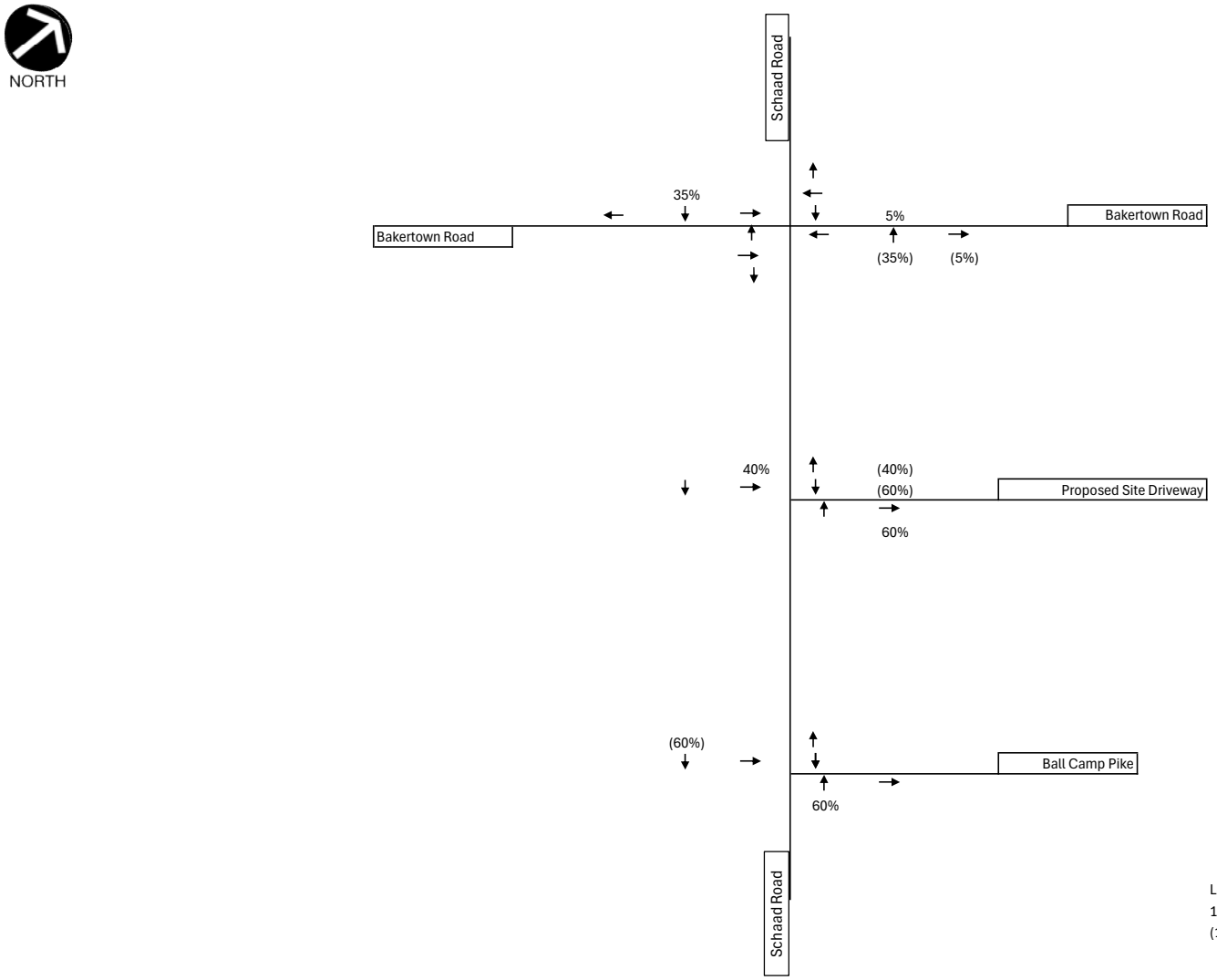
Traffic Impact Analysis
Knoxville, Knox County, Tennessee

Forecasted 2027 No-Build Peak Hour Traffic

DRAWN BY: ANL	CHECKED BY: CAD	APPROVED BY: CAD	FIGURE NO.: 5
DATE: September 2025	DWG SCALE: NTS	PROJECT NO: 352-580	



Legend:
12% - Trip Distribution Arrival %
(12%) - Trip Distribution Departure %

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Proposed Schadd Road Apartments
Traffic Impact Analysis
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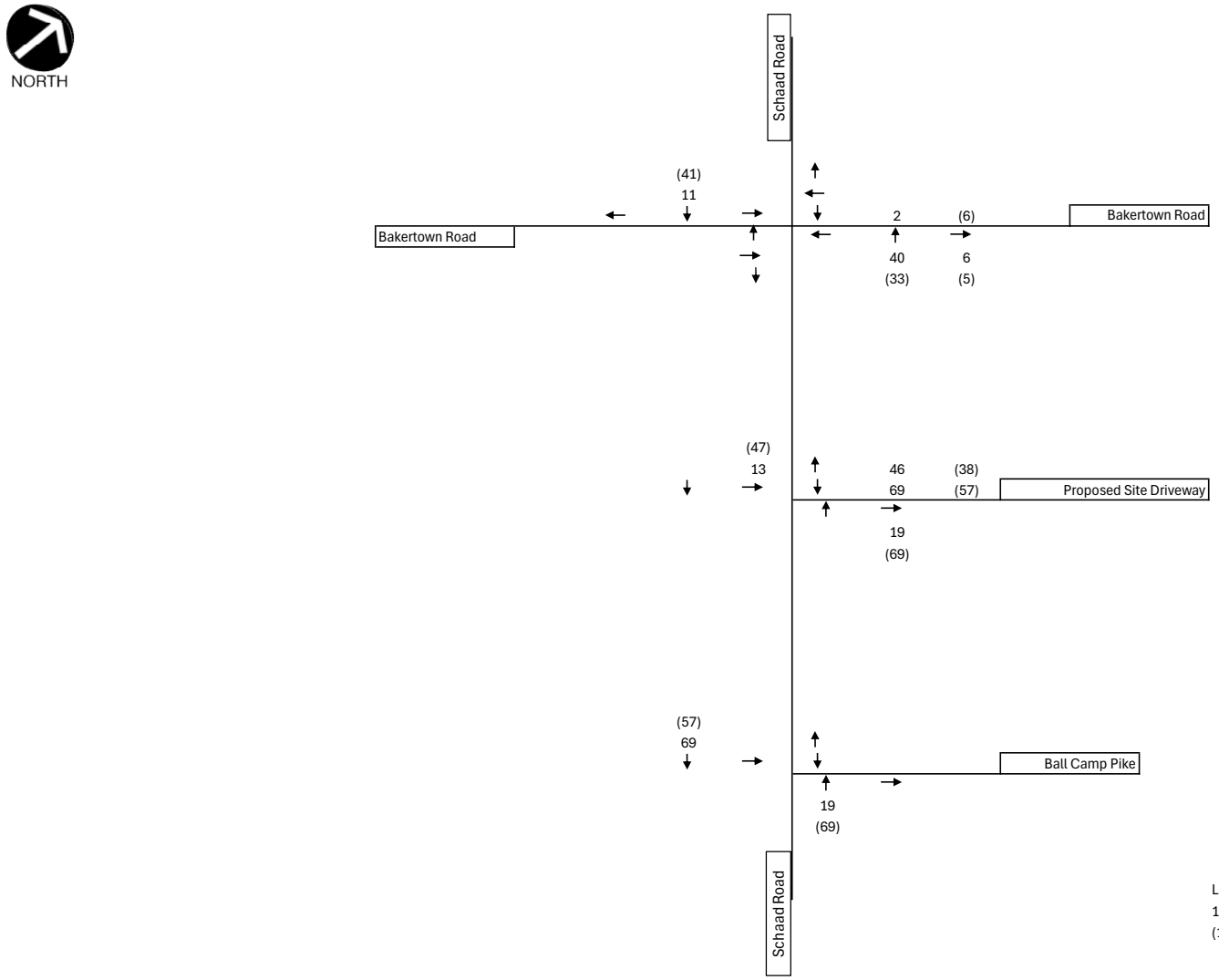
Forecasted Trip Distribution

DRAWN BY: ANL	CHECKED BY: CAD	APPROVED BY: CAD	FIGURE NO.: 6
DATE: September 2025	DWG SCALE: NTS	PROJECT NO: 352-580	



Legend:
12 - A.M. Peak Hour Traffic Volumes
(12) - P.M. Peak Hour Traffic Volumes

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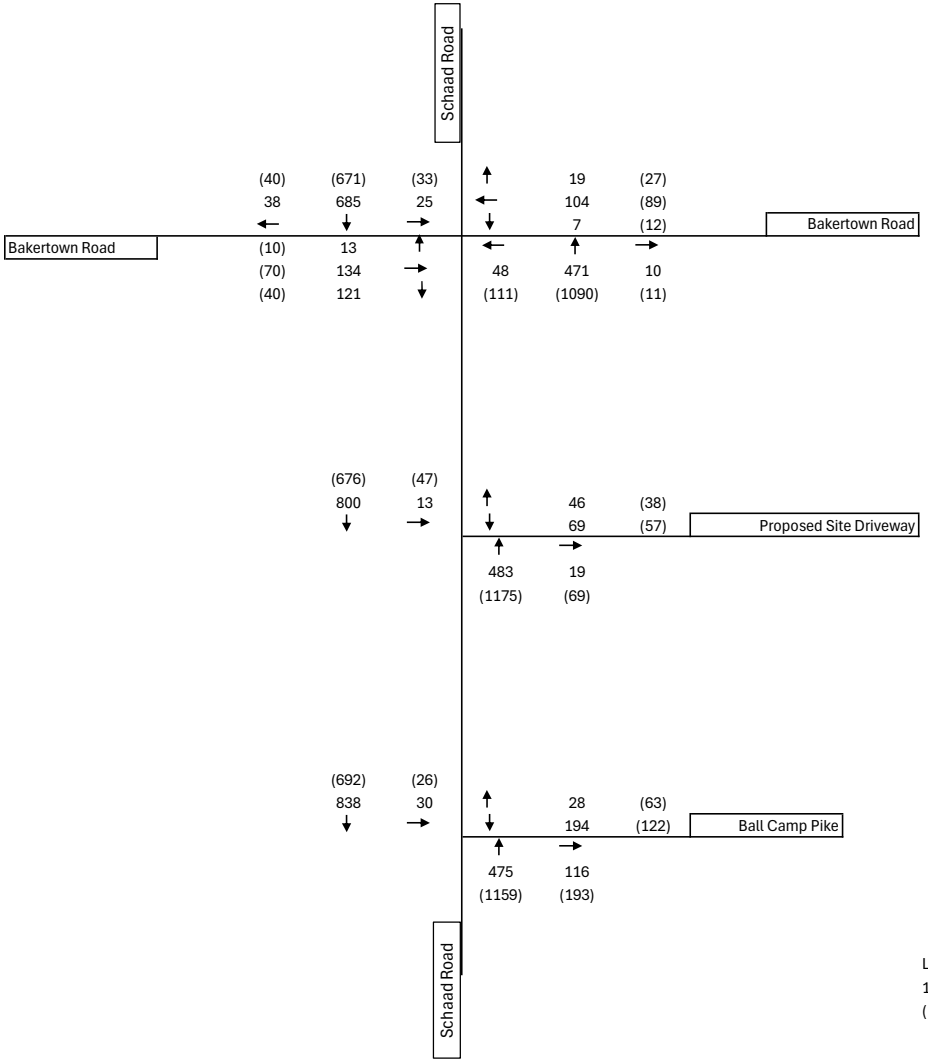
Proposed Schadd Road Apartments
Traffic Impact Analysis
Knoxville, Knox County, Tennessee

Forecasted Trip Additions

DRAWN BY: ANL	CHECKED BY: CAD	APPROVED BY: CAD	FIGURE NO.: 7
DATE: September 2025	DWG SCALE: NTS	PROJECT NO: 352-580	



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Proposed Schadd Road Apartments
Traffic Impact Analysis
Knoxville, Knox County, Tennessee

Forecasted 2027 Build (With Development) Peak Hour Traffic Volumes

DRAWN BY: ANL	CHECKED BY: CAD	APPROVED BY: CAD	FIGURE NO.: 8
DATE: September 2025	DWG SCALE: NTS	PROJECT NO: 352-580	

APPENDIX A

KNOXVILLE KNOX COUNTY PLANNING SCOPE DETERMINATION FORM

(1) Download and fill out this form or print the completed form. (2) Bring the form to Knoxville-Knox County Planning offices or email it to TIA@knoxplanning.org.

Reset Form

Planning
KNOXVILLE | KNOX COUNTY

ATTACHMENT B: Pre-Submittal Transportation Impact Analysis (TIA) Scope Determination Form

DEVELOPMENT INFORMATION	
Project name:	Schaad Road Apartments
Project Description:	Proposed 300 unit multifamily development in Knox County
Project Location	8007 Ball Camp Pike Knoxville, TN 37931
Existing Zoning:	I (OB in the CMU place type and PR in the SR place type. Case file 6-H-25
Development Name:	Schaad Road Apartments
Developer name & address:	Thompson Thrift Residential. 111 Monument Cir. Indianapolis, IN 46206
Telephone number:	317-853-5489
Email:	mnoble@thompsonthrift.com
Tax Map & Parcel #:	091206

CHECKLIST (All items should be available at the time of discussion)		
Complete description of the development that includes:		
	Site Map details (this should be attached):	
■	Building footprints	Yes
■	Number of units/unit size	300 units (120-1 bed, 144-2 bed, 36-3
■	Access points	Along Schaad Road
■	Internal roadways (if any)	private drives/parking
■	Adjacent streets	Yes
■	Proposed sidewalks and bicycle facilities, and	Sidewalks
■	Location and number of proposed parking spaces (if applicable)	564 Total 512 regular, 40 garage, 12 ADA See plan for reference
	Phasing plan (if applicable) that includes:	
☐	Phase size, location, & timing	

BELOW TO BE FILLED OUT BY KNOXVILLE-KNOX COUNTY PLANNING STAFF

☐ Pre-study scope meeting **needed**

☒ Pre-study scope meeting **not needed**

Intersection(s) to study:

Proposed access point(s) to Schaad Road

Level of Analysis:

Level 1 Transportation impact Study (TIS) - Refer to Section 7 of the Knoxville-Knox County Planning Transportation Impact Analysis Guidelines for scope and report elements.

Notes:

Include standard review of operations and safety at access to Schaad Rd including assessment of left turn lane storage length, warrant/need for right turn/deceleration lane and sight distance. Include review of access road configuration such as turning radii and number of exiting lanes along with associated signage and striping needs.

A maximum of 250 units are permitted on one access point per Knox County code so if the developer wishes to move forward with the proposed 300 units then opportunities for secondary access need to be identified, which could include gated, emergency-only access such as the existing driveway to Ball Camp Pike. Discussions with Knox County staff should be conducted to determine feasible alternatives.

Traffic counts to support any analyses need to be conducted after K-12 schools return and

	7/18/2025
Signature	Date

APPENDIX B

TURNING MOVEMENT COUNT SUMMARIES

Tuesday, September 9, 2025

Knoxville, Knox County, Tennessee

All Vehicles	Eastbound			Westbound			Northbound			Southbound			
	Bakertown Road			Bakertown Road			Schaad Road			Schaad Road			
Time	L	T	R	L	T	R	L	T	R	L	T	R	TOTAL
7:00 AM	4	9	6	0	33	9	8	63	0	5	81	3	221
7:15 AM	5	8	14	1	23	11	14	77	1	6	140	10	310
7:30 AM	2	29	32	2	45	7	14	83	2	6	156	16	394
7:45 AM	3	40	29	0	22	4	11	106	2	7	155	8	387
8:00 AM	3	23	23	2	16	1	12	108	0	4	167	7	366
8:15 AM	4	32	28	1	13	6	7	102	0	6	146	4	349
8:30 AM	1	14	11	2	12	5	7	99	0	5	129	3	288
8:45 AM	6	11	8	2	13	1	6	84	0	3	107	3	244
TOTAL	28	166	151	10	177	44	79	722	5	42	1081	54	2559
PH Vol	12	124	112	5	96	18	44	399	4	23	624	35	PHF
PH HV	2	4	1	1	0	0	0	19	0	0	30	0	0.95
HV%	17%	3%	1%	20%	0%	0%	0%	5%	0%	0%	5%	0%	

HV	Eastbound			Westbound			Northbound			Southbound			
	Bakertown Road			Bakertown Road			Schaad Road			Schaad Road			
Time	L	T	R	L	T	R	L	T	R	L	T	R	TOTAL
7:00 AM	1	0	0	0	0	0	0	1	0	0	2	1	5
7:15 AM	1	0	0	0	0	0	0	3	0	0	6	0	10
7:30 AM	0	1	0	0	0	0	0	3	0	0	6	0	10
7:45 AM	1	2	1	0	0	0	0	2	0	0	10	0	16
8:00 AM	1	0	0	1	0	0	0	8	0	0	8	0	18
8:15 AM	0	1	0	0	0	0	0	6	0	0	6	0	13
8:30 AM	0	0	0	0	0	0	1	3	0	0	8	1	13
8:45 AM	0	0	0	0	2	0	0	8	0	0	6	0	16
TOTAL	4	4	1	1	2	0	1	34	0	0	52	2	101
PH Vol	2	4	1	1	0	0	0	19	0	0	30	0	

Tuesday, September 9, 2025
Knoxville, Knox County, Tennessee

All Vehicles	Eastbound			Westbound			Northbound			Southbound			
	Bakertown Road			Bakertown Road			Schaad Road			Schaad Road			
Time	L	T	R	L	T	R	L	T	R	L	T	R	TOTAL
4:00 PM	7	12	9	0	20	7	16	182	0	4	108	4	369
4:15 PM	2	11	10	1	15	10	20	233	0	6	118	4	430
4:30 PM	3	15	10	1	17	10	24	219	1	4	139	9	452
4:45 PM	**3**	**17**	**7**	**2**	**16**	**10**	**16**	**222**	**2**	**10**	**150**	**9**	**464**
5:00 PM	**2**	**22**	**12**	**2**	**19**	**5**	**22**	**274**	**2**	**9**	**127**	**10**	**506**
5:15 PM	**1**	**10**	**7**	**1**	**30**	**7**	**34**	**255**	**2**	**9**	**154**	**9**	**519**
5:30 PM	**3**	**16**	**11**	**1**	**17**	**3**	**31**	**228**	**0**	**3**	**152**	**9**	**474**
5:45 PM	2	20	9	2	23	8	16	200	2	4	124	14	424
TOTAL	**23**	**123**	**75**	**10**	**157**	**60**	**179**	**1813**	**9**	**49**	**1072**	**68**	**3638**
PH Vol	**9**	**65**	**37**	**6**	**82**	**25**	**103**	**979**	**6**	**31**	**583**	**37**	**PHF**
PH HV	**0**	**3**	**1**	**0**	**1**	**0**	**1**	**23**	**0**	**0**	**8**	**0**	**0.95**
HV%	**0%**	**5%**	**3%**	**0%**	**1%**	**0%**	**1%**	**2%**	**0%**	**0%**	**1%**	**0%**	

HV	Eastbound			Westbound			Northbound			Southbound			
	Bakertown Road			Bakertown Road			Schaad Road			Schaad Road			
Time	L	T	R	L	T	R	L	T	R	L	T	R	TOTAL
4:00 PM	0	0	1	0	0	1	1	7	0	0	4	0	14
4:15 PM	0	0	0	0	2	0	0	10	0	0	5	1	18
4:30 PM	0	0	0	0	0	0	0	7	0	0	2	1	10
4:45 PM	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**10**	**0**	**0**	**3**	**0**	**15**
5:00 PM	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**6**	**0**	**0**	**1**	**0**	**8**
5:15 PM	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**2**	**0**	**7**
5:30 PM	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**3**	**0**	**0**	**2**	**0**	**7**
5:45 PM	0	0	1	0	0	0	1	7	0	0	1	0	10
TOTAL	**0**	**3**	**3**	**0**	**3**	**1**	**3**	**54**	**0**	**0**	**20**	**2**	**89**
PH Vol	**0**	**3**	**1**	**0**	**1**	**0**	**1**	**23**	**0**	**0**	**8**	**0**	

Tuesday, September 9, 2025

Knoxville, Knox County, Tennessee

All Vehicles	Westbound Ball Camp Pike		Northbound Schaad Road		Southbound Schaad Road		
Time	**L**	**R**	**T**	**R**	**L**	**T**	**TOTAL**
7:00 AM	57	9	64	17	0	88	235
7:15 AM	55	6	81	22	1	154	319
7:30 AM	**39**	**9**	**96**	**27**	**5**	**173**	**349**
7:45 AM	**49**	**3**	**110**	**24**	**9**	**181**	**376**
8:00 AM	**52**	**8**	**110**	**28**	**7**	**175**	**380**
8:15 AM	**40**	**6**	**106**	**28**	**7**	**183**	**370**
8:30 AM	18	6	105	26	1	134	290
8:45 AM	24	4	80	18	5	120	251
TOTAL	**334**	**51**	**752**	**190**	**35**	**1208**	**2570**
PH Vol	**180**	**26**	**422**	**107**	**28**	**712**	**PHF**
PH HV	**16**	**1**	**19**	**8**	**1**	**26**	**0.97**
HV%	**9%**	**4%**	**5%**	**7%**	**4%**	**4%**	

HV	Westbound Ball Camp Pike		Northbound Schaad Road		Southbound Schaad Road		
Time	**L**	**R**	**T**	**R**	**L**	**T**	**TOTAL**
7:00 AM	5	0	2	0	0	2	9
7:15 AM	1	0	3	2	0	6	12
7:30 AM	**4**	**0**	**3**	**1**	**0**	**5**	**13**
7:45 AM	**4**	**1**	**2**	**3**	**0**	**10**	**20**
8:00 AM	**4**	**0**	**7**	**2**	**0**	**8**	**21**
8:15 AM	**4**	**0**	**7**	**2**	**1**	**3**	**17**
8:30 AM	1	1	4	2	0	6	14
8:45 AM	2	0	8	0	0	6	16
TOTAL	**25**	**2**	**36**	**12**	**1**	**46**	**122**
PH Vol	**16**	**1**	**19**	**8**	**1**	**26**	

Tuesday, September 9, 2025

Knoxville, Knox County, Tennessee

All Vehicles	Westbound Ball Camp Pike		Northbound Schaad Road		Southbound Schaad Road		
Time	**L**	**R**	**T**	**R**	**L**	**T**	**TOTAL**
4:00 PM	20	9	184	34	4	110	361
4:15 PM	15	9	246	35	9	115	429
4:30 PM	20	10	233	44	4	152	463
4:45 PM	**31**	**10**	**237**	**50**	**5**	**141**	**474**
5:00 PM	**38**	**25**	**249**	**43**	**7**	**135**	**497**
5:15 PM	**21**	**12**	**289**	**42**	**4**	**155**	**523**
5:30 PM	**23**	**11**	**234**	**44**	**8**	**157**	**477**
5:45 PM	27	10	213	48	7	133	438
TOTAL	**195**	**96**	**1885**	**340**	**48**	**1098**	**3662**
PH Vol	**113**	**58**	**1009**	**179**	**24**	**588**	**PHF**
PH HV	**0**	**0**	**25**	**5**	**0**	**13**	**0.94**
HV%	**0%**	**0%**	**2%**	**3%**	**0%**	**2%**	

HV	Westbound Ball Camp Pike		Northbound Schaad Road		Southbound Schaad Road		
Time	**L**	**R**	**T**	**R**	**L**	**T**	**TOTAL**
4:00 PM	2	0	5	0	0	4	11
4:15 PM	0	0	9	1	1	5	16
4:30 PM	1	0	8	0	0	2	11
4:45 PM	**0**	**0**	**9**	**0**	**0**	**6**	**15**
5:00 PM	**0**	**0**	**6**	**2**	**0**	**1**	**9**
5:15 PM	**0**	**0**	**5**	**1**	**0**	**3**	**9**
5:30 PM	**0**	**0**	**5**	**2**	**0**	**3**	**10**
5:45 PM	0	2	9	1	0	2	14
TOTAL	**3**	**2**	**56**	**7**	**1**	**26**	**95**
PH Vol	**0**	**0**	**25**	**5**	**0**	**13**	

APPENDIX C

BACKGROUND TRAFFIC GROWTH RATE CALCULATION

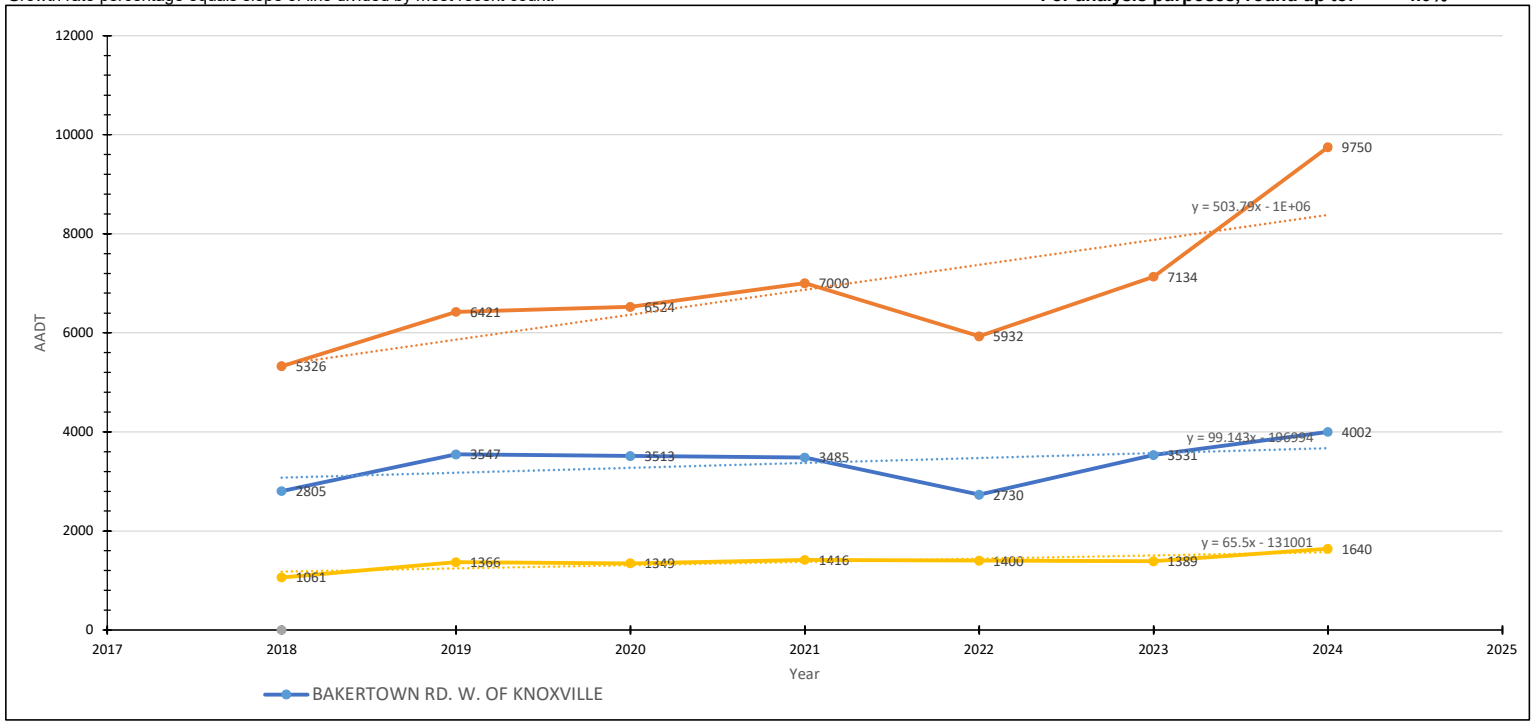
TABLE A1
BACKGROUND TRAFFIC GROWTH RATE CALCULATIONS

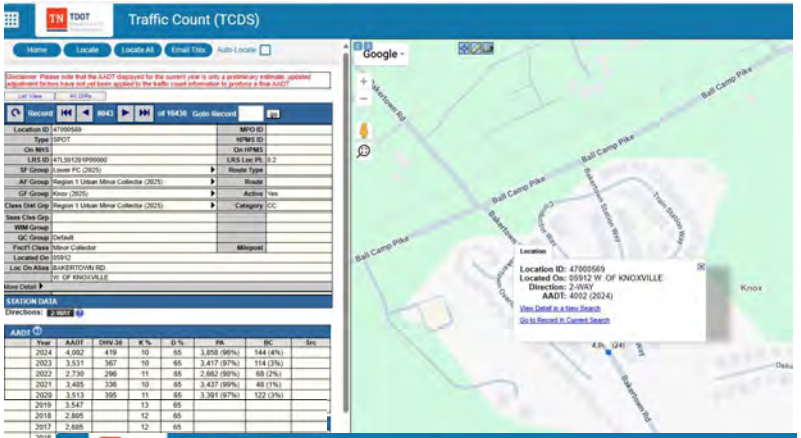
Station ID #	Location	AADT Traffic Counts (1)							Statistics						
		2018	2019	2020	2021	2022	2023	2024	Slope	Y-Intercept	Number of Data Points	R Squared	Linear Growth Rate (2)	Weight	Weighted Growth
47,000,569	BAKERTOWN RD. W. OF KNOXVILLE	2805	3547	3513	3485	2730	3531	4002	99.1429	-196994.4	7	0.226	2.50%	0.26	0.65%
47,000,578	BALL CAMP PIKE SW OF BAKERTOWN RD	5326	6421	6524	7000	5932	7134	9750	503.7857	-1011281.4	7	0.594	5.20%	0.63	3.29%
47,000,468	BAKERTOWN RD. NE. OF KNOXVILLE	1061	1366	1349	1416	1400	1389	1640	65.5000	-131001.1	7	0.698	4.00%	0.11	0.43%
						Total	15,392							1.00	4.37%

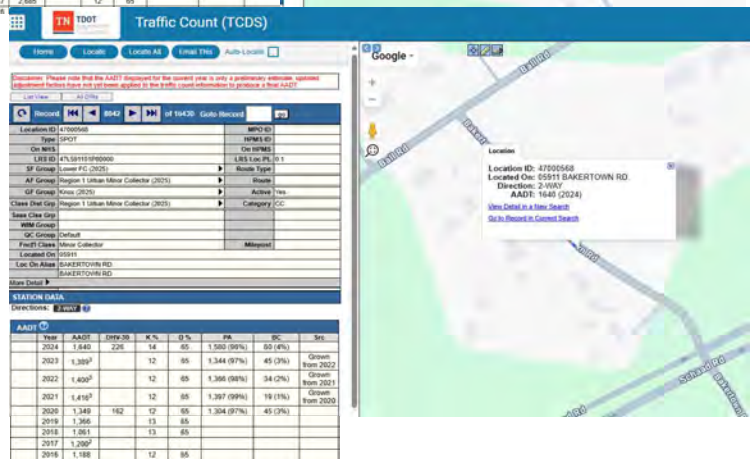
(1) Traffic count data obtained form the Tennesee Department of Transportation TDMS (Transportation data management system)

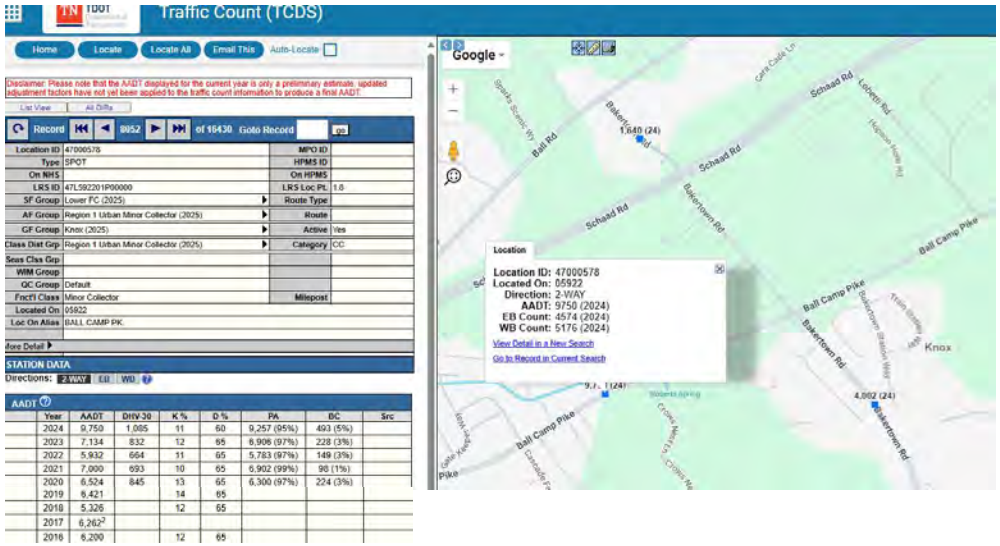
(2) Growth rate percentage equals slope of line divided by most recent count.

Average Weighted Linear Growth Rate **4.37%**
For analysis purposes, round up to: **4.0%**




Traffic Count (TCDS)
Home
Locate
Locate All
Email This
Auto-Locate
Record 8043 of 16430 Goto Record
Location ID 47000569
Type SPOT
On NHS
LRS ID 47L391201P00000
SF Group Lower FC (2025)
AF Group Region 1 Urban Minor Collector (2025)
GF Group Knox (2025)
Class Dist Grp Region 1 Urban Minor Collector (2025)
Sess Clss Grp
WIM Group
QC Group Default
Fnc'l Class Minor Collector
Located On 05912
Loc On Alias BAKERTOWN RD
W OF KNOXVILLE
MPO ID
HPMS ID
On HPMS
LRS Loc Pt. 0.2
Route Type
Route
Active Yes
Category CC
Milepost
More Detail
STATION DATA
Directions: 2-WAY
AADT
Year AADT DHV-30 K % D % PA BC Src
2024 4,002 419 10 65 3,858 (96%) 144 (4%)
2023 3,531 367 10 65 3,417 (97%) 114 (3%)
2022 2,730 296 11 65 2,662 (98%) 68 (2%)
2021 3,485 336 10 65 3,437 (99%) 48 (1%)
2020 3,513 395 11 65 3,391 (97%) 122 (3%)
2019 3,547 13 65
2018 2,865 12 65
2017 2,685 12 65
2016
Google
Ball Camp Pike
Bakertown Rd
Location
Location ID: 47000569
Located On: 05912 W OF KNOXVILLE
Direction: 2-WAY
AADT: 4092 (2024)
View Detail in a New Search
Go to Record in Current Search
Knox


Traffic Count (TCDS)
Home
Locate
Locate All
Email This
Auto-Locate
Record 8042 of 16430 Goto Record
Location ID 47000568
Type SPOT
On NHS
LRS ID 47L591101P00000
SF Group Lower FC (2025)
AF Group Region 1 Urban Minor Collector (2025)
GF Group Knox (2025)
Class Dist Grp Region 1 Urban Minor Collector (2025)
Sess Clss Grp
WIM Group
QC Group Default
Fnc'l Class Minor Collector
Located On 05911
Loc On Alias BAKERTOWN RD
BAKERTOWN RD
MPO ID
HPMS ID
On HPMS
LRS Loc Pt. 0.1
Route Type
Route
Active Yes
Category CC
Milepost
More Detail
STATION DATA
Directions: 2-WAY
AADT
Year AADT DHV-30 K % D % PA BC Src
2024 1,640 226 14 65 1,580 (99%) 60 (4%)
2023 1,389[3] 12 65 1,344 (97%) 45 (3%) Grown from 2022
2022 1,400[3] 12 65 1,366 (98%) 34 (2%) Grown from 2021
2021 1,416[3] 12 65 1,397 (99%) 19 (1%) Grown from 2020
2020 1,349 162 12 65 1,304 (97%) 45 (3%)
2019 1,366 13 65
2018 1,061 13 65
2017 1,200[3]
2016 1,188 12 65
Google
Location
Location ID: 47000568
Located On: 05911 BAKERTOWN RD
Direction: 2-WAY
AADT: 1640 (2024)
View Detail in a New Search
Go to Record in Current Search


Traffic Count (TCDS)
Home
Locate
Locate All
Email This
Auto-Locate
Disclaimer: Please note that the AADT displayed for the current year is only a preliminary estimate, updated adjustment factors have not yet been applied to the traffic count information to produce a final AADT.
List View
All Diffs
Record 8052 of 16430 Goto Record
Location ID 47000578
Type SPOT
On NHS
LRS ID 47L592201P00000
SF Group Lower FC (2025)
AF Group Region 1 Urban Minor Collector (2025)
GF Group Knox (2025)
Class Dist Grp Region 1 Urban Minor Collector (2025)
Sess Clss Grp
WIM Group
QC Group Default
Fnc'l Class Minor Collector
Located On 05922
Loc On Alias BALL CAMP PK
MPO ID
HPMS ID
On HPMS
LRS Loc Pt. 1.8
Route Type
Route
Active Yes
Category CC
Milepost
More Detail
STATION DATA
Directions: 2-WAY EB WB
AADT
Year AADT DHV-30 K % D % PA BC Src
2024 9,750 1,065 11 60 9,257 (95%) 493 (5%)
2023 7,134 832 12 65 6,906 (97%) 228 (3%)
2022 5,932 664 11 65 5,783 (97%) 149 (3%)
2021 7,000 693 10 65 6,902 (99%) 98 (1%)
2020 6,524 845 13 65 6,300 (97%) 224 (3%)
2019 6,421 14 65
2018 5,326 12 65
2017 6,262[2]
2016 6,200 12 65
Google
Location
Location ID: 47000578
Located On: 05922
Direction: 2-WAY
AADT: 9750 (2024)
EB Count: 4574 (2024)
WB Count: 5176 (2024)
View Detail in a New Search
Go to Record in Current Search
Ball Camp Pike
Bakertown Rd
Schaad Rd
Knox

APPENDIX D

TRIP GENERATION CALCULATIONS

Trip Generation Calculations[1]
Traffic Impact Study for the Proposed Schadd Road Apartments
Knoxville, Knox County, TN

Calculated ANL Checked CAD

300	Dwelling Units	ITE Land Use Code		N/A				Local Apartment - Trip Generation Study						
	Weekday 24-Hour	=======>	T =	15.193	(	X	)	'^0.899		(	50	% Entering/	50	% Exiting)
			T =	15.193	(	300.00	)	^0.899						
			T =			2561.978883								
			T =			2562				(	1281	Entering/	1281	Exiting)
	A.M. Peak Hour	=======>	T =	0.758	(	X	)	'^0.924		(	22	% Entering/	78	% Exiting)
			T =	0.758	(	300.00	)	^0.924						
			T =			147.4107803								
			T =			147				(	32	Entering/	115	Exiting)
	P.M. Peak Hour	=======>	T =	0.669	(	X	)	+	10.069	(	55	% Entering/	45	% Exiting)
			T =	0.669	(	300.00	)	+	10.069					
			T =			210.769								
			T =			211				(	116	Entering/	95	Exiting)

(1) Trip generation consistent with Knoxville Knox Planning Comission TIA Guidelines on residential trip generation through the use of their Local Apartment Trip Generation Study.

KNOX COUNTY
LOCAL APARTMENT TRIP GENERATION STUDY

PURPOSE

A Traffic Impact Study (TIS) is currently required in Knox County when a proposed development is projected to generate in excess of 750 trips per day. The determinations of when the threshold is met as well as all subsequent analyses in the TIS are performed using the rates and equations given in the Institute of Transportation Engineers (ITE) Trip Generation Manual. Local governmental agencies rely heavily on the accuracy of these trip generation rates in order to correctly predict the impacts of a proposed development on the transportation system. Therefore, in certain instances, it is logical to verify whether the "national" rates and equations given in the ITE Trip Generation Manual are appropriate for use in a specific local area or region.

The decision was made to study the local trip-making characteristics of apartments because of the discrepancy between the trip generation rates for apartments and single family residential land uses as given in the ITE Trip Generation Manual. While these two land uses are similar in nature, the Trip Generation Manual predicts about three less trips per dwelling unit generated by apartments for the average weekday. Additionally the Trip Generation Manual points out that due to the age of their database, which dates back to the 1960's, "the rates for apartments probably had changed over time". It is also assumed that some of the ITE data had come from larger metropolitan areas with denser development and greater transit use than Knox County, which would contribute to lower trip generation rates. Therefore, this study will be used to either verify the rates given in the Trip Generation Manual or generate new ones that can be applied to locally proposed apartment developments.

PROCEDURE

The procedures recommended by ITE in conducting local trip generation studies were generally followed for this study, along with some important assumptions that have made. ITE has published a proposed recommended practice entitled "Trip Generation Handbook" which specifically outlines procedures for conducting local trip generation studies and establishing new rates and equations.

The first step in the study was to define the number and location of the sites to be studied, as well as the counting methodology. Initially 14 sites were selected, although one apartment complex – the College Park Apartments – was later omitted due to uncharacteristically high traffic generation numbers. The number of sites used in this study far exceeds the recommended minimum amount suggested by ITE, which is five sites. Traffic counts were taken for week-long periods at 15-minute intervals between July 22, 1996 and August 9, 1996 at the access points to the apartment complexes. A Technical Appendix to this report contains the traffic count data collected at each apartment complex.

RESULTS

The traffic count data was analyzed using spreadsheets in order to determine the weighted average rates and regression equations. In order to be considered valid, the local rates and equations for each time period of analysis that were generated must meet certain statistical criteria. First, the standard deviation of the independent variable (dwelling units) should be no more than 110 percent of the weighted average rate; and secondly, the regression equations require a computed coefficient of determination (R^2) value of at least 0.75 before good data fit is indicated. This statistical criteria is met by the local data results, and in fact it often exceeds the level of data fit given by their counterparts in the ITE Trip Generation Manual. Finally, in order to simplify the use of the local data, plots were generated that appear identical to the actual ones in the ITE Trip Generation Manual.

The resulting rates and equations calculated from the local data indicate that the average weekday trip generation of apartments in this area is well above the national rates reported in the ITE manual. For example, the locally computed average rate for number of trips generated during a weekday is 35% higher than the rate given by ITE (increase from 6.63 trips per dwelling unit to 9.03 trips per dwelling unit). The trip generation rates do not increase as much for the AM and PM peak hours however. The local rate is roughly 8% higher for the AM peak, and 16% higher for the PM peak. The plots from the ITE Trip Generation Manual are included in the Technical Appendix for comparison purposes.

ASSUMPTIONS MADE

Some important assumptions have been made which may affect the results of the local data that was collected:

- It is important to note that the local trip generation rates were computed for the *total* number of dwelling units in the apartment complex, and <u>not</u> necessarily for the number of *occupied* dwelling units. There are several reasons why this was done, chiefly because of the need for comparability with the rates given in ITE Trip Generation Manual, as it does not specify whether the dwelling units are occupied. According to ITE procedures the selected sites must only be of "reasonably full occupancy (i.e. at least 85%)". The Apartment Association of Greater Knoxville (AAGK) publishes quarterly reports on occupancy levels of apartment complexes, and the report covering the period of the data collection was reviewed to determine occupancy levels. According to the AAGK report from July 1, 1996 – September 30, 1996 all of the apartment complexes surveyed in this study met the minimum 85% occupancy level, with an average occupancy rate for all sites studied of 94%.

- The count data that was collected at each apartment complex was used "raw" meaning that it was not factored for possible daily or seasonal variations. Once again, according to an ITE representative it is not known whether the data used in the Trip Generation Manual was factored or not, so therefore in order to be able to compare

local rates to those in the manual you must assume that count data should not be factored. Additionally, it was felt that apartment complexes would generally not be as susceptible to major seasonal fluctuations as other land uses might be. The local rates were also developed using count data that was collected and averaged over an entire week, which should limit some of the daily variations. Finally, reliable local daily and seasonal variation factors do not truly exist.

CONCLUSION

The local apartment study methodology and results were distributed for comment to a group of local transportation professionals who are directly responsible for either preparing or reviewing traffic impact studies. A meeting was held between this group on February 16, 2000 in order to gather comments and discuss the study in greater detail. The following conclusions are based on the discussion and consensus reached at this meeting:

1. The trip generation rates and equations meet statistical requirements and resulted from a study that followed accepted procedures; therefore they should be adopted for future use. Furthermore, the rates and equations are recommended for use in reviewing the traffic impact of any development termed as "multi-family", such as townhouse and condominium developments due to their similarity to apartment complexes.

2. The Traffic Access and Impact Study Guidelines and Procedures adopted by MPC should be amended with the language that local data should be used when available, which will allow the implementation of these new multi-family trip generation rates.

3. The following suggestions were made for future consideration:
   - This study should be updated with data collected from local townhouse and condominium developments in order to further justify the use of the new trip generation rates.
   - A statistical comparison should be made between any newly developed rates and the ITE single family trip generation rates to determine if there is a significant difference. If there is no difference then perhaps ITE single-family rates could be used for any residential development proposed in Knox County.

Local Apartment
Trip Generation Study

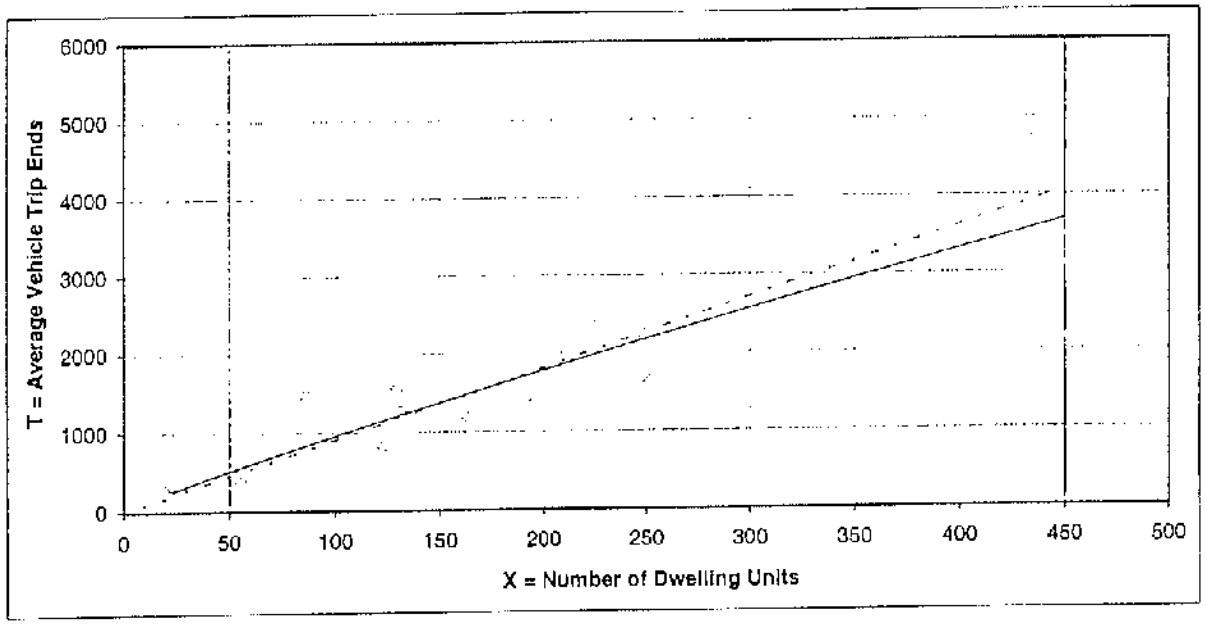
Average Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday**

Number of Studies:	13
Average Number of Dwelling Units:	193
Directional Distribution:	50% entering, 50% exiting

Trip Generation Per Dwelling Unit

Average Rate	Ranges of Rates	Standard Deviation
9.03	6.59 - 17.41	2.47

Data Plot and Equation



Fitted Curve Equation: $T = 15.193(X)^{0.899}$ $R^2 = 0.88$

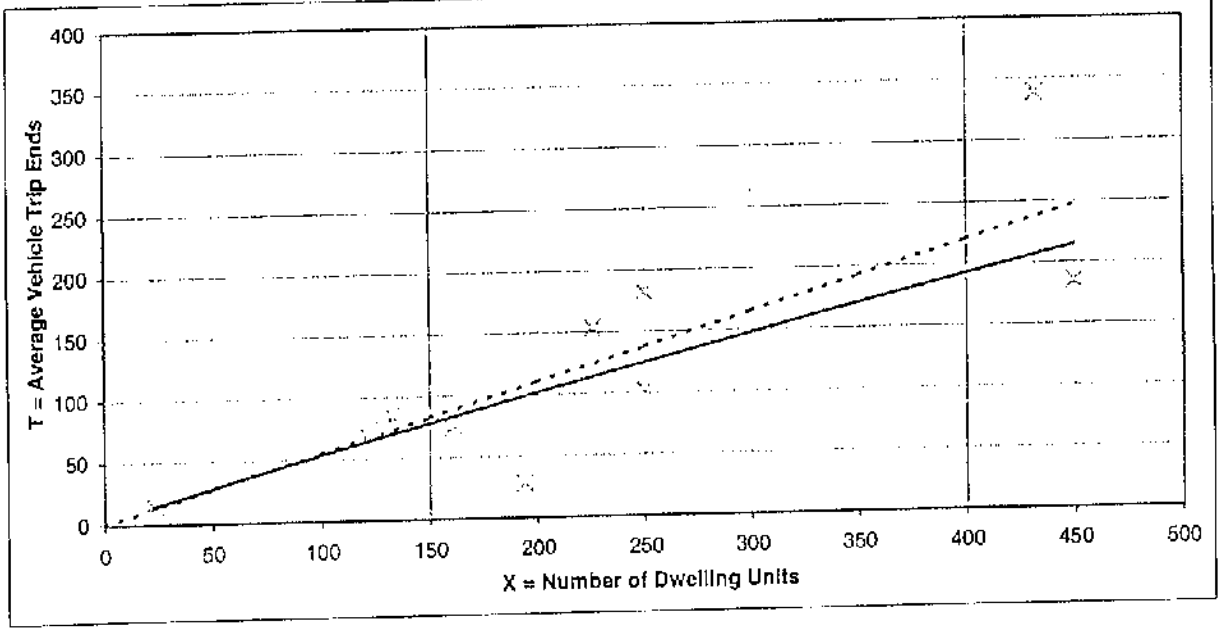
Local Apartment
Trip Generation Study

Average Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,** **Peak Hour of Adjacent Street Traffic,** **One Hour Between 7 and 9 a.m.**
Number of Studies:	13
Average Number of Dwelling Units:	193
Directional Distribution:	22% entering, 78% exiting

Trip Generation Per Dwelling Unit

Average Rate	Ranges of Rates	Standard Deviation
0.55	0.14 - 0.78	0.18

Data Plot and Equation



X Actual Data Points ——— Fitted Curve ····· Average Rate

Fitted Curve Equation: $T = 0.758(X)^{0.924}$ $R^2 = 0.75$

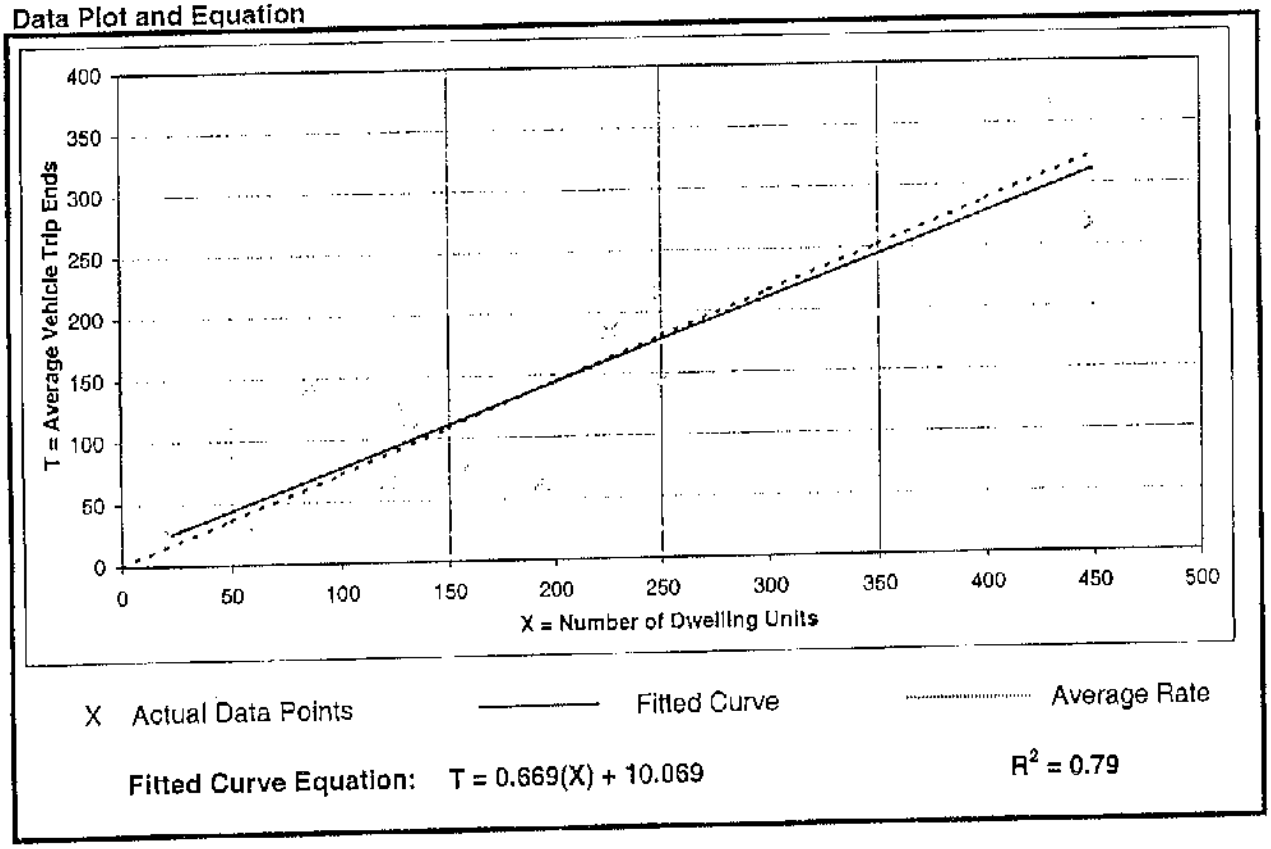
Local Apartment
Trip Generation Study

Average Vehicle Trip Ends vs:	Dwelling Units
On a:	Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.
Number of Studies:	13
Average Number of Dwelling Units:	193
Directional Distribution:	55% entering, 45% exiting

Trip Generation Per Dwelling Unit

Average Rate	Ranges of Rates	Standard Deviation
0.72	0.32 - 1.66	0.25

Data Plot and Equation



Fitted Curve Equation: T = 0.669(X) + 10.069

$R^2 = 0.79$

APPENDIX E

LEVEL OF SERVICE DEFINITIONS

LEVELS OF SERVICE

Intersection levels of service (LOS) were determined through implementation of the methodology presented in the *Highway Capacity Manual 7th Edition*, published by the Transportation Research Board.

i. Signalized Intersections

An explanation of level of service at signalized intersections is as follows:

This subsection describes the LOS criteria for the motorized vehicle mode. The criteria for the motorized vehicle mode are different from those for other modes. Specifically, the motorized vehicle mode criteria are based on performance measures that are field measurable and perceivable by travelers. The criteria for other modes are based on scores reported by travelers indicating their perception of service quality.

LOS can be characterized for the entire intersection, each intersection approach, and each lane group. Control delay alone is used to characterize LOS for the entire intersection of an approach. Control delay and volume-to-capacity ratio are used to characterize LOS for a lane group. Delay quantifies the increase in travel time due to traffic signal control. It is also a surrogate measure of driver discomfort and fuel consumption. The volume-to-capacity ratio quantifies the degree to which a phases's capacity is utilized by a lane group. The following paragraphs describe each LOS.

LOS A describes operations with a control delay of 10 s/veh or less and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is low and either progression is exceptionally favorable or the cycle length is very short. If it is due to favorable progression, most vehicles arrive during the green indication and travel through the intersection without stopping.

LOS B describes operations with control delay between 10 and 20 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with LOS A.

LOS C describes operations with control delay between 20 and 35 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when progression is favorable or the cycle length is moderate. Individual *cycle failures* (i.e., one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.

LOS D describes operations with control delay between 35 and 55 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is high and either progression is ineffective or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.

LOS E describes operations with control delay between 55 and 80 s/veh and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.

LOS F describes operations with control delay exceeding 80 s/veh or a volume-to-capacity ratio greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.

A lane group can incur a delay less than 80 s/veh when the volume-to-capacity ratio exceeds 1.0. This condition typically occurs when the cycle length is short, the signal progression is favorable, or both. As a result, both the delay and volume-to-capacity ratio are considered when lane group LOS is established. A ratio of 1.0 or more indicates that cycle capacity is fully utilized and represents failure from a capacity perspective (just as delay in excess of 80 s/veh represents failure from a delay perspective).

LOS Criteria: Signalized Intersection

Control Delay (s/veh)	**LOS by Volume-to-Capacity (v/c) Ratio[1]**	
	v/c ≤ 1.0	**v/c > 1.0**
≤ 10	A	F
> 10 – 20	B	F
> 20 – 35	C	F
> 35 – 55	D	F
> 55 – 80	E	F
> 80	F	F

(1) For approach-based and intersectionwide assessments, LOS is defined solely by control delay.

ii. Unsignalized Intersections

The following level-of-service criteria for two-way stop-controlled and all-way stop-controlled intersections differ from the criteria for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from various kinds of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an unsignalized intersection. Thus, a higher level of control delay is acceptable at a signalized intersection for the same level of service.

Level of service for two-way stop-controlled (TWSC) intersections and an all-way stop control intersections is determined by the computed or measured control delay. For motor vehicles, LOS is determined for each minor-street movement (or shared movement), as well as the major-street left turns. For TWSC intersections, LOS is not defined for the intersection as a whole or for major –street approaches for three primary reasons: (a) major-street through vehicles are assumed to experience zero delay; (b) the disproportionate number of major-street through vehicles a typical TWSC intersection skews the weighted average of all movements, resulting in a very low overall average delay for all vehicles; and (c) the resulting low delay can mask LOS deficiencies for minor movements.

Level of service for two-way stop control is not defined for the intersection as a whole, while level of service for all-way stop control is defined for the intersection as a whole.

LOS Criteria: Two-Way and All-Way Stop Controlled Intersections

Control Delay (s/veh)	**LOS by Volume-to-Capacity (v/c) Ratio (1)(2)**	
	v/c ≤ 1.0	**v/c > 1.0**
0 – 10	A	F
> 10 – 15	B	F
> 15 – 25	C	F
> 25 – 35	D	F
> 35 – 50	E	F
> 50	F	F

(1) TWSC: The LOS criteria apply to each lane on a given approach and to each approach on the minor street. LOS is not calculated for major-street approaches or for the intersection as a whole.
(2) AWSC: For approaches and intersection wide assessment, LOS is defined solely by control delay.

APPENDIX F

FORECASTED OPENING YEAR 2027 BUILD (WITH DEVELOPMENT) PEAK HOUR CAPACITY ANALYSIS

Intersection	
Int Delay, s/veh	22.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	134	121	7	104	19	48	471	10	25	685	38
Future Vol, veh/h	13	134	121	7	104	19	48	471	10	25	685	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	125	-	-	150	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-6	-	-	2	-	-	-3	-	-	-3	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	17	3	1	20	0	0	0	5	0	0	5	0
Mvmt Flow	14	141	127	7	109	20	51	496	11	26	721	40

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1197	1401	381	1086	1416	253	761	0	0	506	0	0
Stage 1	794	794	-	602	602	-	-	-	-	-	-	-
Stage 2	404	607	-	484	814	-	-	-	-	-	-	-
Critical Hdwy	6.64	5.36	6.32	8.3	6.9	7.1	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	5.64	4.36	-	7.3	5.9	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.64	4.36	-	7.3	5.9	-	-	-	-	-	-	-
Follow-up Hdwy	3.67	4.03	3.31	3.7	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	187	220	661	132	118	742	860	-	-	1069	-	-
Stage 1	413	516	-	385	460	-	-	-	-	-	-	-
Stage 2	636	590	-	463	360	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	167	202	661	31	~ 109	742	860	-	-	1069	-	-
Mov Cap-2 Maneuver	167	202	-	31	~ 109	-	-	-	-	-	-	-
Stage 1	402	503	-	362	433	-	-	-	-	-	-	-
Stage 2	435	555	-	262	351	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	64.22	157.01	0.86	0.28
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	860	-	-	167	301	31	125	1069	-	-
HCM Lane V/C Ratio	0.059	-	-	0.082	0.892	0.236	1.034	0.025	-	-
HCM Control Delay (s/veh)	9.4	-	-	28.5	66	152.6	157.3	8.5	-	-
HCM Lane LOS	A	-	-	D	F	F	F	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.3	8.2	0.7	7.2	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	69	46	483	19	13	800
Future Vol, veh/h	69	46	483	19	13	800
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	150	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	3	-	-	-3
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	5	0	0	5
Mvmt Flow	75	50	525	21	14	870

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	998	273	0	0	546	0
Stage 1	535	-	-	-	-	-
Stage 2	463	-	-	-	-	-
Critical Hdwy	6.8	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	244	731	-	-	1034	-
Stage 1	557	-	-	-	-	-
Stage 2	606	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	240	731	-	-	1034	-
Mov Cap-2 Maneuver	373	-	-	-	-	-
Stage 1	557	-	-	-	-	-
Stage 2	598	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	14.36	0	0.14
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	373	731	1034	-
HCM Lane V/C Ratio	-	-	0.201	0.068	0.014	-
HCM Control Delay (s/veh)	-	-	17.1	10.3	8.5	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.7	0.2	0	-

Intersection	
Int Delay, s/veh	19.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	194	28	475	116	30	838
Future Vol, veh/h	194	28	475	116	30	838
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	3	-	-1	-	-	-1
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	9	4	5	7	4	4
Mvmt Flow	200	29	490	120	31	864

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1043	305	0	0	609	0
Stage 1	549	-	-	-	-	-
Stage 2	494	-	-	-	-	-
Critical Hdwy	7.58	7.28	-	-	4.18	-
Critical Hdwy Stg 1	6.58	-	-	-	-	-
Critical Hdwy Stg 2	6.58	-	-	-	-	-
Follow-up Hdwy	3.59	3.34	-	-	2.24	-
Pot Cap-1 Maneuver	~ 179	668	-	-	952	-
Stage 1	477	-	-	-	-	-
Stage 2	515	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 174	668	-	-	952	-
Mov Cap-2 Maneuver	~ 174	-	-	-	-	-
Stage 1	477	-	-	-	-	-
Stage 2	498	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	149.34	0	0.31
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	174	668	952	-
HCM Lane V/C Ratio	-	-	1.153	0.043	0.032	-
HCM Control Delay (s/veh)	-	-	169.4	10.6	8.9	-
HCM Lane LOS	-	-	F	B	A	-
HCM 95th %tile Q(veh)	-	-	10.5	0.1	0.1	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	79.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	70	40	12	89	27	111	1090	11	33	671	40
Future Vol, veh/h	10	70	40	12	89	27	111	1090	11	33	671	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	125	-	-	150	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-6	-	-	2	-	-	-3	-	-	-3	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	5	3	0	1	0	1	2	0	0	1	0
Mvmt Flow	11	74	42	13	94	28	117	1147	12	35	706	42

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1651	2189	374	1846	2205	579	748	0	0	1159	0	0
Stage 1	797	797	-	1387	1387	-	-	-	-	-	-	-
Stage 2	854	1393	-	459	818	-	-	-	-	-	-	-
Critical Hdwy	6.3	5.4	6.36	7.9	6.92	7.1	4.12	-	-	4.1	-	-
Critical Hdwy Stg 1	5.3	4.4	-	6.9	5.92	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.3	4.4	-	6.9	5.92	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.05	3.33	3.5	4.01	3.3	2.21	-	-	2.2	-	-
Pot Cap-1 Maneuver	115	90	660	39	~ 35	448	863	-	-	610	-	-
Stage 1	457	508	-	131	180	-	-	-	-	-	-	-
Stage 2	431	321	-	529	356	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	88	~ 73	660	29	~ 28	448	863	-	-	610	-	-
Mov Cap-2 Maneuver	88	~ 73	-	29	~ 28	-	-	-	-	-	-	-
Stage 1	431	479	-	114	156	-	-	-	-	-	-	-
Stage 2	139	277	-	395	336	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	$ 1271.28	$ 1191.37	0.9	0.5
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	863	-	-	88	108	29	36	610	-	-
HCM Lane V/C Ratio	0.135	-	-	0.12	1.072	0.43	3.364	0.057	-	-
HCM Control Delay (s/veh)	9.8	-	-	51.5	182.2	199.5	$ 1294	11.3	-	-
HCM Lane LOS	A	-	-	F	F	F	F	B	-	-
HCM 95th %tile Q(veh)	0.5	-	-	0.4	7.1	1.4	14	0.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	57	38	1175	69	47	676
Future Vol, veh/h	57	38	1175	69	47	676
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	150	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	3	-	-	-3
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	2	0	0	1
Mvmt Flow	62	41	1277	75	51	735

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1784	676	0	0	1352	0
Stage 1	1315	-	-	-	-	-
Stage 2	470	-	-	-	-	-
Critical Hdwy	6.8	6.9	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	74	401	-	-	515	-
Stage 1	219	-	-	-	-	-
Stage 2	601	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	67	401	-	-	515	-
Mov Cap-2 Maneuver	166	-	-	-	-	-
Stage 1	219	-	-	-	-	-
Stage 2	542	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	29.37	0	0.83
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	166	401	515	-
HCM Lane V/C Ratio	-	-	0.372	0.103	0.099	-
HCM Control Delay (s/veh)	-	-	38.9	15	12.8	-
HCM Lane LOS	-	-	E	C	B	-
HCM 95th %tile Q(veh)	-	-	1.6	0.3	0.3	-

Intersection	
Int Delay, s/veh	43.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	122	63	1159	193	26	692
Future Vol, veh/h	122	63	1159	193	26	692
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	3	-	-1	-	-	-1
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	0	2	3	0	2
Mvmt Flow	130	67	1233	205	28	736

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1759	719	0	0	1438	0
Stage 1	1336	-	-	-	-	-
Stage 2	423	-	-	-	-	-
Critical Hdwy	7.4	7.2	-	-	4.1	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	~ 58	354	-	-	478	-
Stage 1	171	-	-	-	-	-
Stage 2	591	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 54	354	-	-	478	-
Mov Cap-2 Maneuver	~ 54	-	-	-	-	-
Stage 1	171	-	-	-	-	-
Stage 2	557	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, $/s	$ 528.88	0	0.47
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	54	354	478	-
HCM Lane V/C Ratio	-	-	2.385	0.19	0.058	-
HCM Control Delay (s/veh)	-	-	$ 792.9	17.5	13	-
HCM Lane LOS	-	-	F	C	B	-
HCM 95th %tile Q(veh)	-	-	13.1	0.7	0.2	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

APPENDIX G

TRAFFIC SIGNAL WARRANTS EVALUATION

Tuesday, September 9, 2025

Knoxville, Knox County, Tennessee

2025 Existing

Existing Volumes	Westbound		Northbound		Southbound	
	Proposed Site Driveway		Schaad Road		Schaad Road	
Time	L	R	T	R	L	T
7:00 AM	0	0	71	0	0	87
7:15 AM	0	0	92	0	0	155
7:30 AM	0	0	99	0	0	190
7:45 AM	0	0	119	0	0	184
Hour Tot	0	0	381	0	0	616
8:00 AM	0	0	120	0	0	192
8:15 AM	0	0	109	0	0	175
8:30 AM	0	0	106	0	0	142
8:45 AM	0	0	90	0	0	117
Hour Tot	0	0	425	0	0	626

1.08

2027 No-Build

2027 No-Build	Westbound		Northbound		Southbound	
	Proposed Site Driveway		Schaad Road		Schaad Road	
Time	L	R	T	R	L	T
7:00 -8:00 AM	0	0	411	0	0	665
8:00-9:00 AM	0	0	459	0	0	676
Trip Distribution	Westbound		Northbound		Southbound	
	Proposed Site Driveway		Schaad Road		Schaad Road	
Time	L	R	T	R	L	T
7:00 -8:00 AM	60%	40%		60%	40%	
8:00-9:00 AM	60%	40%		60%	40%	
Trip Additions	Westbound		Northbound		Southbound	
	Proposed Site Driveway		Schaad Road		Schaad Road	
Time	L	R	T	R	L	T
7:00 -8:00 AM	83	56		16	10	
8:00-9:00 AM	65	43		24	16	
2027 Build Volumes	Westbound		Northbound		Southbound	
	Proposed Site Driveway		Schaad Road		Schaad Road	
Time	L	R	T	R	L	T
7:00 -8:00 AM	83	56	411	16	10	665
8:00-9:00 AM	65	43	459	24	16	676

2027 Build Volumes	Westbound		Northbound		Southbound	
	Proposed Site Driveway		Schaad Road		Schaad Road	
Time	L	R*	T	R	L	T
7:00 -8:00 AM	97		1102			
8:00-9:00 AM	76		1175			

*Right turns reduced by 75%

Weekday 24-Hour	Trip Generation [1]					
	Weekday A.M. Peak Hour			Weekday P.M. Peak Hour		
	Enter	Exit	Total	Enter	Exit	Total
2,562	32	115	147	116	95	211

Land Use Code	220					
Land Use	Multifamily Housing (Low-Rise)					
Subcategory	Not Close to Rail Transit					
Setting	General Urban/Suburban					
Time Period	Weekday					
# Data Sites	6					
	% of 24-Hour Vehicle Trips					
Time	Total	Entering	Exiting	Total	Entering	Exiting
7:00 - 8:00 AM	6.5%	2.0%	10.8%	83	26	139
8:00 - 9:00 AM	5.8%	3.1%	8.5%	75	40	108

Tuesday, September 9, 2025

Knoxville, Knox County, Tennessee

2025 Existing

Existing Volumes	Westbound		Northbound		Southbound	
	Proposed Site Driveway		Schaad Road		Schaad Road	
Time	L	R	T	R	L	T
4:00 PM	0	0	198	0	0	117
4:15 PM	0	0	253	0	0	129
4:30 PM	0	0	244	0	0	150
4:45 PM	0	0	240	0	0	159
Hour Tot	0	0	935	0	0	555
5:00 PM	0	0	298	2	0	141
5:15 PM	0	0	291	2	0	162
5:30 PM	0	0	259	0	0	164
5:45 PM	0	0	218	2	0	135
Hour Tot	0	0	1066	6	0	602

1.08

2027 No-Build

2027 No-Build	Westbound		Northbound		Southbound	
	Proposed Site Driveway		Schaad Road		Schaad Road	
Time	L	R	T	R	L	T
4:00 -5:00 PM	0	0	1010	0	0	599
5:00-6:00 PM	0	0	1151	0	0	650
Trip Distribution	Westbound		Northbound		Southbound	
	Proposed Site Driveway		Schaad Road		Schaad Road	
Time	L	R	T	R	L	T
4:00 -5:00 PM	60%	40%		60%	40%	
5:00-6:00 PM	60%	40%		60%	40%	
Trip Additions	Westbound		Northbound		Southbound	
	Proposed Site Driveway		Schaad Road		Schaad Road	
Time	L	R	T	R	L	T
4:00 -5:00 PM	43	29		78	52	
5:00-6:00 PM	58	39		88	58	
2027 Build Volumes	Westbound		Northbound		Southbound	
	Proposed Site Driveway		Schaad Road		Schaad Road	
Time	L	R	T	R	L	T
4:00 -5:00 PM	43	29	1010	78	52	599
5:00-6:00 PM	58	39	1151	88	58	650

2027 Build Volumes	Westbound		Northbound		Southbound	
	Proposed Site Driveway		Schaad Road		Schaad Road	
Time	L	R*	T	R	L	T
4:00 -5:00 PM	50		1739			
5:00-6:00 PM	68		1947			

***Right turns reduced by 75%**

Weekday 24-Hour	Trip Generation [1]					
	Weekday A.M. Peak Hour			Weekday P.M. Peak Hour		
	Enter	Exit	Total	Enter	Exit	Total
2,562	32	115	147	116	95	211

Land Use Code	220					
Land Use	Multifamily Housing (Low-Rise)					
Subcategory	Not Close to Rail Transit					
Setting	General Urban/Suburban					
Time Period	Weekday					
# Data Sites	6					
	% of 24-Hour Vehicle Trips					
Time	Total	Entering	Exiting	Total	Entering	Exiting
4:00 - 5:00 PM	7.9%	10.1%	5.6%	101	130	72
5:00 - 6:00 PM	9.5%	11.4%	7.6%	121	146	97

Project:		Schaad Road Apartments	**Calculations:**	ANL
Major Street	**Name:**	Schaad Road	**Date:**	9/17/25
	Speed Limit (mph):	45	**Checked by:**	CAD
	Approach Lanes:	2	**Date:**	9/17/25
Minor Street	**Name:**	Proposed Site Driveway		
	Speed Limit (mph):	25		
	Approach Lanes:	2		
Population < 10000?		Yes		

Civil & Environmental Consultants, Inc.

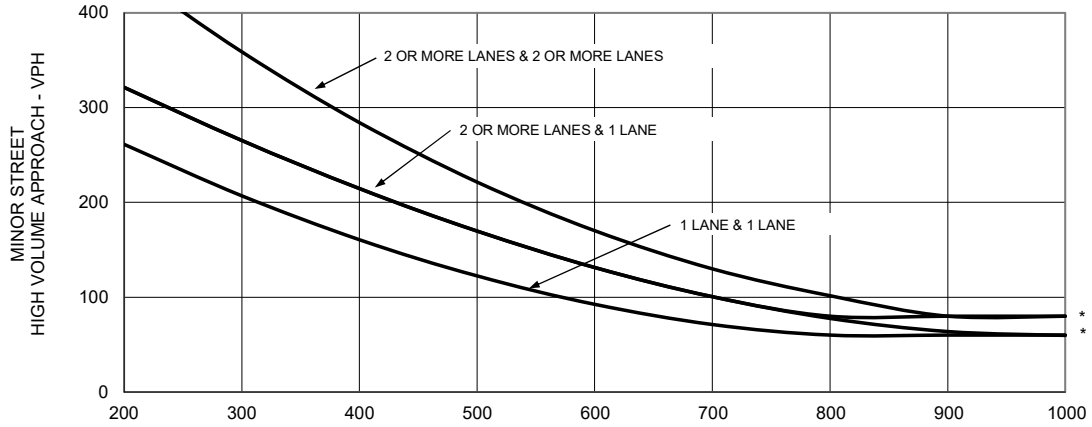
Warrant 2 - Four Hour Vehicular Volume

2027 Build Conditions

Signal Warrant Satisfied? [ ] Yes [X] No

Warrant 2, Four Hour Vehicular Volume

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h (40 mph) ON MAJOR STREET)



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies at the lower threshold volume for a minor-street approach with one lane.

Hour	Major Street (vph)	Minor Street (vph)	Hourly Threshold Minor Street	Hourly Threshold Satisfied?
0:00			650	NO
1:00			650	NO
2:00			650	NO
3:00			650	NO
4:00			650	NO
5:00			650	NO
6:00			650	NO
7:00	1102	97	80	YES
8:00	1175	76	80	NO
9:00			650	NO
10:00			650	NO
11:00			650	NO
12:00			650	NO
13:00			650	NO
14:00			650	NO
15:00			650	NO
16:00	1739	50	80	NO
17:00	1947	68	80	NO
18:00			650	NO
19:00			650	NO
20:00			650	NO
21:00			650	NO
22:00			650	NO
23:00			650	NO
Signal warrant satisfied?				**NO**

Signal warrant satisfied if hourly threshold satisfied for each of any 4 hours of an average day.

APPENDIX H

AUXILIARY TURN LANE WARRANTS ANALYSIS

TABLE 6B

RIGHT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 46 TO 55 MPH

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						
100 - 149 150 - 199						Yes
200 - 249 250 - 299				Yes	Yes Yes	Yes Yes
300 - 349 350 - 399			Yes Yes	Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499			es es	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599			es es	Yes Yes	Yes Yes	Yes Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

AM Peak Hour
Right turn Volume: 19
Through Volume+Left Turn: 254

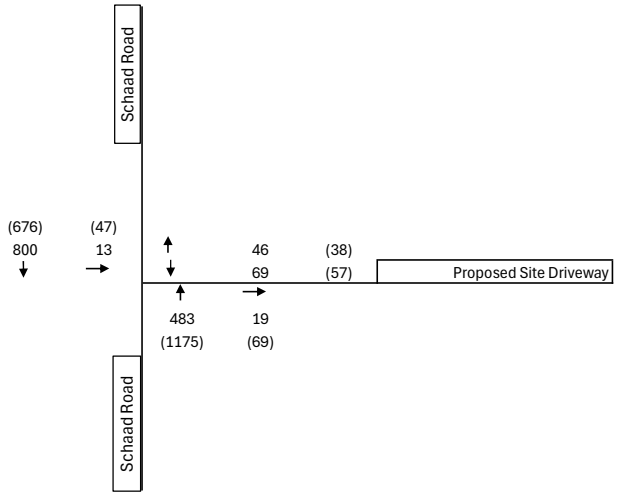
RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600
Fewer Than 25 25 - 49 50 - 99			Yes	Yes Yes	Yes Yes	Yes Yes
100 - 149 150 - 199	Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
200 - 249 250 - 299	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes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

PM Peak Hour
Right turn Volume: 69
Through Volume+Left Turn: 617

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

NORTH

RTLW		RT	Thru	1.05*T
	AM	19	483	254
	PM	(69)	(1175)	(617)



Legend:
12 - A.M. Peak Hour Traffic Volumes
(12) - P.M. Peak Hour Traffic Volumes

Civil & Environmental Consultants, Inc.
700 Cherrington Parkway · Moon Township, PA 15108
412-429-2324 · 800-365-2324
www.cecinc.com

Proposed Schadd Road Apartments
Traffic Impact Analysis
Knoxville, Knox County, Tennessee

Right Turn Lane Warrant Evaluation

DRAWN BY:	ANL	CHECKED BY:	CAD	APPROVED BY:	CAD	FIGURE NO.:	1
DATE:	September 2025	DWG SCALE:	NTS	PROJECT NO:	352-580		