

**Traffic Impact Study**  
**Fox Road Subdivision**  
**Knox County, Tennessee**

**June 9, 2003**



**Prepared for:**  
**S&E Properties, LLC**  
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## EXECUTIVE SUMMARY

This report summarizes a traffic impact study that was prepared for the proposed Fox Road Subdivision, to be located on Fox Road in West Knoxville. The study resulted in the conclusions and recommendations discussed below:

It is the primary conclusion of this study that no significant traffic volume related impacts will result from the development of the Fox Road Subdivision. In fact, capacity analyses of proposed side street (2-way) stop traffic control, indicates that very good conditions (LOS "B" or better) can be expected during all time periods. In addition, analyses of the need for auxiliary traffic lanes such as left and right turning lanes, indicates that no such lanes will be warranted under the anticipated traffic conditions.

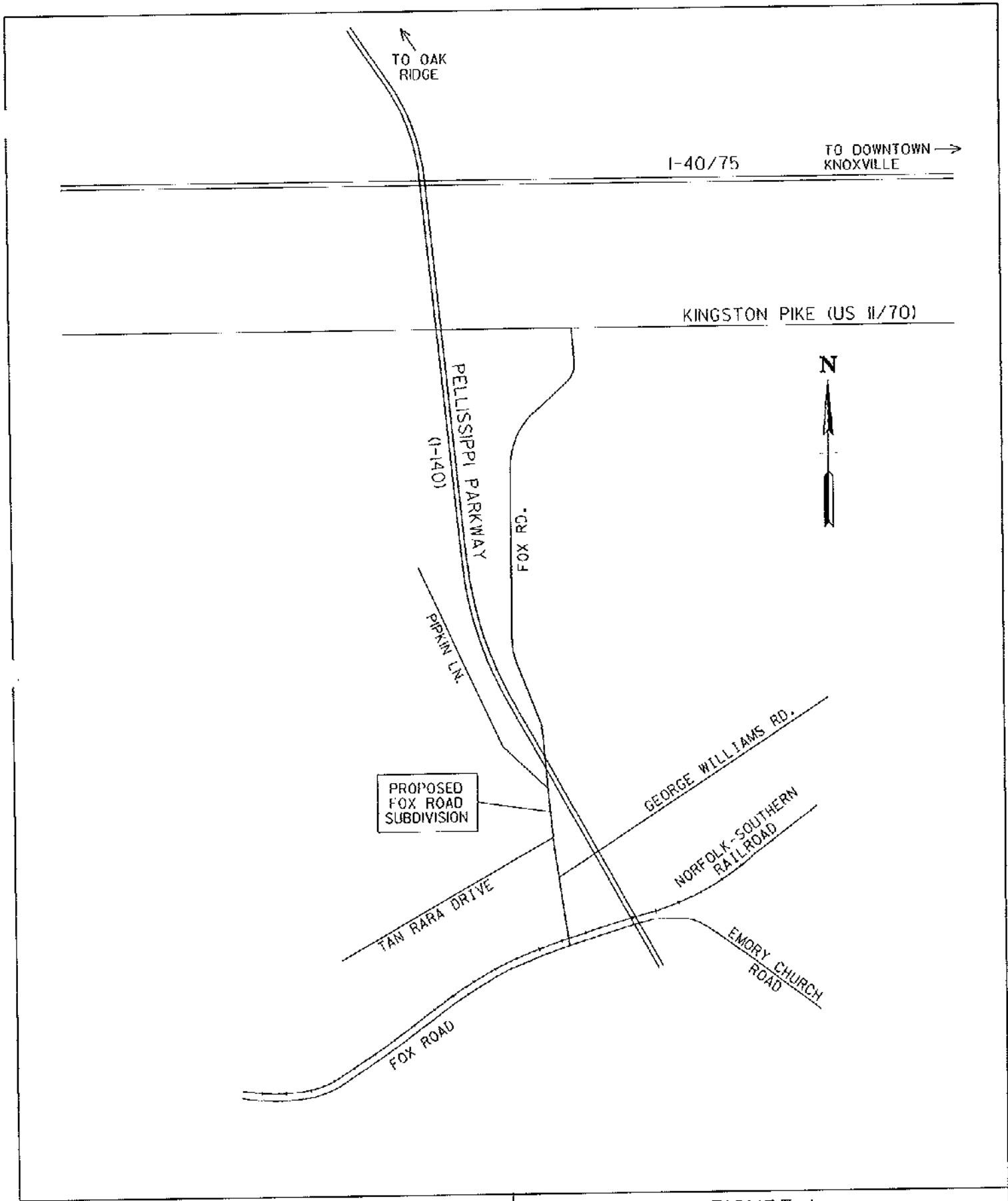
Intersection turning sight distance is the only issue of significant concern that was identified in this study. Specifically, the sight distance looking south from the proposed subdivision access roadway intersection at Fox Road was found to be somewhat deficient. However, it was determined that the cutting down and trimming of some trees and brush would provide more than the required sight distance. Therefore, such action to provide the required sight distance is recommended prior to opening the subdivision roadways to traffic.

## INTRODUCTION AND PURPOSE OF STUDY

This report provides a summary of the traffic impact study that was performed for the proposed Fox Road Subdivision to be located on Fox Road in the west end of the City of Knoxville. The project site is approximately 1.1 miles south of Kingston Pike, and is adjacent to and immediately west of the Pellissippi Parkway. FIGURE 1 is a location map that identifies the project site in relation to the roadways in the vicinity of the proposed subdivision.

The concept plan for this project proposes a subdivision of 146 lots at full build-out. The subdivision entrance will be at a new three-leg intersection on Fox Road, located approximately 700 feet north of the existing Tan Rara Drive, and approximately 450 feet south of the existing Pipkin Lane. FIGURE 2 provides a detailed layout of the proposed subdivision as shown on the concept plan.

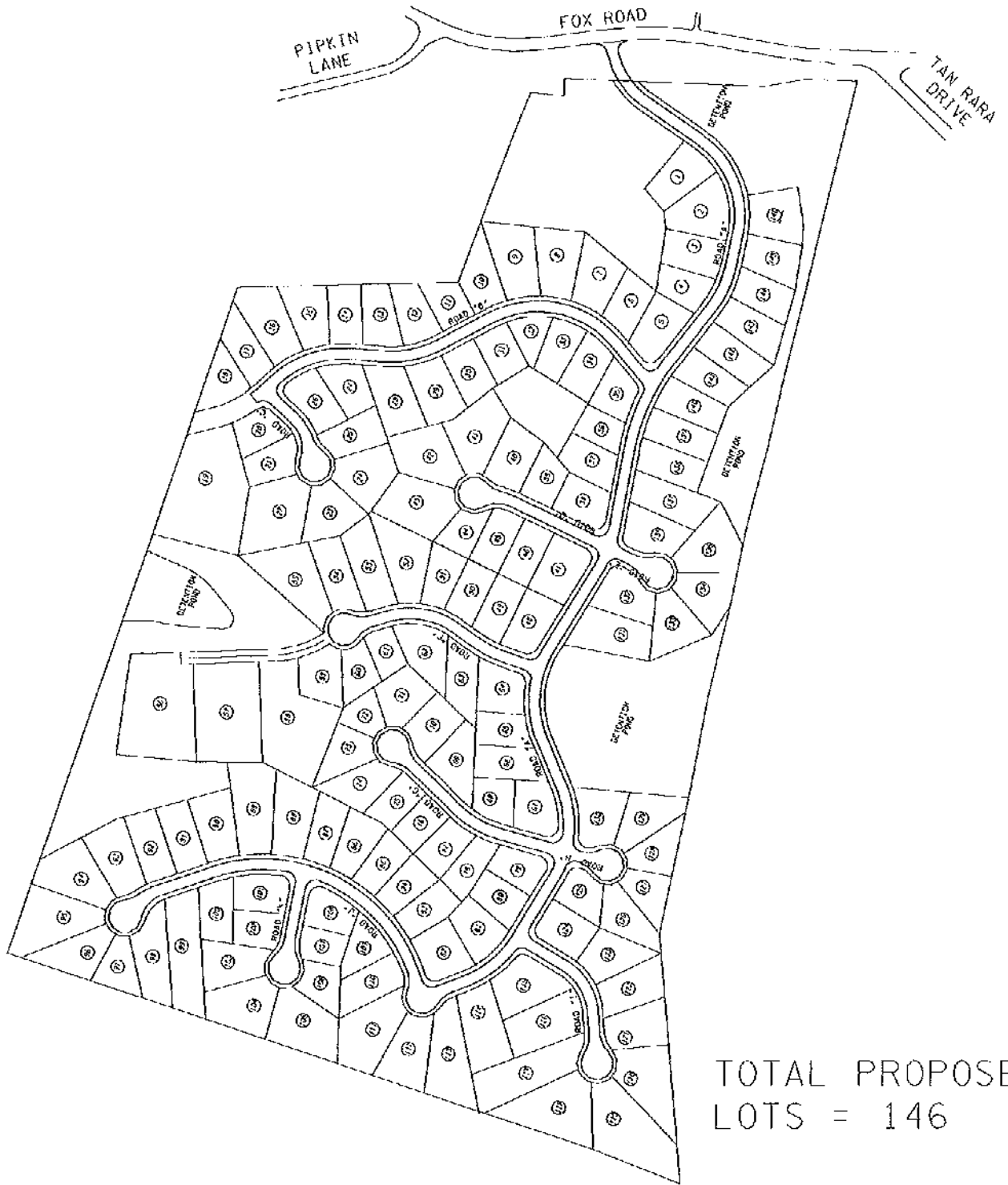
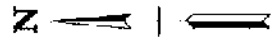
The purpose of this study was the evaluation of the traffic operational and safety impact of the proposed development upon the adjacent portion of Fox Road. Of particular interest was the proposed intersection of Fox Road with the subdivision main entrance roadway.



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FIGURE 1  
LOCATION MAP

FOX ROAD SUBDIVISION  
TRAFFIC IMPACT STUDY



TOTAL PROPOSED  
LOTS = 146



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FIGURE 2  
SITE PLAN

FOX ROAD SUBDIVISION  
TRAFFIC IMPACT STUDY

## EXISTING CONDITIONS

### Existing Roadway Conditions

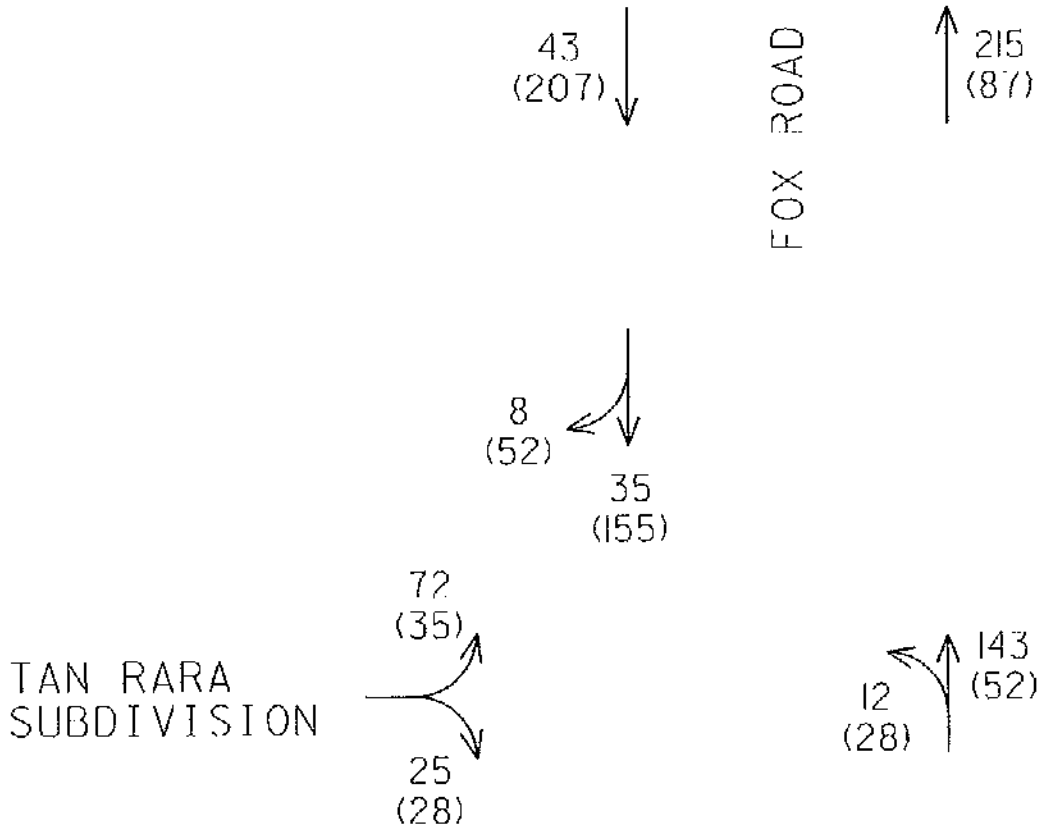
Fox Road is a two-lane roadway that is classified by the Knoxville-Knox County Metropolitan Planning Commission (MPC) as a Minor Collector roadway. It is within the City limits of the City of Knoxville at the study location, and is thus maintained by the City of Knoxville. The roadway pavement consists of two 11-foot traffic lanes and two 5-foot paved shoulders. The speed limit is posted as 30 mph departing Kingston Pike, with no signing in the immediate vicinity of the proposed subdivision.

### Existing Traffic Data

A traffic count station for collecting average daily traffic data (ADT) is located on Fox Road, a few hundred feet south of the proposed subdivision roadway. The most recent data was provided by MPC, with resulting ADTs of 2520 for year 2001 and 2686 for year 2003. A raw data summary sheet for the year 2003 count is contained in the APPENDIX.

In order to collect more refined data, and to establish a basis for trip distribution patterns, turning movement traffic counts were collected at the intersection of Fox Road and the Tan Rara Subdivision intersection, which is approximately 700 feet south of the proposed Fox Road Subdivision intersection. These counts were conducted during the A.M. and P.M. peak hours as established with the year 2003 ADT counts above. Raw data summary sheets for these counts are contained in the APPENDIX.

In addition to helping establish trip distribution patterns, these turning movement counts were used to establish the existing-background traffic volumes for this study. Specifically, the north-leg volumes from the counted intersection were used for this, as displayed on FIGURE 3. These volumes are the count data adjusted to an average weekday basis using adjustment factors developed by the University of Tennessee Transportation Research Center. In addition, another factor was applied to the A.M. data to adjust for the presence of school traffic. This was necessary since the turning movement counts were conducted after the closure for summer break of the nearby West Valley Middle School. The year 2003 ADT counts were conducted while school was in session, and they were used to develop the adjustment factor. See FIGURE 3 for additional information on these adjustments.



TOP NO. - A.M. PEAK HOUR (7:30 - 8:30 A.M.) - A.M. AWD FACTOR = 0.98 (WED. IN JUNE)  
(BOTTOM NO.) - P.M. PEAK HOUR (5:00 P.M. - 6:00 P.M.) - P.M. AWD FACTOR = 0.99 (TUES. IN JUNE)

NOTE:  
THE DATA SHOWN ARE THE RAW TRAFFIC COUNT DATA TIMES A FACTOR TO ADJUST TO AN AVERAGE WEEKDAY VOLUME FROM COUNTS TAKEN IN JUNE. SEE APPENDIX FOR RAW COUNT DATA AND FACTOR TABLE. (FACTORS DEVELOPED BY THE UNIVERSITY OF TENNESSEE TRANSPORTATION RESEARCH CENTER). IN ADDITION, RAW A.M. COUNTS WERE MULTIPLIED BY A FACTOR OF 1.235 TO ADJUST COUNTS FOR SCHOOL TRAFFIC (COUNTS TAKEN IN EARLY JUNE - SCHOOL OUT). THIS FACTOR DEVELOPED FROM MPC MACHINE COUNT DATA TAKEN WHEN SCHOOL WAS IN SESSION.



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FIGURE 3  
EXISTING BACKGROUND TRAFFIC DATA

FOX ROAD SUBDIVISION  
TRAFFIC IMPACT STUDY



### Level of Service Evaluation

Intersection Capacity Analyses employing the methods of the Highway Capacity Manual (HCM 2000) were used to evaluate the proposed study intersection of Fox Road and the Fox Road Subdivision access roadway. However, since this intersection will not exist until the subdivision is constructed, such analyses were not possible for existing conditions. It should be noted that due to the low existing traffic volumes, Fox Road almost certainly currently operates at a Level of Service "A". Please see the following section for an explanation and discussion of Level of Service concepts.

### Level of Service Concepts

In a general sense, a roadway is similar to a pipeline or other material carrying conduit in that it has a certain capacity for the amount of material (vehicles) that it can efficiently carry. As the number of vehicles in a given time period gradually increases, the quality of traffic flow gradually decreases. On roadway sections this results in increasing turbulence in the traffic stream, and at intersections it results in increasing stops and delay. As the volumes begin to approach the capacity of the facility, these problems rapidly magnify, with resulting serious levels of congestion, stops, delay, excess fuel consumption, pollutant emissions, etc.

The Federal Highway Administration has published the Year 2000 Highway Capacity Manual (HCM2000), which establishes theoretical techniques to quantify the capacity conditions on all types of roadways, intersections, ramps, pedestrian facilities, etc. A basic concept that is applicable to most of these techniques is the idea of level of service (LOS). This concept establishes a rating system that quantifies the quality of traffic flow, as perceived by motorists and/or passengers. The general system is similar to a school grade scale, and is outlined as follows:

<u>Level of Service (LOS)</u>	<u>General Quality of Traffic Flow</u>	<u>Description of Corresponding Conditions</u>
A	Excellent	Roadways – Free flow, high maneuverability Intersections – Very few stops, very low delay
B	Very Good	Roadways – Free flow, slightly lower maneuverability Intersections – Minor stops, low delay
C	Good	Roadways – Stable flow, restricted maneuverability Intersections – Significant stops, significant delay
D	Fair	Roadways – Marginally stable flow, congestion seriously restricts maneuverability Intersections – High stops, long but tolerable delay
E	Poor	Roadways – Unstable flow*, lower operating speeds, congestion severely restricts maneuverability Intersections – All vehicles stop, very long queues and very long intolerable delay
F	Very Poor	Roadways – Forced flow, stoppages may be lengthy, congestion severely restricts maneuverability Intersections – All vehicles stop, extensive queues and extremely long intolerable delay

\*Unstable flow is such that minor fluctuations or disruptions can result in rapid degradation to LOS F.

## PROPOSED CONDITIONS

### Background Traffic Growth

The anticipated time for full build-out of the Fox Road Subdivision is 5 years. Therefore, year 2008 was established as the appropriate design/analysis year for this study. In order to determine traffic volumes resulting solely from background traffic growth to year 2008, it was necessary to establish an annual growth rate for existing traffic. The ADT values that were previously discussed represent a 3.1 percent annual growth. Projecting this growth pattern forward, and rounding up to be conservative, results in an annual growth rate of 3.5 percent. FIGURE 4 contains the background traffic volumes that would result from a 3.5 percent annual growth from year 2003 to 2008.

### Trip Generation

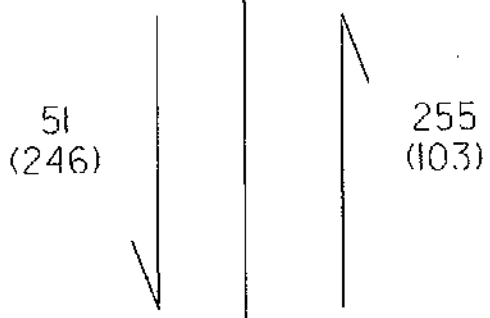
In order to estimate the expected traffic volumes to be generated by full build-out of the proposed Fox Road Subdivision, the data and procedures of *Trip Generation, Sixth Edition* (Institute of Transportation Engineers, 1997) were utilized. The generated traffic volumes were determined based on the total weekday morning, and evening peak hour of adjacent street traffic regression equations for single-family detached housing development (Land Use Code 210, Volume 1, pages 263 to 265). As noted earlier in this report, the anticipated number of units upon full build-out is 146, which was used to determine the number of new trips generated. TABLE 1 summarizes the number and directional split of entering and exiting trips for peak periods for the proposed subdivision.

FOX ROAD SUBDIVISION – 146 LOTS					
	Total New Trips	% Entering	% Exiting	Number Entering	Number Exiting
Weekday	1468	50%	50%	734	734
A.M. Peak	112	25%	75%	28	84
P.M. Peak	151	64%	36%	97	54



FOX ROAD

FOX ROAD  
SUBDIVISION



VOLUME  
LEGEND  
AM  
(PM)



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FIGURE 4  
PEAK HOUR TRAFFIC VOLUMES  
BACKGROUND TRAFFIC - YEAR 2008

FOX ROAD SUBDIVISION  
TRAFFIC IMPACT STUDY

### Trip Distribution

FIGURE 5 provides a summary of the trip generation patterns developed for the proposed subdivision intersection with Fox Road, which were based on the existing patterns at the nearby (700 feet south) intersection of Fox Road and the Tan Rara Subdivision. Because these intersections will be in close proximity and along the same roadway, it was assumed that their trip distribution patterns would be very similar. In addition, FIGURE 5 also provides the generated traffic volumes as assigned to the local roadway network in accordance with these patterns. FIGURE 6 shows the combined year 2005 volumes reflecting the existing traffic, the background traffic growth, and the newly generated traffic from Fox Road Subdivision at full build-out. These are the volumes used in the analysis of full build-out conditions.



FOX ROAD

	NO.	%
AM	11	40%
PM	63	65%

	NO.	%
AM	62	74%
PM	30	56%

FOX ROAD  
SUBDIVISION

	NO.	%
AM	22	26%
PM	24	44%

	NO.	%
AM	17	60%
PM	34	35%

TOTAL GENERATED TRIPS		
	ENTER	EXIT
AM	28	81
PM	97	54

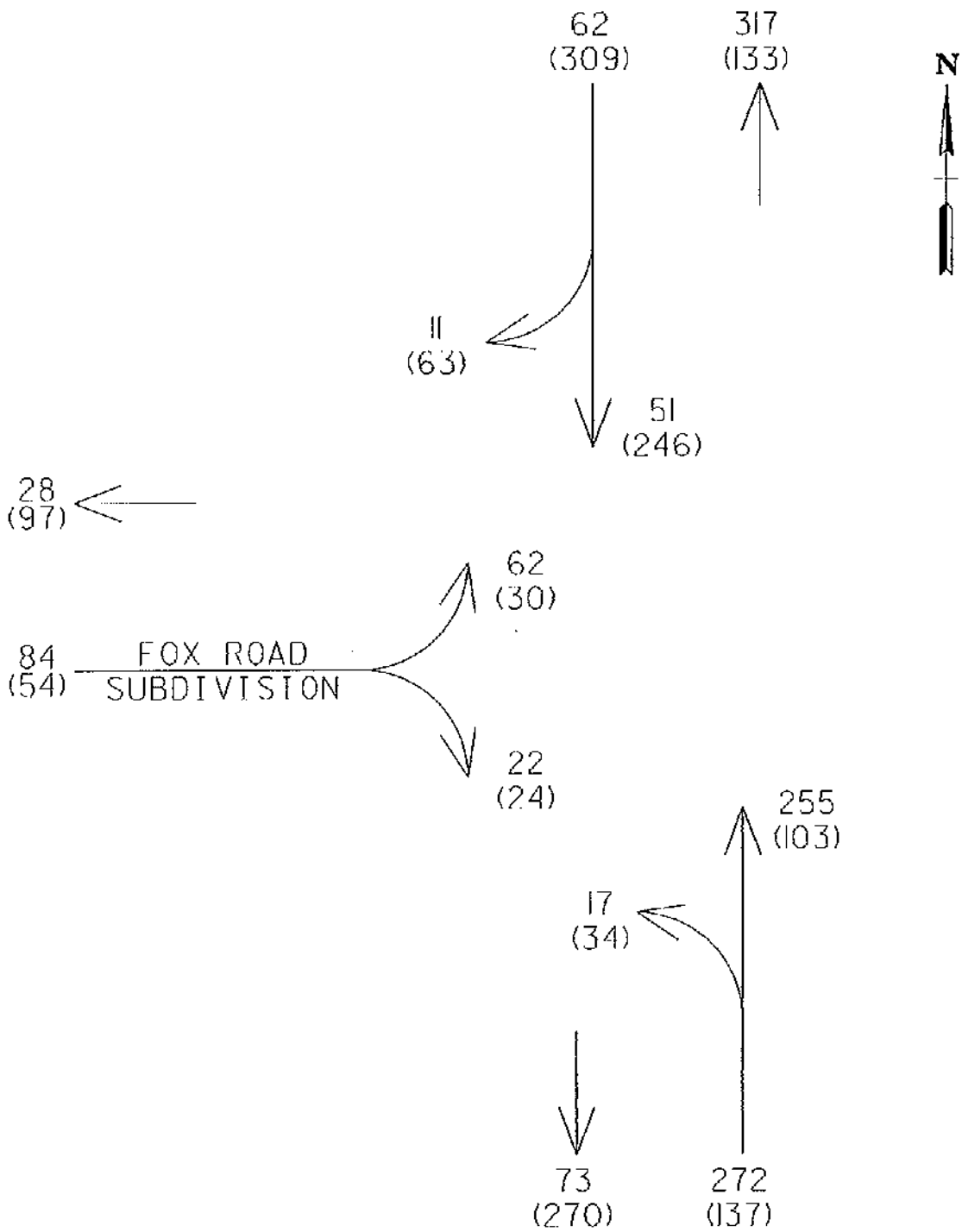
NOTE:  
ENTER/EXIT DISTRIBUTION PERCENTAGES  
ASSUMED SAME AS TAN RARA SUBDIVISION.



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**FIGURE 5**  
TRIP DISTRIBUTION PATTERNS AND ASSIGNMENT  
OF GENERATED TRAFFIC

FOX ROAD SUBDIVISION  
TRAFFIC IMPACT STUDY



VOLUME  
LEGEND

AM  
(PM)

NOTE: VOLUMES SHOWN ARE  
PROJECTED FULL BUILD-OUT  
VOLUMES FOR YEAR 2008.



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FIGURE 6  
COMBINED VOLUMES FOR ANALYSIS

FOX ROAD SUBDIVISION  
TRAFFIC IMPACT STUDY

### Proposed Level-of-Service

Unsignalized intersection capacity analyses were conducted utilizing the combined traffic volumes of FIGURE 6, at the proposed intersection of Fox Road and the Fox Road Subdivision access roadway. The results indicate that all traffic movements are expected to operate at level-of-service "A" or "B" during both peak hours. These results are summarized on the "Two-Way Stop Control Summary" printouts contained in the APPENDIX.

### Intersection Sight Distance and Other Issues

A field review was conducted to identify any sight distance problems, geometric problems or other issues of concern that could impact the proposed subdivision. The results of this review are summarized below:

#### 1) Sight Distance for Vehicles Exiting the Proposed Subdivision:

Looking left (north) from a STOP position at Fox Road, on the proposed subdivision roadway, the sight distance is approximately 500 feet. Looking right (south) from the same STOP position, the sight distance is approximately 350 feet.

The posted speed limit on Fox Road is 30 mph. However, when establishing the required sight distance, it is good practice to consider higher speeds where appropriate. Therefore, in consideration of observed approach speeds in excess of 30 mph, it is recommended that sight distance be provided for a minimum of 40 mph (400 feet).

Based on the above information, there is an existing sight distance problem looking south. However, the source of the restricted sight distance is trees and brush located along the frontage of the subdivision property. The cutting down and trimming of these trees and brush will provide the required sight distance, and in fact will likely provide in excess of 500 feet of total sight distance looking south.

#### 3) Auxiliary Lanes for Proposed Subdivision Intersection:

Left and right turn lane warrant analyses were conducted for the proposed subdivision intersection. These analyses employed Tables 5A and 5B from turn lane warrants developed by Harmelink. The results were that the anticipated traffic volumes are not sufficient to satisfy the minimum warrants. Therefore, auxiliary turn lanes are not warranted. Copies of Tables 5A and 5B are located in the APPENDIX for review.



## CONCLUSIONS AND RECOMMENDATIONS

It is the primary conclusion of this study that no significant traffic volume related impacts will result from the development of the Fox Road Subdivision. In fact, capacity analyses of proposed side street (2-way) stop traffic control, indicates that very good conditions (LOS "B" or better) can be expected during all time periods. In addition, analyses of the need for auxiliary traffic lanes such as left and right turning lanes, indicates that no such lanes will be warranted under the anticipated traffic conditions.

Intersection turning sight distance is the only issue of significant concern that was identified in this study. Specifically, the sight distance looking south from the proposed subdivision access roadway intersection at Fox Road was found to be somewhat deficient. However, it was determined that the cutting down and trimming of some trees and brush would provide more than the required sight distance. Therefore, such action to provide the required sight distance is recommended prior to opening the subdivision roadways to traffic.

**APPENDIX**

ADT - 2686

Weather :  
Counted by :  
Board # :  
Other :

Knoxville/Knox County MPC  
2003 Knox County  
factored

Site Code : 000000000117  
Start Date : 04/06/2003  
File I.D. : PSITE317  
Page : 1

Begin Time	Sun. 04/06		Mon. 04/07		NB Combined		SB Combined	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00	*	*	*	*	1	24	0	19
12:15	*	*	*	*	0	14	0	15
12:30	*	*	*	*	2	28	0	14
12:45	*	*	*	*	3	11	0	18
01:00	*	*	*	*	0	24	0	15
01:15	*	*	*	*	0	19	0	23
01:30	*	*	*	*	0	31	0	28
01:45	*	*	*	*	0	15	0	20
02:00	*	*	*	*	1	23	0	12
02:15	*	*	*	*	0	16	0	15
02:30	*	*	*	*	0	29	0	18
02:45	*	*	*	*	0	21	0	17
03:00	*	*	*	*	0	28	0	21
03:15	*	*	*	*	0	29	0	18
03:30	*	*	*	*	1	23	0	21
03:45	*	*	*	*	0	36	1	39
04:00	*	*	*	*	0	37	0	22
04:15	*	*	*	*	0	33	1	22
04:30	*	*	*	*	0	41	3	23
04:45	*	*	*	*	1	40	1	19
05:00	*	*	*	*	0	51	5	23
05:15	*	*	*	*	0	52	4	19
05:30	*	*	*	*	0	44	5	23
05:45	*	*	*	*	0	41	5	21
06:00	*	*	*	*	0	34	11	18
06:15	*	*	*	*	1	37	13	19
06:30	*	*	*	*	2	27	14	20
06:45	*	1	*	0	4	47	14	21
07:00	*	18	*	17	8	26	22	18
07:15	*	11	*	11	8	23	35	12
07:30	*	20	*	12	12	27	51	12
07:45	*	14	*	9	17	23	57	10
08:00	*	17	*	9	8	19	55	9
08:15	*	12	*	4	7	21	56	12
08:30	*	8	*	5	8	20	36	15
08:45	*	4	*	3	11	23	23	6
09:00	*	12	*	5	15	18	19	3
09:15	*	12	*	5	10	16	20	4
09:30	*	9	*	5	2	7	23	6
09:45	*	5	*	4	10	12	17	3
10:00	*	5	*	3	8	9	20	3
10:15	*	7	*	3	8	5	11	3
10:30	*	3	*	3	15	5	15	1
10:45	*	2	*	2	8	5	19	1
11:00	*	2	*	1	23	3	12	2
11:15	*	2	*	4	14	4	23	3
11:30	*	0	*	3	16	2	13	3
11:45	*	3	*	0	22	2	18	0
Totals	0	174	0	108	0	282	248	1125
Day Totals		174		108		282		1373
↓ Total	.0%	61.7%	.0%	38.3%			9.2%	41.8%
Peaks		07:00		07:00		07:00		11:00
Volume		70		49		119		75
P.H.F.		.87		.72		.85		.81

5-6 PM

7:30  
8:30

ADT (2001) = 2520  
(From MPC Web site)

# Traffic Count

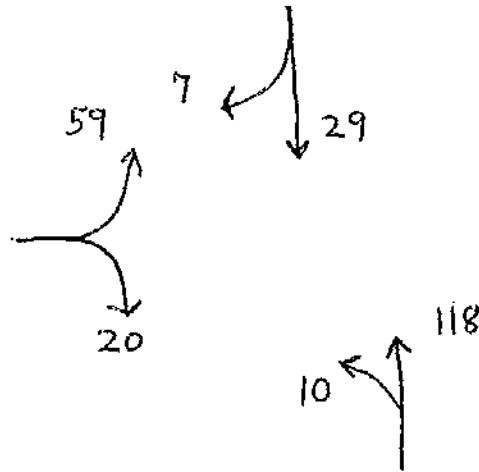
Default Comments  
 Change These in The Preferences Window  
 Select File/Preference in the Main Scree  
 Then Click the Comments Tab

File Name : untitled25  
 Site Code : 00000000  
 Start Date : 06/04/2003  
 Page No : 1

Groups Printed- Unshifted

Start Time Factor	FOX RD. From North				TAN RARA From East				FOX RD. From South				TAN RARA From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
07:30 AM	1	6	0	0	0	0	0	0	0	47	3	0	3	0	24	0	84
07:45 AM	1	6	0	0	0	0	0	0	0	32	1	0	6	0	12	0	58
Total	2	12	0	0	0	0	0	0	0	79	4	0	9	0	36	0	142
08:00 AM	4	9	0	0	0	0	0	0	0	25	4	0	6	0	6	0	54
08:15 AM	1	8	0	0	0	0	0	0	0	14	2	0	5	0	17	0	47
Grand Total	7	29	0	0	0	0	0	0	0	118	10	0	20	0	59	0	243
Apprch %	19.4	80.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	92.2	7.8	0.0	25.3	0.0	74.7	0.0	
Total %	2.9	11.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.6	4.1	0.0	8.2	0.0	24.3	0.0	

36 ↓ ↑ 177



AM Peak Hour  
 7:30 - 8:30 AM  
PHF = 0.72

# Traffic Count

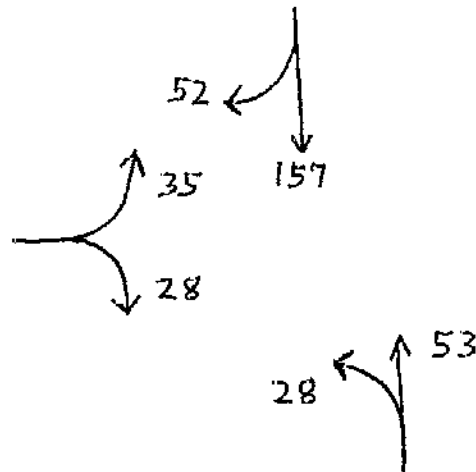
Default Comments  
 Change These in The Preferences Window  
 Select File/Preference in the Main Scree  
 Then Click the Comments Tab

File Name : untitled24  
 Site Code : 00000000  
 Start Date : 06/03/2003  
 Page No : 1

Groups Printed- Unshifted

Start Time	FOX RD. From North				TAN RARA From East				FOX RD. From South				TAN RARA From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
05:00 PM	17	43	0	0	0	0	0	0	0	16	6	0	8	0	7	0	97
05:15 PM	12	40	0	0	0	0	0	0	0	13	7	0	9	0	6	0	87
05:30 PM	9	43	0	0	0	0	0	0	0	12	9	0	6	0	13	0	92
05:45 PM	14	31	0	0	0	0	0	0	0	12	6	0	5	0	9	0	77
<b>Total</b>	<b>52</b>	<b>157</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>53</b>	<b>28</b>	<b>0</b>	<b>28</b>	<b>0</b>	<b>35</b>	<b>0</b>	<b>353</b>
<b>Grand Total</b>	<b>52</b>	<b>157</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>53</b>	<b>28</b>	<b>0</b>	<b>28</b>	<b>0</b>	<b>35</b>	<b>0</b>	<b>353</b>
Apprch %	24.9	75.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65.4	34.6	0.0	44.4	0.0	55.6	0.0	
Total %	14.7	44.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	7.9	0.0	7.9	0.0	9.9	0.0	

209 ↓ ↑ 88



PM Peak Hour  
 5:00 - 6:00 PM  
PHF = 0.91

**TRAFFIC VOLUME ADJUSTMENT FACTORS TO BE USED WITH "TRAFFIC SIGNAL WARRANT ANALYSIS - VOLUME WARRANTS"**  
 Prepared and Distributed by the Tennessee Transportation Assistance Program

**TABLE A**  
 Monthly/Day of Week Urban Area Adjustment Factors<sup>2</sup> - Average Day  
 (Multiply actual count by given factor to obtain estimated average day volumes for a similar time period<sup>3</sup>.)

	January	February	March	April	May	June	July	August	September	October	November	December
Sunday	1.60	1.49	1.40	1.37	1.34	1.25	1.30	1.32	1.35	1.36	1.37	1.48
Monday	1.04	1.00	0.97	0.94	0.93	0.91	0.92	0.93	0.94	0.96	0.98	1.03
Tuesday	1.00	0.99	0.95	0.94	0.93	0.91	0.91	0.92	0.93	0.94	0.96	0.97
Wednesday	1.01	0.99	0.95	0.92	0.92	0.90	0.91	0.92	0.93	0.94	0.95	0.94
Thursday	0.99	0.97	0.93	0.90	0.89	0.88	0.89	0.90	0.90	0.92	0.93	0.93
Friday	0.91	0.89	0.87	0.85	0.83	0.81	0.84	0.83	0.83	0.86	0.92	0.86
Saturday	1.22	1.15	1.09	1.11	1.10	1.04	1.06	1.07	1.11	1.11	1.16	1.15

**TABLE B**  
 Monthly/Day of Week Urban Area Adjustment Factors<sup>2</sup> - Average Weekday  
 (Multiply actual count by given factor to obtain estimated average weekday volumes for a similar time period<sup>3</sup>.)

	January	February	March	April	May	June	July	August	September	October	November	December
Monday	1.13	1.08	1.05	1.02	1.01	0.99	1.00	1.01	1.02	1.06	1.06	1.12
Tuesday	1.08	1.07	1.03	1.02	1.01	0.99	0.98	1.00	1.01	1.02	1.04	1.05
Wednesday	1.09	1.07	1.03	1.00	1.00	0.98	0.99	1.00	1.01	1.02	1.03	1.02
Thursday	1.07	1.05	1.01	0.98	0.96	0.95	0.96	0.98	0.98	1.00	1.01	1.01
Friday	0.99	0.96	0.94	0.92	0.90	0.88	0.91	0.90	0.90	0.93	1.00	0.93

**TABLE C**  
 Monthly/Day of Week Urban Area Adjustment Factors<sup>2</sup> - Average Friday  
 (Multiply actual count by given factor to obtain estimated average Friday volumes for a similar time period<sup>3</sup>.)

	January	February	March	April	May	June	July	August	September	October	November	December
Monday	1.21	1.17	1.13	1.10	1.09	1.06	1.07	1.09	1.10	1.14	1.14	1.20
Tuesday	1.17	1.16	1.11	1.10	1.09	1.06	1.06	1.07	1.09	1.10	1.12	1.13
Wednesday	1.18	1.16	1.11	1.07	1.07	1.05	1.06	1.07	1.09	1.10	1.11	1.10
Thursday	1.16	1.13	1.09	1.05	1.04	1.03	1.04	1.05	1.05	1.07	1.09	1.09
Friday	1.06	1.04	1.02	0.99	0.97	0.95	0.98	0.97	0.97	1.00	1.07	1.00

Notes: 1. "Traffic Signal Warrant Analysis - Volume Warrants" is a Lotus<sup>®</sup> 1-2-3<sup>®</sup> template distributed by the Tennessee Transportation Assistance Program (TTAP).  
 2. Factors should be applied to State highway and major street volumes only. They should not be applied to volumes on driveways (shopping centers, etc.) or minor streets.  
 3. Counts made on holidays should not be used as a basis for estimating average day, average weekday or average Friday volumes.

Sources: TABLE A - Tennessee Department of Transportation (based on 1988 through 1992 data)  
 TABLES B & C - Developed by T. Dorcy Sullivan, P.E. based on TABLE A data

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	ALC			Intersection	Fox Road / Fox Rd. Subdivision			
Agency/Co.	Cannon & Cannon, Inc.			Jurisdiction	City of Knoxville			
Date Performed	6/6/03			Analysis Year	2008			
Analysis Time Period	AM Peak Hour							
Project Description Fox Road Subdivision Traffic Impact Study								
East/West Street: Fox Road Subdivision				North/South Street: Fox Road				
Intersection Orientation: North-South				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume	17	255	0	0	51	11		
Peak-Hour Factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72		
Hourly Flow Rate, HFR	23	354	0	0	70	15		
Percent Heavy Vehicles	0	--	--	0	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT					TR		
Upstream Signal		0			0			
Minor Street	Westbound			Eastbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume	0	0	0	62	0	22		
Peak-Hour Factor, PHF	0.72	0.72	0.72	0.72	0.72	0.72		
Hourly Flow Rate, HFR	0	0	0	86	0	30		
Percent Heavy Vehicles	0	0	0	1	0	1		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	1	0		
Configuration					LTR			
Delay, Queue Length, and Level of Service								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LTR	
v (vph)	23						116	
C (m) (vph)	1524						611	
v/c	0.02						0.19	
95% queue length	0.05						0.70	
Control Delay	7.4						12.3	
LOS	A						B	
Approach Delay	--	--					12.3	
Approach LOS	--	--					B	

TWO-WAY STOP CONTROL SUMMARY								
<b>General Information</b>				<b>Site Information</b>				
Analyst	ALC			Intersection	Fox Road / Fox Rd. Subdivision			
Agency/Co.	Cannon & Cannon, Inc.			Jurisdiction	City of Knoxville			
Date Performed	6/6/03			Analysis Year	2008			
Analysis Time Period	PM Peak Hour							
Project Description Fox Road Subdivision Traffic Impact Study								
East/West Street: Fox Road Subdivision				North/South Street: Fox Road				
Intersection Orientation: North-South				Study Period (hrs): 0.25				
<b>Vehicle Volumes and Adjustments</b>								
<b>Major Street</b>	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume	34	103	0	0	246	63		
Peak-Hour Factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91		
Hourly Flow Rate, HFR	37	113	0	0	270	69		
Percent Heavy Vehicles	0	--	--	0	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT					TR		
Upstream Signal		0			0			
<b>Minor Street</b>	Westbound			Eastbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume	0	0	0	30	0	24		
Peak-Hour Factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91		
Hourly Flow Rate, HFR	0	0	0	32	0	26		
Percent Heavy Vehicles	0	0	0	1	0	1		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	1	0		
Configuration					LTR			
<b>Delay, Queue Length, and Level of Service</b>								
Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LTR	
v (vph)	37						58	
C (m) (vph)	1231						602	
v/c	0.03						0.10	
95% queue length	0.09						0.32	
Control Delay	8.0						11.6	
LOS	A						B	
Approach Delay	--	--					11.6	
Approach LOS	--	--					B	



TABLE 5A

LEFT-TURN LANE VOLUME THRESHOLDS  
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 MPH

(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	250	180	140	** (110) * PM * 90 LT Vol. = 17	80	70
150 - 199	200	140	105		70	60
200 - 249	160	115	85	75	65	55
250 - 299	130	100	75	65	60	50
300 - 349	** (110) * PM * 100 LT Vol. = 34	90	70	60	55	45
350 - 399		80	65	55	50	40
400 - 449	90	70	60	50	45	35
450 - 499	80	65	55	45	40	30
500 - 549	70	60	45	35	35	25
550 - 599	65	55	40	35	30	25
600 - 649	60	45	35	30	25	25
650 - 699	55	35	35	30	25	20
700 - 749	50	35	30	25	20	20
750 or More	45	35	25	25	20	20

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
100 - 149	70	60	50	45	40	35
150 - 199	60	55	45	40	35	30
200 - 249	55	50	40	35	30	30
250 - 299	50	45	35	30	30	30
300 - 349	45	40	35	30	25	25
350 - 399	40	35	30	25	25	20
400 - 449	35	30	30	25	20	20
450 - 499	30	25	25	20	20	20
500 - 549	25	25	20	20	20	15
550 - 599	25	20	20	20	20	15
600 - 649	25	20	20	20	20	15
650 - 699	20	20	20	20	20	15
700 - 749	20	20	20	15	15	15
750 or More	20	20	20	15	15	15

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

TABLE 5B

RIGHT-TURN LANE VOLUME THRESHOLDS  
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 36 TO 45 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	*AM Peak*					
100 - 149 150 - 199						
200 - 249 250 - 299					Yes	Yes Yes
300 - 349 350 - 399			Yes	Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499		Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes	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	Yes Yes
100 - 149 150 - 199		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	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.