

**TRAFFIC IMPACT STUDY**  
**PROPOSED SCOTCH MEADOWS – UNIT 2**  
**SUBDIVISION**  
**KNOX COUNTY, TENNESSEE**

PREPARED FOR:

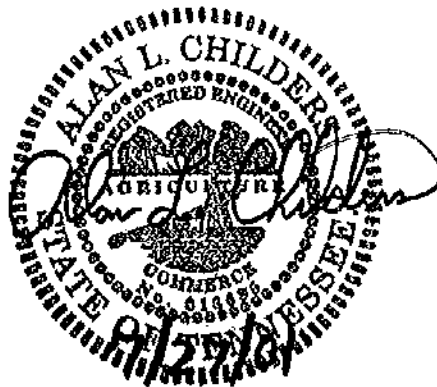
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PREPARED BY:

CANNON & CANNON, INC.  
CIVIL ENGINEERING – FIELD SURVEYING  
9724 KINGSTON PIKE  
SUITE 1100, FRANKLIN SQUARE  
KNOXVILLE, TN 37922  
(865) 670-8555

JULY 26, 2001

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## MANAGEMENT SUMMARY

This report provides a summary of the traffic impact study that was performed for the Scotch Meadows Unit 2 subdivision, which is the second phase of the existing Scotch Meadows subdivision. The project site is located in Northeastern Knox County and is approximately one-quarter mile east of Tazewell Pike (State Route 331) and just north of Emory Road (State Route 131). Interstate 640 is approximately 9 miles to the south. The existing Scotch Meadows subdivision entrance on Emory Road will also serve as the Unit 2 entrance.

This study focused on the evaluation of two intersections: the subdivision entrance on Emory Road, and the intersection of Emory Road and Tazewell Pike. The following summarizes the recommendations that are made to address two concerns that were identified by this evaluation:

1) Intersection Sight Distance at Subdivision Entrance:

It is recommended that some small trees, located primarily on the north side of the eastern leg of the intersection of Findhome Blvd. and Emory Rd., be trimmed. This vegetation removal will address the sight distance concern that was identified during a site field review.

2) Level-of Service at Intersection of Emory Road and Tazewell Pike:

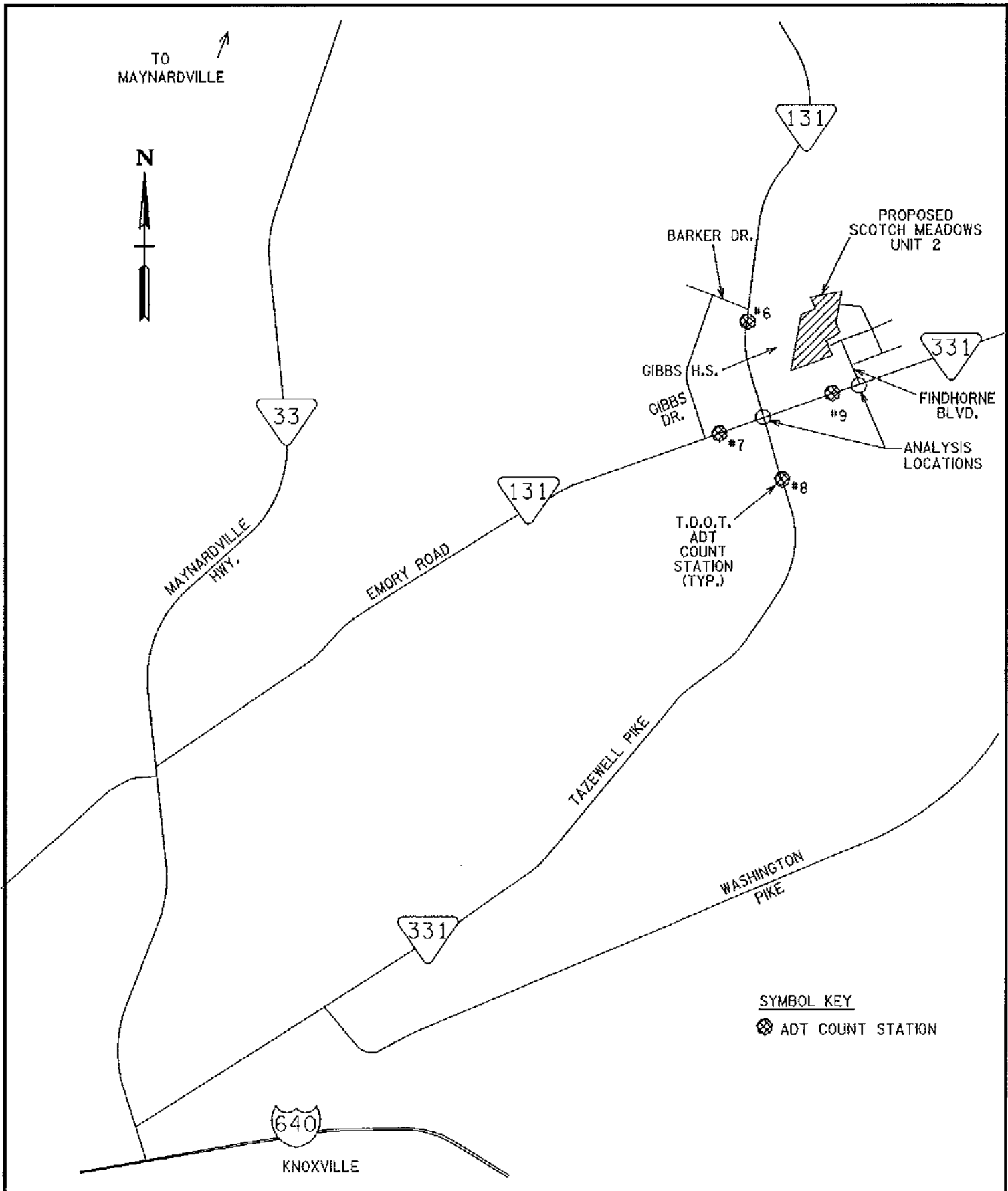
It is recommended that the intersection of Emory Road and Tazewell Pike be signalized. This improvement should be implemented whether or not Scotch Meadows Unit 2 is constructed, because it is clearly justified under existing conditions. An HCS evaluation of existing conditions (Year 2001, all way stop-controlled) shows the intersection operates at a level of service F for both AM and PM peak hours. The intersection would operate at level of service B for both AM and PM under two phase signalization for year 2001. The Signal 2000 analysis of the intersection for the year 2005 (background-growth only) and year 2005 combined (full build-out), using two-phase signalization for AM and PM peak hours, shows improvement to level of services C+(AM) / C (PM) and C (AM) / C(PM) respectively.

## INTRODUCTION

This report provides a summary of the traffic impact study that was performed for the Scotch Meadows Unit 2 subdivision, which is the second phase of the existing Scotch Meadows subdivision. The project site is located in Northeastern Knox County and is approximately one-quarter mile east of Tazewell Pike (State Route 331) and just north of Emory Road (State Route 131). Interstate 640 is approximately 9 miles to the south. 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 expansion of 70 lots at full build-out. The existing Scotch Meadows subdivision entrance on Emory Road will also serve as the Unit 2 entrance. FIGURE 2 provides a detailed layout of the proposed subdivision expansion as shown on the concept plan.

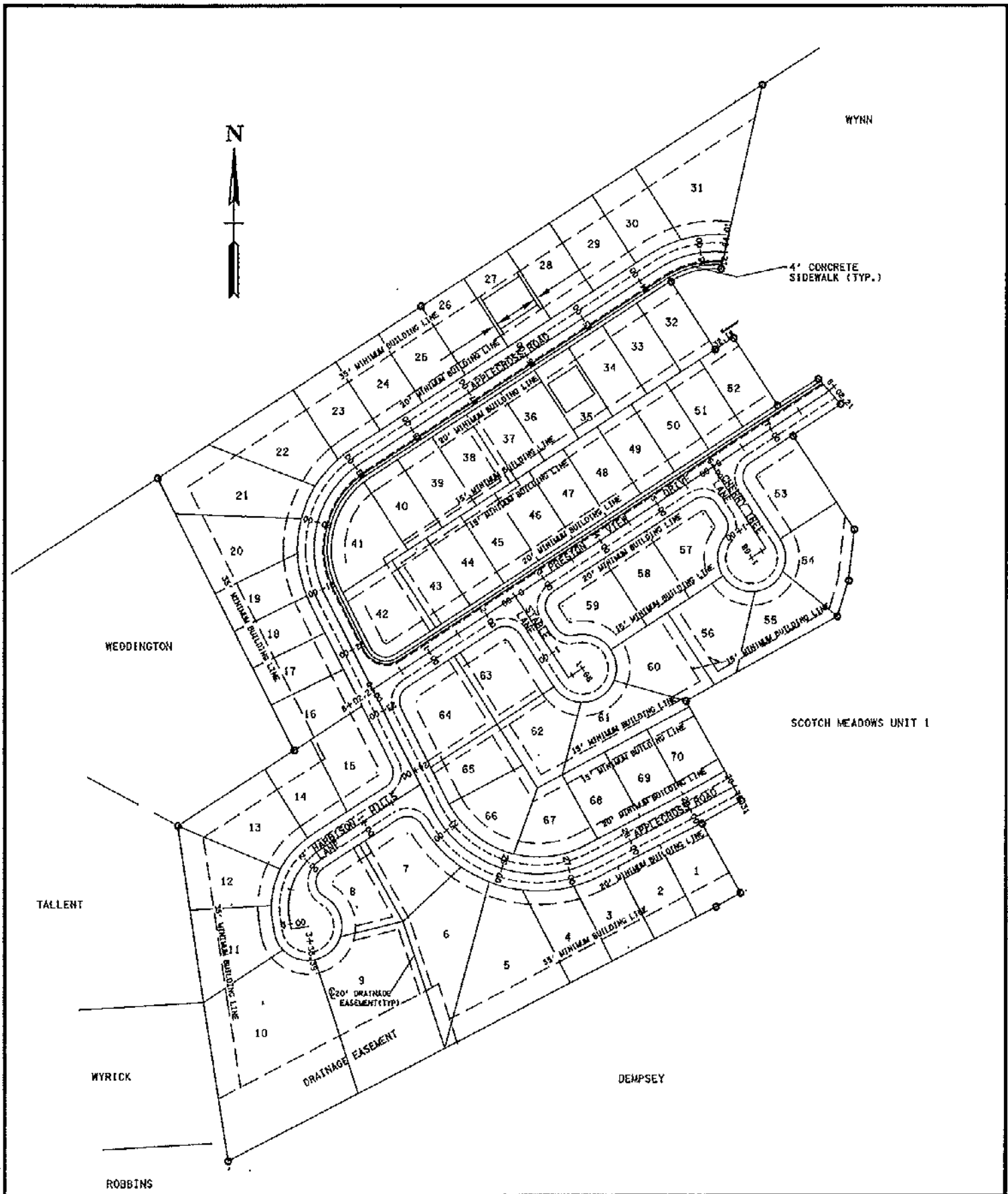
The purpose of this traffic impact study is to assess the impact of the proposed Phase Two of the Scotch Meadows subdivision on the roadway facilities in the project area. Specifically, this assessment includes review of geometric conditions at the intersection of Emory Road and the subdivision entrance roadway (Findhorne Blvd.), and a traffic and capacity assessment at the nearby intersection of Emory Road and Tazewell Pike. The latter assessment was conducted at the request of Knox County, instead of conducting a similar review at Emory Road and Findhorne Blvd.



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**FIGURE 1**  
LOCATION MAP

SCOTCH MEADOWS - UNIT 2  
TRAFFIC IMPACT STUDY



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**FIGURE 2**  
SITE PLAN

SCOTCH MEADOWS - UNIT 2  
TRAFFIC IMPACT STUDY



## EXISTING CONDITIONS

### Existing Roadway Conditions

Findhorne Blvd. is a subdivision type local street with concrete curbs, and a landscaped median at its intersection with Emory Road. The roadway section changes to a standard 26-foot pavement width several hundred feet into the subdivision. Emory Road, which is the road for the subdivision access point, is a two-lane arterial roadway with a pavement width of approximately 23 feet. It is a state maintained facility (State Route 131) and is classified by the Tennessee Department of Transportation (TDOT) as a state secondary highway. The posted speed limit is 40 MPH and the roadway is striped with a double solid yellow centerline and white solid edge-lines to delineate the two traffic lanes, which are approximately 11 feet in width. The intersection of Emory Road and Tazewell Pike is a four leg intersection, with Emory Road being the East-West street and Tazewell Pike being the North-South street. Tazewell Pike is also a two-lane arterial state maintained secondary highway (State Route 331). Lane widths and pavement striping are similar to Emory Road, and the posted speed limit is also 40 MPH.

### Existing Traffic Data

The Tennessee Department of Transportation (TDOT) collects average daily traffic data (ADT) annually on Emory Road and Tazewell Pike. Figure 1 identifies the locations of the ADT count stations which are located near the proposed subdivision site. Table 1 below summarizes this count data for the past five years.

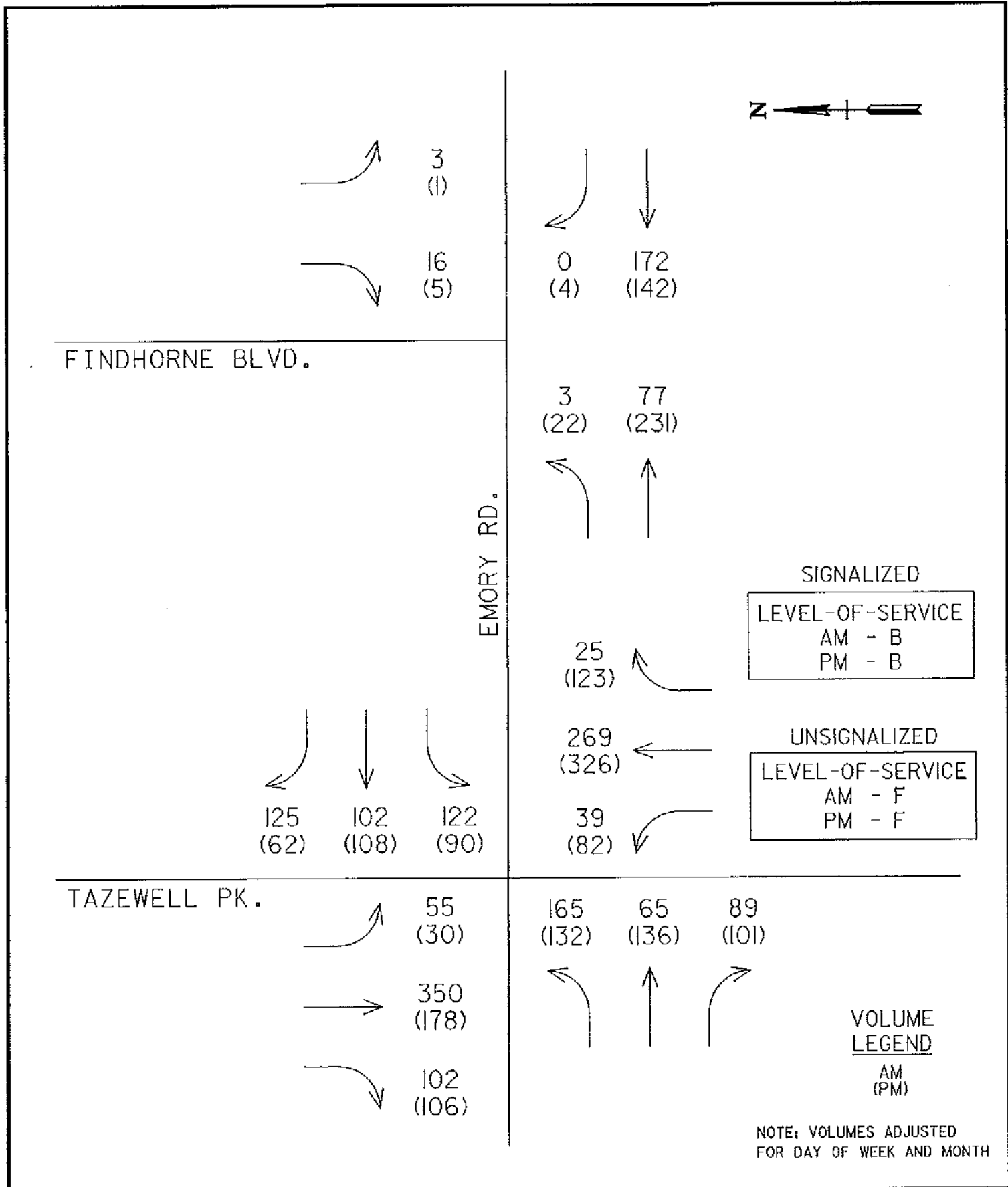
**Table 1**

TDOT Average Daily Traffic Count Summary

Year	Station 6	Station 7	Station 8	Station 9
1995	6576	5829	9137	4456
1996	9834	7946	9000	6348
1997	8049	7032	11014	5515
1998	7950	6360	8830	5376
1999	7760	7510	9320	5740

For purposes of this study, turning movement count data were collected for the intersections of Emory Road at Tazewell Pike on January 27, 2000, and Emory Road at Findhorne Blvd. (subdivision entrance) on June 27, 2001, for the morning and afternoon peak periods. The peak hour traffic periods were determined to be between 7:30 and 8:30 AM and between 4:30 and 5:30 PM. The peak hour volume data were adjusted to an average weekday basis, using factors contained in "Traffic Volume Adjustment Factors to be used with traffic Signal Warrant Analysis -- Volume Warrants" distributed by the Tennessee Transportation Assistance Program. The average weekday adjustment factor for a Wednesday in June is 0.98, and this is the value that was used for these adjustments. The resulting peak hour traffic volumes are shown on FIGURE 3, while detailed summaries of the raw traffic count data are contained in the APPENDIX for the counts of Emory Rd. at Tazewell Pike and Emory Rd. at Findhorne Blvd.

shown in FIGURE 3 that were derived as discussed above. These analyses employed the procedures of the Highway Capacity Manual (Transportation Research Board, 2000) as contained in the Highway Capacity Software (HCS2000), Release 4.1. The results indicated that the intersection currently operates at level-of-service "F" during both peak hours. A signal study was also performed for current geometry and traffic volumes and the results indicated the intersection would operate at level-of-service "B" during both peak hours for two-phase signalization. These results are summarized in FIGURE 3, with detailed computer printouts located in the APPENDIX.



**FIGURE 3**  
EXISTING PEAK HOUR TRAFFIC VOLUMES (2001)

SCOTCH MEADOWS - UNIT 2  
TRAFFIC IMPACT STUDY

## PROPOSED CONDITIONS

### Background Traffic Growth

The year 2005 was established as the appropriate design/analysis year for this study. In order to determine traffic volumes resulting solely from background traffic growth, it was necessary to establish an anticipated annual growth rate for existing traffic. The Knox County Department of Engineering and Public Works was consulted on the matter, and it was determined that for the last several years, growth rates in the area surrounding the proposed subdivision have been in the three to four percent range. For purposes of this study, a different annual growth rate was selected for each leg of the Emory Road and Tazewell Pike intersection. The East, South, and West legs used four percent growth while the Northern leg used three percent growth. FIGURE 4 contains the background traffic volumes that would result from growth from year 2001 to 2005, at the intersection of Emory Road and Tazewell Pike.

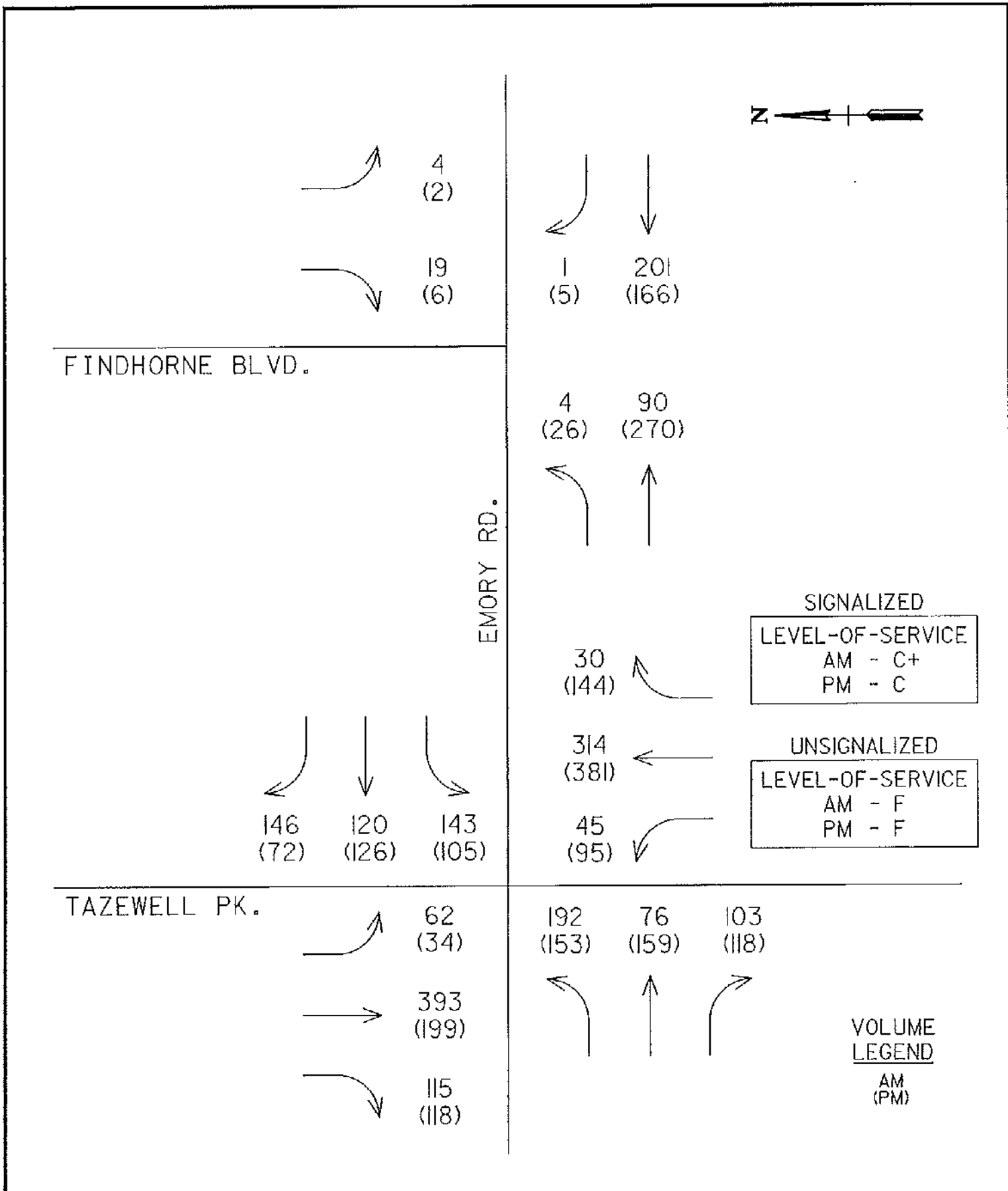
### Trip Generation

In order to project the expected traffic volumes to be generated by full build-out of the proposed Scotch Meadows Unit 2 subdivision phase, 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 morning and evening peak hour of adjacent street regression equations for single-family detached housing developments (Land Use Code 210, Volume 1, pages 264 and 265). As noted earlier in this report, the anticipated number of units upon full build-out is 70, which was used to determine the number of new trips generated. TABLE 2 summarizes the number and directional split of entering and exiting trips for the peak periods.

**Table 2**

**Trip Generation Summary**

	New Trips	% Entering	% Exiting	Number Entering	Number Exiting
AM Peak	59	25	75	15	44
PM Peak	78	64	36	50	28



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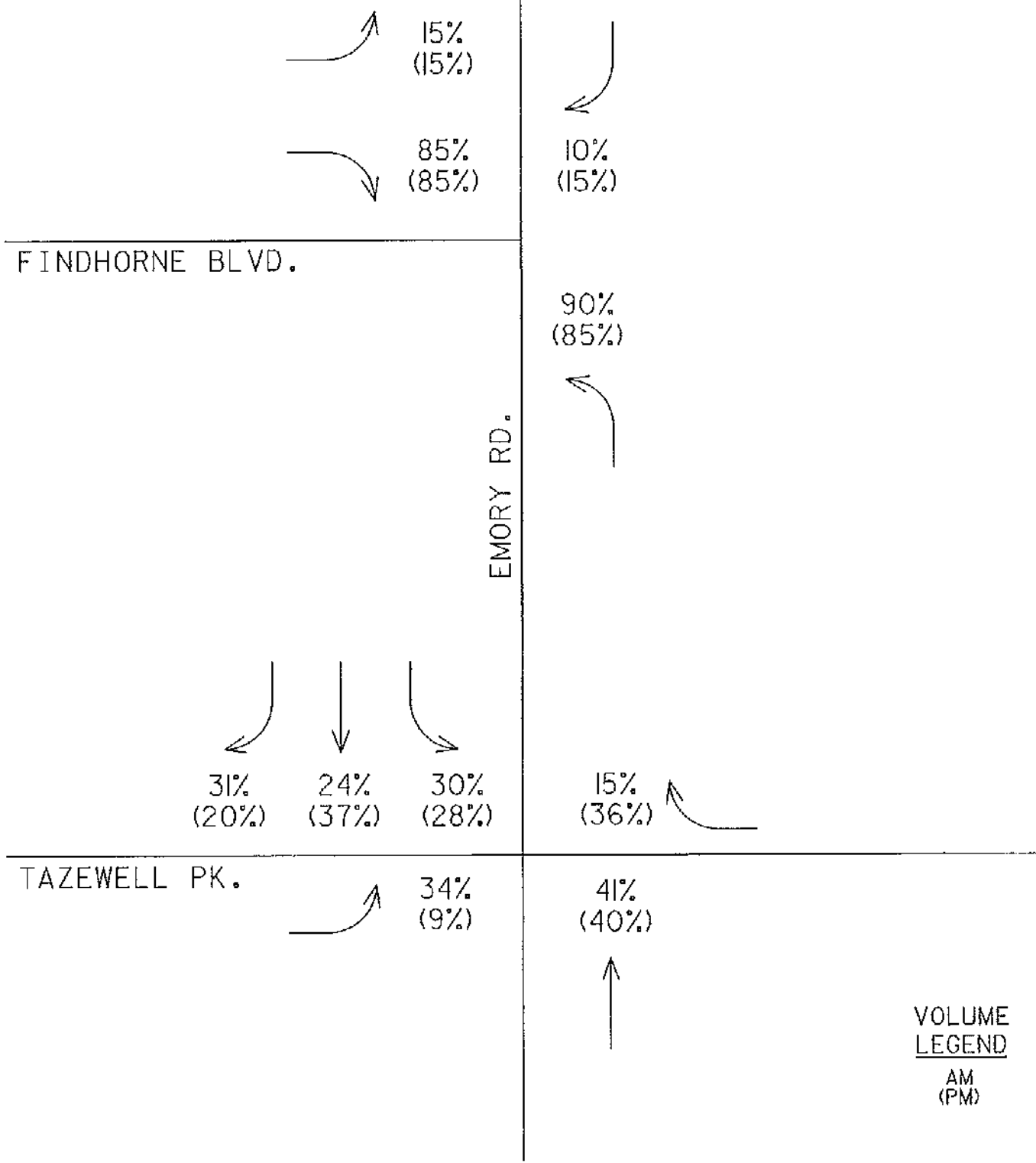
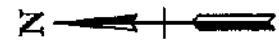
**FIGURE 4**  
PEAK HOUR TRAFFIC VOLUMES  
WITH BACKGROUND GROWTH - YEAR 2005

SCOTCH MEADOWS - UNIT 2  
TRAFFIC IMPACT STUDY

### Trip Distribution

A review of the proposed subdivision concept site plan led to the assumption that all of the generated traffic at full build-out will use the Findhorne at Emory Road subdivision entrance intersection. FIGURE 5 provides a summary of the trip distribution patterns developed for the intersection of Emory Road and Tazewell Pike and the subdivision entrance. These patterns were developed based on counts and assessment of the patterns of existing traffic. In addition, FIGURE 6 provides the generated traffic volumes that were applied to the local roadway network in accordance with these trip distribution patterns. FIGURE 7 shows the combined year 2005 volumes reflecting the existing traffic, the background traffic growth, and the newly generated traffic from the Scotch Meadows Unit 2 subdivision at full build-out. Also shown on FIGURE 7 are summaries of unsignalized and signalized intersection capacity analyses for the intersection of Emory Road and Tazewell Pike.



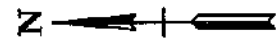


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**FIGURE 5**

TRIP DISTRIBUTION VOLUMES

SCOTCH MEADOWS - UNIT 2  
TRAFFIC IMPACT STUDY



7  
(4)

37  
(24)

1  
(7)

FINDHORNE BLVD.

14  
(43)

EMORY RD.

13  
(6)

11  
(10)

13  
(8)

3  
(19)

TAZEWELL PK.

5  
(4)

6  
(20)

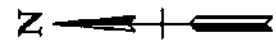
VOLUME  
LEGEND  
AM  
(PM)



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**FIGURE 6**  
PEAK HOUR GENERATED VOLUMES

SCOTCH MEADOWS - UNIT 2  
TRAFFIC IMPACT STUDY



↗ 11  
(6)

↘ 56  
(30)

↙ 2  
(12)

↓ 201  
(166)

FINDHORNE BLVD.

↙ 18  
(69)

↑ 90  
(270)

EMORY RD.

SIGNALIZED  
LEVEL-OF-SERVICE  
AM - C  
PM - C

↙ 159  
(78)

↓ 131  
(136)

↘ 156  
(113)

↙ 33  
(163)

← 314  
(381)

UNSIGNALIZED  
LEVEL-OF-SERVICE  
AM - F  
PM - F

↘ 45  
(95)

TAZEWELL PK.

↗ 67  
(38)

→ 393  
(199)

↘ 115  
(118)

↙ 192  
(153)

↑ 82  
(179)

↗ 103  
(118)

VOLUME  
LEGEND  
AM  
(PM)



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**FIGURE 7**  
PEAK HOUR TRAFFIC VOLUMES (COMBINED-YR 2005)  
AND LEVEL-OF-SERVICE SUMMARY

SCOTCH MEADOWS - UNIT 2  
TRAFFIC IMPACT STUDY

### Proposed Level-of-Service

Unsignalized and signalized intersection capacity analyses were conducted utilizing the combined traffic volumes of FIGURE 7, at the intersection of Emory Road and Tazewell Pike. These analyses were conducted in the same fashion as used to determine existing level-of-service. The results indicate that all the relevant traffic movements are anticipated to operate at level-of-service "F" (both AM and PM peaks) if the intersection remains under all-way stop control. A level-of-service "C" can be achieved for both AM and PM peaks with intersection signalization. These results are summarized in FIGURE 7, with detailed computer printouts located 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 in the study area. The results of this review are summarized below:

1) Findhorne Blvd. and Emory Road Sight Distance:

Looking left from a STOP position on Findhorne Blvd., the sight distance at this existing intersection is approximately 360 feet. Looking right, the sight distance is approximately 550 feet. With a speed limit of 40 mph on Emory Road, the required sight distance is 400 feet. The problem looking left results from small trees on the roadside.

2) Auxiliary lanes for Emory Road at Subdivision entrance (Findhorne Blvd.):

Left and right turn lane analyses were conducted at the subdivision entrance. The analyses concluded that no new turn lanes are warranted based on the *Knox County Access Control and Driveway Design Policy* (Knox County Department of Engineering and Public Works, March 1998). Details of analysis are located in APPENDIX.

## RECOMMENDATIONS

This traffic impact study of the proposed Scotch Meadows Unit 2 subdivision has resulted in the identification of two traffic related concerns. The following summarizes the recommendations that are made to address these concerns:

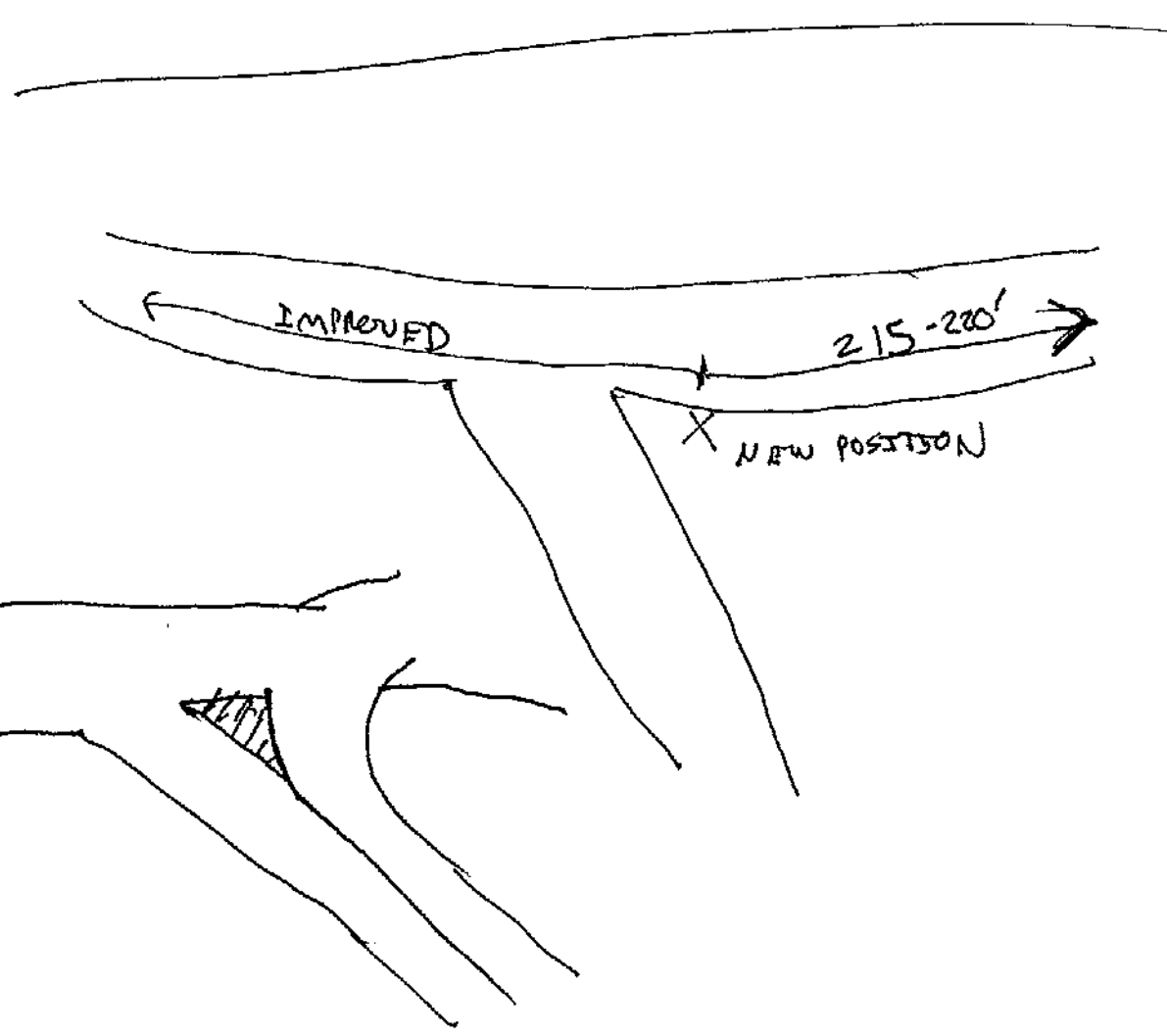
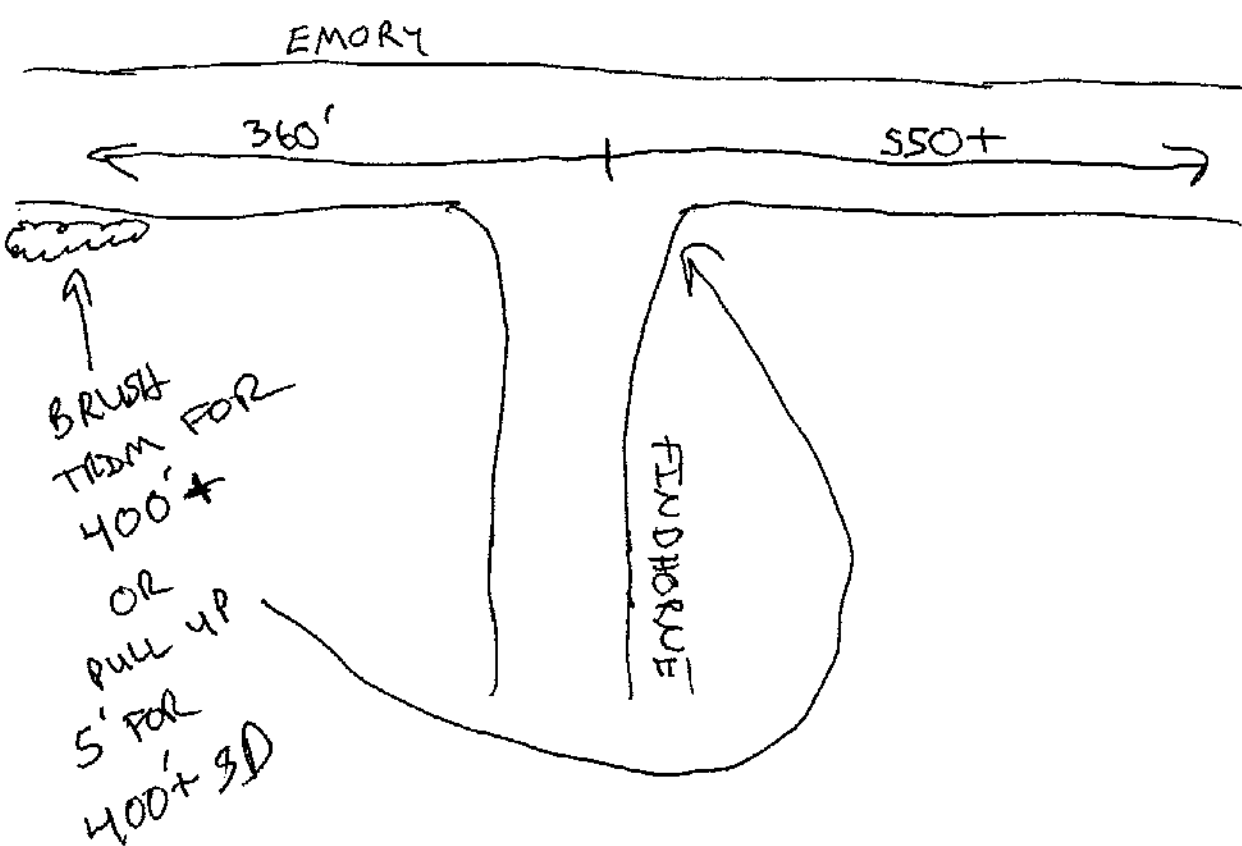
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It is recommended that some small trees, located primarily on the north side of the eastern leg of the intersection of Findhorne Blvd. and Emory Rd., be trimmed. This vegetation removal will address the sight distance concern that was identified during a site field review.

2. Level-of Service at Intersection of Emory Road and Tazewell Pike:

It is recommended that the intersection of Emory Road and Tazewell Pike be signalized. This improvement should be implemented whether or not Scotch Meadows Unit 2 is constructed, because it is clearly justified under existing conditions. An HCS evaluation of existing conditions (Year 2001, all way stop-controlled) shows the intersection operates at a level of service F for both AM and PM peak hours. A Signal 2000 analysis of the intersection for the year 2005 (background-growth only), using two-phase signalization for AM and PM peak hours, shows improvement to level of services C+ and C respectively. Furthermore, a Signal 2000 analysis of the intersection for year 2005, with full build-out of the proposed subdivision, indicates that with two-phase signalization conditions will improve to level of service C for both AM and PM peak hours.

## **APPENDIX**

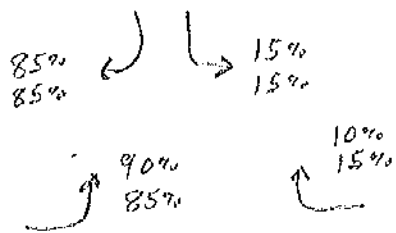


Gannon & Cannon, Inc.  
Traffic Count

File Name : fhornemory  
Site Code : 00000000  
Start Date : 06/27/2001  
Page No : 1

Groups Printed- Unshifted

Start Time	FINDHORNE From North				EMORY From East				FINDHORNE From South				EMORY From West				Int. Total
	Righ t	Thru	Left	Peds	Righ t	Thru	Left	Peds	Righ t	Thru	Left	Peds	Righ t	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	1.0
07:00 AM	8	0	0	0	0	44	0	0	0	0	0	0	0	16	3	0	71
07:15 AM	7	0	1	0	1	40	0	0	0	0	0	0	0	14	0	0	63
07:30 AM	6	0	2	0	0	40	0	0	0	0	0	0	0	20	0	0	68
07:45 AM	4	0	0	0	0	48	0	0	0	0	0	0	0	13	2	0	67
Total	25	0	3	0	1	172	0	0	0	0	0	0	0	63	5	0	269
08:00 AM	3	0	0	0	0	40	0	0	0	0	0	0	0	18	1	0	62
08:15 AM	3	0	1	0	0	47	0	0	0	0	0	0	0	27	0	0	78
08:30 AM	4	0	0	0	0	36	0	0	0	0	0	0	0	10	0	0	50
08:45 AM	1	0	0	0	0	22	0	0	0	0	0	0	0	14	2	0	39
Total	11	0	1	0	0	145	0	0	0	0	0	0	0	69	3	0	229
	16 (84%)	3 (16%)	0 (0%)	0	175								3 (90%)				
04:00 PM	3	0	0	0	1	42	0	0	0	0	0	0	0	54	3	0	103
04:15 PM	4	0	1	0	0	43	0	0	0	0	0	0	0	50	4	0	102
04:30 PM	0	0	0	0	2	44	0	0	0	0	0	0	0	46	3	0	95
04:45 PM	2	0	1	0	1	26	0	0	0	0	0	0	0	70	2	0	102
Total	9	0	2	0	4	155	0	0	0	0	0	0	0	220	12	0	402
05:00 PM	2	0	0	0	0	37	0	0	0	0	0	0	0	66	6	0	111
05:15 PM	1	0	0	0	1	37	0	0	0	0	0	0	0	53	11	0	103
05:30 PM	3	0	0	0	1	43	0	0	0	0	0	0	0	43	2	0	92
05:45 PM	3	0	0	0	1	26	0	0	0	0	0	0	0	69	2	0	101
Total	9	0	0	0	3	143	0	0	0	0	0	0	0	231	21	0	407
Grand Total	54 (83%)	0	6 (11%)	0	8 (15%)	615	0	0	0	0	0	0	0	583 (85%)	41	0	1307
Apprch %	90.0	0.0	10.0	0.0	1.3	98.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	93.4	6.6	0.0	
Total %	4.1	0.0	0.5	0.0	0.6	47.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.6	3.1	0.0	





Knox County Engineering  
 205 W. Baxter Ave.  
 Knoxville, TN 37917  
 423-215-5800

Site Code : 00000000  
 Start Date: 01/27/00  
 File I.D. :  
 Page : 1

Movement 1

Start Time	TAZ From North			BNORY From East			TAZ From South			BNORY From West			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00am	3	103	19	30	12	10	4	35	4	22	14	14	270
7:15	9	86	22	37	13	26	4	46	2	37	15	16	313
7:30	9	75	20	39	24	24	13	68	5	50	14	19	360
7:45	17	91	21	23	31	23	6	47	5	19	10	19	312
Hour Total	38	355	82	129	80	83	27	196	16	128	53	68	1255
8:00am	5	80	15	27	18	31	6	78	7	37	18	25	347
8:15	19	71	27	20	19	34	10	49	7	41	16	17	330
Total	24	151	42	47	37	65	16	127	14	78	34	42	677
	50	317	83	109	92	112	35	242	24	147	58	80	1349
	Total 450						*** Break ***						
3:30	14	61	12	17	26	9	12	59	17	38	25	16	326
3:45	23	60	28	17	22	15	23	56	12	29	32	24	341
Hour Total	37	121	60	34	48	24	35	115	29	67	57	40	667
4:00pm	11	41	28	15	12	9	21	76	25	23	25	26	312
4:15	2	39	10	15	16	9	19	70	22	39	33	31	305
4:30	8	43	23	17	22	17	16	65	28	36	33	30	336
4:45	10	42	26	24	24	9	21	78	20	23	26	21	324
Hour Total	29	165	87	71	74	44	77	289	95	121	117	108	1277
5:00pm	1	42	23	13	20	14	23	74	38	28	28	16	320
5:15	10	34	22	26	30	15	13	76	24	30	35	24	339
5:30	5	26	25	22	19	10	20	91	20	26	24	12	300
Total	16	102	70	61	69	39	56	241	82	84	87	52	959
Grand	144	894	341	342	308	255	211	968	236	478	348	310	4835
% of Total	3.0%	18.5%	7.1%	7.1%	6.4%	5.3%	4.4%	20.0%	4.9%	9.9%	7.2%	6.4%	
Approach %	28.5%			18.7%			29.3%			23.5%			
% of Approach	10.4%	64.8%	24.7%	37.8%	34.0%	28.2%	14.9%	68.4%	16.7%	42.1%	30.6%	27.3%	

21  
 ↓ + 5%  
 27.05  
 5%  
 ↓  
 23.1525  
 ↓ 5%  
 24.310125  
 ↓  
 25.555625

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  
 Month/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>1</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  
 Month/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>1</sup>)

	January	February	March	April	May	June	July	August	September	October	November	December
Monday	1.13	1.06	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	0.99	1.00	1.01	1.02	1.04	1.05
Wednesday	1.08	1.07	1.03	1.00	1.00	0.99	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	0.94	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  
 Month/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>1</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	1.05	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	1.04	1.07	1.09	1.08
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.

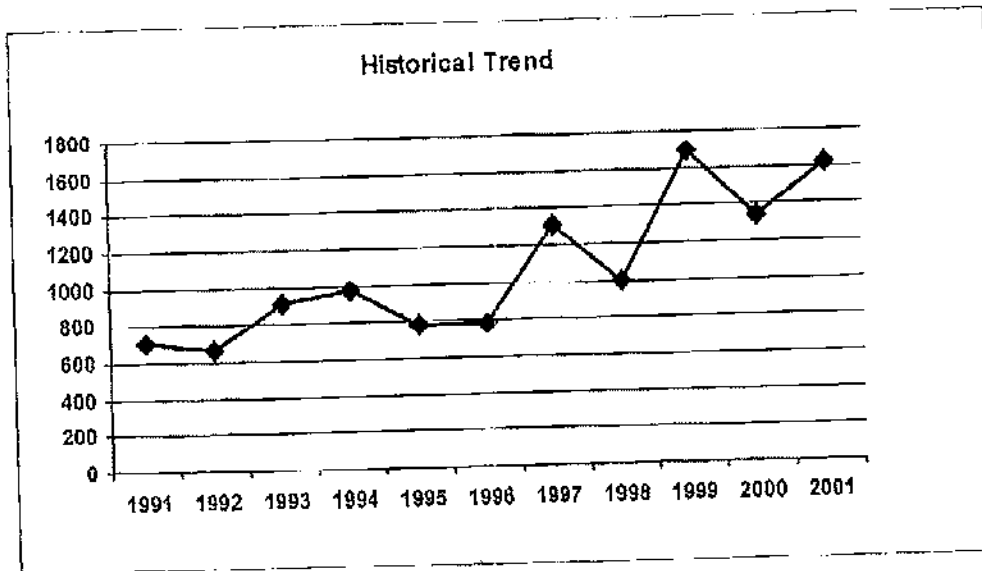
Source: TABLE A - Tennessee Department of Transportation (based on 1988 through 1992 data)  
 TABLES B & C - Developed by T. Doty Sullivan, P.E. based on TABLE A data

T338

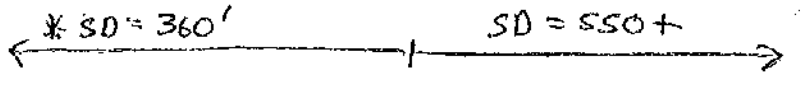
Maloneyville Rd

N of Washington Pk

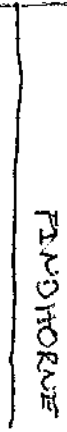
<i>YEAR</i>	<i>ADT</i>
1991	703
1992	669
1993	908
1994	977
1995	784
1996	782
1997	1,311
1998	995
1999	1,694
2000	1,337
2001	1,615



EMORY



\* TRIM TREES BACK FOR  
400' + SD.



ALL-WAY STOP CONTROL (AWSC) ANALYSIS

Analyst: CHRIS KIRBY  
 Agency/Co.: CCI  
 Date Performed: 07/10/2001  
 Analysis Time Period: 4:30-5:30 PM  
 Intersection: TAZEWELL @ EMORY  
 Jurisdiction: KNOX COUNTY  
 Analysis Year: 2005 PM  
 Project ID: 2005 PM BACKGROUND ONLY  
 East/West Street: EMORY RD  
 North/South Street: TAZEWELL, PK

Worksheet 2 - Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound
	L	T	R	L	T	R	L	T	R	L
Volume	153	159	118	105	126	72	95	381	144	34
% Thrus Left Lane	99	118								

Worksheet 5 - Capacity and Level of Service

Direction	Eastbound		Westbound		Northbound		Southbound
	L1	L2	L1	L2	L1	L2	L

1 L2

Flow Rate	430	303	620	35
1				
Service Time	6.9	7.4	6.9	7.
1				
Utilization, x	1.06	0.79	1.53	0.
88				
Dep. headway, hd	8.88	9.42	8.86	9.
06				
Capacity	430	377	620	39
5				
Delay	91.99	40.24	272.11	51
.41				
LOS	F	E	F	F

Approach:

Delay	91.99	40.24	272.11
51.41			
LOS	F	E	F
F			
Intersection Delay	139.97	Intersection LOS	F

ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: CHRIS KIRBY  
 Agency/Co.: CCI  
 Date Performed: 07/10/2001  
 Analysis Time Period: 7:30-8:30 AM  
 Intersection: TAZEWELL @ EMORY  
 Jurisdiction: KNOX COUNTY  
 Analysis Year: 2005 AM  
 Project ID: 2005 AM BACKGROUND ONLY  
 East/West Street: EMORY RD  
 North/South Street: TAZEWELL PK

Worksheet 2 - Volume Adjustments and Site Characteristics

hbound	Eastbound			Westbound			Northbound			Sout	
	L	T	R	L	T	R	L	T	R	L	
T R											
Volume	192	76	103	143	120	146	45	314	30	62 3	
93 115	% Thrus Left Lane										

Worksheet 5 - Capacity and Level of Service

uthbound	Eastbound		Westbound		Northbound		So
	L1	L2	L1	L2	L1	L2	L

1 L2

Flow Rate	371	409	389	57
0				
Service Time	7.7	7.7	7.8	7.
7				
Utilization, x	1.00	1.10	1.06	1.
54				
Dep. headway, hd	9.75	9.66	9.79	9.
71				
Capacity	371	409	389	57
0				
Delay	80.15	107.14	95.29	27
9.65				
LOS	F	F	F	F

Approach:

Delay	80.15	107.14	95.29
279.65			
LOS	F	F	F
F			
Intersection Delay	155.28	Intersection LOS	F



ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: CHRIS KIRBY  
 Agency/Co.: CCI  
 Date Performed: 07/10/2001  
 Analysis Time Period: 7:30-8:30 AM  
 Intersection: TAZEWELL @ EMORY  
 Jurisdiction: KNOX COUNTY  
 Analysis Year: 2001 AM  
 Project ID: 2001 AM EXISTING  
 East/West Street: EMORY RD  
 North/South Street: TAZEWELL PK

Worksheet 2 - Volume Adjustments and Site Characteristics

hbound	Eastbound			Westbound			Northbound			Sout	
	L	T	R	L	T	R	L	T	R	L	
T R											
Volume	165	65	89	122	102	125	39	269	25	55 3	
50 102											
% Thrus Left Lane											

Worksheet 5 - Capacity and Level of Service

uthbound	Eastbound		Westbound		Northbound		So
	L1	L2	L1	L2	L1	L2	L

1 L2

Flow Rate	319	349	333	50
7				
Service Time	6.8	6.6	6.8	6.
3				
Utilization, x	0.78	0.84	0.81	1.
17				
Dep. headway, hd	8.84	8.63	8.77	8.
28				
Capacity	392	406	397	50
7				
Delay	37.20	42.64	40.12	12
4.47				
LOS	E	E	E	F

Approach:

Delay	37.20	42.64	40.12
124.47			
LOS	E	E	E
F			
Intersection Delay	68.45	Intersection	LOS F

ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: CHRIS KIRBY  
 Agency/Co.: CCI  
 Date Performed: 07/10/2001  
 Analysis Time Period: 4:30-5:30 PM  
 Intersection: TAZEWELL @ EMORY  
 Jurisdiction: KNOX COUNTY  
 Analysis Year: 2001 PM  
 Project ID: 2001 <sup>R</sup> AM EXISTING  
 East/West Street: EMORY RD  
 North/South Street: TAZEWELL PK

Worksheet 2 - Volume Adjustments and Site Characteristics

hbound	Eastbound			Westbound			Northbound			Sout
	L	T	R	L	T	R	L	T	R	L
T R										
Volume	132	136	101	190	108	62	182	326	123	130
78 106										
% Thrus Left Lane										

Worksheet 5 - Capacity and Level of Service

Eastbound Westbound Northbound So

uthbound

	L1	L2	L1	L2	L1	L2	L
1 L2							
Flow Rate	369		260		531		31
4 Service Time	6.1		6.6		5.7		6.
1 Utilization, x	0.83		0.62		1.13		0.
71 Dep. headway, hd	8.06		8.56		7.65		8.
14 Capacity	437		394		531		42
2 Delay	39.26		24.44		108.26		28
.74 LOS	E		C		F		D

Approach:

Delay	39.26	24.44	108.26
28.74			
LOS	E	C	F
D			
Intersection Delay	59.26		Intersection LOS F

ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: CHRIS KIRBY  
 Agency/Co.: CCI  
 Date Performed: 07/10/2001  
 Analysis Time Period: 7:30-8:30 AM  
 Intersection: TAZEWELL @ EMORY  
 Jurisdiction: KNOX COUNTY  
 Analysis Year: 2005 AM  
 Project ID: 2005 AM COMBINED  
 East/West Street: EMORY RD  
 North/South Street: TAZEWELL PK

Worksheet 2 - Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	192	82	103	115	131	159	145	381	163	167	393	115
% Thrus Left Lane												

Worksheet 5 - Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate	377		446		589		575	
Service Time	7.7		7.7		7.7		7.7	
Utilization, x	1.02		1.20		1.58		1.55	
Dep. headway, hd	9.75		9.66		9.65		9.71	
Capacity	377		446		589		575	
Delay	84.53		141.67		297.59		285.60	
LOS	F		F		F		F	
Approach:								
Delay		84.53		141.67		297.59		285.60
LOS		F		F		F		F
Intersection Delay	218.70				Intersection LOS		F	

ALL-WAY STOP CONTROL (AUSC) ANALYSIS

Analyst: CHRIS KIRBY  
 Agency/Co.: CCI  
 Date Performed: 07/10/2001  
 Analysis Time Period: 4:30-5:30 PM  
 Intersection: TAZEWELL @ EMORY  
 Jurisdiction: KNOX COUNTY  
 Analysis Year: 2005 PM  
 Project ID: 2005 PM COMBINED  
 East/West Street: EMORY RD  
 North/South Street: TAZEWELL PK

Worksheet 2 - Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	153	179	118	113	136	78	195	381	163	138	199	118
% Thru Left Lane												

Worksheet 5 - Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate	450		327		639		355	
Service Time	7.1		7.5		7.1		7.3	
Utilization, x	1.14		0.86		1.61		0.91	
Dep. headway, hd	9.13		9.50		9.10		9.26	
Capacity	450		376		639		387	
Delay	119.53		49.79		310.84		57.36	
LOS	F		E		F		F	
Approach:								
Delay		119.53		49.79		310.84		57.36
LOS		F		E		F		F
Intersection Delay	163.22							
Intersection LOS					F			

SIGNAL2000/TEAPAC[Ver 1.01.00] - Capacity Analysis Summary

Intersection Averages:

Degree of Saturation (v/c) 0.67 Vehicle Delay 19.7 Level of Service B

Sq 11	Phase 1	Phase 2
**/**	* * *	^
.	* * *	++++
/ \	<* * * >	<++++>
	v	++++
	^	v
North	<+ + + >	****>
	+ + +	****
	+ + +	v
G/C=0.439		G/C=0.428
G= 26.3"		G= 25.7"
Y+R= 4.0"		Y+R= 4.0"
OFF= 0.0%		OFF=50.6%

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= 0.0 sec = 0.0%

Lane Group	Width/Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Adj @E Volume	v/c	HCM Delay	L S	Queue Model 1
N Approach									21.5 C+
RT+TH+LT	12/1	0.375	0.439	683	738	563	0.763	21.5	*C+  395 ft
S Approach									14.5 B+
RT+TH+LT	12/1	0.270	0.439	686	741	370	0.499	14.5	B+  217 ft
E Approach									19.3 B
RT+TH+LT	12/1	0.334	0.428	532	591	388	0.657	19.3	B   259 ft
W Approach									22.7 C+
RT+TH+LT	12/1	0.366	0.428	435	495	354	0.715	22.7	*C+  254 ft

SIGNAL2000/TEAPAC[Ver 1.01.00] - Capacity Analysis Summary

Intersection Averages:

Degree of Saturation (v/c) 0.65 Vehicle Delay 19.3 Level of Service B

Sq 11 **/**	Phase 1	Phase 2
/ \	+ + + + + + <+ + +> v	^ ++++ <++++ ^ ++++ v
North	<* * *> * * * * * *	**** ****> **** v
	G/C=0.468 G= 28.1" Y+R= 4.0" OFF= 0.0%	G/C=0.399 G= 23.9" Y+R= 4.0" OFF=53.4%

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= 0.0 sec = 0.0%

Lane Group	Width/Lanes	g/C Req'd Used	Service Rate @C (vph)	Adj @E Volume	v/c	HCM Delay	L S	Queue Model 1
N Approach							12.7	B+
[RT+TH+LT]	12/1	[0.264   0.468]	720	770   349	0.453	12.7	[B+]	195 ft
S Approach							21.2	C+
[RT+TH+LT]	12/1	[0.404   0.468]	706	756   590	0.780	21.2	[*C+]	415 ft
E Approach							17.2	B
[RT+TH+LT]	12/1	[0.268   0.399]	490	554   289	0.522	17.2	[B]	185 ft
W Approach							23.5	C+
[RT+TH+LT]	12/1	[0.345   0.399]	496	560   410	0.732	23.5	[*C+]	297 ft



SIGNAL2000/TEAPAC[Ver 1.01.00] - Capacity Analysis Summary

Intersection Averages:

Degree of Saturation (v/c) 0.82 Vehicle Delay 31.8 Level of Service C

Sq 11	Phase 1	Phase 2
**/**		
	+ + +	^
	+ + +	++++
/ \	<+ + +>	<++++>
	v	^
		++++
North	<* * *>	* * *
	* * *	* * *
	* * *	v
	G/C=0.463	G/C=0.404
	G= 27.8"	G= 24.2"
	Y+R= 4.0"	Y+R= 4.0"
	OFF= 0.0%	OFF=52.9%

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= 0.0 sec = 0.0%

Lane Group	Width/Lanes	g/C Req'd Used	Service Rate @C (vph)	Adj @E Volume	v/c	HCM Delay	L S	Queue Model 1
N Approach							14.1	B+
RT+TH+LT	12/1	0.294  0.463	697	748	394  0.527	14.1	B+	229 ft
S Approach							39.6	D+
RT+TH+LT	12/1	0.473  0.463	691	742	710  0.957	39.6	*D+	672 ft
E Approach							22.6	C+
RT+TH+LT	12/1	0.341  0.404	455	518	364  0.703	22.6	C+	260 ft
W Approach							41.5	D+
RT+TH+LT	12/1	0.421  0.404	476	539	500  0.928	41.5	*D+	465 ft

SIGNAL2000/TEAPAC[Ver 1.01.00] - Capacity Analysis Summary

Intersection Averages:

Degree of Saturation (v/c) 0.83 Vehicle Delay 29.7 Level of Service C

Sq 11	Phase 1	Phase 2
**/**		
	* * *	^
	* * *	++++
/ \	<* * * >	<++++>
	v	^
		++++
North	<+ + + >	**** v
	+ + +	****
	+ + +	v
	G/C=0.422	G/C=0.444
	G= 25.3"	G= 26.7"
	Y+R= 4.0"	Y+R= 4.0"
	OFF= 0.0%	OFF=48.9%

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= 0.0 sec = 0.0%

Lane Group	Width/Lanes	g/c Reqd	g/c Used	Service Rate @C (vph)	Adj @E [Volume]	v/c	HCM Delay	L S	Queue Model 1
N Approach							34.4	C	
RT+TH+LT	12/1	0.421	0.422	642	701	639	0.912	34.4	*C  557 ft
S Approach							17.8	B	
RT+TH+LT	12/1	0.312	0.422	638	697	436	0.626	17.8	B   280 ft
E Approach							28.6	C	
RT+TH+LT	12/1	0.421	0.444	531	588	496	0.844	28.6	C   395 ft
W Approach							36.2	D+	
RT+TH+LT	12/1	0.448	0.444	414	472	418	0.886	36.2	*D+  367 ft

SIGNAL2000/TEAPAC[Ver 1.01.00] - Capacity Analysis Summary

Intersection Averages:

Degree of Saturation (v/c) 0.79 Vehicle Delay 26.8 Level of Service C+

Sq	Phase 1	Phase 2
11		
**/**		
.	* * *	^
/ \	* * *	++++
	<* * *>	<++++>
	v	++++
	^	^
North	<+ + +>	****
	+ + +	v
	+ + +	v
G/C=0.424		G/C=0.443
G= 25.4"		G= 26.6"
Y+R= 4.0"		Y+R= 4.0"
OFF= 0.0%		OFF=49.0%

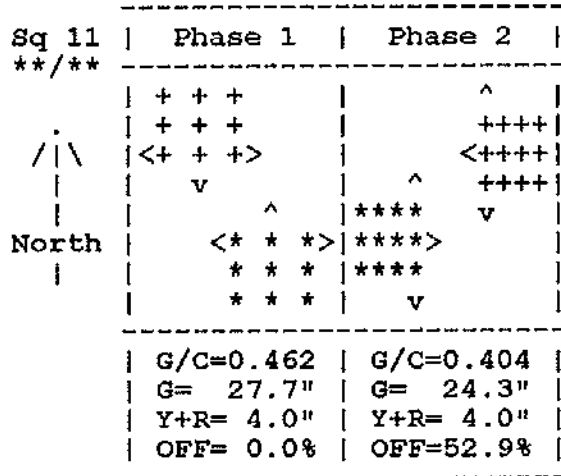
C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= 0.0 sec = 0.0%

Lane Group	Width/Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Adj @E Volume	v/c	HCM Delay	L S	Queue Model 1
N Approach									32.1 C
RT+TH+LT	12/1	0.415	0.424	651	709	634	0.894	32.1	*C   535 ft
S Approach									17.5 B
RT+TH+LT	12/1	0.309	0.424	643	701	432	0.616	17.5	B   275 ft
E Approach									23.3 C+
RT+TH+LT	12/1	0.389	0.443	535	592	454	0.767	23.3	C+   330 ft
W Approach									32.3 C
RT+TH+LT	12/1	0.434	0.443	423	481	411	0.854	32.3	*C   343 ft

SIGNAL2000/TEAPAC[Ver 1.01.00] - Capacity Analysis Summary

Intersection Averages:

Degree of Saturation (v/c) 0.78 Vehicle Delay 27.8 Level of Service C



C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= 0.0 sec = 0.0%

Lane Group	Width/Lanes	g/C Reqd Used	Service Rate @C (vph)	Adj @E Volume	v/c	HCM Delay	L S	Queue Model 1
N Approach							13.9	B+
RT+TH+LT	12/1	0.289 0.462	705	756   390	0.516	13.9	B+	225 ft
S Approach							34.6	C
RT+TH+LT	12/1	0.462 0.462	692	743   689	0.927	34.6	*C	611 ft
E Approach							20.0	C+
RT+TH+LT	12/1	0.314 0.404	468	531   337	0.635	20.0	C+	229 ft
W Approach							35.0	C
RT+TH+LT	12/1	0.404 0.404	479	542   478	0.882	35.0	*C	411 ft

SPD, 36-45

LEFT TURN LANE AVAILABLE DISCRETE MENARDS LANE 12

AM

OPPOSITE DIRECTION = 203

MINIMUM TURN ANGLE = 90

LEFT TURN VOLUME = 12 < 160 OK.

LEFT TURN LANE NOT WARRANTED

PM

OPPOSITE DIRECTION = 176

MINIMUM TURN ANGLE = 270

LEFT TURN VOLUME = 69 < 90 OK.

LEFT TURN LANE NOT WARRANTED

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	80	70
150 - 199	200	140	105	90	70	60
200 - 249	160	115	85	75	65	55
250 - 299	130	100	75	65	60	50
300 - 349	110	90	70	60	55	45
350 - 399	100	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