

Traffic Impact Study
Copper Ridge Subdivision
Knox County, Tennessee

March 22, 2005



Prepared for:
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TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	1
INTRODUCTION AND PURPOSE OF STUDY	2
EXISTING CONDITIONS	5
PROPOSED CONDITIONS	8
CONCLUSIONS AND RECOMMENDATIONS	14
APPENDIX	15

Figures and Tables

FIGURE 1 – LOCATION MAP	3
FIGURE 2 – SITE PLAN	4
FIGURE 3 – EXISTING BACKGROUND TRAFFIC DATA	6
TABLE 1 – TRIP GENERATION SUMMARY	8
FIGURE 4 – PEAK HOUR TRAFFIC VOLUMES BACKGROUND TRAFFIC – YEAR 2008	9
FIGURE 5 – TRIP DISTRIBUTION PATTERNS AND ASSIGNMENT OF GENERATED TRAFFIC	11
FIGURE 6 – COMBINED VOLUMES FOR ANALYSIS	12

EXECUTIVE SUMMARY

This report summarizes a traffic impact study that was prepared for the proposed Copper Ridge Subdivision, to be located on W. Emory Road (SR 131) in the Karns Community of West Knox County. The study resulted in the conclusions and recommendations discussed below:

It is the primary conclusion of this study that only minor traffic volume related impacts will result from the development of the Copper Ridge Subdivision. In fact, capacity analyses of proposed side street (2-way) stop traffic control, indicates that acceptable conditions (LOS "D" or better) can be expected during the peak time periods. In addition, analyses of the need for auxiliary traffic lanes indicates that an eastbound to northbound left-turn lane is warranted. Therefore, construction of such a lane with a minimum storage length of 75 feet is recommended.

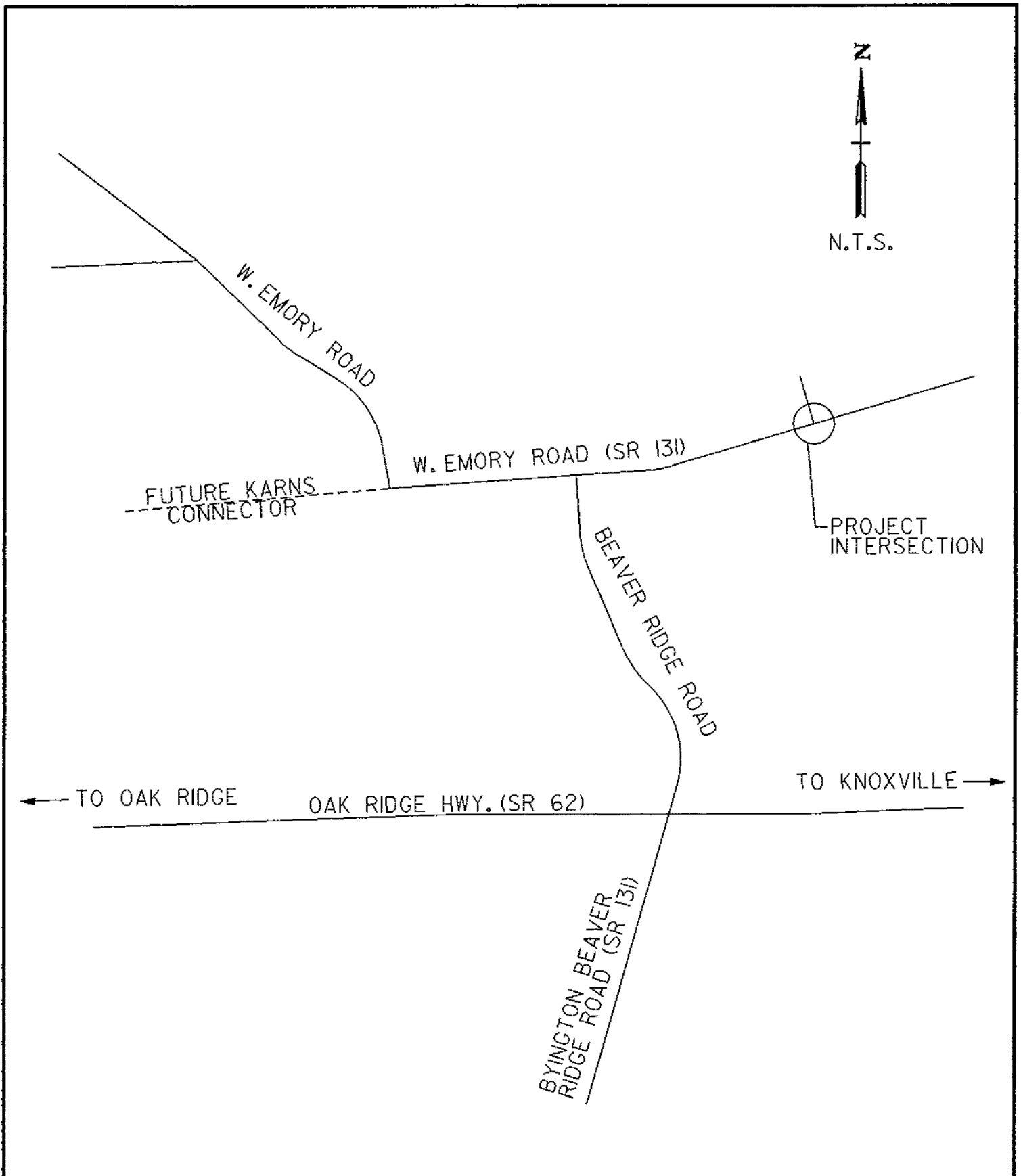
Intersection turning sight distance was also evaluated for the proposed Copper Ridge Subdivision access roadway intersection. This evaluation found that sight distance will be excellent, over 600 feet looking both east and west. These distances significantly exceed the 400 foot minimum that is required per the 40 mph speed limit on W. Emory Road, and even a 500 foot distance that is recommended in this report. Minor grading and trimming of an existing slope with brush may be required in order to fully provide the above stated distances. Therefore, such action 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 Copper Ridge Subdivision to be located on W. Emory Road (SR 131) in the Karns Community of Knox County. The project site is approximately 1/3 mile east of the intersection of W. Emory Road with Beaver Ridge Road, and approximately 6/10 mile north of Oak Ridge Highway (SR 62). 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 116 buildable lots at full build-out. The subdivision entrance will be at a new three-leg intersection on W. Emory Road, located approximately 1150 feet east of the existing Copper Ridge Road intersection. A detailed layout of the proposed subdivision as shown on the concept plan is provided on FIGURE 2.

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



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FIGURE 1
LOCATION MAP

COPPER RIDGE SUBDIVISION
TRAFFIC IMPACT STUDY

N



N.T.S.

SEE SUBDIVISION CONCEPT
PLAN FOR PROJECT LAYOUT

FIGURE 2

SITE PLAN



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COPPER RIDGE SUBDIVISION
TRAFFIC IMPACT STUDY

EXISTING CONDITIONS

Existing Roadway Conditions

W. Emory Road is a two-lane state secondary highway maintained by the Tennessee Department of Transportation (TDOT). It is located within Knox County in the Karns Community. The roadway pavement consists of two traffic lanes of approximately twelve feet in width, with minimal shoulders. The speed limit is posted as 40 mph.

Existing Traffic Data

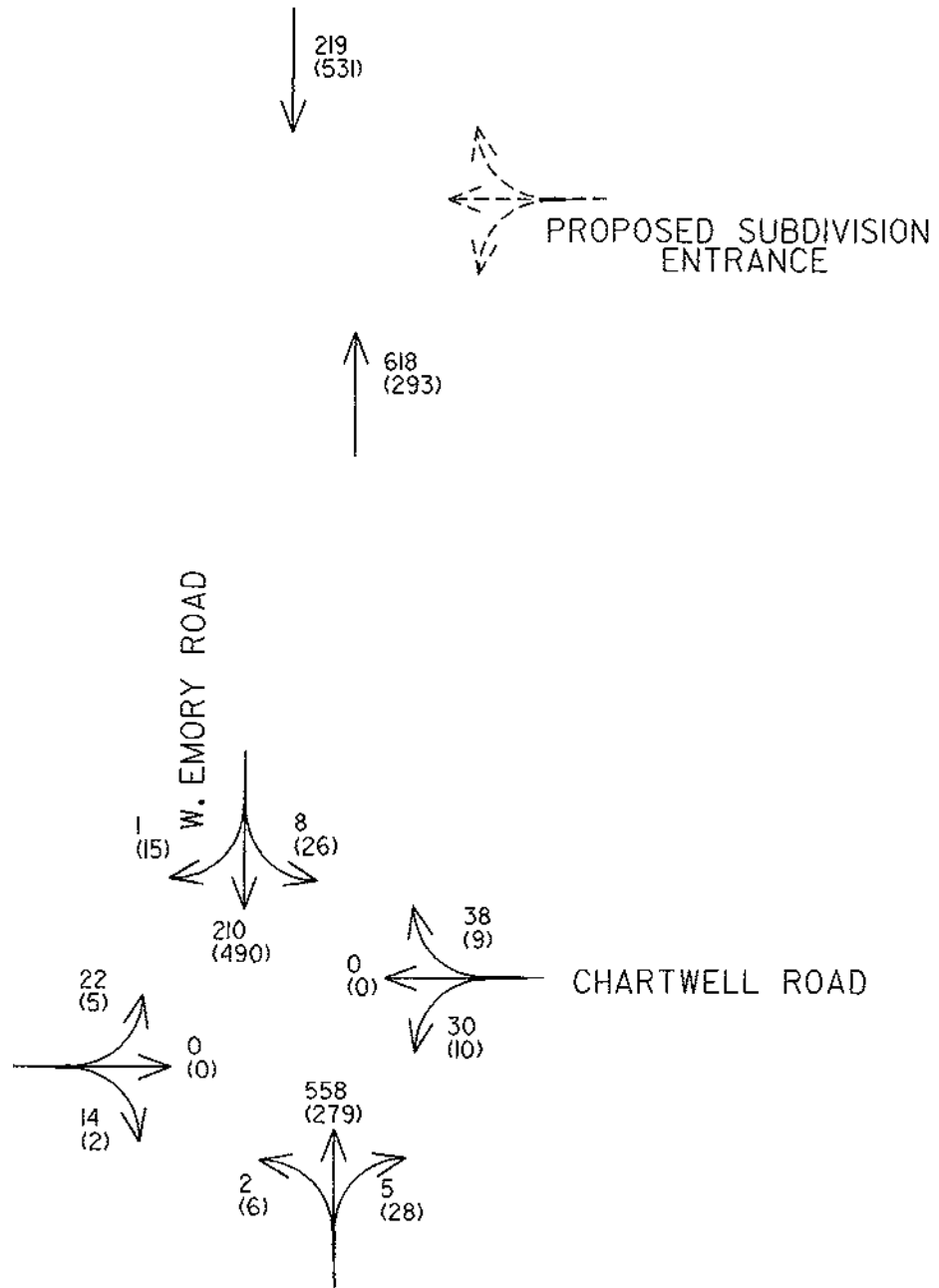
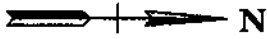
A traffic count station for collecting average daily traffic data (ADT) is not located within a reasonable distance of the project site. Therefore, the turning movement count data collected for this project was factored using data from the City of Knoxville to arrive at estimated ADT volumes. This procedure indicated an approximate ADT for this section of W. Emory Road of 12,000.

The aforementioned turning movement counts were collected at the nearby intersection of W. Emory Road and Chartwell Road. In addition to the above ADT estimates, this data was used to establish project trip distribution patterns, and ultimately as the basis for the project analyses. The counts were conducted during the A.M. and P.M. peak traffic hours. FIGURE 3 displays the hourly peak volumes, while the raw data summary sheets for these counts are contained in the APPENDIX.

The upper part of FIGURE 3 displays the volumes on the west leg from these counts, which are the basis for the actual background volumes used in the project analyses.

Level-of-Service Evaluation

Intersection Capacity/Level of Service Analyses employing the methods of the Highway Capacity Manual (HCM 2000) were used to evaluate the proposed study intersection of W. Emory Road and the Copper Ridge Subdivision access roadway. However, since this intersection will not exist until the subdivision is constructed, such analyses were not possible for existing conditions. Please see the following section for an explanation and discussion of Level of Service concepts.



TOP NO. - A.M. PEAK HOUR (7:15 - 8:15 A.M.) - A.M. RAW 2005

(BOTTOM NO.) - P.M. PEAK HOUR (5:10 - 6:10 P.M.) - P.M. RAW 2005



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FIGURE 3

EXISTING BACKGROUND TRAFFIC

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TRAFFIC IMPACT STUDY

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

PROPOSED CONDITIONS

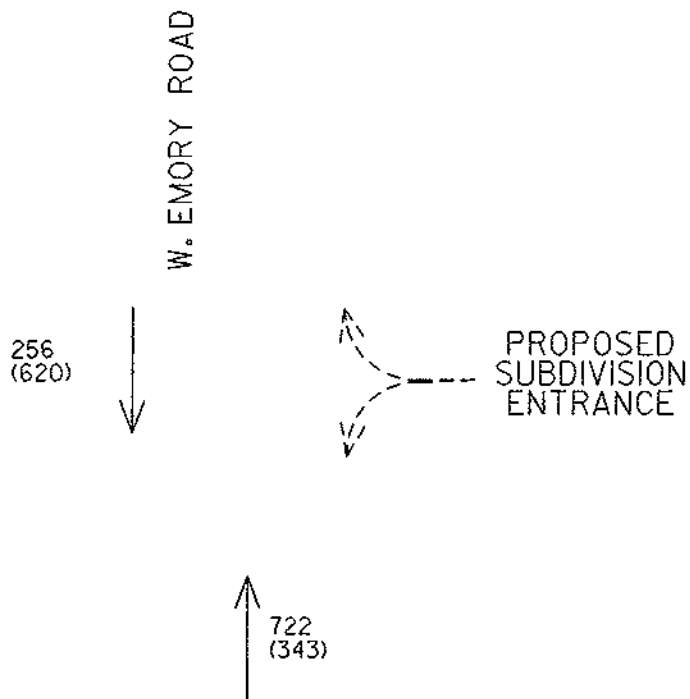
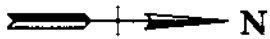
Background Traffic Growth

The anticipated time for full build-out of the Copper Ridge Subdivision is 3 years, with the project beginning in 2005. 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. Because this is a high growth area of Knox County, a fairly high growth rate of 5.0 percent was assumed. FIGURE 4 contains the background traffic volumes that would result from a 5.0 percent annual growth from year 2005, when counts were conducted, to year 2008. These volumes have also been adjusted to an average weekday basis using adjustment factors developed by the University of Tennessee Transportation Research Center.

Trip Generation

In order to estimate the expected traffic volumes to be generated by full build-out of the proposed Copper Ridge Subdivision, the data and procedures of *Trip Generation, Seventh Edition* (Institute of Transportation Engineers, 2003) 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 2, pages 269 to 271). As noted earlier in this report, the anticipated number of units upon full build-out is 116, 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 development.

TABLE 1					
TRIP GENERATION SUMMARY					
COPPER RIDGE SUBDIVISION – 116 LOTS					
SINGLE FAMILY DETACHED HOUSING – I.T.E. LAND USE CODE 210					
	Total New Trips	% Entering	% Exiting	Number Entering	Number Exiting
Weekday	1192	50%	50%	596	596
A.M. Peak	91	25%	75%	23	68
P.M. Peak	123	63%	37%	78	46



NOTES:

ANNUAL GROWTH ASSUMED
= FIVE PERCENT (5%)

THE DATA SHOWN HAVE BEEN FACTORED TO ADJUST TO
AN AVERAGE WEEKDAY VOLUME FROM COUNTS TAKEN IN MARCH (FACTOR = 1.0).
SEE APPENDIX FOR RAW COUNT DATA AND FACTOR TABLE. (FACTORS DEVELOPED
BY THE UNIVERSITY OF TENNESSEE TRANSPORTATION RESEARCH CENTER).

VOLUME
LEGEND
AM
(PM)



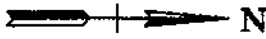
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FIGURE 4
PEAK HOUR TRAFFIC VOLUMES
BACKGROUND TRAFFIC - YEAR 2008

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TRAFFIC IMPACT STUDY

Trip Distribution

FIGURE 5 provides a summary of the trip generation patterns developed for the proposed subdivision intersection with W. Emory Road, which were based on the existing patterns at the nearby (1250 feet south) intersection of W. Emory Road and Chartwell Road. 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 2008 volumes reflecting the existing traffic, the background traffic growth, and the newly generated traffic from the Copper Ridge Subdivision at full build-out. These are the volumes used in the analysis of full build-out conditions.



W. EMORY ROAD

	NO.	%
AM	13	56
PM	43	55

	NO.	%
AM	39	58
PM	25	54

PROPOSED
SUBDIVISION
ENTRANCE

	NO.	%
AM	29	42
PM	21	46

	NO.	%
AM	10	44
PM	35	45

TOTAL GENERATED TRIPS		
	ENTER	EXIT
AM	23	68
PM	78	46

NOTE:
ENTER/EXIT DISTRIBUTION PERCENTAGES
ASSUMED BASED ON TRAFFIC COUNTS
FROM ADJACENT SUBDIVISION AT CHARTWELL
ROAD INTERSECTION WITH W. EMORY ROAD.

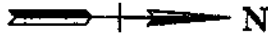
FIGURE 5

TRIP DISTRIBUTION PATTERNS AND ASSIGNMENT
OF GENERATED TRAFFIC

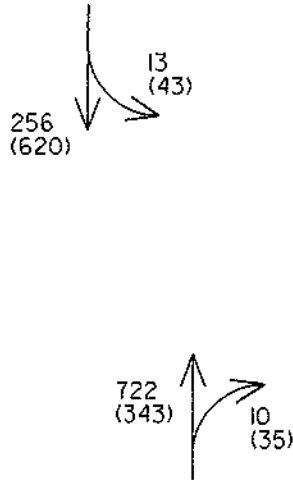
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W. EMORY ROAD



PROPOSED
SUBDIVISION
ENTRANCE

VOLUME
LEGEND
AM
(PM)

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

FIGURE 6

COMBINED VOLUMES FOR ANALYSIS

COPPER RIDGE SUBDIVISION
TRAFFIC IMPACT STUDY



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Proposed Level-of-Service

Unsignalized intersection capacity analyses were conducted utilizing the combined traffic volumes of FIGURE 6, at the proposed intersection of W. Emory Road and the Copper Ridge Subdivision access roadway. The results indicate that all traffic movements are expected to operate no worse than level-of-service "D" during both peak hours. These results are summarized in detail 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 development. The results of this review are summarized below:

1) Sight Distance for Vehicles Exiting the Proposed Development:

Looking left (east) from a STOP position at W. Emory Road, on the proposed subdivision roadway, the sight distance exceeds 600 feet. Looking right (west) from the same STOP position, the sight distance significantly exceeds 600 feet.

The posted speed limit on W. Emory Road is 40 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 40 mph, it is recommended that sight distance be provided for a minimum of 50 mph (500 feet).

Based on the above information, the required sight distance for the proposed intersection will exceed the desired minimum of 500 feet for both approaches. It should be noted that some brush removal and grading may be necessary in the northwest corner of the intersection in order to provide the required sight distance.

2) Auxiliary Lanes for Proposed Subdivision Intersection:

A left turn lane warrant analysis was conducted for the proposed development intersection. This analysis employed Table 5A from the turn lane warrants developed by Harmelink. The results were that the anticipated traffic volumes for the afternoon peak time period are sufficient to satisfy the minimum warrants for an eastbound to northbound left-turn lane. A copy of Tables 5A is located in the APPENDIX for review. The recommended minimum storage length for this turn lane is 75 feet.

CONCLUSIONS AND RECOMMENDATIONS

It is the primary conclusion of this study that only minor traffic volume related impacts will result from the development of the Copper Ridge Subdivision. In fact, capacity analyses of proposed side street (2-way) stop traffic control, indicates that acceptable conditions (LOS "D" or better) can be expected during the peak time periods. In addition, analyses of the need for auxiliary traffic lanes indicates that an eastbound to northbound left-turn lane is warranted. Therefore, construction of such a lane with a minimum storage length of 75 feet is recommended.

Intersection turning sight distance was also evaluated for the proposed Copper Ridge Subdivision access roadway intersection. This evaluation found that sight distance will be excellent, over 600 feet looking both east and west. These distances significantly exceed the 400 foot minimum that is required per the 40 mph speed limit on W. Emory Road, and even a 500 foot distance that is recommended in this report. Minor grading and trimming of an existing slope with brush may be required in order to fully provide the above stated distances. Therefore, such action is recommended prior to opening the subdivision roadways to traffic.

APPENDIX

Traffic Count

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

File Name : untitled12
 Site Code : 00000000
 Start Date : 03/17/2005
 Page No : 1

Groups Printed: Unshifted

Start Time	CHART From North				EMORY From East				CHART From South				EMORY 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	
07:05 AM	2	0	2	0	0	37	0	0	1	0	1	0	0	19	0	0	62
07:10 AM	3	0	1	0	0	46	0	0	0	0	2	0	1	15	0	0	66
07:15 AM	3	0	2	0	0	47	0	0	3	0	2	0	0	21	0	0	78
07:20 AM	5	0	1	0	0	38	0	0	2	0	1	0	1	19	0	0	67
07:25 AM	2	0	3	0	0	51	1	0	0	0	1	0	0	15	0	0	73
07:30 AM	8	0	6	0	0	50	0	0	2	0	3	0	0	28	1	0	98
07:35 AM	1	0	3	0	1	71	0	0	2	0	1	0	0	16	0	0	95
07:40 AM	3	0	3	0	1	46	0	0	1	0	3	0	0	19	2	0	78
07:45 AM	2	0	2	0	1	44	0	0	2	0	2	0	0	19	0	0	72
07:50 AM	3	0	3	0	1	52	0	0	0	0	0	0	0	18	0	0	77
07:55 AM	5	0	3	0	1	44	0	0	1	0	2	0	0	15	0	0	71
Total	37	0	29	0	5	526	1	0	14	0	18	0	2	204	3	0	839
08:00 AM	1	0	1	0	2	28	1	0	0	0	0	0	0	8	0	0	41
08:05 AM	3	0	3	0	2	42	0	0	1	0	3	0	0	14	1	0	69
08:10 AM	2	0	0	0	0	45	0	0	0	0	4	0	0	18	4	0	73
08:15 AM	4	0	3	0	0	42	0	0	0	0	1	0	1	10	2	0	63
*** BREAK ***																	
Total	10	0	7	0	4	157	1	0	1	0	8	0	1	50	7	0	246
*** BREAK ***																	
05:10 PM	0	0	0	0	2	14	1	0	0	0	0	0	1	42	1	0	61
05:15 PM	1	0	1	0	2	24	0	0	0	0	1	0	1	51	3	0	84
05:20 PM	2	0	0	0	1	18	1	0	0	0	0	0	1	51	7	0	81
05:25 PM	0	0	1	0	1	24	1	0	0	0	0	0	0	39	1	0	67
05:30 PM	2	0	1	0	3	38	0	0	0	0	0	0	2	45	0	0	91
05:35 PM	0	0	0	0	1	22	1	0	1	0	0	0	0	47	2	0	74
05:40 PM	2	0	0	0	3	22	0	0	0	0	0	0	1	28	2	0	58
05:45 PM	0	0	0	0	3	28	1	0	0	0	0	0	1	48	2	0	83
05:50 PM	1	0	1	0	1	21	1	0	1	0	1	0	2	44	3	0	78
05:55 PM	2	0	0	0	5	21	0	0	0	0	0	0	4	29	3	0	64
Total	10	0	4	0	22	232	6	0	2	0	2	0	13	424	24	0	739
06:00 PM	0	0	1	0	5	29	0	0	0	0	1	0	0	32	1	0	69
06:05 PM	0	0	4	0	1	18	0	0	0	0	2	0	2	34	1	0	62
06:10 PM	1	0	3	0	3	21	1	0	0	0	1	0	0	25	1	0	56
Grand Total	58	0	48	0	40	983	9	0	17	0	32	0	18	769	37	0	2011
Approch %	54.7	0.0	45.3	0.0	3.9	95.3	0.9	0.0	34.7	0.0	85.3	0.0	2.2	93.3	4.5	0.0	
Total %	2.9	0.0	2.4	0.0	2.0	48.9	0.4	0.0	0.8	0.0	1.6	0.0	0.9	38.2	1.8	0.0	

TRAFFIC VOLUME ADJUSTMENT FACTORS TO BE USED WITH TRAFFIC SIGNAL WARRANT ANALYSIS - VOLUME WARRANTS¹
 Prepared and Distributed by the Tennessee Transportation Assistance Program

TABLE A
 Month/Day of Week Urban Area Adjustment Factors² - Average Day
 (Multiply actual count by given factor to obtain estimated average day volumes for a similar time period³)

	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	0.95	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	0.88	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	0.85	0.92	0.86
Saturday	1.22	1.15	1.09	1.11	1.10	1.04	1.08	1.07	1.11	1.11	1.16	1.15

TABLE B
 Month/Day of Week Urban Area Adjustment Factors² - Average Weekday
 (Multiply actual count by given factor to obtain estimated average weekday volumes for a similar time period³)

	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	0.99	1.00	1.01	1.02	1.04	1.05
Wednesday	1.09	1.07	1.03	1.00	1.00	0.98	0.98	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
 Month/Day of Week Urban Area Adjustment Factors² - Average Friday
 (Multiply actual count by given factor to obtain estimated average Friday volumes for a similar time period³)

	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	1.08	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	1.15	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[®] 1-2-3[®] 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.

HOURLY STREET TRAFFIC VOLUME AS PERCENT OF DAILY TRAFFIC

Hour Beginning	KNOXVILLE						
	CHICAGO	COLUMBUS	PHOENIX				
				ARTERIAL	COLLECTOR	M. COLLECTOR	RESIDENTIAL
12 Midnight	1.3	1.2	1.3	1.1	0.9	0.9	0.5
1 A.M.	0.7	0.7	0.8	0.7	0.4	0.4	0.2
2	0.5	0.5	0.4	0.5	0.2	0.2	0.1
3	0.3	0.4	0.3	0.3	0.1	0.2	0.2
4	0.2	0.4	0.3	0.4	0.2	0.2	0.0
5	0.6	1.1	0.7	1.1	0.8	0.9	0.4
6	1.7	3.3	2.3	3.8	2.6	3.0	1.7
7	5.2	7.5	6.8	6.4	6.1	7.6	4.8
8	6.0	6.6	6.4	5.5	6.6	8.4	6.5
9	5.0	5.4	5.2	5.1	4.1	3.3	5.0
10	5.5	5.5	5.6	5.3	4.2	4.1	4.8
11	6.2	5.8	5.8	6.0	5.2	4.2	5.5
12 Noon	6.8	5.7	6.2	6.3	5.7	5.0	5.4
1 P.M.	6.7	6.2	6.1	6.2	5.5	5.8	5.7
2	6.7	6.2	6.3	6.5	6.3	6.8	6.1
3	7.2	7.0	6.8	7.3	7.9	7.9	8.6
4	8.0	9.0	8.1	8.0	8.1	8.4	8.9
5	8.0	7.9	8.6	7.4	9.2	8.2	9.7
6	5.9	4.4	5.3	5.8	7.2	6.6	6.9
7	5.0	4.2	4.7	5.0	5.8	5.6	6.0
8	3.8	3.2	3.9	4.3	4.8	4.4	4.7
9	3.6	3.1	3.4	3.5	3.8	3.5	3.3
10	2.9	2.5	2.6	2.8	2.6	2.2	2.1
11	2.2	2.2	2.1	1.9	1.5	1.4	1.4

7 AM to 6 PM (11 hrs)

70.0 68.9 69.7 71.0

7, 8, 11, 12, 3, 4, 5 (7 hrs)

46.9 48.8 49.7

AM-No EBLT Lane

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	Alan Childers			Intersection	Emory Rd. / Prop. Subd. St.			
Agency/Co.	Cannon & Cannon, Inc.			Jurisdiction	Knox County			
Date Performed	3/18/2005			Analysis Year	2005			
Analysis Time Period	AM Peak Hour							
Project Description Proposed Subdivision on Emory Road (Map 77, Parcel 136)								
East/West Street: Emory Road (SR 131)				North/South Street: Proposed Subdivision Street				
Intersection Orientation: East-West				Study Period (hrs): 0.25				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	13	256	0	0	722	10		
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82		
Hourly Flow Rate (veh/h)	15	312	0	0	880	12		
Proportion of heavy vehicles, P _{HV}	3	--	--	0	--	--		
Median type	Undivided							
RT Channelized?			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT					TR		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	0	0	0	29	0	39		
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82		
Hourly Flow Rate (veh/h)	0	0	0	35	0	47		
Proportion of heavy vehicles, P _{HV}	0	0	0	2	0	2		
Percent grade (%)	0			0				
Flared approach		N			N			
Storage		0			0			
RT Channelized?			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
Volume, v (vph)	15						82	
Capacity, c _m (vph)	756						258	
v/c ratio	0.02						0.32	
Queue length (95%)	0.06						1.32	

Control Delay (s/veh)	9.9						25.3	
LOS	A						D	
Approach delay (s/veh)	--	--					25.3	
Approach LOS	--	--					D	

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PM-No EBLT Lane

TWO-WAY STOP CONTROL SUMMARY								
General Information			Site Information					
Analyst	Alan Childers		Intersection	Emory Rd. / Prop. Subd. St.				
Agency/Co.	Cannon & Cannon, Inc.		Jurisdiction	Knox County				
Date Performed	3/18/2005		Analysis Year	2005				
Analysis Time Period	PM Peak Hour							
Project Description Proposed Subdivision on Emory Road (Map 77, Parcel 136)								
East/West Street: Emory Road (SR 131)			North/South Street: Proposed Subdivision Street					
Intersection Orientation: East-West			Study Period (hrs): 0.25					
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	43	620	0	0	343	35		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93		
Hourly Flow Rate (veh/h)	46	666	0	0	368	37		
Proportion of heavy vehicles, P _{HV}	3	--	--	0	--	--		
Median type	Undivided							
RT Channelized?			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT					TR		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	0	0	0	21	0	25		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93		
Hourly Flow Rate (veh/h)	0	0	0	22	0	26		
Proportion of heavy vehicles, P _{HV}	0	0	0	2	0	2		
Percent grade (%)	0			0				
Flared approach		N			N			
Storage		0			0			
RT Channelized?			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
Volume, v (vph)	46						48	
Capacity, c _m (vph)	1148						336	
v/c ratio	0.04						0.14	
Queue length (95%)	0.13						0.49	

Control Delay (s/veh)	8.3					17.5	
LOS	A					C	
Approach delay (s/veh)	--	--				17.5	
Approach LOS	--	--				C	

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AM - With EBLT Lane

TWO-WAY STOP CONTROL SUMMARY								
General Information			Site Information					
Analyst	Alan Childers		Intersection	Emory Rd. / Prop. Subd. St.				
Agency/Co.	Cannon & Cannon, Inc.		Jurisdiction	Knox County				
Date Performed	3/18/2005		Analysis Year	2005				
Analysis Time Period	AM Peak Hour							
Project Description Proposed Subdivision on Emory Road (Map 77, Parcel 136)								
East/West Street: Emory Road (SR 131)			North/South Street: Proposed Subdivision Street					
Intersection Orientation: East-West			Study Period (hrs): 0.25					
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
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Volume (veh/h)	13	256	0	0	722	10		
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82		
Hourly Flow Rate (veh/h)	15	312	0	0	880	12		
Proportion of heavy vehicles, P _{HV}	3	--	--	0	--	--		
Median type	Undivided							
RT Channelized?			0			0		
Lanes	1	1	0	0	1	0		
Configuration	L	T				TR		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	0	0	0	29	0	39		
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82		
Hourly Flow Rate (veh/h)	0	0	0	35	0	47		
Proportion of heavy vehicles, P _{HV}	0	0	0	2	0	2		
Percent grade (%)	0			0				
Flared approach		N			N			
Storage		0			0			
RT Channelized?			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LR	
Volume, v (vph)	15						82	
Capacity, c _m (vph)	756						258	
v/c ratio	0.02						0.32	
Queue length (95%)	0.06						1.32	

Control Delay (s/veh)	9.9					25.3	
LOS	A					D	
Approach delay (s/veh)	--	--				25.3	
Approach LOS	--	--				D	

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PM-With EBLT Lane

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	Alan Childers			Intersection	Emory Rd. / Prop. Subd. St.			
Agency/Co.	Cannon & Cannon, Inc.			Jurisdiction	Knox County			
Date Performed	3/18/2005			Analysis Year	2005			
Analysis Time Period	PM Peak Hour							
Project Description Proposed Subdivision on Emory Road (Map 77, Parcel 136)								
East/West Street: Emory Road (SR 131)				North/South Street: Proposed Subdivision Street				
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Volume (veh/h)	43	620	0	0	343	35		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93		
Hourly Flow Rate (veh/h)	46	666	0	0	368	37		
Proportion of heavy vehicles, P _{HV}	3	--	--	0	--	--		
Median type	Undivided							
RT Channelized?			0			0		
Lanes	1	1	0	0	1	0		
Configuration	L	T				TR		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	0	0	0	21	0	25		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93		
Hourly Flow Rate (veh/h)	0	0	0	22	0	26		
Proportion of heavy vehicles, P _{HV}	0	0	0	2	0	2		
Percent grade (%)	0			0				
Flared approach		N			N			
Storage		0			0			
RT Channelized?			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LR	
Volume, v (vph)	46						48	
Capacity, c _m (vph)	1148						336	
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Queue length (95%)	0.13						0.49	

Control Delay (s/veh)	8.3						17.5	
LOS	A						C	
Approach delay (s/veh)	--	--					17.5	
Approach LOS	--	--					C	

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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)

AM
256

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

AM
732

AM Actual = 13 (Projected)

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

PM
378

PM
620

PM
Actual = 43
(Projected)

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