

Traffic Impact Study

Millertown Pike Development Knox County, Tennessee

00262-0007



April 12, 2004

Prepared for:
B & J Enterprises
P.O. Box 23940
Knoxville, Tennessee 37933-1940



Cannon & Cannon, Inc.
Civil Engineering • Field Surveying

9724 Kingston Pike, Suite 1100 • Knoxville, Tennessee 37922
Tel No. (865) 670-8555 • Fax No. (865) 670-8866

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EXECUTIVE SUMMARY

This report summarizes a traffic impact study that was prepared for the proposed Millertown Pike Development, to be located off Millertown Pike in Northeast Knox County. This development, which is approximately one and one-half miles east of the I-640/Knoxville Center Mall area, proposes a total of 193 dwelling units at full build-out. These will consist of four distinct types of units, including 84 townhomes, 40 small lot "ranch" homes, 45 mid-size lot "mid-range" homes and 24 large lot "estate" homes. The development entrance will be at a new three-leg intersection on Millertown Pike, located approximately 0.40 mile west of Harris Road.

It was the primary conclusion of this study that no major negative traffic volume related impacts will result from the construction of the Millertown Pike Development. In fact, capacity analyses of proposed side street (2-way) stop traffic control, indicates that good operational conditions (LOS "C" or better) can be expected during all time periods. It was determined, however, that an eastbound left turn deceleration and storage lane will be warranted, based on anticipated P.M. peak hour traffic conditions. The recommended length for the storage lane portion of this lane is 75 feet.

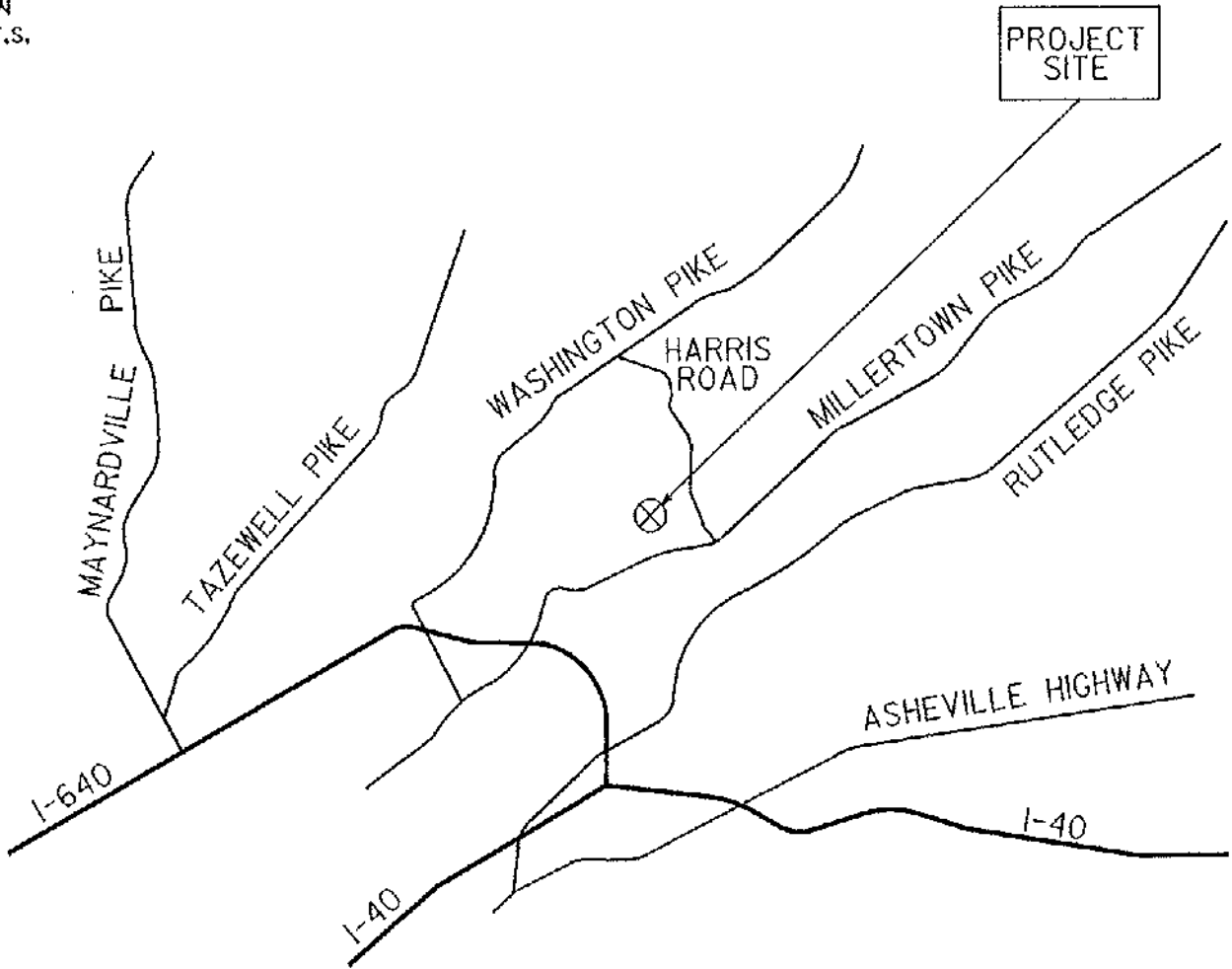
Intersection corner sight distance was also evaluated for the proposed Millertown Pike Development access roadway intersection. This evaluation found that sight distance will be excellent, over 550 feet looking east and over 600 feet looking west. These distances significantly exceed the 400 foot minimum that is required per the 40 mph speed limit on Millertown Pike, and even a 500 foot distance that is recommended in this report.

INTRODUCTION AND PURPOSE OF STUDY

This report provides a summary of the traffic impact study that was performed for the proposed Millertown Pike Development, to be located off Millertown Pike in the Northeast Knox County area known as the Ritta Community. The project site is approximately one and one-half miles east of the I-640/Knoxville Center Mall area. FIGURE 1 is a location map that identifies the project site in relation to the roadways in the vicinity of the proposed development.

The concept plan for this project proposes a multiuse development with a total of 193 dwelling units at full build-out. These consist of four distinct types of units, including 84 townhomes, 40 small lot "ranch" homes, 45 mid-size lot "mid-range" homes and 24 large lot "estate" homes. The development entrance will be at a new three-leg intersection on Millertown Pike, located approximately 0.40 mile west of Harris Road. FIGURE 2 provides a detailed layout of the proposed development 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 Millertown Pike. Of particular interest was the intersection of Millertown Pike with the single access roadway that is proposed for this development.



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FIGURE 1
LOCATION MAP

MILLERTOWN PIKE DEVELOPMENT
TRAFFIC IMPACT STUDY



SCALE: 1"=500'



MILLERTOWN PIKE



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FIGURE 2
SITE PLAN

MILLERTOWN PIKE DEVELOPMENT
TRAFFIC IMPACT STUDY

EXISTING CONDITIONS

Existing Roadway Conditions

Millertown Pike is a two-lane roadway that is classified by the Knoxville-Knox County Metropolitan Planning Commission (MPC) as a Minor Arterial roadway. It is located within Knox County, and is thus maintained by the Knox County Department of Engineering and Public Works. The roadway pavement consists of two traffic lanes of approximately ten and one-half feet in width, and minimal shoulders of six inches to one foot. The speed limit is posted as 40 mph.

Existing Traffic Data

A traffic count station for collecting average daily traffic data (ADT) is located on Millertown Pike, just west of the project site (count station T261), near Mary Emily Lane. The most recent data were provided by MPC, with resulting ADTs of 4182 for year 2001, 4541 for year 2002, and 5074 for year 2003.

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 Millertown Pike and Vincinda Circle, approximately 200 feet west of the proposed Millertown Pike Development intersection. These counts were conducted during the A.M. and P.M. peak traffic hours. Raw data summary sheets for these counts are contained in the APPENDIX.

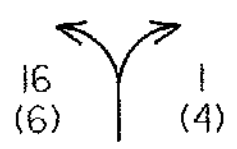
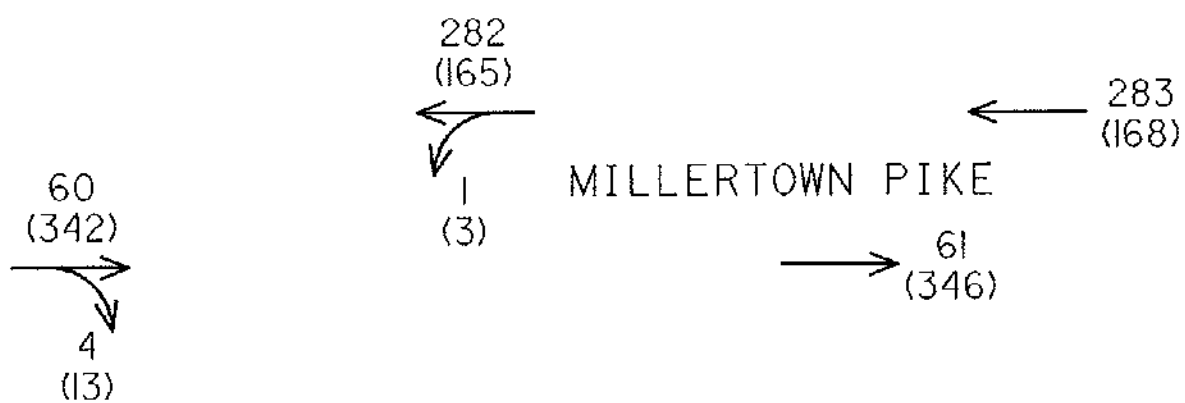
In addition to helping establish trip distribution patterns, these turning movement counts were used to establish the existing-background traffic volumes for this study. Specifically, the east-leg volumes from the counted intersection were used for this, as displayed on FIGURE 3. These volumes are the count data adjusted to an average weekday basis using adjustment factors developed by the University of Tennessee Transportation Research Center (See APPENDIX).

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 Millertown Pike and the Millertown Pike Development 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 APPENDIX for a discussion of Intersection Capacity and Level of Service Concepts, and the PROPOSED CONDITIONS section for analyses of conditions upon full build-out of the proposed development.



MILLERTOWN
PIKE DEVELOPMENT



VINCINDA
CIRCLE

TOP NO. - A.M. PEAK HOUR (7:00 - 8:00 A.M.) - A.M. AWD FACTOR = 1.02 (TUES. IN APRIL)
(BOTTOM NO.) - P.M. PEAK HOUR (5:00 P.M. - 6:00 P.M.) - P.M. AWD FACTOR = 1.02 (MON. IN APRIL)

NOTE:
THE DATA SHOWN ARE THE RAW TRAFFIC COUNT DATA TIMES A FACTOR TO ADJUST TO AN AVERAGE WEEKDAY VOLUME FROM COUNTS TAKEN IN NOVEMBER. SEE APPENDIX FOR RAW COUNT DATA AND FACTOR TABLE. (FACTORS DEVELOPED BY THE UNIVERSITY OF TENNESSEE TRANSPORTATION RESEARCH CENTER).



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FIGURE 3
EXISTING BACKGROUND TRAFFIC DATA
MILLERTOWN PIKE DEVELOPMENT
TRAFFIC IMPACT STUDY

PROPOSED CONDITIONS

Background Traffic Growth

The anticipated time for full build-out of the Millertown Pike Development is 6 years, with the project beginning in 2004. Therefore, year 2010 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 2010, it was necessary to establish an annual growth rate for existing traffic. The MPC ADT values that were previously discussed represent a near 10 percent annual growth. However, this is considered quite high and was based on limited data. Such a growth would be unlikely to be sustained over a six-year period. Therefore, a background annual growth rate of five percent seems more reasonable and was assumed. FIGURE 4 contains the background traffic volumes that would result from a 5.0 percent annual growth from year 2004, when counts were conducted, to year 2010.

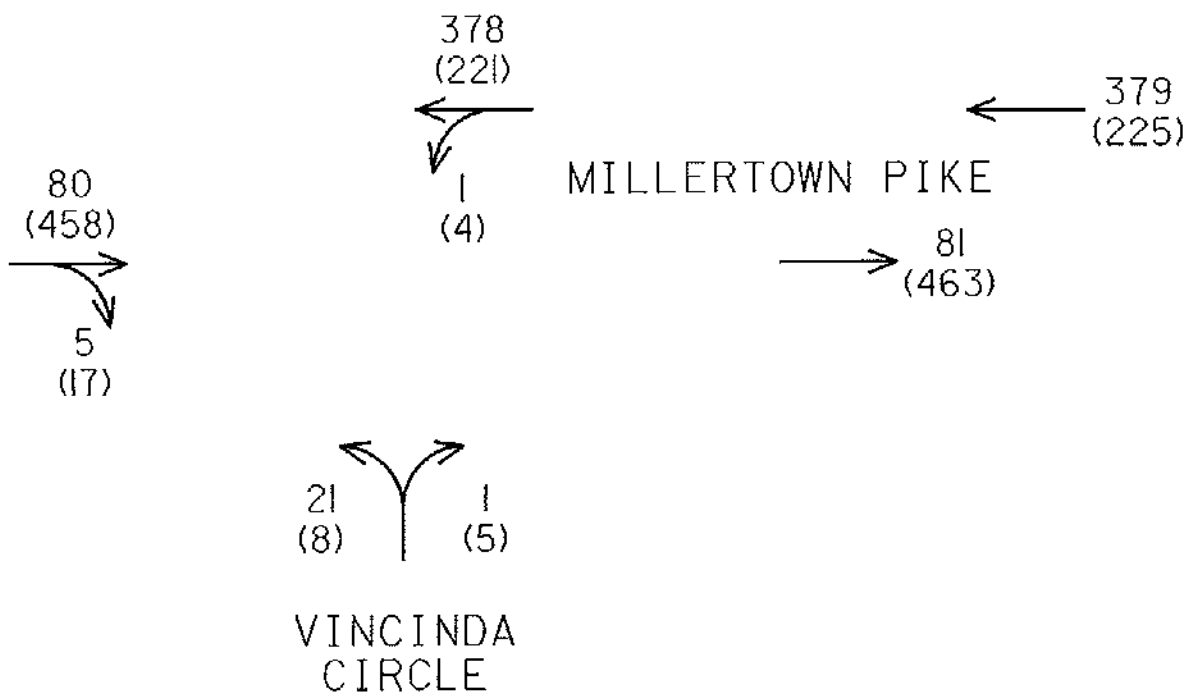
Trip Generation

In order to estimate the expected traffic volumes to be generated by full build-out of the proposed Millertown Pike Development, 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 193, 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					
MILLERTOWN PIKE DEVELOPMENT – 193 UNITS					
RATES FOR SINGLE FAMILY DETACHED HOUSING – I.T.E. CODE 210					
	Total New Trips	% Entering	% Exiting	Number Entering	Number Exiting
Weekday	1898	50%	50%	949	949
A.M. Peak	145	25%	75%	36	109
P.M. Peak	194	64%	36%	124	70



MILLERTOWN
PIKE DEVELOPMENT



NOTE:
ANNUAL GROWTH ASSUMED
= FIVE PERCENT (5%)

VOLUME
LEGEND
AM
(PM)



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FIGURE 4
PEAK HOUR TRAFFIC VOLUMES
BACKGROUND TRAFFIC - YEAR 2010
MILLERTOWN PIKE DEVELOPMENT
TRAFFIC IMPACT STUDY

Trip Distribution

FIGURE 5 provides a summary of the trip generation patterns developed for the proposed development intersection with Millertown Pike, which were based on the existing patterns at the nearby (200 feet west) intersection of Millertown Pike and Vincinda Circle. 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 2010 volumes reflecting the existing traffic, the background traffic growth, and the newly generated traffic from the Millertown Pike Development. These are the volumes used in the analysis of full build-out conditions.

Proposed Level-of-Service

Unsignalized intersection capacity analyses were conducted utilizing the combined traffic volumes of FIGURE 6, at the proposed intersection of Millertown Pike and the Millertown Pike Development access roadway. The methods utilized are those discussed in the APPENDIX on the sheet entitled "Intersection Capacity and Level of Service Concepts". The results for the proposed conditions indicate that all traffic movements are expected to operate at levels-of-service no worse than "C" 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 Millertown Pike, on the proposed access roadway, the sight distance exceeds 550 feet. Looking right (west) from the same STOP position, the sight distance significantly exceeds 600 feet.

The posted speed limit on Millertown Pike 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.

2) Auxiliary Lanes for Proposed Development Intersection:

Left and right turn lane warrant analyses were conducted for the proposed development intersection. These analyses employed Tables 5A and 5B from the Knox County Access Control and Driveway Design Policy, which are based on turn lane warrants developed by Harmelink. The results were that an eastbound left turn lane is anticipated to be warranted, based on P.M. peak traffic volumes. A westbound right turn lane is not expected to be justified. Copies of Tables 5A and 5B are located in the APPENDIX for review.

MILLERTOWN PIKE DEVELOPMENT



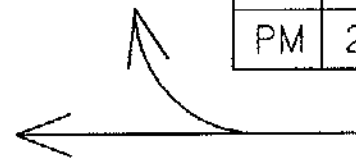
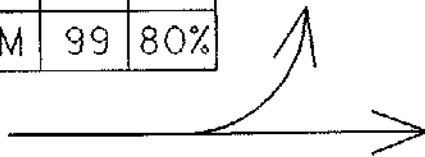
	NO.	%
AM	98	90%
PM	42	60%

	NO.	%
AM	11	10%
PM	28	40%



	NO.	%
AM	29	80%
PM	99	80%

	NO.	%
AM	7	20%
PM	25	20%



TOTAL GENERATED TRIPS		
	ENTER	EXIT
AM	36	109
PM	124	70

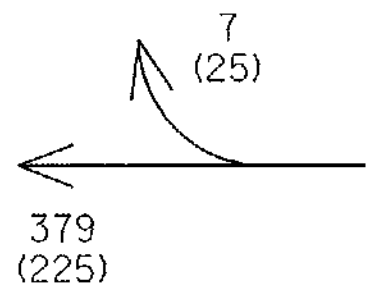
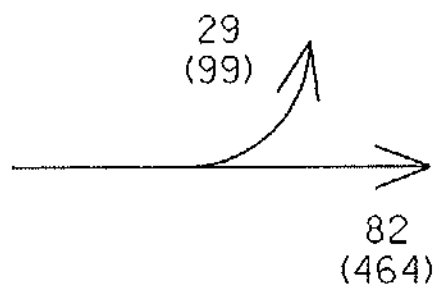
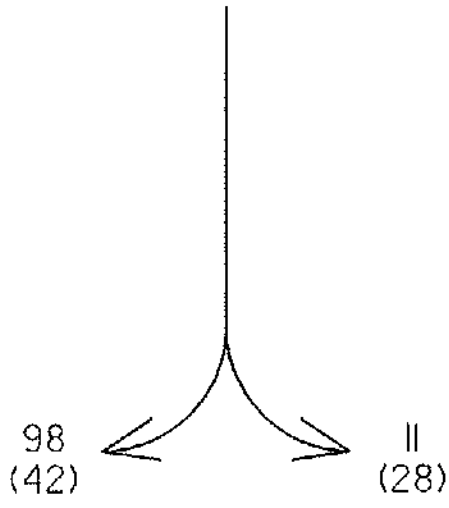
FIGURE 5
TRIP DISTRIBUTION PATTERNS AND ASSIGNMENT
OF GENERATED TRAFFIC

MILLERTOWN PIKE DEVELOPMENT
TRAFFIC IMPACT STUDY



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MILLERTOWN
PIKE DEVELOPMENT



VOLUME
LEGEND
AM
(PM)

NOTE: VOLUMES SHOWN ARE
PROJECTED FULL BUILD-OUT
VOLUMES FOR YEAR 2010.



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FIGURE 6
COMBINED VOLUMES FOR ANALYSIS
MILLERTOWN PIKE DEVELOPMENT
TRAFFIC IMPACT STUDY

CONCLUSIONS AND RECOMMENDATIONS

It was the primary conclusion of this study that no major negative traffic volume related impacts will result from the construction of the Millertown Pike Development. In fact, capacity analyses of proposed side street (2-way) stop traffic control, indicates that good operational conditions (LOS "C" or better) can be expected during all time periods. It was determined, however, that an eastbound left turn deceleration and storage lane will be warranted, based on anticipated P.M. peak hour traffic conditions. The recommended length for the storage lane portion of this lane is 75 feet.

Intersection corner sight distance was also evaluated for the proposed Millertown Pike Development access roadway intersection. This evaluation found that sight distance will be excellent, over 550 feet looking east and over 600 feet looking west. These distances significantly exceed the 400 foot minimum that is required per the 40 mph speed limit on Millertown Pike, and even a 500 foot distance that is recommended in this report.

APPENDIX

Intersection Capacity and 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 congestions, 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.

Traffic Count

Millertown Pike at Vincinda Circle
 AM Peak Period Turning Movements
 Raw Data
 Counts by JDS

File Name : millertown4-6-04
 Site Code : 00000000
 Start Date : 04/06/2004
 Page No : 1

Groups Printed- Unshifted

Start Time	VINCINDA CIRCLE From North				MILLERTOWN PIKE From East				VINCINDA CIRCLE From South				MILLERTOWN PIKE 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	
07:00 AM	0	0	0	0	0	42	1	0	1	0	5	0	0	13	0	0	62
07:15 AM	0	0	0	0	0	58	0	0	0	0	1	0	0	15	0	0	74
07:30 AM	0	0	0	0	0	96	0	0	0	0	6	0	2	19	0	0	123
07:45 AM	0	0	0	0	0	80	0	0	0	0	4	0	2	12	0	0	98
Total	0	0	0	0	0	276	1	0	1	0	16	0	4	59	0	0	357
08:00 AM	0	0	0	0	0	38	0	0	0	0	1	0	0	17	0	0	56
08:15 AM	0	0	0	0	0	46	0	0	0	0	0	0	2	13	0	0	61
Grand Total	0	0	0	0	0	360	1	0	1	0	17	0	6	89	0	0	474
Approch %	0.0	0.0	0.0	0.0	0.0	99.7	0.3	0.0	5.6	0.0	94.4	0.0	6.3	93.7	0.0	0.0	
Total %	0.0	0.0	0.0	0.0	0.0	75.9	0.2	0.0	0.2	0.0	3.6	0.0	1.3	18.8	0.0	0.0	

Traffic Count

Millertown Pike at Vincinda Circle
 PM Peak Period Turning Movements
 Raw Data
 Counts by JDS

File Name : millertown4-5-04
 Site Code : 00000000
 Start Date : 04/05/2004
 Page No : 1

Groups Printed- Unshifted

Start Time	VINCINDA CIRCLE From North				MILLERTOWN PIKE From East				VINCINDA CIRCLE From South				MILLERTOWN PIKE 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	
04:30 PM	0	0	0	0	0	33	0	0	2	0	3	0	2	52	0	0	92
04:45 PM	0	0	0	0	0	24	0	0	1	0	2	0	1	78	0	0	106
Total	0	0	0	0	0	57	0	0	3	0	5	0	3	130	0	0	198
05:00 PM	0	0	0	0	0	35	0	0	1	0	0	0	6	83	0	0	125
05:15 PM	0	0	0	0	0	36	1	0	0	0	5	0	2	89	0	0	133
05:30 PM	0	0	0	0	0	58	2	0	2	0	1	0	3	77	0	0	143
05:45 PM	0	0	0	0	0	33	0	0	1	0	0	0	2	86	0	0	122
Total	0	0	0	0	0	162	3	0	4	0	6	0	13	335	0	0	523
Grand Total	0	0	0	0	0	219	3	0	7	0	11	0	16	465	0	0	721
Apprch %	0.0	0.0	0.0	0.0	0.0	98.6	1.4	0.0	38.9	0.0	61.1	0.0	3.3	96.7	0.0	0.0	
Total %	0.0	0.0	0.0	0.0	0.0	30.4	0.4	0.0	1.0	0.0	1.5	0.0	2.2	64.5	0.0	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	0.98	0.96	1.03
Tuesday	1.00	0.99	0.96	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	0.89	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	0.82	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	1.06	1.03	1.02	1.01	0.99	1.00	1.01	1.02	1.06	1.06	1.12
Tuesday	1.06	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	0.99	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	0.95	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	1.09	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	1.05	1.04	1.02	0.99	0.97	0.95	0.96	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.

TWO-WAY STOP CONTROL SUMMARY

General Information			Site Information				
Analyst	ALC		Intersection	Millertown/Proposed			
Agency/Co.	Cannon & Cannon, Inc.		Jurisdiction	Knox County			
Date Performed	4/7/04		Analysis Year	2010			
Analysis Time Period	AM Peak Hour						
Project Description <i>Traffic Impact Study</i>							
East/West Street: <i>Millertown Pike</i>			North/South Street: <i>Millertown Pike Development</i>				
Intersection Orientation: <i>East-West</i>			Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments							
Major Street	Eastbound			Westbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)	29	82	0	0	379	7	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	
Hourly Flow Rate (veh/h)	32	91	0	0	421	7	
Proportion of heavy vehicles, P _{HV}	2	-	-	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	11	0	98	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	
Hourly Flow Rate (veh/h)	0	0	0	12	0	108	
Proportion of heavy vehicles, P _{HV}	0	0	0	0	0	0	
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
Lane Configuration	LT						LR
Volume, v (vph)	32						120
Capacity, c _m (vph)	1131						612
v/c ratio	0.03						0.20
Queue length (95%)	0.09						0.72
Control Delay (s/veh)	8.3						12.3
LOS	A						B
Approach delay (s/veh)	-	-					12.3
Approach LOS	-	-					B

TWO-WAY STOP CONTROL SUMMARY

General Information			Site Information					
Analyst	ALC		Intersection	Millertown/Proposed				
Agency/Co.	Cannon & Cannon, Inc.		Jurisdiction	Knox County				
Date Performed	4/7/04		Analysis Year	2010				
Analysis Time Period	PM Peak Hour							
Project Description <i>Traffic Impact Study</i>								
East/West Street: <i>Millertown Pike</i>			North/South Street: <i>Millertown Pike Development</i>					
Intersection Orientation: <i>East-West</i>			Study Period (hrs): <i>0.25</i>					
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	99	464	0	0	225	25		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)	110	515	0	0	250	27		
Proportion of heavy vehicles, P _{HV}	2	-	-	0	-	-		
Median type	<i>Undivided</i>							
RT Channelized?			0			0		
Lanes	0	1	0	0	1	0		
Configuration	<i>LT</i>					<i>TR</i>		
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	28	0	42		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90		
Hourly Flow Rate (veh/h)	0	0	0	31	0	46		
Proportion of heavy vehicles, P _{HV}	0	0	0	0	0	0		
Percent grade (%)	0			0				
Flared approach		<i>N</i>			<i>N</i>			
Storage		0			0			
RT Channelized?			0			0		
Lanes	0	0	0	0	0	0		
Configuration					<i>LR</i>			
Control Delay, Queue Length, Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	<i>LT</i>						<i>LR</i>	
Volume, v (vph)	110						77	
Capacity, c _m (vph)	1286						420	
v/c ratio	0.09						0.18	
Queue length (95%)	0.28						0.66	
Control Delay (s/veh)	8.1						15.5	
LOS	<i>A</i>						<i>C</i>	
Approach delay (s/veh)	-	-					15.5	
Approach LOS	-	-					<i>C</i>	

From Knox County
 "Access Control and
 Driveway Design Policy"

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

TABLE 5B

From Knox County
"Access Control and
 Driveway Design Policy"

**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			* PM Peak*			* 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.