

**TRAFFIC IMPACT STUDY**  
**PROPOSED GROVE PARK**  
**SUBDIVISION**  
**KNOX COUNTY, TENNESSEE**

PREPARED FOR:

RICHARD LEMAY  
10816 KINGSTON PIKE  
KNOXVILLE, TN 37922  
(865) 671-0183

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

**TRAFFIC IMPACT STUDY**  
**PROPOSED GROVE PARK**  
**SUBDIVISION**  
**KNOX COUNTY, TENNESSEE**



PREPARED FOR:

RICHARD LEMAY  
10816 KINGSTON PIKE  
KNOXVILLE, TN 37922  
(865) 671-0183

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

## Table of Contents

	Page
MANAGEMENT SUMMARY .....	1
INTRODUCTION.....	2
EXISTING CONDITIONS.....	5
Existing Roadway Conditions .....	5
Existing Traffic Data.....	5
Existing Level of Service .....	6
PROPOSED CONDITIONS.....	9
Background Traffic Growth .....	9
Trip Generation.....	9
Trip Distribution .....	12
Proposed Level of Service.....	16
Intersection Sight Distance and Other Issues .....	16
RECOMMENDATIONS.....	17
APPENDIX.....	18

## LIST OF FIGURES

FIGURE 1 - Location Map.....	3
FIGURE 2 - Concept Site Plan.....	4
FIGURE 3 - Existing Peak Hour Traffic Volumes and Level-of-Service Summary .....	8
FIGURE 4 - Peak Hour Traffic Volumes .....	11
(Background Growth -- Year 2005)	
FIGURE 5 - Trip Distribution Pattern.....	13
FIGURE 6 - Peak Hour Generated Traffic Volumes .....	14
FIGURE 7 - Peak Hour Traffic Volumes and Level-of-Service Summary .....	15
(Combined -- Year 2005)	

## MANAGEMENT SUMMARY

This report provides a summary of the traffic impact study that was performed for the Grove Park subdivision. The project site is located on Maloneyville Road in northeastern Knox County, and is approximately one-half mile north of Washington Pike. Interstate 640 is approximately 6 miles to the southwest. The Grove Park subdivision entrance on Maloneyville Road will serve as the only entrance.

This study primarily focused on the evaluation of two intersections: the subdivision entrance on Maloneyville Road, and the existing intersection of Maloneyville Road and Washington Pike. The results included the identification of two significant traffic related concerns. The following summarizes the recommendations that are made to address these concerns:

1. Intersection Sight Distance at Proposed Subdivision Entrance:

It is recommended that some trees and heavy brush, located primarily on the west side of Maloneyville Road, both north and south of the proposed subdivision entrance intersection be cleared. The clearing should extend approximately forty feet back off the edge of pavement of Maloneyville Road for approximately three hundred and fifty feet to the north and south of the proposed subdivision entrance for adequate sight distance. This significant vegetation removal will address the sight distance concern that was identified during a site field review.

2. Improve Washington Pike with a Left-turn Lane at its Intersection with Maloneyville Road:

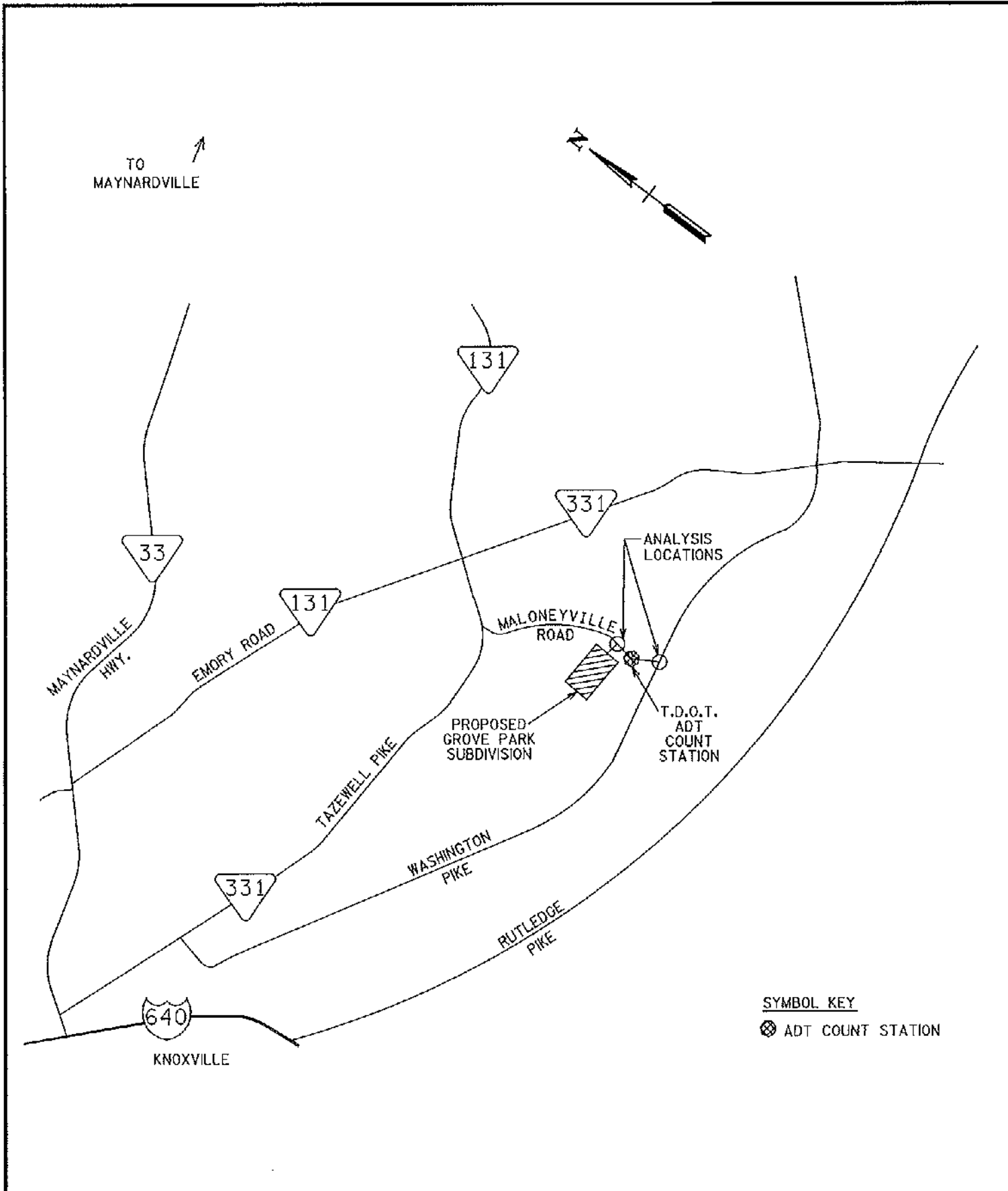
It is recommended that Washington Pike from the west be improved with a left turn lane at Maloneyville Road. The analysis for the year 2005 (combined volumes) shows for the PM peak hour the warrant for a left-turn lane is met.

## INTRODUCTION

This report provides a summary of the traffic impact study that was performed for the Grove Park subdivision. The project site is located in northeastern Knox County and is approximately one-half mile north of Washington Pike. Interstate 640 is approximately 6 miles to the southwest. 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 113 lots at full build-out. The Grove Park subdivision entrance on Maloneyville Road will serve as the only entrance. FIGURE 2 provides a detailed layout of the proposed subdivision as shown on the concept plan.

The purpose of this traffic impact study is to assess the impact of the proposed Grove Park subdivision on the roadway facilities in the project area. Specifically, this assessment includes review of geometric conditions at the intersection of Maloneyville Road and the subdivision entrance, and a traffic and capacity assessment at the nearby intersection of Maloneyville Road and Washington Pike. The latter assessment was conducted at the request of Knox County, instead of conducting a similar review at the subdivision entrance.



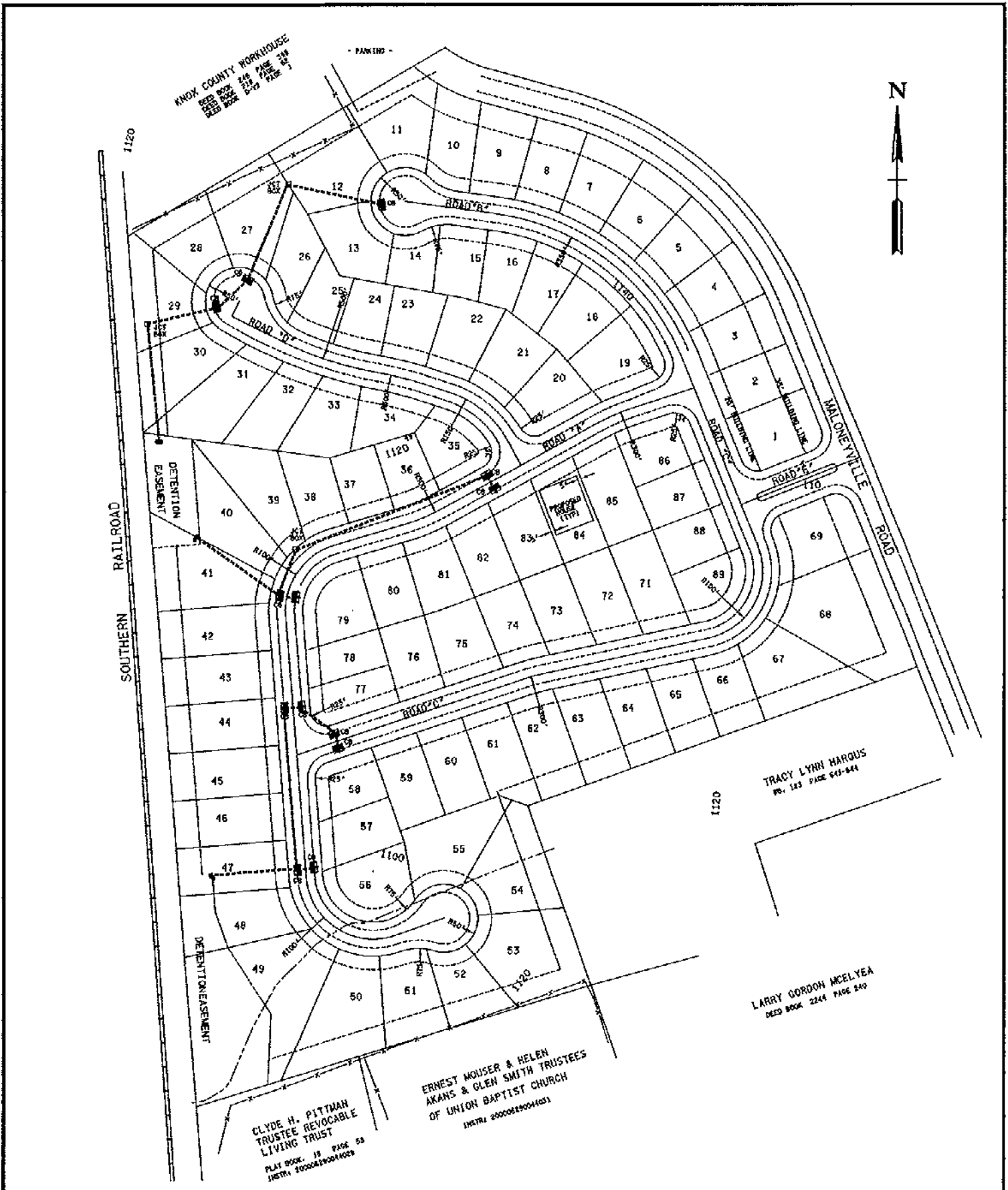
SYMBOL KEY  
 ⊗ ADT COUNT STATION



**Cannon & Cannon, Inc.**  
 Civil Engineering - Field Surveying

**FIGURE 1**  
 LOCATION MAP

GROVE PARK  
 TRAFFIC IMPACT STUDY



**Cannon & Cannon, Inc.**  
Civil Engineering - Field Surveying

**FIGURE 2**  
SITE PLAN

GROVE PARK  
TRAFFIC IMPACT STUDY



## EXISTING CONDITIONS

### Existing Roadway Conditions

Maloneyville Road, which is the road with the subdivision access point, is a two-lane roadway with a pavement width of approximately 23 feet. It is a Knox County maintained facility and is classified by the Metropolitan Planning Commission (MPC) as a minor-collector. The posted speed limit is 30 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 Maloneyville Road and Washington Pike is a “T” intersection, with Maloneyville Road being the northern leg and Washington Pike being the east-west street. Washington Pike is a two-lane minor-arterial roadway maintained by Knox County. Lane widths and pavement striping are similar to Maloneyville Road, and the posted speed limit is 45 MPH.

### Existing Traffic Data

The Tennessee Department of Transportation (TDOT) collects average daily traffic data (ADT) annually on Maloneyville Road. Figure 1 identifies the location of the ADT count station that is located near the proposed subdivision site. Table 1 below summarizes this count data for a recent five-year period.

**Table 1**

Average Daily Traffic Count Summary

Year	Station 338
2001	1615
2000	1337
1999	1694
1998	995
1997	1311

For purposes of this study, turning movement count data were collected for the intersection of Maloneyville Road at Washington Pike for the morning and afternoon peak periods. The peak hour traffic periods were determined to be between 7:00 and 8:00 AM and between 4:45 and 5:45 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 Friday in July is 0.91, 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.

Existing Level-of-Service

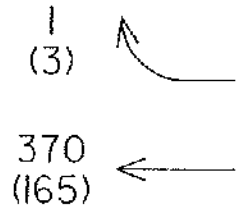
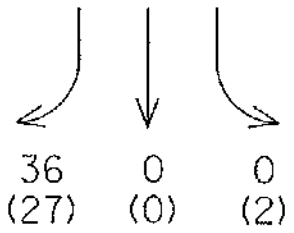
Unsignalized intersection capacity analyses were conducted for the intersection of Maloneyville Road and Washington Pike using existing STOP traffic control conditions for the Maloneyville leg with the volumes shown in FIGURE 3 that were derived as discussed above. These analyses employed the procedures 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 "B" during the AM peak hour and level-of-service "A" during the PM peak hour for the side street (Maloneyville) approach. These results are summarized in FIGURE 3, with detailed computer printouts located in the APPENDIX.



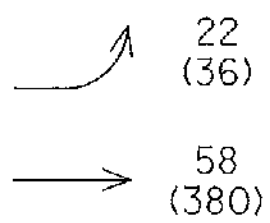
NEW SUBDIVISION  
ENTRANCE

MALONEYVILLE RD.



LEVEL-OF-SERVICE  
AM - B  
PM - A

WASHINGTON PK.



VOLUME  
LEGEND  
AM  
(PM)

NOTE: VOLUMES ADJUSTED  
FOR DAY OF WEEK AND MONTH



**Cannon & Cannon, Inc.**  
Civil Engineering - Field Surveying

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

GROVE PARK  
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 near three percent. FIGURE 4 contains the background traffic volumes that would result from a three percent annual growth from year 2001 to 2005, at the intersection of Maloneyville Road and Washington Pike.

### Trip Generation

In order to project the expected traffic volumes to be generated by full build-out of the proposed Grovc Park subdivision, the data and procedures of *Trip Generation, Sixth Edition* (Institute of Transportation Engineers, 1997) were utilized. The generated traffic volumes were determined based on the 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 113, 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**

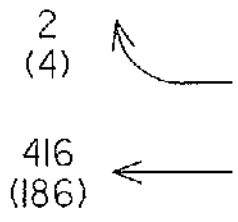
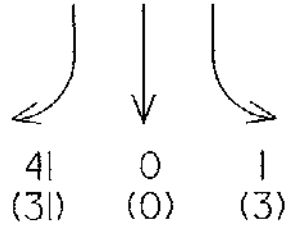
**Trip Generation Summary**

	New Trips	% Entering	% Exiting	Number Entering	Number Exiting
AM Peak	89	25	75	22	67
PM Peak	120	64	36	77	43



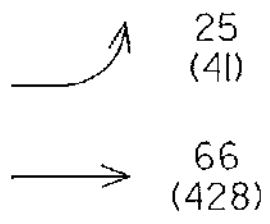
NEW SUBDIVISION  
ENTRANCE

MALONEYVILLE RD.



LEVEL-OF-SERVICE  
AM - B  
PM - A

WASHINGTON PK.



VOLUME  
LEGEND  
AM  
(PM)



**Cannon & Cannon, Inc.**  
Civil Engineering - Field Surveying

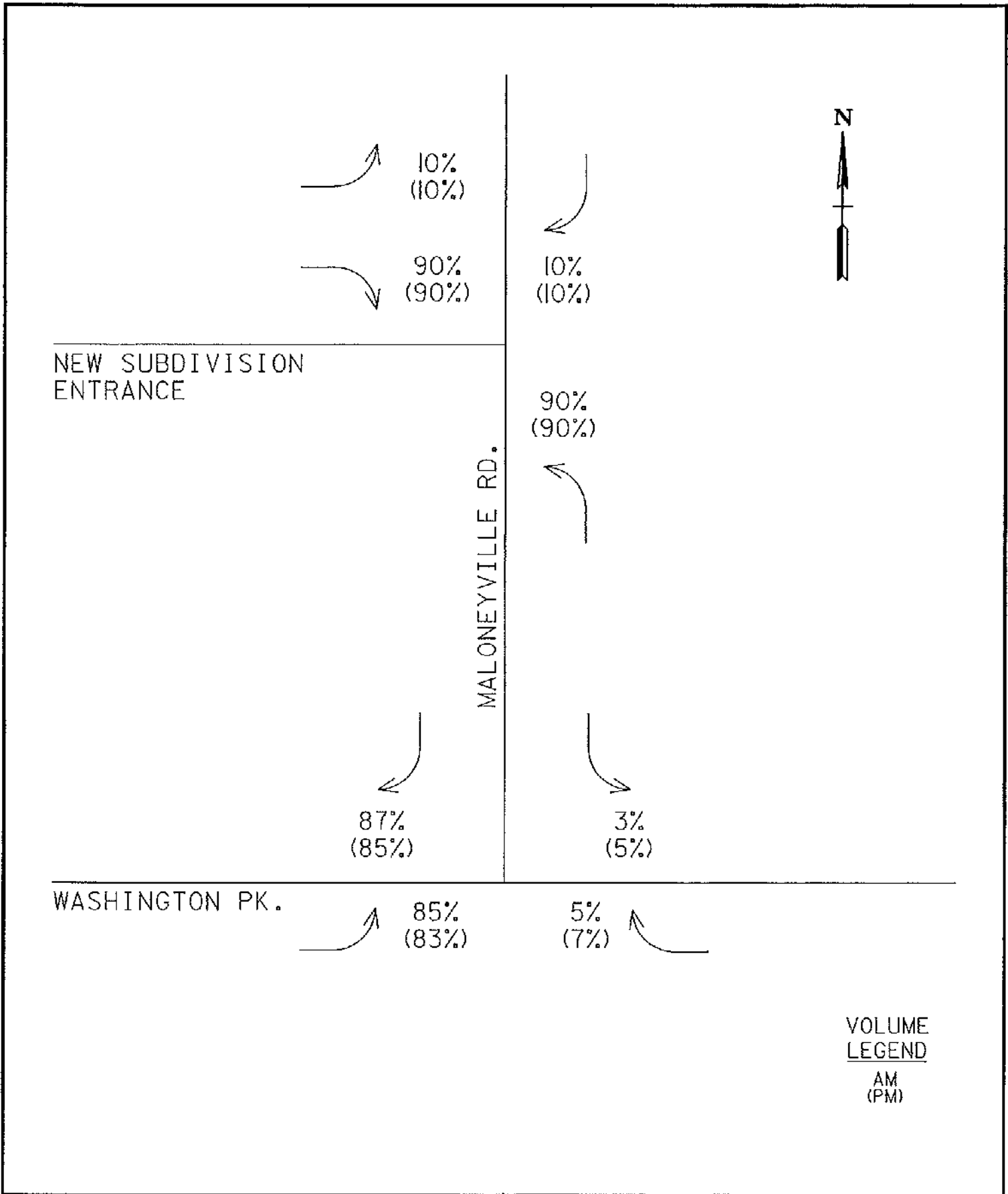
**FIGURE 4**  
PEAK HOUR TRAFFIC VOLUMES  
BACKGROUND GROWTH - YEAR 2005

GROVE PARK  
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 Maloneyville Road subdivision entrance intersection. FIGURE 5 provides a summary of the trip distribution patterns developed for the intersection of Maloneyville Road and Washington 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 patterns. FIGURE 7 shows the combined year 2005 volumes reflecting the existing traffic, the background traffic growth, and the newly generated traffic from the Grove Park subdivision at full build-out. Also shown in FIGURE 7 are summaries of unsignalized intersection capacity analyses for the intersection of Maloneyville Road and Washington Pike.

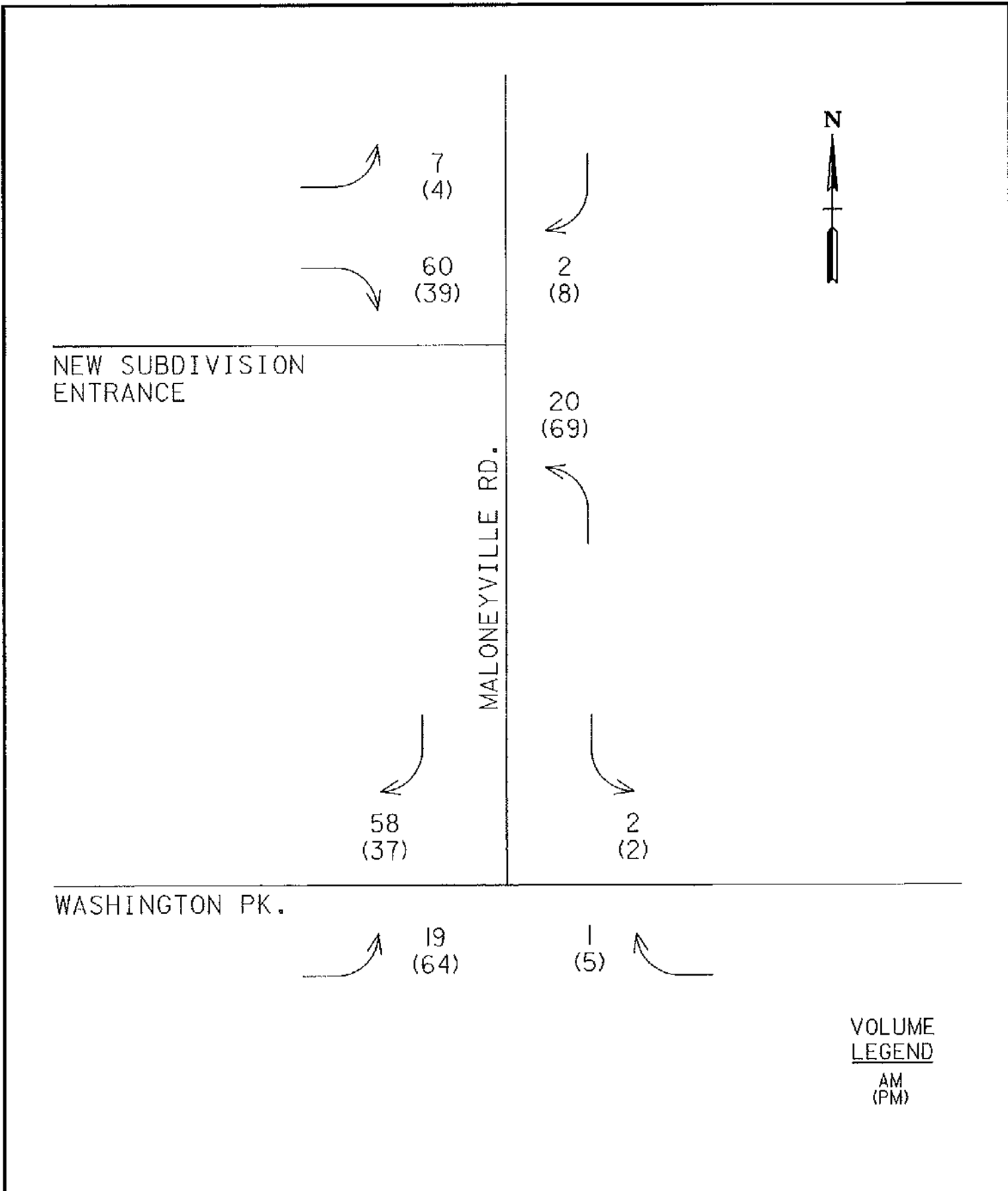




**Cannon & Cannon, Inc.**  
Civil Engineering - Field Surveying

**FIGURE 5**  
TRIP DISTRIBUTION VOLUMES

GROVE PARK  
TRAFFIC IMPACT STUDY

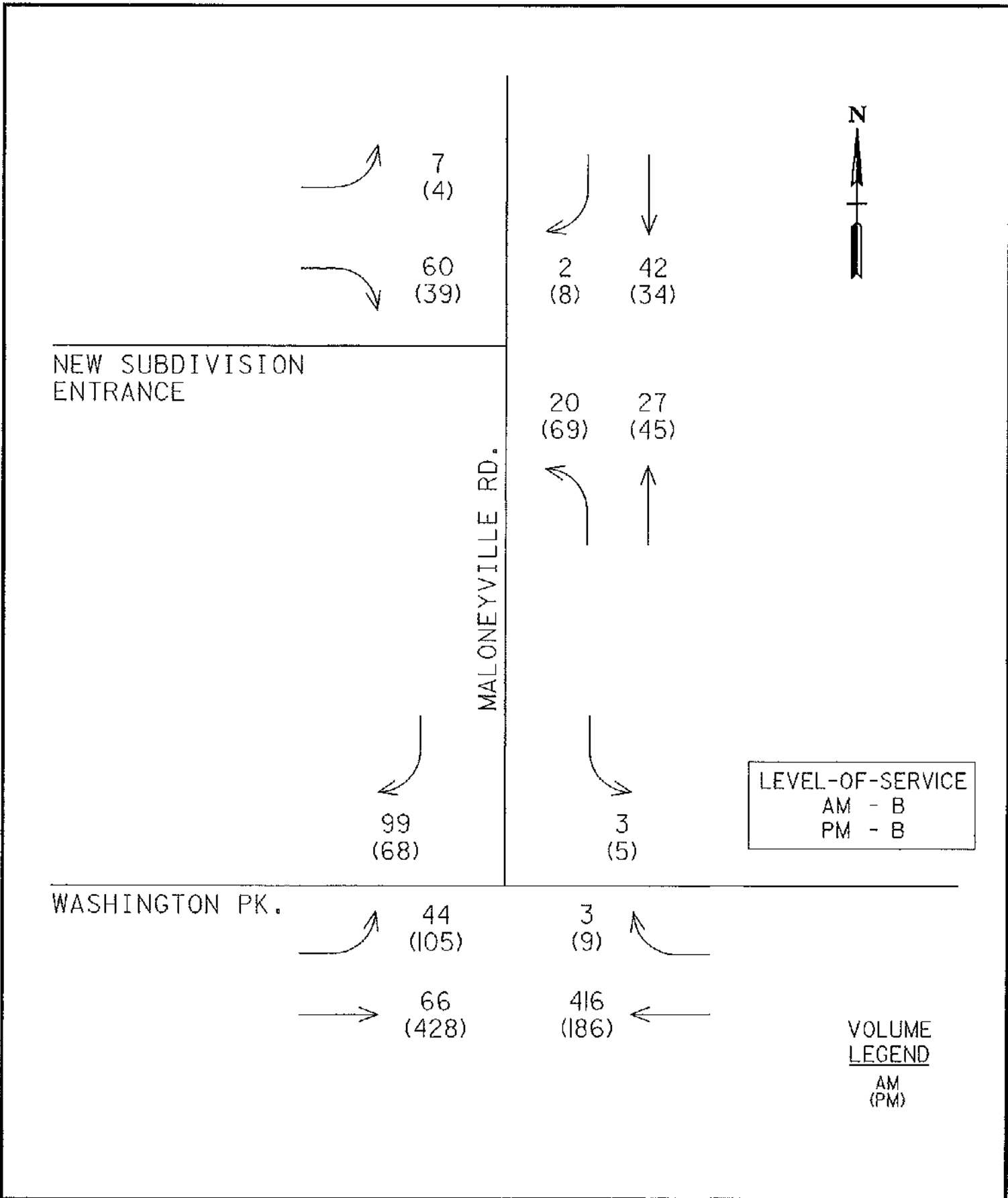


**FIGURE 6**  
PEAK HOUR GENERATED VOLUMES

GROVE PARK  
TRAFFIC IMPACT STUDY



**Cannon & Cannon, Inc.**  
Civil Engineering - Field Surveying



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

GROVE PARK  
 TRAFFIC IMPACT STUDY

### Proposed Level-of-Service

Unsignalized intersection capacity analyses were conducted utilizing the combined traffic volumes of FIGURE 7, at the intersection of Maloneyville Road and Washington 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 "B" (both AM and PM peaks) if the intersection remains under STOP control. 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) Proposed Subdivision Road and Maloneyville Road Sight Distance:

Looking left from a STOP position on the subdivision entrance road, the sight distance is approximately 170 feet. Looking right, the sight distance is approximately 190 feet. With a speed limit of 30 mph on Maloneyville Road, the required sight distance is 300 feet. The major problems looking left and right result from trees and heavy brush on the roadside in conjunction with a horizontal curve to the north.

#### 2) Auxiliary Lanes for Washington Pike at Maloneyville Road Intersection:

Left and right turn lane analyses were conducted at the intersection of Washington Pike and Maloneyville Road. The analyses concluded that a new left-turn lane will be warranted for the PM peak hour 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 Grove Park subdivision has resulted in the identification of two traffic related concerns. The following summarizes the recommendations that are made to address these concerns:

1. Intersection Sight Distance at Proposed Subdivision Entrance:

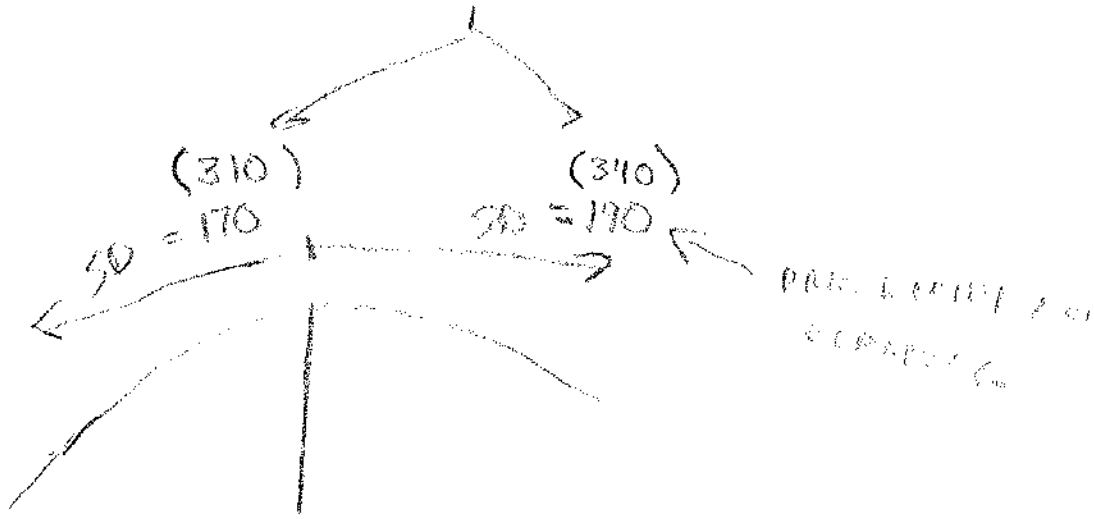
It is recommended that some trees and heavy brush, located primarily on the west side of Maloneyville Road, both north and south of the proposed subdivision entrance intersection be cleared. The clearing should extend approximately forty feet back off the edge of pavement of Maloneyville Road for approximately three hundred and fifty feet to the north and south of the proposed subdivision entrance for adequate sight distance. This significant vegetation removal will address the sight distance concern that was identified during a site field review.

2. Improve Washington Pike with a Left-turn lane at its intersection with Maloneyville Road:

It is recommended that Washington Pike from the West be improved with a left turn lane at Maloneyville Road. It is recommended that the left turn lane have a minimum approach taper length of 270 feet for widening on both sides of the roadway and a minimum approach taper length of 540 feet for widening on one side of the roadway. The minimum bay taper length is 180 feet. The storage length of the left turn lane is recommended to be a minimum of 100 feet in length. An evaluation of current volume conditions shows the warrant for a left-turn lane is not met for either AM or PM peak hours. An analysis for the year 2005 (background-growth only) shows the same result. The AM peak hour for year 2005 (combined volumes) does not meet the warrant. However, an analysis for the year 2005 (combined volumes) shows for the PM peak hour the warrant for a left-turn lane is met.

## **APPENDIX**

MASS CLIMBING (AT LEAST 40' OFF TOP)



Cannon & Cannon, Inc.  
Traffic Count

File Name : mal & wash  
Site Code : 00000000  
Start Date : 07/06/2001  
Page No : 1

Groups Printed- Unshifted

Start Time	MALONEYVILLE From North				WASHINGTON From East				MALONEYVILLE From South				WASHINGTON 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	
07:00 AM	16	0	0	0	0	93	0	0	0	0	0	0	0	12	0	0	121
07:15 AM	6	0	0	0	0	99	0	0	0	0	0	0	0	16	7	0	128
07:30 AM	11	0	0	0	0	128	0	0	0	0	0	0	0	14	11	0	164
07:45 AM	7	0	0	0	1	86	0	0	0	0	0	0	0	21	6	0	121
Total	40	0	0	0	1	406	0	0	0	0	0	0	0	63	24	0	534
08:00 AM	4	0	0	0	1	71	0	0	0	0	0	0	0	22	8	0	106
08:15 AM	3	0	0	0	0	59	0	0	0	0	0	0	0	23	11	0	96
08:30 AM	5	0	0	0	0	57	0	0	0	0	0	0	0	18	7	0	87
08:45 AM	7	0	0	0	1	53	0	0	0	0	0	0	0	23	6	0	90
Total	19	0	0	0	2	240	0	0	0	0	0	0	0	86	32	0	379
04:00 PM	13	0	1	0	0	35	0	0	0	0	0	0	0	74	8	0	131
04:15 PM	12	0	1	0	0	39	0	0	0	0	0	0	0	97	9	0	158
04:30 PM	10	0	1	0	1	43	0	0	0	0	0	0	0	76	15	0	146
04:45 PM	9	0	2	0	0	43	0	0	0	0	0	0	0	98	11	0	163
Total	44	0	5	0	1	160	0	0	0	0	0	0	0	345	43	0	598
05:00 PM	7	0	0	0	0	53	0	0	0	0	0	0	0	86	11	0	157
05:15 PM	7	0	0	0	2	38	0	0	0	0	0	0	0	113	11	0	171
05:30 PM	6	0	0	0	1	47	0	0	0	0	0	0	0	120	6	0	180
05:45 PM	9	0	0	0	0	32	0	0	0	0	0	0	0	80	10	0	131
Total	29	0	0	0	3	170	0	0	0	0	0	0	0	399	38	0	639
Grand Total	132	0	5	0	7	976	0	0	0	0	0	0	0	893	137	0	2150
Appreh %	96.4	0.0	3.6	0.0	0.7	99.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	86.7	13.3	0.0	
Total %	6.1	0.0	0.2	0.0	0.3	45.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.5	6.4	0.0	

(29) (0) (2) (3) (181) (0) (417) (31) (0)

10  
8  
338



TWO-WAY STOP CONTROL SUMMARY

Analyst: CHRIS KIRBY  
 Agency/Co.: CCI  
 Date Performed: 07/09/2001  
 Analysis Time Period: 4:45-5:45 PM  
 Intersection: MAL. @ WASH. PK.  
 Jurisdiction: KNOX COUNTY  
 Analysis Year: 2001  
 Project ID: PM ANALYSIS 2001  
 East/West Street: WASHINGTON PK  
 North/South Street: MALONEYVILLE RD

Intersection Orientation: EU Study period (hrs): 0-25

		Vehicle Volumes and Adjustments							
Major Street:	Approach Movement	Eastbound				Westbound			
		1 L	2 T	3 R	4 L	5 T	6 R		
Volume		39	437	0	0	161	3		
Peak-Hour Factor, PHF		0.89	0.87	1.00	1.00	0.85	0.75		
Hourly Flow Rate, HFR		44	460	0	0	211	4		
Percent Heavy Vehicles		0	--	--	0	--	--		
Median Type	Undivided								
RT Channelized?									
Lanes		0	1	0	0	1	0		
Configuration		LTR			LTR				
Upstream Signal?		No			No				
Minor Street:	Approach Movement	Northbound			Southbound				
		7 L	8 T	9 R	10 L	11 T	12 R		
Volume					2	0	29		
Peak Hour Factor, PHF					1.00	1.00	0.81		
Hourly Flow Rate, HFR					2	0	35		
Percent Heavy Vehicles					0	0	0		
Percent Grade (%)			0			0			
Median Storage									
		Delay, Queue Length, and Level of Service							
Approach Movement	EB	WB	Northbound			Southbound			
			1	4	7	8	9	10	11
Lane Config	LTR	LTR	L	T	R	L	T	R	
v (vph)	44	0						37	
C(m) (vph)	1367	1093						775	
v/c	0.03	0.00						0.05	
95% queue length	0.10	0.00						0.15	
Control Delay	7.7	8.3						9.9	
LOS	A	A						A	
Approach Delay								9.9	
Approach LOS								A	

TWO-WAY STOP CONTROL SUMMARY

Analyst: CHRIS KIRBY  
 Agency/Co.: CCI  
 Date Performed: 07/04/2001  
 Analysis Time Period: 7:00-8:00 AM  
 Intersection: MAL. @ WASH. PK.  
 Jurisdiction: KNOX COUNTY  
 Analysis Year: 2001  
 Project ID: AM ANALYSIS 2001  
 East/West Street: WASHINGTON PK  
 North/South Street: MALONEYVILLE RD

Intersection Orientation: EW Study period (hrs): 0.25

Major Street:	Approach Movement	Vehicle Volumes and Adjustments							
		Eastbound				Westbound			
		1 L	2 T	3 R	1 L	4 L	5 T	6 R	
Volume	24	63	0	0	406	1			
Peak-Hour Factor, PHF	0.55	0.75	1.00	1.00	0.79	0.25			
Hourly Flow Rate, HFR	43	84	0	0	512	4			
Percent Heavy Vehicles	0	--	--	0	--	--			

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR					LTR	
v (vph)	43	0					64	
C(m) (vph)	1060	1526					564	
v/c	0.04	0.00					0.11	
95% queue length	0.13	0.00					0.38	
Control Delay	8.5	7.4					12.2	
LOS	A	A					B	
Approach Delay							12.2	
Approach LOS							B	

TWO-WAY STOP CONTROL SUMMARY

Analyst: CHRIS KIRBY  
 Agency/Co.: CCI  
 Date Performed: 07/09/2001  
 Analysis Time Period: 4:45-5:45 PM  
 Intersection: MAL. @ WASH. PK.  
 Jurisdiction: KNOX COUNTY  
 Analysis Year: 2005 BACKGROUND  
 Project ID: PM ANALYSIS 2005 BACKGROUND ONLY  
 East/West Street: WASHINGTON PK  
 North/South Street: MALONEYVILLE RD

Intersection Orientation: EW Study period (hrs): 0.25

		Vehicle Volumes and Adjustments							
Major Street:	Approach Movement	Eastbound				Westbound			
		1 L	2 T	3 R	4 L	5 T	6 R		
Volume		41	428	0	0	186	4		
Peak-Hour Factor, PHF		1.00	0.90	1.00	1.00	1.00	0.75		
Hourly Flow Rate, HFR		41	475	0	0	186	5		
Percent Heavy Vehicles		0	--	--	0	--	--		
Median Type		Undivided							
RT Channelized?									
Lanes		0	1	0		0	1	0	
Configuration		LTR				LTR			
Upstream Signal?		No				No			

Minor Street:	Approach Movement	Northbound			Southbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume					3	0	31
Peak Hour Factor, PHF					1.00	1.00	1.00
Hourly Flow Rate, HFR					3	0	31
Percent Heavy Vehicles					0	0	0
Percent Grade (%)			0			0	
Median Storage							

		Delay, Queue Length, and Level of Service							
Approach Movement	EB 1 LTR	WB 4 LTR	Northbound			Southbound			
			7 LTR	8 LTR	9 LTR	10 LTR	11 LTR	12 LTR	
v (vph)	41	0					34		
C(m) (vph)	1395	1098					770		
v/c	0.03	0.00					0.04		
95% queue length	0.09	0.00					0.14		
Control Delay	7.7	8.3					9.9		
LOS	A	A					A		
Approach Delay							9.9		
Approach LOS							A		

TWO-WAY STOP CONTROL SUMMARY

Analyst: CHRIS KIRBY  
 Agency/Co.: CCI  
 Date Performed: 07/09/2001  
 Analysis Time Period: 7:00-8:00 AM  
 Intersection: MAL. @ WASH. PK.  
 Jurisdiction: KNOX COUNTY  
 Analysis Year: 2005 BACKGROUND  
 Project ID: AM ANALYSIS 2005 BACKGROUND ONLY  
 East/West Street: WASHINGTON PK  
 North/South Street: MALONEYVILLE RD

Intersection Orientation: EW Study period (hrs): 0.25

		Vehicle Volumes and Adjustments					
Major Street:	Approach Movement	Eastbound			Westbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		25	66	0	0	416	2
Peak-Hour Factor, PHF		1.00	0.25	1.00	1.00	1.00	0.75
Hourly Flow Rate, HFR		25	264	0	0	416	2
Percent Heavy Vehicles		0	--	--	0	--	--
Median Type	Undivided						
RT Channelized?							
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		
Upstream Signal?		No			No		
Minor Street:	Approach Movement	Northbound			Southbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume				1	0	41	
Peak Hour Factor, PHF				1.00	1.00	1.00	
Hourly Flow Rate, HFR				1	0	41	
Percent Heavy Vehicles				0	0	0	
Percent Grade (%)			0		0		
Delay, Queue Length, and Level of Service							
Approach Movement	EB	WB	Northbound			Southbound	
	1	4	7	8	9	10	11 12
Lane Config	LTR	LTR				LTR	
v (vph)	25	0				42	
C(m) (vph)	1152	1312				630	
v/c	0.02	0.00				0.07	
95% queue length	0.07	0.00				0.21	
Control Delay	8.2	7.7				11.1	
LOS	A	A				B	
Approach Delay						11.1	
Approach LOS						B	

TWO-WAY STOP CONTROL SUMMARY

Analyst: CHRIS KIRBY  
 Agency/Co.: CCI  
 Date Performed: 07/09/2001  
 Analysis Time Period: 4:45-5:45 PM  
 Intersection: MAL. @ WASH. PK.  
 Jurisdiction: KNOX COUNTY  
 Analysis Year: 2005  
 Project ID: PM ANALYSIS 2005  
 East/West Street: WASHINGTON PK  
 North/South Street: MALONEYVILLE RD

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments							
Major Street:	Approach Movement	Eastbound				Westbound	
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		105	428	0	0	186	9
Peak-Hour Factor, PHF		1.00	1.00	1.00	1.00	0.95	1.00
Hourly Flow Rate, HFR		105	428	0	0	415	9
Percent Heavy Vehicles		0	--	--	0	--	--
Median Type	Undivided						
RT Channelized?							
Lanes		0	1	0		0	1
Configuration		LTR			LTR		
Upstream Signal?		No			No		

Minor Street:	Approach Movement	Northbound				Southbound	
		7 L	8 T	9 R	10 L	11 T	12 R
Volume					5	0	68
Peak Hour Factor, PHF					1.00	1.00	0.68
Hourly Flow Rate, HFR					5	0	99
Percent Heavy Vehicles					0	0	0
Percent Grade (%)			0			0	
Median Storage							
Flared Approach: Exists?						No	
Storage							
RT Channelized?							
Lanes					0	1	0
Configuration						LTR	

Delay, Queue Length, and Level of Service							
Approach Movement	EB	WB	Northbound			Southbound	
			7	8	9	10	11
Lane Config	LTR	LTR					LTR
v (vph)	105	0					104
C(m) (vph)	1146	1142					587
v/c	0.09	0.00					0.18
95% queue length	0.30	0.00					0.64
Control Delay	8.5	8.2					12.4
LOS	A	A					B
Approach Delay							12.4
Approach LOS							B

TWO-WAY STOP CONTROL SUMMARY

Analyst: CHRIS KIRBY  
 Agency/Co.: CCI  
 Date Performed: 07/09/2001  
 Analysis Time Period: 7:00-8:00 AM  
 Intersection: HAL. @ WASH. PK.  
 Jurisdiction: KNOX COUNTY  
 Analysis Year: 2005  
 Project ID: AM ANALYSIS 2005  
 East/West Street: WASHINGTON PK  
 North/South Street: MALONEYVILLE RD

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments							
Major Street:	Approach Movement	Eastbound				Westbound	
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		44	66	0	0	416	3
Peak-Hour Factor, PHF		1.00	0.25	1.00	1.00	1.00	0.75
Hourly Flow Rate, HFR		44	264	0	0	416	4
Percent Heavy Vehicles		0	--	--	0	--	--
Median Type	Undivided						
RT Channelized?							
Lanes		0	1	0		0	1
Configuration		LTR			LTR		
Upstream Signal?		No			No		

Minor Street:	Approach Movement	Northbound				Southbound	
		7 L	8 T	9 R	10 L	11 T	12 R
Volume					3	0	99
Peak Hour Factor, PHF					1.00	1.00	1.00
Hourly Flow Rate, HFR					3	0	99
Percent Heavy Vehicles					0	0	0
Percent Grade (%)			0			0	
Median Storage							

Delay, Queue Length, and Level of Service							
Approach Movement	EB	WB	Northbound			Southbound	
	1	4	7	8	9	10	11
Lane Config	LTR	LTR	1			1	LTR
v (vph)	44	0					102
C(m) (vph)	1150	1312					625
v/c	0.04	0.00					0.16
75% queue length	0.12	0.00					0.58
Control Delay	8.3	7.7					11.9
LOS	A	A					B
Approach Delay							11.9
Approach LOS							B

STDS. 36-45

LETS MAKE THE INVESTMENT - ANAL. OF MARKET  
COMPLAINTS

AM

OPPS VOL. = 1119

THROUGH VOL. = 66

LT VOL. = 44 < 90 O.K.

NO. IN 1747

PM

OPPS VOL. = 195

THROUGH VOL. = 126

LT VOL. = 105 > 55 WARRANT MET

BACKWARD ONLY

AM

OPPS VOL. = 118

THROUGH VOL. = 66

LT VOL. = 25 < 90 O.K.

NO. IN 1747

PM

OPPS VOL. = 190

THROUGH VOL. = 126

LT VOL. = 48 < 55 WARRANT MET

APPROACH TAPER      SPEED  $\geq 45$  MPH

(ASSUME 6' ON EITHER SIDE)

$$L = WS = 6 \times 45 = \underline{270'} \quad \text{OR} \quad \underline{540'}$$

BACK TAPER      SPEED  $\geq 45$  MPH

$$L = \frac{WS}{3}$$

$$L = \frac{12 \times 45}{3} = \underline{180'}$$

STORAGE LENGTH

CRUSHING VOL = 195

USE  $V = 50$  MPV CLARIS

LT VOL = 105

WTH VOL = 428

L% = 20%

STORAGE = 100'



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