

# ***SOLOMON PLACE SUBDIVISION*** ***Knox County***

## ***TRAFFIC IMPACT STUDY***



***Prepared For:***  
***BATSON, HIMES, NORVELL, & POE***

***Prepared By:***



**Wilbur Smith Associates**

**July 2004**

**SOLOMON PLACE SUBDIVISION  
PHASE 2  
KNOX COUNTY, TENNESSEE  
TRAFFIC IMPACT STUDY**

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## **INTRODUCTION**

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This traffic impact study was commissioned to address the impact of a proposed residential development within Knox County. The study of this development required collection of traffic data, generation of anticipated traffic volumes from the proposed site, development of future traffic volumes from both normal growth and the site, analysis of resulting traffic conditions, and development of measures necessary to mitigate traffic impacts of normal traffic growth and the proposed development. Methods and procedures utilized in the study are those required for a Level 1 traffic impact study as adopted by the Knoxville/Knox County Metropolitan Planning Commission.

### **Project Description**

The proposed project is another residential development phase of the Solomon Place subdivision, with 72 existing single-family residences, adjacent to Hill Road. Solomon Place will be extended to the property of approximately 41 acres and a residential zoning. A residential street is stubbed for a future connection to the property north and Cabbage Drive. The property will be subdivided into 103 single-family lots for a total of 175 units in the subdivision. Figure 1 is the proposed site plan.

### **Site Location**

The location of the site is west of Hill Road and north of Andersonville Pike and E. Emory Road (S.R. 131). The site is in Knox County, north of the Knoxville central business district (CBD). The adjacent land use is residential. Figure 2 illustrates this location relative to local and regional access.

## **LOCAL AND REGIONAL ACCESS**

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### **Local Access**

Local access is to Hill Road from Solomon Place and a possible future access to Cabbage Drive. Hill Road is a 24-foot 2-lane classified minor collector between Andersonville Pike to the south and York Road to the north. Andersonville Road extends northwest and south to E. Emory Road (SR 131), providing an essential link to regional roadway facilities. The approximate average daily traffic (ADT) on Hill Road is 2,575 north of Andersonville Pike.

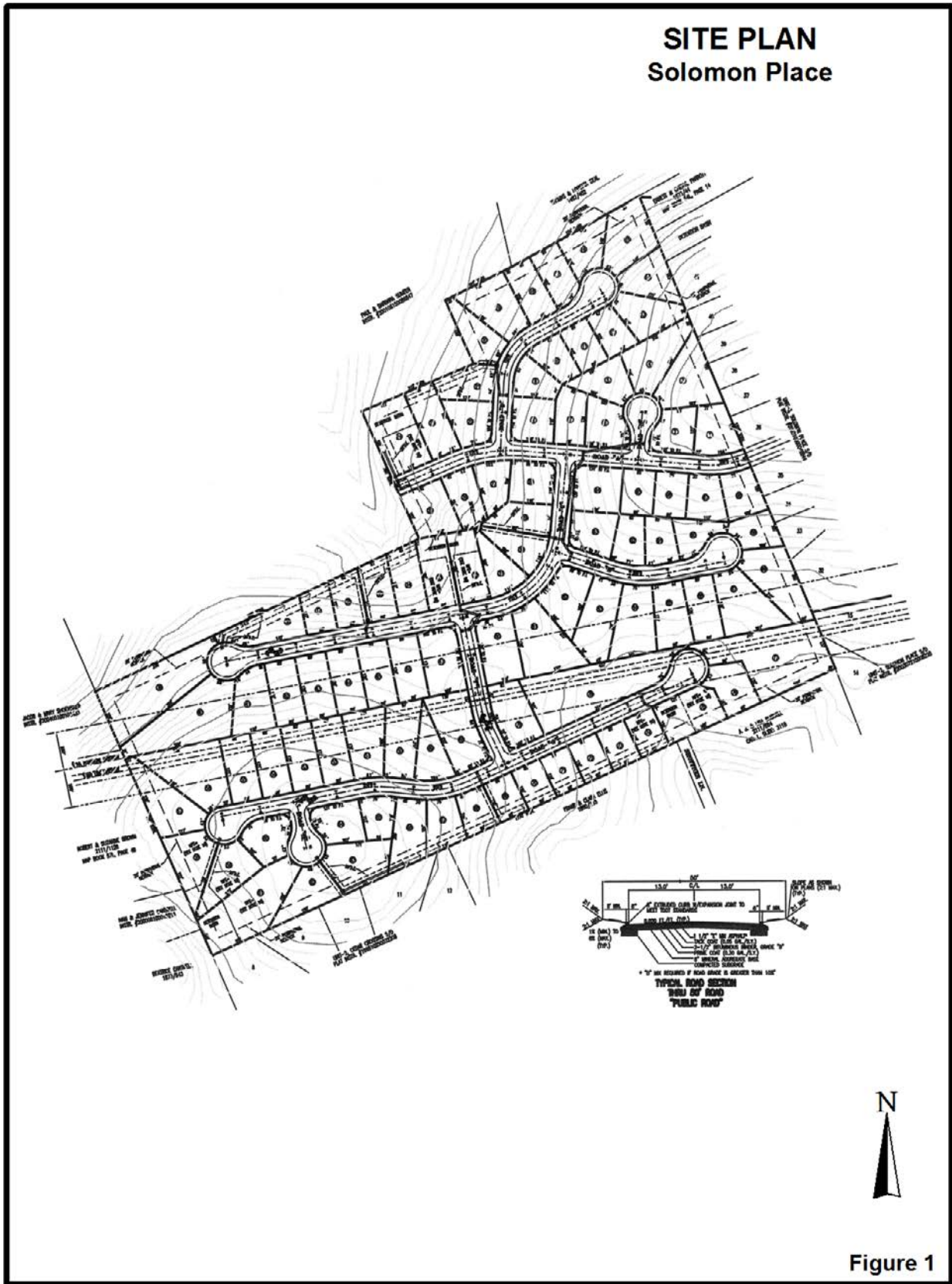
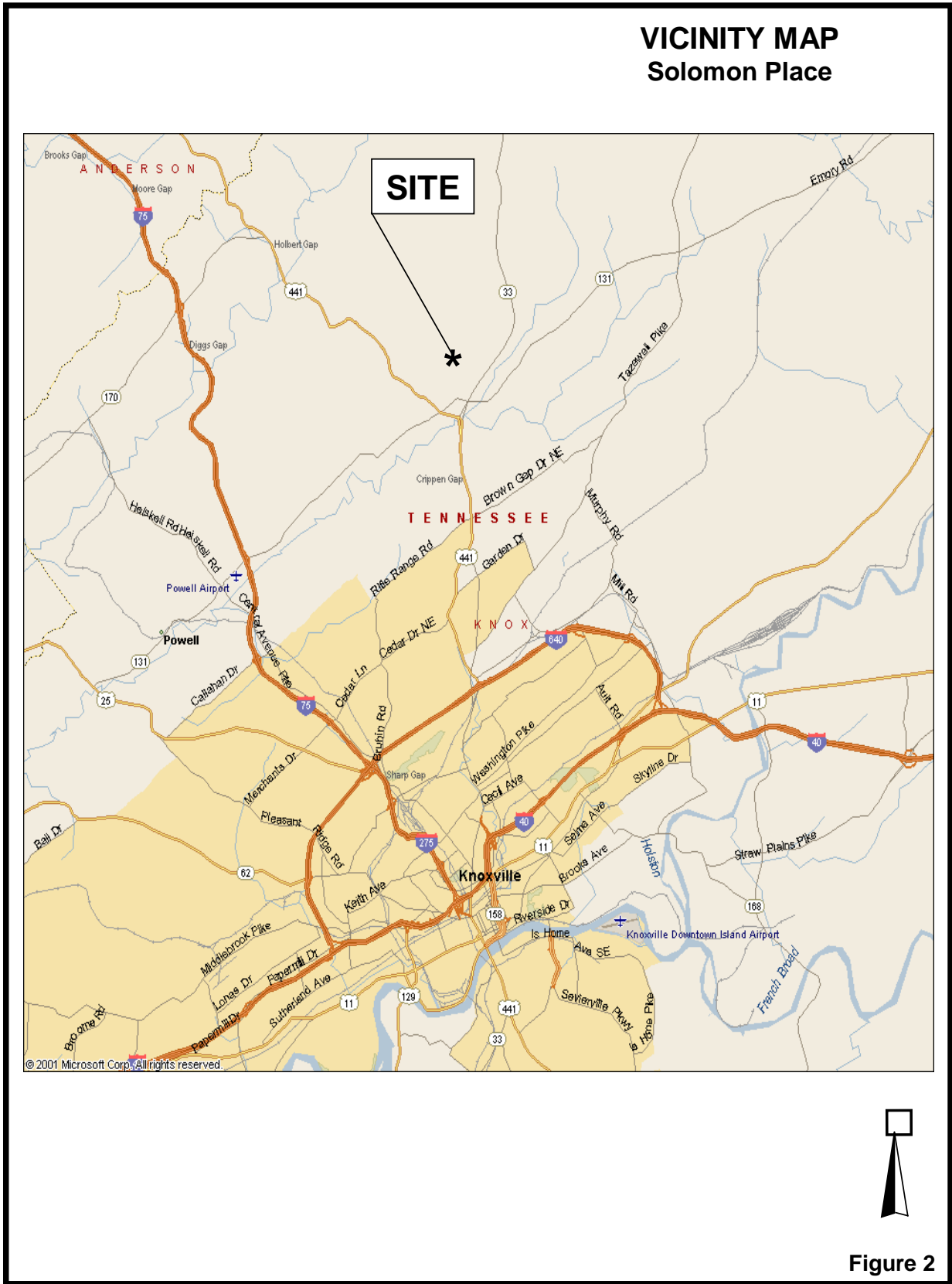


Figure 1



**Regional Access**

Regional access is from Andersonville Pike intersecting E. Emory Road (SR 131) and Maynardville Highway (SR 33) south of the site. The ADT on Andersonville Road near Hill Road is 8,620. Andersonville Pike is a 2-lane classified minor collector northwest of Hill Road and a major collector southeast to E. Emory Road and Maynardville Highway.

To the east of the site, Maynardville Highway (SR 33) extends north from E. Emory Road with an ADT of 18,030. Maynardville Highway extends north from Broadway (US 441, SR 33), which extends south into the City of Knoxville intersecting Interstates 640 and 40. Maynardville Highway is a classified major arterial. The US 441 and SR 33 highways divide just south of E. Emory Road where Norris Freeway (US 441), classified minor arterial, extends to the northwest to Anderson County and Maynardville Highway (SR 33) continues north to Union County. The ADT on Norris Freeway is 7,850. Anderson Pike intersects Norris Freeway northwest of the Solomon Place subdivision.

East Emory Road, a classified a major arterial, is an east-west facility extending east of Tazwell Pike (SR 331) and west becoming Lovell Road, which continues to Kingston Pike. State Route 131 provides access to Interstate 40/75 west of the proposed site. The nearest interchange is with I-75.

Interstate 75 extends north and south west of the intersection of Andersonville Pike and E. Emory Road. The average daily traffic count on Interstate 75, south of Emory Road, is approximately 57,340. This facility is designated as part of the federal interstate system intersecting Interstate 40 to the south, which is an east and west facility running through Knoxville.

To the south, I-75 intersects I-640, which connects to I-40 east and west of the Knoxville CBD. Interstate 75 becomes I-275 south of I-640 and extends into the Knoxville CBD. Interstate 75 extends north to Lexington, Kentucky, and to the west, I-75 turns south to Chattanooga, Tennessee. Interstate 40 is an east and west facility extending between Nashville, Tennessee and Asheville, North Carolina. The approximate 2003 ADT for I-40/75 west of I-640 is 152,130. To the east of I-640, I-40 has an ADT of 74,780.



**EXISTING TRAFFIC CONDITIONS**

**Existing Traffic Control**

Solomon Place is STOP controlled at its intersection with Hill Road. To the south, Hill Road is STOP controlled at Andersonville Pike. The posted speed limit for Hill road is 30mph.

**Existing Traffic Volumes**

This traffic study conducted peak-hour counts between 7:00-9:00AM and 4:00-6:00PM for the intersection of Hill Road and Solomon Place. Figure 3 illustrates the peak-hour traffic.

**Existing Capacity and Level of Service**

In order to evaluate the operations of the traffic control devices, capacity and level of service were calculated using the **2000 Highway Capacity Manual, Special Report 209** published by the Transportation Research Board. Signalized and unsignalized intersections are evaluated based on estimated intersection delays, which may be related to level of service (LOS). Level of service and capacity are the measurements of an intersection's ability to accommodate traffic volumes. Levels of service for intersections range from A to F. LOS A is the best, and LOS F is failing.

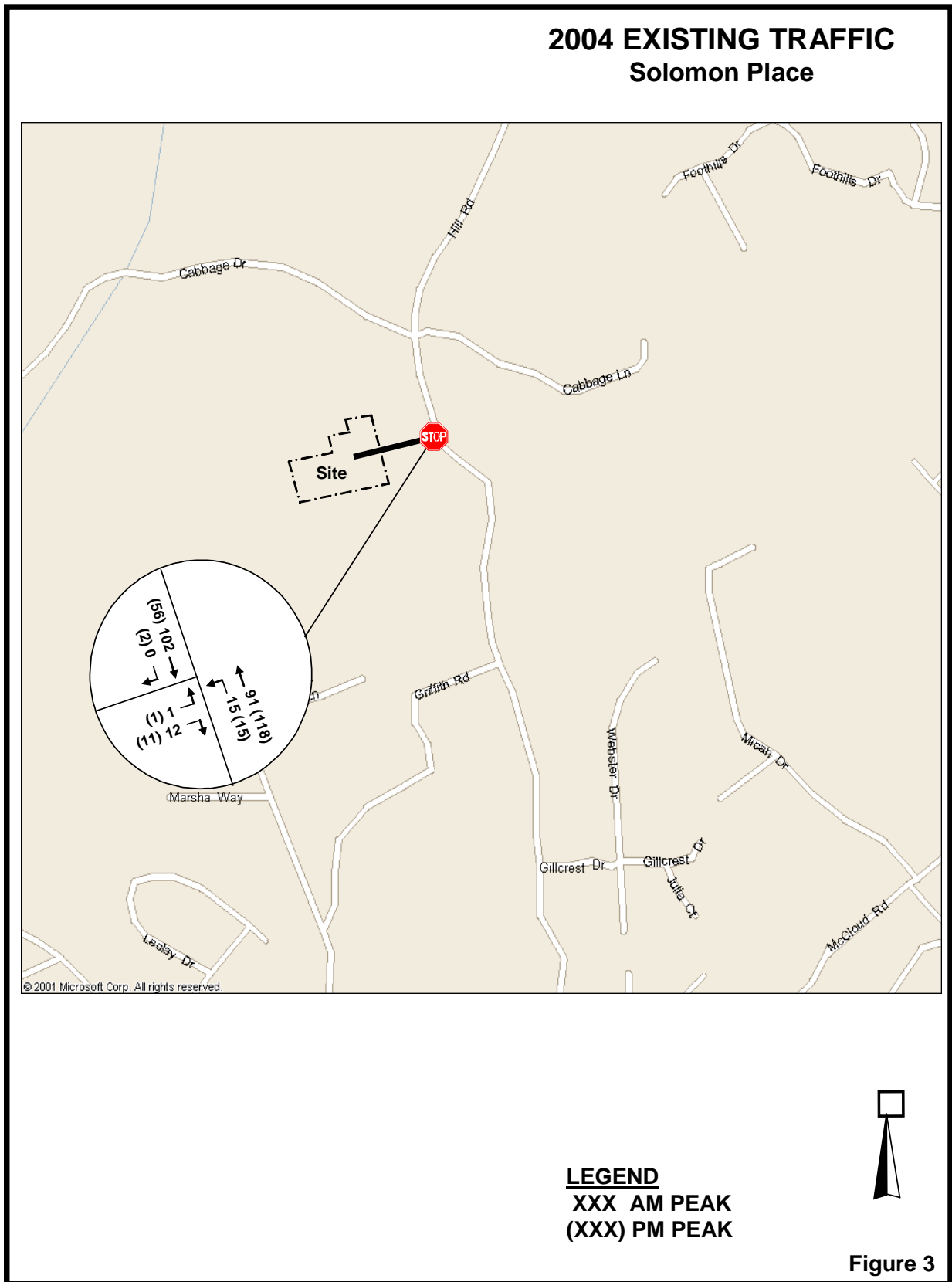
Unsignalized intersection has an estimated delay less than 10 seconds for a LOS A. Delays between 15 and 25 seconds, result in a LOS C. LOS F exceeds estimated delays of 50 seconds. For urban arterials, minor approaches may frequently experience levels of service E. Levels of service and associated delays for unsignalized intersections are presented in Table 1.

**TABLE-1**

**LEVEL-OF-SERVICE (LOS) DESCRIPTION  
FOR TWO-WAY STOP INTERSECTIONS**

<b>LOS</b>	<b>AVERAGE CONTROL DELAY (sec.) PER VEHICLE</b>
A	≤10.0
B	>10.0 and ≤15.0
C	>15.0 and ≤25.0
D	>25.0 and ≤35.0
E	>35.0 and ≤50.0
F	>50.0

SOURCE: 2000 Highway Capacity Manual, TRB Special Report 209



Unsignalized levels of service for the existing traffic conditions were found to be acceptable with a LOS A. Table-2 presents the analyses conducted.

**TABLE-2**  
**2004 EXISTING**  
**LEVELS OF SERVICE**

INTERSECTION	CONTROL	V/C	AM PEAK DELAY	LOS	V/C	PM PEAK DELAY	LOS
Hill Road & Solomon Place	STOP	0.02	9.0	A	0.01	8.7	A

Note: Average vehicle control delay estimated in seconds.

## **BACKGROUND TRAFFIC CONDITIONS**

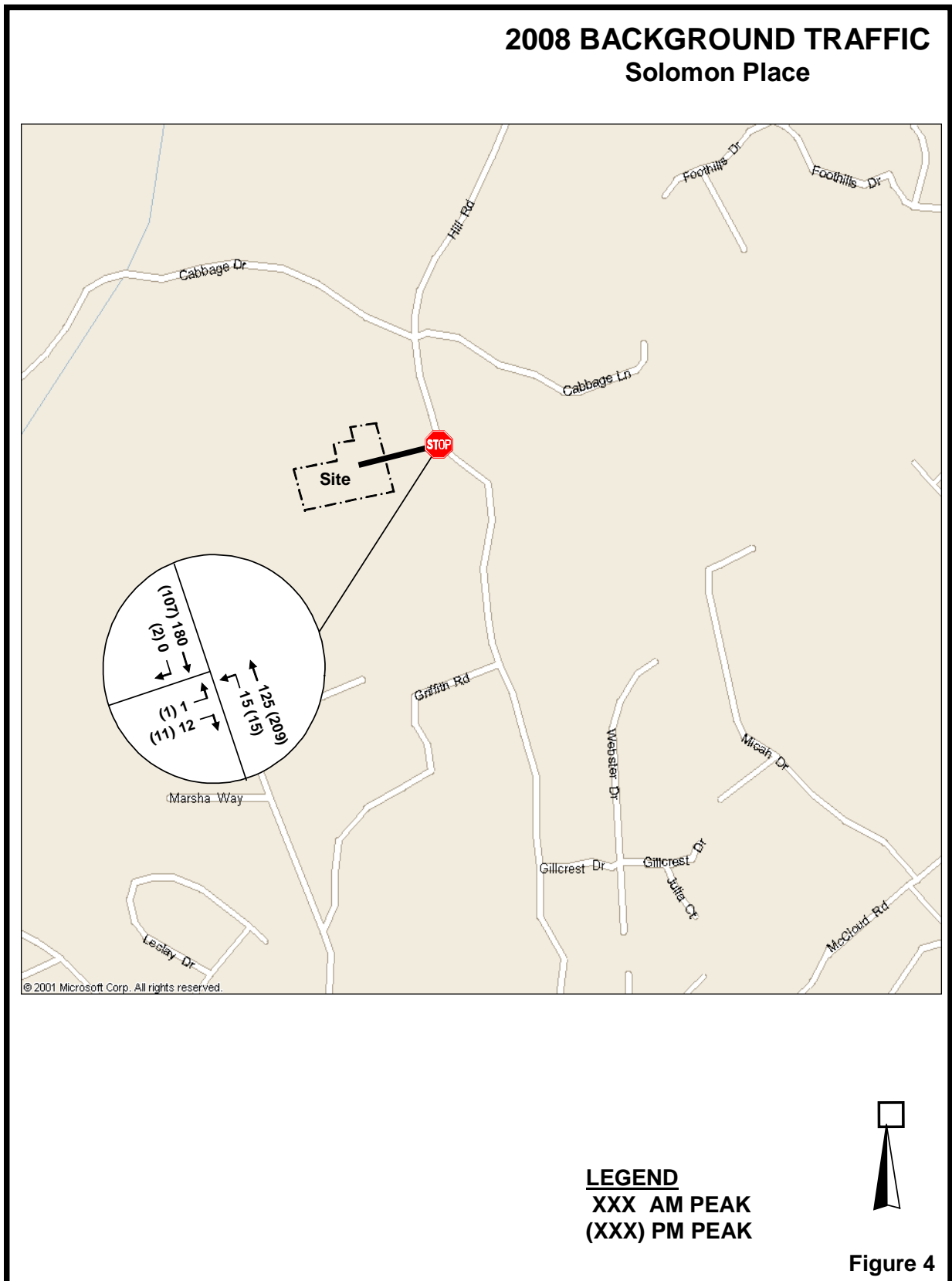
Background traffic is traffic that can be anticipated regardless of the proposed development. Traffic within the study area should continue to grow due to other developments and continued growth of Knoxville and Knox County. This traffic must be developed and analyzed for the purpose of establishing a baseline. For the purpose of this study, traffic was projected for the horizon year of 2008.

### **Background Traffic Volumes**

Wilbur Smith Associates prepared traffic impact study for another subdivision of 120 single-family units north of Cabbage Drive in March of this year. It identified a growth rate of 3.7-percent. Therefore, this study developed background traffic assuming a 3.5-percent annual compounded growth rate until the year 2008 and included 90-percent of the trips generated and assigned from the 120 unit subdivision. This 120-unit subdivision generates 93 and 126 trips during the AM and PM peaks, respectively, and the assigned trips are illustrated a figure found in the Appendix. Figure 4 illustrates the resulting 2008 background traffic.

### **Background Capacity and Level of Service**

The study intersection of Hill Road and Solomon Place was analyzed with the projected traffic. Unsignalized analyses indicate that the intersection of Hill Road and Solomon Place will operate at an acceptable level of service. Table 3 presents the LOS analyses for the study intersection.



**TABLE-3**  
**2008 BACKGROUND**  
**LEVELS OF SERVICE**

INTERSECTION	CONTROL	V/C	AM PEAK		PM PEAK		
			DELAY	LOS	V/C	DELAY	LOS
Hill Road & Solomon Place	STOP	0.02	9.4	A	0.01	9.1	A

Note: Average vehicle control delay estimated in seconds.

**DEVELOPMENT IMPACTS**

Project conditions are developed by generating traffic based on the proposed land uses, distributing the trips to the transportation network, and conducting analyses for capacity and LOS.

**Trip Generation**

Project traffic for the single-family units was determined using the publication, **Trip Generation, 6th Edition**. The **Trip Generation** reference is published by the Institute of Transportation Engineers (ITE) and represents national data collected for many different land uses including industrial, residential, and commercial uses. **Trip Generation** is an essential tool in calculating the traffic, which may be generated by a proposed development. Trips were generated for 175 single-family units and current entering and exiting trips were subtracted. From the trip generation calculations, the subdivision may generate approximately 1,740 daily trips. Table 4 presents the trip generation of this proposed site.

**TABLE-4**  
**TRIP GENERATION**

LAND USE	L.U.C.	Units	DAILY TRIPS	AM PEAK		PM PEAK	
				ENTER	EXIT	ENTER	EXIT
Single Family	210	175	1,740	33	99	114	64
Current Peak-Hour Trips				15	13	17	12
Adjusted Trips Generated				<b>18</b>	<b>76</b>	<b>97</b>	<b>52</b>

### **Trip Distribution and Assignment**

Using the traffic count conducted for Hill Road and Solomon Place and the distribution used in the previous study for Cabbage Drive subdivision, the trip distribution assumes 90-percent of the residential trips will turn to the south towards Andersonville Pike and E. Emory Road, and 10-percent to the north. Figures 5 illustrate this distribution and assignment.

### **Project Traffic Volumes**

By multiplying the trips generated by the distribution percentages, the project traffic volumes were determined. Figure 6 illustrates the resulting project traffic volumes associated with the proposed project.

### **Total Projected Traffic Volumes**

Background and project traffic volumes were added together to develop post-development traffic volumes for the year 2008. Figure 7 illustrates this 2008 projection. Using this projection, mitigation measures including traffic control devices and geometry of the roadway and intersection can be evaluated. The projected traffic did not indicate the requirement for left- or right-turn lanes on Hill Road. The projected PM peak left-turn traffic volume of 102 vehicles during the PM peak hour is less than the required 145 left-turn vehicles with an opposing traffic volume of 119.

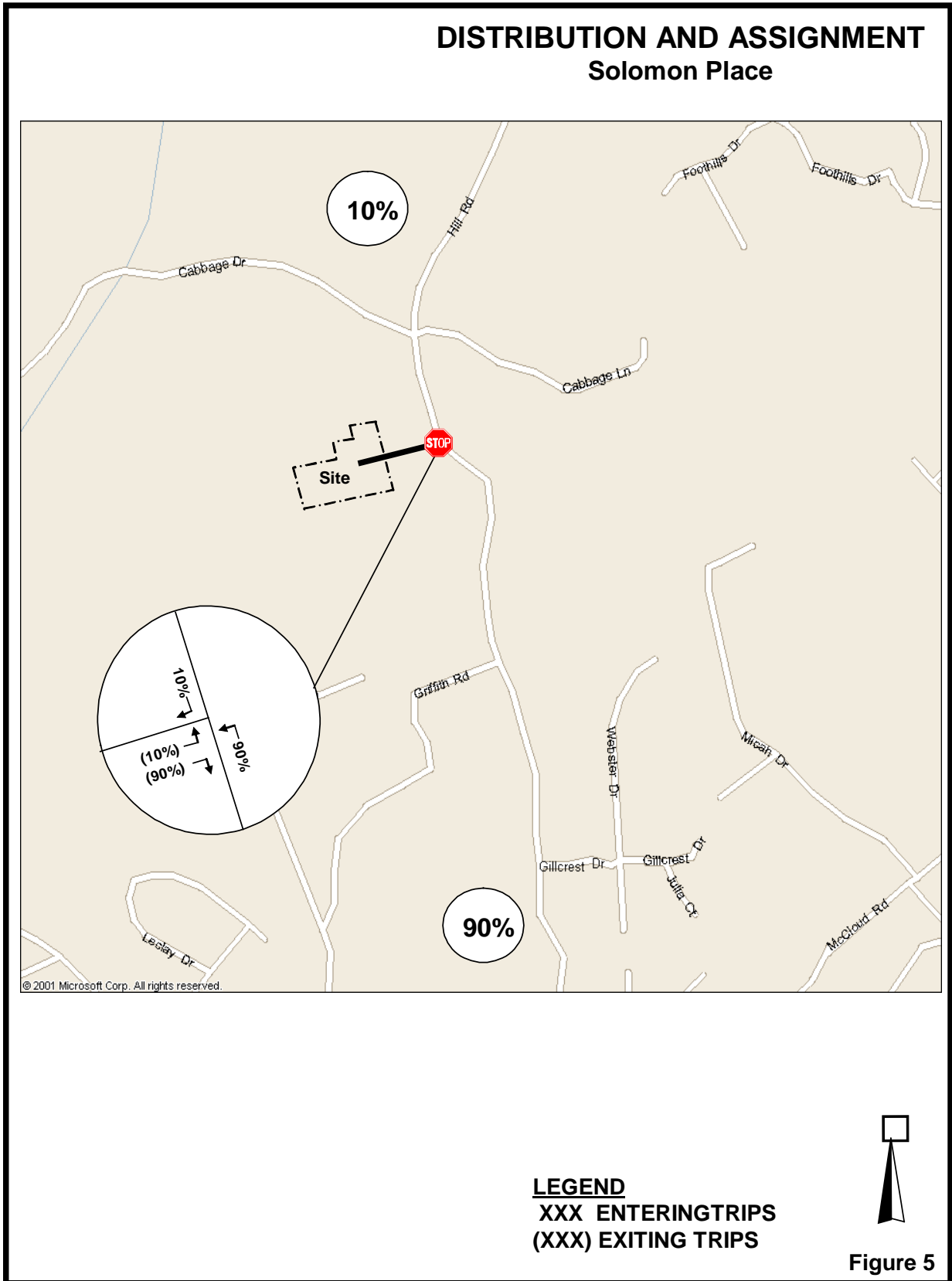
### **Projected Capacity and Level of Service**

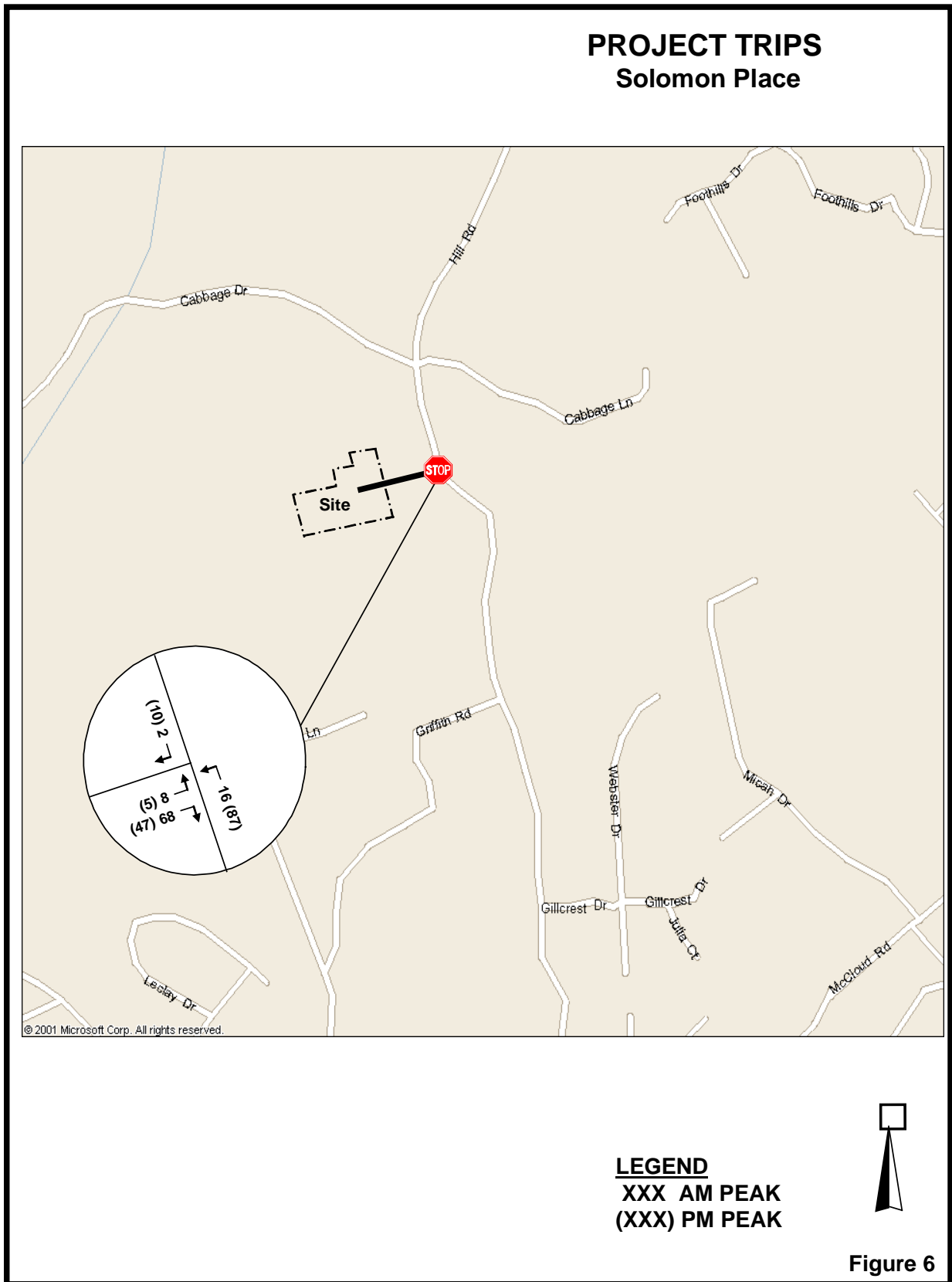
The analyses conducted determined that the study intersection would operate at acceptable levels of service. The unsignalized intersection of Hill Road and Solomon Place would experience a minimum LOS B. Table 5 presents the projected capacity and LOS. Unsignalized analyses suggest negligible increases in the delay for the Solomon Place approach with the proposed development and LOS remains almost unchanged. The AM peak hour drops to a B LOS.

**TABLE-5**  
**2008 PROJECTED**  
**LEVELS OF SERVICE**

INTERSECTION	CONTROL	V/C	AM PEAK		PM PEAK		LOS
			DELAY	LOS	V/C	DELAY	
Hill Road & Solomon Place	STOP	0.12	10.1	B	0.08	9.7	A

Note: Average vehicle control delay estimated in seconds.







### 2008 PROJECTED TRAFFIC Solomon Place



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**LEGEND**  
XXX AM PEAK  
(XXX) PM PEAK



Figure 7

### **Sight Distance**

The project access is proposed to Hill Road from Solomon Place. The posted speed limit is currently 30mph. The initial phase of the subdivision required some realignment of the roadway. Measured sight distance for the access street is 350 feet and 250 feet to the north and south, respectively. To the south, an embankment restricts the sight-distance, and a tree restricts the sight-distance to the north. The tree to the north results in a blind spot, otherwise the sight-distance is approximately 450 feet. The required distance for a 30 MPH posted roadway is 200 feet to meet the minimum stopping sight-distance for American Association of State Highway and Transportation Officials (AASHTO) and 300 feet to meet the Knox County minimum corner sight-distance standard. The proposed site access, therefore, meets the minimum stopping sight-distance but the County's corner sight-distance is not fully satisfied to the south.

### **RECOMMENDATIONS**

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The analyses conducted and the review of the traffic volumes identified the following recommendations:

- Improve the sight-distance to the south for the intersection of Hill Road and Solomon Place to the required 300 feet.
- Intersection and street design should conform to the recommended standards and practices of the American Association of State Highway and Transportation Officials, the Institute of Transportation Engineers, and the Knox County Public Works Department.

### **CONCLUSION**

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The study of this proposed residential development evaluated the projected traffic conditions for the intersection of Hill Road and Solomon Place. Background traffic was determined using a 5.0-percent annual compounded growth rate until the year 2008. Traffic associated with the proposed project was then generated and distributed to the proposed site access. Using the identified turning movements for the projected traffic conditions, unsignalized capacity and level of service analyses were conducted using the **2000 Highway Capacity Manual**. Unsignalized levels of service were found to be acceptable for the intersection of Hill Road and Solomon Place for the future year studied. A minimum LOS B may be experienced for the Solomon Place approach to Hill Road during the peak hours for projected traffic conditions. The proposed development was found to have an insignificant impact on the unsignalized intersection of Hill

Road and Solomon Place.

The proposed development does not have an unacceptable impact on the adjacent street and intersections. With the recommendations of this report, the efficient and safe flow of traffic should be maintained.

## **APPENDIX**

### **TRIP GENERATION CAPACITY AND LOS ANALYSES TRAFFIC COUNT CABBAGE DRIVE RESIDENTIAL DEVELOPMENT TRIPS**

