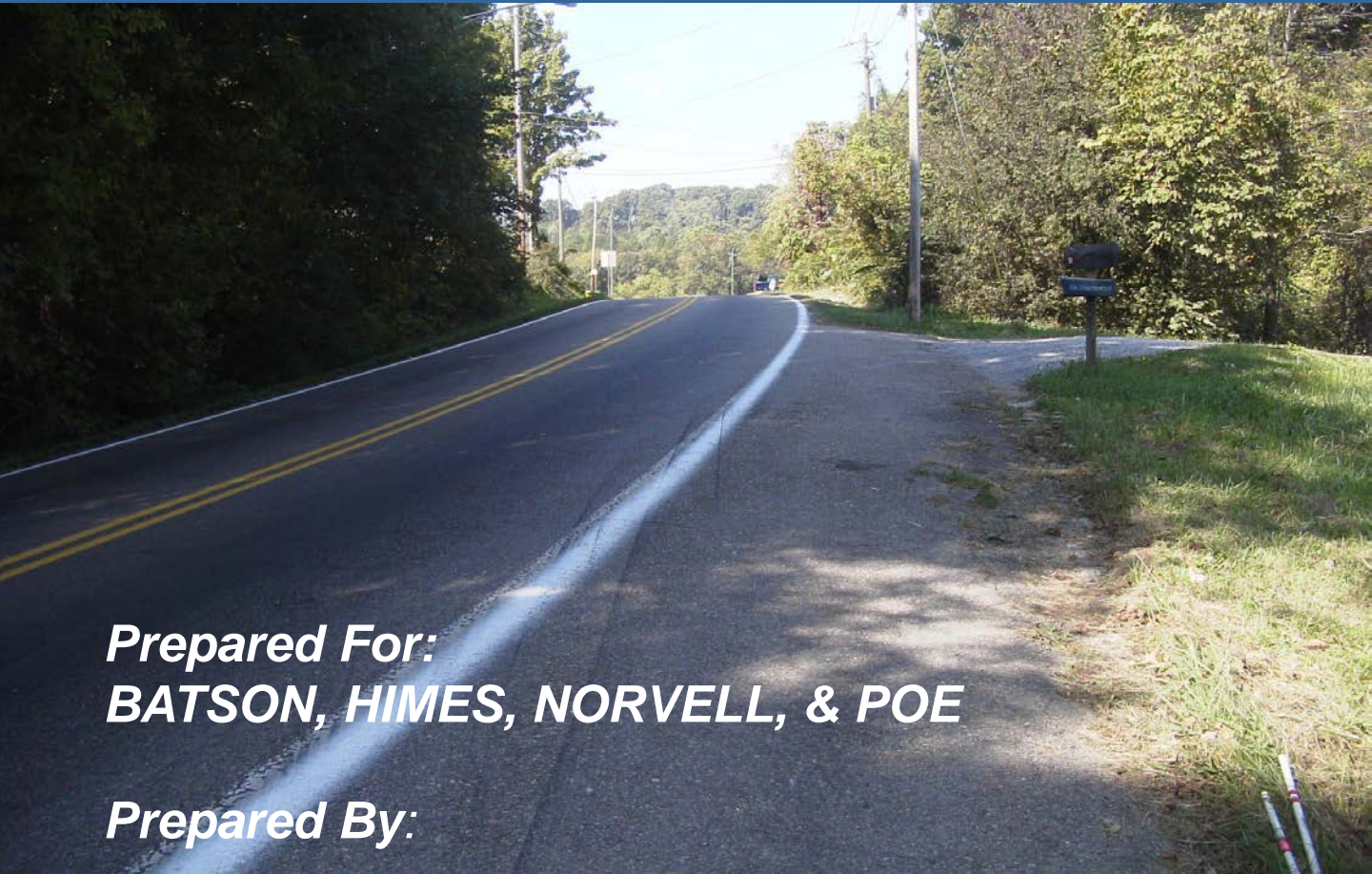


DOUBLE R DEVELOPMENT Knox County

TRAFFIC IMPACT STUDY



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

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October 2004

DOUBLE R DEVELOPMENT
KNOX COUNTY, TENNESSEE
TRAFFIC IMPACT STUDY

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INTRODUCTION

This traffic impact study was commissioned to address the impact of a proposed residential development within Knox County. The study of this development required the 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 the resulting traffic conditions, and the 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 a residential development adjacent to Pleasant Ridge Road. The site is approximately 42 acres with a PR zoning. The proposed development will subdivide the property for 107 single-family unit lots. Pleasant Ridge Road will provide access from a proposed residential street. Figure 1 is the proposed site plan.

Site Location

The location of the site is north of Pleasant Ridge Road between Western Avenue (S.R. 62) to the south and Clinton Highway (U.S. 25) to the north. The site is in Knox County, northwest of the Knoxville central business district (CBD). The adjacent land use is residential in character. Figure 2 illustrates this location relative to local and regional access.

LOCAL AND REGIONAL ACCESS

Local Access

Local access to this site is Pleasant Ridge Road. Site access is a proposed residential street intersecting Pleasant Ridge Road north of Murray Drive. Pleasant Ridge Road is a 22-foot 2-lane northwest and southeast facility extending between Western Avenue (S.R. 62) and Clinton Highway (U.S. 25W). The 2003 average daily traffic (ADT) for Pleasant Ridge Road is approximately 10,100.

SITE PLAN Pleasant Ridge Road Subdivision



Figure 1

VICINITY MAP Pleasant Ridge Road Subdivision

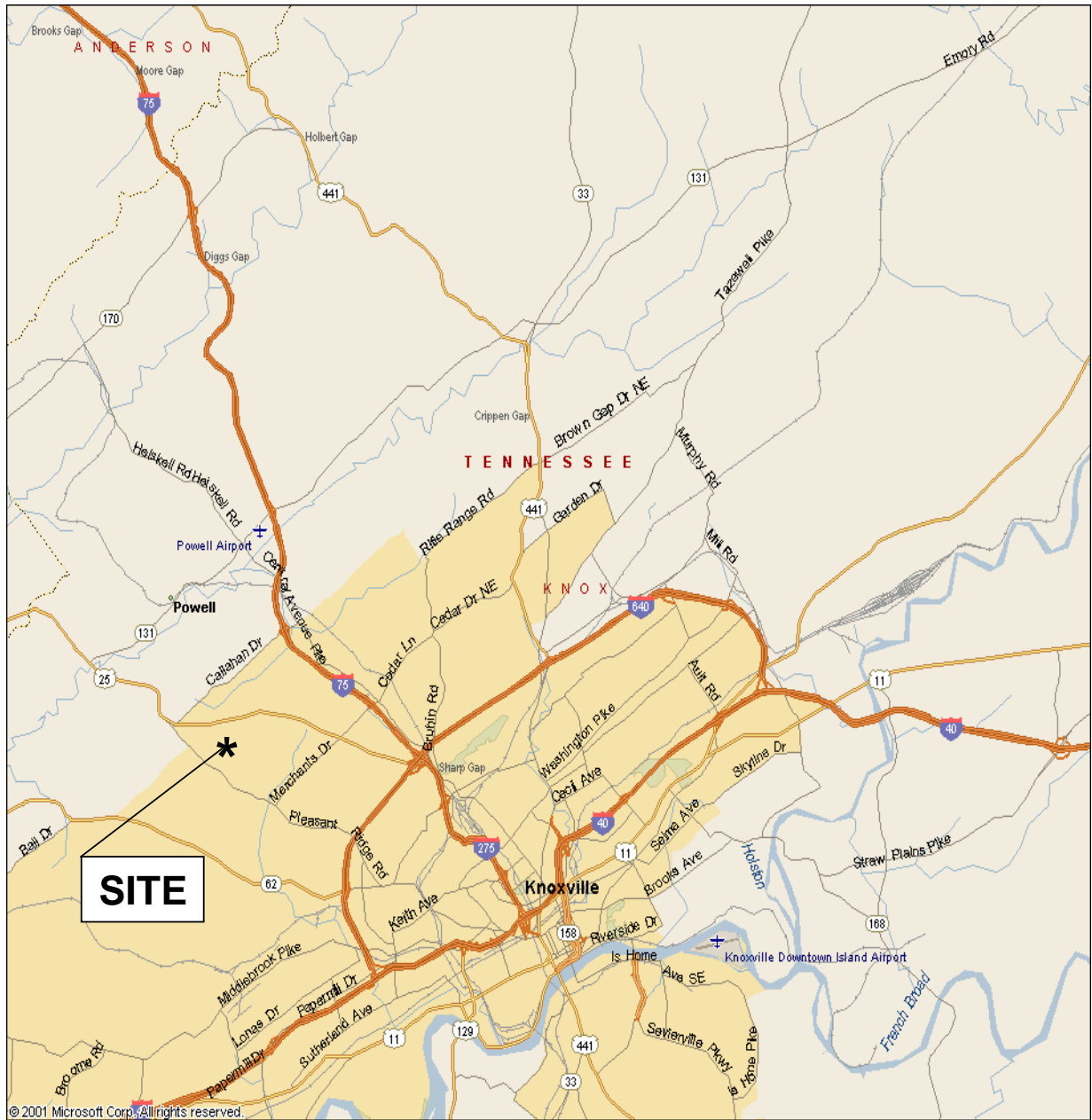


Figure 2

Regional Access

To the southeast, Pleasant Ridge Road intersects Merchants Drive and Western Avenue (S.R. 62). Merchants Drive extends east to I-75, and Western Avenue extends east and west between the Knoxville CBD and Oak Ridge. West of the intersection of Pleasant Ridge Road and Western Avenue is an interchange with Interstate 640. Pleasant Ridge Road intersects Schaad Road and Clinton Highway (U.S. 25W) to the northwest. U.S. 25 extends north to Lexington, KY, and east towards Asheville, NC. East of the site, Clinton Highway intersects the I-75 and I-640 interchange.

Interstate 640 connects to I-40 east and west of the Knoxville CBD and becomes I-75 to the west. 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 101,080. Interstate 75 extends north to Lexington, Kentucky, with an ADT of 66,340; and to the west, I-75 turns south to Chattanooga, Tennessee.

EXISTING TRAFFIC CONDITIONS

Existing Traffic Control

The Pleasant Ridge Road is signalized at the Western Avenue, Schaad Road, and Clinton Highway intersections. Streets intersecting Pleasant Ridge Road adjacent to the site are STOP controlled. The posted speed limit on Pleasant Ridge Road is 40mph.

Existing Traffic Volumes

Peak-hour turning movement counts (TMC) was conducted by WSA in October of 2004 for the intersection of Pleasant Ridge Road and Murray Drive/Wadsworth Drive. The peak hours were found between 7:15-8:15 AM and 5:00-6:00 PM. The count is found in the Appendix and the adjacent traffic to the proposed site access is illustrated in Figure 3.

2004 EXISTING TRAFFIC Pleasant Ridge Road Subdivision



LEGEND
 XXX AM PEAK
 (XXX) PM PEAK



Figure 3

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 as well as the continued growth within the surrounding area. This background traffic is developed for the purpose of establishing a baseline. Background traffic for this study reflects the historical growth experienced over the past few years.

Background Traffic Volumes

An average growth rate was determined using historical ADT traffic data from the Tennessee Department of Transportation (TDOT) count station on Pleasant Ridge Road. An average annual growth rate determined from the historical trend between 1985 and 2003 is 1.35-percent; however, the increased ADT from 2001 indicated a yearly average growth rate of 4.0-percent. The expected completion of the proposed residential development is assumed as year 2008. Therefore, using a 4.0 percent compounded growth rate, the study intersections reflect a 17.0-percent growth. Figure 4 illustrates the traffic volumes with the appropriately applied growth factor.

2008 BACKGROUND TRAFFIC Pleasant Ridge Road Subdivision



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LEGEND
XXX AM PEAK
(XXX) PM PEAK



Figure 4

PROJECT IMPACTS

Project conditions are developed by generating traffic based on the proposed land uses, distributing the trips to the transportation network, and analyzing the projected traffic for capacity and level of service.

Trip Generation

Project traffic was determined using the publication, **Trip Generation, 7th Edition**. This 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. The study will generate traffic for 35.59 acres for Planned Residential. This development is a total of 107 single-family units. From the trip generation calculations, the proposed site may generate approximately 1,110 daily trips. Table 1 presents the trip generation of this proposed site.

TABLE-1

TRIP GENERATION

LAND USE	L.U.C.	Units	DAILY TRIPS	AM PEAK		PM PEAK	
				ENTER	EXIT	ENTER	EXIT
Single Family	210	107	1,107	21	63	73	41

Trip Distribution and Assignment

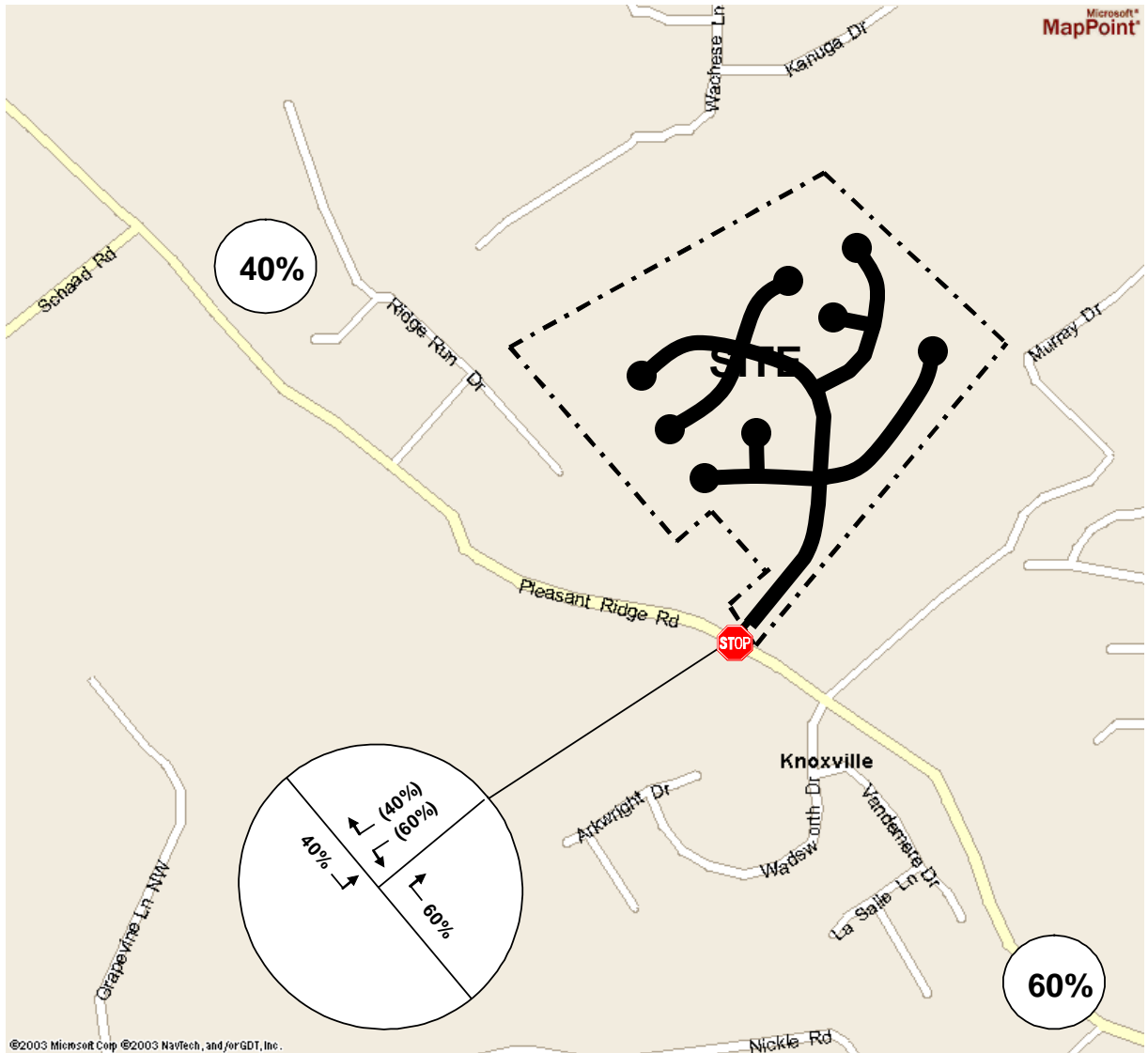
Using the turning-movement count for the intersection of Pleasant Ridge Road and Wadsworth Drive, trips are distributed to the adjacent streets with 60-percent of the generated trips distributed to the northwest and 40-percent assigned to the southeast. Figure 5 illustrates the traffic distribution and 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.

DISTRIBUTION AND ASSIGNMENT

Pleasant Ridge Road Subdivision



LEGEND
 XXX ENTERING TRIPS
 (XXX) EXITING TRIPS



Figure 5

PROJECT TRIPS

Pleasant Ridge Road Subdivision

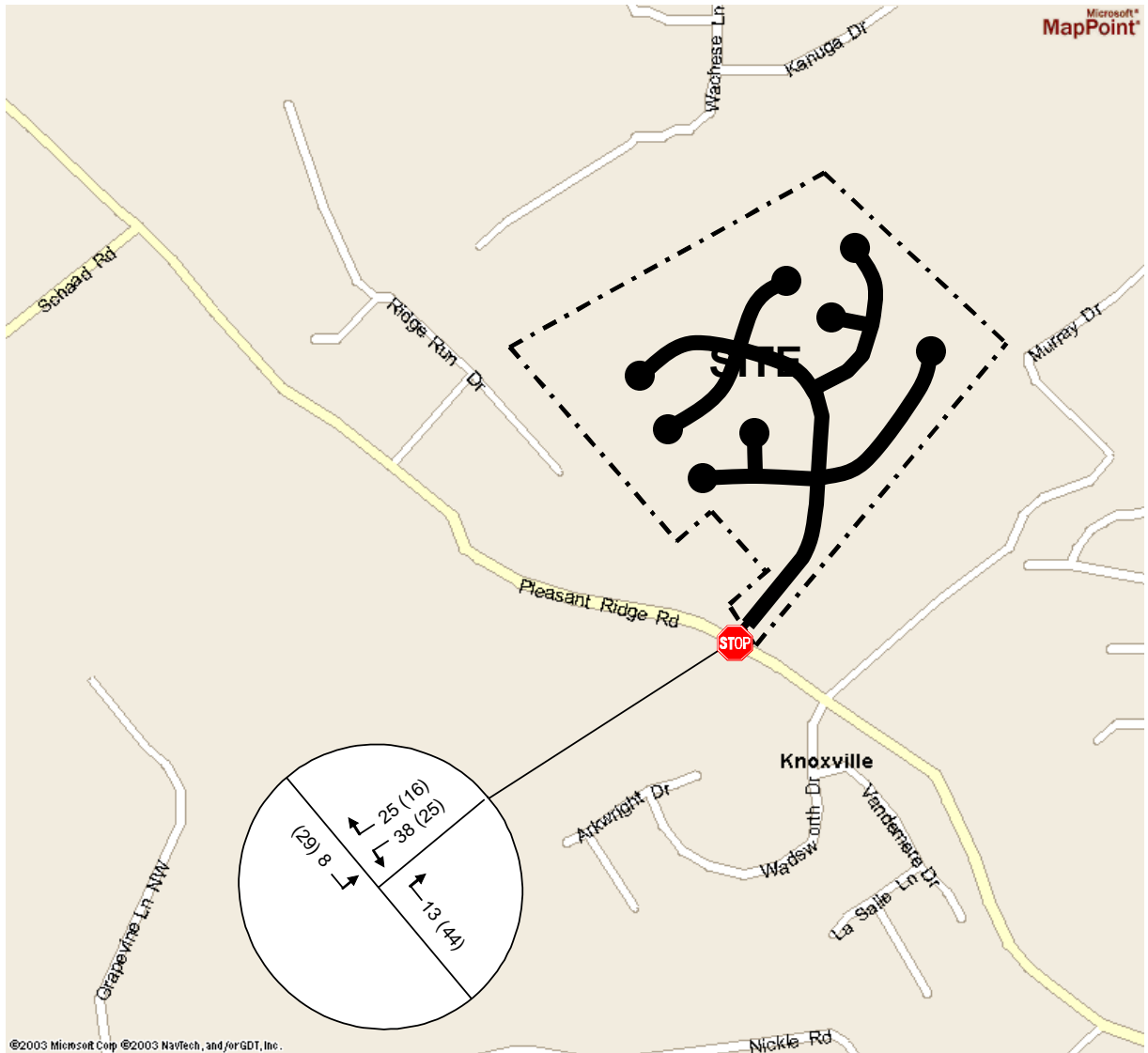


Figure 6

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, the proposed access to Pleasant Ridge Road is evaluated. The projected ADT for Pleasant Ridge Road is approximately 10,540 and 10,760 north and south of the proposed site access, respectively.

Using the Knox County **Access Control and Driveway Design Policy**, the left-turn volume threshold for an opposing traffic flow over 750 vehicles and a speed limit of 40mph is 15 vehicles. The projected left-turn traffic is 29 vehicles which exceeds the threshold volume of 15; therefore, a southbound left-turn lane is required on Pleasant Ridge Road for the site access street. The projected right-turn volume does not require a turn lane from Pleasant Ridge Road to the proposed street.

Sight Distance

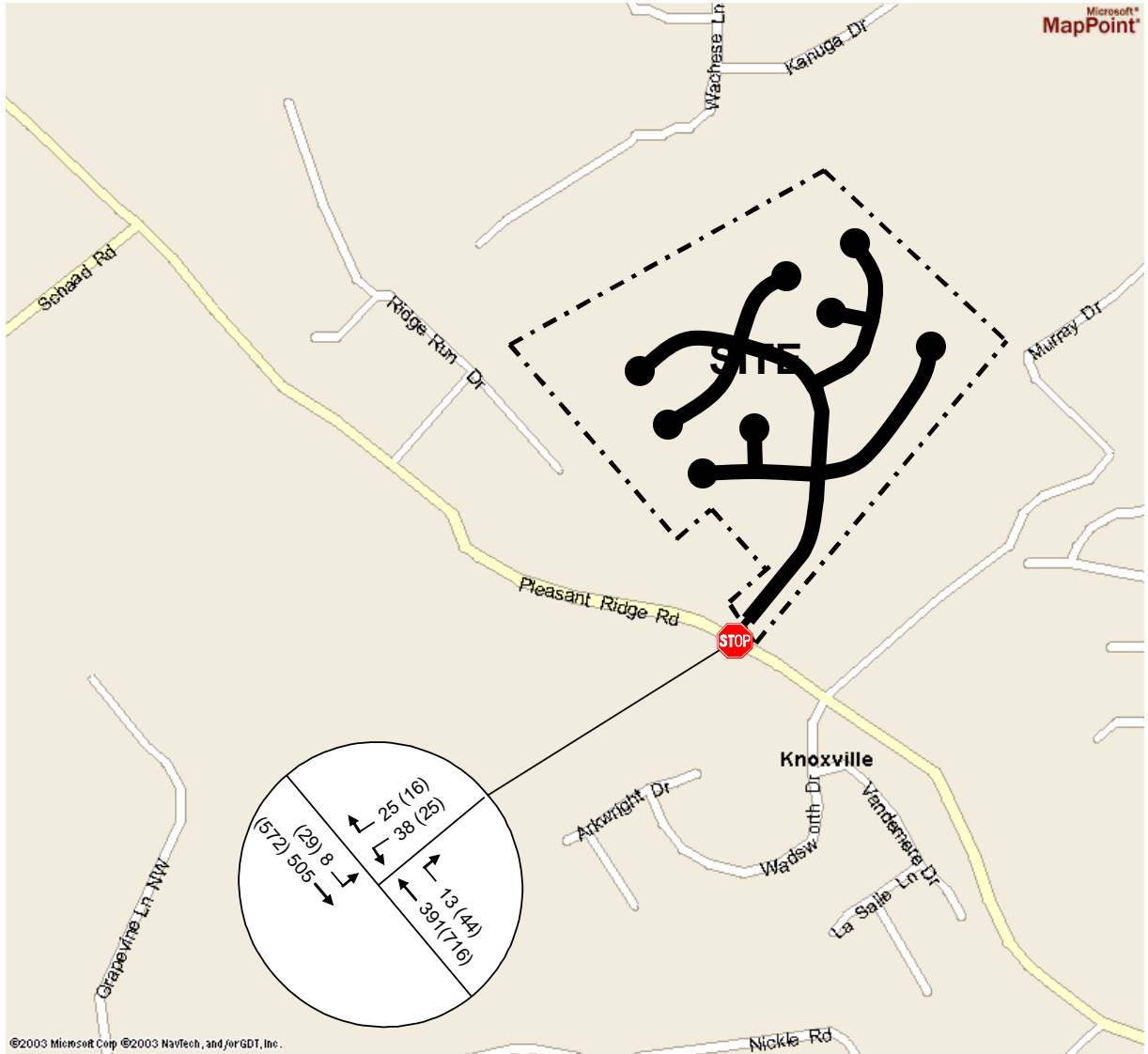
The project is proposed to access Pleasant Ridge Road. The road's speed limit is currently posted for 40mph. Measured sight distance access is over 600 feet and approximately 400 feet looking left and right, respectively. The required distance is 305 feet to meet the minimum stopping sight-distance for American Association of State Highway and Transportation Officials (AASHTO) and 400 feet to meet the Knox County Minimum Corner Sight-distance Standard. The proposed site access, therefore, meets both criteria to be acceptable for safe operations.

Projected 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. A LOS of A is the best, and LOS F is failing.

For unsignalized intersection levels of service have lower thresholds of delays. A LOS of F exceeds estimated delays of 50 seconds. For urban arterials, minor approaches may frequently experience levels of service E. A full level of service description for unsignalized intersections is presented in Table 2.

2008 PROJECTED TRAFFIC Pleasant Ridge Road Subdivision



LEGEND
 XXX AM PEAK
 (XXX) PM PEAK



Figure 7

Analyses were conducted using the Synchro Software, developed by Trafficware. Table 3 presents the unsignalized analyses of the projected traffic conditions. For unsignalized traffic control of the proposed access street, a LOS of D or better and a LOS A was determined for the egress and the left-turn ingress, respectively.

TABLE-2
LEVEL-OF-SERVICE (LOS) DESCRIPTION
FOR TWO-WAY STOP INTERSECTIONS

LEVEL OF SERVICE	AVERAGE CONTROL DELAY PER VEHICLE (seconds)
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

TABLE-3
2008 PROJECTED
LEVELS OF SERVICE

INTERSECTION	AM PEAK			PM PEAK		
	V/C	DELAY	LOS	V/C	DELAY	LOS
Pleasant Ridge Road & Proposed Site Access	0.20	17.9	C	0.25	32.1	D

Note: Unsignalized average vehicle control delay estimated in seconds for proposed street approach.

RECOMMENDATIONS

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

- Minimize landscaping, using low growing vegetation, and signing at the proposed street access to insure that safe sight distance is maintained.
- Provide a 50-foot southbound left-turn lane on Pleasant Ridge Road for the site access street.
- Use a minimum intersection radius of 30-foot for the efficient and safe ingress and egress of the site.
- Post the proposed street with a STOP sign (R1-1) at Pleasant Ridge Road.
- Intersection design should conform to the recommended standards and practices of the American Association of State Highway and Transportation Officials, the Institute of Transportation Engineers, City of Knoxville, and the Knox County Public Works Department.

CONCLUSION

The study of this proposed residential development evaluated the projected traffic conditions. Background traffic was determined using a 4.0-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. The 2008 traffic projection for the proposed site access was analyzed, using the **2000 Highway Capacity Manual**, and found to have acceptable levels of service during the AM and PM peak hours. Projected traffic volumes suggested the requirement of a southbound left-turn lane on Pleasant Ridge Road to the proposed site street.

With the recommendations of this report, the efficient and safe flow of traffic should be maintained.

APPENDIX

Trip Generation

HCS Unsignalized Analyses

Traffic Counts

