



May 31, 2007

Mr. Scott W. Davis
Eagle Bend Realty
P.O. Box 11315
Knoxville, Tennessee 37939

RE: BRADLEY LAKES SUBDIVISION TRAFFIC IMPACT STUDY (REVISED)

Dear Mr. Davis:

Wilbur Smith Associates (WSA) is pleased to submit this letter report pertaining to the anticipated traffic impacts of a proposed residential subdivision to be located near Amherst Road in northwest Knox County, Tennessee. The proposed access will be via Oakleigh subdivision (Oakleigh Township Drive) to Amherst Road. Figure 1 presents the general site location. Figure 2 presents the proposed conceptual site plan. The scope of this study was defined by the Knox County Department of Engineering and Public Works to address intersection capacity and the need for auxiliary lanes at the intersection of Oakleigh Township Drive and Amherst Road and the need for multiple access routes to the proposed development. It should be noted that the intersection of Amherst Road and Oakleigh Township Drive is located within the City of Knoxville's boundary.

Data Collection and General Site Description

The proposed development will consist of 205 single family lots. The proposed access is via Oakleigh Township Drive approximately opposite Eaglewood Lane. Build out and full occupancy is expected to occur within three years, or by 2010. Oakleigh consists of 115 lots, 63 of which are currently occupied. For study purposes, the remaining 52 lots of Oakleigh will be included as background traffic generators.

WSA conducted a field investigation in the environs of the proposed development to note any existing or potential geometric deficiencies. Oakleigh Township Drive is a local roadway with no posted speed limit with a width of 26 feet. Amherst Road is a collector roadway with 9-foot travel lanes and paved shoulders one foot wide. The posted speed limit is 30 MPH. The available intersection sight distance at the intersection of Oakleigh Township Drive and Amherst Road is approximately 500 feet to a vertical curve on the north and approximately 800 feet to a vertical curve on the south.

WSA conducted a turning movement count at the intersection of Amherst Road and Oakleigh Township Drive on Wednesday, April 25, 2007. The count was conducted to determine existing traffic volumes and directional distribution in the proposed site vicinity. Figure 3 shows the existing AM and PM peak hour traffic volumes at the intersection. The peak hours were determined to be 7:15-8:15 AM and 4:45-5:45 PM.

Background Growth of Traffic Volumes

The Tennessee Department of Transportation (TDOT) maintains count stations on Oak Ridge Highway, Ball Road, and Schaad Road in the study area. Station #78 is located on Oak Ridge Highway approximately one-half mile west of Ball Camp Pike. A trend line representing traffic growth at the station over the past twenty-plus years results in a growth rate of 2.23% per year. Station #76 is located on Schaad Road approximately 0.75 mile northeast of Oak Ridge Highway. Annual traffic growth at Station #76 is at 4.28% per year. Station #79 is located on Ball Road approximately one-half mile southwest of Oak Ridge Highway and exhibits a growth rate of 3.45% per year. For study purposes, a growth rate of 3.5% per year was used. This annual growth rate was applied to the observed through traffic volumes on Amherst Road to account for growth beyond the immediate study area.

Trip Generation and Trip Distribution of Site Traffic

Table 1 shows the daily, AM peak hour, and PM peak hour traffic expected to be generated by the 205 proposed Bradley Lakes lots and the 52 unoccupied Oakleigh lots. The procedures of *Trip Generation, 7th Edition*, published by the Institute of Transportation Engineers, were used to estimate these volumes.

Table 1 Bradley Lakes Subdivision TIS Trip Generation Summary							
Time Period	Total Trips	Percent		Number			
		Enter	Exit	Enter		Exit	
				Oakleigh	Bradley Lakes	Oakleigh	Bradley Lakes
Weekday (24 hours)	2478	50%	50%	248	991	248	991
AM Peak Hour	189	25%	75%	9	38	28	114
PM Peak Hour	251	63%	37%	32	126	19	74

The directional distribution of the new traffic was assumed based on the existing traffic patterns evident in the turning movement count at the intersection of Amherst Road and Oakleigh Township Drive. The

typical pattern is for traffic to be heavier in one direction in the morning and in the opposite direction in the evening as commuters travel to and return from work. Based on the cited traffic counts, traffic near the proposed site is more heavily oriented (approximately 70% in the AM and PM) to and from the north. For study purposes it was assumed that 70% of the new traffic would depart to the north in the morning and return from the north in the evening. Thirty percent was assigned to and from the south.

Figure 4 presents the projected 2010 peak hour traffic at the intersection of Amherst Road and Oakleigh Township Drive assuming background growth of through traffic on Amherst Road and new traffic to be generated by occupancy of the remaining Oakleigh lots. Figure 5 shows the traffic expected to be generated by the proposed Bradley Lakes subdivision.

Traffic Conditions

Unsignalized intersection capacity analyses were performed for the AM and PM peak hours to evaluate the traffic conditions at the intersection of Amherst Road and Oakleigh Township Drive. The capacity analysis reports are contained in the Appendix. The methodology of the *2000 Highway Capacity Manual* as contained in the *Highway Capacity Software (version 5.2)* was used. One of the measures employed in such analyses is "level of service" (LOS), a qualitative statement of the acceptability of traffic conditions based on delay. The LOS index ranges from LOS A, indicating excellent traffic conditions with minimal delay, to LOS F indicating very congested conditions with excessive delay. LOS D generally is considered the minimum acceptable condition in urban areas.

Based on capacity analyses using the volumes of Figure 3, Amherst Road drivers currently experience LOS A conditions during both peak hours. With future background traffic growth plus the proposed Bradley Lakes subdivision traffic (Figure 6), those conditions are projected to remain LOS A for both peak hours. Southbound traffic on Amherst Road will be impeded by vehicles turning left onto Oakleigh Township Drive, but their delay will be minimal under all scenarios. Westbound drivers on Oakleigh Township Drive currently experience LOS B conditions during both peak hours. These LOS B conditions are expected to remain with background growth but decline to LOS C upon build-out of Bradley Lakes subdivision.

Evaluation of Turn Lane Warrants

The need for auxiliary turn lanes at the intersection of Amherst Road and Oakleigh Township Drive was evaluated. The criteria for such turn-lane warrants are contained in Knox County's *Access Control and Driveway Design Policy*. The evaluation worksheets are contained in the Appendix. No turn lanes are currently warranted, and none will be warranted with background traffic growth at 2010. However, upon

site build out the projected PM peak hour traffic volumes will fully satisfy the warrant for a southbound left-turn lane on Amherst Road at Oakleigh Township Drive. If an additional access route is provided (see discussion below) the volumes may fall below the threshold for the southbound left-turn lane warrant depending upon the actual portion of traffic that diverts to the alternate access.

Need for Multiple Site Access Routes

It was noted that this study was to include an assessment of the need for additional access routes to the proposed development. While there is not a published policy dictating the threshold for additional access points, local planning and engineering agencies generally require that additional access be considered for residential developments when the number of units exceeds 150. The proposed 205 units exceed the threshold, so provision of an additional access route is desirable. The key issues are traffic operations (capacity and level of service) at the access points and maintaining accessibility for emergency vehicles should an access route be blocked by fallen trees, fallen power lines, automobile crashes, or the like. Given the projected acceptable traffic conditions, the more pertinent issue at hand is emergency vehicle access.

The current site plan provides a single access route through Oakleigh subdivision. The proposed site road splits to form a loop at the southeastern portion of the site and then rejoins as a single spine road into the northern half of the site. If access is blocked between Amherst Road and the split, much or all of the proposed subdivision would be cut off from access by emergency service providers. There appear to be two potential opportunities for additional access, either as public roadways or as gated access points for use only by emergency service providers. These are both through the Fair Oaks subdivision, one at the west end of Hunters Glen Drive and the other at the north end of Orabella Road. The plan-view layout of these roadway termini (as observed using Knox County's GIS mapping) suggests that they may be suitable as access routes.

If one or both of these secondary accesses is provided for public (not emergency-vehicle-only) use, it is expected that some Oakleigh and Bradley Lakes traffic traveling to and from Knoxville via Ball Camp Pike and Oak Ridge Highway would divert to the alternate access. WSA assembled data to estimate the volume of traffic that would divert. A turning movement count conducted at the intersection of Ball Camp Pike and Amherst Road in 2003 for another project suggests that 59% of Amherst Road drivers travel to and from Oak Ridge Highway. WSA conducted a small-sample turning movement count at the intersection of Ball Camp Pike and Oak Ridge Highway on Thursday, May 31, 2007 to estimate the directional split of these drivers at Oak Ridge Highway. In the short count, 46% turned to the east toward Knoxville. Based on these data, it is expected that up to 27% (46% of 59%) of Oakleigh and Bradley

Lakes drivers currently traveling to and from Ball Camp Pike would divert to the alternate access. The resulting volumes are shown in Figure 7.

Conclusions and Recommendations

Based on the analyses and evaluations reported herein, WSA reached the following conclusions and makes the recommendations set forth below.

- *Traffic Conditions (Amherst Road at Oakleigh Township Drive)*
 - Discussion: Currently, this intersection operates at very good levels of service (LOS A for Amherst Road traffic and LOS B for Oakleigh Township Drive). The projected traffic conditions upon build out are LOS A and LOS C, respectively, well within the acceptable range.
 - Recommendation: None.

- *Auxiliary lanes (Amherst Road at Oakleigh Township Drive)*
 - Discussion: No turn lanes are currently warranted, and none are indicated under background-growth-only conditions. However, upon build out of the proposed site a southbound left-turn lane on Amherst Road at Oakleigh Township Drive is expected to be needed to accommodate evening peak hour traffic if the single proposed access is provided. Providing alternate access may disperse Oakleigh and Bradley Lakes traffic sufficiently so that the lane will not be warranted.
 - Recommendation: If the single access route is maintained, it is recommended that the southbound left-turn lane be constructed to minimize delay to through traffic on Amherst Road. The projected storage length based on the capacity analysis is less than one vehicle length, so the turn lane should provide 75 feet of storage (the rule-of-thumb minimum length). As noted above, this lane may not be necessary if other access routes are provided (see discussion below) because traffic volumes at this intersection likely will be reduced.

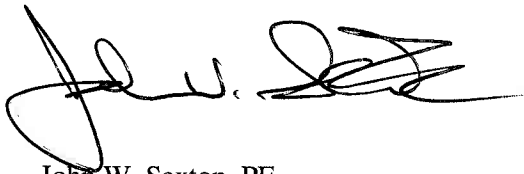
- *Multiple Access Routes*
 - Discussion: The rule-of-thumb threshold beyond which multiple access routes become necessary is 150 units. This is to minimize the probability that emergency vehicles will be blocked by stalled vehicles, downed trees or power lines, or other obstacles such that they would not be able to respond when needed. The proposed access via Oakleigh Township Drive does not provide for multiple access routes to the 205 proposed lots.

- Recommendations: It is recommended that the site owner investigate the feasibility of providing at least one additional access, either as a public roadway that may be used by all drivers or as a gated entrance for use only by emergency service providers. If a second public-use access is provided, it will disperse site traffic away from the Amherst Road/Oakleigh Township Drive intersection. Two possible access opportunities are Hunters Glen Drive and Orabella Road. Each of these currently terminates in a stub that appears to be suitable to extend into the Bradley Lakes site. It likely is not feasible to reconstruct Oakleigh Township Drive as a boulevard-type spine road between Amherst Road and the site as an alternative to the multiple access routes.

Please find enclosed the supporting figures and appendix items cited herein. Do not hesitate to call if you have any questions or wish to discuss this report.

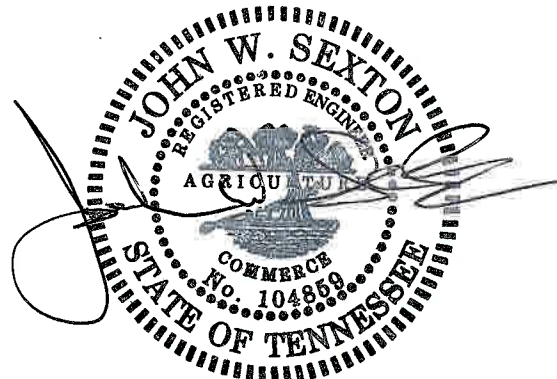
Sincerely,

WILBUR SMITH ASSOCIATES



John W. Sexton, PE

Senior Transportation Engineer



5/31/07

Enclosures:

FIGURES

Figure 1: Location Map

Figure 2: Site Plan

Figure 3: Year 2007 Peak Hour Traffic

Figure 4: Year 2010 Peak Hour Traffic Without Proposed Development

Figure 5: Year 2010 Peak Hour Site Generated Traffic

Figure 6: Year 2010 Peak Hour Traffic With Development

Figure 7: Year 2010 Peak Hour Traffic With Development and Alternate Access

APPENDIX

FIGURES

LOCATION MAP
Proposed Bradley Lakes Subdivision
Knox County, Tennessee



SITE LOCATION

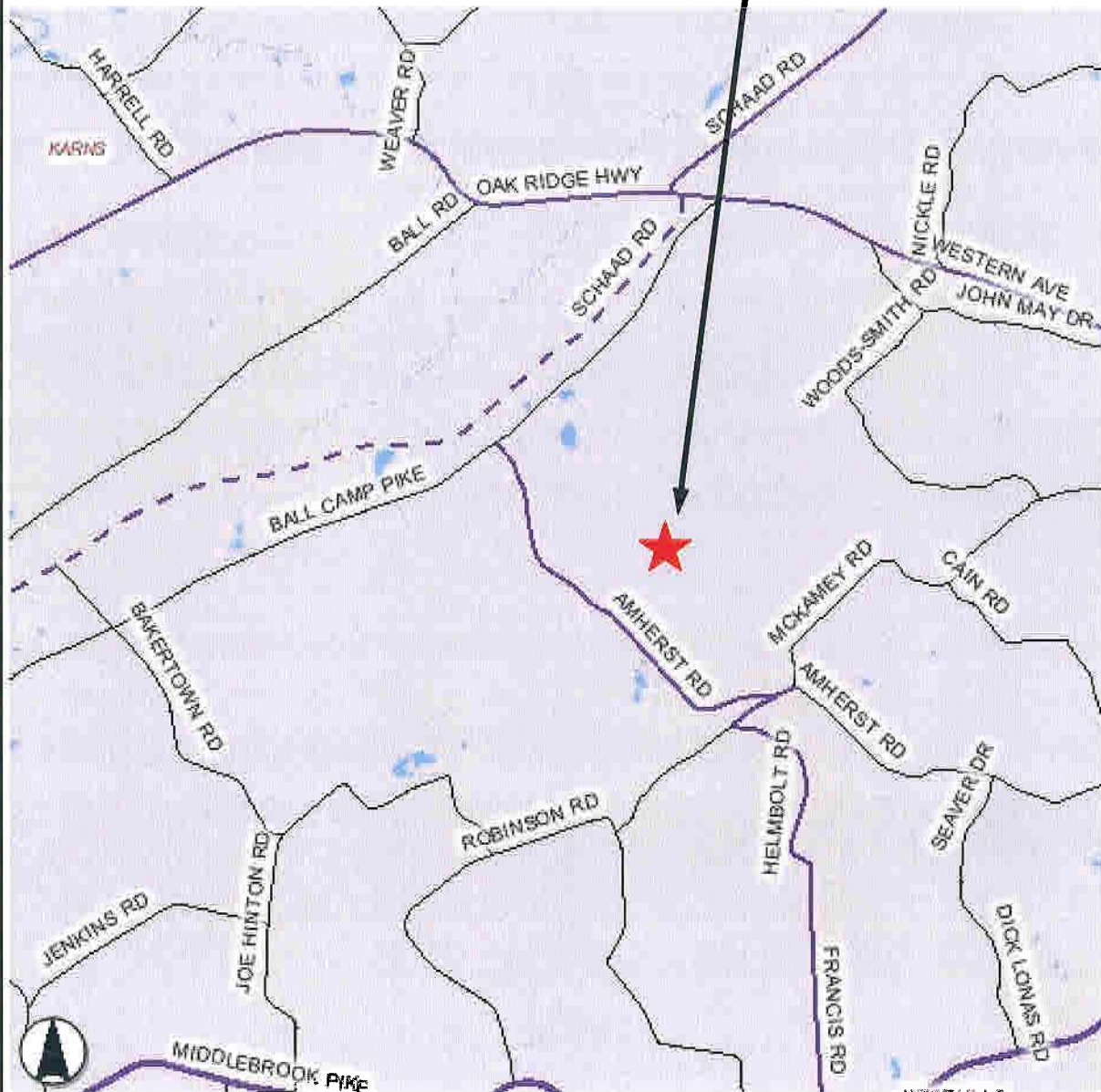


Figure 1

SITE PLAN
Proposed Bradley Lakes Subdivision
Knox County, Tennessee

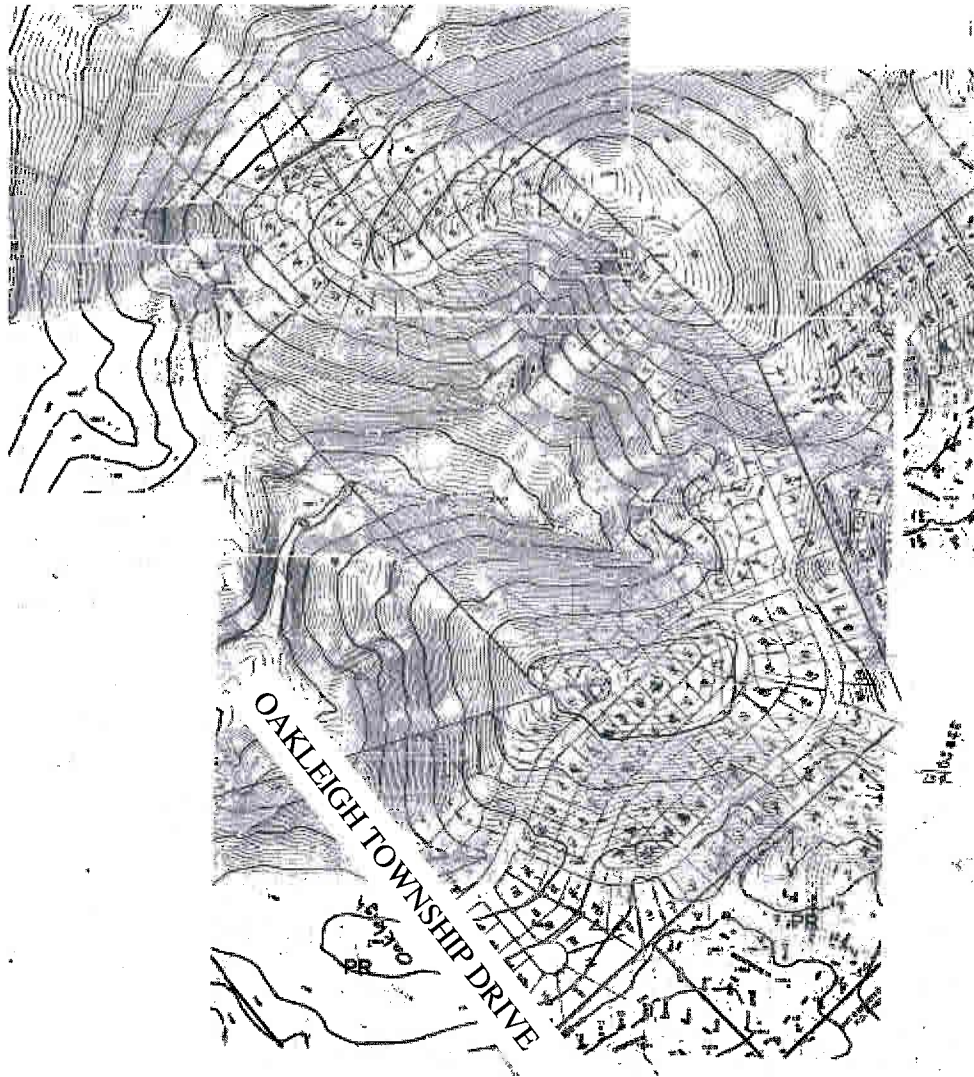
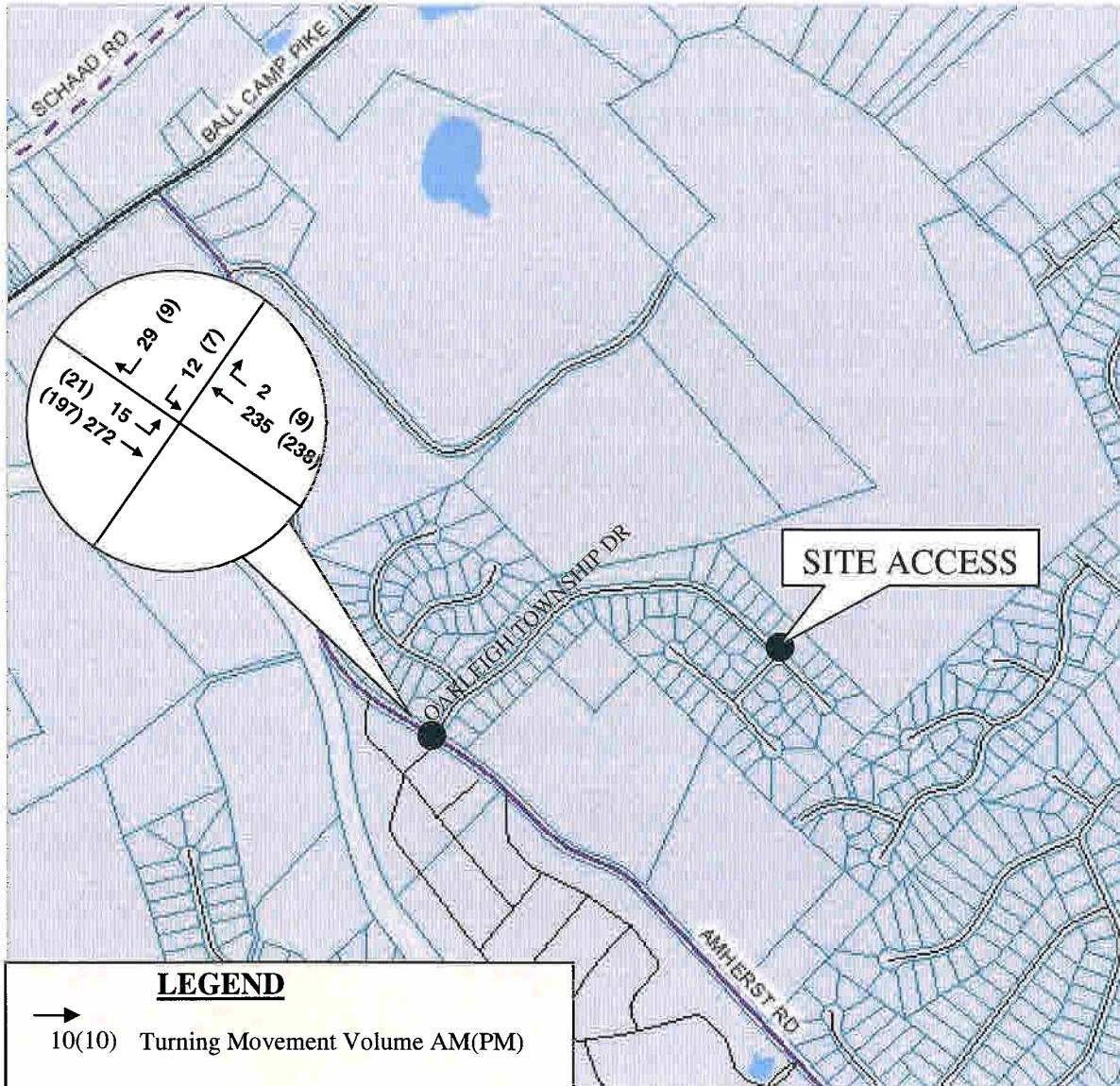
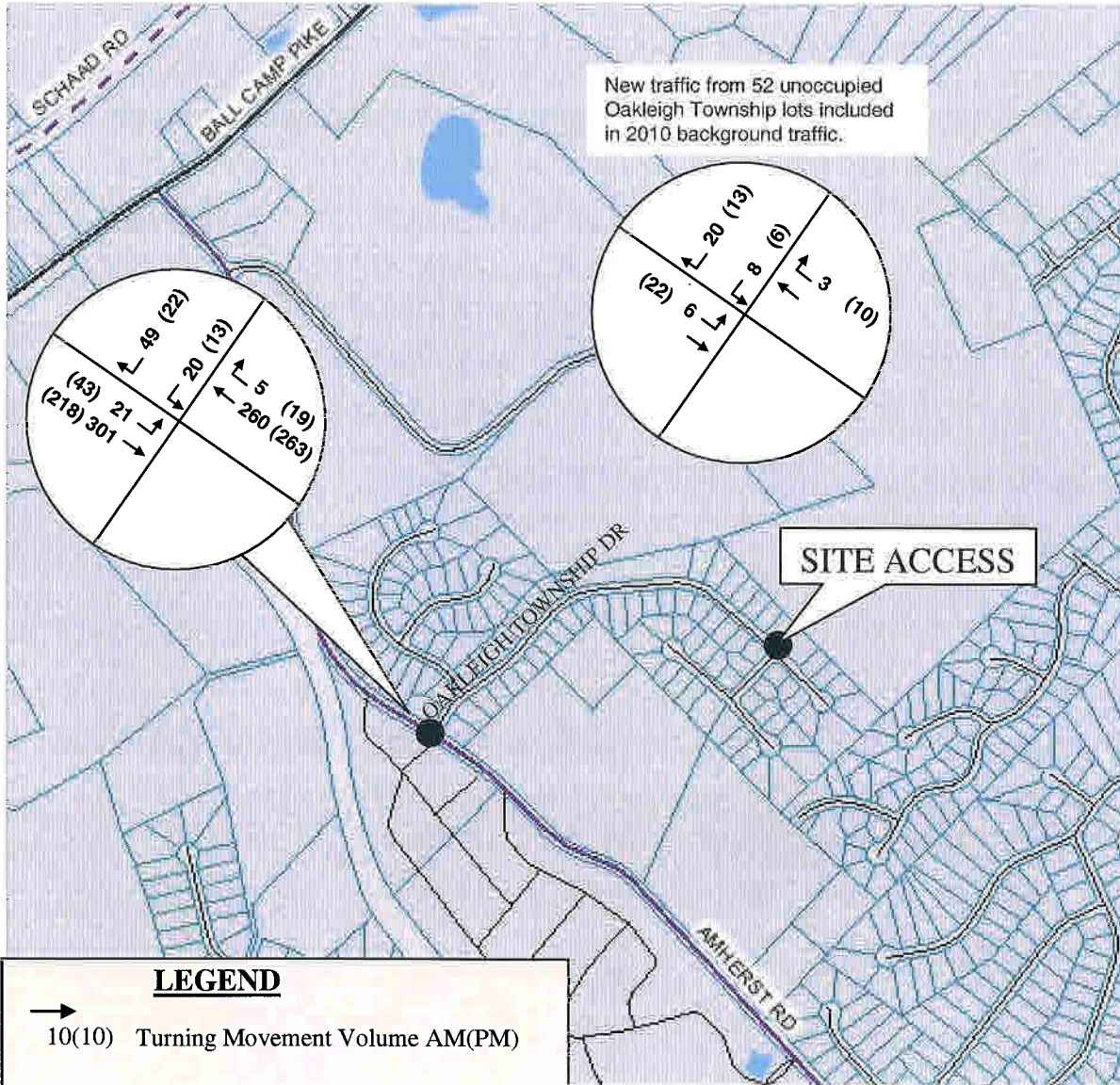


Figure 2

YEAR 2007 PEAK HOUR TRAFFIC
Proposed Bradley Lakes Subdivision
Knox County, Tennessee



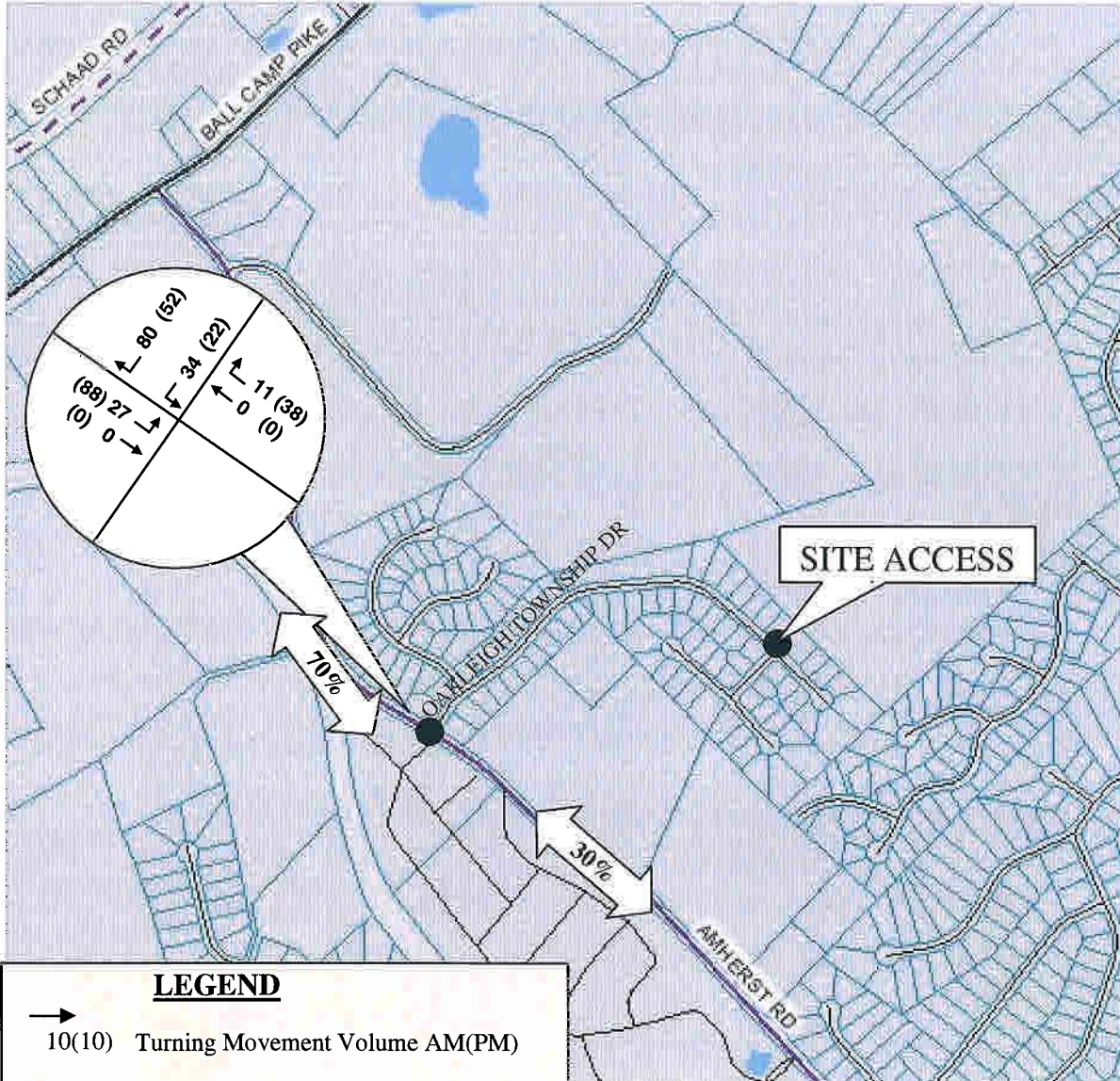
**YEAR 2010 PEAK HOUR TRAFFIC
WITHOUT PROPOSED DEVELOPMENT**
Proposed Bradley Lakes Subdivision
Knox County, Tennessee



LEGEND

→ 10(10) Turning Movement Volume AM(PM)

**YEAR 2010 PEAK HOUR
SITE GENERATED TRAFFIC
Proposed Bradley Lakes Subdivision
Knox County, Tennessee**

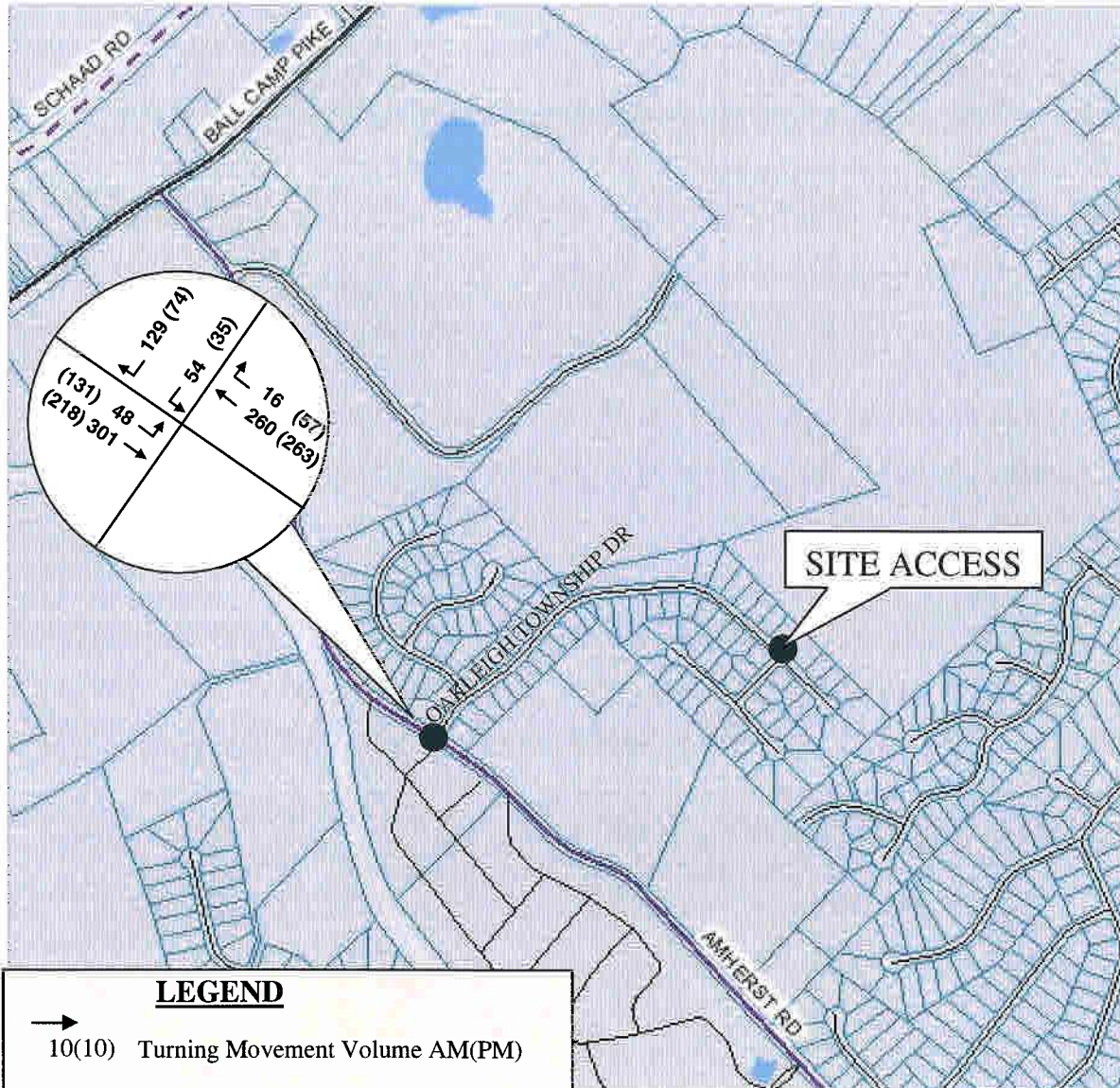


LEGEND

→ 10(10) Turning Movement Volume AM(PM)

↔ % Distribution

**YEAR 2010 PEAK HOUR TRAFFIC
WITH DEVELOPMENT**
Proposed Bradley Lakes Subdivision
Knox County, Tennessee



LEGEND

→ 10(10) Turning Movement Volume AM(PM)

YEAR 2010 PEAK HOUR TRAFFIC WITH DEVELOPMENT AND ALTERNATE ACCESS

Proposed Bradley Lakes Subdivision
Knox County, Tennessee

