VI. ADDITIONAL ANALYSIS

Following input received during public involvement activities, Intersection Alternatives 1, 6, 7, and the No Build scenario were selected for additional analysis. Simulations were run to investigate key components of the Tier 2 Intersection Alternatives. These components include (1) examining alternatives during the AM period; (2) identifying future year impacts to the remaining alternatives; (3) adding a left turn lane on KY 1426 at Huffman Avenue; and (4) improving control at the school access driveway. These investigations are described in the following sections.

A. AM Peak Hour Analysis

The high volume of traffic accessing Pikeville Elementary School creates major impacts on the transportation network in the study area but only affects 30-45 minutes of the day. A long school queue makes AM peak hour performance measures increase and skews alternative evaluations. Alternatives 1, 6, and 7 all showed operating conditions degrading below existing conditions. This is because each alternative is routing the school traffic through an unsignalized intersection. In particular, left-turn movements at the school access road experience significant delay. Gains in system performance are offset by increased delay at the school access road.

To account for this, analysts studied arterial operations along KY 1426 during the AM peak to determine how performance changed for arterial movements in Alternatives 1, 6, and 7. Based on this analysis, each alternative resulted in significant improvement when compared to the existing condition. Delay per vehicle reduced from 82 seconds in the existing condition to 43 seconds for Alternatives 1 and 6. Alternative 7 resulted in a 21 second improvement. Other indicators resulted in similar improvements.

B. Future Year Analysis

Future traffic growth is expected to be minor; however, it is difficult to predict. Minimal traffic growth (less than 1%) is expected to occur throughout the study area. Over the past 20 years, recorded volumes have increased by less than 1% annually. In addition, growth constraints on both Pikeville Elementary and Chloe Ridge neighborhood make it unlikely that additional traffic will be attracted to the area. Despite these considerations, school traffic has a major influence on peak hour traffic operations. Unforeseen changes (e.g., relocation or expansion) to this facility may have large impacts on the network. For these reasons, a detailed future year analysis of the alternatives has not been undertaken at this time.

Conceptually, alternatives that provide a single intersection on KY 1426 (Alternative 1) will handle high traffic volumes better than two separate T intersections (Alternative 7). As volumes increase, storage between both intersections will exceed capacity, thereby reducing signal efficiency and increasing delay. A single intersection configuration is also easier to expand than attempting to route extra lane(s) through multiple intersections.

The number of crashes is likely to increase as traffic volumes grow. Alternatives that include multiple intersections along KY 1426 increase the number of stops along this arterial, thereby increasing the potential for rear end crashes. However, two separate three-leg intersections contain fewer conflict points than a single four-leg intersection.

C. Left Turn Lane on KY 1426

All of the intersection alternatives include a left turn lane on northbound KY 1426 at the Huffman Avenue/Summit Drive intersection, which does not exist currently. To determine

how much benefit is derived by this low cost improvement, analysts ran simulations for the PM peak hour of the existing network with and without this lane; results are presented in **Table 6.1**.

Table 6.1 – Performance Measures for a Left Turn Lane at Huffman

	Existing Conditions	
Measure	**No Left**	**Add Left**
Delay per Vehicle (sec)	35.7	33.8
Total Delay (hr)	18.0	17.0
Total Stops	1,779	1,703
Travel Time (hr)	47.6	46.5
Average Speed (vph)	22	22

Constructing a left turn lane at this location reduces system-wide delay per vehicle by 5-6% during the PM peak period when compared to the existing conditions. Complete construction of any one of the three intersection alternatives results in an additional 5-10% decrease in delay. Other performance measures follow similar trends.

It is necessary to restripe the southbound KY 1426 approach to provide a left turn lane in this direction facing the new northbound lane and to adjust signal timings and phases. Separating southbound left turn traffic combines the higher volumes of through and right turning vehicles into one lane. Based on low AM peak left turn volumes from southbound KY 1426 to Summit Drive, this actually worsens performance at this intersection in the AM peak.

According to Kentucky Transportation Center research[1], adding a left turn lane at an intersection may reduce crash rates by 25% for fatal, injury, and property damage only crashes.

With an estimated cost of $200,000, installing a left turn lane at this location yields a higher benefit/cost ratio than other intersection improvement alternatives.

D. School Access Drive Control Measures

Analysts considered different control measures to find ways to improve operations at the driveway entrance, for example, by installing a signal or having a police officer direct traffic during peak times. This investigation showed that the majority of school traffic does not use KY 1460, but instead comes from KY 1426 northbound and Huffman Avenue. Realigning the school driveway to intersect KY 1460 (as in Alternatives 6 and 7) increases traffic volumes using portions of KY 1426 and KY 1460 and funnels higher volumes through the KY 1426/KY1460 intersection to reach the school.

For each alternative, signalization of the school access drive provided minimal benefits. A reduction in delay for motorists dropping off or picking up children resulted in an increase in delay for motorists traveling KY 1460. As an alternative measure, a police officer could assist motorists entering and exiting the school access drive during the morning and

[1] Kentucky Transportation Center. (2003). *Development and Procedures for Identifying High-Crash Locations and Prioritizing Safety Improvements*. Lexington, KY: Agent, Ken et al.

afternoon peak 15-30 minutes. Extra delay along KY 1460 would be limited to these short periods. Motorists leaving Pikeville Elementary School would be provided an increased level of safety because the police officer would stop oncoming traffic as they make their movement onto KY 1460. The drawback to this option is the cost and availability of police staff to provide this service on a daily basis.