Prepared By:

PB Americas, Inc.

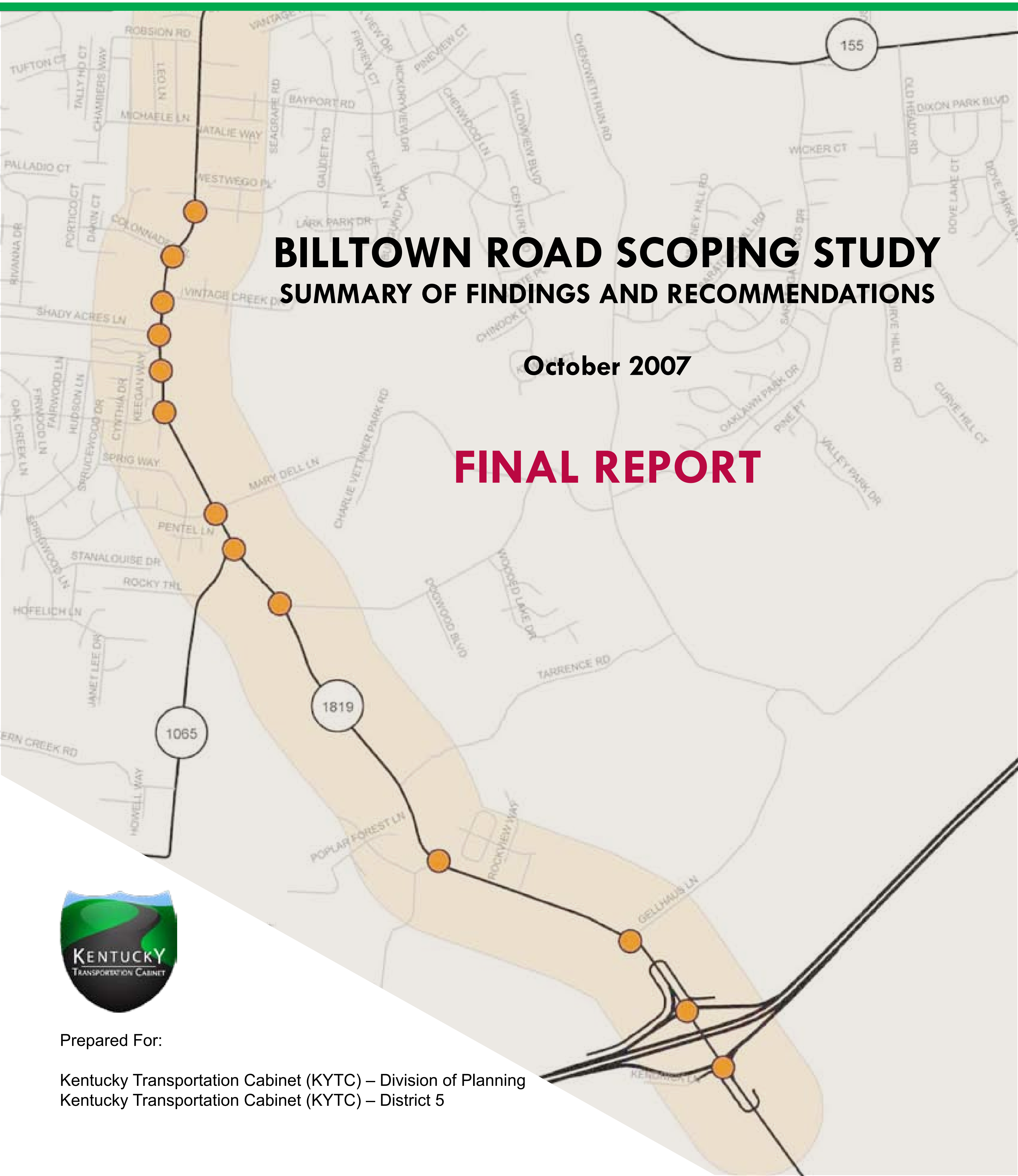
LOUISVILLE, KENTUCKY
JEFFERSON COUNTY
ITEM NO. 5-8203.00

BILLTOWN ROAD SCOPING STUDY

SUMMARY OF FINDINGS AND RECOMMENDATIONS

October 2007

FINAL REPORT



Prepared For:

Kentucky Transportation Cabinet (KYTC) – Division of Planning
Kentucky Transportation Cabinet (KYTC) – District 5

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1.0 INTRODUCTION

The Kentucky Transportation Cabinet (KYTC) initiated the Billtown Road (KY 1819) Scoping Study to address various transportation issues along the Billtown Road corridor from Ruckriegel Parkway to the Gene Snyder Freeway (I-265) ramps. The study focused on short-term recommendations that can be quickly and effectively implemented at both an individual intersection level and on a corridor level. The study also sought to address long-term concerns by examining the future need for capacity and determining options for future improvements.

Members of the project team included: KYTC District 5, KYTC Central Office Division of Planning, and the Kentuckiana Regional Planning and Development Agency (KIPDA). KYTC selected the consulting firm of PB to lead the study effort.

1.1 Study Objectives

Based on the initial direction provided by the KYTC, six primary study objectives were developed as summarized below.

1. Examine existing traffic, highway, environment, and geotechnical conditions in the study area;
2. Determine where (or if) there are problems or deficiencies;
3. Define project purpose and need;
4. Develop a range of alternates to satisfy the project purpose and need and address the identified problems;
5. Evaluate and compare the proposed alternates, considering public input as well as transportation, community, environmental, and economic benefits and impacts; and
6. Recommend an alternate or set of alternates for implementation.

While KYTC has the ultimate responsibility for constructing and maintaining safe and efficient highways, KYTC desires to incorporate public and agency input into the evaluation and decision-making process. Therefore, all six of these study objectives were completed in coordination with a comprehensive public and agency involvement program.

1.2 Project Location and Study Area

The study area begins at Ruckriegel Parkway near Jeffersontown and ends at I-265 in Jefferson County as shown in **Figure 1**.

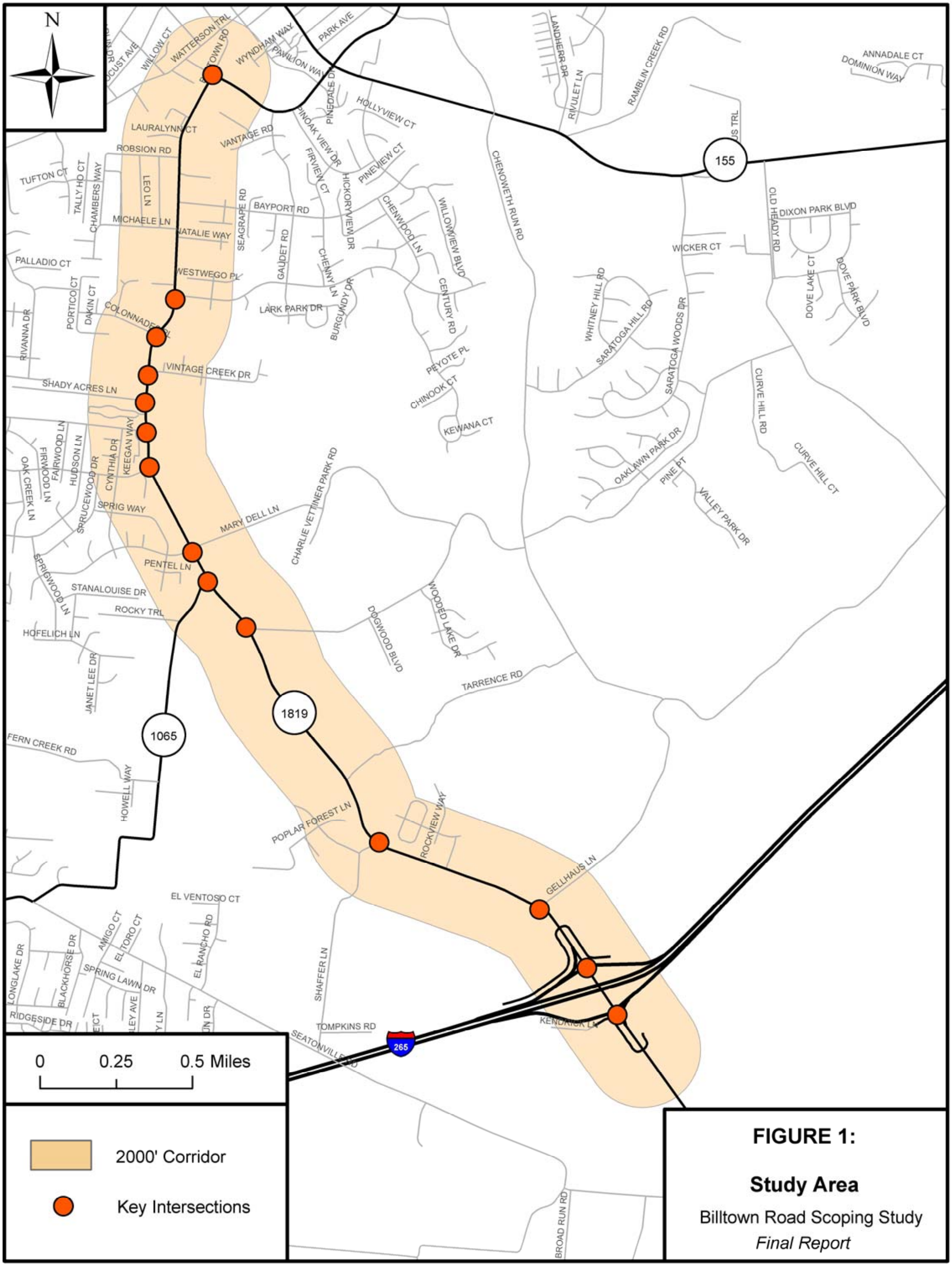

FIGURE 1:

Study Area

Billtown Road Scoping Study

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Specific intersections are also included in the analysis along Billtown Road including:

- Billtown Road / Ruckriegel Parkway
- Billtown Road / Saint Rene Road
- Billtown Road / Colonnades Place
- Billtown Road / Vintage Creek Drive
- Billtown Road / Shady Acres Lane
- Billtown Road / Fairground Road
- Billtown Road / Michael Edward Drive
- Billtown Road / Mary Dell Lane
- Billtown Road / Lovers Lane
- Billtown Road / Easum Road
- Billtown Road / Shaffer Lane
- Billtown Road / Gellhaus Lane
- Billtown Road / I-265 (Westbound / Southbound)
- Billtown Road / I-265 (Eastbound / Northbound)

The study primarily focused on these intersections as well the highway segments in between these intersections.

1.3 Study Process

The study process used to evaluate potential alternates consisted of four major elements: 1) Define the purpose and need of the study, 2) Develop alternates, 3) Evaluate the alternates, and 4) Recommend an alternate(s).

The subsequent chapters in this report follow these steps, beginning with the development of the purpose and need for the study. The following five chapters contain the technical analysis and documentation used to confirm the purpose and need and then develop the alternates. These chapters include an analysis of existing and future No-Build highway conditions, a review of related studies, a summary of the human environment, a summary of the natural environment, and a geotechnical overview.

In addition to the technical analysis, public input and feedback was gathered throughout the study process. The framework for including the public in the study process is presented in the section following the technical analysis. Next, the discussion of the alternates development procedure and evaluation is presented. The final stage in the study process was to provide a recommendation, which is also the final section in this report.

2.0 PURPOSE AND NEED

It is important to establish the Purpose and Need for a project during the beginning stages of a study since it defines the actual reason(s) for doing the study and provides the basis for the development, evaluation, and comparison of alternates. According to current KYTC policy, there are three parts to a complete Purpose and Need statement: (1) the Purpose, (2) the Need, and (3) Goals and Objectives. The Purpose identifies the problem to be solved by the study and is supported by the Need. Goals and Objectives are other elements of the study that go beyond the transportation issues in the study and should be considered and addressed as part of a successful solution to the problem.

The Purpose and Need statement for this study was developed from issues identified in field reviews, the technical analysis, and through stakeholder and public input, as well as from deficiencies identified in the existing and future conditions analysis. A complete description of these project phases is included in the following chapters of this report.

2.1 Purpose

The purpose of this study is to address various transportation issues along the Billtown Road corridor from Ruckriegel Parkway to the Gene Snyder Freeway (I-265) ramps.

2.2 Need

Supporting the study purpose above is the study need. From the existing and future conditions analysis, a documented need exists as shown below.

Limited Right-of-Way and Narrow Shoulders – Development along Billtown Road is close to the roadway, with shoulders of three feet or less along the length of the corridor.

High Traffic Growth – Based on historic traffic volumes, there has been significant growth in traffic over the past several years. According to these trends, traffic volumes are projected to increase in the short-term (by 2010) by 7.5% per year along the length of Billtown Road with the exception of the Ruckriegel Parkway intersection which is expected to increase by 8.0% per year.

High Vehicle Speeds – Based on a speed study, most drivers along Billtown Road exceed the speed limit, particularly in the north end of the study area near Jeffersontown. Most recorded speeds were around ten miles per hour above the posted speed limit.

Poor Traffic Operations – At each study area intersection along Billtown Road with the exception of Easum Road, Shady Acres Lane, and Colonnades Place, there are poor levels of service (LOS D or worse) for one or more approaches. At the Ruckriegel

Parkway / Billtown Road intersection, several of the queue lengths exceed the available storage during the peak periods. Overall, the entire corridor operates at LOS E currently, which is below the desirable LOS threshold.

High Crash Rates – Shady Acres Lane to Ruckriegel Parkway along Billtown Road is a high crash rate area. Between 2004 and 2006, 99 crashes occurred along this segment, including one fatal crash. The fatal crash occurred near the Saint Rene Road intersection with Billtown Road, which was identified through the crash analysis as a high crash spot.

Limited Multimodal Facilities – Currently there are no bicycle facilities or transit facilities along the corridor. Sidewalks are present but intermittent.

2.3 Goals and Objectives

In accordance with the Transportation Cabinet's policy on Purpose and Need statements, the following goals and objectives were developed to balance environmental and community issues with transportation issues.

- Consider low-cost, near-term solutions to address specific deficiencies as well as broader, more all-encompassing alternates to improve corridor wide operations.
- Consider noise and air quality concerns.

3.0 EXISTING AND FUTURE NO-BUILD CONDITIONS

To determine if there are deficiencies or problems with the existing highway, a detailed analysis was completed looking at the existing highway characteristics and geometrics, traffic volumes, truck traffic, speed, levels of service, crash rates, and other key issues. The analysis considered current and future traffic conditions assuming no changes to the existing highway. In support of the analysis, highway and traffic data was collected from a variety of sources including:

- KYTC Highway Information System database
- KYTC District 5 data sources
- Study area field reviews
- Peak period turning movement traffic counts
- 24-hour vehicle classification counts

3.1 Existing Highway Characteristics and Geometrics

Billtown Road is a two-lane undivided highway for the entire section, and is classified as an urban minor arterial. Shoulder widths range from nine feet at the I-265 interchange and narrow down to three feet along the rest of Billtown Road to Ruckriegel Parkway. The posted speed limit is 45 mph between Colonnades Place south to I-265. The remaining sections of Billtown Road are posted at 35 mph. Refer to **Figure 2** for a graphic representation of the existing highway characteristics and geometrics.

3.2 Current and Historic Traffic Volumes

Current Traffic Volumes

The average daily traffic volumes used for this project included traffic counts provided by the KYTC. These counts were conducted during the years of 2003 - 2005, and included the following count stations (refer to **Figure 3** for the count station locations):

- Station 323: Seatonville Road to I-265 Overpass (2005)
- Station 325: I-265 Overpass to KY 1065 (2005)
- Station 498: KY 1065 to Shady Acres Lane (2003)
- Station 496: Shady Acres Lane to KY 155 (2004)

The counts from 2003 to 2005 were forecasted to a base year of 2006 using historical trends. **Figure 4** shows the current (2006) average daily traffic volumes.

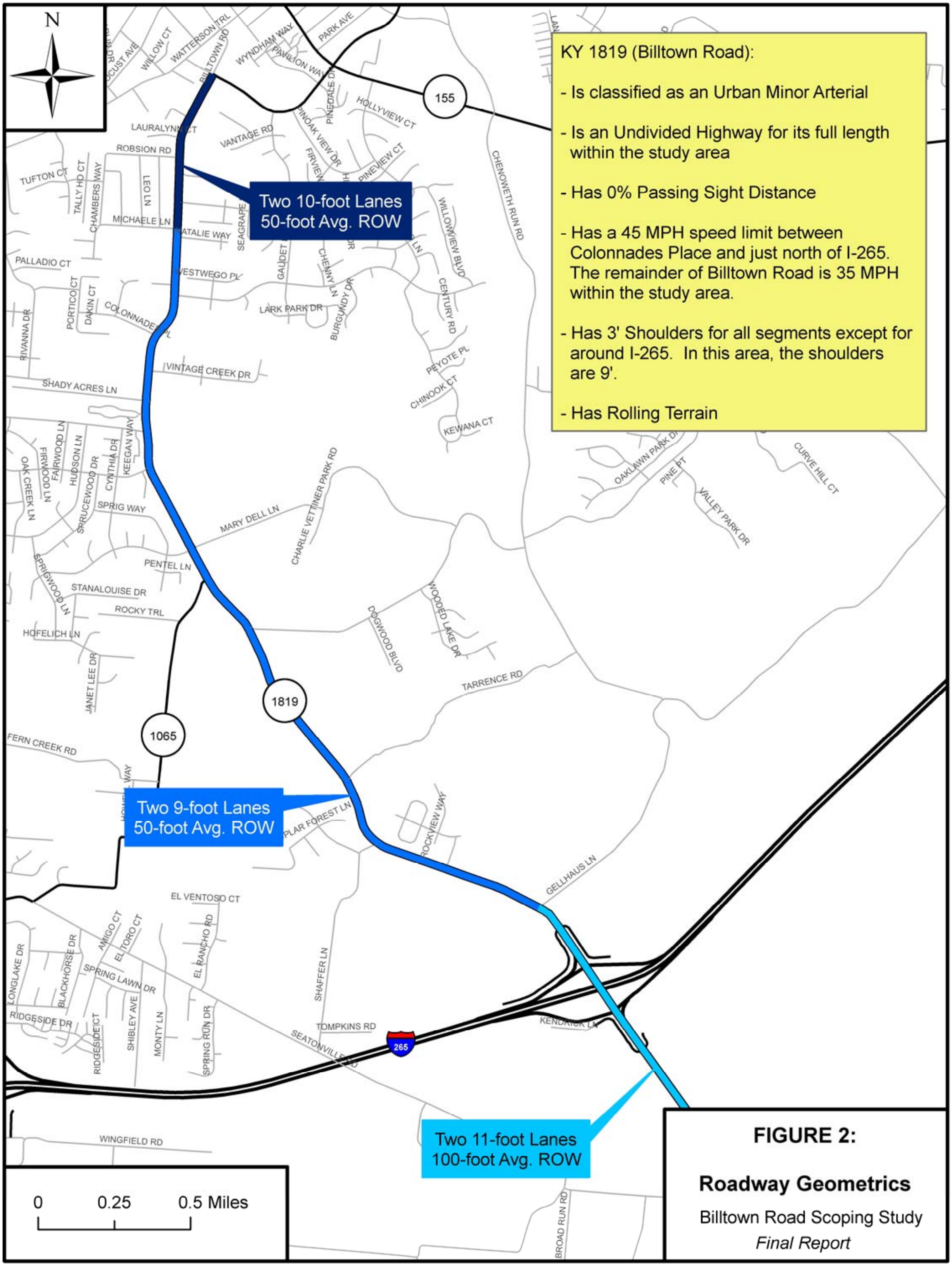

FIGURE 2:

Roadway Geometrics

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Source: KYTC Highway Information System

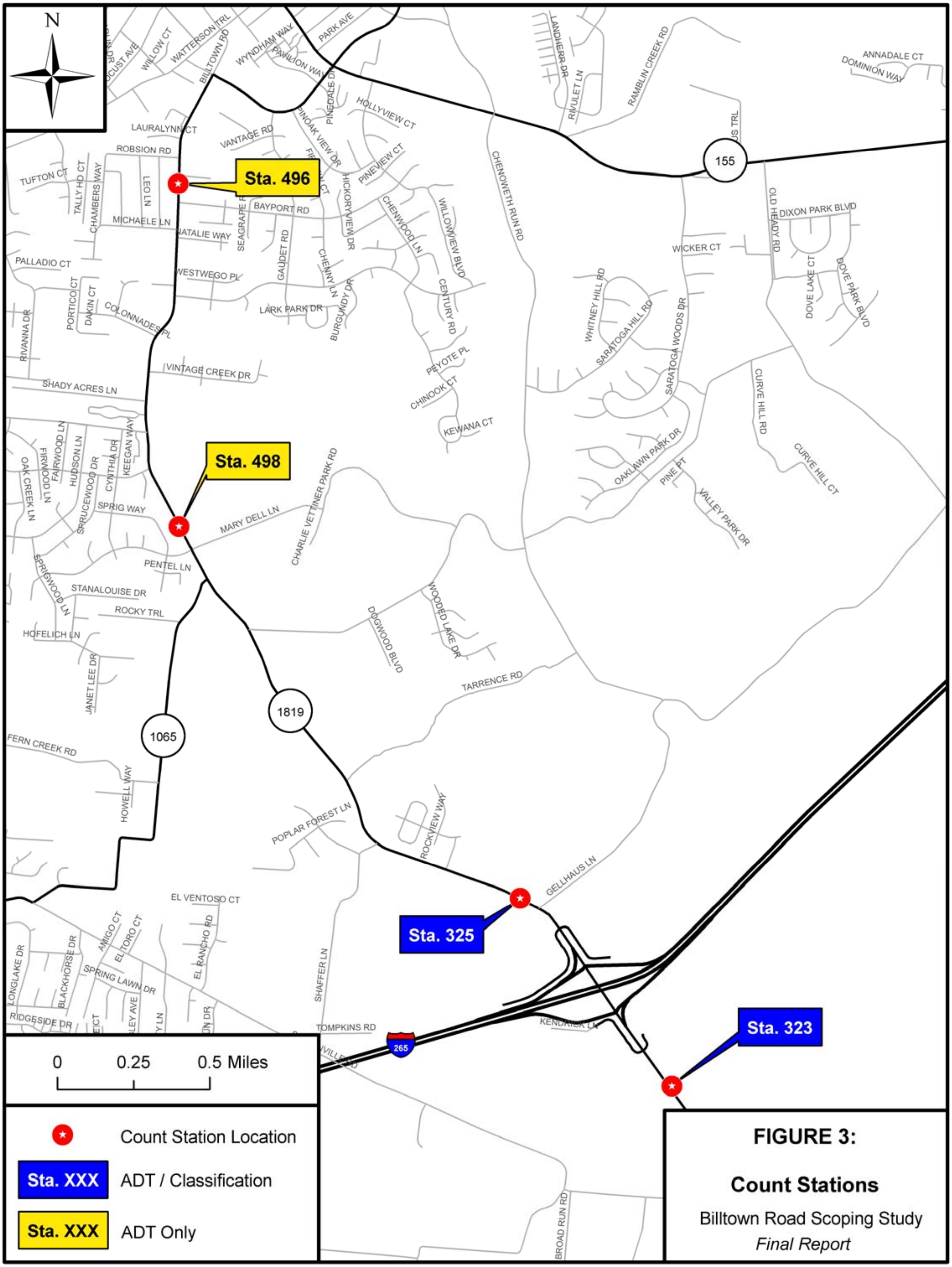

FIGURE 3:

Count Stations

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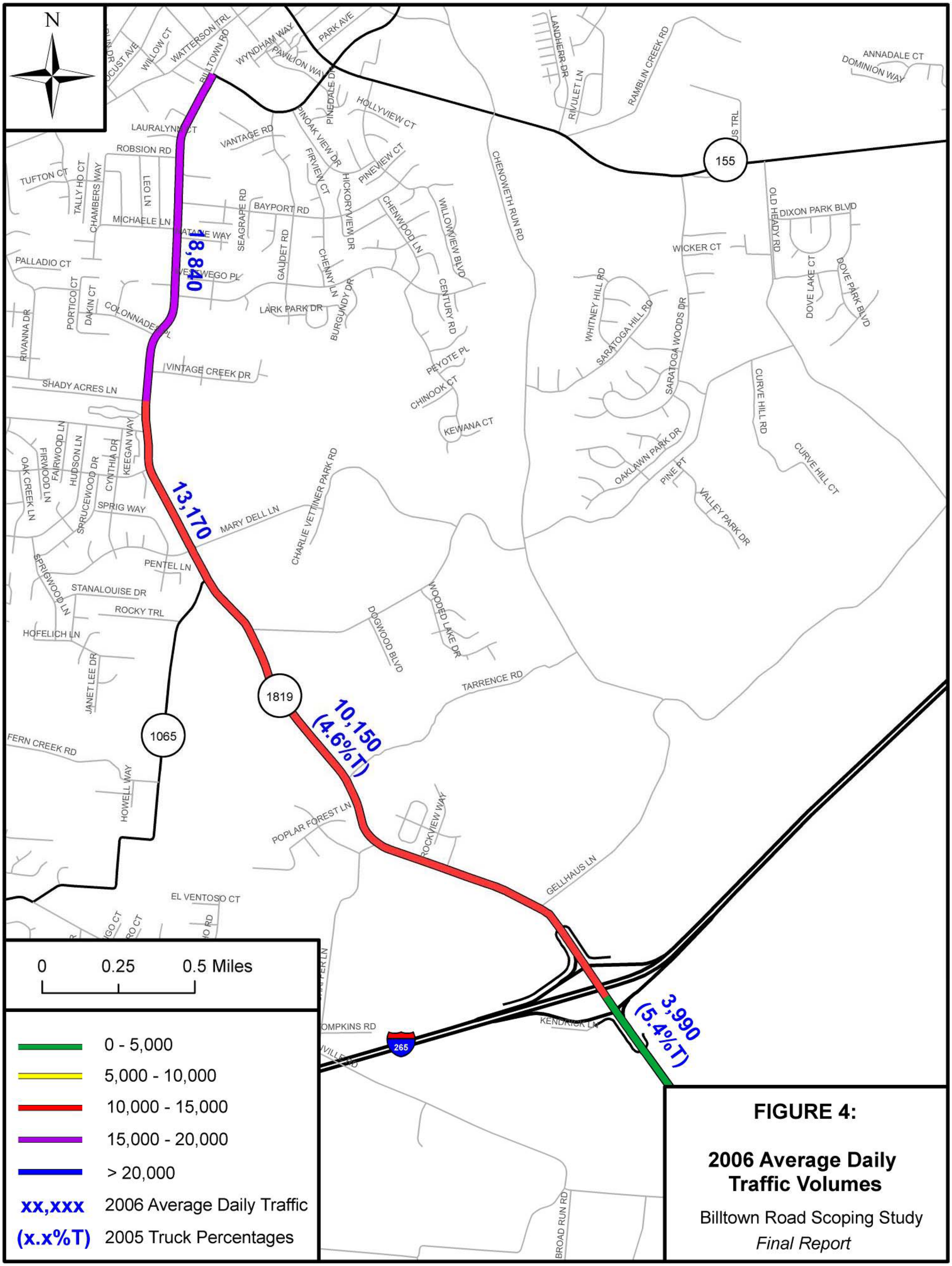

FIGURE 4:

2006 Average Daily Traffic Volumes

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Source: KYTC Highway Information System / KYTC Traffic Counts System (CTS)

In addition, KYTC provided turning movement counts at seven key intersections within the study area during the AM peak (7:00 AM – 9:00 AM) and PM peak (4:00 PM – 6:00 PM) periods. These intersections included:

- Billtown Road / Gellhaus Lane
- Billtown Road / Shaffer Lane
- Billtown Road / Mary Dell Lane
- Billtown Road / Michael Edward Drive
- Billtown Road / Fairground Road
- Billtown Road / Saint Rene Road
- Billtown Road / Ruckriegel Parkway

These counts were performed in 2004 and 2005 and were forecasted to a base year of 2006 using historical trends.

Peak period turning movement counts for seven additional study area intersections were conducted by PB on 8/22/06 and 8/24/06. These intersections included:

- Billtown Road / I-265 EB/NB Ramps
- Billtown Road / I-265 WB/SB Ramps
- Billtown Road / Easum Road
- Billtown Road / Lovers Lane (KY 1065)
- Billtown Road / Shady Acres Lane
- Billtown Road / Vintage Creek Drive
- Billtown Road / Colonnades Place

The turn movement volumes were balanced as appropriate. The 2006 intersection volumes for all fourteen intersections can be seen on **Figures 5** and **6**.

Historic Traffic Volumes and Growth Rates

Growth rates for this study are based upon a historical traffic growth analysis along KY 1819 from I-265 to Ruckriegel Parkway. The analysis utilized traffic counts obtained from the KYTC's 'CTS' traffic count program which includes counts from 1963 to 2006.

The historical counts were entered into a spreadsheet provided by KYTC. The spreadsheet calculates growth rates using both exponential and trendline analyses. The historical growth rates are shown in **Table 1**.

Table 1: **Historic and Proposed Growth Rates**

Station	From	To	Historical Growth Rate	Proposed Growth Rate
323	Seatonville Road	I-265 Overpass	6.60%	7.5%
325	I-265 Overpass	KY 1065 (Lovers Lane)	7.49%	7.5%
498	KY 1065 (Lovers Lane)	Shady Acres Lane	0.77%	7.5%
496	Shady Acres Lane	KY 155	8.03%	7.5%*

* Used 8.0% at Billtown Road / Ruckriegel intersection.

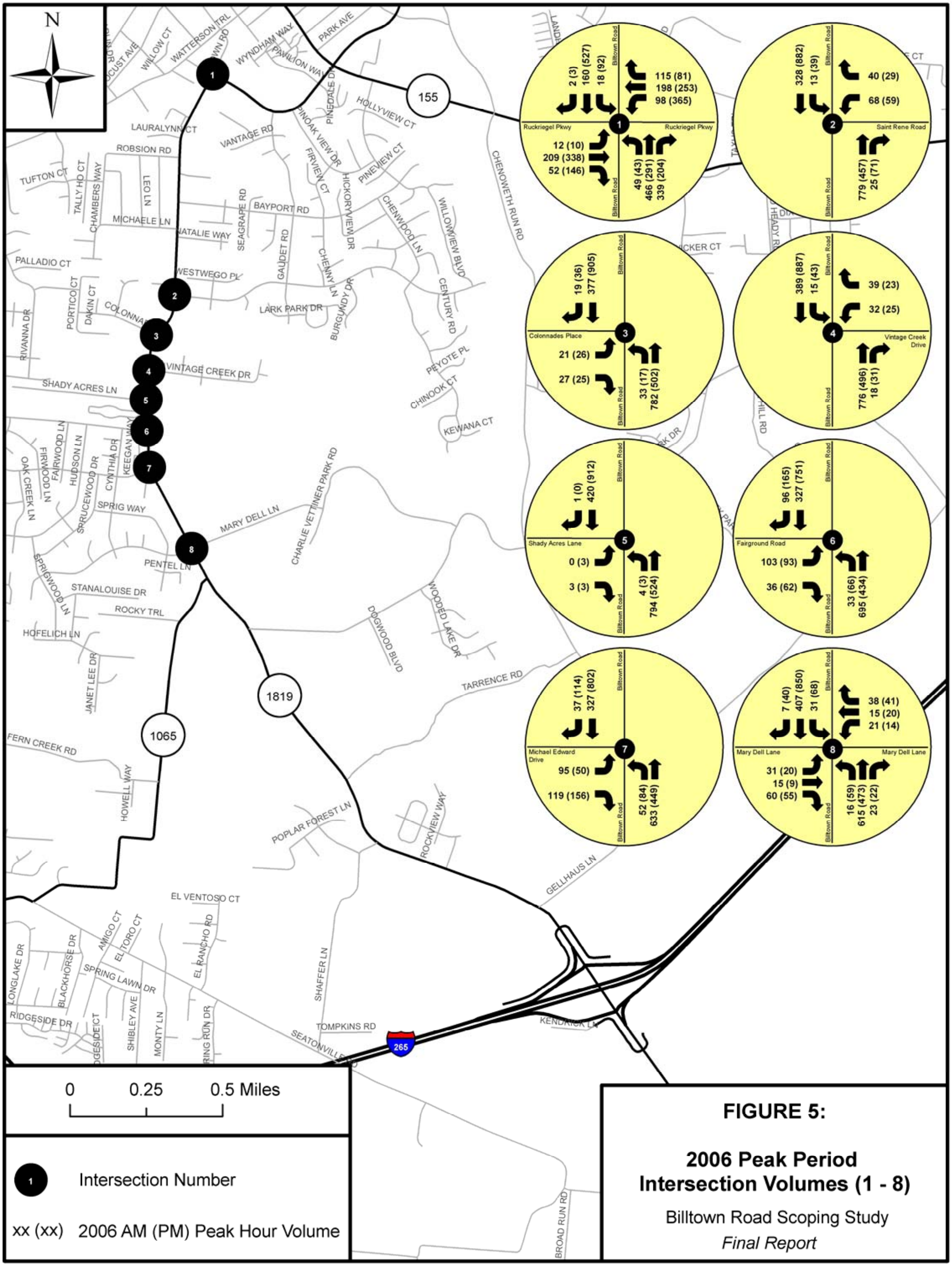

FIGURE 5:

2006 Peak Period Intersection Volumes (1 - 8)

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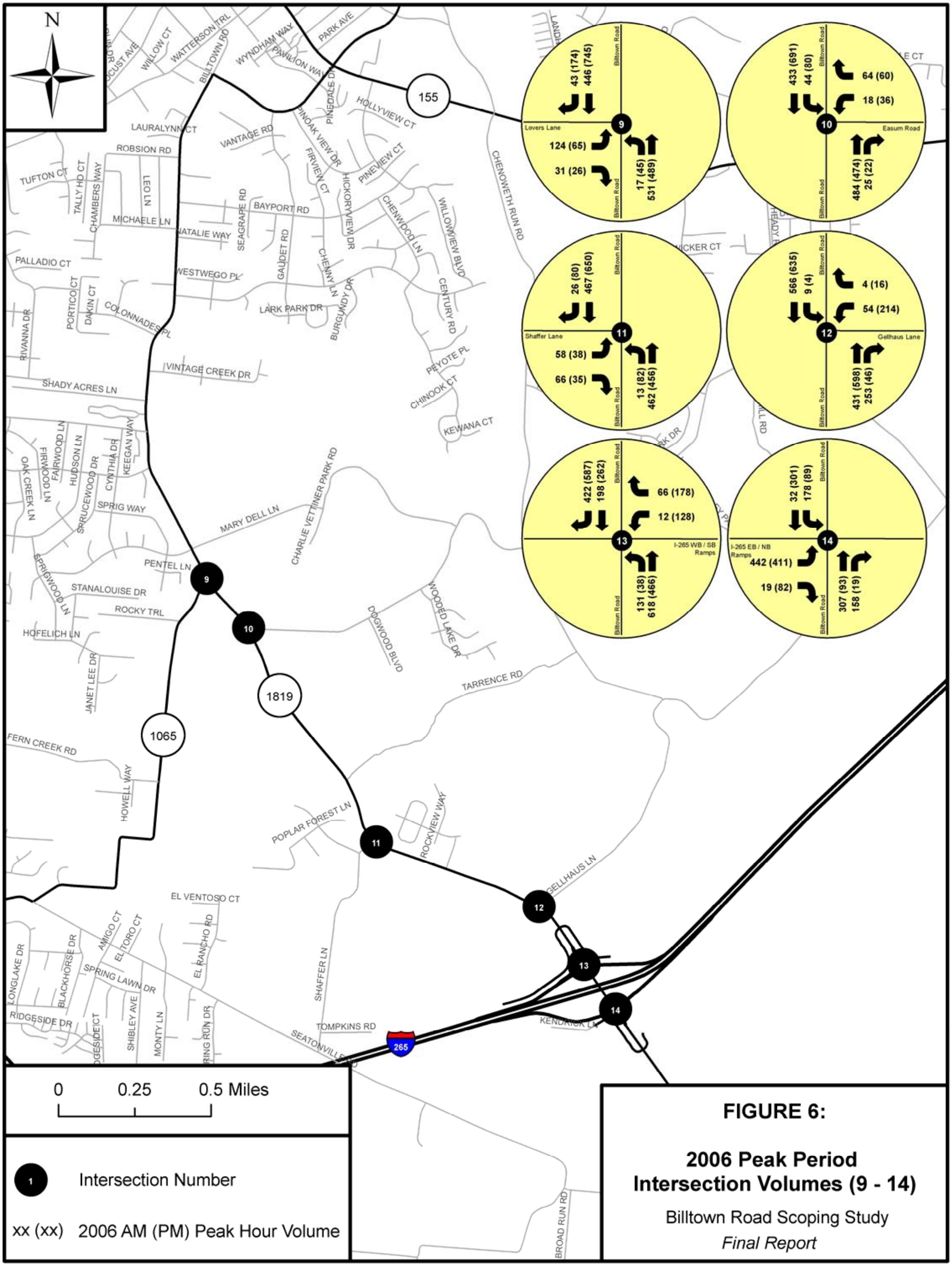

FIGURE 6:

2006 Peak Period Intersection Volumes (9 - 14)

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In selecting an appropriate traffic growth rate, several factors were considered including the historical growth, recent traffic volumes, and geography. It should be noted that future traffic volumes calculated for this study reflect intersection demand and do not consider capacity constraints at intersections. Several of the intersections being evaluated as part of this study are within close proximity of each other. Due to this close proximity, it makes sense to balance traffic volumes between the intersections, and therefore, apply a similar growth rate. Specific intersection groupings along Billtown Road include:

- I-265 Eastbound Ramps; I-265 Westbound Ramps; and Gellhaus Lane.
- Easum Road; Lovers Lane; Mary Dell Lane; Michael Edward Drive; Fairground Road; Shady Acres Lane; Vintage Creek Drive; Colonnades Place; and St. Rene Road.

The intersections of Shaffer Lane and Ruckriegel Parkway with Billtown Road are somewhat isolated from these intersection groupings and were considered as individual intersections.

Based on the divisions of the count stations, a different growth rate would be applied to the I-265 Eastbound Ramps intersection, the two intersections north of I-265 (I-265 Westbound Ramps intersection and Gellhaus Lane), the intersections north of Shady Acres Lane, the intersections between Shady Acres Lane and Lovers Lane, as well as south of Lovers Lane to Gellhaus Lane. Analysis of the most recent traffic volumes between Lovers Lane and Shady Acres Lane showed that in 2003, average daily traffic volumes were 10,600. South of Lovers Lane, the 2005 average daily traffic volume was 9,350. These average daily traffic volumes are very similar, and continuing back a few years, the similarities remain. Therefore, it seemed reasonable to use the higher growth rate of 7.5% per year and apply it to all intersections from Easum Road to St. Rene Road. Shaffer Lane was already within the 7.5% growth rate section; therefore, 7.5% was applied to this intersection as well.

In the south, only the intersection of I-265 Eastbound Ramps was under the 6.5% growth rate. To be consistent, 7.5% was used instead to balance this intersection with the I-265 Westbound Ramps intersection and Gellhaus Lane. In the north end of the study area, the intersection of Ruckriegel Parkway was forecasted at 8.0% since it was identified as an individual intersection. Given the proximity of this intersection to Jeffersontown and the surrounding development at this intersection (drug store, post office, gas station), a higher growth rate seems appropriate.

The growth rates discussed in this section reflect historical trends along each segment, but do not include specific developments that may be constructed within or adjacent to the project area. Potential developments were discussed with KYTC and other knowledgeable agencies, including Louisville Metro Planning and Jefferson County Public Schools. This information as well as trip generation in the future year forecasts is discussed in a later section.

3.3 Truck Volumes

Vehicle classification counts on Billtown Road were obtained to examine recent truck percentages. Historic truck percentage trends were not available within the study area. Classification counts were taken on Billtown Road during 2005 as shown in **Table 2**.

Table 2: Vehicle Classification Counts on Billtown Road and Average Statewide Truck Percentages

Route	Milepoint	Count Station	General Location	Year	ADT	Axles per Truck	Percent Trucks	2004 Statewide Average Truck %[1]
KY 1819	4.800	323	B/W Seatonville Rd & I-265 Overpass	2005	4,000	2.743	5.4%	8.7%
	6.000	325	B/W I-265 Overpass & KY 1065	2005	9,790	3.224	4.6%	

[1]2004 Statewide Average Truck % from Traffic Forecasting Report 2004, KYTC Division of Multimodal Programs, December 2004, Page 21.

3.4 Spot Speed Study

Speed data was collected at two locations along Billtown Road on October 24, 2006 (Tuesday) to determine vehicle speeds relative to the posted speed limit. The locations were selected to provide speed data in both the north and south end of the study area. Vehicle speeds were obtained by radar for the northbound and southbound directions in fifteen minute time periods. The methodology used for conducting the speed study was based on the procedures outlined in the *Institute of Transportation Engineers Manual of Transportation Studies*. This included collecting the data during off-peak periods.

In speeds studies, the most significant statistic is the 85th percentile speed. The 85th percentile speed is the speed threshold at or below which 85 percent of the motorists travel. Generally speed limits are set within five mph of the 85th percentile speed. **Table 3** presents a summary of the speed statistics for Billtown Road.

Table 3: Speed Statistics

	Between Gellhaus Lane & Shaffer Lane		Between Colonnades Place & St. Rene Road	
Statistics	Northbound	Southbound	Northbound	Southbound
No. of Observations	34	40	72	36
Minimum Speed (mph)	38	41	35	34
Maximum Speed (mph)	51	63	51	49
85th Percentile Speed (mph)	47	54	45	45
Posted Speed Limit (mph)	45	45	35	35
Difference (85th – Posted)	+2	+9	+10	+10

The observed vehicle speeds exceeded the posted speed limit, particularly in the north end of the study area where the posted speed limit is 35 mph. At this location, almost all vehicles were observed to be going faster than the posted speed limit. Overall, there appears to be a trend with vehicles exceeding the posted speed limit along the entire length of Billtown Road.

3.5 Current Level of Service Analysis

3.5.1 Methodology

Intersection Analysis

Intersection operations were evaluated at the following study intersections:

- Billtown Road / Ruckriegel Parkway
- Billtown Road / Saint Rene Road
- Billtown Road / Colonnades Place
- Billtown Road / Vintage Creek Drive
- Billtown Road / Shady Acres Lane
- Billtown Road / Fairground Road
- Billtown Road / Michael Edward Drive
- Billtown Road / Mary Dell Lane
- Billtown Road / Lovers Lane
- Billtown Road / Easum Road
- Billtown Road / Shaffer Lane
- Billtown Road / Gellhaus Lane
- Billtown Road / I-265 Westbound Ramps
- Billtown Road / I-265 Eastbound Ramps

Of the fourteen intersections listed above, only the intersections at Ruckriegel Parkway and Gellhaus Lane are signalized.

For this analysis, the Highway Capacity Software Plus package (HCS+) was used to assess the peak period traffic operating conditions. This software package implements the Highway Capacity Manual (HCM) intersection analysis method. For each study intersection, average vehicle delays were calculated as well as the resulting levels of service (LOS).

Level of service (LOS) is a qualitative measure of expected traffic conflicts, delay, driver discomfort, and congestion. Levels of service are described according to a letter rating system ranging from LOS A (free flow, minimal or no delays – best conditions) to LOS F (stop and go conditions, very long delays – worst conditions). For intersections, the Highway Capacity Manual (2000) defines levels of service based on the average delay due to signal or STOP control as shown in **Table 4**.

Table 4: LOS Criteria for Intersections

LOS	Signalized Intersections Control Delay (seconds vehicle)	Unsignalized Intersections Control Delay (seconds/vehicle)
A	$\leq$ 10	$\leq$ 10
B	>10 – 20	>10 – 15
C	>20 – 35	>15 – 25
D	>35 – 55	>25 – 35
E	>55 – 80	>35 – 50
F	>80	>50

Source: Highway Capacity Manual (2000)

In general terms, a facility is considered to have reached its physical capacity at LOS E. However, for urban and suburban conditions, LOS C is usually considered the threshold for desirable traffic conditions. Operations below this threshold are noted as undesirable and warrant improvement. LOS C corresponds to $\leq$ 35 seconds of delay per vehicle at a signalized intersection and $\leq$ 25 seconds of delay at an unsignalized intersection. (Refer to the HCM published by the Transportation Research Board for more specific information.)

Two-Lane Highway Analysis

A corridor level of service analysis was also prepared for Billtown Road from Ruckriegel Parkway to I-265 using the HCS+ two-lane road analysis module. This is based on the 2000 HCM. For this method, there are two classes of roadways: Class I highways which include higher speed arterials and daily commuter routes, and Class II highways which include lower speed collector roadways and roads primarily designed to provide access. Driver expectations regarding speed and flow are important in determining a highway's class. Billtown Road, a major through route in the study area, was considered to be a Class I highway. Levels of service for Class I highways are based on the estimated average travel speeds and percent time vehicles spend following other vehicles as shown in **Table 5**. Levels of service for Class II highways are defined only in terms of the percent time vehicles spend following other vehicles. Average travel speed is not considered since drivers typically will tolerate lower speeds on a Class II facility because of its function as an access roadway (serving shorter trips and fewer through trips). Refer to the HCM for more details.

Table 5: LOS Criteria for Two-Lane Highways

LOS	Class I Highways Percent Time Spent Following	Class I Highways Average Travel Speed	Class II Highways Percent Time Spent Following
A	≤ 35	>55	≤ 40
B	>35 - 50	>50 – 55	>40 – 55
C	>50 - 65	>45 – 50	>55 – 70
D	>65 – 80	>40 - 45	>70 – 85
E	>80	≤40	>85
F	LOS F applies whenever the flow rate exceeds the capacity		

Source: Highway Capacity Manual (2000)

Again, LOS C is the threshold for desirable traffic operations in this study. Operations below this threshold are noted as undesirable and warrant improvement. For Class I highways, the LOS C threshold corresponds to an average travel speed of >45 miles per hour with ≤65 percent time spent following another vehicle. For Class II highways, the LOS C threshold corresponds to ≤ 70 percent time spent following another vehicle. (Refer to the HCM for more specific information.)

3.5.2 Existing Traffic Operating Conditions

Intersection Level of Service and Delay

In order to determine the level of service and delay at the key intersections, the peak period traffic counts collected by KYTC and PB were utilized. As noted, the peak periods were 7:00 AM to 9:00 AM (AM peak) and 4:00 PM to 6:00 PM (PM peak) for most of the study intersections. The highest peak hour for each count was selected for use in the analysis. Intersection geometry, signal timings, and other necessary traffic operations data was also collected and used to evaluate the intersection operations.

Typical weekday traffic operating conditions were determined for both the AM and PM peak hours. **Table 6** lists the level of service and delay for each approach. For the unsignalized intersections, the Highway Capacity Software (HCS+) does not calculate whole intersection levels of service or a level of service for approaches with no conflicting movements.

Table 6: 2006 Intersection Levels of Service

Intersection	Type	Approach	AM Avg. Delay (sec)	AM LOS	PM Avg. Delay (sec)	PM LOS
Billtown Road / I-265 EB/NB Ramps	STOP Controlled	Eastbound	415.7	F	100.4	F
		Northbound	-	-	-	-
		Southbound	9.2	A	7.6	A
Billtown Road / I-265 WB/SB Ramps	STOP Controlled	Westbound	18.3	C	36.3	E
		Northbound	9.7	A	10.2	B
		Southbound	-	-	-	-
Billtown Road / Gellhaus Lane	Signalized	Westbound	30.4	C	34.6	C
		Northbound	56.2	E	38.7	D
		Southbound	11.9	B	13.2	B
		Whole Int.	35.7	D	27.3	C
Billtown Road / Shaffer Lane	STOP Controlled	Eastbound	22.1	C	37.3	E
		Northbound	8.5	A	9.9	A
		Southbound	-	-	-	-
Billtown Road / Easum Road	STOP Controlled	Westbound	16.6	C	31.4	D
		Northbound	-	-	-	-
		Southbound	8.7	A	8.8	A
Billtown Road / Lovers Lane	STOP Controlled	Eastbound	47.4	E	76.6	F
		Northbound	8.5	A	10.8	B
		Southbound	-	-	-	-
Billtown Road / Mary Dell Lane	STOP Controlled	Eastbound	36.3	E	209.1	F
		Westbound	35.2	E	158.5	F
		Northbound	8.3	A	10.6	B
		Southbound	9.1	A	8.8	A
Billtown Road / Michael Edward Drive	STOP Controlled	Eastbound	41.8	E	149.1	F
		Northbound	8.3	A	11.1	B
		Southbound	-	-	-	-
Billtown Road / Fairground Road	STOP Controlled	Eastbound	49.8	E	169.9	F
		Northbound	8.4	A	10.9	B
		Southbound	-	-	-	-

Table 6: 2006 Intersection Levels of Service (cont.)

Intersection	Type	Approach	AM Avg. Delay (sec)	AM LOS	PM Avg. Delay (sec)	PM LOS
Billtown Road / Shady Acres Lane	STOP Controlled	Eastbound	11.0	B	27.4	D
		Northbound	8.3	A	10.2	B
		Southbound	-	-	-	-
Billtown Road / Vintage Creek Drive	STOP Controlled	Westbound	28.2	D	35.2	E
		Northbound	-	-	-	-
		Southbound	9.9	A	8.8	A
Billtown Road / Colonnades Place	STOP Controlled	Eastbound	19.9	C	33.4	D
		Northbound	8.3	A	10.6	B
		Southbound	-	-	-	-
Billtown Road / St. Rene Road	STOP Controlled	Westbound	30.0	D	55.4	F
		Northbound	-	-	-	-
		Southbound	9.8	A	8.8	A
Billtown Road / Ruckriegel Parkway	Signalized	Eastbound	86.8	F	350.7	F
		Westbound	117.1	F	174.4	F
		Northbound	180.4	F	63.7	E
		Southbound	56.2	E	194.9	F
		Whole Int.	112.5	F	191.5	F

Most of the intersections have at least one approach during one or more peak periods that operates at a LOS E or F. The only exceptions are the intersections of Billtown Road and Easum Road, Shady Acres Lane, and Colonnades Place respectively. However, these three intersections have at least one approach that operates at a LOS D during one of the peak periods. Given the current poor levels of service, these intersections will most likely continue to experience traffic operational problems in the future, which may possibly become worse with any additional traffic.

In addition to a level of service analysis, queue lengths were evaluated for all of the intersections with dedicated turn lanes. Queue lengths, available storage, and an assessment of adequacy are provided in **Table 7**. This table is based on the Highway Capacity Manual method (95^{th} percentile) and uses existing signal timings for the two signalized intersections. This method is somewhat conservative in estimating queues.

Table 7: 2006 Queue Length Evaluation

Int.	Approach / Movement	Design Hour	95th Percentile Queue (HCM)	Queue Length (ft)	Available Storage Length (ft)	Notes
Billtown Road / I-265 EB Ramps	EB Left	AM	33.82	846	2,060	**MEETS** available storage
		PM	16.88	422	2,060	**MEETS** available storage
	EB Right	AM	0.06	2	280	**MEETS** available storage
		PM	0.44	11	280	**MEETS** available storage
	SB Left	AM	0.69	17	160	**MEETS** available storage
		PM	0.21	5	160	**MEETS** available storage
Billtown Road / I-265 WB Ramps	WB Left	AM	0.34	9	180	**MEETS** available storage
		PM	4.93	123	180	**MEETS** available storage
	WB Right	AM	0.60	15	1,380	**MEETS** available storage
		PM	1.57	39	1,380	**MEETS** available storage
	NB Left	AM	0.57	14	460	**MEETS** available storage
		PM	0.18	5	460	**MEETS** available storage
Billtown Road / Gellhaus Lane	WB Left	AM	3.00	75	156	**MEETS** available storage
		PM	12.80	320	156	**EXCEEDS** available storage
	WB Right	AM	0.20	5	156	**MEETS** available storage
		PM	0.90	23	156	**MEETS** available storage
	SB Left	AM	0.30	8	150*	**MEETS** available storage
		PM	0.10	3	150*	**MEETS** available storage

* Turn lane striped for 150 feet but two-way left turn lane prior to turn lane could be used for additional storage.

Table 7: 2006 Queue Length Evaluation (Cont.)

Int.	Approach / Movement	Design Hour	95th Percentile Queue (HCM)	Queue Length (ft)	Available Storage Length (ft)	Notes
Billtown Road / Colonnades Place	EB Left	AM	0.50	13	100	**MEETS** available storage
		PM	0.92	23	100	**MEETS** available storage
	WB Right	AM	0.15	4	100	**MEETS** available storage
		PM	0.31	8	100	**MEETS** available storage
Billtown Road / St. Rene Road	WB Left	AM	1.83	46	100	**MEETS** available storage
		PM	2.87	72	100	**MEETS** available storage
	WB Right	AM	0.43	11	100	**MEETS** available storage
		PM	0.19	5	100	**MEETS** available storage
Billtown Road / Ruckriegel Parkway	EB Left	AM	1.10	28	225	**MEETS** available storage
		PM	1.00	25	225	**MEETS** available storage
	WB Left	AM	9.70	243	180	**EXCEEDS** available storage
		PM	51.50	1288	180	**EXCEEDS** available storage
	NB Left	AM	4.40	110	190	**MEETS** available storage
		PM	3.90	98	190	**MEETS** available storage
	NB Right	AM	39.10	978	200	**EXCEEDS** available storage
		PM	19.80	495	200	**EXCEEDS** available storage
	SB Left	AM	1.60	40	240	**MEETS** available storage
		PM	8.40	210	240	**MEETS** available storage

Most turn lanes have adequate storage given the current traffic volumes and operations. The exceptions are the westbound left turn lane at the Gellhaus Lane intersection and several turn lanes at the Ruckriegel Parkway intersection. At the Ruckriegel Parkway intersection, the westbound left and the northbound right turn lanes have queues that exceed the available storage during both peak periods.

Two-Lane Highway Level of Service and Delay

The most recent 24-hour KYTC traffic counts were used to evaluate corridor operating conditions on Billtown Road. Peak hour traffic volumes for highway segments were estimated based on the average daily traffic volumes for those segments using K-factors derived from the KYTC counts. The current lane widths, shoulder widths, percent passing, and other design factors were also used.

All sections operate at a level of service E, which is below the desirable LOS threshold of C. The poor levels of service are a result of low estimated travel speeds (<45 mph) which are attributable to a number of factors including narrow lanes and shoulders, poor sight distance and the inability to pass other vehicles (especially those turning left), and high traffic volumes. The segment levels of service are listed in **Table 8** and are shown on **Figure 7**.

Table 8: 2006 Corridor Levels of Service

Route	Section	Begin Milepoint	End Milepoint	Section Length (miles)	2006 ADT	K-Factor	2006 DHV	Posted Speed Limit (MPH)	% Trucks and Buses	Estimated Travel Speed (MPH)	% Time Spent Following	LOS
KY 1819	1	3.930 (Beg. of Study Area)	5.180 (I-265)	1.25	3,990	0.133	531	35	5.4%	29.2	62.5	E
	2	5.181 (I-265)	7.139 (Lovers Lane)	1.96	10,050	0.108	1085	45	4.6%	24.5	75.6	E
	3	7.140 (Lovers Lane)	7.770 (Shady Acres Lane)	0.63	13,170	0.112	1475	45	5.0%	21.6	82.9	E
	4	7.771 (Shady Acres Lane)	8.885 (Ruckriegel Parkway)	1.11	18,840	0.106	1997	35	5.0%	17.3	89.4	E

LOS E - F
LOS D
LOS A - C

Notes:
ADT = 2006 Average Daily Traffic (forecasted volume based on 2003 - 2005 KYTC counts)
K-Factor = Design Hour Factor obtained from KYTC counts
DHV = 2006 Design Hour Volume (Average Daily Traffic x K-Factor)
Speed Limit obtained from Highway Information System
% Trucks and Buses obtained from KYTC counts
Estimated Travel Speed, % Time Spent Following, and Level of Service (LOS) calculated using Highway Capacity Software

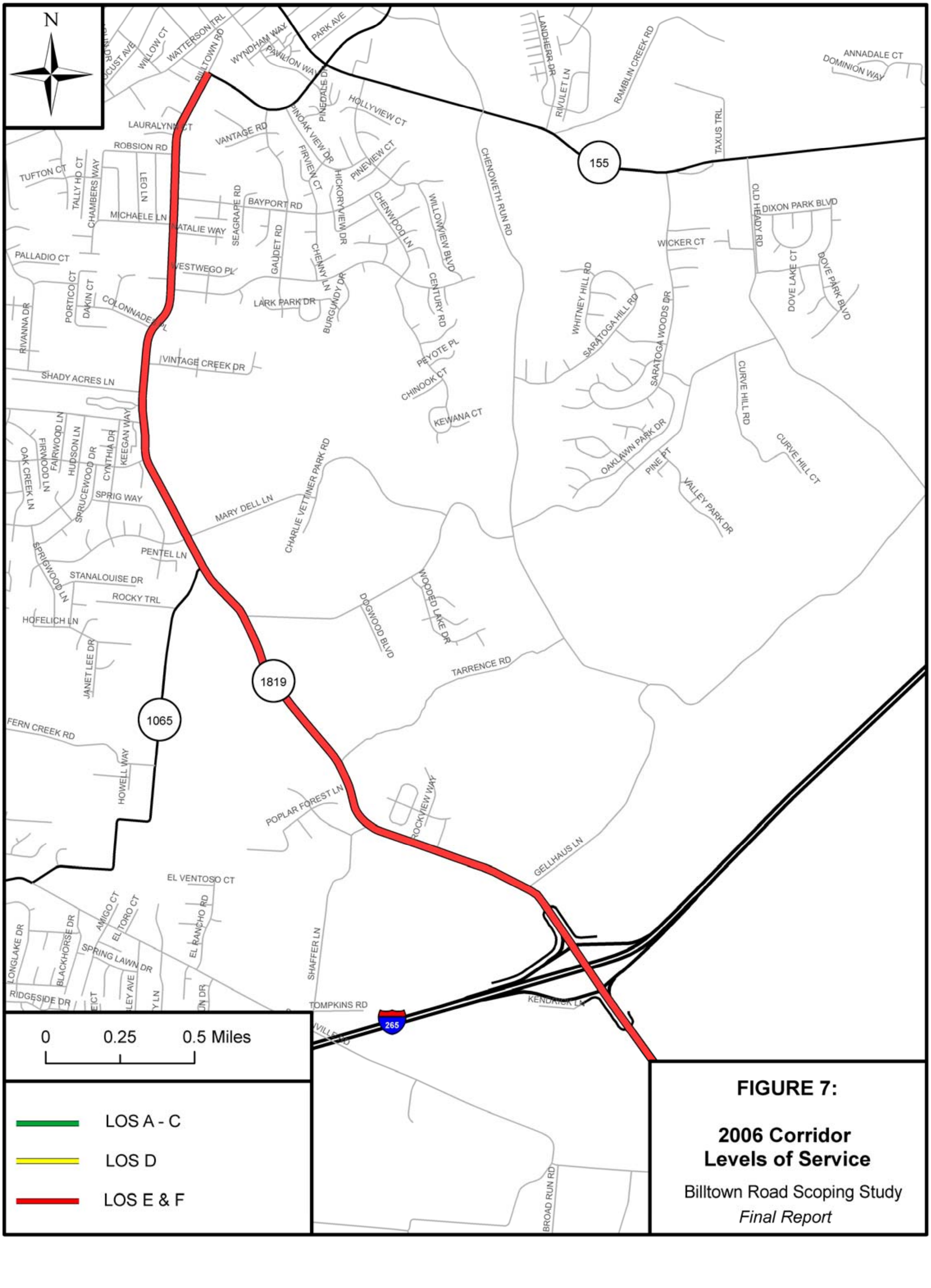

FIGURE 7:

2006 Corridor Levels of Service

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3.6 Future No-Build Traffic Operating Conditions

Traffic forecasts for each of the fourteen intersections were developed for the No-Build scenario for the future year 2010. In addition, traffic forecasts were developed for each of the study area segments for the future years of 2010 and 2030. The methodology and findings for the future No-Build traffic forecasts are summarized below. For a more detailed explanation of the traffic forecast methodology, refer to **Appendix A** where the complete Traffic Forecast Methodology Report is included.

Traffic Forecast Methodology
For intersections, a growth rate of 7.5% per year was applied to current turning movement volumes except for the intersection of Billtown Road and Ruckriegel Parkway which was forecasted at 8.0% per year. These growth rates were based primarily on historic traffic data as discussed previously in Section 3.2. Corridor traffic volumes for 2010 and 2030 were forecasted using model output from the Kentuckiana Regional Planning and Development Agency (KIPDA).

Upon review of the Traffic Forecast Methodology Report and proposed growth rates for Billtown Road by KYTC, there was some concern that the growth rate proposed for the 2010 volumes was too high. The KYTC Division of Planning proposed a 5.0% growth rate for the study area based on similar historical traffic counts but used a slightly different procedure to calculate historic growth patterns. After reviewing both methodologies, it was determined that the growth rate of 7.5% per year proposed by PB may be high, but it would not have a significant affect on the intersection operations in the future since most intersections currently have poor traffic operations in 2006.

Trip Generation
In addition to projected traffic growth, there are several planned developments along this corridor that are likely to impact traffic volumes in the future. The most significant development is the construction of a new school complex off of Gellhaus Lane. The school complex consists of a new elementary school, middle school, and bus compound. The elementary school opened in August 2007, but as this study was begun a year prior to its opening, the associated traffic is treated as forecasted volumes rather than included in a new traffic count. It was designed for 650 students with bell times at 9:05 AM to 3:45 PM. The middle school is due to open in August 2008. It is being designed to accommodate 950 students, with bell times from 7:40 AM to 2:20 PM. The bus compound has also opened and has parking for 110 buses and 112 cars.

Recently, there have been numerous new subdivisions built along Billtown Road; however, at the time of this study, most of them were complete with only scattered lots still available for construction. The only significant development currently underway noted during a field visit was off of Shaffer Lane. In the subdivision of Grey Oaks, 111 lots are available. Directly across from this development is a smaller community called Shaffer Farms which will have a total of 20 lots. In all, the traffic generated by these new homes was considered significant such that it should be added to the analysis. It is expected that build-out of these developments should be substantially complete by the beginning of 2008.

Additional information was provided by the Louisville Metro Planning and Design department regarding three residential developments to be located along or near Billtown Road. One development is located off of Gellhaus Lane, near the school complex. It is proposed to have 40 single family homes and 294 multi-family homes. Another development is located along Tarrance Road with access on Billtown Road. This development is listed as having 40 condo / townhouse units. Finally, a third development is to be built along Lovers Lane with multiple access points, including Lovers Lane and Billtown Road. This development includes plans for 191 single family homes. **Figure 8** shows the general location for each of these developments.

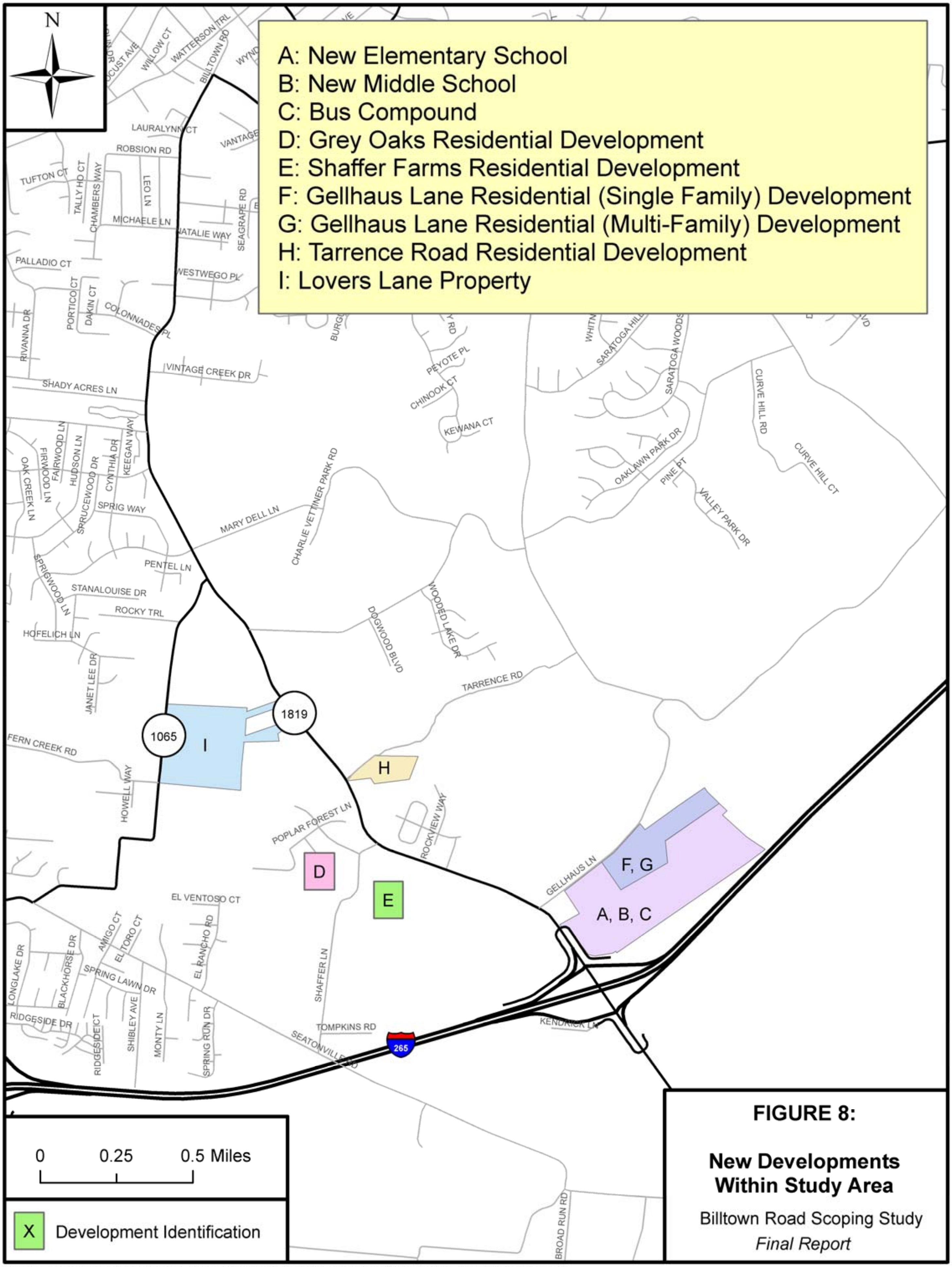

FIGURE 8:

New Developments Within Study Area

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Source: Schools / Bus Compound information provided by Jefferson County Public Schools.

The *Institute of Transportation Engineers (ITE) Trip Generation* manuals were used to develop approximate numbers of trips generated by these developments. **Tables 9, 10,** and **11** provide a summary of the trips generated by the identified developments.

For the Bus Compound, comparison studies used to develop trip rates were not available in the manual. Therefore, some assumptions were made. Based on a conversation with the Executive Director of the Division of Facilities and Transportation for Jefferson County Public Schools, buses at the compound typically are on the road before 6:30 AM and do not return to the compound until after 9:30 AM (outside the AM peak hour). In the afternoon, buses typically leave the compound around 1:30 PM and do not return until 5:30 PM. The return of the buses and the departure of the drivers in their personal vehicles will occur during the PM peak period. Therefore, with this information, it was assumed that four trips per day would be made by the buses with a portion of trips being made during the AM peak period, and one trip for each space made during the PM peak period.

Table 9: Identified Developments

Development	Name / Location	Units	Daily Trips / Unit	Daily Trips (Rounded)
A	New Elementary School	650 Students	1.29	839
B	New Middle School	950 Students	1.62	1,539
C	Bus Compound	110 Spaces	4.00	440
D	Grey Oaks Residential Development	111 S.F. Units	-	1,145
E	Shaffer Farms Residential Development	20 S.F. Units	-	237
F	Gellhaus Lane Residential Development	40 S.F. Units	-	448
G	Gellhaus Lane Residential Development	294 Multi Units	-	1,920
H	Tarrence Road Residential Development	40 Condo/T.H.	-	295
I	Lovers Lane Property	191 S.F. Units	-	1,886
			Total =	8,749

Table 10: AM Trip Rates / Distribution

Development	Units	Trips / Unit	Trips (Rounded)	% Trips In	% Trips Out	Number of Trips In	Number of Trips Out
A	650 Students	-	235	55	45	129	106
B	950 Students	-	523	55	45	288	235
C	110 Spaces	0.20	22	0	100	0	22
D	111 S.F. Units	-	90	25	75	23	68
E	20 S. F. Units	-	20	25	75	5	15
F	40 S.F. Units	-	40	25	75	10	30
G	294 Multi Units	-	150	20	80	30	120
H	40 Condo/T.H.	-	25	17	83	4	21
I	191 S.F. Units	-	140	25	75	35	105
					Total =	524	722

Table 11: PM Trip Rates / Distribution

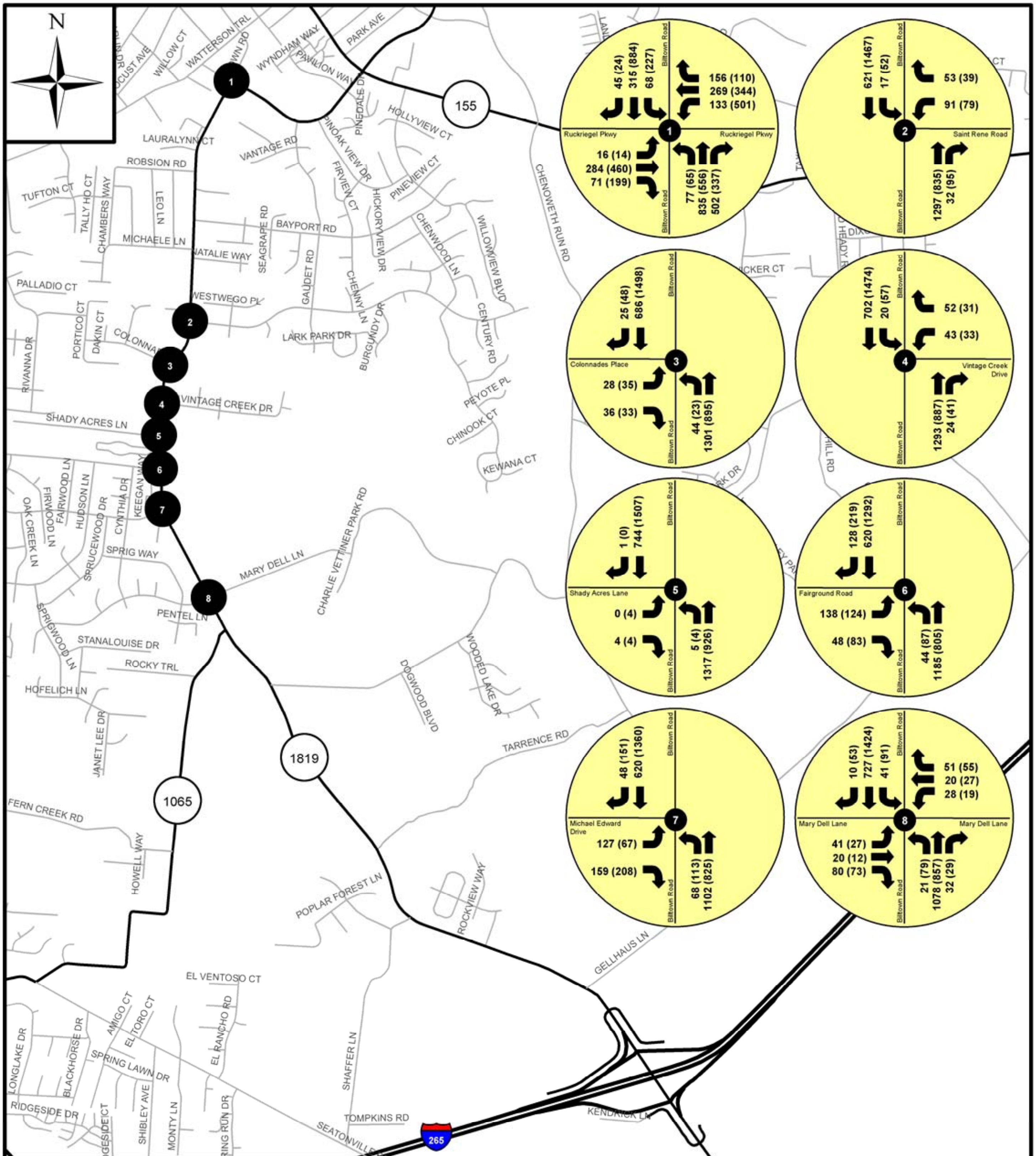
Development	Units	Trips / Unit	Trips (Rounded)	% Trips In	% Trips Out	Number of Trips In	Number of Trips Out
A	650 Students	-	163	45	55	73	90
B	950 Students	0.30	285	45	55	128	157
C	110 Spaces	1.00	110	50	50	55	55
D	111 S.F. Units	-	118	63	37	74	44
E	20 S. F. Units	-	25	63	37	16	9
F	40 S.F. Units	-	47	63	37	30	17
G	294 Multi Units	-	178	65	35	116	62
H	40 Condo/T.H.	-	28	67	33	19	9
I	191 S.F. Units	-	192	63	37	121	71
					Total =	632	514

Given that the types of development are residential or schools, it is unlikely that pass-by trips would be attracted to these developments such as they would be for a retail center. Therefore, 0% pass-by trips were assumed. It was also assumed that full build-out of the developments would be completed by the future forecast year of 2010. The additional volumes from these developments was added to the future year forecasted traffic volumes as appropriate.

Future No-Build Traffic Volumes

The 2010 future year intersection No-Build traffic volumes were calculated by applying a 7.5% per year growth rate to all intersections except for the Ruckriegel Parkway / Billtown Road intersection. An 8.0% per year growth rate was applied to this intersection. The additional traffic volumes generated by the new developments for the AM and PM peak periods were added to the increased volumes for 2010. For the 2010 and 2030 corridor volumes, the KIPDA model was used to generate these volumes. The 2030 corridor volumes were provided directly from KIPDA. The 2010 volumes were derived from interpolation between the 2006 and 2030 No-Build volumes.

Figures 9 and **10** show the projected 2010 intersection volumes for the No-Build scenario. Similarly, **Figures 11** and **12** show 2010 and 2030 average daily traffic volumes for the No-Build scenario, respectively. It should be noted that the low growth south of the I-265 interchange is attributed to the proposed Urton Lane connector which is included in the KIPDA model approximately 0.25 miles north of the northern interchange ramps.



0 0.25 0.5 Miles

● Intersection Number

xx (xx) 2010 AM (PM) Peak Hour Volume

FIGURE 9:

2010 Peak Period Intersection Volumes (1 - 8)

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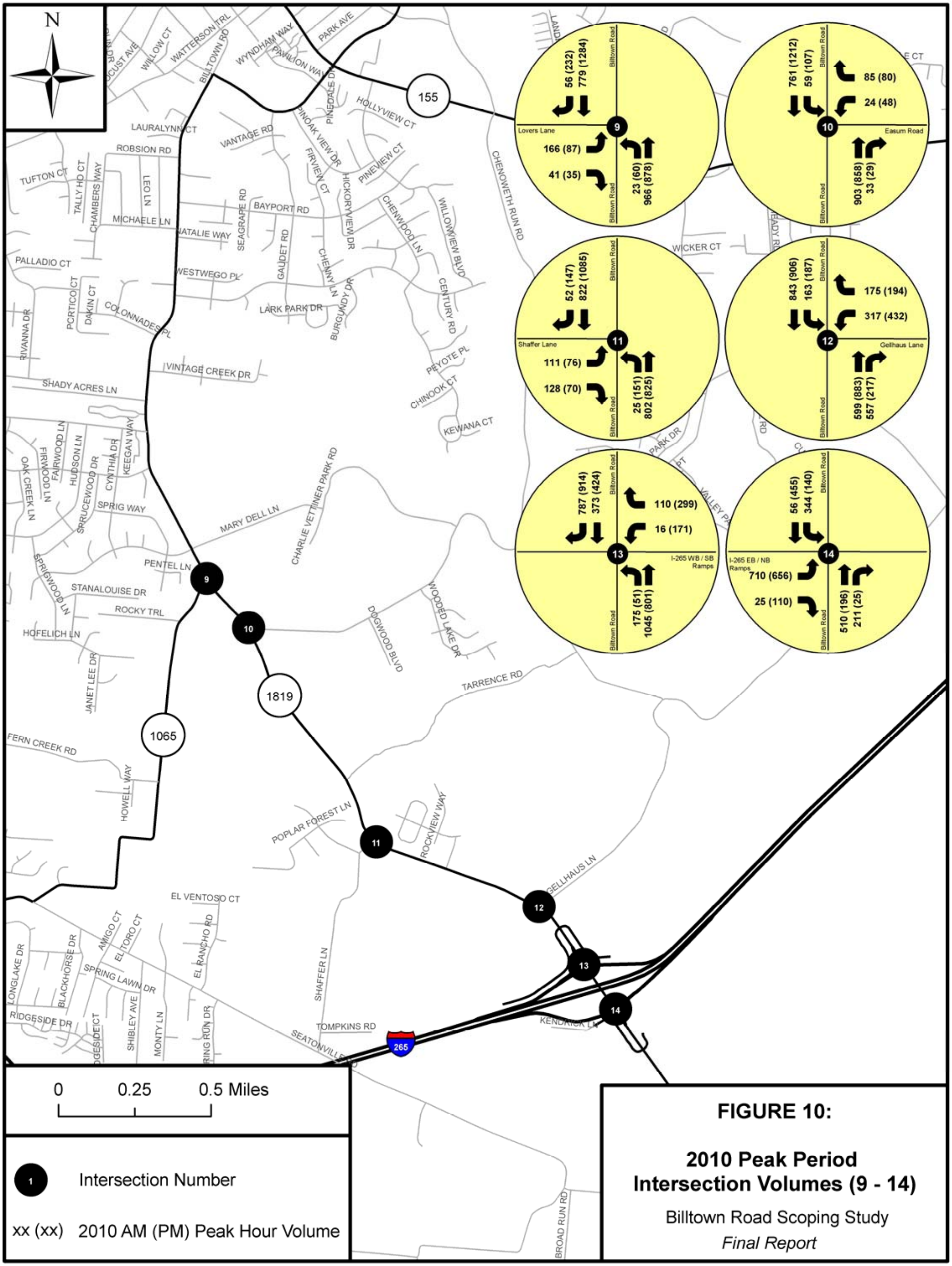

FIGURE 10:

2010 Peak Period Intersection Volumes (9 - 14)

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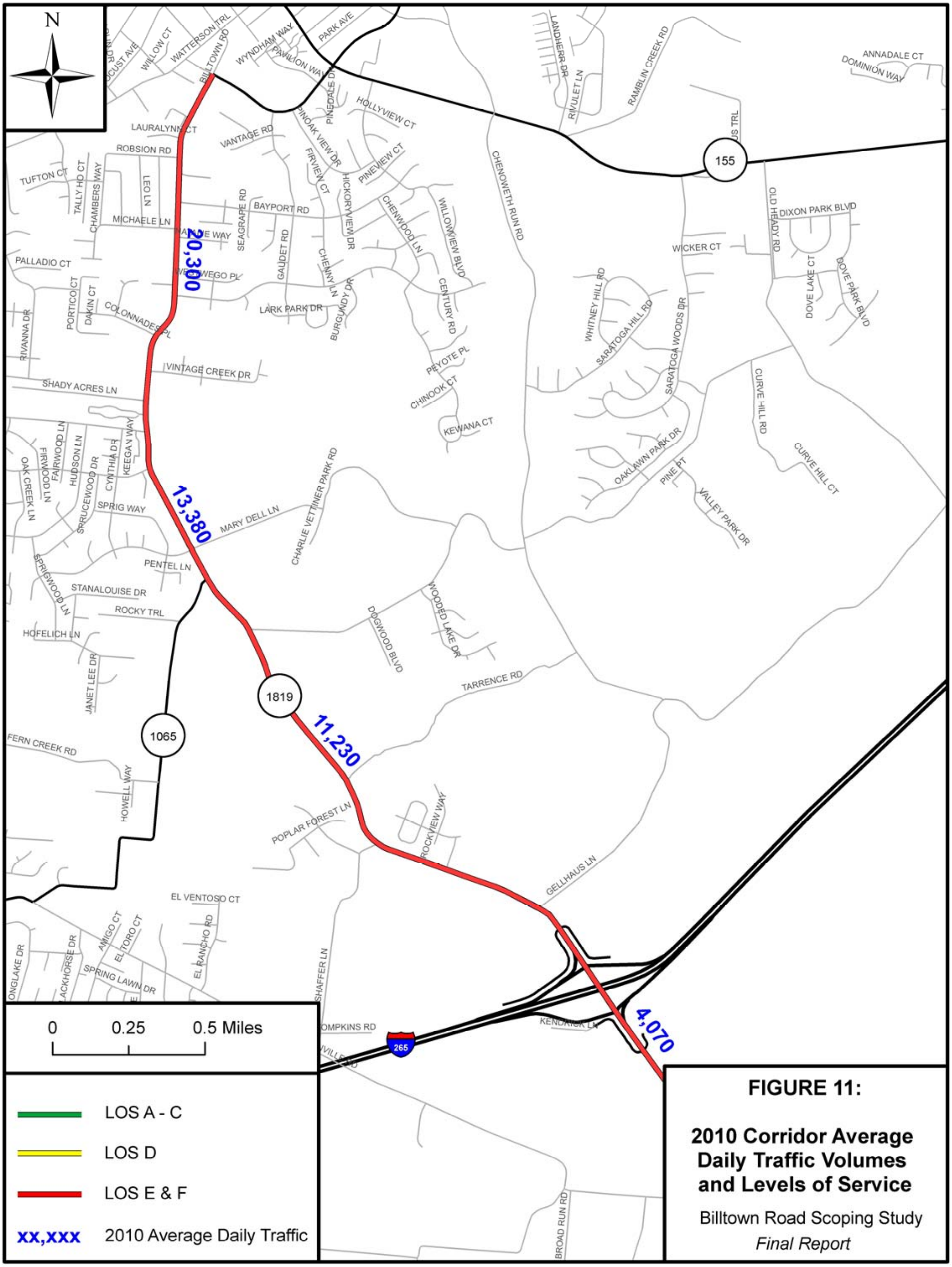

FIGURE 11:

2010 Corridor Average Daily Traffic Volumes and Levels of Service

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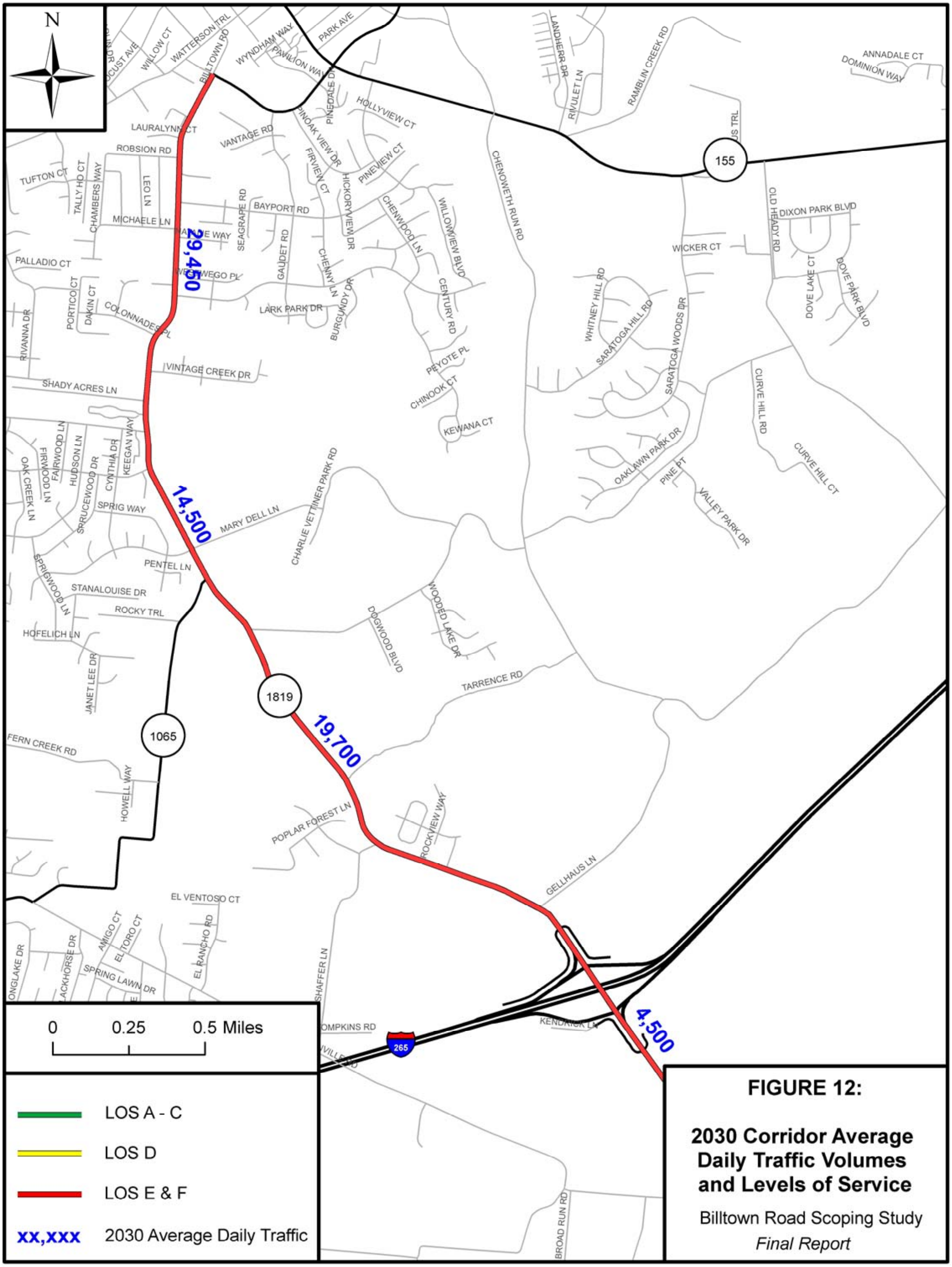

FIGURE 12:

2030 Corridor Average Daily Traffic Volumes and Levels of Service

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2010 Intersection Level of Service and Delay

No-Build scenario levels of service were evaluated for the key intersections using the projected traffic volumes. The key intersections are the same as the ones evaluated in the 2006 analysis. **Table 12** shows the 2010 No-Build intersection levels of service and delay.

Table 12: 2010 Intersection Levels of Service

Intersection	Type	Approach	AM Avg. Delay (sec)	AM LOS	PM Avg. Delay (sec)	PM LOS
Billtown Road / I-265 EB/NB Ramps	STOP Controlled	Eastbound	4301.0	F	929.8	F
		Northbound	-	-	-	-
		Southbound	12.9	B	8.1	A
Billtown Road / I-265 WB/SB Ramps	STOP Controlled	Westbound	73.9	F	456.5	F
		Northbound	15.4	C	14.0	B
		Southbound	-	-	-	-
Billtown Road / Gellhaus Lane	Signalized	Westbound	40.4	D	72.5	E
		Northbound	340.9	F	276.5	F
		Southbound	21.6	C	26.5	C
		Whole Int.	164.2	F	134.3	F
Billtown Road / Shaffer Lane	STOP Controlled	Eastbound	571.8	F	1850.0	F
		Northbound	10.2	B	15.6	C
		Southbound	-	-	-	-
Billtown Road / Easum Road	STOP Controlled	Westbound	78.3	F	846.1	F
		Northbound	-	-	-	-
		Southbound	10.9	B	11.1	B
Billtown Road / Lovers Lane	STOP Controlled	Eastbound	1063.0	F	1987.0	F
		Northbound	10.0	A	16.6	C
		Southbound	-	-	-	-
Billtown Road / Mary Dell Lane	STOP Controlled	Eastbound	2227.0	F	*	F
		Westbound	1590.0	F	*	F
		Northbound	9.5	A	16.6	C
		Southbound	11.9	B	10.9	B
Billtown Road / Michael Edward Drive	STOP Controlled	Eastbound	1024.0	F	2706.0	F
		Northbound	9.5	A	18.8	C
		Southbound	-	-	-	-
Billtown Road / Fairground Road	STOP Controlled	Eastbound	1160.0	F	3124.0	F
		Northbound	9.7	A	17.5	C
		Southbound	-	-	-	-

*Delay too high to calculate

Table 12: 2010 Intersection Levels of Service (cont.)

Intersection	Type	Approach	AM Avg. Delay (sec)	AM LOS	PM Avg. Delay (sec)	PM LOS
Billtown Road / Shady Acres Lane	STOP Controlled	Eastbound	14.7	B	116.2	F
		Northbound	9.5	A	14.4	B
		Southbound	-	-	-	-
Billtown Road / Vintage Creek Drive	STOP Controlled	Westbound	381.0	F	681.7	F
		Northbound	-	-	-	-
		Southbound	13.3	B	10.9	B
Billtown Road / Colonnades Place	STOP Controlled	Eastbound	108.3	F	421.4	F
		Northbound	9.6	A	15.6	C
		Southbound	-	-	-	-
Billtown Road / St. Rene Road	STOP Controlled	Westbound	440.8	F	1203.0	F
		Northbound	-	-	-	-
		Southbound	13.2	B	10.8	B
Billtown Road / Ruckriegel Parkway	Signalized	Eastbound	55.0	D	326.5	F
		Westbound	85.5	F	144.8	F
		Northbound	185.8	F	65.5	E
		Southbound	63.1	E	540.0	F
		Whole Int.	129.1	F	277.8	F

Compared to the 2006 levels of service and delay, all intersection operations declined with the additional traffic. In fact, each intersection has one or more approach with a LOS F in 2010. Several intersections that either had acceptable levels of service or borderline levels of service in 2006 fail in 2010. These intersections include Shaffer Lane, Easum Road, Vintage Creek Drive, and Colonnades Place. Most of the poor approach operations are on the side streets which are stop controlled. However, the two signalized intersections (Gellhaus Lane and Ruckriegel Parkway) will both fail overall in this future year. Improvements need to be considered for the system, but in particular at these two intersections to handle the additional traffic demand.

2010 Highway Level of Service and Delay

No-Build scenario levels of service were also calculated for Billtown Road for the year 2010. The highway sections are the same as those used in the 2006 analysis. **Table 13** and **Figure 11** displays the levels of service for each of the highway sections.

As shown in this table, all of the sections remain at LOS E. Overall, the 2006 analysis showed poor operations the entire length of the corridor with the 2010 analysis showing that traffic operations will only continue to decrease with the additional traffic volumes.

2030 Highway Level of Service and Delay

Table 14 and **Figure 12** display the levels of service for each of the highway sections for the year 2030. Most sections remain at LOS E, however, the section between Shady Acres Lane and Ruckriegel Parkway drops to a LOS F with traffic operations almost at a near standstill.

Table 13: 2010 Corridor Levels of Service

Route	Section	Begin Milepoint	End Milepoint	Section Length (miles)	2010 ADT	K-Factor	2010 DHV	Posted Speed Limit (MPH)	% Trucks and Buses	Estimated Travel Speed (MPH)	% Time Spent Following	LOS
KY 1819	1	3.930 (Beg. of Study Area)	5.180 (I-265)	1.25	4,070	0.133	541	35	5.4%	29.2	62.8	E
	2	5.181 (I-265)	7.139 (Lovers Lane)	1.96	11,230	0.108	1213	45	4.6%	23.7	78.0	E
	3	7.140 (Lovers Lane)	7.770 (Shady Acres Lane)	0.63	13,380	0.112	1499	45	5.0%	21.4	83.3	E
	4	7.771 (Shady Acres Lane)	8.885 (Ruckriegel Parkway)	1.11	20,300	0.106	2152	35	5.0%	15.9	90.8	E

LOS E - F
LOS D
LOS A - C

Notes:
ADT = ADT based on 2006 volumes with an applied per year growth rate provided by KIPDA
K-Factor = Design Hour Factor obtained from KYTC counts
DHV = 2010 Design Hour Volume (Average Daily Traffic x K-Factor)
Speed Limit obtained from Highway Information System
% Trucks and Buses obtained from KYTC counts
Estimated Travel Speed, % Time Spent Following, and Level of Service (LOS) calculated using Highway Capacity Software

Table 14: 2030 Corridor Levels of Service

Route	Section	Begin Milepoint	End Milepoint	Section Length (miles)	2030 ADT	K-Factor	2030 DHV	Posted Speed Limit (MPH)	% Trucks and Buses	Estimated Travel Speed (MPH)	% Time Spent Following	LOS
KY 1819	1	3.930 (Beg. of Study Area)	5.180 (I-265)	1.25	4,500	0.133	599	35	5.4%	29.0	64.0	E
	2	5.181 (I-265)	7.139 (Lovers Lane)	1.96	19,700	0.108	2128	45	4.6%	16.1	90.6	E
	3	7.140 (Lovers Lane)	7.770 (Shady Acres Lane)	0.63	14,500	0.112	1624	45	5.0%	20.5	85.1	E
	4	7.771 (Shady Acres Lane)	8.885 (Ruckriegel Parkway)	1.11	29,450	0.106	3122	35	5.0%	*	97.1	F

LOS E - F
LOS D
LOS A - C

Notes:
ADT = Forecasted Volumes from KIPDA based on output from their Regional Travel Demand Forecasting Model
K-Factor = Design Hour Factor obtained from KYTC counts
DHV = 2030 Design Hour Volume (Average Daily Traffic x K-Factor)
Speed Limit obtained from Highway Information System
% Trucks and Buses obtained from KYTC counts
Estimated Travel Speed, % Time Spent Following, and Level of Service (LOS) calculated using Highway Capacity Software

3.7 Crash Analysis

Crash Analysis Methodology

The Kentucky Transportation Cabinet provided crash data for a three-year period from January 1, 2004 through December 31, 2006. **Figure 13** shows the locations of these crashes by crash type (fatality, injury or property damage). The Jeffersontown Police Department and Louisville Metro Police Department were also contacted to determine if any additional reported crashes occurred during the same time period (2004 – 2006) not listed in the state database. The Jeffersontown Police Department has jurisdiction from Fairground Road to Ruckriegel Parkway and provided data for 14 additional crashes. The Louisville Metro Police Department has jurisdiction from Fairground Road south to the I-265 interchange, but did not have any additional crashes for this area. The additional crash data provided by the Jeffersontown Police was incorporated into the crash analysis.

Crash rates were computed for specific segments of Billtown Road using the methodology provided in the crash analysis report periodically published by the Kentucky Transportation Center (KTC)[1]. The section crash rates are based on the number of crashes on a specified section, the average daily traffic on the roadway, the time frame of analysis, and the length of the section. They are expressed in terms of crashes per 100 million vehicle-miles. A section's crash rate was then compared to a statewide critical crash rate[2] derived from critical crash rate tables for highway sections in the KTC crash report (Appendix D of KTC crash report). This comparison is expressed as a ratio of the section crash rate to the critical crash rate and is referred to as the critical crash rate factor. Sections with a critical crash rate factor greater than one are considered high crash locations and are potential candidates for safety improvements.

The section crash rate is also compared directly to the statewide average crash rate presented in the KTC crash report. The statewide averages consider all crashes for a specified period that are listed in the Collision Report Analysis for Safer Highways (CRASH) database maintained by the Kentucky State Police and stratified by functional classification (Table B-2 in KTC crash report). Section rates that exceed the statewide average crash rate but not the critical crash rate may be problem areas, but they are not statistically proven to be higher crash areas. Therefore, this second comparison is used to identify a second tier of highway sections that may have crash problems and could be considered for safety improvements if warranted based on further analysis.

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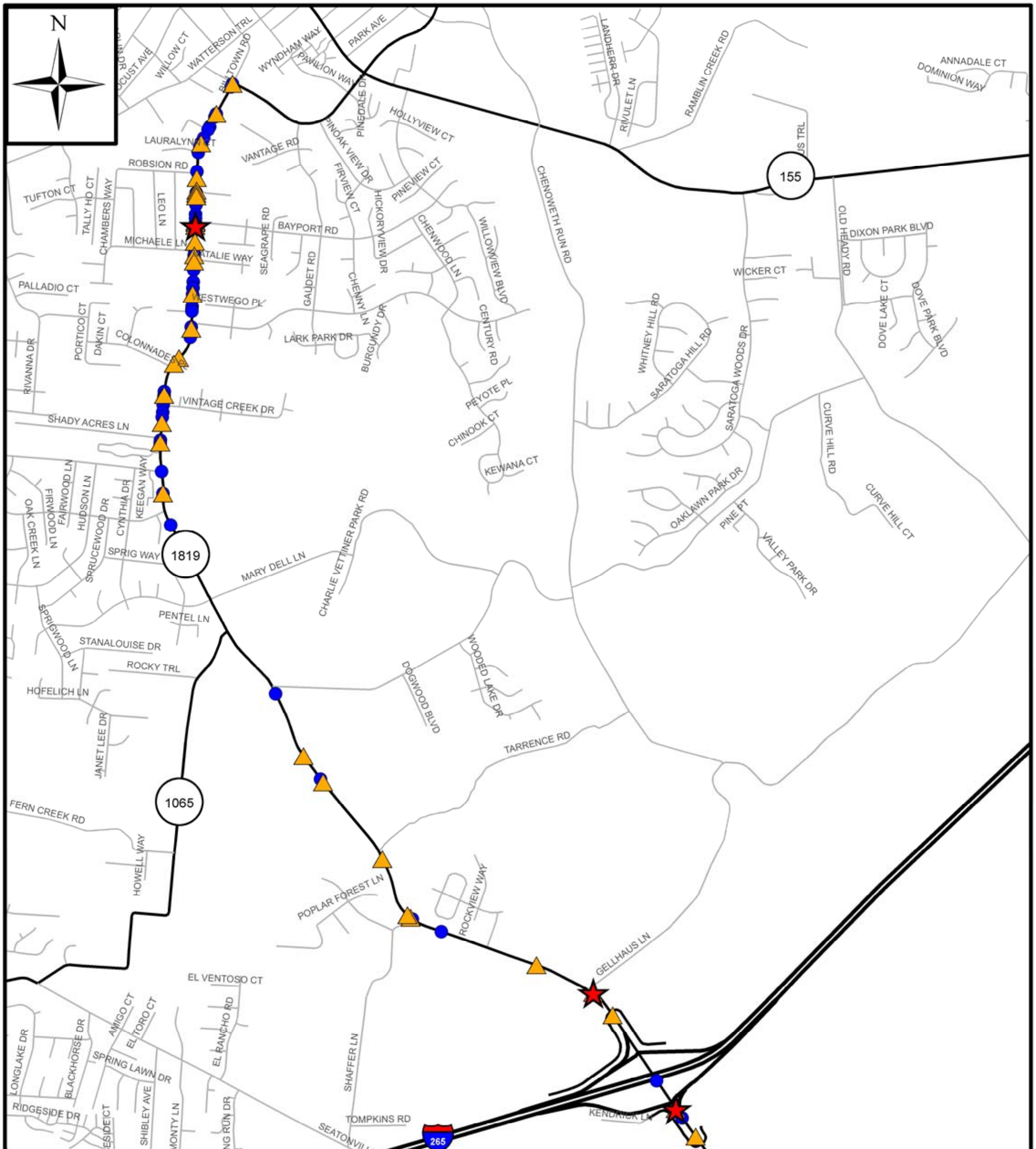
[1] Analysis of Traffic Crash Data in Kentucky (2000 – 2004), Kentucky Transportation Center Research Report KTC-05-19/KSP2-05-1F.

[2] The critical crash rate is the threshold above which an analyst can be statistically certain (at a 99.5% confidence level) that the section crash rate exceeds the average crash rate for a similar roadway and is not mistakenly shown as higher than the average due to randomly occurring crashes.



0 0.25 0.5 Miles

Fatal Crash

Injury Crash

Property Damage Only

NOTES:

1. The crash locations represent crashes occuring January 1, 2004 to December 31, 2006 based on KYTC data.

2. Additonal data was obtained from the Jeffersontown Police (23 crashes for same time period) but is not shown on this map since the data does not include specific crash location.

3. The purpose of this figure is to provide an approximate location of crashes within the study area. In some cases, more than one crash is represented by a symbol.

FIGURE 13:

Crash Locations

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Section Crash Analysis

Only one section along Billtown Road exceeded the critical crash rate for that roadway type. Between Shady Acres Lane and Ruckriegel Parkway 99 crashes occurred between 2004 and 2006 and the critical crash rate factor was 1.32. Most of these crashes were rear-end crashes possibly due to excessive speed, drivers unaware of intersections/driveways, slippery surface, or lack of adequate gaps. From the I-265 interchange area to Shady Acres Lane, the critical crash rate factor was much lower than one (0.18 – 0.49). **Table 15** shows the crash statistics for the segments analyzed and **Figure 14** shows the crash analysis by segment on a map.

Spot Crash Analysis

To determine if there are any crash rate problems in the vicinity of the study area intersections, a spot crash analysis was conducted. A spot location is defined as a section of highway 0.3 miles in length. The methodology used to calculate the spot crash rates is similar to that used for calculating the section crash rates. The crash rates at these “spots” were compared to the critical crash rates for similar facilities derived from critical spot crash rate tables in the KTC crash report (Appendix E in KTC crash report). **Table 16** lists the spots crash analysis by intersection, highlighting places exceeding the critical crash rate for the location.

From the spot crash analysis, the intersection of Saint Rene Road at the north end of the study area had a critical crash rate factor greater than one, and is therefore considered a high crash location. The majority of crashes at this intersection were also rear-end crashes, possibly indicating the need for turn lanes or further intersection improvements. The remaining thirteen study area intersections did not have a crash rate problem based on the existing data.

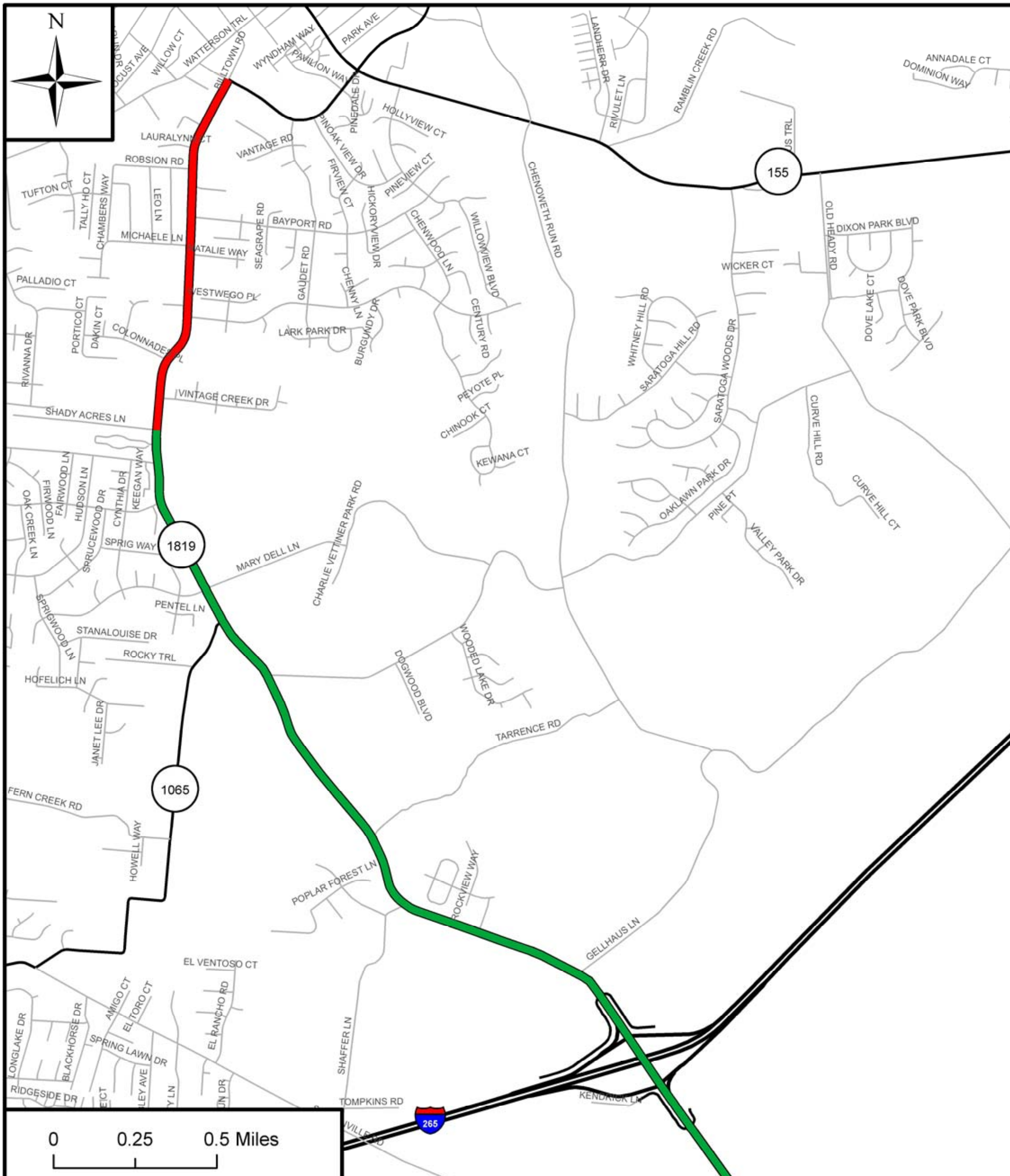
Table 15: Crash Rates by Segment

Route	Section	Begin Milepoint	End Milepoint	Total Crashes	Average Daily Traffic	Section Length* (miles)	Exposure "M" (100 or 1 MVM)	Statewide Average Crash Rate	Section Crash Rate	Statewide Critical Crash Rate	Critical Crash Rate Factor
KY 1819	1	3.930 (Beg. of Study Area)	5.180 (I-265)	4	3,710	1.25	0.051	258	79	439	0.18
	2	5.181 (I-265)	7.139 (Lovers Lane)	13	9,350	1.958	0.200	258	65	349	0.19
	3	7.140 (Lovers Lane)	7.770 (Shady Acres Lane)	15	11,050	0.63	0.076	258	197	403	0.49
	4	7.771 (Shady Acres Lane)	8.885 (Ruckriegel Parkway)	99	17,718	1.114	0.216	258	458	348	1.32

Critical Crash Rate Factor >1, Section Crash Rate Exceeds Statewide Critical Rate (High Crash Rate Section)
Critical Crash Rate Factor <1, Section Crash Rate Exceeds Statewide Average Rate
Critical Crash Rate Factor <1, Section Crash Rate Lower Than Statewide Average Rate

Notes:
Analysis Period: 3 Years (1/1/2004 to 12/31/2006)
Crash rates are expressed in crashes per 100 MVM (100 million vehicle miles traveled)
Exposure (M) = [(ADT) x (365) x (Time Frame of Analysis (Years)) x (Section Length)] / 100,000,000
Section Crash Rate = Total Crashes / Exposure
Critical Crash Rate Factor = Section Crash Rate / Statewide Critical Crash Rate
ADT = Average Daily Traffic, MVM = Million Vehicle Miles

Sources:
Crash data for 1/1/2004 to 12/31/2006 from KYTC Data and Jeffersontown Police
Statewide Rates from KTC Research Report KTC-05-19/KSP2-05-1F, Analysis of Traffic Crash Data in Kentucky (2000 - 2004)



- Crash Rate Exceeds Critical Crash Rate for Road Type (red)
- Crash Rate Exceeds Average for Road Type (yellow)
- Crash Rate Below Average for Road Type (green)

NOTES:

1. The crash locations represent crashes occuring January 1, 2004 to December 31, 2006.

FIGURE 14:

Crash Rates by Segment

Billtown Road Scoping Study

Final Report

Table 16: Crash Rates by Spot

Route		Intersection	Total Crashes	Average Daily Traffic	Spot Crash Rate	Critical Crash Rate	Critical Crash Rate Factor
KY 1819	1	I-265 (Northbound / Eastbound) (4.910 - 5.210)	4	3,710	0.98	1.84	0.54
	2	I-265 (Southbound / Westbound) (5.211 - 5.415)	1	9,350	0.10	1.42	0.07
	3	Gellhaus Lane (5.416 - 5.716)	2	9,350	0.20	1.42	0.14
	4	Shaffer Lane (5.945 - 6.245)	4	9,350	0.39	1.42	0.28
	5	Easum Road (6.732 - 7.032)	1	9,350	0.10	1.42	0.07
	6	Lovers Lane (7.033 - 7.194)	0	11,050	0.00	1.37	0.00
	7	Mary Dell Lane (7.195 - 7.398)	0	11,050	0.00	1.37	0.00
	8	Michael Edward Drive (7.399 - 7.607)	4	11,050	0.33	1.37	0.24
	9	Fairground Road (7.608 - 7.719)	1	11,050	0.08	1.37	0.06
	10	Shady Acres Lane (7.720 - 7.820)	11	17,718	0.57	1.25	0.45
	11	Vintage Creek Drive (7.821 - 7.928)	10	17,718	0.52	1.25	0.41
	12	Colonnades Place (7.929 - 8.063)	3	17,718	0.15	1.25	0.12
	13	Saint Rene Road (8.064 - 8.364)	25	17,718	1.29	1.25	1.03
	14	Ruckriegel Parkway (8.735 - 9.035)	17	17,718	0.88	1.25	0.70

Notes:
Analysis Period: 3 Years (1/1/2004 to 12/31/2006)
Spot Crash Rate = [(1,000,000) x (Total Crashes)] / [(365) x (Analysis Period in Years) x (Average Daily Traffic)]
Critical Crash Rate Factor = Spot Crash Rate / Critical Crash Rate

Sources:
Crash data for 1/1/2004 to 12/31/2006 from KYTC Data and Jeffersontown Police
Critical Crash Rates from KTC Research Report KTC-05-19/KSP2-05-1F, Analysis of Traffic Crash Data in Kentucky (2000 - 2004)

Crash Report Analysis

Because of the number of crashes within the primary study area, an additional crash analysis was conducted to look at severity and crash type.

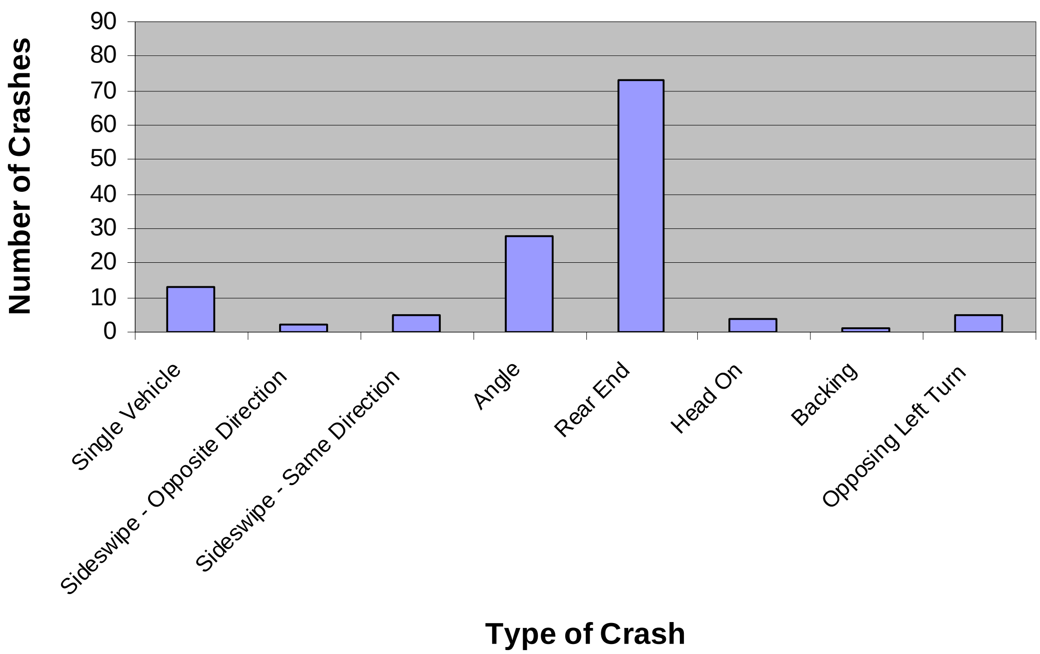
A breakdown of the crash severity along Billtown Road from the I-265 interchange to Ruckriegel Parkway is provided below.

Severity	Number of Crashes	Percentage
Property Damage Only	88	67.2%
Injury	40	30.5%
Fatality	3	2.3%
	131	100%

The majority of crashes were property damage only (88). Over one-third of the crashes involved an injury, and three fatal crashes occurred between 2004 and 2006. The first crash that resulted in a fatality occurred near Gellhaus Lane. The vehicle was entering / leaving an entrance in the afternoon. The second crash that resulted in a fatality occurred near the I-265 Northbound / Eastbound interchange. This was a head on collision with another vehicle. The third crash occurred just north of Saint Rene Road. The vehicle collided with a fixed object in the morning. The weather was not a contributing factor for any of the crashes.

A review of all crash types for the study area was performed to determine the most frequent type. **Figure 15** shows the results.

Figure 15: Crash Types (2004 – 2006)



Rear end crashes were by far the most frequent type of crash on Billtown Road (73 crashes). Given that the majority of the roadway is a two-lane facility without turn lanes, this seems reasonable.

3.8 Multimodal Facilities (Pedestrian, Bicycle, and Transit)

Sidewalks are intermittent along the corridor, with sections occurring primarily bordering neighborhoods and schools. In the south end of the study area at the Gellhaus Lane intersection, there are crosswalks and pedestrian signals, but the sidewalk does not extend to the crosswalks. This is the intersection that leads to the new elementary and middle schools, therefore, good pedestrian access should be provided.

There are no designated bicycle facilities along Billtown Road from I-265 to Ruckriegel Parkway. In fact, the narrow shoulders, limited sight distance and speed of vehicles makes it difficult to safely ride a bicycle along this roadway.

The Transit Authority of River City (TARC) operates the public bus system serving the greater Louisville area. Currently, there are no designated bus routes along Billtown Road. Billtown Road does provide a primary connection between I-265 and Jeffersontown; however, the corridor is composed of mostly residential development and has limited space available in the existing right-of-way for bus stops. The incorporation of transit facilities, such as a bus route, would be difficult given the constraints along the corridor.

3.9 Existing and Future No-Build Traffic and Highway Conditions Summary

Based on the existing transportation conditions analysis, there appear to be a number of key transportation issues in the study area. These include the following:

- Limited right-of-way and narrow shoulders (three feet or less) along the length of the corridor.
- Historic traffic volumes have shown strong growth along Billtown Road with traffic volumes expected to increase by 7.5% per year along the length of Billtown Road; with the exception of the Ruckriegel Parkway intersection which is expected to increase by 8.0% per year.
- A speed study showed that most drivers exceed the speed limit, particularly in the north end of the study area.
- For at least one or more approaches there are current (2006) poor levels of service at each intersection except for the intersections of Easum Road, Shady Acres Lane, and Colonnades Place.
- In 2010, all intersections have at least one or more approaches with a poor level of service.
- At the intersection of Gellhaus Lane and Billtown Road, the queue length for the westbound left turn exceeds the available storage.

- At the intersection of Ruckriegel Parkway and Billtown Road, the queue lengths during peak periods exceed the available storage for the westbound left and the northbound right turn.
- The entire corridor operates at LOS E in 2006 and 2010.
- All sections except the portion of Billtown Road between Shady Acres Lane and Ruckriegel Parkway operate at LOS E in 2030. The Shady Acres Lane to Ruckriegel Parkway section operates at LOS F.
- There is a high crash area between Shady Acres Lane and Ruckriegel Parkway.
- The intersection of Saint Rene Road with Billtown Road is a high crash spot.
- The most frequent crash type was rear end crashes on Billtown Road.
- There are no bicycle or transit facilities along the corridor. Sidewalks are present but intermittent.

4.0 REVIEW OF PREVIOUS REPORTS

A review of previous transportation studies and reports for the study area is necessary to better understand the problems and possible solutions that have already been identified or studied. In this case, there are several previous reports relevant to the current planning study. They include the following:

- Traffic Signal Warrant Analysis for Billtown Road at Shaffer Lane
- Traffic Analysis Study for Billtown Road and Shaffer Lane
- Gellhaus Lane Residential Development Traffic Impact Study
- Tarrance Road Traffic Study

The Traffic Signal Warrant Analysis for Billtown Road at Shaffer Lane was prepared by Jordan, Jones, and Goulding in January 2005 to determine if a traffic signal was warranted at this location. The analysis takes into consideration the impacts of four proposed subdivisions which would lead to the construction of 256 new homes in the area. Even with the addition of traffic generated by these homes, it was determined that traffic signal warrants would not be met, primarily due to low off-peak volumes on Billtown Road.

The Traffic Analysis Study for Billtown Road and Shaffer Lane was prepared in June 2005 by Quest following the results of the previous signal warrant analysis to determine if a left turn lane would be warranted. This analysis also considered the addition of 63 more homes as a result of a proposed development (Willow Springs by Prescott Homes) located along the south side of Shaffer Lane, approximately one mile west of Billtown Road. This study found that a left turn lane is warranted based on the existing traffic only, and storage length changes very little with the additional 256 and 63 homes.

The Gellhaus Lane Residential Development Traffic Impact Study was prepared by Jordan, Jones, and Goulding in July 2006. A new residential development was proposed by WGR Development, LLC and LDG Development on approximately 25.6 acres along Gellhaus Lane. The purpose of the study was to estimate the traffic impacts to the surrounding transportation network and determine if any improvements are necessary as a result of the development. The study concluded that the proposed development will only have modest impacts to intersection delays, but did recommend the installation of a traffic signal at the intersection of Billtown Road and the I-265 Eastbound / Northbound Ramps intersection. This problem was found during the study and exists even without the additional traffic generated by the development. Ultimately, the study recommended that the KYTC reevaluate this intersection for installing a traffic signal based on current conditions.

Another study completed in the area by Jordan, Jones, and Goulding was the Tarrence Road Traffic Study. This study was completed in October 2006 and was performed to determine the need for turning lanes as required for an encroachment permit from the KYTC resulting from the development of 40 patio homes on Tarrence Road just east of

Billtown Road. It was determined that the traffic generated by the proposed development along with the volume of traffic forecasted for the year 2016 would not require the construction of a left turn lane.

While a formal study was not provided to PB, a preliminary plan for a new subdivision was given to PB for traffic impact considerations. The plan shows the layout for construction of 191 new homes located along Lovers Lane and was prepared by Mindel, Scott, and Associates, Inc.

Relevant information from these previous studies was included in this planning study. Of primary interest were the traffic counts performed at several of the key intersections as well as the proposed trip generation and distribution. The new housing developments mentioned above were included in the traffic forecasts for 2010. Any recommendations resulting from the study were also considered during the alternate development and evaluation phase discussed later in this report.

5.0 HUMAN ENVIRONMENT OVERVIEW

An overview was conducted to determine the general characteristics of the human environment in the study area. The analysis addresses: general socioeconomic characteristics, environmental justice, land use characteristics, and cultural / historic and archeological characteristics. The following sections summarize the overview findings.

5.1 Socioeconomic Profile

Population Growth – According to the 2000 Census, the population of Jefferson County was 693,604, the population of the City of Louisville was 256,231 and the population of the City of Jeffersontown was 26,633. The population for Jefferson County has increased by 4.3% from 1990 when the population was 664,937. The population for the City of Louisville actually decreased from 269,063 in 1990. This represents a decrease of 4.7%. The population of the City of Jeffersontown increased from 1990 when the population was 23,221. This represents an increase of 14.6%. By 2030, the population of Jefferson County is expected to grow to 763,393. This represents an increase of 10%.

The trend exhibited in the study area is typical of those observed across the nation. The older central city areas are losing population while the outlying more suburban areas are gaining. The case of the Louisville area is somewhat mixed and interesting as the City of Louisville and Jefferson County merged in 2003 to form Metro Louisville. The old City of Louisville boundary is now known as the urban service district. Therefore, any reference to the City of Louisville for the 2000 Census is now known as the urban service district. The City of Jeffersontown is still a separate jurisdictional area from that of Metro Louisville.

Minority Populations – According to the 2000 Census, minority populations in Jefferson County represented 22.6% of all residents. In the City of Louisville, minority population represents a total of 37.0% of residents. In the City of Jeffersontown, minority residents represent 14.5% of all residents. As a comparison, the total minority population percentage of the entire Commonwealth of Kentucky is 9.9%.

Low – Income Populations – In 2000, approximately 12.4% of the Jefferson County population was below the poverty line. In Louisville, approximately 21.6% was below the poverty line. In the City of Jeffersontown, 12.4% were below the poverty line. The numbers for the City of Louisville exceed the statewide average of 15.8%, while those for Jefferson County and the City of Jeffersontown are both below the statewide average.

Age of Population – The City of Louisville and Jefferson County both have a higher percentage of residents age 60 and over (18.3% and 17.5% respectively) compared to the statewide average (17.0%). The City of Jeffersontown has a lower percentage of residents age 60 and over with 14.5% of its residents falling into this category.

Local Economy – In 2000, Jefferson County's unemployment rate was 3.3%. This is lower than the 2000 unemployment rates for Kentucky and the U.S., which were 3.5% and 4.0%, respectively. In the City of Louisville and the City of Jeffersontown the rates were 4.5% and 1.9% respectively.

The highest percentage of employees in all jurisdictions is in the field of management, professional and related occupations. This is accounted for by the service-based economy and the presence of healthcare, government, banking and insurance companies. Sales and office occupations also account for a high percentage of the local workforce. Manufacturing is also important in the Louisville area. Large employers in the area include: Ford, GE Appliances, Jefferson County Public Schools, UPS, and Humana.

Commuting – Approximately 92.3% of employed Jefferson County residents work in the county, with the remaining 7.7% commuting to other nearby counties such as Bullitt, Hardin, Oldham and Shelby counties respectively. In 2000, the average travel time to work was 21.9 minutes. In 1990, the average travel time to work was 20.8 minutes. The increase in time from 1990 to 2000 represents an increase of 5.3%. The dominant mode in both 1990 and 2000 was the single occupant vehicle (SOV) which accounted for 79% and 80.8%, respectively.

Community Facilities and Development Patterns – The study area is primarily residential, with some pockets of commercial and business development near the northern end where Billtown Road intersects with Ruckriegel Parkway near Jeffersontown. Schools, churches, cemeteries and other community facilities including parks, a golf course and some convenience retail are along Billtown Road within the study area limits. Towards the southern end of the study area, there is an emerging school complex along Gelhaus Lane where Jefferson County Public Schools (JCPS) is building an elementary school and middle school. A school bus compound has already been completed at this location.

5.2 Environmental Justice

The Environmental Justice (EJ) assessment examined potential disproportionate adverse community impacts of selected groups (minority, low income and elderly) within the defined project study area for the proposed transportation improvement(s) in the Billtown Road (KY 1819) corridor from Ruckreigel Parkway to I-265 in Jefferson County, Kentucky. The assessment was prepared by the Kentuckiana Regional Planning and Development Agency (KIPDA) in support of the KYTC's project to identify improvements that will enhance safety and reduce congestion in the rapidly developing area surrounding the study corridor. A summary of the assessment is provided below. For a more in-depth analysis, refer to **Appendix B** which contains the entire report.

The purpose of the assessment is to:

- assist the Kentucky Transportation Cabinet in carrying out the Division of Planning's mission "… to collect, maintain, analyze and report accurate data for making sound fiscally responsible recommendations regarding the maintenance, operation and improvement of our transportation network";
- fulfill applicable federal Environmental Justice commitments; and
- further the goals and objectives and cooperative nature of the metropolitan transportation planning process.

The assessment focused on identifying, through a demographic analysis, the extent to which EJ populations and other groups of concern reside in or near the study area and may be impacted by the proposed project. Subsequent actions (determination of disproportionately high and adverse effects; proposing measures to avoid, minimize, and/or mitigate such effects; and providing specific opportunities for public involvement) may be undertaken, as appropriate, contingent upon the results of the demographic analysis.

The KIPDA staff assessment of demographic data from the 2000 Census, consideration of information from other sources, and conversations with individuals familiar with the area indicate the following:

- Resident minority populations do not appear to be concentrated in any one area within the study area; nor do they occur in any greater proportions than that expected within the general resident population for the United States, Kentucky, or Jefferson County. In fact, the average minority concentrations were most similar to that of the state level.

- For the most part, resident low-income populations within the study corridor exist in much lower proportions than those seen in the general population of the nation, state, and county; one block group had a low-income resident concentration close to, but slightly less than, the national and county averages.

- For most of the study corridor, elderly residents are present in concentrations similar to or less than those of the general population of the county, state, and nation; one block group was an exception and had an elderly proportion slightly higher than that found in the population-at large.

- Persons with disabilities are not present in significantly different proportions from the county, state, or national percentages within the study area.

Given the level of detail of the available information, the community impact assessment did not uncover any significant concentrations of EJ populations, elderly, or persons with disabilities within the study area. Further, the information suggests that these persons are largely present within the general resident population of the study corridor in proportions similar to or less than county, state, and national levels. An exception to this pattern is the elderly population concentration of Tract 111.10 Block Group 3, which is slightly higher than that of the population-at-large. This section is located in the vicinity of Fairground Road between Billtown Road and Bardstown Road.

5.3 Previously Documented Cultural Historic and Archeological Sites

A records search and windshield survey were performed by KYTC to determine the existence of any cultural resources. Three recorded individually listed National Register sites were found within the project area and are listed below.

- *Leatherman House*, 3606 College Drive, listed in 1980.
- *Confederate Martyrs Monument*, City Cemetery, corner of Billtown and Maple, listed in 1997.
- *Omer / Pound House*, 6609 Billtown Road, listed in 1983.

Upon further review of the location, these sites are located in the northern portion of the corridor in the Jeffersontown vicinity and will likely not be impacted.

Based on the windshield survey conducted on November 22, 2006, there are numerous houses over 50 years old within the project area. In addition, two existing cemeteries exist at the western portion of the project study area. Most likely these cemeteries will be eligible. If the project advances using federal funds, a historical baseline analysis will be required.

If there are adverse impacts to historic resources, Section 106 initiation would begin once the environmental documentation and design of any future project started. Should proposed roadway improvements require the use of historic resources, then a Section 4(f) evaluation will be necessary.

As for archeological sites, there are no known archeological resources within the project area. Because the area is largely residential, it is likely that any archaeological resources have already been disturbed due to utilities in the area. There is potential for sites surrounding older standing structures in the area. Also, from the windshield survey, several farmhouses with structures were identified.

For additional information about the cultural historic and archeological overview, refer to the full report completed as part of the Environmental Overview prepared by KYTC which is included in **Appendix C**.

6.0 NATURAL ENVIRONMENT OVERVIEW

An overview was conducted by the Kentucky Transportation Cabinet to determine the characteristics of the natural environment in the study area. Resources addressed in this section include: aquatic ecosystems (surface waters, wetlands, ponds, and 100-year floodplains) and terrestrial ecosystems (nature preserves and wildlife management areas, threatened and endangered species, floral communities, and faunal communities). Below is a summary of key points from the overview. Refer to **Appendix C** for the entire document.

6.1 Aquatic Ecosystems

Surface Water – Within the project corridor, blue line streams do not directly cross Billtown Road. If a project is implemented with a disturbance of greater than 1 acre, a Notice of Intent for Stormwater Discharges (KPDES) will need to be filed with the Division of Water. As for Wild and Scenic Rivers, none are located within the project corridor.

Wetlands and Ponds – Several areas of hydric soils exist on the western side of the project area. These areas should be evaluated for the presence of hydrology and hydrophytic vegetation. If it is determined these are jurisdictional, mitigation may be required for impacts over 0.1 acres.

Floodplains – According to FEMA Q3 floodplain maps, any improvements to Billtown Road will not cross any floodplains.

6.2 Terrestrial Ecosystems

Nature Preserves and Wildlife Management Areas – There are none in the study area.

Threatened and Endangered Species – There are several federally protected species known to exist within Jefferson County. These include two types of bats, seven species of mussels, and one bird species. Any improvement project implemented will require a Habitat Assessment.

Floral and Faunal Communities – Only one type of plant that is federally projected is known to occur in Jefferson County. This is the running buffalo clover.

7.0 GEOTECHNICAL OVERVIEW

Based on comments received from the Kentucky Geological Survey, there are no major geologic concerns in the Billtown Road improvement corridor. It should be noted that the study area might encounter karst features such as sinkholes, but would not encounter units prone to landslides or unconsolidated sediments in drainage areas. Rocks suitable for construction stone are possible within the corridor such as rocks from the upper part of the Laurel Dolomite.

For additional information about geologic features / concerns, refer to the letter provided by the Kentucky Geological Survey attached in **Appendix D** as part of the public involvement / agency coordination for this study.

8.0 PUBLIC INVOLVEMENT

The Public Involvement Program for the Billtown Road Scoping Study was comprised of several key elements designed to encourage participation and obtain feedback from the greatest number of the affected populace as possible. The key aspects include: a local officials meeting, stakeholder meetings, public workshops/meetings, and agency correspondence. The process and methods for public involvement are outlined in this chapter. The results and feedback from implementation of the Public Involvement Program are provided throughout the entire report as it was particularly beneficial in the development and evaluation of alternates. Copies of the public involvement meeting summaries are included in **Appendix E** for reference including summaries of the input received at the public workshops/meetings.

Local Officials Meeting – A meeting was held on December 14, 2006 with local elected officials including Metro Council Members, state legislators, and heads of local agencies. The purpose of this meeting was to brief the officials about the project and to gather any feedback about issues and concerns. Those in attendance provided insight on the key issues related to the study and provided some feedback as to what they have heard regarding the need for improvements. Some in attendance also filled out survey forms for written documentation of project needs. Meeting minutes are provided at the end of the report in **Appendix E.**

Stakeholder Meetings – Stakeholder meetings were held during the course of the study with selected key stakeholders representing a wide variety of interests. The purpose of the meetings was to inform them about the project and receive input on issues and concerns about the project. Of note was a meeting held with the Jeffersontown Planning and Design Department. This meeting was particularly helpful in that the improvement projects currently being pursued by Jeffersontown were discussed along with how they affect and could be incorporated into this study. Meeting minutes are provided at the end of the report in **Appendix E.**

Public Meetings – Two public meetings were held during the course of this study. The first public meeting was actually held as part of the 2006 Jeffersontown Gaslight Festival. The second meeting was held in Jeffersontown in a more traditional open house style format. Key goals for these meetings were to gather input on the issues and alternates to be considered and then to obtain feedback on the preliminary recommendation before a final recommendation was made. Each of these meetings is described in more detail below.

- Public Meeting #1 – This meeting was held on September 16 and 17 as part of the 2006 Jeffersontown Gaslight Festival. The purpose of the first public information meeting was to inform the public of the study, present the existing conditions documentation, gather input on the project issues and goals, and begin the process of alternate development. Informational materials were available at a booth both days of the festival which was staffed with both KYTC and PB personnel. In addition to engaging passersby in discussion about the study, survey forms were distributed. A summary of this informational event and the resulting survey information is provided in **Appendix E**.

- Public Meeting #2 – This meeting was held on February 27, 2007 at the Jeffersontown Community Center. The purpose of the meeting was to present to the public all of the analysis work completed up to that time, and to present and request feedback on the various improvement alternates developed prior to KYTC making a final decision on the project. A brief presentation was given to familiarize the public with the study and the open house format. The meeting featured display stations staffed with project team members to answer questions about the various alternates and recommendations. All attendees were encouraged to provide their thoughts and opinions on the comment forms provided at the meeting. A summary of this meeting as well as the comment form responses can also be found in **Appendix E**.

Agency Correspondence – An agency mailing was prepared during the initial stages of this study and sent to various local, state, and federal agencies to obtain input in the study process. The list of recipients includes:

- The Kentucky Department of Military Affairs
- Kentucky Division of Forestry
- Kentucky Vehicle Enforcement
- Kentucky Geological Survey
- Kentucky Department for Environmental Protection Division for Air Quality
- Kentucky Department of Agriculture
- The Kentuckiana Regional Planning and Development Agency (KIPDA)
- Kentucky Cabinet for Health and Family Services Facilities Management Division
- Kentucky Division of Water
- Kentucky Division of Waste Management
- Kentucky Department of Fish and Wildlife Resources Commerce Cabinet
- State Historic Preservation Office

The review by the State Historic Preservation Office (SHPO) indicated that there are many cultural resources and previously recorded archeological sites within the project area, many of which have not been evaluated. A Section 106 Review Process may need to be completed depending on the funding source for improvements to Billtown Road. A full survey of both cultural and archeological resources would need to be completed and submitted to the SHPO via the KYTC Central Office Division of Environmental Analysis for review.

Overall, there were no additional significant comments that would require avoidance or mitigation related to potential improvements along the Billtown Road corridor. The following are some considerations mentioned in the response letters that could be included in future phases of this project.

- The Division of Forestry did express concern regarding existing trees and requested that care be taken during any construction and replanting be considered where applicable.
- The Kentucky Department for Environmental Protection Division for Air Quality response stated that the project must meet the conformity requirements of the Clean Air Act as amended and the transportation planning provisions of Title 23 and Title 49 of United States Code.
- The Kentucky Division of Waste Management noted that if underground storage tanks are encountered, they must be addressed properly and that any solid waste generated by this project must be disposed of at a permitted facility.
- Based on comments provided by the Kentucky Department of Fish and Wildlife Resources Commerce Cabinet, the federally endangered gray bat, *Myotis grisescens*, and Indiana bat, *Myotis sodalist* are known to occur within close proximity to the project area. Any impact to trees during construction should be completed within a specific time frame to avoid any harm to the bats.

A copy of the responses can be found in **Appendix D** for reference.

Project Team Meetings – Several meetings were also held with the KYTC to discuss project issues including the development of alternates and the presentation of these alternates to the public, the results of the second public meeting, and a meeting to discuss project recommendations. The meeting minutes from these meetings are included in **Appendix E** for reference.

9.0 ALTERNATES DEVELOPMENT AND EVALUATION

The development, evaluation, and recommendation for improvements to Billtown Road have been subdivided into two categories – short-term projects and long-term projects. Short-term refers to projects that could be completed in the near future (year 2010) and would generally consist of improvements that could be implemented at an intersection level such as new and/or additional traffic signals, signal system optimization, turn pockets or lanes, storage lanes and/or extended turn lanes. Long-term projects refer to projects that are broader in scope and apply to the entire corridor by looking at what the ultimate vision is for improvements. This includes determining if additional lanes are necessary in the future to meet increased traffic demand and if so, how many. The long- term design year for this project is 2030.

As the alternates and the evaluation criteria are specific to improvement type, the development and analysis of alternates is presented below in two separate sections. Alternate recommendations follow in the next chapter.

9.1 Short-Term Project Development and Evaluation

9.1.1 Alternates Development

As mentioned above, the primary focus for alternates development in the short-term is at the intersection level. As there are fourteen intersections that are part of this study, multiple alternates were developed for each intersection. These were based on the following:

- Project purpose and need
- Existing / future conditions and problem definition and analysis
- Recommendations and alternates from any past and concurrent studies
- Project Team suggestions
- Feedback from the public involvement process including stakeholder interviews, the elected officials briefing, and public open houses.

Figures 16 – 29 depict the list of alternate improvements developed for this study.

Also considered was the potential for construction of roundabouts at all study area intersections. An analysis of traffic volumes on Billtown Road compared to standard guidelines (FHWA Roundabout Guide) for the installation of a roundabout showed that there were no locations where a roundabout would be feasible along this corridor. The through traffic volumes on Billtown Road contributed to a high circulatory flow causing the roundabouts to operate at or above capacity. Therefore, while the installation of roundabouts was initially examined, they were not included on the full list of alternates following the results of the initial feasibility analysis.

FIGURE 16: BILLTOWN ROAD & RUCKRIEGEL PARKWAY INTERSECTION

2010 NO BUILD LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	D	55.0	F	326.5
WB	F	85.5	F	144.8
NB	F	185.8	E	65.5
SB	E	63.1	F	540.0
WHOLE INT.	F	129.1	F	277.8

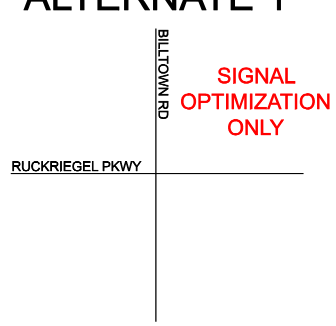
Key Issues / Deficiencies

- Poor LOS for all approaches.
- Intersection of Ruckriegel Parkway / Billtown Road is located in a high crash rate section, although the intersection is not specifically a high crash rate spot.
- Queue lengths for the WB left turn lane and NB right turn lane exceed available storage during peak periods.

Alternates

- Alt. 1 – Signal Optimization:
  Minimal reduction in delay – intersection still operates below desirable LOS threshold.
- Alt. 2 – Add Exclusive Right Turn Bays:
  Reduced delay; however intersection still operates below desirable LOS threshold.
- Alt. 3 – Add Exclusive Turn Lanes and Thru Lanes:
  The entire intersection as well as all approaches operates at an acceptable LOS.

ALTERNATE 1

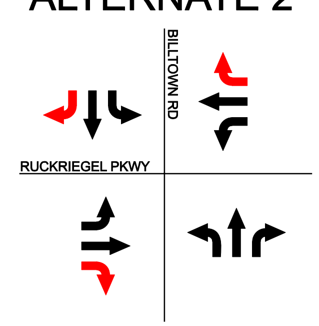


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	168.0	F	418.4
WB	F	120.7	F	386.0
NB	E	71.0	D	48.9
SB	E	56.1	F	145.8
WHOLE INT.	F	92.7	F	236.0

ESTIMATED CONSTRUCTION COST*: MINIMAL

ALTERNATE 2

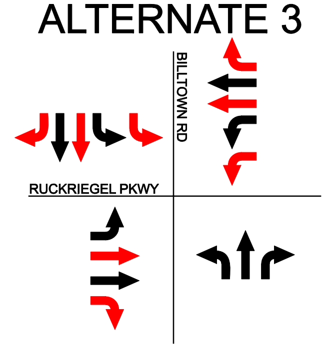


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	D	48.9	F	126.9
WB	D	45.9	F	267.6
NB	D	39.6	D	35.8
SB	B	17.6	F	155.2
WHOLE INT.	D	38.6	F	150.2

ESTIMATED CONSTRUCTION COST*: $240,000

ALTERNATE 3



2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	D	39.7	D	35.7
WB	D	37.2	C	25.6
NB	C	31.8	C	27.2
SB	B	15.1	C	21.7
WHOLE INT.	C	31.3	C	26.5

ESTIMATED CONSTRUCTION COST*: $1,030,000

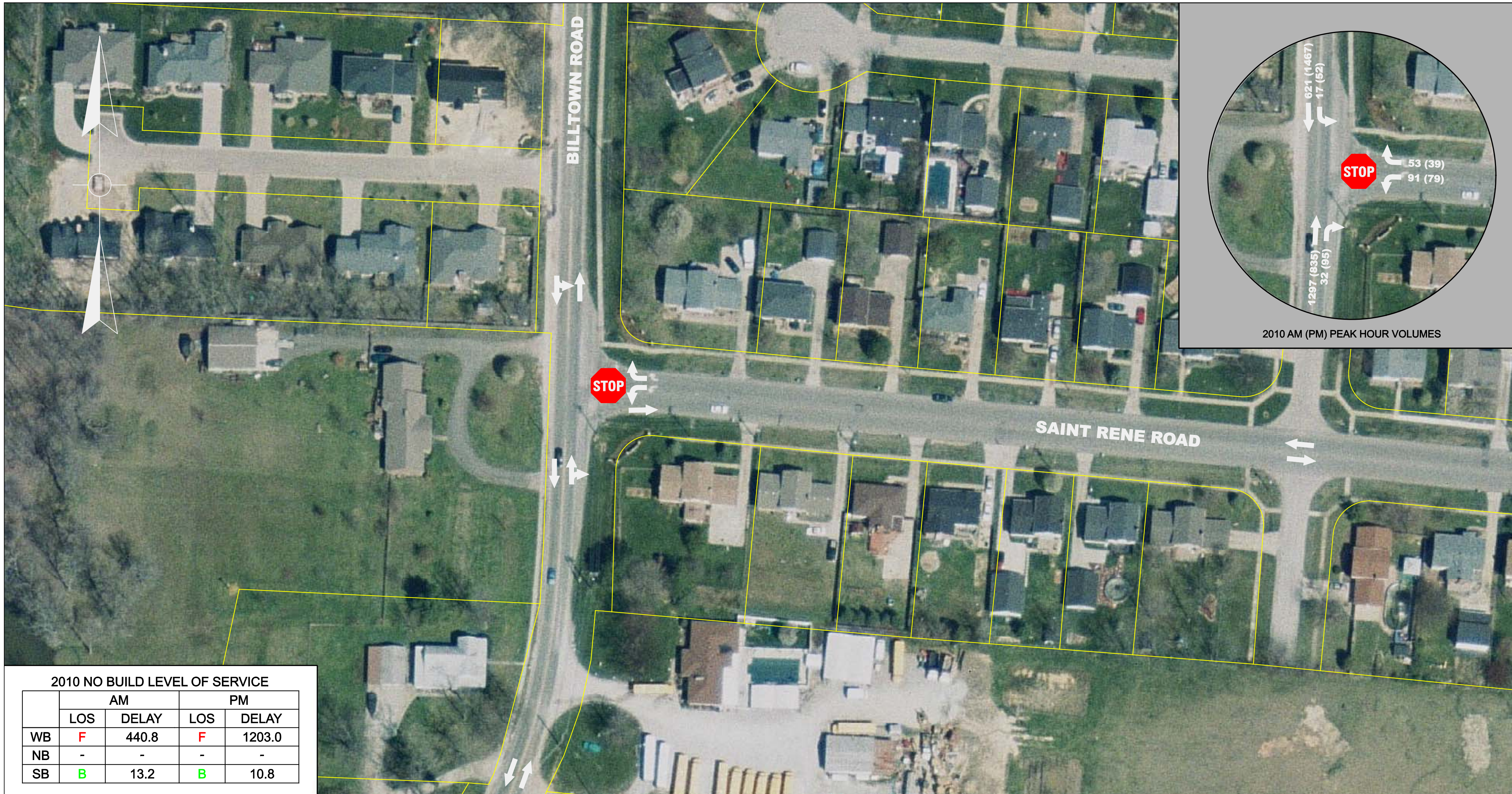
*CONSTRUCTION COST ONLY - EXCLUDES RIGHT-OF-WAY AND UTILITIES

LEGEND

- EXISTING RIGHT OF WAY
- SIGNALIZED INTERSECTION
- STOP-CONTROLLED INTERSECTION
- 980 (1080) 2010 AM (PM) PEAK HOUR VOLUMES

50 0 50 100 150
GRAPHIC SCALE IN FEET

FIGURE 17: BILLTOWN ROAD & SAINT RENE ROAD INTERSECTION



2010 NO BUILD LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	F	440.8	F	1203.0
NB	-	-	-	-
SB	B	13.2	B	10.8

2010 AM (PM) PEAK HOUR VOLUMES

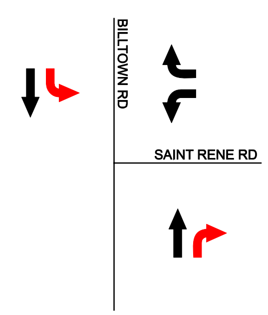
Key Issues / Deficiencies

- Poor LOS for WB approach.
- No separate turn lanes on Billtown Road.
- Intersection of St. Rene Road / Billtown Road is located in a high crash rate section, and is a high crash rate spot.
- A fatal crash occurred just north of the intersection and involved one vehicle colliding with a fixed object.
- Most crashes occurring in the vicinity of St. Rene Road were rear-end crashes on Billtown Road.

Alternates

- Alt. 1 – Separate Turn Lanes on Billtown Road:
  Minor traffic operation improvements. Increases safety on Billtown Road.
- Alt. 2 – Signalization:
  Does not meet Warrant 2, four-hour vehicular volume or Warrant 3, peak hour based on 2006 volumes.
- Alt. 3 – Signalization with SB Left Turn Lane:
  The entire intersection as well as all approaches operates at an acceptable LOS.

ALTERNATE 1

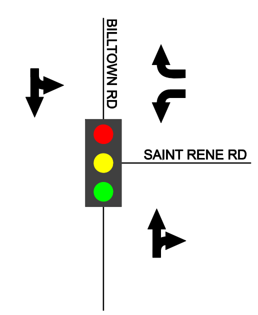


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	F	427.2	F	1076.0
NB	-	-	-	-
SB	B	13.2	B	10.8

ESTIMATED CONSTRUCTION COST*: $270,000

ALTERNATE 2

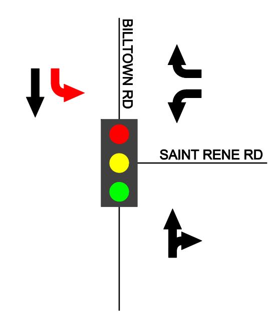


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	D	40.4	E	70.6
NB	C	34.2	A	4.1
SB	A	3.8	E	77.9
WHOLE INT.	C	25.3	D	50.8

ESTIMATED CONSTRUCTION COST*: $130,000

ALTERNATE 3



2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	D	40.4	D	46.2
NB	C	34.2	A	5.4
SB	A	3.5	D	51.9
WHOLE INT.	C	25.3	C	34.8

ESTIMATED CONSTRUCTION COST*: $330,000

*CONSTRUCTION COST ONLY - EXCLUDES RIGHT-OF-WAY AND UTILITIES

LEGEND

- EXISTING RIGHT OF WAY
- SIGNALIZED INTERSECTION
- STOP-CONTROLLED INTERSECTION
- 980 (1080) 2010 AM (PM) PEAK HOUR VOLUMES

50 0 50 100 150
GRAPHIC SCALE IN FEET

FIGURE 18: BILLTOWN ROAD & COLONNADES PLACE INTERSECTION

2010 AM (PM) PEAK HOUR VOLUMES

2010 NO BUILD LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	108.3	F	421.4
NB	A	9.6	C	15.6
SB	-	-	-	-

Key Issues / Deficiencies

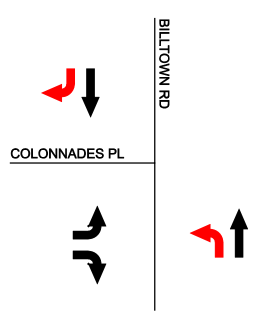
- Poor LOS for EB approach.
- No separate turn lanes on Billtown Road.
- Intersection of Colonnades Place / Billtown Road is located in a high crash rate section, although the intersection is not specifically a high crash rate spot.
- In the NB direction, there is a tree blocking sight distance for turning vehicles from Colonnades Place.

Alternates

- Alt. 1 – Separate Turn Lanes on Billtown Road:
  Minor traffic operation improvements. Increases safety on Billtown Road.
- Alt. 2 – Signalization:
  Does not meet Warrant 3, peak hour based on 2006 volumes.
- Alt. 3 – Signalization with SB Right Turn Lane:
  The entire intersection as well as all approaches operates at an acceptable LOS.
- Alt. 4 – Two-Way Left-Turn Lane Between Vintage Creek Drive and Colonnades Place:
  This would help reduce the high number of rear-end crashes on Billtown Road at this location.
  (Estimated Construction Cost: $180,000)

*CONSTRUCTION COST ONLY - EXCLUDES RIGHT-OF-WAY AND UTILITIES

ALTERNATE 1

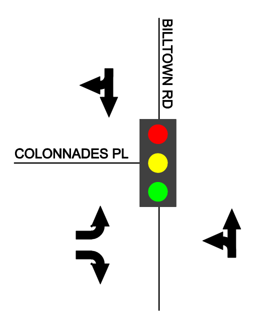


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	104.1	F	394.9
NB	A	9.6	C	15.6
SB	-	-	-	-

ESTIMATED CONSTRUCTION COST*: $270,000

ALTERNATE 2

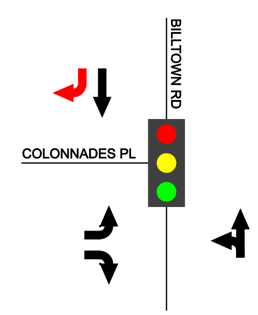


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	D	47.9	D	53.4
NB	C	34.5	A	4.9
SB	A	3.3	D	54.7
WHOLE INT.	C	24.3	D	36.5

ESTIMATED CONSTRUCTION COST*: $130,000

ALTERNATE 3



2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	D	48.0	D	53.5
NB	D	41.8	A	5.1
SB	A	3.9	D	42.3
WHOLE INT.	C	29.2	C	29.1

ESTIMATED CONSTRUCTION COST*: $200,000

ALTERNATE 4

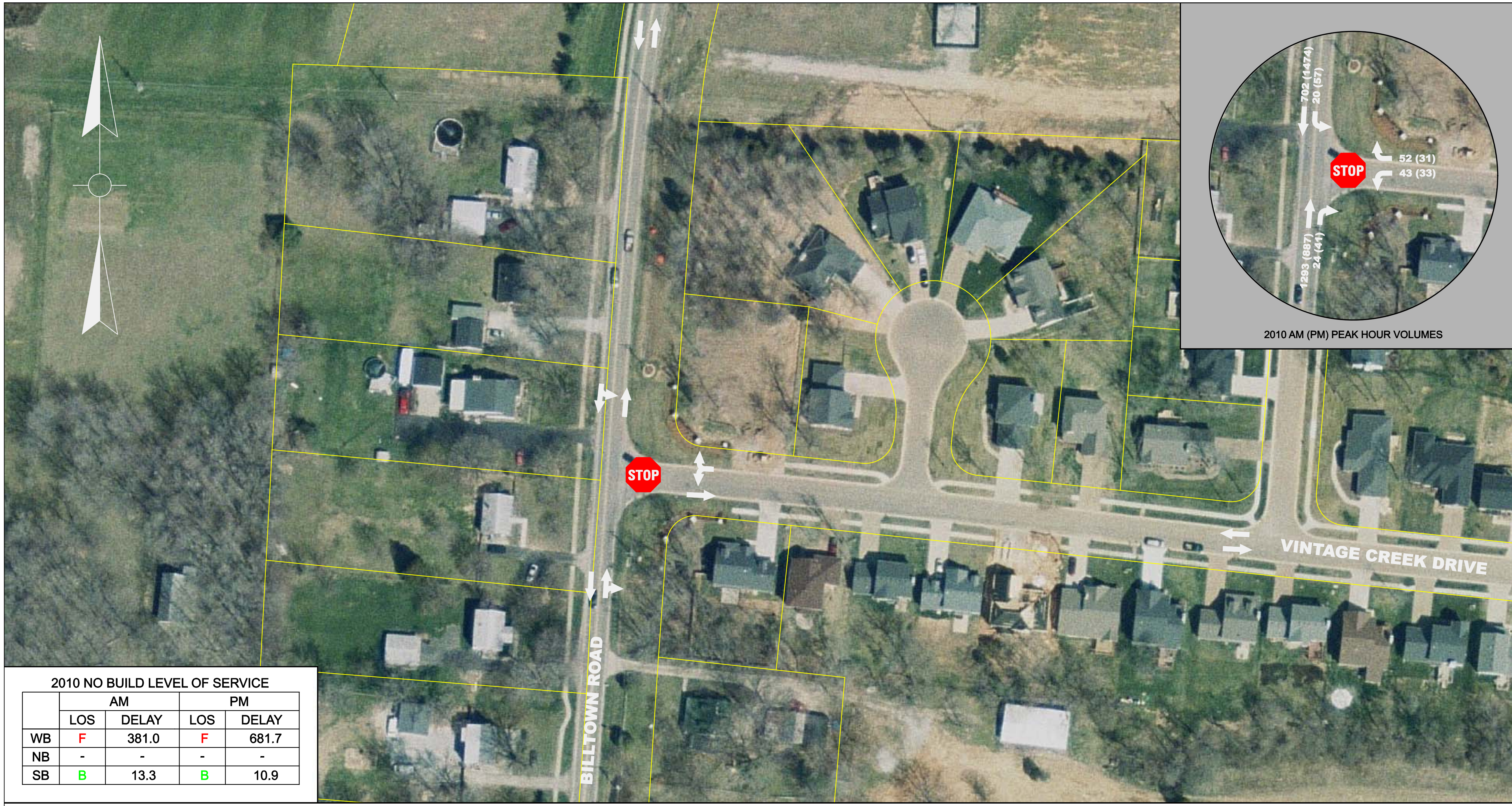
TWO-WAY LEFT-TURN LANE BETWEEN VINTAGE CREEK DRIVE AND COLONNADES PLACE
(ESTIMATED CONSTRUCTION COST*: $180,000)

LEGEND

- EXISTING RIGHT OF WAY
- SIGNALIZED INTERSECTION
- STOP-CONTROLLED INTERSECTION
- 980 (1080) 2010 AM (PM) PEAK HOUR VOLUMES

50 0 50 100 150
GRAPHIC SCALE IN FEET

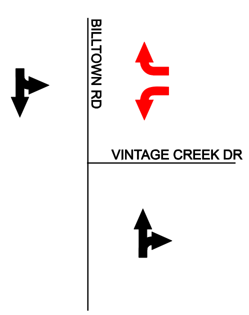
FIGURE 19: BILLTOWN ROAD & VINTAGE CREEK DRIVE INTERSECTION



2010 NO BUILD LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	F	381.0	F	681.7
NB	-	-	-	-
SB	B	13.3	B	10.9

ALTERNATE 1

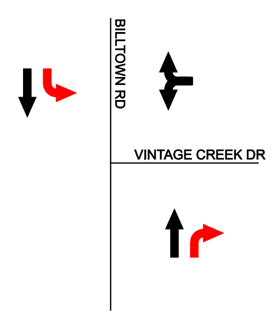


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	F	169.8	F	414.1
NB	-	-	-	-
SB	B	13.3	B	10.9

ESTIMATED CONSTRUCTION COST*: $60,000

ALTERNATE 2

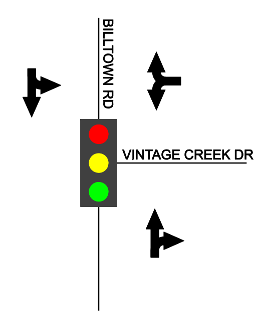


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	F	361.2	F	653.8
NB	-	-	-	-
SB	B	13.3	B	10.9

ESTIMATED CONSTRUCTION COST*: $270,000

ALTERNATE 3

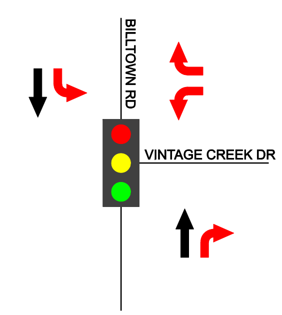


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	C	34.8	E	74.7
NB	D	50.0	A	3.6
SB	A	6.4	E	76.3
WHOLE INT.	C	34.5	D	49.5

ESTIMATED CONSTRUCTION COST*: $130,000

ALTERNATE 4



2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	D	44.1	D	44.0
NB	D	35.7	B	12.3
SB	A	3.7	D	39.7
WHOLE INT.	C	25.1	C	29.7

ESTIMATED CONSTRUCTION COST*: $460,000

Key Issues / Deficiencies

- Poor LOS for WB approach.
- No separate turn lanes (all movements shared).
- Intersection of Vintage Creek Drive / Billtown Road is located in a high crash rate section, although the intersection is not specifically a high crash rate spot.

Alternates

- Alt. 1 – Separate Turn Lanes for WB Approach:
  Does not fully address problem with WB movements.
- Alt. 2 – Separate Turn Lanes on Billtown Road:
  Minor traffic operation improvements. Increases safety on Billtown Road.
- Alt. 3 – Signalization:
  On threshold of meeting Warrant 3, peak hour based on 2006 volumes.
- Alt. 4 – Signalization with Separate Turn Lanes:
  The entire intersection as well as all approaches operates at an acceptable LOS.

*CONSTRUCTION COST ONLY - EXCLUDES RIGHT-OF-WAY AND UTILITIES

LEGEND

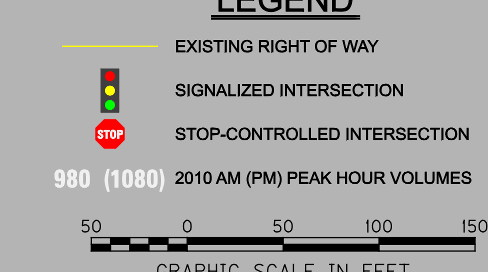
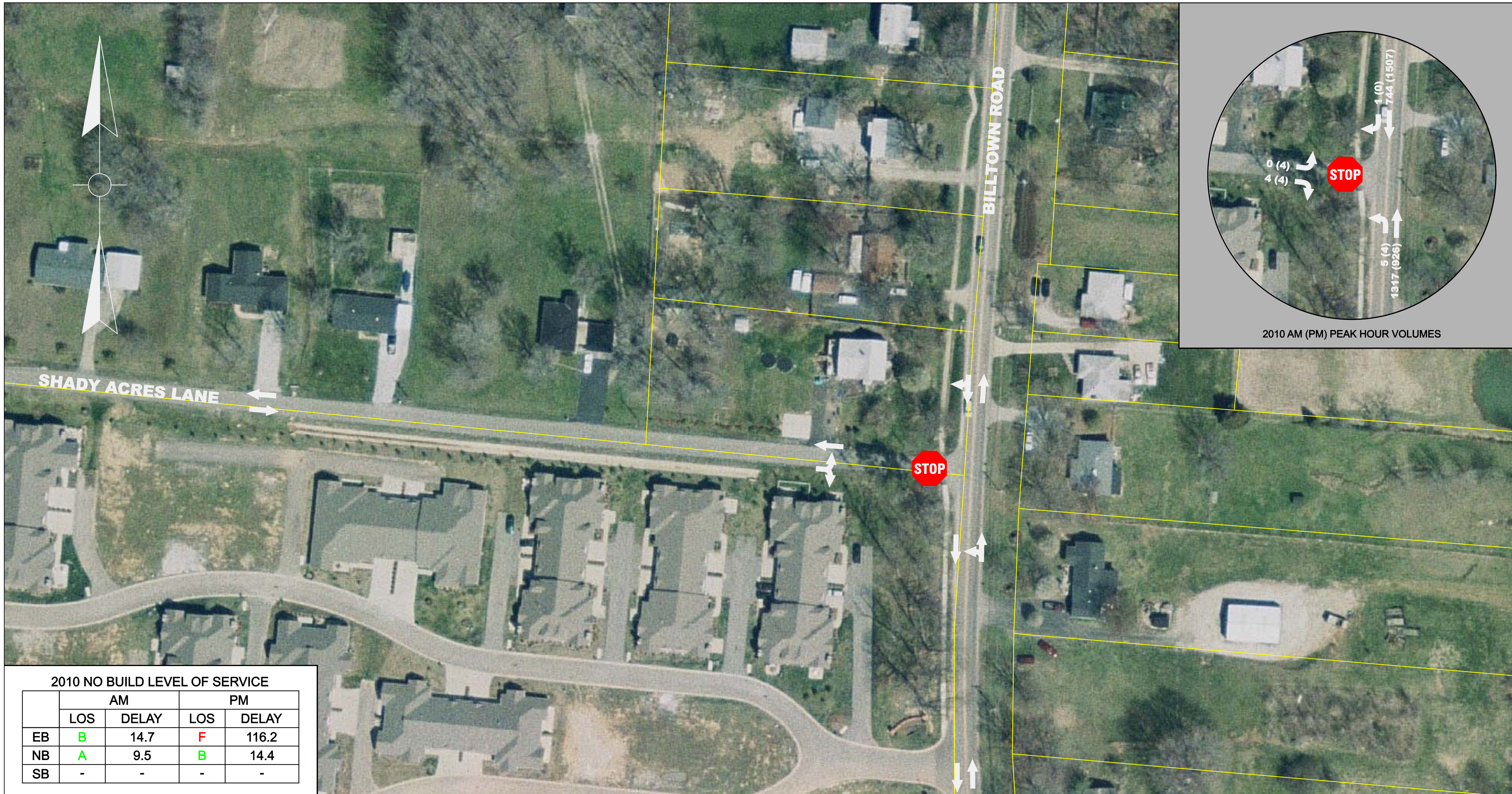


FIGURE 20: BILLTOWN ROAD & SHADY ACRES LANE INTERSECTION



2010 NO BUILD LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	B	14.7	F	116.2
NB	A	9.5	B	14.4
SB	-	-	-	-

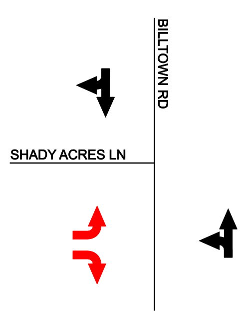
Key Issues / Deficiencies

- Poor LOS for EB approach during PM peak period.
- No separate turn lanes (all movements shared).
- Very few vehicles entering / leaving Shady Acres Lane (5 or less during peak hour).
- Volumes do not meet traffic signal warrants.

Alternates

- Alt. 1 – Separate Turn Lanes for EB Approach:
  Does not fully address problem with EB movements.

ALTERNATE 1



2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	B	14.7	F	109.6
NB	A	9.5	B	14.4
SB	-	-	-	-

ESTIMATED CONSTRUCTION COST*: $60,000

*CONSTRUCTION COST ONLY - EXCLUDES RIGHT-OF-WAY AND UTILITIES

LEGEND

- EXISTING RIGHT OF WAY
- SIGNALIZED INTERSECTION
- STOP-CONTROLLED INTERSECTION
- 980 (1080) 2010 AM (PM) PEAK HOUR VOLUMES

50 0 50 100 150
GRAPHIC SCALE IN FEET

2010 NO BUILD LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	1160.0	F	3124.0
NB	A	9.7	C	17.5
SB	-	-	-	-

2010 AM (PM) PEAK HOUR VOLUMES

FIGURE 21: BILLTOWN ROAD & FAIRGROUND ROAD INTERSECTION

Key Issues / Deficiencies

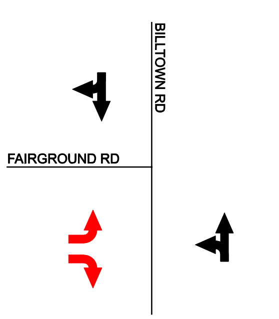
- Poor LOS for EB approach.
- No separate turn lanes (all movements shared).

Alternates

- Alt. 1 – Separate Turn Lanes for EB Approach:
  Does not fully address problem with EB movement.
- Alt. 2 – Separate Turn Lanes on Billtown Road:
  Minor traffic operation improvements. Increased safety on Billtown Road.
- Alt. 3 – Signalization:
  Does meet requirements for Warrant 1, Eight-Hour Vehicular Volume Condition B with 2006 volumes.
- Alt. 4 – Signalization with Separate Turn Lanes:
  Overall the intersection operates at an acceptable LOS; however, the NB left still operates at LOS E during the PM peak period.
- Alt. 5 – Signalization with Separate Turn Lanes and Right-In, Right-Out Access at Michael Edward Drive:
  Intersection operates acceptably in AM peak period, but has some increases in delay during the PM peak period due to the extra traffic from Michael Edward Drive.

*CONSTRUCTION COST ONLY - EXCLUDES RIGHT-OF-WAY AND UTILITIES

ALTERNATE 1

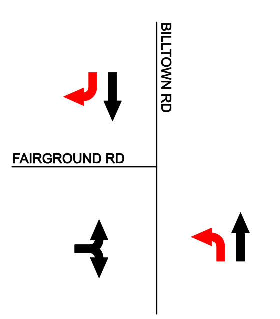


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	844.4	F	1831.0
NB	A	9.7	C	17.5
SB	-	-	-	-

ESTIMATED CONSTRUCTION COST*: $60,000

ALTERNATE 2

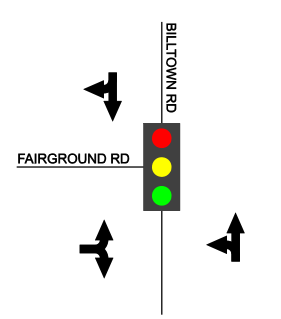


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	1003.0	F	2718.0
NB	A	9.7	C	17.5
SB	-	-	-	-

ESTIMATED CONSTRUCTION COST*: $270,000

ALTERNATE 3

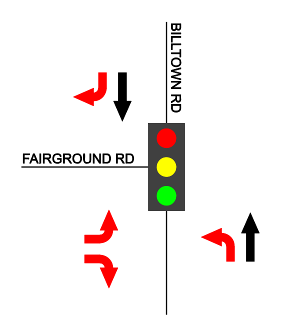


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	D	47.8	F	176.2
NB	D	53.4	D	43.0
SB	A	8.2	E	79.2
WHOLE INT.	D	37.3	E	74.5

ESTIMATED CONSTRUCTION COST*: $130,000

ALTERNATE 4

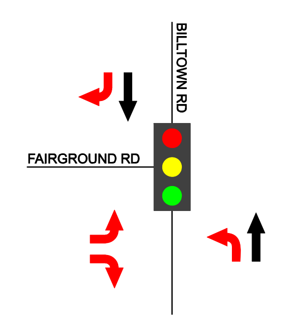


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	D	40.2	C	30.0
NB	D	39.7	B	12.7
SB	A	7.4	D	47.1
WHOLE INT.	C	28.8	C	33.8

ESTIMATED CONSTRUCTION COST*: $460,000

ALTERNATE 5



NOTE: SAME AS ALTERNATE 4 WITH LEFT TURN TRAFFIC FROM MICHAEL EDWARD DRIVE

2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	D	51.7	E	79.6
NB	D	38.0	B	18.7
SB	A	7.4	E	78.0
WHOLE INT.	C	30.3	E	56.2

ESTIMATED CONSTRUCTION COST*: $460,000

LEGEND

- EXISTING RIGHT OF WAY
- SIGNALIZED INTERSECTION
- STOP-CONTROLLED INTERSECTION
- 980 (1080) 2010 AM (PM) PEAK HOUR VOLUMES

50 0 50 100 150

GRAPHIC SCALE IN FEET

FIGURE 22: BILLTOWN ROAD & MICHAEL EDWARD DRIVE INTERSECTION

2010 AM (PM) PEAK HOUR VOLUMES

2010 NO BUILD LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	1024.0	F	2706.0
NB	A	9.5	C	18.8
SB	-	-	-	-

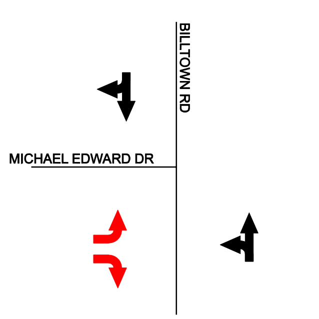
Key Issues / Deficiencies

- Poor LOS for EB approach.
- No separate turn lanes (all movements shared).
- Poor sight distance for turning vehicles from the current stop bar on Michael Edward Drive.

Alternates

- Alt. 1 – Separate Turn Lanes for EB Approach:
  Does not fully address problem with EB movements.
- Alt. 2 – Separate Turn Lanes on Billtown Road:
  Minor traffic operation improvements. Increased safety on Billtown Road.
- Alt. 3 – Signalization:
  Based on Warrant 2, four-hour vehicular volume and Warrant 3, peak hour, 2006 volumes do meet warrants.
- Alt. 4 – Right-In, Right-Out Access:
  Additional access to Michael Edward Drive is provided at Fairground Road. Does reduce overall delay, but still has poor LOS for EB approach during the PM peak period.

ALTERNATE 1

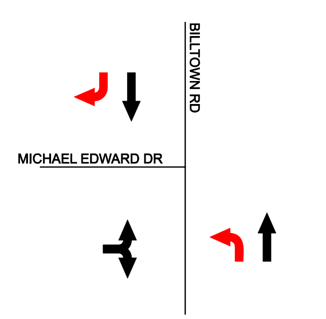


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	418.1	F	869.4
NB	A	9.5	C	18.8
SB	-	-	-	-

ESTIMATED CONSTRUCTION COST*: $60,000

ALTERNATE 2

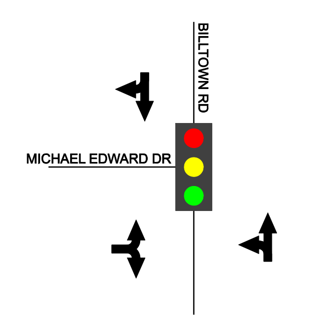


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	944.4	F	2344.0
NB	A	9.5	C	18.8
SB	-	-	-	-

ESTIMATED CONSTRUCTION COST*: $270,000

ALTERNATE 3

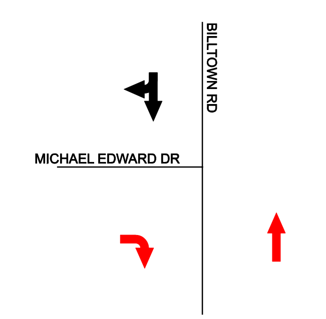


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	C	22.4	F	389.5
NB	A	6.6	F	117.5
SB	B	11.7	E	77.0
WHOLE INT.	B	13.6	F	122.4

ESTIMATED CONSTRUCTION COST*: $130,000

ALTERNATE 4



2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	C	18.9	F	418.4
NB	-	-	-	-
SB	-	-	-	-

ESTIMATED CONSTRUCTION COST*: $60,000

*CONSTRUCTION COST ONLY - EXCLUDES RIGHT-OF-WAY AND UTILITIES

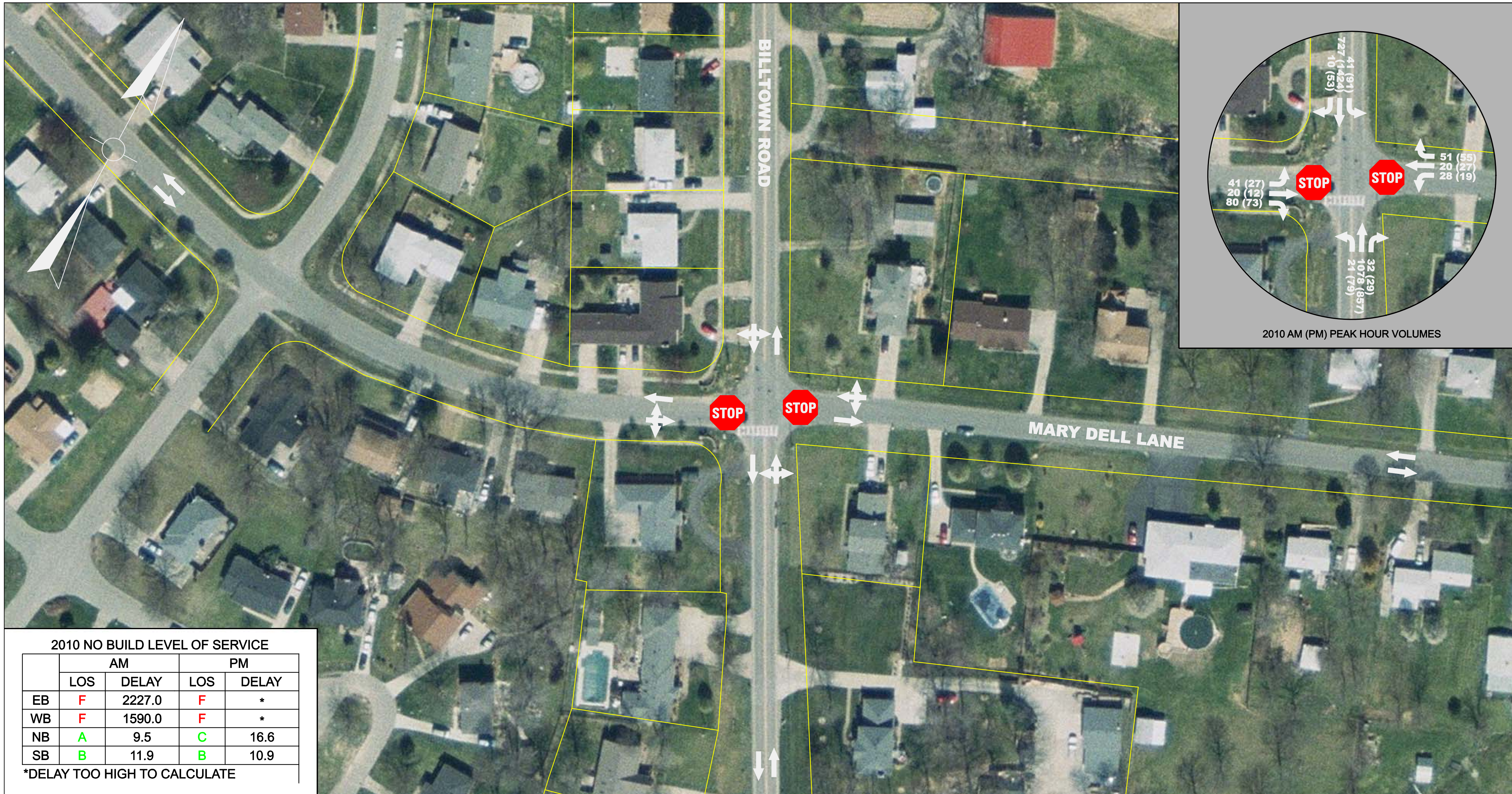
LEGEND

- EXISTING RIGHT OF WAY
- SIGNALIZED INTERSECTION
- STOP-CONTROLLED INTERSECTION
- 980 (1080) 2010 AM (PM) PEAK HOUR VOLUMES

50 0 50 100 150

GRAPHIC SCALE IN FEET

FIGURE 23: BILLTOWN ROAD & MARY DELL LANE INTERSECTION



2010 AM (PM) PEAK HOUR VOLUMES

2010 NO BUILD LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	2227.0	F	*
WB	F	1590.0	F	*
NB	A	9.5	C	16.6
SB	B	11.9	B	10.9

*DELAY TOO HIGH TO CALCULATE

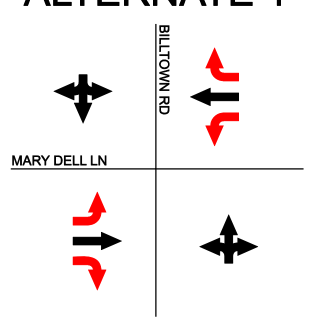
Key Issues / Deficiencies

- Poor LOS for EB/WB approaches.
- No separate turn lanes (all movements shared).
- Mary Dell Lane provides access to Charlie Vettiner Park and Golf Course to the east of Billtown Road and Virginia Wheeler Elementary School to the west of Billtown Road.

Alternates

- Alt. 1 – Separate Turn Lanes for EB/WB Approaches:
  Does not fully address LOS problem with EB/WB movements.
- Alt. 2 – Separate Turn Lanes on Billtown Road:
  Minor traffic operation improvements. Increased safety on Billtown Road.
- Alt. 3 – Signalization:
  Based on Warrant 2, four-hour vehicular volume and Warrant 3, peak hour, 2006 volumes do not meet warrants; therefore a signal is currently not warranted at this location.

ALTERNATE 1

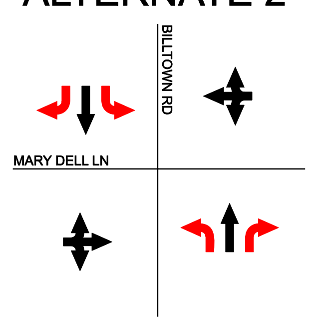


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	712.0	F	*
WB	F	535.5	F	*
NB	A	9.5	C	16.6
SB	B	11.9	B	10.9

ESTIMATED CONSTRUCTION COST**: $240,000

ALTERNATE 2



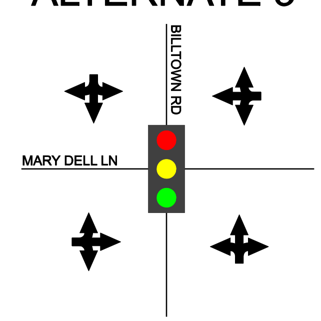
2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	1656.0	F	*
WB	F	1192.0	F	*
NB	A	9.5	C	16.6
SB	B	11.9	B	10.9

*DELAY TOO HIGH TO CALCULATE

ESTIMATED CONSTRUCTION COST**: $440,000

ALTERNATE 3



2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	C	34.9	F	142.6
WB	C	32.9	F	92.4
NB	C	34.7	D	36.5
SB	B	11.6	F	151.9
WHOLE INT.	C	26.3	F	108.8

ESTIMATED CONSTRUCTION COST**: $130,000

**CONSTRUCTION COST ONLY - EXCLUDES RIGHT-OF-WAY AND UTILITIES

LEGEND

- EXISTING RIGHT OF WAY
- SIGNALIZED INTERSECTION
- STOP-CONTROLLED INTERSECTION
- 980 (1080) 2010 AM (PM) PEAK HOUR VOLUMES

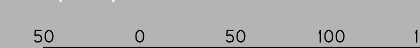


FIGURE 24: BILLTOWN ROAD & LOVERS LANE INTERSECTION

2010 NO BUILD LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	1063.0	F	1987.0
NB	-	-	-	-
SB	A	10.0	C	16.6

Key Issues / Deficiencies

- Poor LOS for EB Approach
- No separate turn lanes (all movements shared).

Alternates

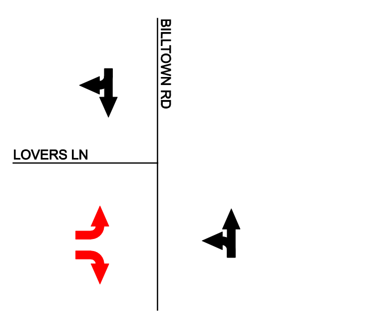
- Alt. 1 – Separate Turn Lanes for EB Approach:
  Does not solve poor LOS for EB left.
- Alt. 2 – Separate Turn Lanes on Billtown Road:
  Minor traffic operation improvements. Increased safety on Billtown Road.
- Alt. 3 – Signalization:
  Based on Warrant 2, four-hour vehicular volume and Warrant 3, peak hour, 2006 volumes meet these warrants.
- Alt. 4 – Signalization with Separate SB Right Turn Lane:
  The entire intersection as well as all approaches operates at an acceptable LOS.

Recommendation

- Trim Landscaping / Trees:
  This will improve sight distance for traffic turning onto Billtown Road from Lovers Lane.
  (Estimated Construction Cost: Minimal)

*CONSTRUCTION COST ONLY - EXCLUDES RIGHT-OF-WAY AND UTILITIES

ALTERNATE 1

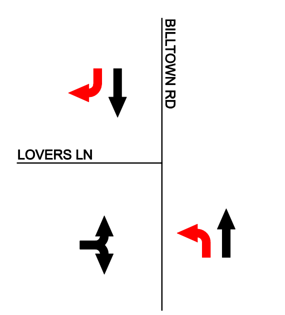


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	830.1	F	1429.0
NB	A	10.0	C	16.6
SB	-	-	-	-

ESTIMATED CONSTRUCTION COST*: $60,000

ALTERNATE 2

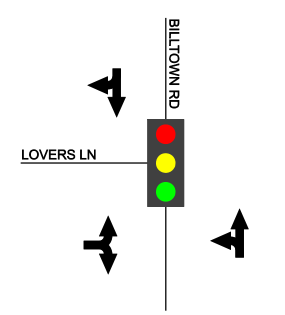


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	1006.0	F	1564.0
NB	A	10.0	C	16.6
SB	-	-	-	-

ESTIMATED CONSTRUCTION COST*: $270,000

ALTERNATE 3

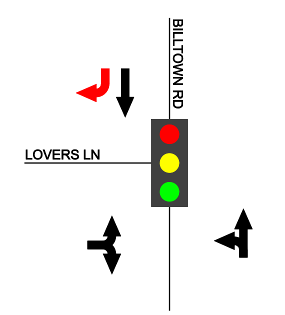


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	C	34.4	E	72.1
NB	B	19.4	B	14.3
SB	B	11.2	E	72.6
WHOLE INT.	B	17.6	D	51.4

ESTIMATED CONSTRUCTION COST*: $130,000

ALTERNATE 4



2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	C	34.4	C	34.2
NB	B	19.2	B	20.0
SB	A	9.5	D	37.7
WHOLE INT.	B	16.8	C	30.9

ESTIMATED CONSTRUCTION COST*: $200,000

RECOMMENDATION

TRIM LANDSCAPING / TREES
(ESTIMATED CONSTRUCTION COST*: MINIMAL)

LEGEND

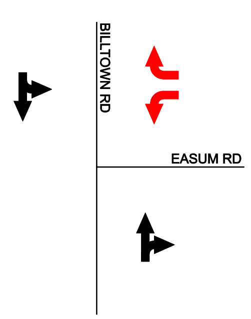
EXISTING RIGHT OF WAY
SIGNALIZED INTERSECTION
STOP-CONTROLLED INTERSECTION
980 (1080) 2010 AM (PM) PEAK HOUR VOLUMES
50 0 50 100 150
GRAPHIC SCALE IN FEET

FIGURE 25: BILLTOWN ROAD & EASUM ROAD INTERSECTION

2010 NO BUILD LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	F	78.3	F	846.1
NB	-	-	-	-
SB	B	10.9	B	11.1

ALTERNATE 1

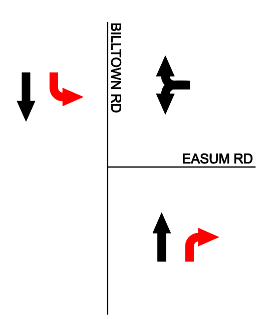


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	E	41.2	F	351.3
NB	-	-	-	-
SB	B	10.9	B	11.1

ESTIMATED CONSTRUCTION COST*: $60,000

ALTERNATE 2

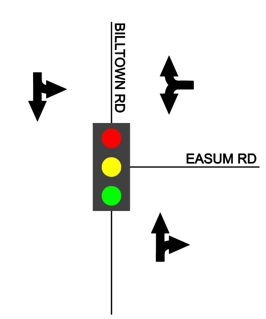


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	F	73.9	F	783.0
NB	-	-	-	-
SB	B	10.9	B	11.1

ESTIMATED CONSTRUCTION COST*: $270,000

ALTERNATE 3

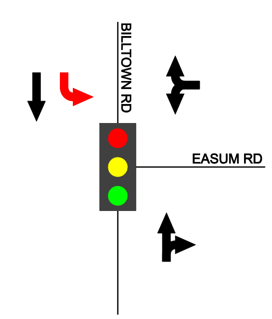


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	C	33.4	F	92.6
NB	B	12.6	A	5.0
SB	B	13.4	E	78.1
WHOLE INT.	B	14.2	D	51.1

ESTIMATED CONSTRUCTION COST*: $130,000

ALTERNATE 4



2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	C	33.4	C	34.5
NB	B	12.6	A	9.9
SB	A	8.4	C	34.1
WHOLE INT.	B	12.0	C	25.0

ESTIMATED CONSTRUCTION COST*: $330,000

ALTERNATE 5

STRAIGHTEN CURVE
(ESTIMATED CONSTRUCTION COST*: $480,000)

ALTERNATE 6

INSTALL ADDITIONAL WARNING SIGNS AND RETRO-REFLECTIVE MARKINGS
(ESTIMATED CONSTRUCTION COST*: $10,000)

Key Issues / Deficiencies

- Poor LOS for WB Approach
- Poor sight distance, intersection located in a curve.
- No separate turn lanes (all movements shared).

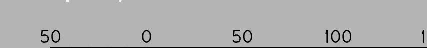
Alternates

- Alt. 1 – Separate Turn Lanes for WB Approach:
  Does not solve poor LOS for WB left.
- Alt. 2 – Separate Turn Lanes on Billtown Road:
  Minor traffic operation improvements. Increased safety on Billtown Road.
- Alt. 3 – Signalization:
  Based on Warrant 2, four-hour vehicular volume and Warrant 3, peak hour, 2006 volumes are on the threshold of meeting warrants.
- Alt. 4 – Signalization with Separate SB Left Turn Lane:
  The entire intersection as well as all approaches operates at an acceptable LOS.
- Alt. 5 – Straighten Curve
  (Estimated Construction Cost: $480,000)
- Alt. 6 – Install Additional Warning Signs and Retro-reflective Markings.
  (Estimated Construction Cost: $10,000)

*CONSTRUCTION COST ONLY - EXCLUDES RIGHT-OF-WAY AND UTILITIES

LEGEND

- EXISTING RIGHT OF WAY
- SIGNALIZED INTERSECTION
- STOP-CONTROLLED INTERSECTION
- 980 (1080) 2010 AM (PM) PEAK HOUR VOLUMES



GRAPHIC SCALE IN FEET

FIGURE 26: BILLTOWN ROAD & SHAFFER LANE INTERSECTION

2010 AM (PM) PEAK HOUR VOLUMES

2010 NO BUILD LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	571.8	F	1850.0
NB	B	10.2	C	15.6
SB	-	-	-	-

Key Issues / Deficiencies

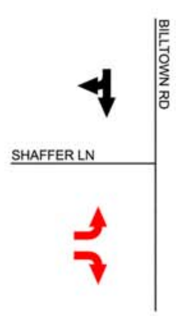
- Poor LOS for EB approach.
- No separate turn lanes (all movements shared).

Alternates

- Alt. 1 – Separate Turn Lanes for EB Approach:
  This improves traffic operations for WB right, but does not improve traffic operations to an acceptable level for the WB left.
- Alt. 2 – Separate Turn Lanes on Billtown Road:
  Minor traffic operation improvements. Increased safety on Billtown Road.
- Alt. 3 – Signalization:
  Does not meet warrant 1, eight hour vehicular volume, however signalization does improve intersection operation. With significant development planned for the near future, a signal could be warranted by 2010.
- Alt. 4 – Signalization with Separate EB Left and Right Turns and Separate NB Left:
  The entire intersection as well as all approaches operates at an acceptable LOS.

*CONSTRUCTION COST ONLY - EXCLUDES RIGHT-OF-WAY AND UTILITIES

ALTERNATE 1

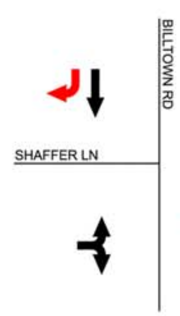


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	214.8	F	971.6
NB	B	10.2	C	15.6
SB	-	-	-	-

ESTIMATED CONSTRUCTION COST*: $60,000

ALTERNATE 2

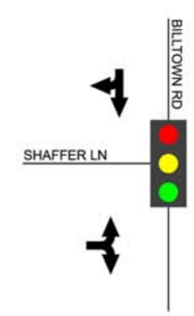


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	534.7	F	1567.0
NB	B	10.2	C	15.6
SB	-	-	-	-

ESTIMATED CONSTRUCTION COST*: $270,000

ALTERNATE 3

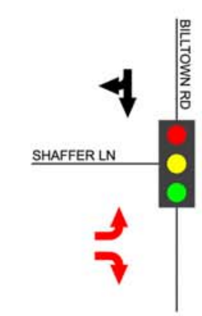


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	C	34.6	F	108.9
NB	B	12.5	F	125.9
SB	B	13.0	B	15.7
WHOLE INT.	B	15.4	E	67.2

ESTIMATED CONSTRUCTION COST*: $130,000

ALTERNATE 4



2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	C	26.2	C	34.7
NB	B	10.5	A	8.7
SB	B	13.0	C	28.7
WHOLE INT.	B	13.5	C	20.5

ESTIMATED CONSTRUCTION COST*: $390,000

LEGEND

- EXISTING RIGHT OF WAY
- SIGNALIZED INTERSECTION
- STOP-CONTROLLED INTERSECTION
- 980 (1080) 2010 AM (PM) PEAK HOUR VOLUMES

50 0 50 100 150

GRAPHIC SCALE IN FEET

FIGURE 27: BILLTOWN ROAD & GELLHAUS LANE INTERSECTION

2010 AM (PM) PEAK HOUR VOLUMES

2010 NO BUILD LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	D	40.4	E	72.5
NB	F	340.9	F	276.5
SB	C	21.6	C	26.5
WHOLE INT.	F	164.2	F	134.3

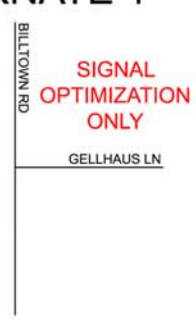
Key Issues / Deficiencies

- Poor LOS for NB Thru and Right Turn movement.
- Poor LOS for WB Left Turn during PM peak period.
- Crosswalks and pedestrian signals are present across the NB and WB approaches but do not connect to existing sidewalks.
- Queue length for WB Left Turn exceeds available storage.

Alternates

- Alt. 1 – Signal Optimization:
  Improves overall intersection operations and delay, but still operates below the desirable level of service threshold.
- Alt. 2 – Add NB Right Turn Lane:
  In combination with signal optimization, this causes the intersection to operate at an acceptable level of service or better.
- Alt. 3 – Connect Sidewalks and Approaches
  (Estimated Construction Cost: $11,000)
- Alt. 4 – Extend WB Left Turn Lane:
  Need to extend lane as far back as possible to accommodate PM queues.
  (Estimated Construction Cost: $150,000)

ALTERNATE 1

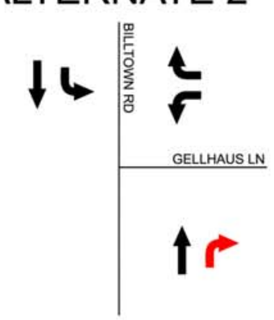


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	E	60.6	F	121.5
NB	F	132.3	F	121.6
SB	C	21.2	C	22.0
WHOLE INT.	E	77.1	F	82.2

ESTIMATED CONSTRUCTION COST*: MINIMAL

ALTERNATE 2



2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	C	33.4	E	67.6
NB	C	22.4	E	62.0
SB	C	21.3	D	38.0
WHOLE INT.	C	24.0	D	53.5

ESTIMATED CONSTRUCTION COST*: $140,000

ALTERNATE 3

CONNECT SIDEWALKS AND APPROACHES
(ESTIMATED CONSTRUCTION COST*: $11,000)

ALTERNATE 4

EXTEND WB LEFT TURN LANE
(ESTIMATED CONSTRUCTION COST*: $150,000)

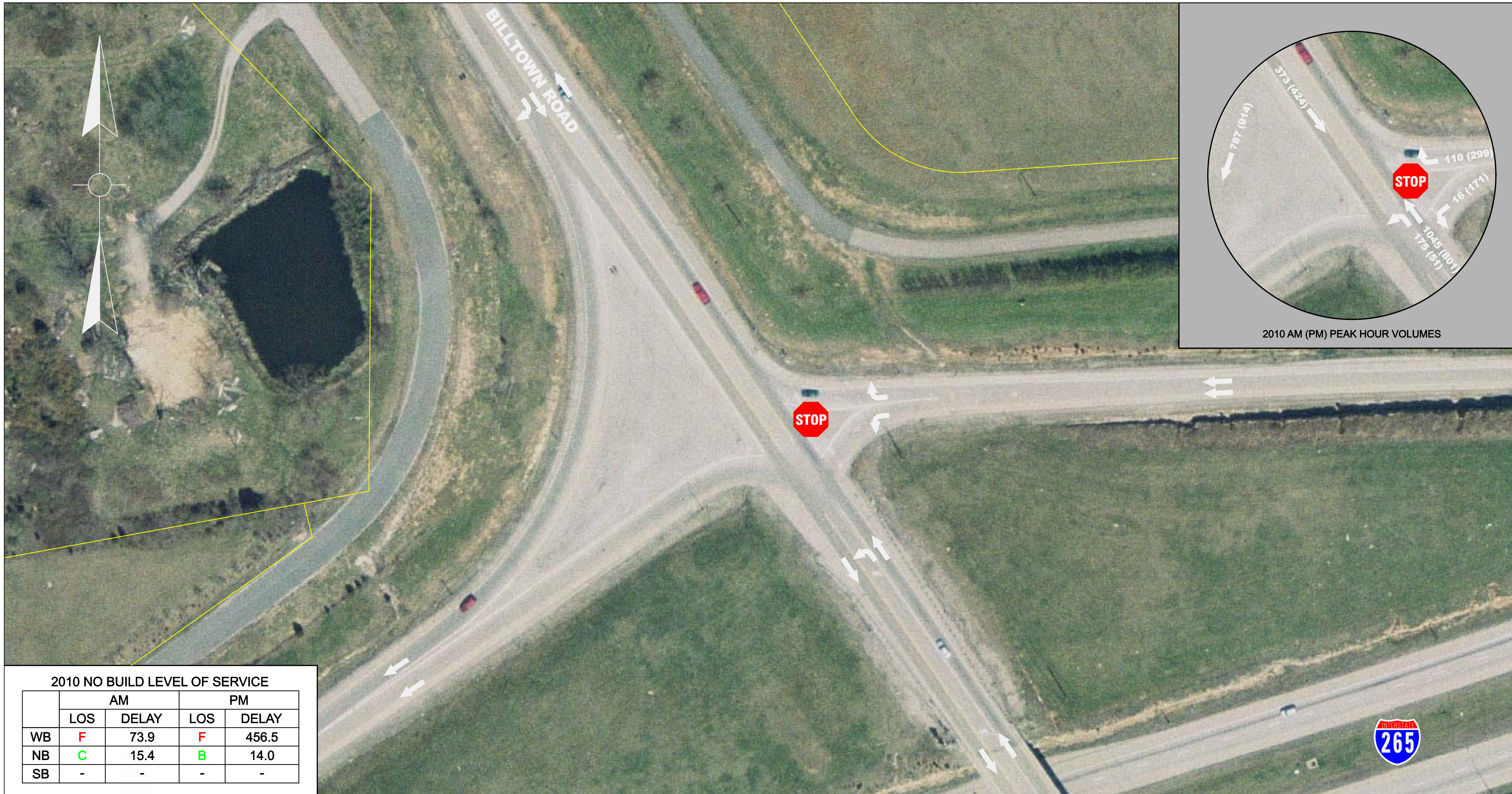
*CONSTRUCTION COST ONLY - EXCLUDES RIGHT-OF-WAY AND UTILITIES

LEGEND

- EXISTING RIGHT OF WAY
- SIGNALIZED INTERSECTION
- STOP-CONTROLLED INTERSECTION
- 980 (1080) 2010 AM (PM) PEAK HOUR VOLUMES

50 0 50 100 150
GRAPHIC SCALE IN FEET

FIGURE 28: BILLTOWN ROAD & I-265 WB/SB RAMPS INTERSECTION

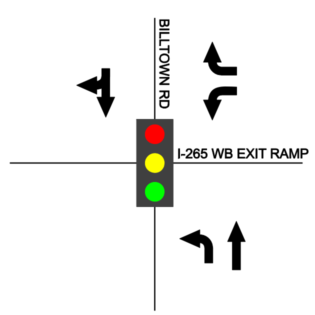


2010 AM (PM) PEAK HOUR VOLUMES

2010 NO BUILD LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	F	73.9	F	456.5
NB	C	15.4	B	14.0
SB	-	-	-	-

ALTERNATE 1



2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
WB	C	34.3	C	24.3
NB	B	11.1	B	12.2
SB	B	13.9	B	14.2
WHOLE INT.	B	13.1	B	15.6

ESTIMATED CONSTRUCTION COST*: $130,000

Key Issues / Deficiencies

- Poor LOS for WB Approach

Alternates

- Alt. 1 – Signalization:
  Based on Warrant 2, four-hour vehicular volume and Warrant 3, peak hour, 2006 volumes do not meet warrants; therefore a signal is currently not warranted at this location. However, the traffic signal proposed for the intersection to the south should provide some improvement for the operation of this intersection.

*CONSTRUCTION COST ONLY - EXCLUDES RIGHT-OF-WAY AND UTILITIES

LEGEND

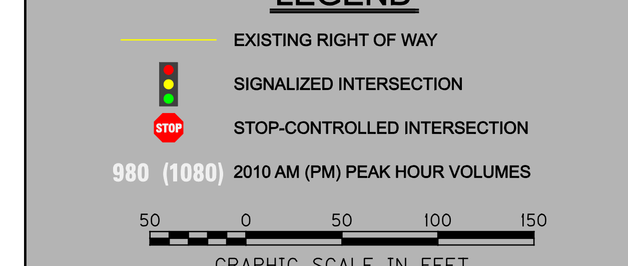
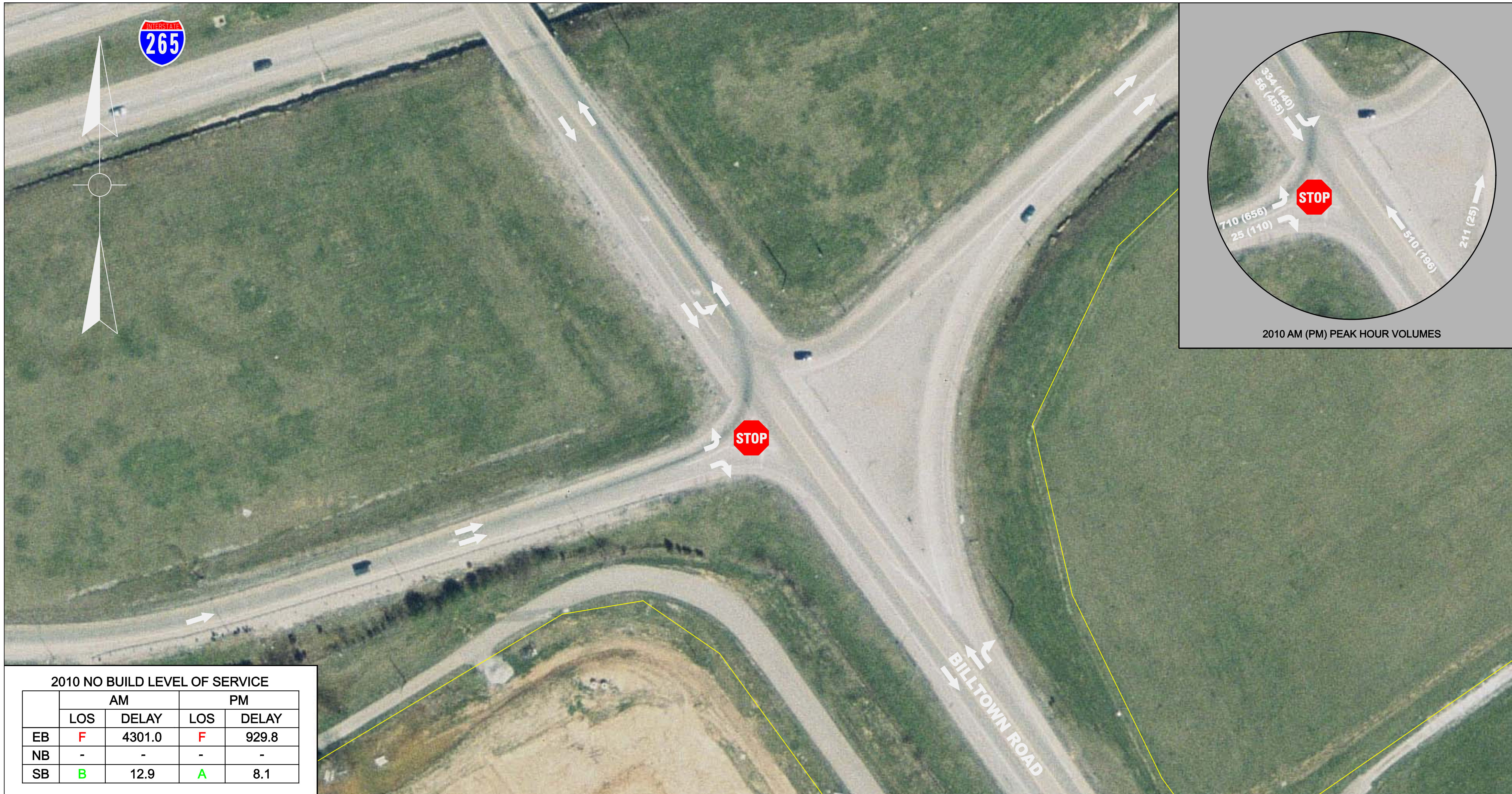


FIGURE 29: BILLTOWN ROAD & I-265 EB/NB RAMPS INTERSECTION



2010 NO BUILD LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	4301.0	F	929.8
NB	-	-	-	-
SB	B	12.9	A	8.1

Key Issues / Deficiencies

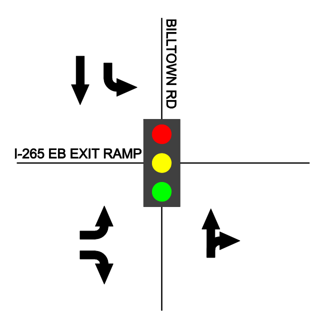
- Poor LOS for EB Approach

Alternates

- Alt. 1 – Signalization:
  Based on Warrant 2, four-hour vehicular volume and Warrant 3, peak hour, 2006 volumes are on the threshold of meeting warrants. Future volumes may meet warrants in 2010 given projected traffic volumes.

- Alt. 2 – Signalization with 2nd EB Left Turn Lane:
  Improves LOS to acceptable LOS D, but would require widening of I-265 overpass bridge to accommodate 2nd turn lane.

ALTERNATE 1

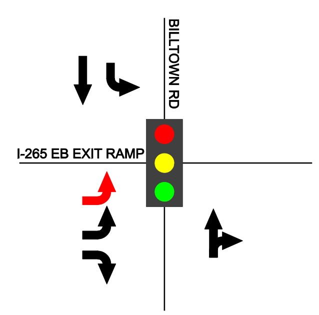


2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	F	93.1	C	23.6
NB	F	98.8	C	33.0
SB	F	142.3	C	25.0
WHOLE INT.	F	106.7	C	25.3

ESTIMATED CONSTRUCTION COST*: $130,000

ALTERNATE 2



2010 LEVEL OF SERVICE

	AM		PM	
	LOS	DELAY	LOS	DELAY
EB	C	33.6	B	10.6
NB	D	42.5	C	31.7
SB	D	48.1	C	25.0
WHOLE INT.	D	39.9	B	19.0

ESTIMATED CONSTRUCTION COST*: $1,000,000

*CONSTRUCTION COST ONLY - EXCLUDES RIGHT-OF-WAY AND UTILITIES

LEGEND

- EXISTING RIGHT OF WAY
- SIGNALIZED INTERSECTION
- STOP-CONTROLLED INTERSECTION
- 980 (1080) 2010 AM (PM) PEAK HOUR VOLUMES

50 0 50 100 150

GRAPHIC SCALE IN FEET

9.1.2 Alternates Evaluation

The analysis procedure used to evaluate each alternate is a comparative process that considers multiple evaluation criteria and enables the best alternate of the set to be recommended for implementation. A matrix consisting of the evaluation criteria was developed for each intersection to be used as an evaluation tool. A list of the matrix criterion is provided below along with a description of each.

Level of Service / Delay – For intersection improvements such as signalization and / or adding turn lanes, a level of service analysis was performed using the HCS+ software package and 2010 volumes. No-Build levels of service and delay for the same year (2010) were calculated and used to compare to values resulting from intersection improvements to determine the extent to which they improve intersection operations.

For signalized intersections, the overall intersection level of service and delay (in seconds) is listed for the worst peak period. For the unsignalized intersections, the approach with the worst level of service and delay was selected for the worst peak period. Therefore, the poorest levels of service and delay for each intersection are shown in the table.

Signal Warrants – A traffic signal warrant evaluation was performed to determine if the intersection meets or exceeds any of the signal warrants as outlined in the Manual of Uniform Traffic Control Devices (MUTCD). According to the MUTCD, there are eight warrants used to justify the installation of a traffic signal, seven of which are most relevant to intersections analyzed as part of this study. These seven warrants are listed below along with a brief definition.

- Warrant 1: Eight-Hour Vehicular Volume – To satisfy this warrant, a minimum hourly volume must be exceeded for eight hours during an average day.
- Warrant 2: Four-Hour Vehicular Volume – For this warrant, traffic volumes for each of any 4 hours of an average day must be above the applicable curve in Figure 4C-1 or 4C-2 in the MUTCD manual.
- Warrant 3: Peak Hour – For this warrant, traffic volumes during one hour must be such that they exceed the given threshold as shown on either Figure 4C-3 or 4C-4 in the MUTCD.
- Warrant 5: School Crossing – This warrant is used when the primary reason for considering installation of a traffic signal is due to school children crossing the major street.
- Warrant 6: Coordinated Signal System – To ensure proper platooning of vehicles, this warrant may be used at an intersection to justify the installation of a traffic signal where otherwise it would not be needed.
- Warrant 7: Crash Experience – This warrant is used when the primary reason for installing a signal is due to a history of severe and frequent crashes in the vicinity of the intersection.

- Warrant 8: Roadway Network – This warrant can be used to justify installation of a traffic signal to encourage concentration and organization of traffic flow on a roadway network.

The remaining warrant (Warrant 4) was not applicable to this study as it pertains to pedestrian volumes, of which there are no intersections with sufficient pedestrian volumes to meet this warrant.

Intersections that are part of the study area and not currently signalized were evaluated to determine if any of the seven warrants discussed above apply. In some instances, more information including turning movement counts are necessary to determine if warrants are met. Overall, it should be noted that simply meeting a warrant does not mean that a traffic signal must be installed at that location. Engineering judgment must also be used to make sure that the installation of a traffic signal would be the best method for improving traffic operations and safety at that location.

Safety – Based on the crash analysis performed as part of the existing conditions analysis, it was noted if the intersection is located in a high crash rate section or is a high crash rate spot. Other, more qualitative discussion is also included where an improvement may lead to a reduction in certain crash types.

Environment Impacts – This evaluation criterion is subdivided into two categories – human and natural. The human environmental impacts relates to issues that would impact populations of people who live along the corridor or infrastructure that has specific value to the community such as historical or archaeological value. An assessment of environmental justice issues such as adverse impacts to minority, low-income, or elderly populations was performed to determine if there are any locations along the corridor where these occur. The full discussion on environmental justice issues is included as **Appendix B** at the end of this report.

The natural environmental impacts refer to impacts to floodplains, wetlands, and threatened / rare / endangered species. As this is a fairly urban / suburban area, these types of impacts are minimal.

Public Input – Results from the second public meeting held on February 27, 2007 were used to populate the evaluation criteria. Specifically, attendees were asked to select the alternate they thought would best improve any operational or safety deficiencies at the intersection on a comment form. These forms were collected at the meeting as well as via mail and fax following the meeting and compiled to determine the preferred alternate for each intersection as chosen by the public. The ranking of alternates is listed in the evaluation matrix.

Property Impacts – For the improvement alternates that require physical improvements such as turn lane construction, an assessment of the number of properties impacted by this construction was performed. The results are noted in the matrix.

Cost – Construction costs were developed for each alternate. The costs are in 2007 dollars and are for planning level purposes only. They do not include any costs for right-of-way or utilities.

The individual matrices for each intersection are shown as **Tables 17 – 30** on the following pages. The green shading indicates that an alternate has the best performance in a category while the red shading indicates the poorest performance. A summary of key evaluation points for each intersection is provided below.

Billtown Road / Ruckriegel Parkway – This intersection is very constrained by the surrounding development including a commercial development in the northeast corner, a post office in the southeast corner, and a cemetery in the northwest corner as well as just south of the post office. This intersection is also one of the primary entry points for Jeffersontown which, according to discussions with the city representative, major changes are not desired in order to preserve the character of the community. From a traffic perspective, the intersection currently operates poorly, and in order to achieve a good level of service, major reconstruction (Alternate 3) would need to occur including additional turn lanes as well as through lanes. This results in the highest cost of the alternates as well as the highest number of property impacts. However, based on public input, Alternate 3 was the preferred alternate.

Billtown Road / Saint Rene Road – This intersection is currently not signalized; however, installing a signal would improve the intersection operations to an acceptable level. A review of traffic warrants showed that neither Warrant 2 (Four-Hour Vehicular Volume) nor Warrant 3 (Peak Hour) is met based on 2006 volumes. Given the projections in traffic, it is possible that signal warrants may be met by the year 2010. Traffic signals can also be justified given a high crash history at an intersection which applies to this intersection. Warrant 7 is the traffic signal warrant for crash experience and further evaluation of the detailed crash reports at this intersection should be consulted to determine if this warrant is met. Overall, signalization with a separate southbound left turn lane was the preferred alternate by the public, and this alternate (Alternate 3) also had the best level of service as well as provided some measure to address the safety issue at this intersection.

Billtown Road / Colonnades Place – This intersection leads to a more residential neighborhood area and is not used as a major through route for vehicles. Based on the 2010 No-Build level of service analysis, the intersection has a poor level of service for the stop controlled approach. While signalization would improve the level of service to an acceptable level, an evaluation of signal warrants showed that Warrant 3 (Peak Hour) is not met. Additional volume information was not available to determine if any other signal warrants are met.

Table 17: Billtown Road / Ruckriegel Parkway Evaluation Matrix

Alternate	Description	Traffic			Environment Impacts		Public Input	Property Impacts	Cost*
		Delay (sec) / LOS	Signal Warrants	Safety	Human	Natural			
0	Do Nothing	277.8 / F	N/A	High Crash Rate Section	None	None	No response	0	$0
1	Signal Optimization	236 / F	N/A	High Crash Rate Section	None	None	2nd	0	Minimal
2	Add Exclusive Right Turn Bays	150.2 / F	N/A	High Crash Rate Section	1 cemetery	None	No response	3	$240,000
3	Add Exclusive Turn Lanes and Through Lanes	31.3 / C	N/A	High Crash Rate Section	1 cemetery	None	1st	5	$1,030,000

* Planning level cost estimate in 2007 dollars. Does not include utilities or right-of-way costs.

Table 18: Billtown Road / Saint Rene Road Evaluation Matrix

Alternate	Description	Traffic			Environment Impacts		Public Input	Property Impacts	Cost*
		Delay (sec) / LOS	Signal Warrants	Safety	Human	Natural			
0	Do Nothing	1203.0 / F	N/A	High Crash Rate Spot	None	None	No response	0	$0
1	Separate Turn Lanes on Billtown Rd	1076.0 / F	N/A	High Crash Rate Spot	None	None	2nd - Tied	3	$270,000
2	Signalization	50.8 / D	Does not meet warrants	High Crash Rate Spot	None	None	2nd - Tied	0	$130,000
3	Signalization with SB Left Turn Lane from Billtown Rd to Saint Rene Rd	34.8 / C	Does not meet warrants	High Crash Rate Spot	None	None	1st	2	$330,000

* Planning level cost estimate in 2007 dollars. Does not include utilities or right-of-way costs.

Table 19: Billtown Road / Colonnades Place Evaluation Matrix

Alternate	Description	Traffic			Environment Impacts		Public Input	Property Impacts	Cost*
		Delay (sec) / LOS	Signal Warrants	Safety	Human	Natural			
0	Do Nothing	451.4 / F	N/A	High Crash Rate Section	None	None	No response	0	$0
1	Separate Turn Lanes on Billtown Rd	394.9 / F	N/A	High Crash Rate Section	None	None	1st	5	$270,000
2	Signalization	36.5 / D	Does not meet warrants	High Crash Rate Section	None	None	2nd	0	$130,000
3	Signalization with SB Right Turn Lane from Billtown Rd to Colonnades Place	29.2 / C	Does not meet warrants	High Crash Rate Section	None	None	No response	0	$200,000
4	Two-Way Left-Turn Lane b/w Vintage Creek Dr and Colonnades Place	N/A	N/A	High Crash Rate Section	None	None	No response	9	$180,000

* Planning level cost estimate in 2007 dollars. Does not include utilities or right-of-way costs.

Table 20: Billtown Road / Vintage Creek Drive Evaluation Matrix

Alternate	Description	Traffic			Environment Impacts		Public Input	Property Impacts	Cost*
		Delay (sec) / LOS	Signal Warrants	Safety	Human	Natural			
0	Do Nothing	681.7 / F	N/A	High Crash Rate Section	None	None	1st - Tied	0	$0
1	Separate Turn Lanes for WB Approach (Vintage Creek Dr)	414.1 / F	N/A	High Crash Rate Section	None	None	No response	4	$60,000
2	Separate Turn Lanes on Billtown Road	653.8 / D	N/A	High Crash Rate Section	None	None	No response	7	$270,000
3	Signalization	49.5 / D	On threshold of meeting Warrant 3	High Crash Rate Section	None	None	No response	0	$130,000
4	Signalization with Separate Turn Lanes	29.7 / C	On threshold of meeting Warrant 3	High Crash Rate Section	None	None	1st - Tied	11	$460,000

* Planning level cost estimate in 2007 dollars. Does not include utilities or right-of-way costs.

Table 21: Billtown Road / Shady Acres Lane Evaluation Matrix

Alternate	Description	Traffic			Environment Impacts		Public Input	Property Impacts	Cost*
		Delay (sec) / LOS	Signal Warrants	Safety	Human	Natural			
0	Do Nothing	116.2 / F	N/A	High Crash Rate Section	None	None	No response	0	$0
1	Separate Turn Lanes for EB Approach (Shady Acres Ln)	109.6 / F	N/A	High Crash Rate Section	None	None	1st - Tied	3	$60,000

* Planning level cost estimate in 2007 dollars. Does not include utilities or right-of-way costs.

Table 22: Billtown Road / Fairground Road Evaluation Matrix

Alternate	Description	Traffic			Environment Impacts		Public Input	Property Impacts	Cost*
		Delay (sec) / LOS	Signal Warrants	Safety	Human	Natural			
0	Do Nothing	3124 / F	N/A	-	None	None	6th	0	$0
1	Separate Turn Lanes for EB Approach (Fairground Rd)	1831.0 / F	N/A	-	None	None	5th	2	$60,000
2	Separate Turn Lanes on Billtown Rd	2718.0 / F	N/A	Could reduce rear end crashes	None	None	4th	10	$270,000
3	Signalization	74.5 / E	Meets Warrant 1	-	None	None	2nd	0	$130,000
4	Signalization with Separate Turn Lanes	33.8 / C	Meets Warrant 1	Could reduce rear end crashes	None	None	1st	12	$460,000
5	Signalization with Separate Turn Lanes and Right-in, Right-out Access at Michael Edward Dr	56.2 / E	Meets Warrant 1	Could reduce rear end crashes	None	None	3rd	12	$460,000

* Planning level cost estimate in 2007 dollars. Does not include utilities or right-of-way costs.

Table 23: Billtown Road / Michael Edward Drive Evaluation Matrix

Alternate	Description	Traffic			Environment Impacts		Public Input	Property Impacts	Cost*
		Delay (sec) / LOS	Signal Warrants	Safety	Human	Natural			
0	Do Nothing	2706.0 / F	N/A	-	None	None	3rd - Tied	0	$0
1	Separate Turn Lanes for Eastbound Approach (Michael Edward Dr)	869.4 / F	N/A	-	None	None	3rd - Tied	3	$60,000
2	Separate Turn Lanes on Billtown Rd	2344.0 / F	N/A	Could reduce rear end crashes	None	None	1st - Tied	6	$270,000
3	Signalization	122.4 / F	Meets Warrant 2 and 3	-	None	None	1st - Tied	0	$130,000
4	Right-in, Right-out Access for Michael Edward Dr	418.4 / F	N/A	Could reduce rear end crashes	Reduces access to corner business	None	5th	0	$60,000

* Planning level cost estimate in 2007 dollars. Does not include utilities or right-of-way costs.

Table 24: Billtown Road / Mary Dell Lane Evaluation Matrix

Alternate	Description	Traffic			Environment Impacts		Public Input	Property Impacts	Cost*
		Delay (sec) / LOS	Signal Warrants	Safety	Human	Natural			
0	Do Nothing	2227.0 / F	N/A	-	None	None	3rd - Tied	0	$0
1	Separate Turn Lanes for Eastbound / Westbound Approaches (Mary Dell Lane)	712.0 / F	N/A	-	None	None	3rd - Tied	8	$240,000
2	Separate Turn Lanes on Billtown Road	1656.0 / F	N/A	Could reduce rear end crashes	None	None	2nd	8	$440,000
3	Signalization	108.8 / F	Does not meet warrants	-	None	None	1st	0	$130,000

* Planning level cost estimate in 2007 dollars. Does not include utilities or right-of-way costs.

Table 25: Billtown Road / Lovers Lane Evaluation Matrix

Alternate	Description	Traffic			Environment Impacts		Public Input	Property Impacts	Cost*
		Delay (sec) / LOS	Signal Warrants	Safety	Human	Natural			
0	Do Nothing	1987.0 / F	N/A	-	None	None	5th	0	$0
1	Separate Turn Lanes for Eastbound Approach (Lovers Lane)	1429.0 / F	N/A	-	None	None	1st	2	$60,000
2	Separate Turn Lanes on Billtown Road	1564.0 / F	N/A	Could reduce rear end crashes	None	None	2nd - Tied	6	$270,000
3	Signalization	51.4 / D	Meets Warrant 2 and 3	-	None	None	4th	0	$130,000
4	Signalization with Separate Southbound Right Turn Lane from Billtown Road to Lovers Lane	30.9 / C	Meets Warrant 2 and 3	Could reduce rear end crashes	None	None	2nd - Tied	3	$200,000

* Planning level cost estimate in 2007 dollars. Does not include utilities or right-of-way costs.

Table 26: Billtown Road / Easum Road Evaluation Matrix

Alternate	Description	Traffic: Delay (sec) / LOS	Traffic: Signal Warrants	Traffic: Safety	Environment Impacts: Human	Environment Impacts: Natural	Public Input	Property Impacts	Cost*
0	Do Nothing	846.1 / F	N/A	-	None	None	3rd - Tied	0	$0
1	Separate Turn Lanes for Westbound Approach (Easum Road)	351.3 / F	N/A	-	None	None	5th - Tied	3	$60,000
2	Separate Turn Lanes on Billtown Road	783.0 / F	N/A	Could reduce rear end crashes	None	None	2nd	8	$270,000
3	Signalization	51.1 / D	On threshold of Meeting Warrants 2 and 3	-	None	None	3rd - Tied	0	$130,000
4	Signalization with Separate Southbound Left Turn Lane from Billtown Road to Easum Road	25.0 / C	On threshold of Meeting Warrants 2 and 3	Could reduce rear end crashes	None	None	1st	3	$330,000
5	Straighten Curve	N/A	N/A	Could improve sight distance and reduce crashes	None	None	5th - Tied	14	$480,000
6	Install Additional Warning Signs and Retro-reflective Markings	N/A	N/A	Could slow down vehicles and make curve more visible	None	None	5th - Tied	0	$10,000

* Planning level cost estimate in 2007 dollars. Does not include utilities or right-of-way costs.

Table 27: Billtown Road / Shaffer Lane Evaluation Matrix

Alternate	Description	Traffic: Delay (sec) / LOS	Traffic: Signal Warrants	Traffic: Safety	Environment Impacts: Human	Environment Impacts: Natural	Public Input	Property Impacts	Cost*
0	Do Nothing	1850.0 / F	N/A	-	None	None	3rd - Tied	0	$0
1	Separate Turn Lanes for Eastbound Approach (Shaffer Lane)	971.6 / F	N/A	-	None	None	3rd - Tied	4	$60,000
2	Separate Turn Lanes on Billtown Road	1567.0 / F	N/A	Could reduce rear end crashes	None	None	3rd - Tied	8	$270,000
3	Signalization	67.2 / E	Does not meet warrants	-	None	None	2nd	0	$130,000
4	Signalization with Separate EB Left and Right Turn Lanes from Shaffer Ln to Billtown Rd and Separate NB Left Turn Lane from Billtown Rd to Shaffer Ln	20.5 / C	Does not meet warrants	Could reduce rear end crashes	None	None	1st	8	$390,000

* Planning level cost estimate in 2007 dollars. Does not include utilities or right-of-way costs.

Table 28: Billtown Road / Gellhaus Lane Evaluation Matrix

Alternate	Description	Traffic: Delay (sec) / LOS	Traffic: Signal Warrants	Traffic: Safety	Environment Impacts: Human	Environment Impacts: Natural	Public Input	Property Impacts	Cost*
0	Do Nothing	164.2 / F	N/A	-	None	None	5th	0	$0
1	Signal Optimization	82.2 / F	N/A	-	None	None	1st - Tied	0	Minimal
2	Add NB Right Turn Lane from Billtown Rd to Gellhaus Ln	53.5 / D	N/A	Could reduce rear end crashes	None	None	1st - Tied	1	$140,000
3	Connect Sidewalks and Approaches	N/A	N/A	Would improve pedestrian safety	None	None	3rd - Tied	0	$11,000
4	Extend WB Left Turn Lane	N/A	N/A	-	None	None	3rd - Tied	3	$150,000

* Planning level cost estimate in 2007 dollars. Does not include utilities or right-of-way costs.

Table 29: Billtown Road / I-265 WB/SB Ramps Evaluation Matrix

Alternate	Description	Traffic			Environment Impacts		Public Input	Property Impacts	Cost*
		Delay (sec) / LOS	Signal Warrants	Safety	Human	Natural			
0	Do Nothing	456.5 / F	N/A	-	None	None	No response	0	$0
1	Signalization	15.6 / B	Does not meet warrants	-	None	None	1st	0	$130,000

* Planning level cost estimate in 2007 dollars. Does not include utilities or right-of-way costs.

Table 30: Billtown Road / I-265 EB/NB Ramps Evaluation Matrix

Alternate	Description	Traffic			Environment Impacts		Public Input	Property Impacts	Cost*
		Delay (sec) / LOS	Signal Warrants	Safety	Human	Natural			
0	Do Nothing	4301.0 / F	N/A	-	None	None	No response	0	$0
1	Signalization	106.7 / F	On threshold of Meeting Warrants 2 and 3	-	None	None	No response	0	$130,000
2	Signalization with 2nd EB Left Turn Lane from the I-265 EB Exit Ramp to Billtown Rd	39.9 / D	On threshold of Meeting Warrants 2 and 3	-	None	None	1st	0	$1,000,000

* Planning level cost estimate in 2007 dollars. Does not include utilities or right-of-way costs.

Billtown Road / Vintage Creek Drive – This intersection also leads to a more residential neighborhood area and is not used as a major through route for vehicles. Similar to the traffic operations at Colonnades Place, this intersection has a poor level of service for the stop controlled approach. An evaluation of signal warrants showed that Warrant 3 (Peak Hour) is on the threshold of being met. Additional volume information was not available to determine if any other signal warrants are currently met. While signalization would improve the level of service, to effectively improve the level of service on all approaches, additional turn lanes would need to be constructed on both the side street (Vintage Creek Drive) and Billtown Road.

Billtown Road / Shady Acres Lane – Shady Acres Lane is a residential neighborhood street that has no outlet at the end. The delay and level of service are poor for the Shady Acres Lane approach; however, traffic volumes are so low that it may be hard to justify any improvement at this intersection. Only one person commented on this intersection at the second public meeting, selecting the alternate with the addition of turn lanes on Shady Acres Lane as their preferred alternate.

Billtown Road / Fairground Road – This intersection received the most response at the second public meeting, with 44 comment forms returned. Overall, signalization with separate turn lanes on both Fairground Road and Billtown Road (Alternate 4) was selected as the preferred alternate by the public. Based on 2006 traffic volumes, the requirements for Warrant 1 (Eight-Hour Vehicular Volume Condition B) are met. Installation of a traffic signal with the separate turn lanes is not only warranted, but these improvements would also provide the greatest improvement in level of service and delay of all the alternates, thereby improving intersection operations to an acceptable level. The only drawback to this alternate is that it has the highest estimated construction cost, though not significantly higher than the cost estimates for the other alternates.

Also included as a potential alternate was combining signalization and separate turn lanes at Fairground Road with limited access at Michael Edward Drive (Alternate 5). Only right turns in and out of Michael Edward Drive would be allowed, thereby redirecting any left turns through the now signalized intersection at Fairground Road. An analysis of traffic operations showed that with this additional traffic through the Fairground Road intersection, the level of service would drop to LOS E for several approaches and the overall intersection during the PM peak period. While this is below a desirable level of service threshold, it is an improvement over the 2010 level of service and delay for no improvements. There was also good public response for this alternate (rated 3rd by the public – signalization only of Fairground Road was rated second).

Billtown Road / Michael Edward Drive – Similar to most intersections along Billtown Road, the side street (Michael Edward Drive) has poor intersection operations (LOS F). Signal Warrants 2 (Four-Hour Vehicular Volumes) and 3 (Peak Hour) are met using 2006 volumes; however, signalization alone does not solve the poor intersection operations during the PM peak period. Another alternate that was developed to provide an option for improvements in addition to signalization was limiting access at this location to right-in, right-out traffic only. This still causes a poor level of service (LOS F) in the PM peak period, but significantly reduces delay compared to the No-Build Alternate and is not much higher than the delay for the same approach as adding a signal. The cost for completing the access restrictions is also less ($60,000) compared to installation of a signal ($130,000). The drawback for this alternate is that the public did not have a high response based on returned comment forms. They selected either signalization or separate turn lanes on Billtown Road as their preferred alternate. Some of the lack of response for the limited access alternate could be due to uncertainty about how this alternate would actually operate. At the public meeting when the alternate was discussed, some people were confused about how this would work in conjunction with improvements at Fairground Road. The public did not have a significant reaction either way to leaving access open at this road, even given the business located at the corner.

Billtown Road / Mary Dell Lane – Mary Dell Lane has four approaches, with the two on the side street (Mary Dell Lane) stop-controlled. Poor level of service (LOS F) and very high delays are experienced on Mary Dell Lane according to the HCS+ analysis. The intersection is also unique in the fact that Mary Dell Lane provides access to a school to the west and a park and golf course to the east. Therefore, in addition to poor traffic operations, there are concerns about access to these locations as well as the need for pedestrian provisions given a high pedestrian concentration at this intersection compared to other locations in the study area. The traffic volumes are so high on Billtown Road that signalization of the intersection still results in poor traffic operations and in fact the addition of turn lanes on all approaches only moderately improves this. Also, neither Warrant 2 (Four-Hour Vehicular Volumes) nor 3 (Peak Hour) are met. There is the possibility that a third warrant could be met – Warrant 5 (School Crossing). A signal could be considered due to the school if there are sufficiently high pedestrian volumes crossing Billtown Road at this location. Further evaluation would need to be performed, including pedestrian counts, to justify a signal based on this warrant. While the public seemed to think that signalization would be the best improvement alternate at this location, there are several factors that indicate this may not be the case.

Given that traditional methods such as signal installation and turn lane additions do not solve the problem at this location, additional improvement alternates were developed and considered to provide some measure of relief including pedestrian improvements. An experimental pedestrian signal is available currently that employs new technology that is more responsive to pedestrians – it provides enhanced warning for vehicles prior to the pedestrian crossing and lights up the pedestrian with a flashing strobe light. A system like this might be applicable at this location. Further consideration may need to be given to improving the safety at this intersection and focusing on other traffic operational improvements at upstream and downstream intersections that could lead to residual improvements at this location.

Billtown Road / Lovers Lane – Lovers Lane is actually a state designated route (KY 1065) that runs between Billtown Road and Bardstown Road. The stop-controlled approach on Lovers Lane operates at a poor LOS (LOS F), with signalization and the addition of a southbound left turn lane onto Lovers Lane needed to improve the intersection level of service and all approaches to a LOS D or better. A review of traffic volumes for 2006 compared to signal warrants indicates that two warrants are currently met – Warrant 2 (Four-Hour Vehicular Volumes) and 3 (Peak Hour). While signalization and construction of an additional turn lane provides the greatest improvement in level of service and safety at the intersection, the public selected Alternate 1 (Separate Turn Lanes on Lovers Lane) as the preferred alternate. Based on comments received at the public meeting, there is a perceived problem with accessing Billtown Road and that side street improvements would facilitate this in conjunction with signals at all major intersections.

Billtown Road / Easum Road – There have been several complaints about this intersection by citizens, especially regarding safety concerns. The intersection is located in a slight curve and sight distance is an issue. The crash analysis did not show a crash rate problem at this location, however, several of the crashes mentioned by members of the public such as run-off road type crashes may not have been reported. The side street of Easum Road has a poor level of service and some delay (though not as much as other intersections located throughout the corridor). Ultimately, signalization of the intersection as well as construction of a southbound left turn lane would be necessary to improve intersection operations from a LOS E/F to LOS C. An analysis of traffic signal warrants showed that Warrant 2 (Four-Hour Vehicular Volumes) and 3 (Peak Hour) are not met using 2006 volumes. Since a signal is currently not warranted, safety improvements may need to be the focus of targeted improvements at this location. Other alternates that would improve safety at this location include installation of separate turn lanes on Billtown Road or on Easum Road to reduce rear-end crashes, straightening the curve to improve sight distance, or simply improving the visibility of the intersection through additional retroreflective warning signs and striping. Other improvements at adjacent upstream and downstream intersections may cause intersection operations to improve without any specific operational improvements at this location.

Billtown Road / Shaffer Lane – Shaffer Lane primarily serves residential traffic, however, it also provides a connector between Billtown Road and Seatonville Road. Shaffer Lane is stop-controlled and this results in a poor LOS (LOS F) and high delays on Shaffer Lane. The evaluation of several alternates showed that signalization alone does not solve the LOS problem in the PM peak period and turn lanes on Shaffer Lane and a northbound left turn lane on Billtown Road are needed to improve intersection operations to a LOS C. In fact, this alternate (Alternate 4) was the preferred alternate by the public. However, based on a full day of turning movement counts, Warrant 1 (Eight-Hour Vehicular Volume Condition B) is not met. Given the residential growth projected for this area, this may change in the future. While signalization may not be warranted currently, the installation of turn lanes could be considered from a safety perspective as opposed to an operational improvement perspective.

Billtown Road / Gellhaus Lane – This intersection has recently undergone some major changes as a result of the on-going construction for a new elementary and middle school and the completed bus compound. The intersection was realigned to form a “T” intersection and a signal was installed. Separate turn lanes are provided on all approaches with the exception of the northbound direction (no northbound right turn lane). With the additional traffic generated by the schools and a potential new residential development on Gellhaus Lane, the intersection volumes increase sufficiently that without improvements the intersection operates at a LOS F in the year 2010. Optimizing the signal timing improves the delay slightly, but the intersection still remains at a LOS F. If a northbound right turn lane is added along with signal optimization, the intersection operations improve to a LOS D. Based on public input, signal optimization and the construction of a northbound right turn lane are the favorable alternates (Alternate 1 and 2). If the right turn lane was constructed, there might be additional cost in moving the existing traffic signal controller box and pole since they are located in the right-of-way where the new turn lane would be constructed.

In addition to traffic operations, pedestrian needs were considered at this location in particular given the construction of the new schools. Based on a field visit, there are some new sections of sidewalk and striped crossings through the intersection; however, these are not connected currently. Therefore an alternate was proposed to connect the sidewalks to the intersection crossings thereby improving the safety and connectivity of the intersection for pedestrians.

Billtown Road / I-265 Westbound/Southbound Ramps – This intersection forms the northern half of a diamond interchange of Billtown Road with I-265. Traffic volumes coming from I-265 in the PM peak period are higher than the AM peak period. This is shown by the higher delay (456.5 seconds) during the PM peak period as opposed to the AM peak period (73.9 seconds) although the westbound approach level of service is LOS F for both peak periods. Installation of a traffic signal was the primary alternate considered for improvements at this intersection since there are already separate turn lanes in all directions. Based on current (2006) volumes, a signal is not justified from either Warrant 2 (Four-Hour Vehicular Volume) or Warrant 3 (Peak Hour). However, an additional signal warrant could be used to justify installation of a signal at this location if it was determined to be appropriate. Warrant 6 (Coordinated Signal System) is used when there are signals located nearby such that to maintain proper platooning of vehicles, a signal is needed at the location that normally would not be justified. If a traffic signal is installed at the southern ramp intersection, a signal may be needed at this intersection and coordinated with both the other interchange signal and the one at Gellhaus to ensure optimum traffic flow.

Billtown Road / I-265 Eastbound/Northbound Ramps – For this intersection, traffic flow is heavier from I-265 during the AM peak period. This is shown by the higher delay on the eastbound approach (4301.0 seconds) during the AM peak period as opposed to the lower delay (929.8 seconds) during the PM peak period. Installation of a traffic signal would improve the delay dramatically for the entire intersection; however it would still operate at LOS F. Current (2006) traffic volumes are on the threshold for meeting Warrant 2 (Four-Hour Vehicular Volume) and Warrant 3 (Peak Hour). Installing a second northbound left turn lane along with a new traffic signal would improve the overall intersection level of service to a LOS D with all approaches operating at LOS D or better. However, this would be a costly project as the bridge over I-265 would need to be widened to accommodate the receiving lane for the second left turn lane from the ramp.

System Intersection Improvements – While it is useful to evaluate individual intersections, given the close proximity of several of the intersections along Billtown Road, an additional analysis of intersection improvements was considered from a system perspective (how well the individual improvements work together to form an optimal network). This analysis was done using the Synchro / SimTraffic software package.

A base scenario was created initially using 2010 traffic volumes and existing traffic signal timings. Then, various combinations of intersection improvements were tested. Based on these simulation runs, the following issues were identified.

- The addition of a traffic signal at the intersection of Billtown Road / I-265 NB/EB ramps has a negative impact on the Billtown Road / I-265 SB/WB intersection. The green time provided to the left turn traffic from the I-265 NB/EB ramps reduces gaps to the right turn vehicles at the other intersection.
- The increased traffic at the Billtown Road / Gellhaus intersection also has an impact on the Billtown Road / I-265 SB/WB intersection due to long queues.
- The southbound left turn lane from Billtown Road onto I-265 NB/EB should be extended and the northbound left turn lane from Billtown Road onto I-265 SB/WB reduced to accommodate the higher left turn traffic volumes.

The best combination of improvements was found to be the following:

- Traffic signals and separate left turn lanes at:
    - St. Rene Road
    - Fairground Road
    - Lovers Lane
- Traffic signals only:
    - I-265 SB / WB Ramp
    - I-265 NB / EB Ramp
- Separate left turn lanes only (no signals) at:
    - Mary Dell Lane
    - Easum Road
    - Shaffer Lane
- Separate right turn lane only at Gellhaus Lane (NB)
- Right In – Right Out at Michael Edward

It should be noted that this combination does not include improvements at the Billtown / Ruckriegel Parkway intersection. Without major reconstruction of the intersection, there were no improvement options that significantly improved traffic flow.

9.2 Long-Term Project Development and Evaluation

9.2.1 Alternates Development

For the long-term time frame of improvements to Billtown Road, a corridor approach was taken as opposed to evaluating specific intersections. The focus of the alternate development included determining different typical sections for the Billtown Road corridor. This includes determining the number of lanes, aesthetics, and multimodal aspects that could be included for an ultimate build-out of the roadway. Given these types of characteristics, the following alternates comprise the range of alternates considered for this study.

- 3 Lanes (One travel lane in each direction and a two-way left-turn lane)
- 4 Lanes (Two travel lanes in each direction separated by a median)
- 5 Lanes (Two travel lanes in each direction and a two-way left-turn lane)
- 6 Lanes (Three travel lanes in each direction separated by a median)

Given that most of the corridor is in an urban / suburban setting, curb and gutter is assumed for all typical sections. For the alternates that include a median, the median could either be a narrow strip of concrete to limit right-of-way impacts or could be a landscaped grass median. Sidewalks, wide curb lanes or off-road multi-use paths could be considered with any of the alternates to accommodate bicyclists and pedestrians.

9.2.2 Alternates Evaluation

Traffic Forecasts and Level of Service – Given the broader scope of alternate type and potential combinations, the first step in evaluating the long-term alternates was to determine the need for additional travel lanes, particularly how many, to meet future traffic demand in the corridor. This included the preparation of traffic forecasts for each alternate. The traffic forecasts were prepared by the Kentuckiana Regional Planning and Development Agency (KIPDA) for the year 2030. These forecasted traffic volumes are shown in the following figures (**Figures 30 – 33**).

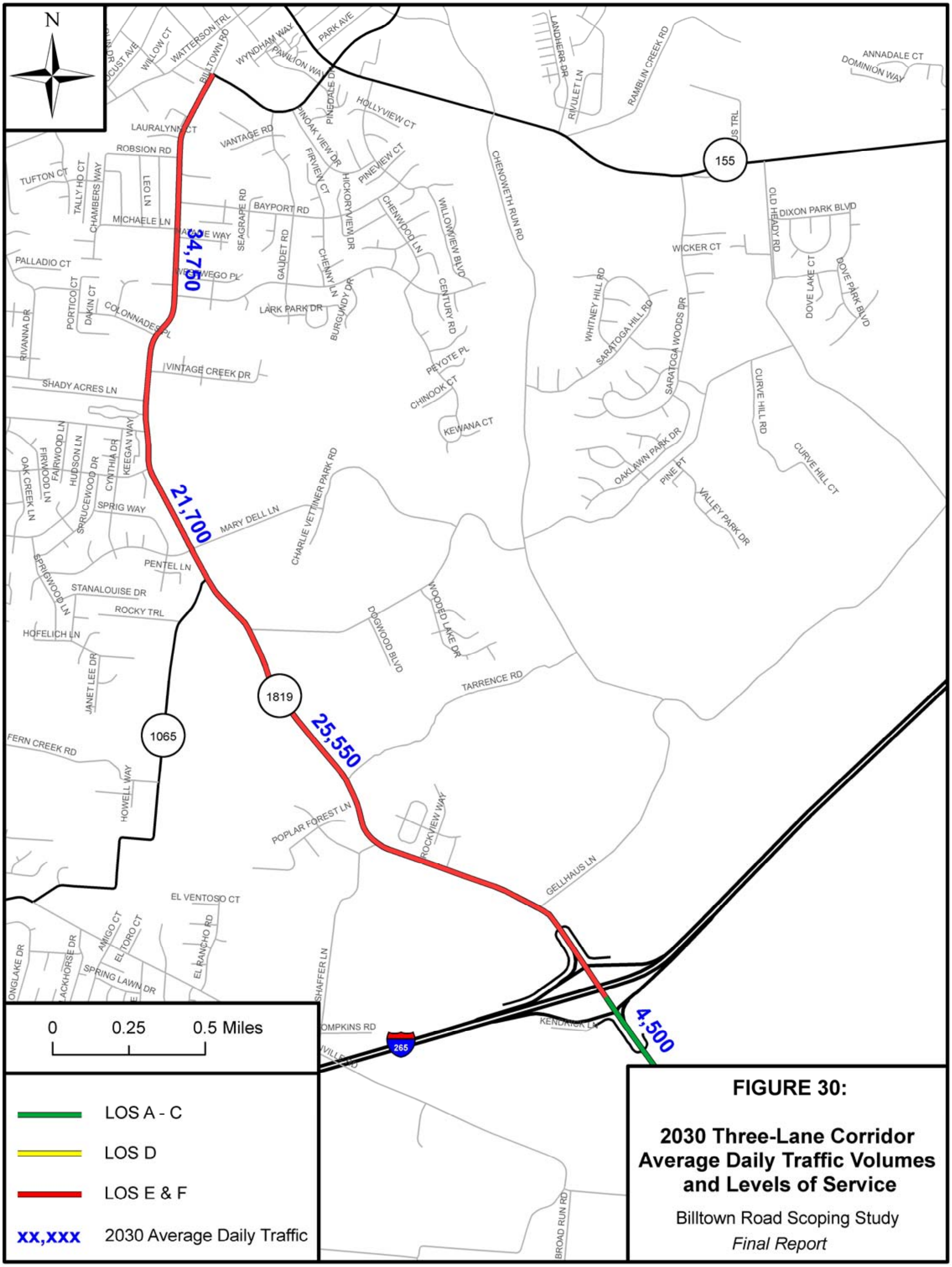


FIGURE 30:

2030 Three-Lane Corridor Average Daily Traffic Volumes and Levels of Service

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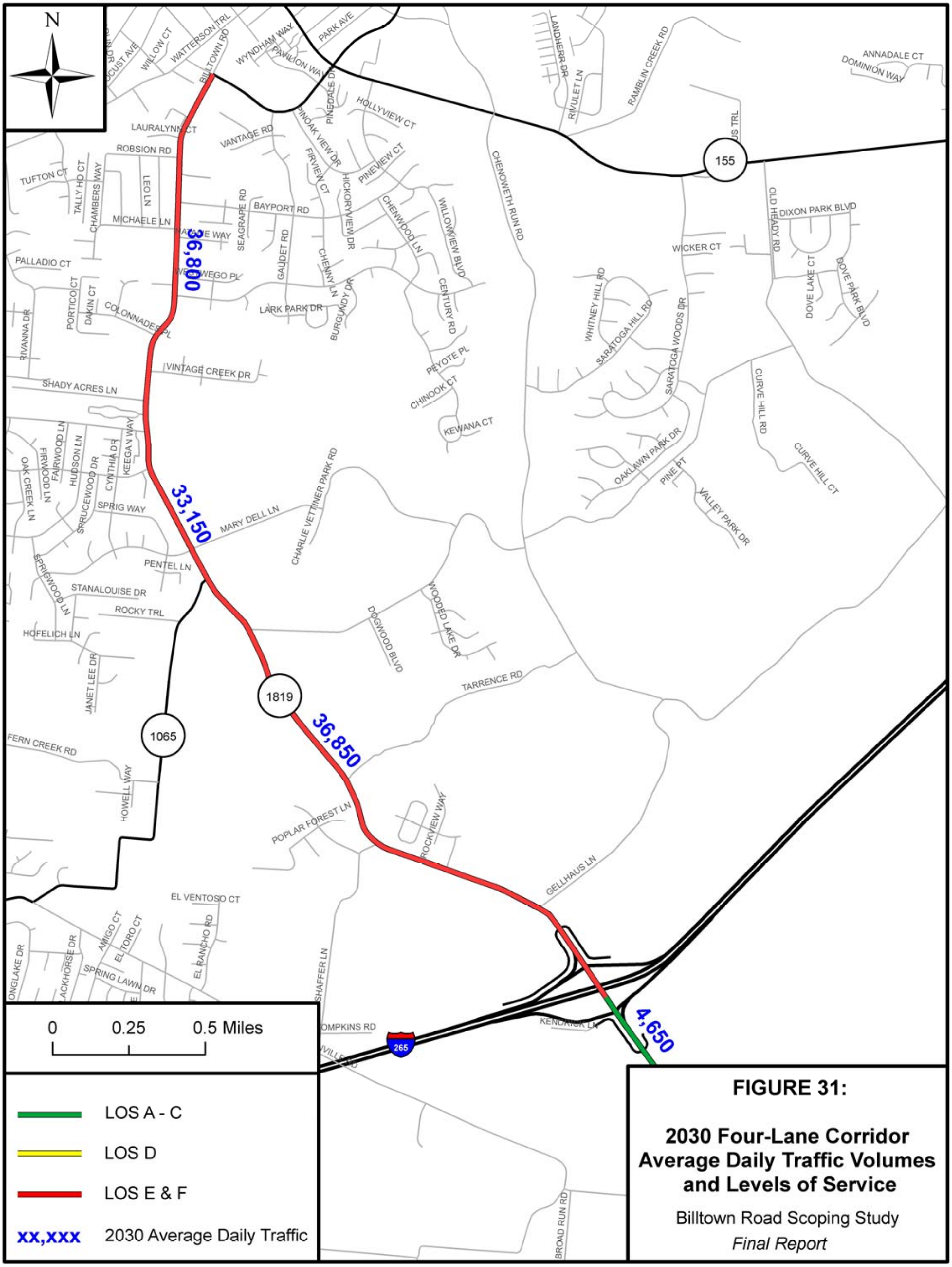

FIGURE 31:

2030 Four-Lane Corridor Average Daily Traffic Volumes and Levels of Service

Billtown Road Scoping Study

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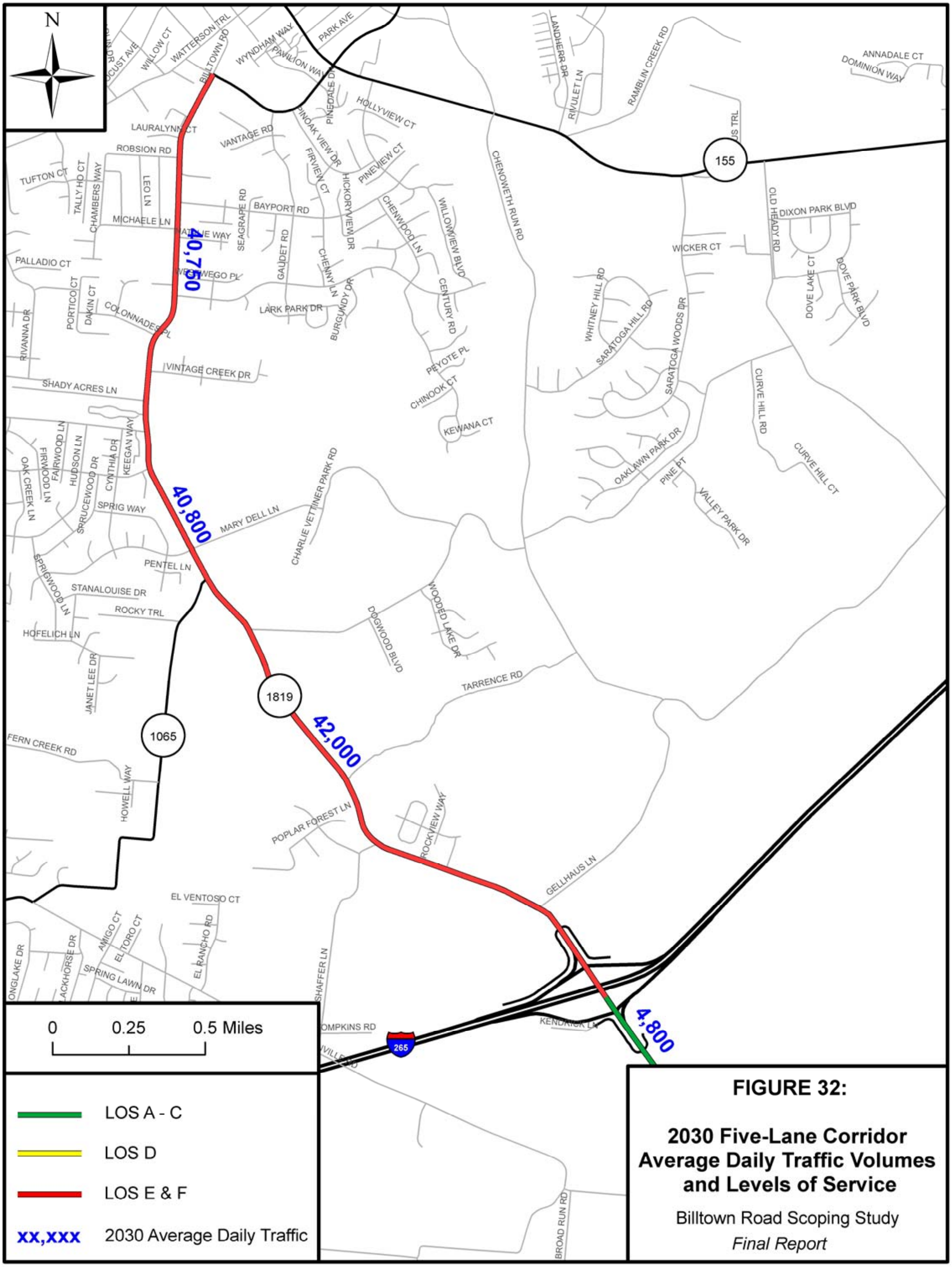

FIGURE 32:

2030 Five-Lane Corridor Average Daily Traffic Volumes and Levels of Service

Billtown Road Scoping Study

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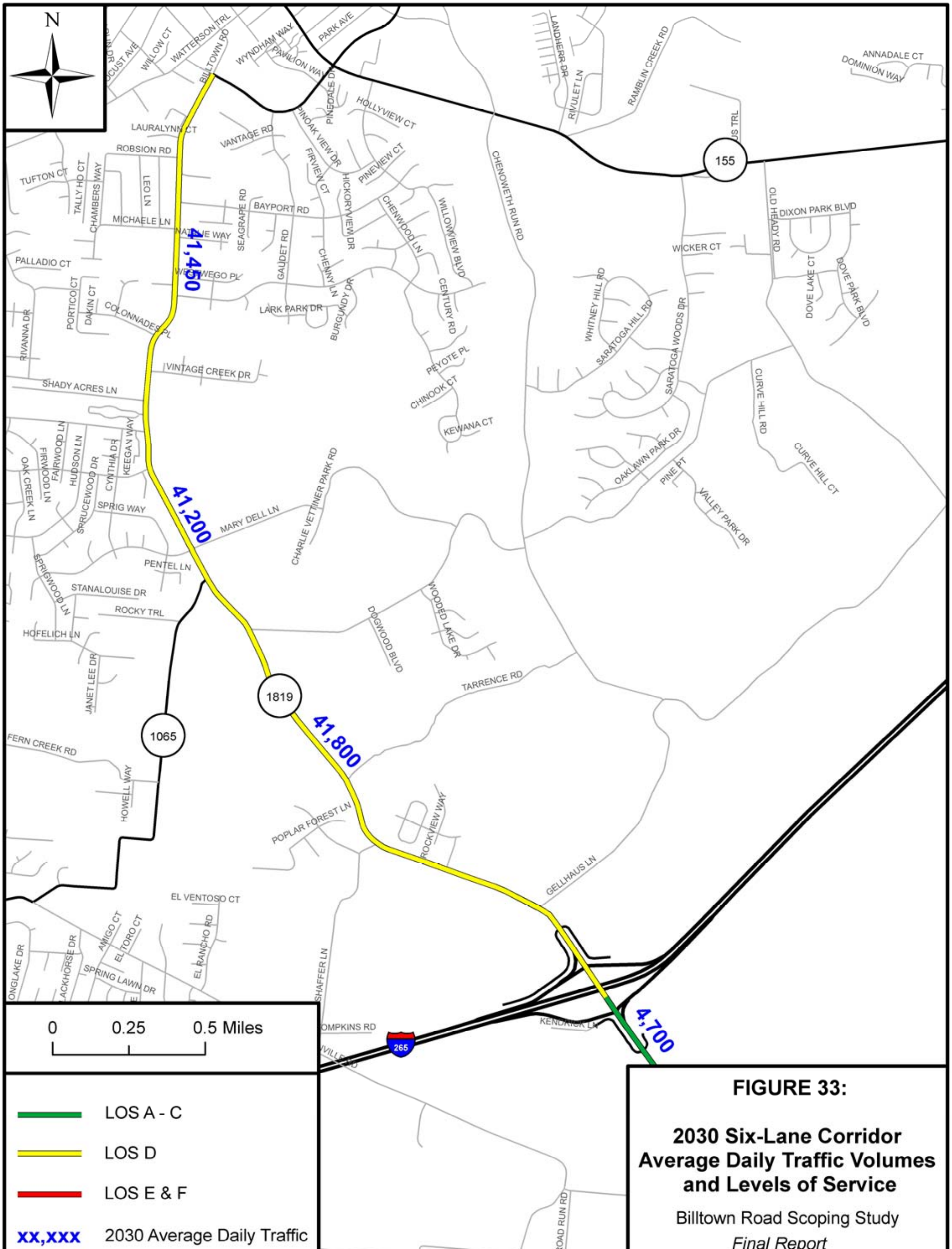

FIGURE 33:

2030 Six-Lane Corridor Average Daily Traffic Volumes and Levels of Service

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A level of service analysis was prepared for the corridor using the new forecasted volumes for each scenario. When calculating levels of service for these build alternates (3-Lane, 4-Lane, 5-Lane, and 6-Lane), it was realized that there are limitations in using the Highway Capacity Software Plus and the Highway Capacity Manual methods. With the Highway Capacity methods, there are two possible ways of analyzing the Billtown Road corridor, either as a multilane highway or as an urban street. Urban streets include arterials and collectors and typically have a high concentration of roadside development, a high density of access points and signalized intersections are spaced at less than two miles apart. Billtown Road does not meet these criteria as most of the development located along the roadside is residential with a lower frequency of access for driveways. Also, the current location of traffic signals is spaced further apart than two miles. A multilane highway generally has a posted speed limit of 40 to 55 mph, has a total of four or six lanes, may have medians, and may have traffic signals, but they are typically spaced at two miles apart or more. While Billtown Road generally fits this description of roadway type better, this still does not provide a means for analyzing the three-lane alternate. It also does not provide a means for evaluating differences between the four-lane and five-lane alternates since both divided and two-way left-turn lanes are considered medians and the Highway Capacity methods do not differentiate between the two types. Finally, when the free-flow speed drops below 45 mph, the Highway Capacity methods will not calculate a LOS. Two sections of Billtown Road are posted at 35 mph, and the other two have a 45 mph posted speed limit. After reductions for access, lane width, lateral clearance, median type, the free-flow speed for all sections drops below 45 mph.

Given these limitations, it was determined that using the Highway Capacity methods was not appropriate to develop levels of service for the different build alternates. However, a relative comparison is possible using level of service thresholds developed for various functional classifications and number of lanes based on average daily traffic. Using this method, the following levels of service were calculated for the different build scenarios as shown on **Table 31** and **Figures 30 – 33**. These levels of service should be used for comparison purposes only and not assumed to be the ultimate achievable level of service, although they should be correct in magnitude (i.e. if the level of service is poor – LOS E or F, the section is likely to operate poorly).

As shown on the table, almost all sections operate poorly for all scenarios with the exception of the section south of I-265 and the six-lane build scenario. This is likely due to the fact that as the number of travel lanes increases, more traffic is attracted to the roadway thus preventing the level of service to improve. Knowing this, it is difficult to make a determination of which alternate is preferred based on traffic volumes alone.

Table 31: 2030 Build Corridor Levels of Service

Alternate	Section	Begin Milepoint	End Milepoint	Section Length (miles)	2030 ADT	K-Factor	2006 DHV	Posted Speed Limit (MPH)	% Trucks and Buses	LOS
3-LaneAlternate	1	3.930 (Beg. of Study Area)	5.180 (I-265)	1.25	4,500	0.133	599	35	5.4%	A
	2	5.181 (I-265)	7.139 (Lovers Lane)	1.96	25,550	0.108	2759	45	4.6%	F
	3	7.140 (Lovers Lane)	7.770 (Shady Acres Lane)	0.63	21,700	0.112	2430	45	5.0%	E
	4	7.771 (Shady Acres Lane)	8.885 (Ruckriegel Parkway)	1.11	34,750	0.106	3684	35	5.0%	F
4-Lane Alternate	1	3.930 (Beg. of Study Area)	5.180 (I-265)	1.25	4,650	0.133	618	35	5.4%	A
	2	5.181 (I-265)	7.139 (Lovers Lane)	1.96	36,850	0.108	3980	45	4.6%	F
	3	7.140 (Lovers Lane)	7.770 (Shady Acres Lane)	0.63	33,150	0.112	3713	45	5.0%	F
	4	7.771 (Shady Acres Lane)	8.885 (Ruckriegel Parkway)	1.11	36,800	0.106	3901	35	5.0%	F
5-LaneAlternate	1	3.930 (Beg. of Study Area)	5.180 (I-265)	1.25	4,800	0.133	638	35	5.4%	A
	2	5.181 (I-265)	7.139 (Lovers Lane)	1.96	4,200	0.108	454	45	4.6%	F
	3	7.140 (Lovers Lane)	7.770 (Shady Acres Lane)	0.63	40,800	0.112	4570	45	5.0%	F
	4	7.771 (Shady Acres Lane)	8.885 (Ruckriegel Parkway)	1.11	40,750	0.106	4320	35	5.0%	F
6-Lane Alternate	1	3.930 (Beg. of Study Area)	5.180 (I-265)	1.25	4,700	0.133	625	35	5.4%	A
	2	5.181 (I-265)	7.139 (Lovers Lane)	1.96	41,800	0.108	4514	45	4.6%	D
	3	7.140 (Lovers Lane)	7.770 (Shady Acres Lane)	0.63	41,200	0.112	4614	45	5.0%	D
	4	7.771 (Shady Acres Lane)	8.885 (Ruckriegel Parkway)	1.11	41,450	0.106	4394	35	5.0%	D

LOS E - F
LOS D
LOS A - C

Notes:
ADT = Forecasted Volumes from KIPDA based on output from their Regional Travel Demand Forecasting Model
K-Factor = Design Hour Factor obtained from KYTC counts
DHV = 2030 Design Hour Volume (Average Daily Traffic x K-Factor)
Speed Limit obtained from Highway Information System
% Trucks and Buses obtained from KYTC counts
Level of Service (LOS) based on Alabama DOT and Maryland SHA LOS Reference Sheet

Property Impacts – A major issue in addition to traffic volume and demand on the Billtown Road Corridor is right-of-way. Billtown Road is currently two lanes with very narrow shoulders and mostly residential development located in close proximity to the roadway leaving little room for expansion. A review of property impacts associated with each build scenario was performed to determine the magnitude of impact. This is shown in **Table 32** below.

Table 32: Build Alternate Property Impacts

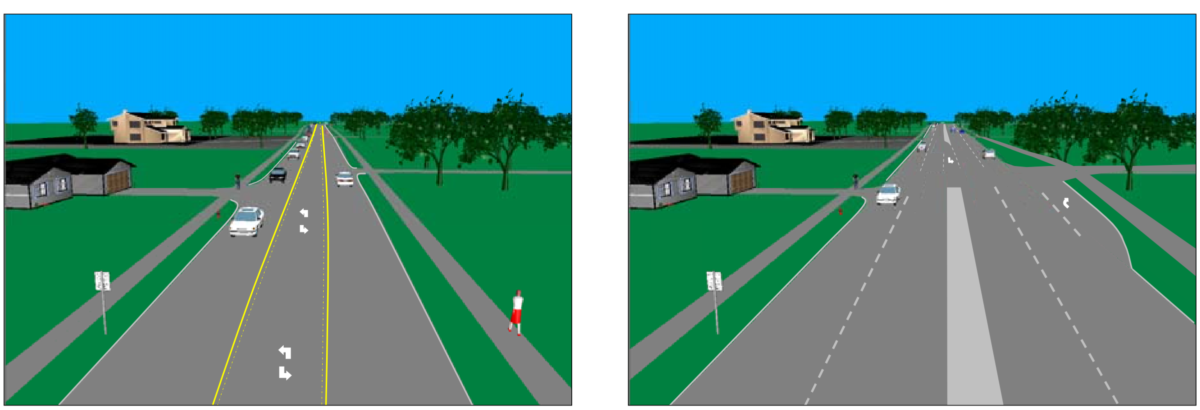
Alternate	# of Properties Impacted		Total Acreage	
	with Sidewalk	w/o Sidewalk	with Sidewalk	w/o Sidewalk
3-Lane	216	191	12.2	8.9
4-Lane	252	245	28.2	24.5
5-Lane	252	249	29.8	25.9
6-Lane	255	255	47.0	43.0

In order to determine the total acreage impacted, some assumptions were made regarding the typical section for each alternate. Typical section widths were used for the travel lanes (12 feet), curb and gutter is used for the entire length, and the median / two-way left-turn lane is assumed to be 14 feet.

Based on this analysis, all of the alternates have some degree of impact to the existing development, although the 5-lane and 6-Lane alternates are very high and may not be reasonable given the fact that the 5-Lane alternate still does not improve corridor level of service. Therefore, only the 3-Lane and 4-Lane alternates were considered beyond this point. During a project team meeting on February 22, 2007, this was decision was agreed upon by those in attendance.

Public Input – For the second public meeting held on February 27, 2007, the two primary alternates (3-Lane and 4-Lane) were presented to the public. **Figure 34** shows the general concept of these alternates as presented to the public.

Figure 34: 3-Lane and 4-Lane Alternates



As shown in the figure, the 3-Lane alternate includes one travel lane in each direction as well as a center two-way left-turn lane. The 4-Lane alternate has two travel lanes in each direction as well as a narrow concrete median. The median is shown as a narrow concrete strip to minimize property impacts. However, the actual median type could change if this was selected as the preferred alternate.

Only eight people provided input as to which typical section should be applied to the Billtown Road corridor in the future, and they were evenly split on which alternate they preferred (4 for the 3-Lane alternate and 4 for the 4-Lane alternate). When asked if the same type of section should be applied to the entire corridor or if different sections should be applied to different locations, most respondents indicated they would like to see the same look applied throughout the corridor.

Based on this response, the public input also does not provide much distinction between which alternate should be recommended.

Median versus Two-Way Left-Turn Lane – Much research and analysis has been performed in determining the implications with constructing a two-way left-turn lane as opposed to a median. Some of the benefits of each include:

Median:
- Allows for landscaping and aesthetic improvements
- Reduces headlight glare from opposing traffic
- Allows for a refuge area for pedestrians

Two-Way Left-Turn Lane (TWLTL):
- Provides additional storage for turning vehicles
- Maintains full access for driveways and businesses
- Minimizes landscaping and the associated maintenance requirements

In order to determine if one is better suited for this corridor than the other, a comparative analysis was performed that included several evaluation categories (safety, traffic operations, access and control, aesthetics, and cost/economics). Following the category listing below is a brief comparison of how each type of median treatment works with regard to that category.

Safety:
- Comparing crash rates, a TWLTL has a higher crash rate and is more dangerous for pedestrians (Georgia Department of Transportation Study of Divided Highways between 1995 and 1998).
- Both types of divided highways reduce rear-end collisions, but other types of crashes may increase including head-on crashes associated with a TWLTL and run-off road crashes associated with a median.

Traffic Operations:

- Research from Oregon State University suggests that when traffic volumes exceed 24,000 vehicles per day (except in an urban area) then a TWLTL should be replaced. For a three-lane scenario, traffic volumes just north of I-265 and just south of Ruckriegel Parkway exceed 24,000 vehicles per day. The middle section near Mary Dell Lane is near the threshold (21,000 vehicles per day).
- For analysis purposes, both types of divided highways accommodate the same volumes of traffic and there is essentially no difference in level of service operations.
- Points of access alter the functionality of both highway types.

Access and Control:

- As access density increases, the potential for conflicts and collisions also increases.
- Installing a median limits conflict points at intersections. For example, at a typical intersection with three approaches, installing a median limits access to right-in, right-out turns only and results in two conflict points. If a TWLTL was installed at the same location, full movements would be allowed resulting in ten conflict points.

Aesthetics:

- Divided highways can use different alignments for each direction of travel, with potential for saving construction costs and being more aesthetically pleasing.
- A TWLTL separates the travel lanes, but does not allow any room for landscaping.

Cost:

- Landscaped medians require maintenance regularly whereas a TWLTL does not.

The following table (**Table 33**) summarizes the comparison between a median and a TWLTL.

Table 33: Median versus TWLTL Comparison Table

Criteria	Median	TWLTL
Safety	✓	
Traffic Operations	No difference operationally, but traffic volumes may be too high for TWLTL	
Access and Control	✓	
Aesthetics	✓	
Cost		✓

Cost – A planning level cost estimate was prepared for both the 3-Lane and the 4-Lane alternates. The cost estimate is for construction cost only of the roadway and does not include design, right-of-way, or utility costs. It also does not include sidewalk or bicycle lane costs as these may be incorporated with either alternate. The typical section assumptions used in the cost estimate for each are as follows:

3-Lane Alternate:

- Two 12-foot travel lanes
- 14-foot two-way left-turn lane
- Curb and gutter

4-Lane Alternate:

- Four 12-foot travel lanes
- 8-foot median (Barrier Type 5)
- Curb and gutter

Based on these assumptions, the 2007 planning level cost estimates for each alternate (including a 25% contingency) are:

3-Lane Alternate: $8.90 million
4-Lane Alternate: $14.98 million

Multimodal Aspects – Billtown Road currently does not have any bus service, and based on comment forms returned at the second pubic meeting, there is not a strong desire from these respondents (11) to have this type of service or use it. The total number of citizens signed in at the public meeting was 112; however some were at the meeting to discuss a separate study (Taylorsville Road). Regardless, there was little public interest at the meeting regarding bus service along Billtown Road.

There are no designated bicycle lanes along Billtown Road and sidewalks are intermittent. Based on feedback from the public, improving the connectivity of sidewalks was viewed as much more important than the installation of bicycle lanes. Several people commented on the need for sidewalk continuity, particularly because of the fact that there are several schools that are accessed from Billtown Road along with a park and golf course. In addition to the public input, a review of plans for a bicycle network from Louisville Metro showed that Billtown Road is not considered one of the priority bicycle routes.

Comparison Matrix – To provide a better understanding of the benefits and drawbacks for each of the primary alternates (3-Lane Alternate or the 4-Lane Alternate), a summary evaluation matrix was compiled consisting of the evaluation criteria discussed above (**Table 34**). As with previous matrices, green indicates good performance and red indicates poor performance.

Table 34: Billtown Road Corridor Evaluation Matrix

Alternate Description	LOS	Property Impacts (with Sidewalk)	Public Input	Median vs TWLTL Comparison	Cost* (in millions)
3-Lanes: One Travel Lane in Each Direction plus a Two-Way Left-Turn Lane	E/F	216	4 Responses in Favor of Alternate	Poor Performance Based on Evaluation Criteria	$8.9
4-Lanes: Two Travel Lanes in Each Direction plus a Median	F	252	4 Responses in Favor of Alternate	Good Performance Based on Evaluation Criteria	$15.0

* Planning level cost estimate in 2007 dollars. Does not include utilities or right-of-way costs.

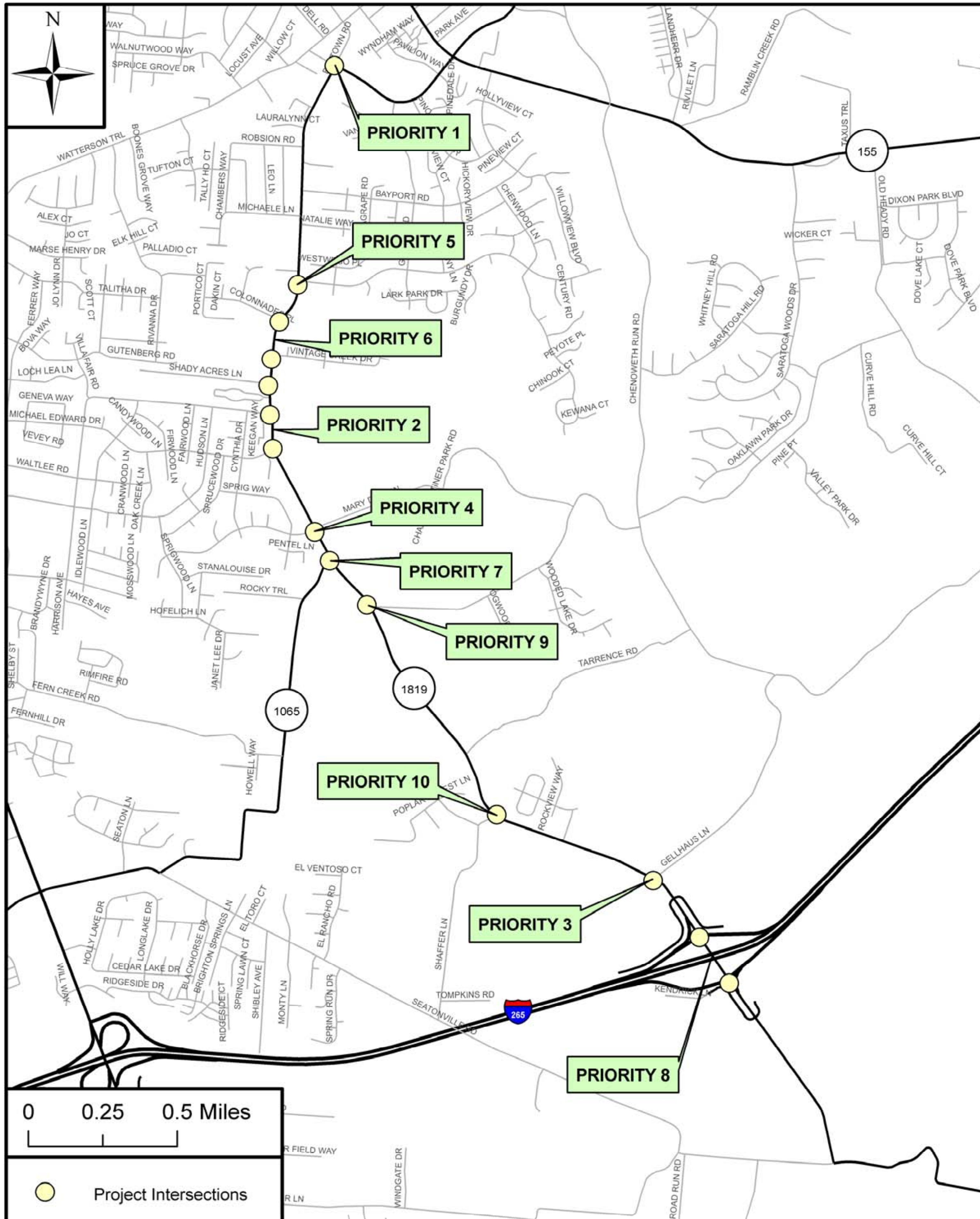
10.0 ALTERNATES RECOMMENDATION

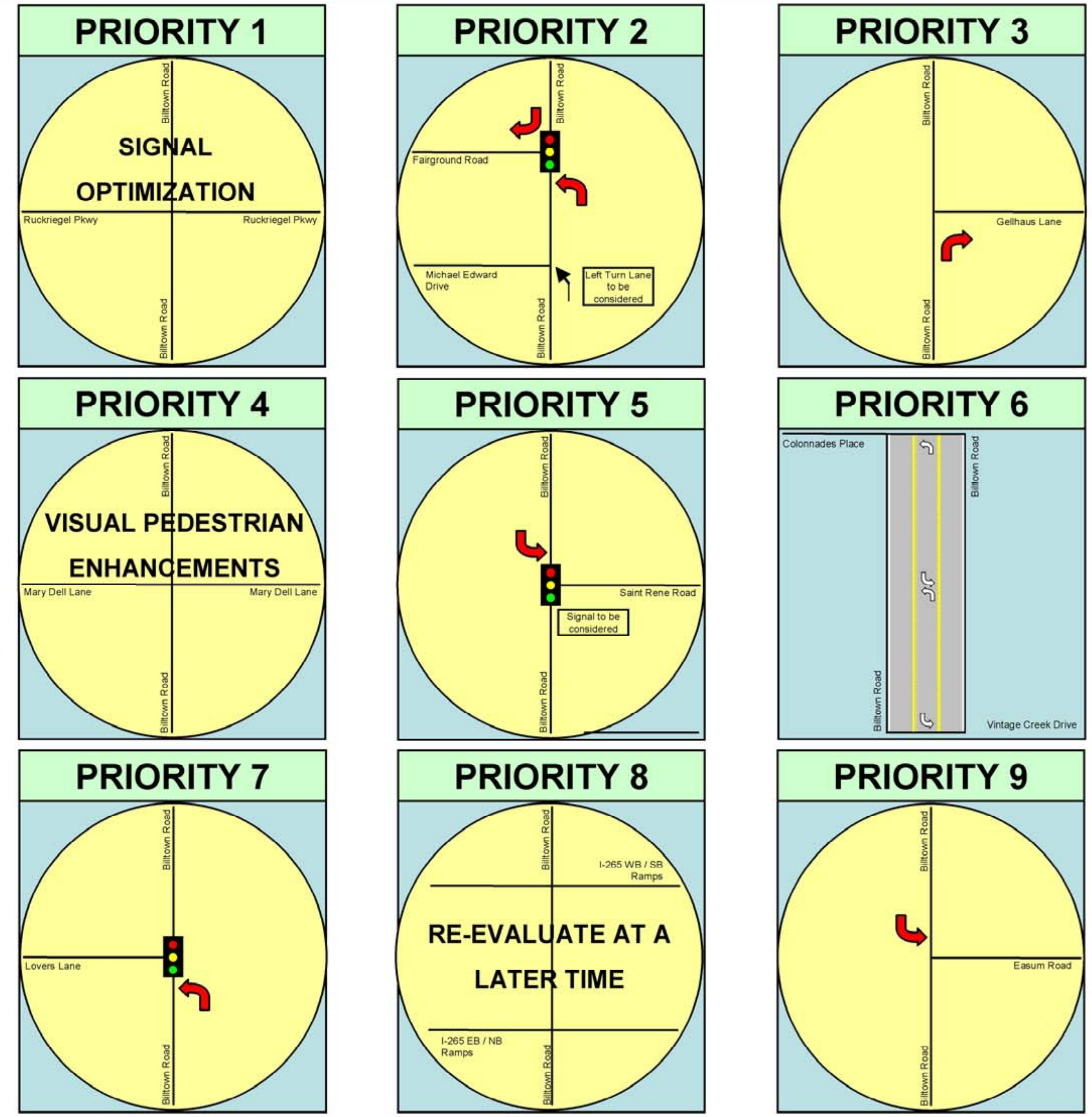
10.1 Short-Term Recommendations

Based on the evaluation criteria supplied in **Tables 17 – 30**, the Synchro / SimTraffic analysis, and a project team meeting held on July 6, 2007, the following are the short-term intersection recommendations. Also refer to **Figure 35** for a graphical summary of the recommendations.

Intersection	Alternate
Ruckriegel Parkway	Signal Optimization as Currently Being Pursued by KYTC
Saint Rene Road	SB Left Turn Lane from Billtown Road to Saint Rene Road First, then Signalization
Colonnades Place	Alt. 4 – Two-Way Left-Turn Lane between Vintage Creek Drive and Colonnades Place
Vintage Creek Drive	Same as the Recommendation for Colonnades Place
Shady Acres Lane	Do Nothing
Fairground Road	Alt. 4 – Signalization with Separate Turn Lanes
Michael Edward Drive	Evaluate Signal Operation at Fairground Road, Consider NB Left Turn Lane from Billtown Road to Michael Edward Drive
Mary Dell Lane	Pedestrian Enhancements (signs, upgraded markings with actuated flashing beacons, etc.)
Lovers Lane	Signalization with NB Left Turn Lane from Billtown Road to Lovers Lane Pending the Urton Lane Recommendation

Intersection	Alternate
Easum Road	SB Left Turn Lane from Billtown Road to Easum Road
Shaffer Lane	NB Left Turn Lane from Billtown Road to Shaffer Lane
Gellhaus Lane	Alt. 2 – NB Right Turn Lane from Billtown Road to Gellhaus Lane
I-265 WB/SB Ramps	Re-evaluate upon Completion of Elementary and Middle School
I-265 EB/NB Ramps	Re-evaluate upon Completion of Elementary and Middle School





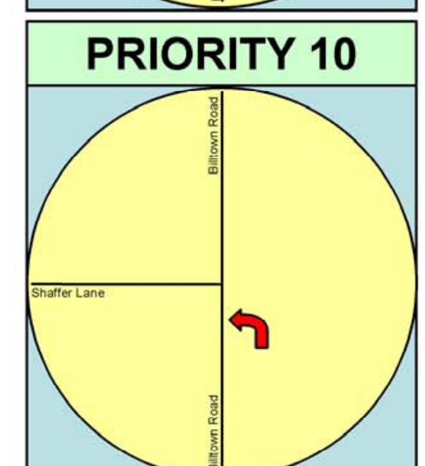


FIGURE 35:

High Priority Short-Term Recommendations

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The following text provides some discussion / justification regarding the selection of each alternate.

Ruckriegel Parkway – Based on conversations with the Project Team at a meeting held on July 6, 2007, KYTC District 5 was already in the process of optimizing the signal at this location. While the analysis provided in this report indicates that the intersection may still operate poorly, this was identified as a low-cost solution that is in line with the City of Jeffersontown's vision(s) and plan. They do not want any significant impacts to the intersection that would detract from the small, downtown feel that is in their master plan, and are therefore not recommending the construction of additional through or turn lanes that would increase traffic flow through the downtown Jeffersontown area. Due to the concern of major impacts to the aesthetics, property and potential cemetery impacts, and the plans currently being pursued by the KYTC District 5, signal optimization was recommended as the preferred alternate.

Saint Rene Road – Signal warrants are currently not met for the installation of a traffic signal at this location; however, with the additional growth in the Billtown Road corridor as well as the known crash rate problem at this location, a traffic signal may be warranted by the year 2010. To initially address the safety issue at this location, it is recommended that a southbound left turn lane be constructed first, then signal warrants re-evaluated with the potential for signal installation in the future.

Colonnades Place and Vintage Creek Drive – Both of these intersections lead into neighborhoods, with the primary concern being the high crash rate on Billtown Road between the two intersections. To improve safety, a two-way left-turn lane is recommended which should reduce the number of rear-end crashes that occur on this segment. Traffic signals were considered for both intersections to improve traffic operations, however, traffic volumes are such that neither one meet signal warrants currently.

Shady Acres Lane – A "Do Nothing" approach is recommended for this intersection since Shady Acres Lane is a dead-end street and the traffic volumes on Shady Acres Lane are very low.

Fairground Road – The recommended alternate for this intersection is the installation of a traffic signal along with the construction of separate turn lanes on both Fairground Road and Billtown Road. This intersection is in close proximity to Michael Edward Drive; therefore only one intersection should be signalized. It is thought that the other intersection will benefit from the gaps provided by the new signal. Based on traffic volumes and available data, this intersection was selected over Michael Edward Drive for signal installation. Traffic volumes are such that Warrant 1 of the traffic signal warrants is met. While the proposed improvements at this intersection have the highest cost, they also will provide the best improvement in LOS / delay, would improve safety, and were selected by the public as their preferred alternate.

Michael Edward Drive – With the proposed installation of a traffic signal at Fairground Road, it is recommended that traffic operations be re-evaluated at this intersection following the upstream signal installation. After installation of the signal, traffic operations should be re-evaluated to consider the installation of a northbound left turn lane from Billtown Road to Michael Edward Drive. This is the preferred recommendation with the thought that the improvements at Fairground Road should result in improvements at this intersection as well.

Mary Dell Lane – As none of the alternates sufficiently improves the level of service to justify the associated cost, no improvements are recommended at this time for traffic operations. Instead, the focus at this intersection is on pedestrian improvements to provide a safe path for pedestrians through the intersection to the park and school located on Mary Dell Lane. It is recommended that one of the new, experimental, pedestrian signal systems be considered for this location that provides enhanced warning for vehicles prior to the pedestrian crossing and lights up the pedestrian with a flashing strobe light. Any in-pavement modifications are discouraged as they are likely to cause issues with maintenance including snow removal. Also, new advanced warning pedestrian signage and retro-reflective pavement markings should be installed.

Lovers Lane – The recommendation for this intersection is the installation of a traffic signal as well as construction of a northbound left turn lane. This recommendation varies slightly from the alternates previously presented in that only a northbound left turn lane is constructed as opposed to exclusive turn lanes in both directions on Billtown Road or an exclusive southbound right turn lane only on Billtown Road. This was determined based on traffic operations and safety. Traffic volumes are such that Warrants 2 and 3 are met for signal installation; however, additional turning movement data should be collected to determine if traffic volumes are high enough during the off-peak hours to justify signal installation.

It should also be noted that this recommendation is pending the location of the Urton Lane Extension. Depending on where it crosses Billtown Road, signalization will be considered at the new intersection and there is concern that multiple signals may be too closely spaced since the Urton Lane Extension may be located in the vicinity of Lovers Lane.

Easum Road – Currently, a traffic signal is not warranted at this location; therefore the only recommendation for improvements at this time is the construction of a southbound left turn lane. This is primarily to improve safety at this intersection and reduce the number of rear-end crashes.

Shaffer Lane – Similar to the analysis at Easum Road, currently, a traffic signal is not warranted at this location; therefore the only recommendation for improvements at this time is the construction of a northbound left turn lane. This is primarily to improve safety at this intersection and reduce the number of rear-end crashes.

Gellhaus Lane – The preferred recommendation at this intersection is the construction of a separate northbound right turn lane along with signal optimization. This alternate resulted in the best level of service / delay improvement and was selected by the public as their preferred alternate as well.

At the time of this report, the new residential housing development planned to be located along Gellhaus Lane was approved by the Louisville Metro Planning Commission. As a condition of approval, the developer will be responsible for constructing the right turn lane on Billtown Road to Gellhaus Lane along with widening Gellhaus Lane the length of their frontage.

I-265 WB/SB Ramps and EB/NB Ramps – With the uncertainty of the increase in traffic through the interchange due to the new schools and bus compound, it is recommended that these interchanges be re-evaluated upon the opening of the schools. New traffic counts should be performed at that time with traffic signal installation at one or both intersections considered.

10.2 Long-Term Recommendations

Based on the technical analysis presented in Section 9.2, it was decided by the Project Team at a meeting held on July 6, 2007 that the preferred long-term recommendation is a three-lane section (one lane in each direction and a two-way left-turn lane) along Billtown Road with curb and gutter the entire corridor. Sidewalks would be included as appropriate, however, a separate bicycle lane was not recommended due to lack of public support and minimal right-of-way which would result in high property impacts. Additional discussion regarding the recommendation specifics such as design elements is presented in the following section.

11.0 PROPOSED DESIGN / MITIGATION AND NEXT STEPS

11.1 Design Elements

For the intersection recommendations, specific design elements will be determined in the next phase of project development.

For the long-term corridor recommendation, the following design elements are assumed which form the basis for the cost estimate.

- Two 12-foot travel lanes
- 14-foot two-way left-turn lane
- Curb and gutter
- Sidewalks on both sides of Billtown Road

More detailed design plans will be developed in the next phase of project development.

11.2 Design Issues

For all alternates recommended, acquiring adequate right-of-way is a major issue as the current available right-of-way is minimal. As discussed in the alternates evaluation sections, there will be multiple property impacts associated with any build alternate; however, the ensuing design should take this into consideration and minimize the impacts to the greatest extent possible.

Also, the recommendation for the Urton Lane Extension should be taken into consideration when designing / implementing the recommendations for the Lovers Lane, Shaffer Lane, Easum Road, and Gellhaus Lane intersections. It is the desire of KYTC to ensure that any recommendations from both studies are compatible and that any new signal installations are placed in appropriate locations (i.e. at the intersections of Urton Lane and Billtown Road).

11.3 Cost Estimate

Final 2007 planning level cost estimates have been developed for each of the recommended projects. The estimated construction costs are listed in **Table 35** for each project. Design, right-of-way, utility, and other mitigation costs are not presented. These cost estimates, in 2007 dollars, are for planning purposes only and are subject to further refinement during the design phase.

Table 35: Recommended Projects Cost Estimates

Project	Cost
Ruckriegel Parkway – Signal Optimization as Currently Being Pursued by KYTC	**Minimal**
Saint Rene Road – SB Left Turn Lane from Billtown Road to Saint Rene Road First, then Signalization	**$200,000**
Colonnades Place and Vintage Creek Drive – Two-Way Left-Turn Lane b/w Vintage Creek Drive and Colonnades Place	**$180,000**
Fairground Road – Signalization with Separate Turn Lanes	**$460,000**
Michael Edward Drive – Consider NB Left Turn Lane from Billtown Road to Michael Edward Drive	**$200,000**
Mary Dell Lane – Pedestrian Enhancements (signs, upgraded markings with actuated flashing beacons, etc.)	**$75,000**
Lovers Lane – Signalization with NB Left Turn Lane from Billtown Road to Lovers Lane Pending the Urton Lane Recommendation	**$330,000**
Easum Road – SB Left Turn Lane from Billtown Road to Easum Road	**$200,000**
Shaffer Lane – NB Left Turn Lane from Billtown Road to Shaffer Lane	**$200,000**
Gellhaus Lane – NB Right Turn Lane from Billtown Road to Gellhaus Lane*	**$140,000**

*Note: To be completed by Gellhaus Lane developer in conjunction with the construction of a new housing development located off of Gellhaus Lane.

11.4 Right-of-Way Impact Assessment

For the short-term recommended projects, detailed right-of-way impact assessments were performed. These are planning level estimates only and should be used as a guide for proceeding into subsequent project development phases. **Table 36** lists the impacts for each project in terms of acres required for improvements.

Table 36: Recommended Projects Right-of-Way Estimates

Project	Acres
Ruckriegel Parkway – Signal Optimization as Currently Being Pursued by KYTC	**0**
Saint Rene Road – SB Left Turn Lane from Billtown Road to Saint Rene Road First, then Signalization	**0.85**
Colonnades Place and Vintage Creek Drive – Two-Way Left-Turn Lane b/w Vintage Creek Drive and Colonnades Place	**1.60**
Fairground Road – Signalization with Separate Turn Lanes	**1.54**
Michael Edward Drive – Consider NB Left Turn Lane from Billtown Road to Michael Edward Drive	**1.71**
Mary Dell Lane – Pedestrian Enhancements (signs, upgraded markings with actuated flashing beacons, etc.)	**0**
Lovers Lane – Signalization with NB Left Turn Lane from Billtown Road to Lovers Lane Pending the Urton Lane Recommendation	**1.92**
Easum Road – SB Left Turn Lane from Billtown Road to Easum Road	**2.76**
Shaffer Lane – NB Left Turn Lane from Billtown Road to Shaffer Lane	**2.41**
Gellhaus Lane – NB Right Turn Lane from Billtown Road to Gellhaus Lane	**0.94**

It should be noted that some projects overlap and have an impact on how much right-of-way is required overall. If the project at Michael Edward Drive is completed first, then the required right-of-way for the Fairground Road project is 1.15 acres. If the Fairground Road project is completed first, then the required right-of-way for the Michael Edward Drive project is 1.32 acres. A similar situation exists for the Lovers Lane and Easum Road projects. If the Easum Road project is completed first, then the required right-of-way for the Lovers Lane project is 0.70 acres. If the Lovers Lane project is completed first, then the required right-of-way for the Easum Road project is 1.54 acres.

11.5 Project Phasing

The following is the priority ranking for the short-term intersection improvements as determined during a project team meeting on July 6, 2007.

1. Traffic Signal optimization at Ruckriegel Parkway (currently being pursued by KYTC).

2. Traffic signal installation at the Fairground Road intersection along with the construction of separate turn lanes on both Fairground Road and Billtown Road. A northbound left turn lane may be considered at Michael Edward Drive pending the implementation of improvements at the Fairground Road intersection.

3. Construction of a northbound right turn lane from Billtown Road to Gellhaus Lane and traffic signal optimization. The turn lane is to be constructed by a developer in conjunction with construction of a new housing development along Gellhaus Lane. As a result, this project may not need to be funded by KYTC and can be removed from the project prioritization list.

4. Visual pedestrian enhancements at the Mary Dell Lane intersection.

5. Construction of a southbound left turn lane from Billtown Road to Saint Rene Road. Consideration of the installation of a traffic signal would follow depending on the resulting improvement from the turn lane installation.

6. Construction of a two-way left-turn lane between Colonnades Place and Vintage Creek Drive.

7. Traffic signal installation at Lovers Lane along with the construction of a separate northbound left turn lane from Billtown Road to Lovers Lane.

8. Re-evaluate the I-265 ramps intersections following the opening of both new schools along Gellhaus Lane.

9. Construction of a southbound left turn lane from Billtown Road to Easum Road.

10. Construction of a northbound left turn lane from Billtown Road to Shaffer Lane.

The recommendation of a three-lane section for Billtown Road is a long-term solution and has less priority than the intersection recommendations.

11.6 Multimodal Facilities

There are no freight or transit facilities in the study area; therefore, these facilities would not be impacted by the study recommendation.

Bicycle and pedestrian provisions have been evaluated in keeping with the KYTC Pedestrian and Bicycle Travel Policy (July 2002). Care should be taken in the placement of shoulder rumble strips to avoid conflicts with the travel way for cyclists. For the urban typical sections, sidewalks should be included.

11.7 Intelligent Transportation Systems (ITS)

Although examined, no intelligent transportation systems have been included in the proposed recommendations.

11.8 Commitment Action Plan

KYTC is committed to incorporating appropriate pedestrian and bicycle facilities into the proposed highway projects. KYTC is also committed to working with KTC/SHPO as the project progresses to avoid, to the greatest extent possible, impacts to any identified existing and/or National Register eligible properties.

11.9 Next Steps / Implementation

Following approval of this report by KYTC, funding should be allocated out of the remaining funds for this project to acquire right-of-way, for utility work, design, and possible construction for the high priority projects discussed in Section 11.5. For the remaining projects, these should be included in the KYTC Six-Year Highway plan for future funding. The corridor recommendation should be included in the district's long range plan for future consideration.