HIGHWAY 10 STEP INNOVATION STUDY (Little Rock) (S)

PULASKI COUNTY

FINAL TRAFFIC REPORT

Prepared by Garver for the
City of Little Rock and Metroplan
In cooperation with the Federal Highway Administration

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1.0 Introduction

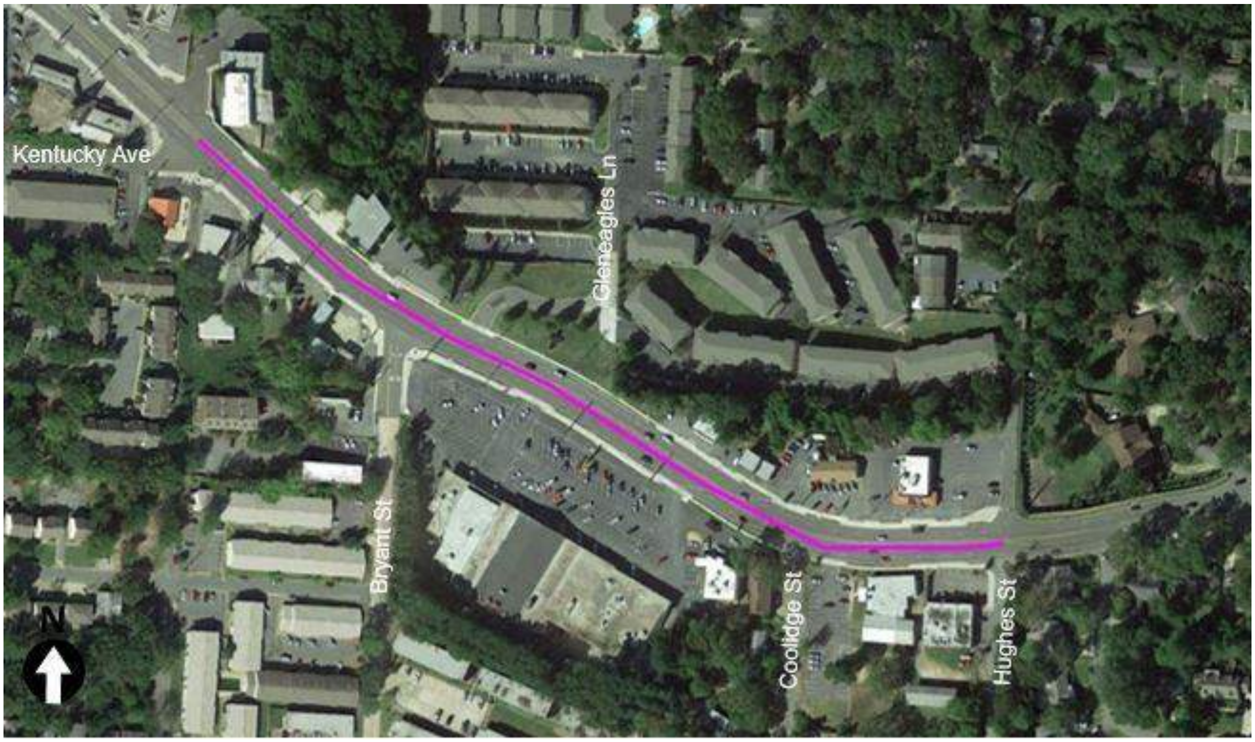
This Traffic Report was developed in order to achieve the following goals:

- Identify the pedestrian and bicyclist safety issues that exist within the Highway 10 project corridor.
- Identify and evaluate potential countermeasures to address current and long-term needs.
- Recommend select countermeasures for implementation.

1.1 Background

Highway 10, also known as Cantrell Road, serves as a principal arterial facility through Little Rock. The study area extends from Kentucky Street on the west end to Hughes Street on the east end. The posted speed limit is 35 miles per hour (mph). This segment of Highway 10 contains four traffic lanes and a two-way left turn lane (TWLTL) with sidewalks along both sides of the roadway. The TWLTL was installed on May 26, 2016. Three bus stops are located within the study area: one at Bryant Street, one at Coolidge Street, and one at Gleneagles Lane. There are also two bus stops just outside of the study area located west of Kentucky Avenue. A map of the study corridor is shown in **Figure 1** on the following page**.**

Figure 1: Highway 10 Study Corridor



2.0 Existing Conditions

In order to identify and evaluate appropriate countermeasures for pedestrian and bicyclist safety issues within the corridor, data was collected and existing conditions were observed. The findings from this effort are described in the following subsections.

2.1 Data Collected

The following data was collected for this study:

- The most recent stops and schedule information for the Rock Region METRO bus system were obtained and verified during the site visit. A METRO bus (Route 1 – Pulaski Heights) services the bus stops within the study area from 5:37 AM to

6:48 PM, approximately every 35 minutes on weekdays and every 45 minutes on Saturdays throughout the day. Detailed bus schedule information is provided in **Appendix A – Traffic Data**. **Table 1** shows 2018 ridership data for the bus stops in the study area. Based on the 2018 ridership data, the majority of the bus riders board the bus at the Bryant Street bus stop and disembark at the Gleneagles bus stop.

Table 1: 2018 Bus Stops Ridership Data

Stop Name	Boardings	Alightings	Total
Cantrell Rd & Bryant St	2632	519	3151
Cantrell Rd & Gleneagles Ln	144	1326	1470
Cantrell Rd & Coolidge St	16	342	358
Cantrell Rd & Kentucky Ave (IB)	720	117	837
Cantrell Rd & Kentucky Ave (OB)	25	801	826

- Crash reports involving pedestrians from 1995 to 2017 along Highway 10 were reviewed for this study. This data revealed two pedestrian-related crashes occurred within the study area. The first crash occurred east of Bryant Street on August 31, 2005. No crash report was available due to the age of crash. The second crash took place on April 22, 2012 when the driver struck two pedestrians attempting to cross Highway 10 just west of Coolidge Street.
- The City of Little Rock provided 12-hour counts for pedestrians crossing Highway 10 from 7:00 AM to 7:00 PM in May, 2019. **Table 2** on the following page summarizes the pedestrian counts collected. This data is also provided in **Appendix A – Traffic Data**. As shown in **Table 2**, the highest crossing activity occurred between east of Bryant Street and Coolidge Street with 31 pedestrians crossing Highway 10 within the 12-hour period. Data show the pedestrian peak

hour for the study area to be from 6:00 PM to 7:00 PM with 12 pedestrians per hour (pph) crossing Highway 10.

Table 2: Pedestrian Crossing Counts

Time Period		Pedestrians Crossing Hwy 10			
From	To	Section B7: Fire Station to West of Kentucky Ave	Section A6: Fire Station to East of Bryant St	Section D5: East of Bryant St to Coolidge St	Section C8: Coolidge St to Hughes St
7:00 AM	8:00 AM	0	0	2	0
8:00 AM	9:00 AM	0	1	3	0
9:00 AM	10:00AM	0	0	3	0
10:00 AM	11:00 AM	0	0	1	0
11:00 AM	12:00 PM	1	0	0	0
12:00 PM	1:00PM	2	1	2	0
1:00 PM	2:00 PM	1	1	2	0
2:00 PM	3:00 PM	0	0	1	0
3:00 PM	4:00 PM	2	1	2	1
4:00 PM	5:00 PM	2	1	4	0
5:00 PM	6:00 PM	1	1	4	0
6:00 PM	7:00 PM	0	5	7	0
Total		9	11	31	1

- 12-hour turning movement counts for the intersections at Kentucky Avenue, Bryant Street, and Hughes Street were provided by the City of Little Rock. The counts at Kentucky Avenue and at Hughes Street were collected on April 17, 2019 and the counts at Bryant Street were collected on August 14, 2018. This data is provided in **Appendix A – Traffic Data.**
- The Average Daily Traffic (ADT) volumes along Highway 10 within the study area were obtained from ARDOT permanent count stations. The classification count station (Station ID 600208 located east of Kentucky Avenue) shows a 2018 ADT of 32,000 vehicles per day (vpd) with 2% trucks.

2.2 Site Visit Observations

A site visit was conducted on Thursday, March 28, 2019 during AM and PM peak times. Observations from this site visit are discussed in the following subsections.

2.2.1 Vehicular and Bus Observations

In the AM peak period, school buses drive through the area and were observed loading at the bus stop located on the northeast corner of Highway 10 and Gleneagles Lane shown in **Figure 2**. No shelter or bench are currently provided at this bus stop. School children were seen sitting on the landscaping wall around the monument sign for the Legacy Pointe Apartments near the Highway 10 bus stop while waiting for the school buses. In the PM peak period, school buses unloaded school children at this same bus stop. The school buses load and unload directly on Highway 10. No METRO bus made stops at the Gleneagles Lane bus stop during AM and PM observations.

Figure 2: Bus Stop at Highway 10 and Gleneagles Lane

Two other METRO bus stop locations exist within the study area: on the north side of Highway 10 at Coolidge Street and on the southwest corner at Bryant Street as shown in **Figures 3 and 4,** respectively. The bus stop at Coolidge Street lacks a bench and shelter while the bus stop at Bryant Street has a bench but no shelter.

Figure 3: Bus Stop at Highway 10 and Coolidge Street

Figure 4: Bus Stop at Highway 10 and Bryant Street

Excessive speeding is of concern through the study area. Sight distances were checked along the corridor, and no issues were noted. Heavy traffic was observed between 7:00-8:00 AM in the eastbound direction and between 4:30-5:30 PM in the westbound direction. During the PM observations, westbound traffic queued through the corridor due to the traffic signal at the Highway 10 and Mississippi Street intersection.

2.2.2 Pedestrian and Bicyclist Observations

During the AM observations, several pedestrians were observed walking along the sidewalks on both sides of the roadway as shown in **Figure 5**. The majority of the pedestrians came from the Legacy Pointe Apartments and Bryant Street. Six pedestrians were noted boarding the METRO bus at Bryant Street during the AM peak hour. Three of the six pedestrians crossed Highway 10 from the Legacy Pointe Apartments to board the bus. During the PM observations, a pedestrian was seen crossing Highway 10 to the Legacy Pointe Apartments from the same bus stop. The majority of the pedestrians crossing Highway 10 quickly walked or ran across when there was a sufficient gap. A pedestrian crossing Highway 10 between Kentucky Avenue and Bryant Street was observed to stop in the center turn lane for oncoming traffic before continuing to cross. No bicycles were noted during the site visit.

Figure 5: Pedestrians Walking along Highway 10

2.2.3 Existing Pedestrian and Bicyclist Accommodations

Sidewalks exist on both sides of Highway 10 from Kentucky Avenue to Hughes Street. The majority of the sidewalks are approximately five feet wide with a three-foot wide grass median. The sidewalks are continuous across driveways. It should be noted that Gleneagles Lane is currently treated as a driveway with continuous sidewalk across the driveway. The sidewalks were clear of obstructions, and the grass within the buffer area was trimmed during observations. The sidewalks and all wheelchair ramps meet current ADA standards. There are no existing bicycle facilities such as bicycle lanes along Highway 10. Roadway lighting is provided along the south side of Highway 10.

Pedestrian facilities were inventoried at each of the intersections and are described below:

- At Kentucky Avenue, east-west wheelchair ramps and yellow tactile truncated domes are provided. No existing crosswalk and stop bar are provided.
- At Bryant Street, east-west wheelchair ramps and yellow tactile truncated domes are provided. No existing crosswalk and stop bar are provided.
- At Gleneagles Lane, the sidewalk continues across the side street.
- At Coolidge Street, east-west wheelchair ramps and yellow tactile truncated domes are provided. No existing crosswalk and stop bar are provided.
- At Hughes Street, east-west wheelchair ramps and yellow tactile truncated domes are provided at the northwest and southwest corners. No receiving wheelchair ramps or sidewalks exist east of Hughes Street.

3.0 Safety Analysis

Based on the available crash data, two pedestrian-related crashes have occurred within the study area. The first crash occurred on August 31, 2005 on Highway 10 east of Bryant Street. No police report was available due to age of crash. The second crash occurred at 5:20 PM on April 22, 2012 when a vehicle struck two pedestrians crossing Highway 10 west of Coolidge Street, resulting in serious injuries to both pedestrians. Alcohol was not involved, and no contributing factors were listed in the accident report.

4.0 Potential Countermeasures

Potential countermeasures to improve pedestrian safety were selected based on field observations as well as STEP Countermeasure tables provided by the Federal Highway Administration (FHWA).

The following countermeasures were identified based on field observations:

- Provide a bench and shelter at the bus stops located at Gleneagles Lane and at Coolidge Street.
- Provide a shelter at the bus stop located at Bryant Street.
- Add a designated crosswalk location across Highway 10 east of Gleneagles Lane. This designated crosswalk location should be marked with high-visibility crosswalk markings, stop bars on both sides of the crosswalk, wheelchair ramps on both ends of the crosswalk, and advance “Yield Here” signs.
- Add and improve lighting, particularly at crossing locations.
- Apply countermeasures to reduce vehicle speeds through the area including raised medians, landscaping, and speed-monitoring trailers. Raised medians and landscaping can change the character of the street and reduce speeds. Appropriate plants can be planted in the raised medians and existing buffer area between the sidewalk and street to reduce the visual width of the roadway. The speed-monitoring trailers can enhance speed compliance prior to implementing traffic-calming treatments.

Table 3 was produced by FHWA and shows STEP countermeasures that should be considered based on the posted speed limit and AADT of the corridor. The Highway 10 corridor has a posted speed limit of 35 mph and an AADT of 32,000 vpd. This corridor has two lanes in each direction and no raised median.

Table 3: Application of Pedestrian Crash Countermeasures by Roadway Feature (from FHWA)

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	❶ 2 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6 7 9	① 5 6 7 9	① 5 6 ❾
3 lanes with raised median (1 lane in each direction)	❶ 2 3 4 5	❶ ❸ 5 7 9	① ❸ 5 ❼ ❾	① 3 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❼ ❾	① ❸ 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❾
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	❶ 2 3 4 5 6 7 9	❶ ❸ 5 6 7 9	① ❸ 5 6 ❾	① 3 4 5 6 7 9	① ❸ 5 6 ❼ ❾	① ❸ 5 6 ❾	① ❸ 4 5 6 7 9	① ❸ 5 6 ❾	① ❸ 5 6 ❾
4+ lanes with raised median (2 or more lanes in each direction)	❶ ❸ 5 7 8 9	❶ ❸ 5 7 8 9	① ❸ 5 8 ❾	① ❸ 5 7 8 9	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 8 ❾
4+ lanes w/o raised median (2 or more lanes in each direction)	❶ ❸ 5 6 7 8 9	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 8 ❾

Given the set of conditions in a cell,

\# Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location.

● Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location.

○ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.*

The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

1 High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs
2 Raised crosswalk
3 Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line
4 In-Street Pedestrian Crossing sign
5 Curb extension
6 Pedestrian refuge island
7 Rectangular Rapid-Flashing Beacon (RRFB)**
8 Road Diet
9 Pedestrian Hybrid Beacon (PHB)**

*Refer to Chapter 4, "Using Table 1 and Table 2 to Select Countermeasures," for more information about using multiple countermeasures.

**It should be noted that the PHB and RRFB are not both installed at the same crossing location.

This table was developed using information from: Zegeer, C.V., J.R. Stewart, H.H. Huang, P.A. Lagerwey, J. Feaganes, and B.J. Campbell. (2005). Safety effects of marked versus unmarked crosswalks at uncontrolled locations: Final report and recommended guidelines. FHWA, No. FHWA-HRT-04-100, Washington, D.C.; FHWA. Manual on Uniform Traffic Control Devices, 2009 Edition. (revised 2012). Chapter 4F, Pedestrian Hybrid Beacons. FHWA, Washington, D.C.; FHWA. Crash Modification Factors (CMF) Clearinghouse. *http://www.cmfclearinghouse.org/*; FHWA. Pedestrian Safety Guide and Countermeasure Selection System (PEDSAFE). *http://www.pedbikesafe.org/PEDSAFE/*; Zegeer, C., R. Srinivasan, B. Lan, D. Carter, S. Smith, C. Sundstrom, N.J. Thirsk, J. Zegeer, C. Lyon, E. Ferguson, and R. Van Houten. (2017). NCHRP Report 841: Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments. Transportation Research Board, Washington D.C.; Thomas, Thirsk, and Zegeer. (2016). NCHRP Synthesis 498: Application of Pedestrian Crossing Treatments for Streets and Highways. Transportation Research Board, Washington, D.C.; and personal interviews with selected pedestrian safety practitioners.

Based on the information provided in **Table 3**, the following countermeasures should be considered for Highway 10:

- High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crosswalk warning signs.
  - Parking restrictions on crosswalk approach are not applicable to the study area since parking on the street is currently not allowed.
  - The high-visibility crosswalk markings, adequate nighttime lighting levels, and crosswalk warning signs were identified as desirable countermeasures.
- Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line.
  - These were identified as desirable countermeasures.
- Curb extension
  - This countermeasure is not applicable since on-street parking is not allowed on this corridor.
- Pedestrian refuge island
  - This countermeasure is highly desirable for midblock pedestrian crossings on roads with four or more lanes.
- Road Diet
  - This countermeasure is not considered due to the high traffic volumes along Highway 10 (32,000 vpd).
- Pedestrian Hybrid Beacon (PHB)
  - This countermeasure may be appropriate if pedestrians are unable to find adequate gaps in vehicular traffic to safely cross Highway 10. Site visit

observations indicate some issues with availability of gaps. Further investigation of this countermeasure performed in Section 5.0.

As shown in **Table 4** on the following page, FHWA provides another table of STEP countermeasures which are listed according to the safety issues that they address. The safety issues pertain to existing crosswalks. Since there are no existing crosswalks on Highway 10 within the study area, **Table 4** was not considered in this study.

Table 4: Safety Issues Addressed Per Countermeasure (from FHWA)

Pedestrian Crash Countermeasure for Uncontrolled Crossings	Safety Issue Addressed				
	Conflicts at crossing locations	Excessive vehicle speed	Inadequate conspicuity/ visibility	Drivers not yielding to pedestrians in crosswalks	Insufficient separation from traffic
Crosswalk visibility enhancement	🚶	🚶	🚶	🚶	🚶
High-visibility crosswalk markings*	🚶		🚶	🚶	
Parking restriction on crosswalk approach*	🚶		🚶	🚶	
Improved nighttime lighting*	🚶		🚶		
Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line*	🚶		🚶	🚶	🚶
In-Street Pedestrian Crossing sign*	🚶	🚶	🚶	🚶	
Curb extension*	🚶	🚶	🚶		🚶
Raised crosswalk	🚶	🚶	🚶	🚶	
Pedestrian refuge island	🚶	🚶	🚶		🚶
Pedestrian Hybrid Beacon	🚶	🚶	🚶	🚶	
Road Diet	🚶	🚶	🚶		🚶
Rectangular Rapid-Flashing Beacon	🚶		🚶	🚶	🚶

*These countermeasures make up the STEP countermeasure “crosswalk visibility enhancements.” Multiple countermeasures may be implemented at a location as part of crosswalk visibility enhancements.

Table 5 on the following page summarizes the countermeasures that were identified as applicable to the study area and shows the source(s) of the countermeasure recommendations. The countermeasures with asterisks will be investigated further in Section 5.0 in order to determine whether they should be included in the recommendations.

Table 5: Potential Countermeasures for Highway 10 Corridor

Countermeasure	Site Visit	FHWA Table 3
Provide bench and shelter at Gleneagles Lane bus stop	X	
Provide bench and shelter at Coolidge Street bus stop	X	
Provide shelter at Bryant Street bus stop	X	
Add designated crosswalk location	X	
Add raised medians, landscaping, and speed-monitoring trailers to reduce vehicle speeds	X	
Improve lighting	X	X
High-visibility crosswalk markings		X
Stop bars in front of crosswalks		X
Advance Yield Here to (Stop Here for) Pedestrians sign		X
Pedestrian Refuge Island		X
Pedestrian Hybrid Beacon*		X

*Countermeasure will be investigated further before including as a recommendation.

5.0 Investigation of Countermeasures

The Pedestrian Hybrid Beacon (PHB) countermeasure requires further investigation before being selected as a recommendation. The investigation of the PHB is detailed in the following subsections.

5.1.1 Pedestrian Hybrid Beacon

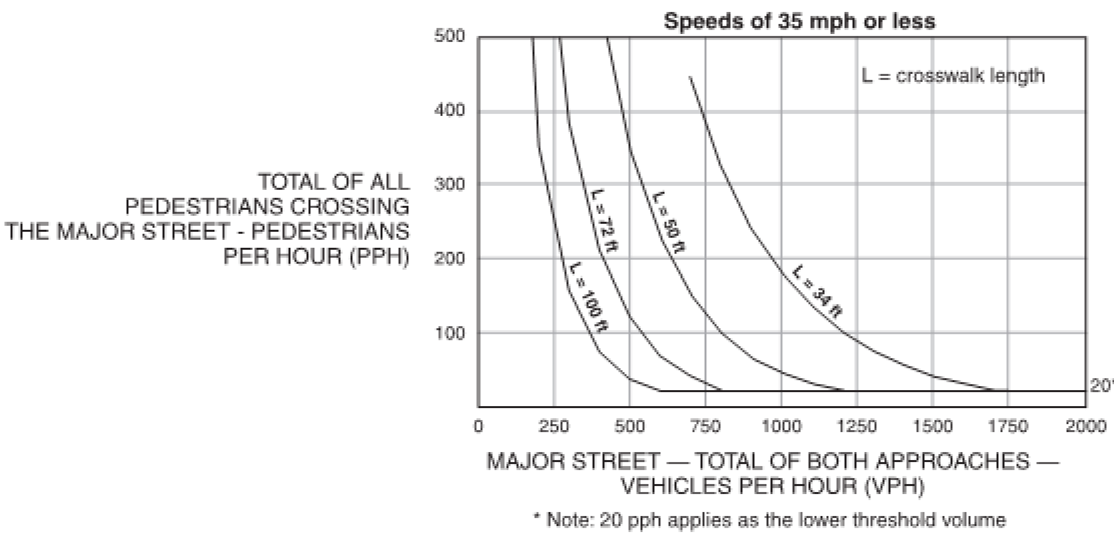
The PHB should be considered if a signal is not warranted but gaps in traffic are inadequate to permit pedestrians to cross. According to the *Traffic Control Devices Handbook, Second Edition*, an average of one gap per minute (60 gaps per hour) is needed to adequately allow pedestrians to cross the road. The number of available gaps of adequate length were estimated based on the road width, average pedestrian walking speed, and hourly vehicular volume. The volumes on the east approach of the intersection of Highway 10 at Bryant Street were used for this analysis since this is a potential location for a new crosswalk. **Table 6** shows the results of the gap analysis. Based on these results, pedestrians do not experience enough gaps in traffic of adequate length to safely cross during the day.

Table 6: Gap Analysis for Designated Crosswalk

From Time	To Time	Contributing Movement Volumes			# Veh Crossing	Headway	Flow rate	Probability of no vehicles arriving during needed time to cross	Adequate Length Gaps/hr	Meets critical volume
		EBT	NBR	WB						
7:00 AM	8:00 AM	1574	32	653	2259	1.59	0.63	0.00%	0	fail
8:00 AM	9:00 AM	1455	28	765	2248	1.60	0.62	0.00%	0	fail
9:00 AM	10:00AM	930	36	717	1683	2.14	0.47	0.04%	1	fail
10:00 AM	11:00 AM	854	14	809	1677	2.15	0.47	0.04%	1	fail
11:00 AM	12:00AM	1000	25	1052	2077	1.73	0.58	0.01%	0	fail
12:00 PM	1:00PM	999	25	1154	2178	1.65	0.61	0.00%	0	fail
1:00 PM	2:00 PM	974	26	1120	2120	1.70	0.59	0.00%	0	fail
2:00 PM	3:00 PM	956	32	1067	2055	1.75	0.57	0.01%	0	fail
3:00 PM	4:00 PM	937	19	1226	2182	1.65	0.61	0.00%	0	fail
4:00 PM	5:00 PM	971	45	1677	2693	1.34	0.75	0.00%	0	fail
5:00 PM	6:00 PM	1000	46	1636	2682	1.34	0.75	0.00%	0	fail
6:00 PM	7:00 PM	836	26	1004	1866	1.93	0.52	0.01%	0	fail

The *Manual on Uniform Traffic Control Devices* (*MUTCD)* provides a table of guidelines for the installation of PHB on low-speed roadways (35 mph or less) roadways as shown in **Figure 6**. These guidelines are not meant as mandatory warrants but rather as guidance. Based on this figure, 20 or more pedestrians crossing per hour would be cause for considering the installation of a PHB. The pedestrian crossing data does not indicate that this high of a volume of pedestrians crossing is likely at any single crossing location during one hour. However, since the number of pedestrians crossing is merely a factor for guidance and not a firm warrant, the use of a PHB was considered further as an option to improve pedestrian safety and address the inadequacy of gaps in vehicular traffic for crossing safely.

Figure 6: Guidelines for Installation of PHB (MUTCD Figure 4F-1)



In order to evaluate the impact to vehicular traffic through installing a PHB, *SimTraffic* was used to compare the average delay per vehicle traveling through the study area under existing conditions versus conditions with one PHB installation east of Gleneagles Lane. The model with the PHB assumed that the signal was actuated eight times during the PM peak hour. This was a conservative approximation based on pedestrian crossing data where 7 pph is the highest pedestrian volume crossing between east of Bryant Street and Coolidge Street. The model also assumed 26 seconds for each pedestrian crossing phase (7 seconds of walk time, 16 seconds of flashing don't walk time, and 3 seconds of all-red time). The flashing don't walk time was calculated based on *MUTCD* guidelines. The results of the *SimTraffic* analysis are provided in **Appendix B – Operational Analysis Results** and are summarized in **Table 7**. As shown, installing one PHB would increase the average delay experienced by drivers within the study area during the peak period by as much as 1.6 seconds per vehicle (an increase from 7.1 seconds per vehicle to 8.7 seconds per vehicle). It should be noted that the total delay added to vehicular traffic is directly related to the number of times the PHB is actuated, and a conservative value was assumed for this analysis in order to show a reasonable worst case scenario on the vehicular impact during the peak hour.

Table 7: Vehicular Delays with and without Pedestrian Hybrid Beacon

***SimTraffic* Results**	**Existing**	**One Pedestrian Hybrid Beacon**
Vehicles Entered	3458	3381
Total Delay (hr)	6.8	8.2
Avg. Delay (sec/veh)	7.1	8.7

Based on this investigation, a PHB is recommended for installation in a single location. Multiple installations were not considered due to the cost of installation as well as the goal to preserve vehicular flow throughout the corridor. The amount of delay to vehicular traffic introduced by a single PHB is reasonable in order to provide safe crossing for a high pedestrian crossing location where gaps in vehicular traffic are currently inadequate to cross safely.

The proposed PHB shall be installed at the new marked crosswalk in conjunction with signs and pavement markings to warn and control traffic. The *MUTCD* states the PHB should be installed at least 100 feet from side streets or driveways controlled by STOP or YIELD signs. Therefore, the proposed PHB and designated crosswalk need to be installed at least 100 feet east of Bryant Street. It should be noted that Gleneagles Lane is currently not controlled by a STOP or YIELD sign. In conjunction with the PHB and crosswalk, advance stop lines placed 20 to 50 feet in advance of the proposed crosswalk should be installed to improve the visibility of pedestrians to motorist and prevent multiple-threat crashes.

Considerations should also be given when locating the proposed crosswalk due to its proximity to the bus stops at Gleneagles Lane and at Bryant Street. Crosswalks at midblock transit stops should be placed behind the bus stop so pedestrians cross behind the bus where they are more visible to approaching traffic. In addition, this placement enables the bus driver to pull away without endangering pedestrians and reduces delay for buses. Closing the west driveway to the Westgate Shopping Center and moving the location of the bus stop at Bryant Street may be necessary to ensure proper placement of the PHB and designated crosswalk.

6.0 Recommendations

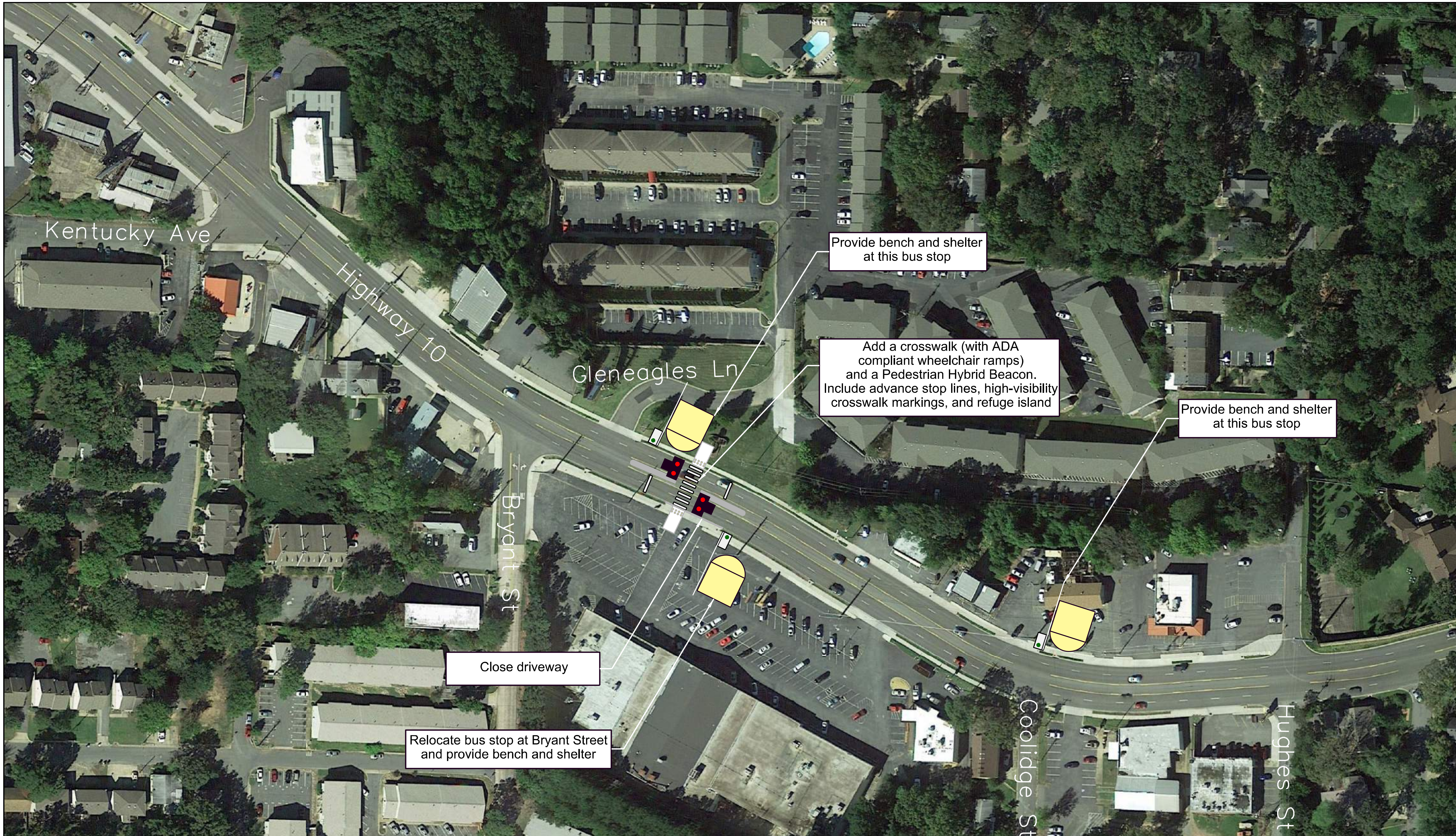
The purpose of this traffic study was to identify the pedestrian and bicyclist safety issues that exist within the Highway 10 project corridor, identify and evaluate potential countermeasures to address current and long-term needs, and provide recommendations for implementation. Observations and data were collected, and FHWA guidelines were consulted in order to develop a list of potential countermeasures. These countermeasures were then considered for relevancy to the study area, and further evaluation was conducted as necessary in order to weigh the need for the countermeasure versus the impact it would have on vehicular traffic. Based on the findings from this traffic study, the following improvements are recommended:

- Crossings
    - Midblock east of Bryant Street, add a crosswalk with ADA compliant wheelchair ramps and install a PHB. Utilize high-visibility crosswalk markings, advance stop lines, and advance “Stop Here For Pedestrians” signs.
    - Provide additional/improved lighting at crosswalk location.
    - Provide pedestrian refuge island.
    - Close west driveway at Westgate Shopping Center.
- Bus Stops
    - Provide a bench and shelter for the bus stops located at Gleneagles Lane and at Coolidge Street.
    - Relocate the bus stop at Bryant Street to the east to accommodate the proposed crosswalk location. Provide shelter at relocated bus stop.

These countermeasures are summarized in **Figure 7** on the following page. With these improvements, pedestrian and bicyclist safety will be enhanced without having a detrimental effect on vehicular operations.

Figure 7

Hwy. 10 STEP Innovation Study
Conceptual Layout of Recommended Countermeasures



LEGEND:

- Refuge Island
- Wheelchair Ramp
- Crosswalk
- Pedestrian Hybrid Beacon
- Bench and Shelter
- Bus Stop

Additional Improvements:
- Provide additional/improved lighting at crosswalk location
- Add landscaping along buffer
- Implement speed-monitoring trailers

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N.T.S.

Aug 2019

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