MEMORANDUM

DATE:	May 5, 2022
TO:	Eric Sideras MCDOT, Traffic Engineering Studies Section
FROM:	Kristen Haas, PE, PTOE STV
SUBJECT:	High Injury Networks – Bel Pre Road from MD 182 (Layhill Road) to MD 97 (Georgia Avenue)

Introduction

The Montgomery County Department of Transportation (MCDOT) is planning to build out improvements on the High Injury Networks (HINs) identified in its Vision Zero Two-Year Action Plan. Bel Pre Road from MD 182 (Layhill Road) to MD 97 (Georgia Avenue) was identified as an HIN corridor, as shown in **Figure 1**. The purpose of this memorandum is to provide a safety evaluation of the Bel Pre Road corridor and to provide recommendations that assist in the goal of eliminating severe injury and fatal crashes.

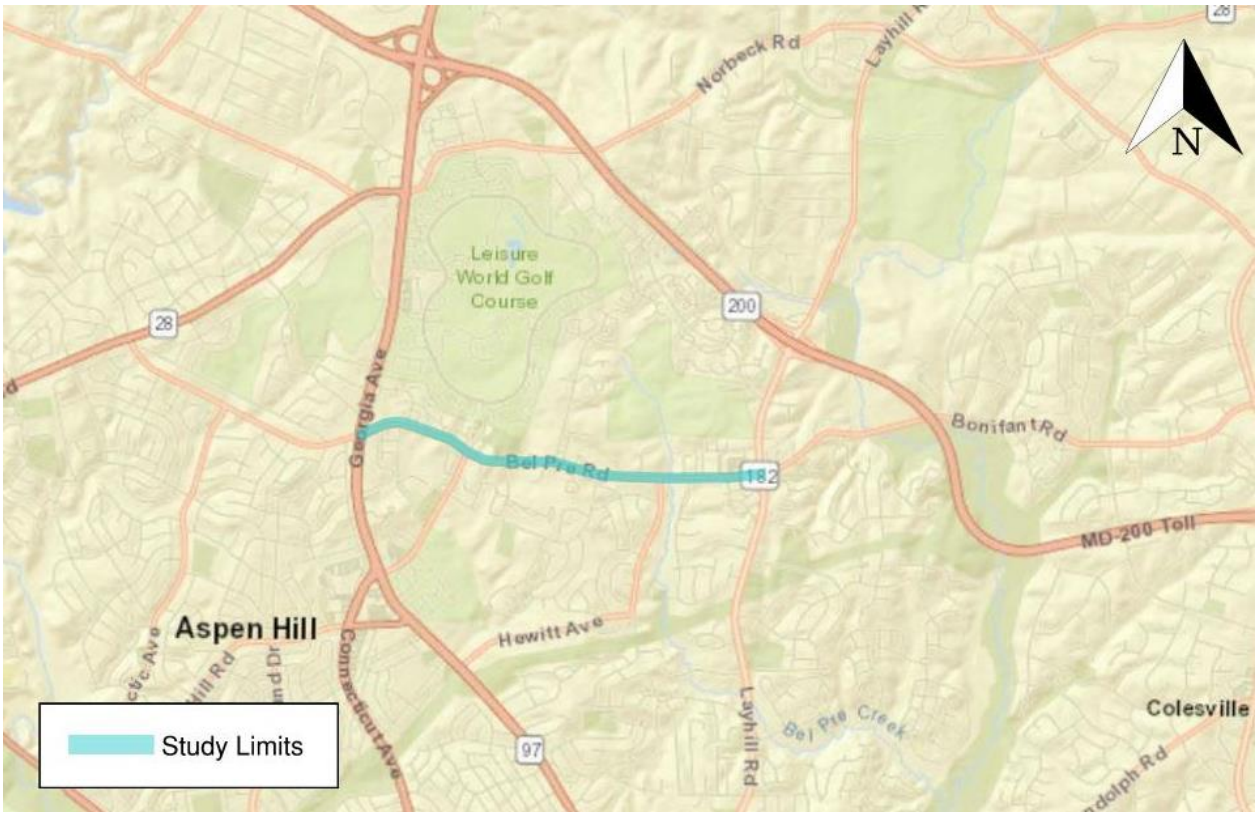


Figure 1: Study Location

Background Information

The MCDOT Vision Zero Two-Year Action Plan dated November 2017 identifies roadway segments with five or more severe or fatal collisions and one or more collisions per mile per year. The 1.9 mile segment of Bel Pre Road between MD 182 (Layhill Road) and MD 97 (Georgia Avenue) was identified as a High Injury Network based on 5-year crash data from 2012 to 2016. There were ten (10) severe or fatal crashes over the 5-year period, with seven (7) vehicular crashes and three (3) pedestrian crashes, which amounts to 1.0 crashes per mile per year within the study segment. This study includes the analysis of serious injury and fatal crashes for January 2012 through December 2014 and minor injury, serious injury, and fatal crashes for January 2015 through February 2020.

The study area is part of the 1994 Aspen Hill Master Plan area. Capacity improvements suggested in the master plan for intersections along the study corridor have already been implemented. Additionally, the segment of Bel Pre Road between Georgia Avenue and Connecticut Avenue was included in the 2019 Aspen Hill Vision Zero Study. This study made the following recommendations:

- Reducing the speed limit on Bel Pre Road from 35 mph to 30 mph between Layhill Road and Georgia Avenue
- Install median refuge islands at the Georgia Avenue at Bel Pre Road and Connecticut Avenue at Bel Pre Road intersections
- Consider protected left turn phasing at the Georgia Avenue at Bel Pre Road and Connecticut Avenue at Bel Pre Road intersections
- Remove channelized right turn lanes at the Georgia Avenue at Bel Pre Road and Connecticut Avenue at Bel Pre Road intersections
- Ensure all sidewalks and sidepaths are unobstructed
- Coordinate with Montgomery County Public Schools to relocate bus stops to residential side streets

A Pedestrian Road Safety Audit (PRSA) was performed in June 2015 for Bel Pre Road between Georgia Avenue and Beaverwood Lane. As a result of the audit, the PRSA team identified a number of suggestions to improve pedestrian and bicycle safety within the study area. MCDOT provided the following recommendations that were suggested as part of the Bel Pre Road PRSA that are still outstanding and should be considered for this study. These recommendations are summarized in **Table 1**.

Table 1 – Bel Pre Road PRSA Recommended Improvements

Location	Safety Issue	Recommendation
Bel Pre Road at Homecrest Road	Pedestrian Vehicle Conflicts	Evaluate the feasibility of implementing a No Turn on Red restriction for southbound traffic on Homecrest Road to westbound Bel Pre Road.
Bel Pre Road at Homecrest Road	Pedestrian Vehicle Conflicts	Determine the feasibility of moving the bus stop west of Homecrest Road closer to the signalized intersection.
Bel Pre Road at Beaverwood Lane	Pedestrian Facility Issues	Repair the APS/CPS for the west leg crosswalk (crossing Bel Pre Road). The APS in the northwest corner does not emit sound when the pedestrian pushbutton is pressed, or during the walk and flashing don't walk phases. The APS in the southwest corner beeps continuously.
Bel Pre Road at Beaverwood Lane	Pedestrian Facility Issues	Restripe faded transverse crosswalk pavement markings with continental crosswalk markings.
Bel Pre Road at Beaverwood Lane	Pedestrian Facility Issues	Install APS/CPS with applicable signage and signal heads for the north and south leg crosswalks crossing the American Legion driveway and Beaverwood Lane, respectively.
Bel Pre Road between Georgia Avenue and Connecticut Avenue	Pedestrian Vehicle Conflicts	Coordinate with the Montgomery County Police Department to ensure appropriate levels of enforcement of posted speed limits.
Bel Pre Road between Georgia Avenue and Connecticut Avenue	Pedestrian Vehicle Conflicts	Evaluate the feasibility of lane width reductions on Bel Pre Road from just east of Georgia Avenue to Layhill Road to slow vehicles.
Bel Pre Road between Georgia Avenue and Connecticut Avenue	Pedestrian Facility Issues	Evaluate the feasibility of relocating utility poles outside of the sidewalk area.
Bel Pre Road between Georgia Avenue and Connecticut Avenue	Drainage	Redesign pedestrian refuge islands in the median of Bel Pre Road at Tynewick Drive and Dunsinane Drive to provide a pedestrian crossing cutout of 10 feet through the median. Also, redesign concrete medians on Tynewick Drive and Dunsinane Drive such that the medians are pulled back out of the pedestrian crossing paths, thus providing 10 feet of space for pedestrians to cross.

It should be noted that the three Rectangular Rapid Flashing Beacons (RRFB's) within the study area were replaced with pedestrian hybrid beacons in August 2021.

The following is a summary of the corridor-wide police-reported crash history provided by MCDOT for serious injury and fatal crashes for January 2012 through December 2014 and minor injury, serious injury, and fatal crashes for January 2015 through February 2020. This crash data was reviewed to evaluate patterns and trends to assist in determining appropriate safety recommendations for the corridor. There were 86 serious or minor injury crashes and no fatalities over the study period. Of the 86 police-reported crashes, 48 were listed as

intersection or intersection related crashes. The crash locations are shown in **Figure 2** and the crash data is provided in **Appendix A**.

There were 14 serious injury crashes over the study period occurring throughout the corridor. Four of the serious injury crashes involved pedestrians at unsignalized locations. Three of the four pedestrian crashes occurred under dark conditions. The contributing circumstance was only available for two of the four pedestrian crashes. One of the two pedestrian crashes was attributed to an improper action by the pedestrian and a vision obstruction (blinded by the sun) while the other was attributed to the pedestrian failing to yield right of way as well as dark clothing that was not visible to the driver. The remaining serious injury crashes involved three angle collisions, three single vehicle collisions, two rear end collisions, and two left turn collisions.

The following figures summarize the crash trends along the corridor. It's important to reiterate that the crash data received for 2012 through 2014 only includes serious injury and fatal police-reported crashes.

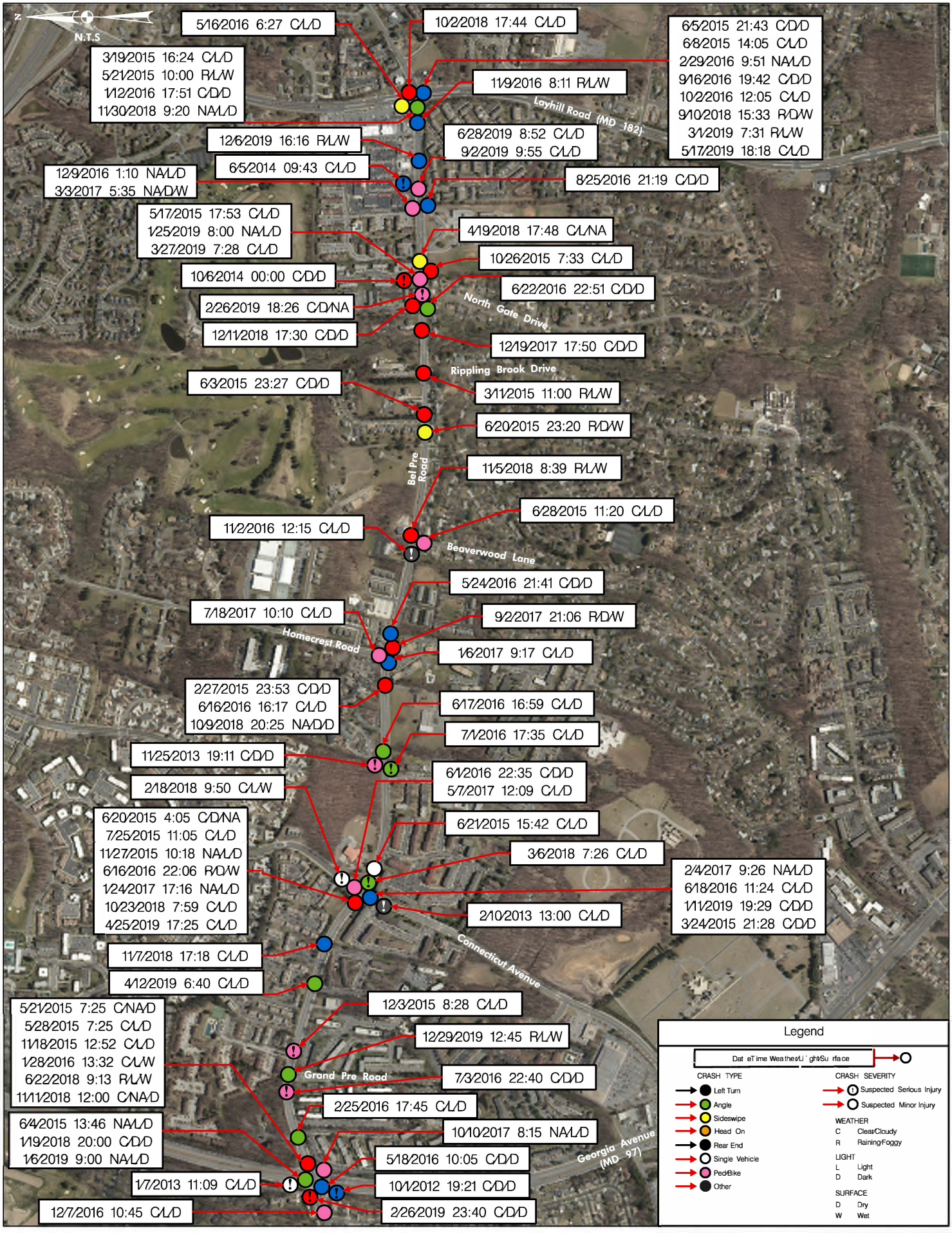


Figure 2: Crash Locations (2012-2019)

Figure 3 summarizes the crash data for the study corridor by year.

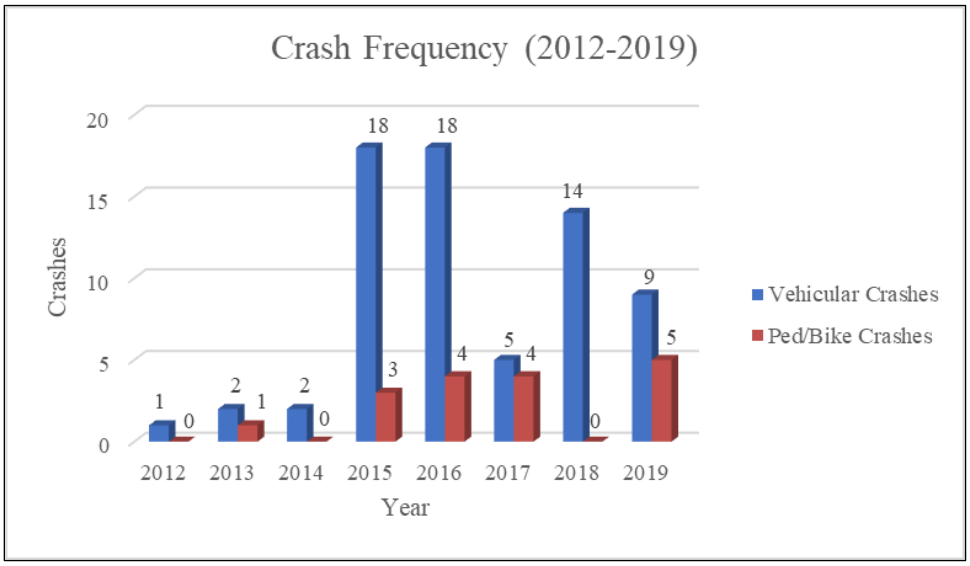


Figure 3: Vehicular and Pedestrian Crash Frequency by Year (2012-2019)

As shown above, vehicular crashes that resulted in minor or serious injuries occurred most frequently during 2015 and 2016. The number of ped/bike crashes slowly increased over the study period with the exception of 2014 and 2018, where zero ped/bike crashes were reported.

Figure 4 summarizes the relationship between vehicular peak hours and injury crashes.

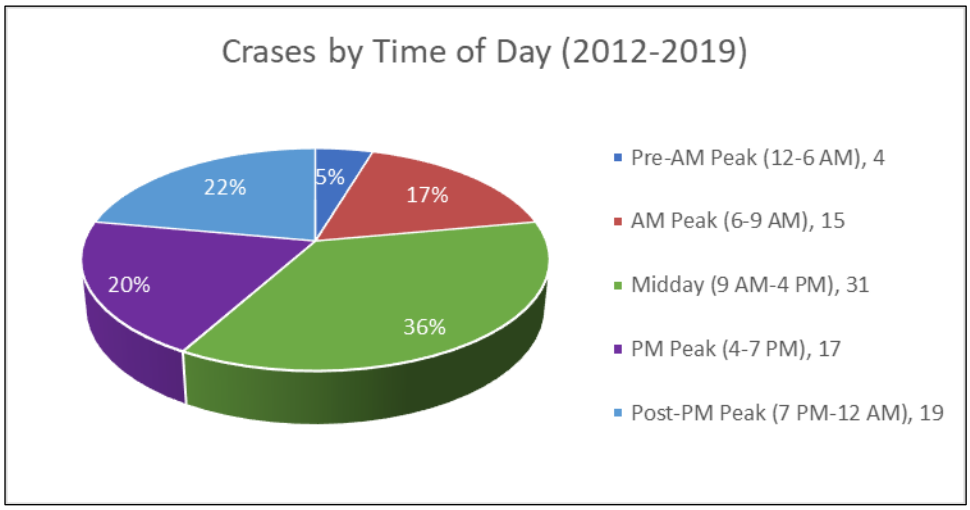


Figure 4: Injury Crashes by Time of Day (2012-2019)

As shown above, the greatest number of injury crashes occurred during the midday peak period with 31 crashes (36%). During the AM and PM peak periods, 15 (17%) and 17 (20%) crashes were reported, respectively.

Figure 5 summarizes the injury crashes by illumination level.

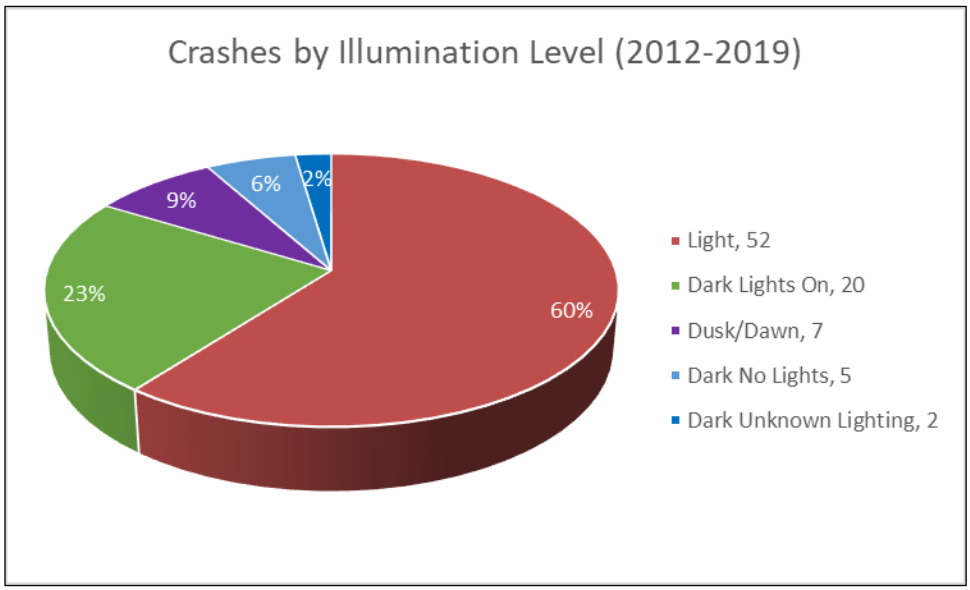


Figure 5: Injury Crashes by Illumination Level (2012-2019)

As shown above, 52 of the 86 reported injury crashes (60%) occurred under daylight conditions. Twenty seven injury crashes (31%) occurred during dark conditions while seven crashes (9%) occurred during dusk or dawn. None of the reported crashes listed lighting levels as a contributing circumstance.

Figure 6 summarizes the injury crashes by type.

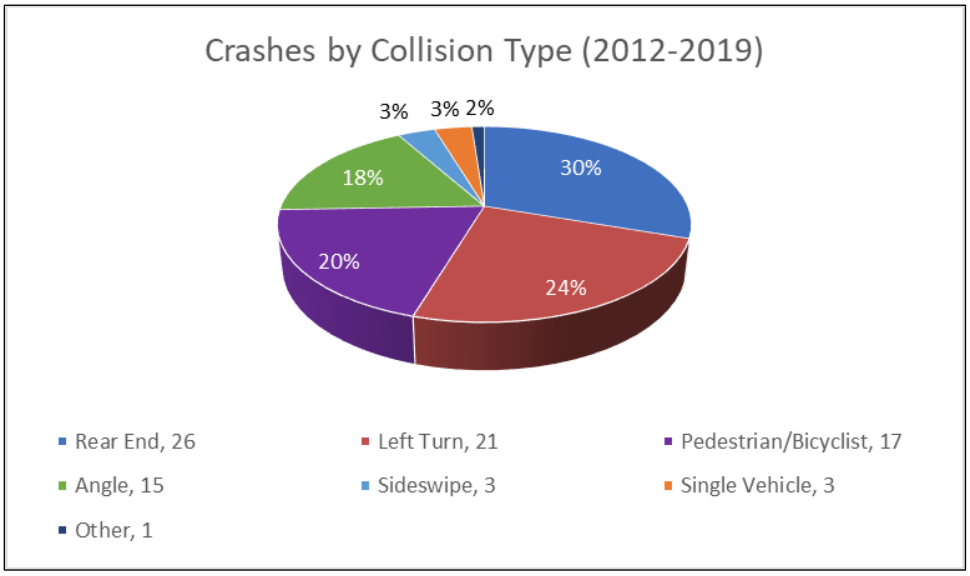


Figure 6: Injury Crashes by Collision Type (2012-2019)

As shown above, the highest number of injury crashes were rear end crashes, resulting in 26 reported crashes (30%) during the study period. Of the 26 reported rear end crashes, two were identified as serious injury crashes while the remaining 24 crashes were identified as minor injury crashes. Other predominant collision types include left turn (24%), pedestrian/bicyclist (20%), and angle (15%). Seven of the 26 rear end crashes occurred at the intersection of Bel Pre Road at Connecticut Avenue while eight of the 19 left turn crashes occurred at the intersection of Bel Pre Road at Layhill Road.

Observations

Field observations were obtained from the Bel Pre Road PRSA. The PRSA was conducted during day and evening hours and included weekday morning, midday, and evening peak hour observations from Tuesday June 2, 2015 and Wednesday June 3, 2015. It should be noted that the PRSA limits consisted of Bel Pre Road between Georgia Avenue and Beaverwood Lane. Additional weekday morning and evening peak period field observations were conducted for the full study corridor on September 15, 2020. The following summarizes the field observations and relates it to the crash data shown in Figure 2 where applicable.

- Some vehicular speeds on Bel Pre Road between Georgia Avenue and Connecticut Avenue appeared greater than the posted speed limit of 35 mph.
- A majority of pedestrians crossing Bel Pre Road were observed crossing at locations with marked crosswalk. A few pedestrians, however, were observed crossing Bel Pre Road outside of marked crosswalks, particularly on the western half of the corridor. Of the pedestrians observed crossing at the RRFB locations, almost all were observed activating the RRFB. It should be noted, however, that pedestrian hybrid beacons were being designed for these crossings at the time observations were conducted and were later constructed in August 2021.
- Vehicles on Grand Pre Drive had a difficult time turning left onto Bel Pre Road given a sight distance issue with vehicles coming from the west as well as high vehicle speeds on Bel Pre Road.
    - One angle crash was reported at the intersection during the study period.
- Vehicles were observed frequently changing lanes in order to pass vehicles slowing down to make right turns. This was most commonly observed between Georgia Avenue and Connecticut Avenue, where speeds were typically highest.
- There are automatic speed enforcement cameras for east- and westbound Bel Pre Road approaching the Winchester School.
    - Two rear end crashes occurred on westbound Bel Pre Road and one rear end crash occurred on eastbound Bel Pre Road near the automatic speed enforcement cameras.
    - Vehicles were observed slowing down in advance of the cameras.
- Existing lighting levels along Bel Pre Road do not appear sufficient.
    - Thirty two percent of reported crashes occurred during dark conditions while seven percent occurred during dusk or dawn.

In addition to the observations mentioned above, a safety assessment for Argyle Middle School located near Layhill Road was conducted in 2015. The assessment referenced queuing from the parent drop off loop spilling back onto Bel Pre Road. Eight pedestrian crashes were reported in the vicinity of Argyle Middle School, two of which appear to involve students during the school's arrival period. It should be noted that both crashes occurred at the RRFB south of the Argyle Middle School and the students activated the RRFB in both instances. Further, both of these crashes were attributed to the driver not giving full time and attention.

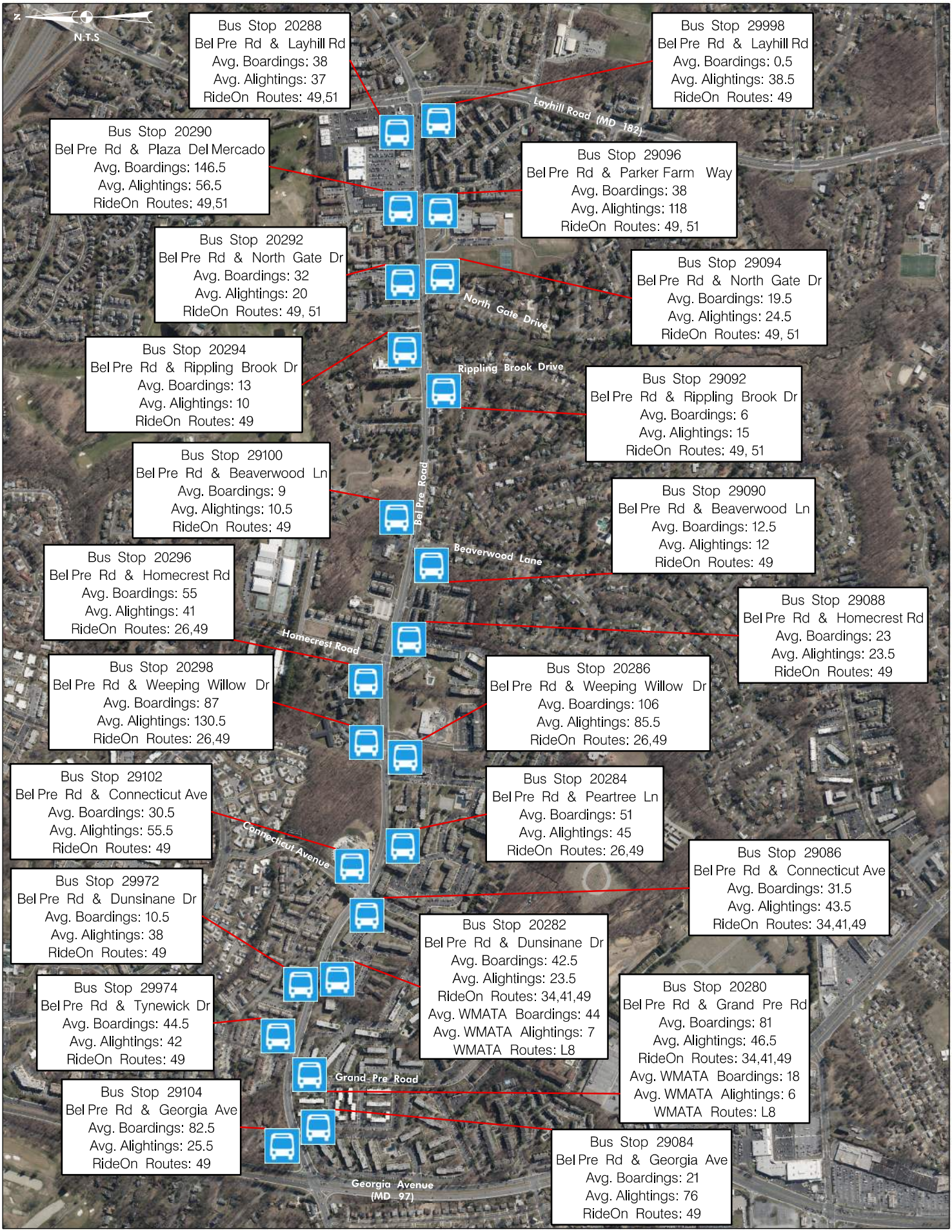
Corridor Bus Data

Within the study limits, there are 12 eastbound and 11 westbound bus stops along Bel Pre Road. These bus stops service both Ride On routes 26, 34, 41, 49, and 51 and WMATA route L8. The locations of the study area bus stops are shown in **Figure 7**. Average daily ridership data for Fall 2019 (pre-COVID 19) was provided by MCDOT's Division of Transit Services and WMATA. A review of the data indicated that daily boardings and alightings by stop varied widely throughout the study area (See **Table 2**), with the highest total ridership occurring at the westbound Bel Pre Road at Weeping Willow Drive bus stop. Several bus stops have low average ridership, including the bus stops in both directions at Beaverwood Lane and at Rippling Brook Drive.

Table 2 – Bus Ridership Data

Location	Stop ID	Routes		Average Boardings	Average Alightings
		Ride On	WMATA		
Eastbound					
BEL PRE RD & GEORGIA AVE	29084	49	-	21	76
BEL PRE RD & GRAND PRE RD	Ride On: 20280 WMATA: 2000916	34, 41, 49	L8	99	53
BEL PRE RD & DUNSINANE DR	Ride On: 20282 WMATA: 2000920	34, 41, 49	L8	87	31
BEL PRE RD & CONNECTICUT AVE	29086	34, 41,	-	32	44
BEL PRE RD & PEARTREE LN	20284	26, 49	-	51	45
BEL PRE RD & WEEPING WILLOW DR	20286	26, 49	-	106	86
BEL PRE RD & HOMECREST RD	29088	49	-	23	24
BEL PRE RD & BEAVERWOOD LN	29090	49	-	13	12
BEL PRE RD & RIPPLING BROOK DR	29092	49, 51	-	6	15
BEL PRE RD & NORTH GATE DR	29094	49, 51	-	20	25
BEL PRE RD & PARKER FARM WAY	29096	49, 51	-	38	118
BEL PRE RD & LAYHILL RD	29998	49	-	1	39
Westbound					
BEL PRE RD & LAYHILL RD	20288	49, 51	-	38	37
BEL PRE RD & PLAZA DEL MERCADO	20290	49, 51	-	147	57
BEL PRE RD & NORTH GATE DR	20292	49, 51	-	32	20
BEL PRE RD & RIPPLING BROOK DR	20294	49	-	13	10
BEL PRE RD & BEAVERWOOD LN	29100	49	-	9	11
BEL PRE RD & HOMECREST RD	20296	26, 49	-	55	41
BEL PRE RD & WEEPING WILLOW DR	20298	26, 49	-	87	131
BEL PRE RD & CONNECTICUT AVE	29102	49	-	31	56
BEL PRE RD & DUNSINANE DR	29972	49	-	11	38
BEL PRE RD & TYNEWICK DR	29974	49	-	45	42
BEL PRE RD & GEORGIA AVE	29104	49	-	83	26

FIGURE 7 - BUS RIDERSHIP



Speed Data

Speed data was collected for 48-hours in March 2022 for the following locations on Bel Pre Road:

- Approximately 250 feet west of Grand Pre Road
- Approximately 900 feet east of Beaverwood Lane

Average and 85th percentile speeds are summarized in **Table 3** and the raw speed data is provided in **Appendix B**.

Table 3 – Speed Data Summary

Location	Posted Speed Limit	Eastbound		Westbound	
		Average Speed (MPH)	85th Percentile Speed (MPH)	Average Speed (MPH)	85th Percentile Speed (MPH)
Bel Pre Road west of Grand Pre Road	35	32	37	35	40
Bel Pre Road east of Beaverwood Lane	35	38	44	40	45

The speed data shows that west of Grand Pre Road, the average and 85th percentile speeds are 32 and 37 MPH in the eastbound direction and 35 and 40 MPH in the westbound direction, respectively. The recorded speeds within 5 MPH of the posted speed limit of 35 MPH. East of Beaverwood Lane, the average and 85th percentile speeds are 38 and 44 MPH in the eastbound direction and 40 and 45 MPH in the westbound direction, respectively. Given that the 85th percentile speeds are more than 9-10 MPH over the posted speed limit of 35 MPH, speeding relative to the posted speed limit is more pronounced along this segment of Bel Pre Road.

The speed data summarized above was used to help determine the appropriate speed limit for Bel Pre Road utilizing the Federal Highway Administration's USLIMITS2 tool, which is a web based tool used to assist in setting reasonable, safe, and consistent speed limits for specific segments of roads. The USLIMITS2 tool considers roadway characteristics including, but not limited to, AADT, operating speeds, geometric conditions, crash and injury rates, and pedestrian and bicycle activity. It should be noted, however, that the speed limit analysis required a summary of injury and non-injury crashes. Since the crash analysis for this study only captured minor injury, severe injury, and fatality crashes, data for all crash types including injury and property damage only crashes was obtained from the *dataMontgomery* website for the January 2015 – December 2019 study period. The results of the USLIMITS2 speed limit analysis indicate that the recommended speed limit for Bel Pre Road west of Grand Pre Road is **35 MPH**, while the recommended speed limit east of Beaverwood Lane is **40 MPH**. Outputs from the USLIMITS2 analysis are provided in **Appendix C**. It should be noted that no posted speed limit change is recommended at this time.

Pedestrian Hybrid Beacon Analysis

Signal Warrant Analysis

At the request of MCDOT, the need for a pedestrian hybrid beacon, also known as a High Intensity Activated Crosswalk (HAWK) beacon, was evaluated for Bel Pre Road at the intersection of St. Matthew Church Driveway/Crystal Springs Driveway. A pedestrian hybrid beacon warrant was performed for this location

according to procedures outlined in the 2009 MUTCD. It should be noted that the 2011 MdMUTCD prohibited the use of pedestrian hybrid beacons; however, the use of these beacons received interim approval for use in Maryland in November 2017. The guidelines state:

> ***For a major street where the posted or statutory speed limit or the 85th percentile speed is 35 mph or less, the need for a pedestrian hybrid beacon should be considered if the engineering study finds that the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding total of all pedestrians crossing the major street for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4F-1 for the length of the crosswalk.***
>
> ***For a major street where the posted or statutory speed limit or the 85th percentile speed exceeds 35 mph, the need for a pedestrian hybrid beacon should be considered if the engineering study finds that the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding total of all pedestrians crossing the major street for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4F-2 for the length of the crosswalk***
>
> ***For crosswalks that have lengths of other than the four that are specifically shown in Figure 4F-1 and F4-2, the values should be interpolated between the curves.***

Based on the speed data collected just west of Grand Pre Road, it is assumed that 85th percentile speeds are higher than 35 mph at this intersection. Thus, Figure F4-2 was used for this warrant and is shown in **Figure 8** below. It should be noted, however, that both graphs utilize the same minimum threshold of 20 pedestrians per hour to warrant a pedestrian hybrid beacon.

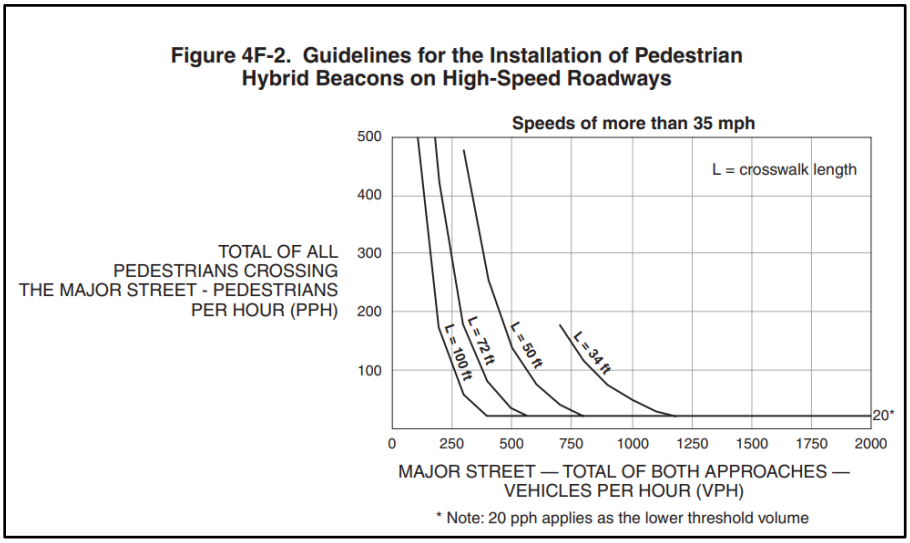


Figure 8: Pedestrian Hybrid Beacon Warrant Guidelines

In order to complete the pedestrian hybrid beacon warrant, a 13-hour vehicular and pedestrian count was performed on Wednesday March 2, 2022 and is provided in **Appendix D**. The count data indicates that the highest hourly volume of pedestrians crossing Bel Pre Road at this location is nine pedestrians per hour, thus not meeting the 20 pedestrians per hour threshold shown in Figure 8. It should be noted, however, that the presence of a pedestrian hybrid beacon would likely increase the number of pedestrians crossing Bel Pre Road at this location due to the adjacent bus stops on east- and westbound Bel Pre Road (with a total of 104 daily boardings and 102 daily alightings for both stops combined), along with the close proximity of several apartment complexes and St. Matthew Church.

Capacity Analysis

A capacity analysis was performed utilizing Synchro software to determine potential impacts associated with the implementation of a pedestrian hybrid beacon at the St. Matthew Church Driveway/Crystal Springs Driveway intersection. MCDOT provided an existing conditions Synchro model with peak hour volumes for the intersection of MD 97 at Bel Pre Road, to which the St. Matthew Church/Crystal Springs Driveway intersection was added. The March 2022 turning moment count for the proposed pedestrian hybrid beacon location was used for this analysis and balanced to the MD 97 at Bel Pre Road intersection volumes at the direction of MCDOT. The resultant AM and PM peak hour volumes are shown in **Figure 9**.

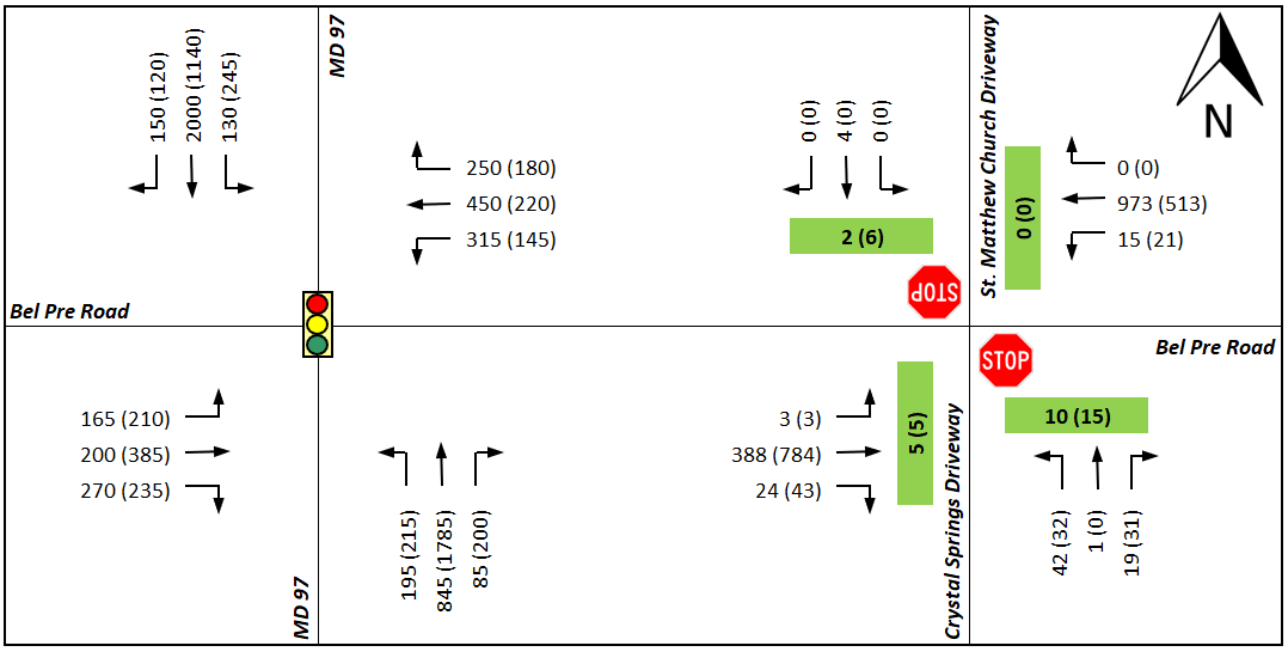


Figure 9: AM and PM Peak Hour Volumes

It should be noted that pedestrian hybrid beacons cannot be explicitly modeled in Synchro due to limitations of the software. However, the operational impacts of a pedestrian hybrid beacon can be approximated by

modeling a modified full traffic signal. The pedestrian hybrid beacon was approximated using the following assumptions:

- A traffic signal was placed just east of St. Matthew Church/Crystal Springs Driveway (with the understanding that the pedestrian hybrid beacon would actually control vehicular traffic on both the eastbound and westbound approaches of Bel Pre Road in the field).
- The signal was set to uncoordinated control, with the Bel Pre Road vehicular phases set to Max Recall.
- The pedestrian phase was set to No Recall and the pedestrian calls per hour was set to the number of pedestrians crossing the east and west legs of Bel Pre Road shown in Figure 9.
- The total length of the pedestrian phase was set assuming a 7 second Walk interval and the required Flashing Don't Walk time based on a pedestrian walking speed of 3.5 feet per second.

The capacity results for the existing and proposed conditions are summarized in **Table 4**. Synchro outputs are provided in **Appendix E**.

Table 4 – Capacity Analysis Results

Intersection	Movement	Existing Conditions				Proposed Pedestrian Hybrid Beacon			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
MD 97 at Bel Pre Road	**Overall**	**59.3**	**E**	**55.5**	**E**	**59.3**	**E**	**55.5**	**E**
	EBL	70.6	E	62.1	E	70.6	E	62.1	E
	EBT	72.3	E	73.1	E	72.3	E	73.1	E
	EBR	-	-	-	-	-	-	-	-
	WBL	118.5	F	59.2	E	118.5	F	59.2	E
	WBT	84.0	F	67.3	E	84.0	F	67.3	E
	WBR	-	-	-	-	-	-	-	-
	NBL	101.3	F	94.8	F	101.3	F	94.8	F
	NBT	27.8	C	51.4	D	27.8	C	51.4	D
	NBR	-	-	-	-	-	-	-	-
	SBL	91.5	F	98.0	F	91.5	F	98.0	F
	SBT	47.6	D	34.7	C	47.6	D	34.7	C
	SBR	-	-	-	-	-	-	-	-
Bel Pre Road at St. Matthew Church Driveway/Crystal Springs Driveway	**Overall**	**<5**	**A**	**<5**	**A**	**<5[1]**	**A**	**<5[1]**	**A**
	EBL	10.5	B	8.6	A	10.5[1]	B	8.6[1]	A
	EBTR	<5	A	<5	A	<5[1]	A	<5[1]	A
	WBL	8.4	A	10.1	B	8.4[1]	A	10.1[1]	B
	WBTR	<5	A	<5	A	<5[1]	A	<5[1]	A
	NBLTR	26.7	D	31.1	D	26.4[1]	D	30.4[1]	D
	SBLTR	39.7	E	<5	A	39.7[1]	E	<5[1]	A

Notes: HCM 6th edition excludes delay for the channelized right turns from calculations of approach delay and intersection delay.

[1] Pedestrian hybrid beacons can be approximated, but not explicitly modeled, at intersections using Synchro software. As a result, mainline eastbound and westbound Bel Pre Road movement delays for the proposed condition (with pedestrian hybrid beacon) at St. Matthew Church Driveway/Crystal Springs Driveway may be greater than shown in Table 4. In contrast, northbound and southbound access driveway movement delays may be less than shown in Table 4.

The results in Table 4 indicate that under existing conditions, the intersection of MD 97 at Bel Pre Road operates at LOS E during the AM and PM peak hours, while the intersection of Bel Pre Road at St. Matthew Church Driveway/Crystal Springs Driveway operates at LOS A during the AM and PM peak hours. Synchro also indicates that the intersections continue to operate at LOS E and LOS A, respectively, with the installation of the proposed pedestrian hybrid beacon. Movement delays are also similar with the proposed pedestrian hybrid beacon, with all delays being within one second of those experienced under existing conditions. However, the LOS and delay results for the Bel Pre Road at St. Matthew Church Driveway/Crystal Springs Driveway intersection under the proposed pedestrian hybrid beacon condition should be interpreted with care, as they are based on a modeled approximation of a pedestrian hybrid beacon. The approximation involved modeling a full signal just east of St. Matthew Church Driveway/Crystal Springs Driveway, to allow for the

northbound Crystal Springs Driveway and southbound St. Matthew Church Driveway approaches to remain under stop sign control for the analysis (as they would be if a Pedestrian Hybrid Beacon was implemented at this intersection). As a result, it is possible that mainline eastbound and westbound Bel Pre Road movement delays under the proposed condition would be greater than shown in Table 4. In contrast, northbound and southbound St. Matthew Church Driveway/Crystal Springs Driveway movement delays may be less than shown in Table 4. An examination of the vehicular queuing results in the following section complements the capacity analysis results, providing a more complete picture of the operational impacts expected with a pedestrian hybrid beacon.

Queuing Analysis

A queuing analysis was performed utilizing SimTraffic software to determine potential queuing impacts associated with the proposed pedestrian hybrid beacon. The average of five simulation runs are summarized in **Table 5**. SimTraffic outputs are provided in **Appendix F**.

Table 5 – Queuing Analysis Results

Intersection	Movement	Storage Length[1] (ft)	Existing Conditions				Proposed Pedestrian Hybrid Beacon			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			Avg Q (ft)	95th Q (ft)	Avg Q (ft)	95th Q (ft)	Avg Q (ft)	95th Q (ft)	Avg Q (ft)	95th Q (ft)
MD 97 at Bel Pre Road	EBL	180	125	**200**	175	**250**	125	**200**	175	**250**
	EBT	790	125	200	625	**1,000**	125	250	550	**950**
	EBR	240	25	150	50	225	25	150	25	150
	WBL	295	250	**375**	150	275	250	**375**	125	275
	WBT	290	200	**325**	125	250	200	**325**	125	225
	WBR	150	75	**225**	25	150	100	**225**	25	125
	NBL[2]	675/400	125	200	200	375	125	200	200	375
	NBT	1,915	175	300	325	575	175	325	350	600
	NBR	200	<25	25	100	**275**	<25	<25	125	**300**
	SBL[2]	525/300	150	500	225	425	150	500	200	350
	SBT	> 2,500	525	750	200	400	525	800	200	375
	SBR	40	**50**	**75**	**50**	**75**	**50**	**75**	25	**75**
Bel Pre Road at St. Matthew Church Driveway/Crystal Springs Driveway	EBL	150	<25	25	<25	<25	<25	<25	<25	<25
	EBTR	305	<25	<25	<25	25	<25	50	25	125
	WBL	95	<25	25	<25	25	<25	50	<25	50
	WBTR	515	25	125	<25	25	100	375	25	100
	NBLTR	455	50	75	25	75	50	125	25	75
	SBLTR	240	<25	25	<25	<25	<25	25	<25	<25

1 - Storage length based on distance to the nearest upstream intersection

2 - Dual left turn lane with varying widths

The results of the queuing analysis indicate that the 95th percentile queues for the following movements at the MD 97 at Bel Pre Road intersection extend beyond the available storage distance under **existing conditions**:

- Eastbound left turn (AM and PM peak hours)
- Eastbound through (PM peak hour)
- Westbound left turn (AM peak hour)
- Westbound through (AM peak hour)
- Westbound right turn (AM peak hour)
- Northbound right turn (PM peak hour)
- Southbound right turn (AM and PM peak hours)

These movements continue to exceed the available storage distance under proposed conditions **but are not otherwise significantly impacted by the pedestrian hybrid beacon.** At the St. Matthew Church/Crystal Springs intersection, queues do not exceed the available storage distance under existing or proposed conditions. It should be noted, however, that with the implementation of a pedestrian hybrid beacon, the westbound 95th percentile through queue is projected to increase from 125 to 375 feet during the AM peak hour and from 25 to 100 feet during the PM peak hour, while the northbound 95th percentile queue is projected to increase from 75 to 125 during the AM peak hour and remain comparable to existing conditions during the PM peak hour. In the eastbound direction, eastbound 95th percentile through queues increase from <25 to 50 feet during the AM peak hour and from <25 to 125 feet during the PM peak hour, indicating that **the pedestrian hybrid beacon is not anticipated to impact the MD 97 at Bel Pre Road intersection.**

Summary of Suggested Improvements

Based on field observations and available crash data, the following improvements are recommended for consideration to address safety issues on the study corridor. It should be noted that a number of the recommendations below will need to be coordinated with the appropriate third parties, including but not limited to, Maryland Department of Transportation State Highway Administration (MDOT SHA), WMATA, MTA, and Montgomery County Public Schools. The improvements are compiled and summarized in **Table 6** below. A concept plan showing several of the recommended improvements is provided in **Appendix G**.

Table 6 – Recommended Improvements

Location	Observation/Issue	Recommendation	Timeframe
Bel Pre Road at Georgia Avenue	Seven of fifteen crashes that occurred at the Georgia Avenue intersection were rear end crashes. Five of the seven crashes occurred on the Georgia Avenue approaches.	Evaluate the current yellow change and all red clearance intervals for Bel Pre Road and Georgia Avenue and update timings if necessary.	Short
Bel Pre Road at Georgia Avenue	Two of the fifteen crashes that occurred at the Georgia Avenue intersection involved pedestrians.	Update crosswalks with continental style pavement markings. See Appendix G for the proposed pavement markings.	Short

Location	Observation/Issue	Recommendation	Timeframe
Bel Pre Road at Dunsinane Drive	A serious pedestrian crash was reported at the midblock crosswalk just west of Dunsinane Drive.	Consider installing an advance pedestrian crossing sign along eastbound Bel Pre Road, similar to what is provided for westbound Bel Pre Road, to warn motorists of the upcoming midblock crossing.	Short
Bel Pre Road at Connecticut Avenue	Seven of the seventeen crashes that occurred at the Connecticut Avenue intersection were rear end crashes. All seven of the crashes occurred on the Bel Pre Road approaches. Five occurred in the westbound direction and two occurred in the eastbound direction.	Evaluate the current yellow change and all red clearance intervals for Bel Pre Road and update timings if necessary.	Short
Bel Pre Road at Homecrest Road	Pedestrians were observed crossing the west leg between the bus stop on the north side of Bel Pre Road and the residential community on the south side.	Evaluate the feasibility of implementing a No Turn on Red restriction for southbound traffic on Homecrest Road to westbound Bel Pre Road.	Short
Bel Pre Road at Homecrest Road	Pedestrians were observed crossing the west leg between the bus stop on the north side of Bel Pre Road and the residential community on the south side.	Determine the feasibility of moving the bus stop west of Homecrest Road closer to the signalized intersection.	Short
Bel Pre Road at Beaverwood Lane	The APS in the northwest corner does not emit sound when the pedestrian pushbutton is pressed, or during the walk and flashing don't walk phases. The APS in the southwest corner beeps continuously.	Repair the APS/CPS for the west leg crosswalk.	Short
Bel Pre Road at Beaverwood Lane	Crosswalk markings are faded.	Restripe faded transverse crosswalk pavement markings with continental crosswalk markings. See Appendix G for the proposed pavement markings.	Short
Bel Pre Road east of Rippling Brook Drive	There is overgrown vegetation encroaching on the sidewalk on the north side of Bel Pre Road east of Rippling Brook Drive	Trim foliage encroaching on sidewalk.	Short

Location	Observation/Issue	Recommendation	Timeframe
Throughout	Vehicular speeds are significantly greater than the posted speed limit, particularly between Georgia Avenue and Connecticut Avenue.	Consider installing raised medians within stretches of the existing two way left turn lane to reduce travel speeds. See Appendix G for potential locations.	Long
Bel Pre Road at Connecticut Avenue	Four of the seventeen crashes that occurred at the Connecticut Avenue intersection were left turn crashes. Two of the left turn crashes occurred in the northbound direction, one occurred in the southbound direction, and one occurred in the eastbound direction.	Evaluate the traffic impacts associated with implementing exclusive/permissive left turn phasing in the northbound direction.	Intermediate
Bel Pre Road at Beaverwood Lane	There are no pedestrian signal heads for the south leg crosswalk.	Install APS/CPS pedestrian signal heads with applicable signage for the south leg crosswalk.	Intermediate
Bel Pre Road at Parker Farm Way	There were two pedestrian related crashes reported during the study period at the intersection of Bel Pre Road at Parker Farm Way. Both crashes involved vehicles making the southbound left turn from Parker Farm Way onto eastbound Bel Pre Road colliding with pedestrians in the east leg crosswalk	Evaluate the traffic impacts associated with implementing exclusive/permissive left turn phasing in the southbound direction.	Intermediate
Bel Pre Road at Layhill Road	Eight of the fourteen crashes that occurred at the Layhill Road intersection were left turn crashes. Three of these crashes involved vehicles traveling in the southbound direction, two involved vehicles traveling in the north- and westbound directions, and one involved a vehicle traveling in the eastbound direction.	Evaluate the traffic impacts associated with implementing exclusive left turn phasing in all directions.	Intermediate
Throughout	Thirty one percent of reported crashes occurred during dark conditions while nine percent occurred during dusk or dawn. An existing photometrics lighting analysis was conducted in 2016 and identified deficient lighting conditions.	Conduct further analysis to determine lighting improvements required to meet Illuminating Engineering Society (IES) recommended levels throughout the corridor.	Long

Location	Observation/Issue	Recommendation	Timeframe
Throughout	Vehicular speeds are significantly greater than the posted speed limit, particularly between Georgia Avenue and Connecticut Avenue.	Evaluate the feasibility of lane width reductions on Bel Pre Road from just east of Georgia Avenue to Layhill Road to slow vehicles. See Appendix G for the proposed lane width reduction concept design.	Long
Bel Pre Road at Georgia Avenue	Two of the fifteen crashes that occurred at the Georgia Avenue intersection involved pedestrians.	Consider installing pedestrian refuge medians on all legs of the Georgia Avenue at Bel Pre Road intersection, and pedestrian pushbuttons on all median refuge islands that do not have pedestrian recall phasing. See Appendix G for the proposed pedestrian refuge medians.	Long
Bel Pre Road at Georgia Avenue	There is the potential for higher speed vehicular turning movements due to the channelized rights on all four corners combined with marked crosswalks across all four channelized turn lanes.	Determine the feasibility of removing the channelized right turn lanes. Alternatively, consider the installation of a treatment such as a truck apron/traversable curb bump out that encourages slower turning speeds for vehicles. See Appendix G for potential channelized right turn treatments for the Georgia Avenue intersection.	Long
Bel Pre Road at St. Matthew Church Driveway/Crystal Springs Apartments Driveway	Pedestrians were observed crossing outside of marked crosswalks, particularly in the western portion of the corridor.	Consider installing a pedestrian hybrid beacon/High Intensity Activated Crosswalk (HAWK) at the intersection of Bel Pre Road and St. Matthew Church Driveway/Crystal Springs Apartments Driveway, along with marked crosswalks across the east and west legs of Bel Pre Road. See Appendix G for a potential layout of the pedestrian hybrid beacon/marked crosswalk locations.	Long
Bel Pre Road between Georgia Avenue and Connecticut Avenue	Vehicular speeds are significantly greater than the posted speed limit, particularly between Georgia Avenue and Connecticut Avenue.	Coordinate with the Montgomery County Police Department to ensure appropriate levels of enforcement of posted speed limits.	Long

Location	Observation/Issue	Recommendation	Timeframe
Bel Pre Road between Georgia Avenue and Connecticut Avenue	Utility poles on the north side of Bel Pre Road at Grand Pre Road block a portion of the sidewalk.	Evaluate the feasibility of constructing sidewalk jogs around utility poles.	Long
Bel Pre Road between Georgia Avenue and Connecticut Avenue	The medians on Dunsinane Drive and Tynewick Drive extend into the pedestrian crossing area/path.	Redesign pedestrian refuge islands in the median of Bel Pre Road at Tynewick Drive and Dunsinane Drive to provide a pedestrian crossing cutout of 10 feet through the median. Also, redesign concrete medians on Tynewick Drive and Dunsinane Drive such that the medians are pulled back out of the pedestrian crossing paths. See Appendix G for the proposed median design.	Long
Bel Pre Road at Connecticut Avenue	Two of the seventeen crashes that occurred at the Connecticut intersection involved pedestrians.	Consider installing pedestrian refuge medians on the east and west legs of the Connecticut Avenue at Bel Pre Road intersection and pedestrian pushbuttons on all median refuge islands that do not have pedestrian recall phasing. See Appendix G for the proposed concept design.	Long
Bel Pre Road at Connecticut Avenue	Two of the seventeen crashes that occurred at the Connecticut intersection involved pedestrians.	Consider removing the channelizing island and add a lane for the northbound Connecticut Avenue right turn that is signal controlled. Alternatively, consider the installation of a treatment such as a truck apron/traversable curb bump out for the channelized northbound right that encourages slower turning speeds for vehicles.	Long
Bel Pre Road west of Weeping Willow Drive	The two way left turn lane (TWLTL) west of Weeping Willow Drive shows arrow pavement markings, however, there are no access points along this segment into which a motorist could make a left turn from the existing TWLTL.	Consider extending the median west of Weeping Willow Drive. See Appendix G for the proposed design.	Long

APPENDIX

A

Crash Data

Crash Data (2015-2019) - Bel Pre Road
Layhill Road to Georgia Avenue

report_number	highest_injury_level	crash_date_time	lane_direction	lane_no	no_of_la	direction	distance	distance_unit	road_name	cross_street_name	at_fault	collision_type	weather	surface_co	light	second_harmful_event	fixed_oject	latitude	longitude	related_non_motorist
MCP27220037	SUSPECTED MINOR INJURY	5/17/2019 18:18	South	2	2	North	0	FEET	LAYHILL RD	BEL PRE RD	DRIVER	ANGLE MEETS LEFT TURN	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.0906	-77.0449	NA
MCP3020003S	SUSPECTED MINOR INJURY	6/28/2019 8:52	West	0	5	East	0	FEET	BEL PRE RD	PARKER FARM WAY	DRIVER	SINGLE VEHICLE	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.09059	-77.0481	PEDESTRIAN
MCP31180029	SUSPECTED MINOR INJURY	9/2/2019 9:55	East	2	2	West	0	FEET	BEL PRE RD	PARKER FARM WAY	DRIVER	SINGLE VEHICLE	CLOUDY	DRY	DAYLIGHT	N/A	N/A	39.09037	-77.0477	PEDESTRIAN
MCP2182001M	SUSPECTED MINOR INJURY	11/5/2018 8:39	West	1	2	West	25	FEET	BEL PRE RD	BEAVERWOOD LA	DRIVER	SAME DIR REAR END	RAINING	WET	DAYLIGHT	N/A	N/A	39.09065	-77.0591	NA
MCP2753001X	SUSPECTED MINOR INJURY	2/4/2017 9:26	South	1	2	North	0	FEET	CONNECTICUT AVE	BEL PRE RD	DRIVER	ANGLE MEETS LEFT HEAD ON	N/A	DRY	DAYLIGHT	N/A	N/A	39.05814	-77.0485	NA
MCP2947001H	SUSPECTED MINOR INJURY	1/28/2016 13:32	North	3	3	South	100	FEET	GEORGIA AVE	BEL PRE RD	DRIVER	SAME DIR REAR END	CLEAR	WET	DAYLIGHT	N/A	N/A	39.09312	-77.0793	NA
MCP29950048	SUSPECTED SERIOUS INJURY	2/26/2019 18:26	West	2	2	West	0.1	MILE	BEL PRE RD	NORTH GATE DR	DRIVER	OTHER	CLEAR	N/A	DARK LIGHTS ON	N/A	N/A	39.09191	-77.0692	PEDESTRIAN
MCP2917002B	SUSPECTED MINOR INJURY	12/19/2017 17:50	North	1	3	North	0	FEET	GEORGIA AVE	BEL PRE RD	DRIVER	SAME DIR REAR END	CLEAR	DRY	DARK NO LIGHTS	OTHER VEHICLE	N/A	39.09088	-77.0798	NA
MCP2796001S	SUSPECTED MINOR INJURY	5/21/2015 10:00	West	1	2	West	300	FEET	BEL PRE RD	LAYHILL RD	DRIVER	STRAIGHT MOVEMENT ANGLE	RAINING	WET	DAYLIGHT	OTHER VEHICLE	N/A	39.09089	-77.0462	NA
MCP2753001P	SUSPECTED MINOR INJURY	11/9/2016 8:11	West	2	2	West	50	FEET	BEL PRE RD	LAYHILL RD	DRIVER	ANGLE MEETS LEFT HEAD ON	RAINING	WET	DAYLIGHT	N/A	N/A	39.09058	-77.0469	NA
MCP2746000S	SUSPECTED MINOR INJURY	5/17/2015 17:53	East	1	2	West	40	FEET	BEL PRE RD	NORTH GATE DR	DRIVER	N/A	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.09035	-77.0512	PEDESTRIAN
MCP23960017	SUSPECTED MINOR INJURY	6/18/2016 11:24	North	1	3	North	0	FEET	CONNECTICUT AVE	BEL PRE RD	DRIVER	HEAD ON LEFT TURN	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.08332	-77.0942	NA
MCP2588000P	SUSPECTED MINOR INJURY	3/11/2015 11:00	East	1	2	West	15	FEET	BEL PRE RD	RIPPLING BROOK DR	DRIVER	SAME DIR REAR END	SNOW	WET	DAYLIGHT	N/A	N/A	39.0904	-77.0539	NA
MCP2796001Y	SUSPECTED MINOR INJURY	6/28/2015 11:20	South	0	1	South	10	FEET	BEAVERWOOD LA	BEL PRE RD	UNKNOWN	STRAIGHT MOVEMENT ANGLE	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.09047	-77.0591	BICYCLIST
MCP2960001C	SUSPECTED SERIOUS INJURY	11/2/2016 12:15	East	1	2	West	5	FEET	BEL PRE RD	BEAVERWOOD LA	DRIVER	OTHER	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.09061	-77.0592	NA
MCP3059003K	SUSPECTED MINOR INJURY	1/11/2019 19:29	East	0	3	West	0	FEET	BEL PRE RD	CONNECTICUT AVE	DRIVER	HEAD ON LEFT TURN	CLEAR	DRY	DARK LIGHTS ON	OTHER VEHICLE	N/A	39.09191	-77.0704	NA
MCP3124000F	SUSPECTED MINOR INJURY	4/19/2018 17:48	East	1	4	East	100	FEET	BEL PRE RD	ASTRODOME DR	DRIVER	SAME DIRECTION SIDESWIPE	CLOUDY	N/A	DAYLIGHT	OTHER VEHICLE	N/A	39.09041	-77.05	NA
MCP2951001S	SUSPECTED MINOR INJURY	8/25/2016 21:19	West	1	2	West	50	FEET	BEL PRE RD	PARKER FARM WAY	DRIVER	SAME DIRECTION LEFT TURN	CLEAR	DRY	DARK LIGHTS ON	N/A	N/A	39.09047	-77.0484	NA
MCP29660020	SUSPECTED MINOR INJURY	6/1/2016 22:35	South	0	2	North	0	FEET	CONNECTICUT AVE	BEL PRE RD	DRIVER	OTHER	CLEAR	DRY	DARK -- UNKNOWN LIGHTING	N/A	N/A	39.09196	-77.0703	PEDESTRIAN
MCP2960003V	SUSPECTED MINOR INJURY	1/25/2019 8:00	West	1	2	East	150	FEET	BEL PRE RD	NORTH GATE DR	DRIVER	SINGLE VEHICLE	N/A	DRY	DAYLIGHT	N/A	N/A	39.09046	-77.0506	PEDESTRIAN
MCP29750017	SUSPECTED MINOR INJURY	6/16/2016 22:06	West	2	3	West	0	FEET	BEL PRE RD	CONNECTICUT AVE	DRIVER	SAME DIR REAR END	RAINING	WET	DARK LIGHTS ON	N/A	N/A	39.09182	-77.07	NA
MCP2746000P	SUSPECTED MINOR INJURY	3/24/2015 21:28	North	1	2	North	0	FEET	CONNECTICUT AVE	BEL PRE RD	DRIVER	HEAD ON LEFT TURN	CLEAR	DRY	DARK LIGHTS ON	FIXED OBJECT	CURB	39.09202	-77.0701	NA
MCP1573000P	SUSPECTED MINOR INJURY	6/4/2015 13:46	South	3	3	North	0	FEET	GEORGIA AVE	BEL PRE RD	DRIVER	STRAIGHT MOVEMENT ANGLE	N/A	DRY	DAYLIGHT	N/A	N/A	39.09314	-77.08	NA
MCP2966000J	SUSPECTED MINOR INJURY	6/5/2015 21:43	South	0	4	North	0	FEET	LAYHILL RD	BEL PRE RD	DRIVER	HEAD ON LEFT TURN	CLEAR	DRY	DARK NO LIGHTS	N/A	N/A	39.0908	-77.0453	NA
MCP30070017	SUSPECTED MINOR INJURY	1/6/2017 9:17	West	1	2	West	100	FEET	BEL PRE RD	HOMECREST RD	DRIVER	HEAD ON LEFT TURN	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.09203	-77.0647	NA
MCP2755000M	SUSPECTED MINOR INJURY	5/18/2016 10:05	South	1	8	North	0	FEET	GEORGIA AVE	BEL PRE RD	DRIVER	HEAD ON LEFT TURN	CLEAR	DRY	DARK LIGHTS ON	OTHER VEHICLE	N/A	39.0931	-77.0795	NA
MCP25880018	SUSPECTED MINOR INJURY	11/18/2015 12:52	North	3	3	North	10	FEET	GEORGIA AVE	SPUR FR BEL PRE RD	DRIVER	SAME DIR REAR END	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.0934	-77.0791	NA
MCP28200011	SUSPECTED MINOR INJURY	5/21/2015 7:25	East	3	3	West	0	FEET	BEL PRE RD	GEORGIA AVE	DRIVER	SAME DIR REAR END	CLOUDY	DRY	N/A	N/A	N/A	39.09246	-77.0797	NA
MCP0539001Y	SUSPECTED SERIOUS INJURY	12/3/2015 8:28	East	1	2	East	700	FEET	BEL PRE RD	GRAND PRE RD	DRIVER	SINGLE VEHICLE	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.09336	-77.0752	PEDESTRIAN
MCP2997000H	SUSPECTED SERIOUS INJURY	7/3/2016 22:40	East	0	4	West	500	FEET	BEL PRE RD	GRAND PRE RD	DRIVER	OTHER	CLEAR	DRY	DARK LIGHTS ON	N/A	N/A	39.09354	-77.0778	PEDESTRIAN
MCP27960021	SUSPECTED MINOR INJURY	7/25/2015 11:05	West	2	2	East	15	FEET	BEL PRE RD	CONNECTICUT AVE	DRIVER	SAME DIR REAR END	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.0919	-77.0702	NA
MCP2582001Q	SUSPECTED MINOR INJURY	9/2/2017 21:06	West	1	2	East	20	FEET	BEL PRE RD	HOMECREST RD	DRIVER	SAME DIR REAR END	RAINING	WET	DARK LIGHTS ON	N/A	N/A	39.09128	-77.0624	NA
MCP3007002F	SUSPECTED MINOR INJURY	10/10/2017 8:15	West	3	3	East	25	FEET	BEL PRE RD	GEORGIA AVE	NONMOTORIST	SINGLE VEHICLE	N/A	DRY	DAYLIGHT	N/A	N/A	39.09347	-77.0787	PEDESTRIAN
MCP2997000L	SUSPECTED MINOR INJURY	12/9/2016 1:10	West	1	4	West	30	FEET	BEL PRE RD	PARKER FARM WAY	NONMOTORIST	STRAIGHT MOVEMENT ANGLE	N/A	DRY	DARK LIGHTS ON	N/A	N/A	39.09047	-77.0488	PEDESTRIAN
MCP2782002X	SUSPECTED MINOR INJURY	4/25/2019 17:25	East	2	2	West	30	FEET	BEL PRE RD	CONNECTICUT AVE	DRIVER	SAME DIR REAR END	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.09206	-77.0707	NA
MCP27830010	SUSPECTED MINOR INJURY	9/16/2016 19:42	North	0	2	North	0	FEET	LAYHILL RD	BEL PRE RD	DRIVER	HEAD ON LEFT TURN	CLEAR	DRY	DARK LIGHTS ON	OTHER VEHICLE	N/A	39.09049	-77.0448	NA
MCP2753001K	SUSPECTED MINOR INJURY	10/2/2016 12:05	North	0	3	West	0	FEET	BEL PRE RD	LAYHILL RD	DRIVER	ANGLE MEETS LEFT TURN	CLOUDY	DRY	DAYLIGHT	N/A	N/A	39.0907	-77.0448	NA
MCP30550013	SUSPECTED SERIOUS INJURY	2/18/2018 9:50	South	3	1	North	25	FEET	CONNECTICUT AVE	BEL PRE RD	DRIVER	SINGLE VEHICLE	CLEAR	WET	DAYLIGHT	OVERTURN	TREE SHRU	39.09231	-77.0701	NA
MCP27530029	SUSPECTED MINOR INJURY	5/7/2017 12:09	North	2	3	North	0	FEET	CONNECTICUT AVE	BEL PRE RD	BOTH	OTHER	CLOUDY	DRY	DAYLIGHT	N/A	N/A	39.09152	-77.0707	PEDESTRIAN
MCP3130000T	SUSPECTED MINOR INJURY	11/11/2018 12:00	South	1	1	South	30	FEET	GEORGIA AVE	BEL PRE RD	DRIVER	SAME DIR REAR END	CLEAR	DRY	N/A	N/A	N/A	39.09289	-77.0799	NA
MCP0617000K	SUSPECTED MINOR INJURY	5/16/2016 6:27	West	1	2	West	25	FEET	BEL PRE RD	LAYHILL RD	DRIVER	SAME DIRECTION SIDESWIPE	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.12929	-77.0237	NA
MCP2704000F	SUSPECTED MINOR INJURY	2/27/2015 23:53	West	2	2	West	100	FEET	BEL PRE RD	HOMECREST RD	DRIVER	SAME DIR REAR END	CLEAR	DRY	DARK LIGHTS ON	N/A	N/A	39.091	-77.061	NA
MCP2612001D	SUSPECTED MINOR INJURY	6/16/2016 16:17	East	2	4	West	100	FEET	BEL PRE RD	HOMECREST RD	DRIVER	SAME DIR REAR END	CLEAR	DRY	DAYLIGHT	OTHER VEHICLE	N/A	39.09131	-77.0653	NA
MCP26780015	SUSPECTED MINOR INJURY	6/22/2016 22:51	West	2	2	West	0	FEET	BEL PRE RD	BEL PRE DR	DRIVER	STRAIGHT MOVEMENT ANGLE	CLEAR	DRY	DARK LIGHTS ON	FIXED OBJECT	CURB	39.09049	-77.0516	NA
MCP0539004M	SUSPECTED MINOR INJURY	6/22/2018 9:13	South	2	5	North	2	FEET	GEORGIA AVE	BEL PRE RD	DRIVER	SAME DIR REAR END	RAINING	WET	DAYLIGHT	N/A	N/A	39.02972	-77.0134	NA
MCP2917003C	SUSPECTED MINOR INJURY	12/11/2018 17:30	East	1	2	East	0	FEET	BEL PRE RD	BEL PRE DR	DRIVER	SAME DIR REAR END	CLEAR	DRY	DARK NO LIGHTS	OTHER VEHICLE	N/A	39.0906	-77.0516	NA
MCP2951001N	SUSPECTED SERIOUS INJURY	7/1/2016 17:35	East	2	2	West	1	MILE	BEL PRE RD	BEAVERWOOD LA	DRIVER	STRAIGHT MOVEMENT ANGLE	CLEAR	DRY	DAYLIGHT	OFF ROAD	N/A	39.09109	-77.0665	NA
MCP23960026	SUSPECTED MINOR INJURY	7/18/2017 10:10	East	2	2	West	0	FEET	BEL PRE RD	HOMECREST RD	DRIVER	HEAD ON LEFT TURN	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.09161	-77.0627	PEDESTRIAN
MCP31300017	SUSPECTED MINOR INJURY	4/12/2019 6:40	West	1	2	West	0	FEET	BEL PRE RD	ENT TO APARTMENTS	DRIVER	STRAIGHT MOVEMENT ANGLE	CLOUDY	DRY	DAWN	N/A	TREE SHRU	39.09308	-77.0733	NA
MCP2951000W	SUSPECTED MINOR INJURY	11/27/2015 10:18	West	1	3	West	0	FEET	BEL PRE RD	CONNECTICUT AVE	DRIVER	SAME DIR REAR END	N/A	DRY	DAYLIGHT	N/A	N/A	39.09164	-77.0698	NA
MCP3190000B	SUSPECTED MINOR INJURY	3/27/2019 7:28	East	2	2	East	50	FEET	BEL PRE RD	NORTH GATE DR	DRIVER	SINGLE VEHICLE	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.09048	-77.0509	PEDESTRIAN
MCP2753000Y	SUSPECTED MINOR INJURY	5/28/2015 7:25	West	0	2	West	30	FEET	BEL PRE RD	GEORGIA AVE	DRIVER	SAME DIR REAR END	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.0929	-77.0803	NA
MCP2960003S	SUSPECTED MINOR INJURY	1/6/2019 9:00	North	3	3	North	0	FEET	GEORGIA AVE	BEL PRE RD	DRIVER	STRAIGHT MOVEMENT ANGLE	N/A	DRY	DAYLIGHT	OTHER VEHICLE	N/A	39.09317	-77.0793	NA
MCP9406000V	SUSPECTED MINOR INJURY	6/17/2016 16:59	West	1	2	East	0	MILE	BEL PRE RD	CONNECTICUT AVE	DRIVER	STRAIGHT MOVEMENT ANGLE	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.09136	-77.0659	NA
MCP2960003M	SUSPECTED MINOR INJURY	11/30/2018 9:20	South	1	2	North	0	FEET	LAYHILL RD	BEL PRE RD	DRIVER	STRAIGHT MOVEMENT ANGLE	N/A	DRY	DAYLIGHT	N/A	N/A	39.09059	-77.0448	NA
MCP30500021	SUSPECTED MINOR INJURY	1/19/2018 20:00	North	1	3	North	0	FEET	GEORGIA AVE	BEL PRE RD	DRIVER	STRAIGHT MOVEMENT ANGLE	CLEAR	DRY	DARK LIGHTS ON	OTHER VEHICLE	N/A	39.09318	-77.0793	NA
MCP3153000L	SUSPECTED MINOR INJURY	11/7/2018 17:18	East	1	2	West	100	FEET	BEL PRE RD	CONNECTICUT AVE	DRIVER	HEAD ON LEFT TURN	CLEAR	DRY	DUSK	N/A	N/A	39.09282	-77.0721	NA
MCP20010010	SUSPECTED SERIOUS INJURY	2/26/2019 23:40	North	2	6	North	0	FEET	GEORGIA AVE	BEL PRE RD	DRIVER	SAME DIR REAR END	CLEAR	DRY	DARK LIGHTS ON	OTHER VEHICLE	N/A	39.09305	-77.0795	NA
MCP1119003D	SUSPECTED MINOR INJURY	1/24/2017 17:16	West	2	2	East	10	FEET	BEL PRE RD	CONNECTICUT AVE	DRIVER	SAME DIR REAR END	N/A	DRY	DUSK	FIXED OBJECT	OTHER POI	39.09202	-77.0703	NA
MCP1123002L	SUSPECTED MINOR INJURY	3/1/2019 7:31	East	1	2	North	0	FEET	LAYHILL RD	BEL PRE RD	DRIVER	HEAD ON LEFT TURN	WINTRY M	WET	DAWN	N/A	N/A	39.09044	-77.0447	NA
MCP2725000W	SUSPECTED MINOR INJURY	6/20/2015 4:05	East	2	2	West	50	FEET	BEL PRE RD	CONNECTICUT AVE	DRIVER	SAME DIR REAR END	CLEAR	UNKNOWN	DARK LIGHTS ON	N/A	N/A	39.0918	-77.0703	NA
MCP3018000H	SUSPECTED MINOR INJURY	3/3/2017 5:35	East	1	4	East	20	FEET	BEL PRE RD	SUN VALLEY CIR	NONMOTORIST	OTHER	OTHER	WET	DARK LIGHTS ON	N/A	N/A	39.0905	-77.0479	PEDESTRIAN
MCP2917000J	SUSPECTED MINOR INJURY	6/21/2015 15:42	East	2	2	West	200	FEET	BEL PRE RD	CONNECTICUT AVE	DRIVER	SINGLE VEHICLE	CLEAR	DRY	DAYLIGHT	OTHER NON COLLISION	N/A	39.09157	-77.0698	NA
MCP2755000N	SUSPECTED MINOR INJURY	5/24/2016 21:41	East	1	4	East	20	FEET	BEL PRE RD	HOMECREST RD	DRIVER	SAME DIRECTION LEFT TURN	CLEAR	DRY	DARK -- UNKNOWN LIGHTING	OTHER VEHICLE	N/A	39.09121	-77.0624	NA
MCP1565002V	SUSPECTED SERIOUS INJURY	3/6/2018 7:26	East	2	2	West	0	FEET	BEL PRE RD	CONNECTICUT AVE	DRIVER	STRAIGHT MOVEMENT ANGLE	CLEAR	DRY	DAYLIGHT	FIXED OBJECT	LIGHT SUPI	39.09184	-77.0704	NA
MCP29920022	SUSPECTED MINOR INJURY	10/9/2018 20:25	West	2	2	West	500	FEET	BEL PRE RD	HOMECREST RD	DRIVER	SAME DIR REAR END	N/A	DRY	DARK LIGHTS ON	OTHER VEHICLE	N/A	39.09141	-77.064	NA
MCP2182001J	SUSPECTED MINOR INJURY	10/23/2018 7:59	West	1	2	East	200	FEET	BEL PRE RD	CONNECTICUT AVE	DRIVER	SAME DIR REAR END	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.09193	-77.0703	NA
MCP2960000Q	SUSPECTED MINOR INJURY	10/26/2015 7:33	East	2	2	West	20	FEET	BEL PRE RD	ASTRODOME DR	DRIVER	SAME DIR REAR END	CLEAR	DRY	DAWN	N/A	N/A	39.0904	-77.0505	NA
MCP28200021	SUSPECTED MINOR INJURY	2/29/2016 9:51	East	1	3	West	0	FEET	BEL PRE RD	LAYHILL RD	DRIVER	HEAD ON LEFT TURN	N/A	DRY	DAYLIGHT	N/A	N/A	39.09057	-77.0451	NA
MCP3153000F	SUSPECTED MINOR INJURY	10/2/2018 17:44	East	1	2	West	10	FEET	BEL PRE RD	LAYHILL RD	DRIVER	SAME DIR REAR END	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.09056	-77.045	NA
MCP2720001Q	SUSPECTED MINOR INJURY	1/12/2016 17:51	West	1	2	North	0	FEET	LAYHILL RD	BEL PRE RD	UNKNOWN	STRAIGHT MOVEMENT ANGLE	CLEAR	DRY	DARK NO LIGHTS	N/A	N/A	39.09033	-77.0449	NA
MCP3059002T	SUSPECTED MINOR INJURY	9/10/2018 15:33	South	1	2	North	0	FEET	LAYHILL RD	BEL PRE RD	DRIVER	HEAD ON LEFT TURN	RAINING	WET	DAYLIGHT	N/A	N/A	39.09063	-77.0449	NA
MCP27960030	SUSPECTED MINOR INJURY	2/25/2016 17:45	East	1	2	West	0	FEET	BEL PRE RD	ENT TO APARTMENTS	DRIVER	STRAIGHT MOVEMENT ANGLE	CLEAR	DRY	DUSK	N/A	N/A	39.09306	-77.0779	NA
MCP2162000X	SUSPECTED MINOR INJURY	3/19/2015 16:24	North	2	4	North	0	FEET	LAYHILL RD	BEL PRE RD	DRIVER	STRAIGHT MOVEMENT ANGLE	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.09054	-77.0448	NA
MCP2973002F	SUSPECTED MINOR INJURY	12/7/2016 10:45	East	1	2	West	200	FEET	BEL PRE RD	GEORGIA AVE	NONMOTORIST	OTHER	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.09286	-77.0806	PEDESTRIAN
MCP2698000Z	SUSPECTED MINOR INJURY	6/8/2015 14:05	West	1	2	West	0	FEET	BEL PRE RD	LAYHILL RD	DRIVER	HEAD ON LEFT TURN	CLEAR	DRY	DAYLIGHT	N/A	N/A	39.09077	-77.0449	NA

Crash Data (2015-2019) - Bel Pre Road
Layhill Road to Georgia Avenue

report_number	highest_injury_level	crash_date_time	lane_direction	lane_no	no_of_la	direction	distance	distance_unit	road_name	cross_street_name	at_fault	collision_type	weather	surface_co	light	second_harmful_event	fixed_oject	latitude	longitude	related_non_motorist
MCP2975000F	SUSPECTED MINOR INJURY	6/20/2015 23:20	West	2	4	West	0	FEET	BEL PRE RD	BIG BEAR CT	DRIVER	SAME DIRECTION SIDESWIPE	RAINING	WET	DARK LIGHTS ON	OTHER VEHICLE	CURB	39.09032	-77.0557	NA
MCP27760010	SUSPECTED MINOR INJURY	6/3/2015 23:27	East	2	2	West	0	FEET	BEL PRE RD	BIG BEAR CT	DRIVER	SAME DIR REAR END	CLEAR	DRY	DARK LIGHTS ON	N/A	N/A	39.09054	-77.0552	NA
MCP3059004C	SUSPECTED MINOR INJURY	12/6/2019 16:16	West	2	2	West	0	FEET	BEL PRE RD	PARKER FARM WAY	DRIVER	HEAD ON LEFT TURN	RAINING	WET	DAYLIGHT	N/A	N/A	39.09066	-77.0468	NA
MCP29600046	SUSPECTED MINOR INJURY	12/29/2019 12:45	West	1	2	West	0	FEET	BEL PRE RD	GRAND PRE RD	DRIVER	STRAIGHT MOVEMENT ANGLE	RAINING	WET	DAYLIGHT	N/A	N/A	39.09381	-77.0766	NA

Crash Data (2012-2014) - Shady Grove Road
Layhill Road to Georgia Avenue
Serious Injury and Fatal Crashes

Top HIN	INTERSECTION_X	INTERSECTION_Y	State Report Number	Local Case Number	Date	Time	Date and Time	Location	Main Road Name	Intersecting Road Name	Report Type	Collision Type	Lighting	Weather	NonMotorist	Fault	Highest Injury Level	Traffic Control	Harmful Event 1	Harmful Event 2	Surface Condition
Bel Pre Rd	-77.0796	39.093129	12247131	12048727	10/1/2012	7:21:00 PM	10/01/2012 07:21 PM	BEL PRE RD & GEORGIA AVE	BEL PRE RD	GEORGIA AVENUE	Injury Crash	Angle Meets Left Turn	Dark - Lights On	Clear or Cloudy		.	Suspected Serious Injury	.	Other Motor Vehicle	.	Dry
Bel Pre Rd	-77.0796	39.093129	12249957	13001073	1/7/2013	11:09:00 AM	01/07/2013 11:09 AM	BEL PRE RD & GEORGIA AVE	BEL PRE RD	GEORGIA AVENUE	Injury Crash	Single Vehicle	Daylight	Clear or Cloudy		.	Suspected Serious Injury	.	Fixed Object	.	Dry
Bel Pre Rd	-77.07034	39.09193	12250794	13006699	2/10/2013	1:00:00 PM	02/10/2013 01:00 PM	BEL PRE RD & CONNECTICUT AVE	BEL PRE RD	CONNECTICUT AVENUE	Injury Crash	Straight Movement Angle	Daylight	Clear or Cloudy		.	Suspected Serious Injury	.	Other Motor Vehicle	.	Dry
Bel Pre Rd	-77.06555	39.091332	12844819	13056842	11/25/2013	7:11:00 PM	11/25/2013 07:11 PM	BEL PRE RD & HOMECREST RD	BEL PRE RD	HOMECREST DRIVE	Injury Crash	Head On	Dark - No Street Lights	Clear or Cloudy	Pedestrian	Pedestrian	Suspected Serious Injury	.	Pedestrian	.	Dry
Bel Pre Rd	-77.0478617	39.09068833	MCP11230009	14026515	6/5/2014	9:43:00 AM	06/05/2014 09:43 AM	BEL PRE RD & PARKER FARM WAY	BEL PRE RD	PARKER FARM WAY	Injury Crash	Head On Left Turn	Daylight	Cloudy		Unknown	Suspected Serious Injury	Traffic Signal	Other Vehicle	Fixed Object	Dry
Bel Pre Rd	-77.0504217	39.09072667	MCP0539000X	14048788	10/6/2014	12:00:00 AM	10/06/2014 12:00 AM	BEL PRE RD & ASTRODOME DR	BEL PRE RD	ASTRODOME DR	Injury Crash	Same Direction Rear End	Dawn	Clear		Unknown	Suspected Serious Injury	No Controls	Other Vehicle	N/A	Dry

APPENDIX

B

Speed Data

Connor Speed Report

Site Attribute BEL EB - W. OF GRAND
Direction EAST

Tuesday, March 1, 2022

Time [--	Vbin 6 12	Vbin 12 19	Vbin 19 25	Vbin 25 31	Vbin 31 37	Vbin 37 43	Vbin 43 50	Vbin 50 56	Vbin 56 62	Vbin 62 68	Vbin 68 75	Vbin 75 81	Vbin 81 87	Vbin 87 93	Vbin 93 99	Vpp 50	]PSL 35
0000	0	0	5	21	26	10	2	0	0	0	0	0	0	0	0	32.2	16
0100	0	0	0	9	15	5	1	0	0	0	0	0	0	0	0	33	12
0200	0	0	2	3	5	3	0	1	0	0	0	0	0	0	0	33.4	6
0300	0	0	0	3	9	6	0	0	0	0	0	0	0	0	0	34.7	8
0400	0	0	0	7	11	4	1	0	0	0	0	0	0	0	0	33.8	8
0500	0	0	5	14	43	17	2	1	0	0	0	0	0	0	0	34.6	38
0600	0	2	14	48	78	15	2	0	0	0	0	0	0	0	0	32.2	46
0700	0	2	10	114	169	52	3	0	0	0	0	0	0	0	0	32.5	104
0800	0	3	18	151	196	44	4	2	0	0	0	0	0	0	0	32	105
0900	1	0	10	112	195	44	3	0	0	0	0	0	0	0	0	33.1	105
1000	0	1	15	66	165	44	3	0	1	0	0	0	0	0	0	33.4	95
1100	0	0	16	106	154	45	6	0	0	0	0	0	0	0	0	32.3	87
1200	0	0	22	115	181	47	3	1	0	0	0	0	0	0	0	32.4	102
1300	0	0	11	117	208	42	5	1	0	0	0	0	0	0	0	33.1	110
1400	0	2	14	150	188	45	3	1	0	0	0	0	0	0	0	32.2	103
1500	0	3	42	212	286	53	5	0	0	0	0	0	0	0	0	32	134
1600	0	1	29	230	342	63	10	0	0	0	0	0	0	0	0	32.1	153
1700	1	5	41	260	305	37	1	2	1	0	0	0	0	0	0	31.3	111
1800	0	0	27	231	267	58	3	1	0	0	0	0	0	0	0	31.5	123
1900	0	2	21	174	239	27	3	0	0	0	0	0	0	0	0	31.8	95
2000	0	1	9	119	177	39	3	1	0	0	0	0	0	0	0	32.1	89
2100	0	0	16	97	124	32	2	0	0	0	0	0	0	0	0	32.1	65
2200	0	2	6	69	80	31	2	0	0	0	0	0	0	0	0	32.8	62
2300	0	1	6	46	78	21	5	0	0	0	0	0	0	0	0	33.2	53
00-00	**2**	**25**	**339**	**2474**	**3541**	**784**	**72**	**11**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**32.2**	**1830**

Vehicles = 7250
Posted speed limit = 35 mph, Exceeding = 1830 (25.24%), Mean Exceeding = 37.95 mph
Maximum = 60.9 mph, Minimum = 7.4 mph, Mean = 32.2 mph
50% Speed = 32.21 mph, 85% Speed = 36.69 mph, Median = 32.21 mph
12 mph Pace = 26 - 38, Number in Pace = 5971 (82.36%)
Variance = 21.18, Standard Deviation = 4.60 mph

Wednesday, March 2, 2022

Time [--	Vbin 6 12	Vbin 12 19	Vbin 19 25	Vbin 25 31	Vbin 31 37	Vbin 37 43	Vbin 43 50	Vbin 50 56	Vbin 56 62	Vbin 62 68	Vbin 68 75	Vbin 75 81	Vbin 81 87	Vbin 87 93	Vbin 93 99	Vpp 50	]PSL 35
0000	0	0	3	14	28	8	0	1	0	0	0	0	0	0	0	33.2	16
0100	0	0	0	11	9	6	1	0	0	0	0	0	0	0	0	33.6	11
0200	0	0	2	7	10	4	1	1	0	0	0	0	0	0	0	32.4	9
0300	0	0	0	3	2	7	0	0	0	0	0	0	0	0	0	38	8
0400	0	0	2	10	5	4	0	0	0	0	0	0	0	0	0	30.9	6
0500	0	0	7	19	36	22	3	0	0	0	0	0	0	0	0	34	38
0600	0	0	16	45	71	35	2	0	0	0	0	0	0	0	0	33.3	61
0700	3	2	18	100	168	57	3	0	0	0	0	0	0	0	0	33	123
0800	0	2	27	110	230	50	7	0	0	0	0	0	0	0	0	32.7	117
0900	0	1	14	82	173	60	5	0	1	0	0	0	0	0	0	33.4	116
1000	0	1	13	96	159	36	3	0	0	2	0	0	0	0	0	32.4	80
1100	0	1	16	104	187	39	3	1	0	0	0	0	0	0	0	32.4	95
1200	0	0	25	98	169	24	5	0	0	0	0	0	0	0	0	32.3	82
1300	0	0	16	105	202	53	6	0	0	0	0	0	0	0	0	32.8	109
1400	2	2	27	162	201	60	8	1	0	0	0	0	0	0	0	31.9	124
1500	2	3	23	217	270	60	10	1	0	0	0	0	0	0	0	32	131
1600	3	1	28	272	328	51	14	0	0	0	0	0	0	0	0	31.9	147
1700	3	1	39	275	294	46	0	0	0	0	0	0	0	0	0	31.3	117
1800	1	2	39	278	266	49	1	0	0	0	0	0	0	0	0	31	116
1900	0	0	24	207	220	39	0	0	0	0	0	0	0	0	0	31.3	85
2000	0	3	12	159	183	41	2	0	0	0	0	0	0	0	0	31.9	102
2100	0	1	19	101	119	32	5	0	0	0	0	0	0	0	0	31.7	76
2200	0	1	19	68	100	26	0	0	0	0	0	0	0	0	0	32.1	48
2300	0	0	6	59	62	18	3	0	0	0	0	0	0	0	0	31.9	36
00-00	**14**	**21**	**395**	**2602**	**3492**	**827**	**82**	**5**	**1**	**2**	**0**	**0**	**0**	**0**	**0**	**32.1**	**1853**

Vehicles = 7441
Posted speed limit = 35 mph, Exceeding = 1853 (24.90%), Mean Exceeding = 38.07 mph
Maximum = 63.4 mph, Minimum = 6.3 mph, Mean = 32.1 mph
50% Speed = 32.10 mph, 85% Speed = 36.69 mph, Median = 32.10 mph
12 mph Pace = 26 - 38, Number in Pace = 6027 (81.00%)
Variance = 23.00, Standard Deviation = 4.80 mph

Grand Total

Time [--	Vbin 6 12	Vbin 12 19	Vbin 19 25	Vbin 25 31	Vbin 31 37	Vbin 37 43	Vbin 43 50	Vbin 50 56	Vbin 56 62	Vbin 62 68	Vbin 68 75	Vbin 75 81	Vbin 81 87	Vbin 87 93	Vbin 93 99	Vpp 50	]PSL 35
--	**16**	**46**	**734**	**5076**	**7033**	**1611**	**154**	**16**	**3**	**2**	**0**	**0**	**0**	**0**	**0**	**32.1**	**3683**

Vehicles = 14691
Posted speed limit = 35 mph, Exceeding = 3683 (25.07%), Mean Exceeding = 38.01 mph
Maximum = 63.4 mph, Minimum = 6.3 mph, Mean = 32.2 mph
50% Speed = 32.10 mph, 85% Speed = 36.69 mph, Median = 32.10 mph
12 mph Pace = 26 - 38, Number in Pace = 11998 (81.67%)
Variance = 22.11, Standard Deviation = 4.70 mph

Connor Speed Report

Dataset

Site Name	BEL WB - W. OF GRAND
Direction	West

Tuesday, March 1, 2022

Time [--	Vbin 6 12	Vbin 12 19	Vbin 19 25	Vbin 25 31	Vbin 31 37	Vbin 37 43	Vbin 43 50	Vbin 50 56	Vbin 56 62	Vbin 62 68	Vbin 68 75	Vbin 75 81	Vbin 81 87	Vbin 87 93	Vbin 93 99	Vpp 50	]PSL 35
0000	0	0	0	8	14	7	3	2	0	0	0	0	0	0	0	34.2	14
0100	0	0	0	2	5	6	2	0	0	0	0	0	0	0	0	37.5	9
0200	0	0	0	5	7	2	0	0	0	0	0	0	0	0	0	32.5	3
0300	0	0	0	2	8	6	0	0	0	0	0	0	0	0	0	35.6	9
0400	0	0	0	5	26	13	8	0	0	0	0	0	0	0	0	35.8	29
0500	0	0	3	25	76	41	17	4	1	0	0	0	0	0	0	36.1	96
0600	0	1	3	54	166	107	25	4	0	0	0	0	0	0	0	36	207
0700	0	3	20	126	324	152	27	5	0	0	0	0	0	0	0	34.6	292
0800	0	0	5	118	328	176	37	3	1	0	0	0	0	0	0	34.9	330
0900	0	0	5	66	237	135	25	3	2	0	0	0	0	0	0	35.5	260
1000	0	0	3	34	192	76	24	3	1	1	0	0	0	0	0	35.1	168
1100	0	0	4	39	163	107	12	6	0	0	0	0	0	0	0	35.5	179
1200	0	0	2	76	193	100	21	0	0	0	0	0	0	0	0	35.2	204
1300	0	0	7	47	184	100	16	1	0	0	0	0	0	0	0	35.1	186
1400	0	0	7	60	190	120	17	2	1	0	0	0	0	0	0	35.5	219
1500	0	0	10	89	264	143	18	1	0	0	0	0	0	0	0	35.1	269
1600	0	0	4	66	220	141	20	1	0	0	0	0	0	0	0	35.2	233
1700	0	1	8	120	251	97	16	0	0	0	0	0	0	0	0	34.2	212
1800	0	0	4	70	227	92	23	3	0	0	0	0	0	0	0	34.8	203
1900	0	1	6	57	156	74	6	1	0	0	0	0	0	0	0	34.3	139
2000	0	0	5	41	123	64	6	2	1	0	0	0	0	0	0	34.7	114
2100	0	0	6	37	91	41	5	1	4	0	0	0	0	0	0	34.3	80
2200	0	0	3	28	72	40	4	1	1	0	0	0	0	0	0	35	71
2300	0	0	0	12	39	15	1	0	0	0	0	0	0	0	0	34.4	32
00-00	**0**	**6**	**105**	**1187**	**3556**	**1855**	**333**	**43**	**12**	**1**	**0**	**0**	**0**	**0**	**0**	**35**	**3558**

Vehicles = 7098
Posted speed limit = 35 mph, Exceeding = 3558 (50.13%), Mean Exceeding = 39.15 mph
Maximum = 62.3 mph, Minimum = 12.7 mph, Mean = 35.3 mph
50% Speed = 35.01 mph, 85% Speed = 40.15 mph, Median = 35.01 mph
12 mph Pace = 29 - 41, Number in Pace = 5665 (79.81%)
Variance = 25.34, Standard Deviation = 5.03 mph

Wednesday, March 2, 2022

Time [--	Vbin 6 12	Vbin 12 19	Vbin 19 25	Vbin 25 31	Vbin 31 37	Vbin 37 43	Vbin 43 50	Vbin 50 56	Vbin 56 62	Vbin 62 68	Vbin 68 75	Vbin 75 81	Vbin 81 87	Vbin 87 93	Vbin 93 99	Vpp 50	]PSL 35
0000	1	0	1	7	20	4	1	0	0	0	0	0	0	0	0	32.7	8
0100	0	0	0	6	11	7	1	0	0	0	0	0	0	0	0	35.1	13
0200	0	0	0	4	12	5	0	2	0	0	0	0	0	0	0	36.5	13
0300	0	0	0	2	4	5	1	1	0	0	0	0	0	0	0	37.4	7
0400	0	0	0	12	21	15	4	1	0	0	0	0	0	0	0	34.4	24
0500	0	0	2	34	51	45	24	4	0	0	0	0	0	0	0	35.8	92
0600	0	0	4	67	156	106	24	5	0	0	0	0	0	0	0	35.6	196
0700	0	0	7	89	322	205	29	6	1	0	0	0	0	0	0	35.7	372
0800	1	7	15	95	316	223	31	6	0	0	1	0	0	0	0	35.6	376
0900	0	1	10	65	180	137	26	2	0	0	0	0	0	0	0	35.9	244
1000	0	0	2	40	179	102	14	3	0	0	0	0	0	0	0	35.8	198
1100	0	0	4	57	174	94	23	4	1	0	0	0	0	0	0	35.6	197
1200	0	0	1	53	197	107	23	2	1	0	0	0	0	0	0	35.3	204
1300	0	0	2	58	171	128	16	2	1	0	0	0	0	0	0	35.8	215
1400	0	0	9	65	203	131	21	1	0	0	0	0	0	0	0	35.3	225
1500	0	4	9	120	253	140	17	1	0	0	0	0	0	0	0	34.7	263
1600	0	0	5	82	245	103	17	1	0	0	0	0	0	0	0	34.8	215
1700	0	0	6	95	288	99	14	1	0	0	0	0	0	0	0	34.2	214
1800	0	1	9	111	236	85	11	5	0	0	0	0	0	0	0	33.8	177
1900	0	0	4	58	183	80	10	0	0	0	0	0	0	0	0	34.7	157
2000	0	0	3	37	110	60	9	1	0	0	0	0	0	0	0	35	111
2100	0	0	3	43	94	48	7	3	0	0	0	0	0	0	0	34.8	95
2200	0	0	1	24	61	24	12	0	1	0	0	0	0	0	0	34.4	55
2300	0	0	0	16	40	22	3	0	0	0	0	0	0	0	0	35.3	42
00-00	**2**	**13**	**97**	**1240**	**3527**	**1975**	**338**	**51**	**5**	**0**	**1**	**0**	**0**	**0**	**0**	**35.1**	**3713**

Vehicles = 7249
Posted speed limit = 35 mph, Exceeding = 3713 (51.22%), Mean Exceeding = 39.13 mph
Maximum = 74.0 mph, Minimum = 7.6 mph, Mean = 35.3 mph
50% Speed = 35.12 mph, 85% Speed = 40.26 mph, Median = 35.12 mph
12 mph Pace = 30 - 42, Number in Pace = 5711 (78.78%)
Variance = 25.80, Standard Deviation = 5.08 mph

Grand Total

Time [--	Vbin 6 12	Vbin 12 19	Vbin 19 25	Vbin 25 31	Vbin 31 37	Vbin 37 43	Vbin 43 50	Vbin 50 56	Vbin 56 62	Vbin 62 68	Vbin 68 75	Vbin 75 81	Vbin 81 87	Vbin 87 93	Vbin 93 99	Vpp 50	]PSL 35
--	**2**	**19**	**202**	**2427**	**7083**	**3830**	**671**	**94**	**17**	**1**	**1**	**0**	**0**	**0**	**0**	**35.1**	**7271**

Vehicles = 14347
Posted speed limit = 35 mph, Exceeding = 7271 (50.68%), Mean Exceeding = 39.14 mph
Maximum = 74.0 mph, Minimum = 7.6 mph, Mean = 35.3 mph
50% Speed = 35.12 mph, 85% Speed = 40.15 mph, Median = 35.12 mph
12 mph Pace = 29 - 41, Number in Pace = 11373 (79.27%)
Variance = 25.57, Standard Deviation = 5.06 mph

Connor Speed Report

Dataset

Site Name BEL PRE EB W.OF BIG BEAR
Direction East

Tuesday, March 1, 2022

Time [--	Vbin 6 12	Vbin 12 19	Vbin 19 25	Vbin 25 31	Vbin 31 37	Vbin 37 43	Vbin 43 50	Vbin 50 56	Vbin 56 62	Vbin 62 68	Vbin 68 75	Vbin 75 81	Vbin 81 87	Vbin 87 93	Vbin 93 99	Vpp 50	]PSL 35
0000	1	0	0	3	8	15	6	3	0	0	0	0	0	0	0	39.3	27
0100	0	0	0	2	5	8	7	1	0	0	0	0	0	0	0	40.6	17
0200	0	0	0	1	4	5	0	0	1	0	1	0	0	0	0	39.6	8
0300	0	0	0	0	6	8	10	5	1	1	1	0	0	0	0	44.1	29
0400	0	0	0	4	10	20	21	6	3	0	0	0	0	0	0	43.3	58
0500	0	0	1	7	43	67	57	23	8	1	0	0	0	0	0	42.3	179
0600	0	0	0	11	84	146	77	24	3	0	0	0	0	0	0	40.5	288
0700	0	0	3	27	209	252	106	22	4	1	0	0	0	0	0	38.7	492
0800	0	0	2	35	262	273	91	12	2	0	1	0	0	0	0	37.8	505
0900	0	2	2	36	186	230	84	14	4	2	0	0	0	1	0	38.5	428
1000	0	1	1	18	191	172	53	10	2	1	0	0	0	0	0	37.7	338
1100	0	0	1	15	210	232	58	15	4	2	0	0	0	0	0	38.1	420
1200	0	0	1	29	221	227	58	10	4	0	0	0	0	0	0	37.7	405
1300	0	0	1	50	213	227	80	13	3	1	0	0	0	0	0	37.9	439
1400	0	1	2	40	270	240	71	9	1	1	0	0	0	0	0	37.5	429
1500	0	4	7	62	339	285	81	12	4	1	1	0	0	0	0	37.1	538
1600	0	1	1	48	328	328	81	11	2	0	0	0	0	0	0	37.6	568
1700	0	0	0	46	368	314	57	16	5	1	0	0	0	0	0	37.1	559
1800	0	1	1	63	372	261	59	15	2	1	1	1	0	0	0	36.7	507
1900	0	2	16	48	263	186	53	12	3	0	0	0	0	0	0	36.5	364
2000	0	0	3	28	173	142	57	13	1	0	0	0	0	0	0	37.4	286
2100	0	0	1	10	116	123	32	9	0	0	1	0	0	0	0	37.7	223
2200	0	0	1	16	51	75	36	4	2	0	0	0	0	0	0	38.8	144
2300	0	0	0	6	36	37	23	6	0	0	0	0	0	0	0	38.7	84
00-00	**1**	**12**	**44**	**605**	**3968**	**3873**	**1258**	**265**	**59**	**13**	**6**	**1**	**0**	**1**	**0**	**37.7**	**7335**

Vehicles = 10106
Posted speed limit = 35 mph, Exceeding = 7335 (72.58%), Mean Exceeding = 40.68 mph
Maximum = 88.8 mph, Minimum = 12.2 mph, Mean = 38.4 mph
50% Speed = 37.69 mph, 85% Speed = 43.73 mph, Median = 37.69 mph
12 mph Pace = 32 - 44, Number in Pace = 7707 (76.26%)
Variance = 31.94, Standard Deviation = 5.65 mph

Wednesday, March 2, 2022

Time [--	Vbin 6 12	Vbin 12 19	Vbin 19 25	Vbin 25 31	Vbin 31 37	Vbin 37 43	Vbin 43 50	Vbin 50 56	Vbin 56 62	Vbin 62 68	Vbin 68 75	Vbin 75 81	Vbin 81 87	Vbin 87 93	Vbin 93 99	Vpp 50	]PSL 35
0000	0	0	0	2	13	18	4	2	2	0	0	0	0	0	0	39.3	32
0100	0	0	0	0	6	9	6	3	0	0	0	0	0	0	0	40.8	21
0200	0	0	0	1	6	5	1	0	1	0	1	0	0	0	0	37.4	12
0300	0	0	0	1	7	7	7	0	1	0	1	0	0	0	0	40.1	16
0400	0	0	0	1	20	22	16	8	2	1	0	0	0	0	0	41	64
0500	0	0	0	8	35	84	58	30	5	3	0	0	0	0	0	42.5	200
0600	0	0	1	7	107	142	69	28	5	1	0	0	0	0	0	40.4	305
0700	0	0	1	42	231	276	97	26	5	0	0	0	0	0	0	38.2	517
0800	0	4	10	30	292	263	72	14	3	0	0	0	0	0	0	37.5	492
0900	0	0	3	36	186	222	79	17	3	0	0	0	0	0	0	38.3	404
1000	0	0	0	27	151	204	78	13	2	0	0	0	0	0	0	38.7	394
1100	0	0	1	18	220	214	57	11	4	1	0	0	0	0	0	37.8	391
1200	0	0	7	34	221	230	87	14	1	2	0	0	0	0	0	38.2	453
1300	0	0	3	31	217	300	62	17	4	1	0	0	0	0	0	38.3	502
1400	0	1	1	34	239	261	69	13	5	0	1	0	0	0	0	37.9	449
1500	2	2	5	58	309	308	78	13	4	0	0	0	0	0	0	37.6	548
1600	0	1	2	78	393	291	72	12	5	1	0	0	0	0	0	36.8	584
1700	5	2	3	92	357	295	74	11	2	0	0	0	0	0	0	36.8	570
1800	0	3	3	61	360	249	57	9	1	0	0	0	0	0	0	36.6	473
1900	0	0	1	60	229	215	51	3	1	1	0	0	0	0	0	37	372
2000	0	0	0	29	157	139	41	17	1	1	0	0	0	0	0	37.5	271
2100	0	0	7	25	106	88	36	12	2	0	0	1	0	0	0	37.4	192
2200	0	0	0	12	70	65	32	10	0	0	0	0	0	0	0	38.7	125
2300	0	2	0	5	33	48	26	3	2	0	0	0	0	0	0	39.9	92
00-00	**7**	**15**	**48**	**692**	**3965**	**3955**	**1229**	**286**	**61**	**12**	**3**	**1**	**0**	**0**	**0**	**37.8**	**7479**

Vehicles = 10274
Posted speed limit = 35 mph, Exceeding = 7479 (72.80%), Mean Exceeding = 40.62 mph
Maximum = 75.4 mph, Minimum = 6.3 mph, Mean = 38.3 mph
50% Speed = 37.80 mph, 85% Speed = 43.62 mph, Median = 37.80 mph
12 mph Pace = 32 - 44, Number in Pace = 7791 (75.83%)
Variance = 32.71, Standard Deviation = 5.72 mph

Grand Total

Time [--	Vbin 6 12	Vbin 12 19	Vbin 19 25	Vbin 25 31	Vbin 31 37	Vbin 37 43	Vbin 43 50	Vbin 50 56	Vbin 56 62	Vbin 62 68	Vbin 68 75	Vbin 75 81	Vbin 81 87	Vbin 87 93	Vbin 93 99	Vpp 50	]PSL 35
--	**8**	**27**	**92**	**1297**	**7933**	**7828**	**2487**	**551**	**120**	**25**	**9**	**2**	**0**	**1**	**0**	**37.8**	**14814**

Vehicles = 20380
Posted speed limit = 35 mph, Exceeding = 14814 (72.69%), Mean Exceeding = 40.65 mph
Maximum = 88.8 mph, Minimum = 6.3 mph, Mean = 38.3 mph
50% Speed = 37.80 mph, 85% Speed = 43.73 mph, Median = 37.80 mph
12 mph Pace = 32 - 44, Number in Pace = 15494 (76.03%)
Variance = 32.33, Standard Deviation = 5.69 mph

Connor Speed Report

Dataset

Site Name BEL PRE WB W.OF BIG BEAR
Direction West

Tuesday, March 1, 2022

Time [--	Vbin 6 12	Vbin 12 19	Vbin 19 25	Vbin 25 31	Vbin 31 37	Vbin 37 43	Vbin 43 50	Vbin 50 56	Vbin 56 62	Vbin 62 68	Vbin 68 75	Vbin 75 81	Vbin 81 87	Vbin 87 93	Vbin 93 99	Vpp 50	]PSL 35
0000	0	0	0	1	13	22	14	6	1	2	0	0	0	0	0	41.2	49
0100	0	0	0	0	7	16	6	2	0	0	0	0	0	0	0	38.7	27
0200	0	0	0	1	5	4	3	0	1	0	0	0	0	0	0	39.1	11
0300	0	0	0	1	7	3	4	1	0	0	0	0	0	0	0	37.7	12
0400	0	0	1	0	11	15	6	4	1	0	0	0	0	0	0	39.4	34
0500	0	0	0	3	20	50	34	9	2	0	0	0	0	0	0	41.6	105
0600	0	1	2	5	68	136	92	37	4	2	1	0	0	0	0	41.5	305
0700	0	1	1	10	112	335	171	30	5	1	0	0	0	0	0	41.2	600
0800	0	0	1	19	215	430	147	20	1	0	0	0	0	0	0	39.5	709
0900	0	0	0	15	134	240	110	26	8	0	0	0	0	0	0	40.6	468
1000	0	0	1	9	142	233	87	22	0	1	0	0	0	0	0	39.7	429
1100	0	0	0	12	154	240	80	8	4	2	0	0	0	0	0	39.3	421
1200	0	1	2	21	170	256	88	14	5	0	0	0	0	0	0	38.8	451
1300	0	0	1	10	190	266	99	14	4	0	0	0	0	0	0	39.5	486
1400	0	0	1	14	187	293	95	17	2	1	1	0	0	0	0	39	516
1500	0	0	1	32	279	335	86	20	2	0	0	0	0	0	0	38.3	578
1600	4	6	5	24	221	326	124	28	6	0	0	0	0	0	0	39.3	602
1700	0	0	1	34	221	394	128	31	4	3	0	0	0	0	0	39.1	682
1800	0	0	1	37	280	299	83	14	2	1	0	0	0	0	0	37.9	542
1900	0	2	3	61	268	230	53	8	2	0	0	0	0	0	0	36.9	417
2000	0	1	0	21	168	146	37	10	2	0	1	0	0	0	0	37.4	278
2100	0	0	1	24	96	115	61	7	0	1	0	0	0	0	0	38.1	230
2200	0	0	1	7	62	89	44	11	1	1	1	0	0	0	0	39.8	184
2300	0	0	0	5	42	54	28	5	2	1	0	0	0	0	0	39.8	114
00-00	**4**	**12**	**23**	**366**	**3072**	**4527**	**1680**	**344**	**59**	**16**	**4**	**0**	**0**	**0**	**0**	**39.1**	**8250**

Vehicles = 10107
Posted speed limit = 35 mph, Exceeding = 8250 (81.63%), Mean Exceeding = 41.21 mph
Maximum = 70.6 mph, Minimum = 9.4 mph, Mean = 39.6 mph
50% Speed = 39.15 mph, 85% Speed = 44.85 mph, Median = 39.15 mph
12 mph Pace = 33 - 45, Number in Pace = 7716 (76.34%)
Variance = 30.29, Standard Deviation = 5.50 mph

Wednesday, March 2, 2022

Time [--	Vbin 6 12	Vbin 12 19	Vbin 19 25	Vbin 25 31	Vbin 31 37	Vbin 37 43	Vbin 43 50	Vbin 50 56	Vbin 56 62	Vbin 62 68	Vbin 68 75	Vbin 75 81	Vbin 81 87	Vbin 87 93	Vbin 93 99	Vpp 50	]PSL 35
0000	0	0	0	3	14	22	15	2	0	0	0	0	0	0	0	39.6	46
0100	0	0	0	1	11	10	12	3	0	0	0	0	0	0	0	42.2	33
0200	0	0	1	1	9	9	2	0	1	0	0	0	0	0	0	37.5	16
0300	0	0	0	0	4	8	3	1	1	0	0	0	0	0	0	42.3	16
0400	0	0	1	3	6	17	11	4	0	1	0	0	0	0	0	40.9	36
0500	0	0	0	2	22	45	32	12	1	0	0	0	0	0	0	42.2	105
0600	0	0	1	8	44	149	103	28	10	4	0	0	0	0	0	42.4	317
0700	0	1	1	8	140	372	140	35	9	0	0	0	0	0	0	40.4	650
0800	0	0	0	28	222	366	185	33	5	0	1	0	0	0	0	40	714
0900	0	0	3	7	148	264	102	27	4	1	0	0	0	0	0	40	480
1000	0	0	0	7	138	240	67	16	4	2	0	0	0	0	0	39.3	409
1100	0	0	1	12	153	257	101	16	6	1	1	0	0	0	0	39.6	482
1200	0	0	1	11	179	279	76	15	4	0	1	0	0	0	0	39	485
1300	0	0	1	11	170	297	95	15	8	2	0	0	0	0	0	39.4	514
1400	0	0	0	12	177	319	96	20	4	0	0	0	0	0	0	39	528
1500	0	1	7	48	270	338	100	21	3	1	0	0	0	0	0	38.4	592
1600	0	1	1	30	201	343	142	21	5	0	0	0	0	0	0	39.5	616
1700	0	1	4	33	232	374	110	12	5	1	0	0	0	0	0	39	616
1800	0	0	1	53	310	314	75	18	2	3	0	0	0	0	0	37.7	561
1900	0	0	1	27	216	233	57	10	0	0	0	0	0	0	0	37.7	409
2000	0	0	4	20	139	171	55	8	2	0	1	0	0	0	0	38.4	313
2100	0	0	1	15	98	139	51	17	3	0	1	0	0	0	0	39	258
2200	0	1	1	12	82	96	30	10	2	0	0	0	0	0	0	38.5	176
2300	0	0	0	2	38	43	31	8	0	1	0	0	0	0	0	40.6	99
00-00	**0**	**5**	**30**	**354**	**3023**	**4705**	**1691**	**352**	**79**	**17**	**5**	**0**	**0**	**0**	**0**	**39.1**	**8471**

Vehicles = 10261
Posted speed limit = 35 mph, Exceeding = 8471 (82.56%), Mean Exceeding = 41.24 mph
Maximum = 70.8 mph, Minimum = 14.9 mph, Mean = 39.7 mph
50% Speed = 39.15 mph, 85% Speed = 44.96 mph, Median = 39.15 mph
12 mph Pace = 33 - 45, Number in Pace = 7849 (76.49%)
Variance = 30.22, Standard Deviation = 5.50 mph

Grand Total

Time [--	Vbin 6 12	Vbin 12 19	Vbin 19 25	Vbin 25 31	Vbin 31 37	Vbin 37 43	Vbin 43 50	Vbin 50 56	Vbin 56 62	Vbin 62 68	Vbin 68 75	Vbin 75 81	Vbin 81 87	Vbin 87 93	Vbin 93 99	Vpp 50	]PSL 35
--	**4**	**17**	**53**	**720**	**6095**	**9232**	**3371**	**696**	**138**	**33**	**9**	**0**	**0**	**0**	**0**	**39.1**	**16721**

Vehicles = 20368
Posted speed limit = 35 mph, Exceeding = 16721 (82.09%), Mean Exceeding = 41.22 mph
Maximum = 70.8 mph, Minimum = 9.4 mph, Mean = 39.6 mph
50% Speed = 39.15 mph, 85% Speed = 44.85 mph, Median = 39.15 mph
12 mph Pace = 33 - 45, Number in Pace = 15561 (76.40%)
Variance = 30.25, Standard Deviation = 5.50 mph

APPENDIX

C

USLIMITS2 Outputs

USLIMITS2 Speed Zoning Report

Project Overview

Project Name: Bel Pre Road, west of GPR

Analyst: STV

Date: 2022-03-08

Basic Project Information
Route Name: Bel Pre Road
From: MD 97
To: Layhill Road
State: Maryland
County: Montgomery County
City: Aspen Hill CDP
Route Type: Road Section in Developed Area
Route Status: Existing

Crash Data Information
Crash Data Years: 5.00
Crash AADT: 14519 veh/day
Total Number of Crashes: 247
Total Number of Injury Crashes: 107
Section Crash Rate: 491 per 100 MVM
Section Injury Crash Rate: 213 per 100 MVM
Crash Rate Average for Similar Roads: 213
Injury Rate Average for Similar Roads: 67

Roadway Information
Section Length: 1.9 mile(s)
Statutory Speed Limit: 35 mph
Existing Speed Limit: 35 mph
Adverse Alignment: No
One-Way Street: No
Divided/Undivided: TWLTL
Number of Through Lanes: 4
Area Type: Residential-Collector/Arterial
Number of Driveways: 61
Number of Signals: 9

Traffic Information
85th Percentile Speed: 38 mph
50th Percentile Speed: 34 mph
AADT: 14519 veh/day
On Street Parking and Usage: Not High
Pedestrian / Bicyclist Activity: High

Recommended Speed Limit: **35**

Note: The section crash rate of 491 per 100 MVM is above the critical rate (248). The injury crash rate for the section of 213 per 100 MVM is above the critical rate (87). A comprehensive crash study should be undertaken to identify engineering and traffic control deficiencies and appropriate corrective actions. The speed limit should only be reduced as a last measure after all other treatments have either been tried or ruled out.

Note: The road section is in an area with high pedestrian or bicycle activity. Consider implementing engineering measures to reduce speeds before lowering the recommended speed limit. See Engineering Countermeasures for Speed Management and PedSafe for more guidance.

Equations Used in the Crash Data Calculations

Exposure (M)
M = (Section AADT * 365 * Section Length * Duration of Crash Data) / (100000000)
M = (14519 * 365 * 1.9 * 5.00) / (100000000)
M = 0.5034

Crash Rate (Rc)
Rc = (Section Crash Average * 100000000) / (Section AADT * 365 * Section Length)
Rc = (49.40 * 100000000) / (14519 * 365 * 1.9)
Rc = 490.62 crashes per 100 MVM

Injury Rate (Ri)
Ri = (Section Injury Crash Average * 100000000) / (Section AADT * 365 * Section Length)
Ri = (21.40 * 100000000) / (14519 * 365 * 1.9)
Ri = 212.54 injuries per 100 MVM

Critical Crash Rate (Cc)
Cc = Crash Average of Similar Sections + 1.645 * (Crash Average of Similar Sections / Exposure) ^ (1/2) + (1 / (2 * Exposure))
Cc = 212.78 + 1.645 * (212.78 / 0.5034) ^ (1/2) + (1 / (2 * 0.5034))
Cc = 247.59 crashes per 100 MVM

Critical Injury Rate (Ic)
Ic = Injury Crash Average of Similar Sections + 1.645 * (Injury Crash Average of Similar Sections / Exposure) ^ (1/2) + (1 / (2 * Exposure))
Ic = 67.19 + 1.645 * (67.19 / 0.5034) ^ (1/2) + (1 / (2 * 0.5034))
Ic = 87.19 injuries per 100 MVM

USLIMITS2 Speed Zoning Report

Project Overview

Project Name: Bel Pre Road, east of Beaverwood Lane

Analyst: STV

Date: 2022-03-08

Basic Project Information
Route Name: Bel Pre Road
From: MD 97
To: Layhill Road
State: Maryland
County: Montgomery County
City: Aspen Hill CDP
Route Type: Road Section in Developed Area
Route Status: Existing

Crash Data Information
Crash Data Years: 5.00
Crash AADT: 20374 veh/day
Total Number of Crashes: 247
Total Number of Injury Crashes: 107
Section Crash Rate: 350 per 100 MVM
Section Injury Crash Rate: 151 per 100 MVM
Crash Rate Average for Similar Roads: 231
Injury Rate Average for Similar Roads: 77

Roadway Information
Section Length: 1.9 mile(s)
Statutory Speed Limit: 35 mph
Existing Speed Limit: 35 mph
Adverse Alignment: No
One-Way Street: No
Divided/Undivided: TWLTL
Number of Through Lanes: 4
Area Type: Residential-Collector/Arterial
Number of Driveways: 61
Number of Signals: 9

Traffic Information
85th Percentile Speed: 44 mph
50th Percentile Speed: 38 mph
AADT: 20374 veh/day
On Street Parking and Usage: Not High
Pedestrian / Bicyclist Activity: High

Recommended Speed Limit: **40**

Note: The final recommended speed limit is higher than the 35 mph statutory speed limit for this type of road. An engineering study such as the one carried out with USLIMITS is usually required to set a speed limit above the statutory limit.

Note: The section crash rate of 350 per 100 MVM is above the critical rate (262). The injury crash rate for the section of 151 per 100 MVM is above the critical rate (95). A comprehensive crash study should be undertaken to identify engineering and traffic control deficiencies and appropriate corrective actions. The speed limit should only be reduced as a last measure after all other treatments have either been tried or ruled out.

Note: The road section is in an area with high pedestrian or bicycle activity. Consider implementing engineering measures to reduce speeds before lowering the recommended speed limit. See Engineering Countermeasures for Speed Management and PedSafe for more guidance.

Disclaimer: The U.S. Government assumes no liability for the use of the information contained in this report. This report does not constitute a standard, specification, or regulation.

Equations Used in the Crash Data Calculations

Exposure (M)
M = (Section AADT * 365 * Section Length * Duration of Crash Data) / (100000000)
M = (20374 * 365 * 1.9 * 5.00) / (100000000)
M = 0.7065

Crash Rate (Rc)
Rc = (Section Crash Average * 100000000) / (Section AADT * 365 * Section Length)
Rc = (49.40 * 100000000) / (20374 * 365 * 1.9)
Rc = 349.63 crashes per 100 MVM

Injury Rate (Ri)
Ri = (Section Injury Crash Average * 100000000) / (Section AADT * 365 * Section Length)
Ri = (21.40 * 100000000) / (20374 * 365 * 1.9)
Ri = 151.46 injuries per 100 MVM

Critical Crash Rate (Cc)
Cc = Crash Average of Similar Sections + 1.645 * (Crash Average of Similar Sections / Exposure) ^ (1/2) + (1 / (2 * Exposure))
Cc = 231.25 + 1.645 * (231.25 / 0.7065) ^ (1/2) + (1 / (2 * 0.7065))
Cc = 261.72 crashes per 100 MVM

Critical Injury Rate (Ic)
Ic = Injury Crash Average of Similar Sections + 1.645 * (Injury Crash Average of Similar Sections / Exposure) ^ (1/2) + (1 / (2 * Exposure))
Ic = 77.17 + 1.645 * (77.17 / 0.7065) ^ (1/2) + (1 / (2 * 0.7065))
Ic = 95.08 injuries per 100 MVM

APPENDIX

D

Turning Movement Count

Turning Movement Counts - Field Sheet

Job No.: 17-01-44

Location: BEL PRE RD @ ST MATTHEWS DRIVEWAY - CRYSTAL SPRINGS DRIVEWAY
Date: 3/2/2022 Wednesday
Recorder: CSS
Interval (dd) : 15 (In Minutes)

County: MONTHOMERY
Town: SILVER SPRING
Weather: CLEAR

PEAK HOURS	AM PERIOD 6:00AM-12:00PM	Start	End	Volume	LOS	V/C	PM PERIOD 12:00PM-7:00PM	Start	End	Volume	LOS	V/C
		07:30	08:30	1326				16:45	17:45	1416		

Street Name-->	CRYSTAL SPRINGS DRIVEWAY					ST. MATTHEWS DRIVEWAY					BEL PRE RD					BEL PRE RD					GRAND
HOUR	From North					From South					From East					From West					
ENDING	U turn	Left	Through	Right	Total	U turn	Left	Through	Right	Total	U turn	Left	Through	Right	Total	U turn	Left	Through	Right	Total	TOTAL
00:15					0					0					0					0	0
00:30					0					0					0					0	0
00:45					0					0					0					0	0
01:00					0					0					0					0	0
01:15					0					0					0					0	0
01:30					0					0					0					0	0
01:45					0					0					0					0	0
02:00					0					0					0					0	0
02:15					0					0					0					0	0
02:30					0					0					0					0	0
02:45					0					0					0					0	0
03:00					0					0					0					0	0
03:15					0					0					0					0	0
03:30					0					0					0					0	0
03:45					0					0					0					0	0
04:00					0					0					0					0	0
04:15					0					0					0					0	0
04:30					0					0					0					0	0
04:45					0					0					0					0	0
05:00					0					0					0					0	0
05:15					0					0					0					0	0
05:30					0					0					0					0	0
05:45					0					0					0					0	0
06:00					0					0					0					0	0
06:15	0	0	0	0	0	0	16	0	3	19	0	1	73	0	74	0	0	36	2	38	131
06:30	0	0	0	0	0	0	12	0	7	19	0	2	87	0	89	0	0	28	2	30	138
06:45	0	0	0	0	0	0	15	0	9	24	0	2	120	0	122	1	0	36	1	38	184
07:00	0	0	0	0	0	0	11	0	6	17	0	4	119	0	123	0	0	55	4	59	199
07:15	0	0	0	0	0	0	11	0	5	16	0	3	151	0	154	0	0	67	6	73	243
07:30	0	0	0	0	0	0	11	0	4	15	0	0	173	0	173	0	0	91	3	94	282
07:45	**0**	0	0	0	**0**	**0**	13	0	8	**21**	**0**	3	225	0	**228**	**2**	0	75	8	**85**	**334**
08:00	**0**	0	2	0	**2**	**0**	9	1	6	**16**	**0**	5	199	0	**204**	**0**	0	125	4	**129**	**351**
08:15	**0**	0	2	0	**2**	**0**	13	0	3	**16**	**0**	4	198	0	**202**	**0**	0	109	6	**115**	**335**
08:30	**0**	0	0	0	**0**	**0**	7	0	2	**9**	**0**	3	157	0	**160**	**1**	0	130	6	**137**	**306**
08:45	0	0	0	0	0	0	21	0	7	28	0	5	198	0	203	0	0	91	6	97	328
09:00	0	0	0	1	1	0	11	0	6	17	0	4	189	1	194	0	0	101	5	106	318
09:15	0	0	0	0	0	0	9	0	5	14	0	1	143	0	144	1	0	86	9	96	254
09:30	0	0	0	0	0	0	7	0	2	9	0	2	129	0	131	0	0	91	5	96	236
09:45	0	0	0	0	0	0	7	0	6	13	0	2	102	0	104	1	0	88	6	95	212
10:00	0	1	0	0	1	0	11	0	3	14	0	6	88	2	96	0	2	72	7	81	192
10:15	0	0	0	0	0	0	7	0	3	10	0	1	100	0	101	0	1	66	2	69	180
10:30	0	0	0	0	0	0	7	0	1	8	0	3	93	0	96	0	1	86	6	93	197
10:45	0	1	0	1	2	0	4	0	2	6	0	2	88	0	90	0	0	88	4	92	190
11:00	0	0	0	0	0	0	7	0	3	10	0	1	83	0	84	0	1	65	2	68	162
11:15	0	1	0	0	1	0	7	0	1	8	0	4	78	1	83	0	0	88	3	91	183
11:30	0	0	0	2	2	0	5	0	4	9	0	0	85	0	85	0	1	95	4	100	196
11:45	0	0	0	0	0	0	3	0	3	6	0	5	101	0	106	2	1	81	5	89	201
12:00	0	1	0	1	2	0	6	0	2	8	0	3	106	0	109	0	1	95	4	100	219
12:15	0	0	0	0	0	0	7	0	2	9	0	1	96	0	97	1	0	67	1	69	175
12:30	0	0	0	0	0	0	5	0	5	10	0	3	90	0	93	0	0	76	11	87	190
12:45	0	0	0	0	0	0	3	0	4	7	0	6	116	0	122	0	0	108	4	112	241
13:00	0	0	0	0	0	0	4	0	2	6	0	4	98	0	102	0	0	84	5	89	197
13:15	0	0	0	0	0	0	9	0	4	13	0	2	97	0	99	2	0	88	5	95	207
13:30	0	0	0	0	0	0	8	0	2	10	0	2	100	0	102	0	0	109	6	115	227
13:45	0	0	0	0	0	0	5	0	5	10	0	3	107	0	110	0	0	86	6	92	212
14:00	0	0	0	0	0	0	4	0	4	8	0	3	88	0	91	0	0	104	9	113	212
14:15	0	0	0	0	0	0	10	0	7	17	0	4	98	0	102	0	1	101	7	109	228
14:30	0	0	0	0	0	0	4	0	3	7	0	2	105	0	107	0	1	104	5	110	224
14:45	0	0	0	0	0	0	1	0	5	6	0	2	116	0	118	0	0	116	7	123	247
15:00	0	0	0	0	0	0	10	0	8	18	0	1	138	0	139	0	0	138	12	150	307
15:15	0	0	0	0	0	0	9	0	5	14	0	7	135	0	142	0	0	159	7	166	322
15:30	0	0	0	0	0	0	9	0	2	11	0	3	143	0	146	0	0	156	9	165	322
15:45	0	0	0	0	0	0	7	0	8	15	0	8	154	0	162	0	0	152	10	162	339
16:00	0	0	0	0	0	0	13	0	5	18	0	5	143	0	148	1	0	144	13	158	324
16:15	0	0	0	0	0	0	12	0	3	15	0	6	126	1	133	0	0	147	10	157	305
16:30	0	0	0	0	0	0	3	0	9	12	0	3	98	0	101	1	0	201	9	211	324
16:45	0	0	0	0	0	0	10	0	6	16	0	4	114	0	118	3	0	174	11	188	322
17:00	**0**	0	0	0	**0**	**0**	4	0	11	**15**	**0**	4	135	0	**139**	**1**	0	216	7	**224**	**378**
17:15	**0**	0	0	0	**0**	**0**	10	0	8	**18**	**0**	7	129	0	**136**	**1**	0	189	11	**201**	**355**
17:30	**0**	0	0	0	**0**	**0**	7	0	5	**12**	**0**	3	132	0	**135**	**1**	0	181	17	**199**	**346**
17:45	**0**	0	0	0	**0**	**0**	4	0	7	**11**	**0**	7	137	0	**144**	**0**	0	174	8	**182**	**337**
18:00	0	0	0	0	0	0	11	0	6	17	0	6	132	0	138	1	0	167	9	177	332
18:15	0	0	0	0	0	0	9	0	7	16	0	9	127	0	136	0	0	183	12	195	347
18:30	0	0	0	0	0	0	9	0	5	14	0	6	113	0	119	0	0	180	10	190	323
18:45	0	0	0	0	0	0	10	0	8	18	0	6	121	0	127	0	1	179	12	192	337
19:00	0	0	0	0	0	0	5	0	4	9	0	8	119	0	127	0	1	142	10	153	289
19:15					0					0					0					0	0
19:30					0					0					0					0	0
19:45					0					0					0					0	0
20:00					0					0					0					0	0
20:15					0					0					0					0	0
20:30					0					0					0					0	0
20:45					0					0					0					0	0
21:00					0					0					0					0	0
21:15					0					0					0					0	0
21:30					0					0					0					0	0
21:45					0					0					0					0	0
22:00					0					0					0					0	0
22:15					0					0					0					0	0
22:30					0					0					0					0	0
22:45					0					0					0					0	0
23:00					0					0					0					0	0
23:15					0					0					0					0	0
23:30					0					0					0					0	0
23:45					0					0					0					0	0
00:00					0					0					0					0	0
TOTAL	**0**	**4**	**4**	**5**	**13**	**0**	**432**	**1**	**251**	**684**	**0**	**191**	**6392**	**5**	**6588**	**20**	**12**	**5870**	**353**	**6255**	**13540**
AM Peak Vol	0	0	4	0	4	0	42	1	19	62	0	15	779	0	794	3	0	439	24	466	1326
PM Peak Vol	0	0	0	0	0	0	32	0	31	56	0	21	533	0	554	3	0	760	43	806	1416

Turning Movement Counts - Field Sheet

Job No.: 17-01-44

Location: BEL PRE RD @ ST MATTHEWS DRIVEWAY - CRYSTAL SPRINGS DRIVEWAY
Date: 3/2/2022 Wednesday
Recorder: CSS
Interval (dd) : 15 (In Minutes)

County: MONTHOMERY
Town: SILVER SPRING
Weather: CLEAR

PEAK HOURS	AM PERIOD 6:00AM-12:00PM	Start	End	Volume	LOS	V/C	PM PERIOD 12:00PM-7:00PM	Start	End	Volume	LOS	V/C
		07:30	08:30	1326				16:45	17:45	1416		

SCHOOL CHILDREN, PEDESTRIANS & BICYCLES

Hour Ending	From North CRYSTAL SPRINGS DRIVEWAY		From South ST. MATTHEWS DRIVEWAY			From East BEL PRE RD			From West BEL PRE RD		
		Pedestrians	Bicycles		Pedestrians	Bicycles		Pedestrians	Bicycles		Pedestrians	Bicycles
00:15												
00:30												
00:45												
01:00												
01:15												
01:30												
01:45												
02:00												
02:15												
02:30												
02:45												
03:00												
03:15												
03:30												
03:45												
04:00												
04:15												
04:30												
04:45												
05:00												
05:15												
05:30												
05:45												
06:00												
06:15		0	0		1	0		0	0		1	0
06:30		0	0		1	0		0	0		0	0
06:45		0	0		3	0		0	0		0	0
07:00		1	0		3	0		0	0		1	0
07:15		0	0		6	0		0	0		0	0
07:30		0	0		2	0		0	0		2	0
07:45		1	0		3	0		0	0		1	0
08:00		1	0		2	0		0	0		1	0
08:15		0	0		4	0		0	0		1	0
08:30		0	0		1	0		0	1		2	0
08:45		0	0		8	0		1	0		0	0
09:00		1	0		1	0		0	0		5	0
09:15		1	0		1	0		0	0		0	0
09:30		1	0		2	0		0	0		0	0
09:45		1	0		2	0		0	0		0	0
10:00		0	0		6	0		1	0		2	0
10:15		0	0		1	0		0	1		0	0
10:30		0	0		5	0		0	0		4	0
10:45		0	0		3	0		0	0		1	0
11:00		1	0		1	0		1	0		0	0
11:15		0	0		3	0		0	0		0	0
11:30		0	0		9	0		0	0		1	0
11:45		0	0		2	0		0	0		0	0
12:00		0	0		2	0		0	0		0	0
12:15		0	0		0	0		0	0		0	0
12:30		0	0		2	0		1	0		1	0
12:45		0	0		6	0		0	0		3	0
13:00		0	0		2	1		0	0		3	0
13:15		0	0		4	0		0	0		1	0
13:30		0	0		3	0		1	0		0	0
13:45		0	0		6	0		0	0		0	0
14:00		0	0		1	0		0	0		0	0
14:15		0	0		1	0		1	0		0	0
14:30		0	0		5	0		0	0		1	0
14:45		1	0		2	0		0	0		0	0
15:00		0	0		6	0		0	0		2	0
15:15		0	0		0	0		0	0		0	0
15:30		0	0		1	0		0	0		1	0
15:45		0	0		4	0		0	0		3	0
16:00		1	0		3	0		0	0		1	0
16:15		0	0		4	0		0	0		1	0
16:30		1	0		0	0		0	0		1	0
16:45		1	0		2	0		1	0		1	0
17:00		3	0		7	0		0	0		1	0
17:15		0	0		2	0		0	0		1	0
17:30		0	0		3	0		0	0		0	0
17:45		3	0		3	0		0	0		3	0
18:00		0	0		4	0		0	0		1	0
18:15		0	0		1	0		1	0		1	0
18:30		0	0		3	0		0	0		1	0
18:45		2	0		6	0		0	0		0	0
19:00		0	0		5	0		0	0		0	0
19:15												
19:30												
19:45												
20:00												
20:15												
20:30												
20:45												
21:00												
21:15												
21:30												
21:45												
22:00												
22:15												
22:30												
22:45												
23:00												
23:15												
23:30												
23:45												
00:00												
TOTAL	**0**	**20**	**0**	**0**	**158**	**1**	**0**	**8**	**2**	**0**	**49**	**0**
AM Peak Vol	0	2	0	0	10	0	0	0	1	0	5	0
PM Peak Vol	0	6	0	0	15	0	0	0	0	0	5	0

Turning Movement Counts - Field Sheet

Job No.: 17-01-44

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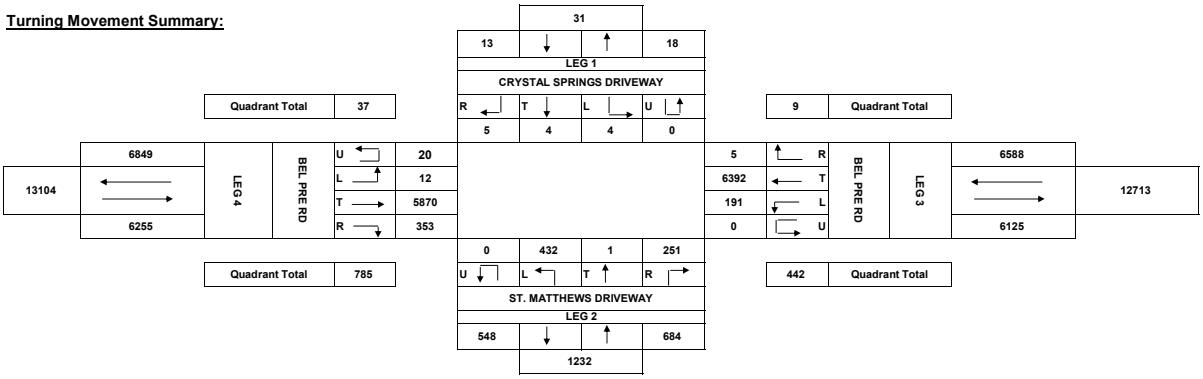
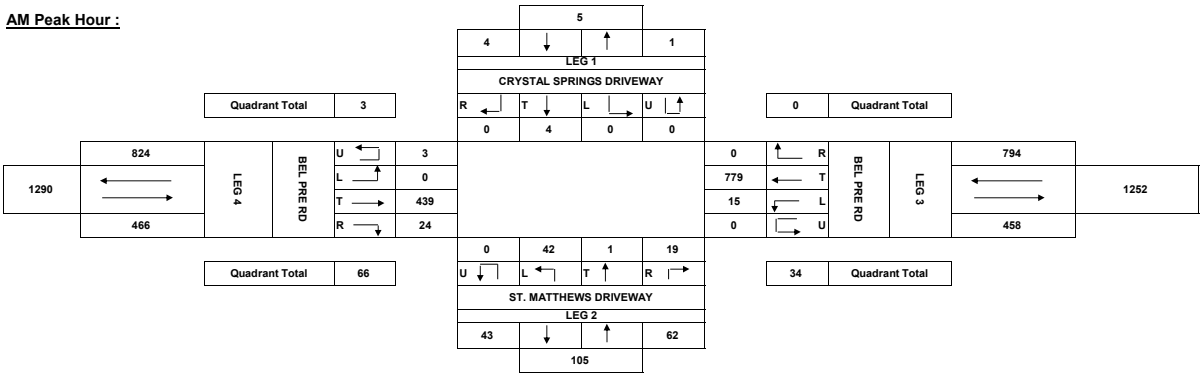
PEAK HOURS	AM PERIOD 6:00AM-12:00PM	Start	End	Volume	LOS	V/C	PM PERIOD 12:00PM-7:00PM	Start	End	Volume	LOS	V/C
		07:30	08:30	1326				16:45	17:45	1416		

Turning Movement Summary:

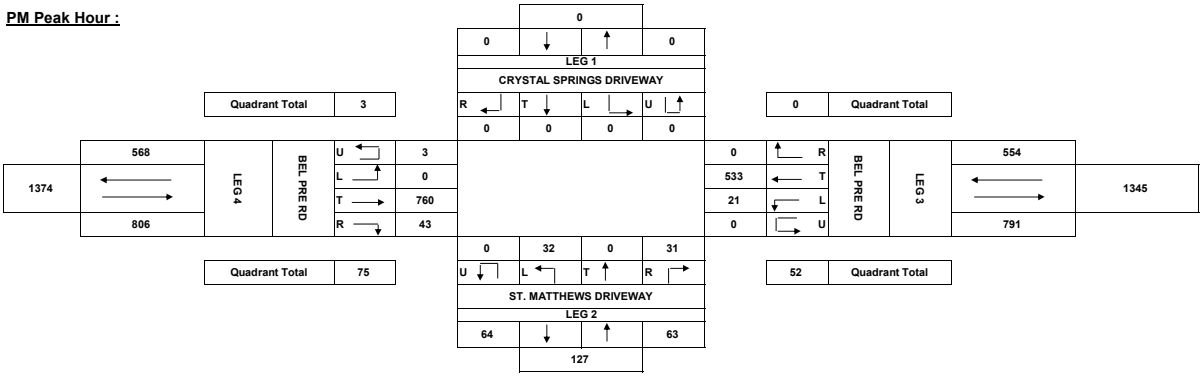


Comments:

AM Peak Hour :



PM Peak Hour :



APPENDIX

E

Synchro Outputs

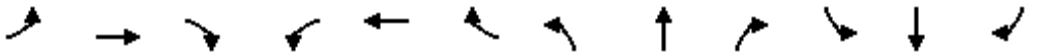
Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	388	24	15	973	0	42	1	19	0	4	0
Future Vol, veh/h	3	388	24	15	973	0	42	1	19	0	4	0
Conflicting Peds, #/hr	2	0	10	10	0	2	5	0	0	0	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	125	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	422	26	16	1058	0	46	1	21	0	4	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1060	0	0	458	0	0	1019	1543	234	1310	1556	536
Stage 1	-	-	-	-	-	-	451	451	-	1092	1092	-
Stage 2	-	-	-	-	-	-	568	1092	-	218	464	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	653	-	-	1099	-	0	191	114	768	117	112	489
Stage 1	-	-	-	-	-	0	557	569	-	229	289	-
Stage 2	-	-	-	-	-	0	475	289	-	764	562	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	652	-	-	1089	-	-	180	110	761	111	108	486
Mov Cap-2 Maneuver	-	-	-	-	-	-	180	110	-	111	108	-
Stage 1	-	-	-	-	-	-	549	560	-	228	284	-
Stage 2	-	-	-	-	-	-	459	284	-	738	554	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	26.7	39.7
HCM LOS			D	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	232	652	-	-	1089	-	108
HCM Lane V/C Ratio	0.29	0.005	-	-	0.015	-	0.04
HCM Control Delay (s)	26.7	10.5	-	-	8.4	-	39.7
HCM Lane LOS	D	B	-	-	A	-	E
HCM 95th %tile Q(veh)	1.2	0	-	-	0	-	0.1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	165	200	270	315	450	250	195	845	85	130	2000	150
Future Volume (veh/h)	165	200	270	315	450	250	195	845	85	130	2000	150
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	0.99		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1575	1870	1870	1723	1870
Adj Flow Rate, veh/h	183	222	0	366	523	0	207	899	0	134	2062	0
Peak Hour Factor	0.90	0.90	0.90	0.86	0.86	0.86	0.94	0.94	0.94	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	235	484		358	583		245	2196		174	2304	
Arrive On Green	0.10	0.14	0.00	0.13	0.16	0.00	0.07	0.51	0.00	0.05	0.49	0.00
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	3456	4300	1585	3456	4703	1585
Grp Volume(v), veh/h	183	222	0	366	523	0	207	899	0	134	2062	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1728	1433	1585	1728	1568	1585
Q Serve(g_s), s	15.7	10.4	0.0	23.0	26.0	0.0	10.7	23.3	0.0	6.9	71.7	0.0
Cycle Q Clear(g_c), s	15.7	10.4	0.0	23.0	26.0	0.0	10.7	23.3	0.0	6.9	71.7	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	235	484		358	583		245	2196		174	2304	
V/C Ratio(X)	0.78	0.46		1.02	0.90		0.84	0.41		0.77	0.89	
Avail Cap(c_a), veh/h	285	790		358	790		278	2196		278	2304	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	60.0	71.6	0.0	65.3	73.7	0.0	82.6	27.3	0.0	84.4	41.7	0.0
Incr Delay (d2), s/veh	10.6	0.7	0.0	53.1	10.3	0.0	18.7	0.6	0.0	7.0	5.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.9	4.8	0.0	10.6	12.6	0.0	5.3	7.9	0.0	3.2	27.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	70.6	72.3	0.0	118.5	84.0	0.0	101.3	27.8	0.0	91.5	47.6	0.0
LnGrp LOS	E	E		F	F		F	C		F	D	
Approach Vol, veh/h		405	A		889	A		1106	A		2196	A
Approach Delay, s/veh		71.5			98.2			41.6			50.3	
Approach LOS		E			F			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.3	95.2	32.0	31.5	17.6	98.9	27.0	36.6
Change Period (Y+Rc), s	8.5	7.0	9.0	7.0	8.5	7.0	9.0	7.0
Max Green Setting (Gmax), s	14.5	71.0	23.0	40.0	14.5	71.0	23.0	40.0
Max Q Clear Time (g_c+I1), s	12.7	0.0	25.0	12.4	8.9	0.0	17.7	28.0
Green Ext Time (p_c), s	0.1	0.0	0.0	0.8	0.2	0.0	0.2	1.6

Intersection Summary	
HCM 6th Ctrl Delay	59.3
HCM 6th LOS	E

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

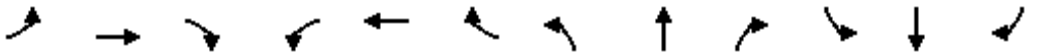
Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	784	43	21	513	0	32	0	31	0	0	0
Future Vol, veh/h	3	784	43	21	513	0	32	0	31	0	0	0
Conflicting Peds, #/hr	6	0	15	15	0	6	5	0	0	0	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	125	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	852	47	23	558	0	35	0	34	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	564	0	0	914	0	0	1227	1507	465	1042	1530	290
Stage 1	-	-	-	-	-	-	897	897	-	610	610	-
Stage 2	-	-	-	-	-	-	330	610	-	432	920	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1004	-	-	742	-	0	134	120	544	184	116	707
Stage 1	-	-	-	-	-	0	301	357	-	448	483	-
Stage 2	-	-	-	-	-	0	657	483	-	572	348	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	998	-	-	731	-	-	128	114	536	167	110	700
Mov Cap-2 Maneuver	-	-	-	-	-	-	128	114	-	167	110	-
Stage 1	-	-	-	-	-	-	296	351	-	444	465	-
Stage 2	-	-	-	-	-	-	633	465	-	534	342	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.4	31.1	0
HCM LOS			D	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	205	998	-	-	731	-	-
HCM Lane V/C Ratio	0.334	0.003	-	-	0.031	-	-
HCM Control Delay (s)	31.1	8.6	-	-	10.1	-	0
HCM Lane LOS	D	A	-	-	B	-	A
HCM 95th %tile Q(veh)	1.4	0	-	-	0.1	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	210	385	235	145	220	180	215	1785	200	245	1140	120
Future Volume (veh/h)	210	385	235	145	220	180	215	1785	200	245	1140	120
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1575	1870	1870	1575	1870
Adj Flow Rate, veh/h	231	423	0	159	242	0	222	1840	0	255	1188	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.97	0.97	0.97	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	340	652		261	598		264	2026		296	2066	
Arrive On Green	0.10	0.18	0.00	0.08	0.17	0.00	0.08	0.47	0.00	0.09	0.48	0.00
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	3456	4300	1585	3456	4300	1585
Grp Volume(v), veh/h	231	423	0	159	242	0	222	1840	0	255	1188	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1728	1433	1585	1728	1433	1585
Q Serve(g_s), s	18.0	19.9	0.0	13.2	10.9	0.0	11.4	71.2	0.0	13.1	35.7	0.0
Cycle Q Clear(g_c), s	18.0	19.9	0.0	13.2	10.9	0.0	11.4	71.2	0.0	13.1	35.7	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	340	652		261	598		264	2026		296	2066	
V/C Ratio(X)	0.68	0.65		0.61	0.40		0.84	0.91		0.86	0.58	
Avail Cap(c_a), veh/h	340	652		288	652		355	2026		355	2066	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	56.7	68.1	0.0	56.1	66.8	0.0	82.1	44.0	0.0	81.3	33.6	0.0
Incr Delay (d2), s/veh	5.4	5.0	0.0	3.1	0.4	0.0	12.7	7.4	0.0	16.8	1.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	9.6	0.0	6.2	5.0	0.0	5.5	25.7	0.0	6.5	12.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	62.1	73.1	0.0	59.2	67.3	0.0	94.8	51.4	0.0	98.0	34.7	0.0
LnGrp LOS	E	E		E	E		F	D		F	C	
Approach Vol, veh/h		654	A		401	A		2062	A		1443	A
Approach Delay, s/veh		69.2			64.1			56.1			45.9	
Approach LOS		E			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	22.2	93.5	24.3	40.0	23.9	91.8	27.0	37.3
Change Period (Y+Rc), s	8.5	7.0	9.0	7.0	8.5	7.0	9.0	7.0
Max Green Setting (Gmax), s	18.5	79.0	18.0	33.0	18.5	79.0	18.0	33.0
Max Q Clear Time (g_c+I1), s	13.4	0.0	15.2	21.9	15.1	0.0	20.0	12.9
Green Ext Time (p_c), s	0.3	0.0	0.1	1.3	0.3	0.0	0.0	0.8

Intersection Summary	
HCM 6th Ctrl Delay	55.5
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

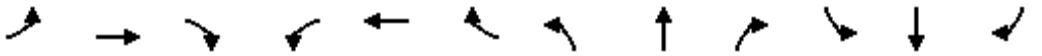
Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	388	24	15	973	0	42	1	19	0	4	0
Future Vol, veh/h	3	388	24	15	973	0	42	1	19	0	4	0
Conflicting Peds, #/hr	2	0	10	10	0	2	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	422	26	16	1058	0	46	1	21	0	4	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1060	0	0	458	0	0	1014	1543	234	1310	1556	531
Stage 1	-	-	-	-	-	-	451	451	-	1092	1092	-
Stage 2	-	-	-	-	-	-	563	1092	-	218	464	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	653	-	-	1099	-	0	193	114	768	117	112	493
Stage 1	-	-	-	-	-	0	557	569	-	229	289	-
Stage 2	-	-	-	-	-	0	478	289	-	764	562	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	652	-	-	1089	-	-	183	110	761	111	108	492
Mov Cap-2 Maneuver	-	-	-	-	-	-	183	110	-	111	108	-
Stage 1	-	-	-	-	-	-	549	560	-	228	284	-
Stage 2	-	-	-	-	-	-	464	284	-	738	554	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	26.4	39.7
HCM LOS			D	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	235	652	-	-	1089	-	108
HCM Lane V/C Ratio	0.287	0.005	-	-	0.015	-	0.04
HCM Control Delay (s)	26.4	10.5	-	-	8.4	-	39.7
HCM Lane LOS	D	B	-	-	A	-	E
HCM 95th %tile Q(veh)	1.1	0	-	-	0	-	0.1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	165	200	270	315	450	250	195	845	85	130	2000	150
Future Volume (veh/h)	165	200	270	315	450	250	195	845	85	130	2000	150
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	0.99		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1575	1870	1870	1723	1870
Adj Flow Rate, veh/h	183	222	0	366	523	0	207	899	0	134	2062	0
Peak Hour Factor	0.90	0.90	0.90	0.86	0.86	0.86	0.94	0.94	0.94	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	235	484		358	583		245	2196		174	2304	
Arrive On Green	0.10	0.14	0.00	0.13	0.16	0.00	0.07	0.51	0.00	0.05	0.49	0.00
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	3456	4300	1585	3456	4703	1585
Grp Volume(v), veh/h	183	222	0	366	523	0	207	899	0	134	2062	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1728	1433	1585	1728	1568	1585
Q Serve(g_s), s	15.7	10.4	0.0	23.0	26.0	0.0	10.7	23.3	0.0	6.9	71.7	0.0
Cycle Q Clear(g_c), s	15.7	10.4	0.0	23.0	26.0	0.0	10.7	23.3	0.0	6.9	71.7	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	235	484		358	583		245	2196		174	2304	
V/C Ratio(X)	0.78	0.46		1.02	0.90		0.84	0.41		0.77	0.89	
Avail Cap(c_a), veh/h	285	790		358	790		278	2196		278	2304	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	60.0	71.6	0.0	65.3	73.7	0.0	82.6	27.3	0.0	84.4	41.7	0.0
Incr Delay (d2), s/veh	10.6	0.7	0.0	53.1	10.3	0.0	18.7	0.6	0.0	7.0	5.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.9	4.8	0.0	10.6	12.6	0.0	5.3	7.9	0.0	3.2	27.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	70.6	72.3	0.0	118.5	84.0	0.0	101.3	27.8	0.0	91.5	47.6	0.0
LnGrp LOS	E	E		F	F		F	C		F	D	
Approach Vol, veh/h		405	A		889	A		1106	A		2196	A
Approach Delay, s/veh		71.5			98.2			41.6			50.3	
Approach LOS		E			F			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.3	95.2	32.0	31.5	17.6	98.9	27.0	36.6
Change Period (Y+Rc), s	8.5	7.0	9.0	7.0	8.5	7.0	9.0	7.0
Max Green Setting (Gmax), s	14.5	71.0	23.0	40.0	14.5	71.0	23.0	40.0
Max Q Clear Time (g_c+I1), s	12.7	0.0	25.0	12.4	8.9	0.0	17.7	28.0
Green Ext Time (p_c), s	0.1	0.0	0.0	0.8	0.2	0.0	0.2	1.6

Intersection Summary	
HCM 6th Ctrl Delay	59.3
HCM 6th LOS	E

Notes

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

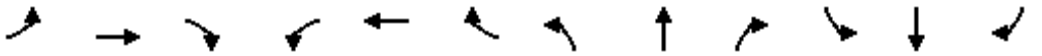
Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	784	43	21	513	0	32	0	31	0	0	0
Future Vol, veh/h	3	784	43	21	513	0	32	0	31	0	0	0
Conflicting Peds, #/hr	6	0	15	15	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	852	47	23	558	0	35	0	34	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	564	0	0	914	0	0	1222	1507	465	1042	1530	285
Stage 1	-	-	-	-	-	-	897	897	-	610	610	-
Stage 2	-	-	-	-	-	-	325	610	-	432	920	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1004	-	-	742	-	0	136	120	544	184	116	712
Stage 1	-	-	-	-	-	0	301	357	-	448	483	-
Stage 2	-	-	-	-	-	0	661	483	-	572	348	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	998	-	-	731	-	-	131	114	536	167	110	708
Mov Cap-2 Maneuver	-	-	-	-	-	-	131	114	-	167	110	-
Stage 1	-	-	-	-	-	-	296	351	-	444	465	-
Stage 2	-	-	-	-	-	-	640	465	-	534	342	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.4	30.4	0
HCM LOS			D	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	209	998	-	-	731	-	-
HCM Lane V/C Ratio	0.328	0.003	-	-	0.031	-	-
HCM Control Delay (s)	30.4	8.6	-	-	10.1	-	0
HCM Lane LOS	D	A	-	-	B	-	A
HCM 95th %tile Q(veh)	1.4	0	-	-	0.1	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	210	385	235	145	220	180	215	1785	200	245	1140	120
Future Volume (veh/h)	210	385	235	145	220	180	215	1785	200	245	1140	120
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1575	1870	1870	1575	1870
Adj Flow Rate, veh/h	231	423	0	159	242	0	222	1840	0	255	1188	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.97	0.97	0.97	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	340	652		261	598		264	2026		296	2066	
Arrive On Green	0.10	0.18	0.00	0.08	0.17	0.00	0.08	0.47	0.00	0.09	0.48	0.00
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	3456	4300	1585	3456	4300	1585
Grp Volume(v), veh/h	231	423	0	159	242	0	222	1840	0	255	1188	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1728	1433	1585	1728	1433	1585
Q Serve(g_s), s	18.0	19.9	0.0	13.2	10.9	0.0	11.4	71.2	0.0	13.1	35.7	0.0
Cycle Q Clear(g_c), s	18.0	19.9	0.0	13.2	10.9	0.0	11.4	71.2	0.0	13.1	35.7	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	340	652		261	598		264	2026		296	2066	
V/C Ratio(X)	0.68	0.65		0.61	0.40		0.84	0.91		0.86	0.58	
Avail Cap(c_a), veh/h	340	652		288	652		355	2026		355	2066	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	56.7	68.1	0.0	56.1	66.8	0.0	82.1	44.0	0.0	81.3	33.6	0.0
Incr Delay (d2), s/veh	5.4	5.0	0.0	3.1	0.4	0.0	12.7	7.4	0.0	16.8	1.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	9.6	0.0	6.2	5.0	0.0	5.5	25.7	0.0	6.5	12.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	62.1	73.1	0.0	59.2	67.3	0.0	94.8	51.4	0.0	98.0	34.7	0.0
LnGrp LOS	E	E		E	E		F	D		F	C	
Approach Vol, veh/h		654	A		401	A		2062	A		1443	A
Approach Delay, s/veh		69.2			64.1			56.1			45.9	
Approach LOS		E			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	22.2	93.5	24.3	40.0	23.9	91.8	27.0	37.3
Change Period (Y+Rc), s	8.5	7.0	9.0	7.0	8.5	7.0	9.0	7.0
Max Green Setting (Gmax), s	18.5	79.0	18.0	33.0	18.5	79.0	18.0	33.0
Max Q Clear Time (g_c+I1), s	13.4	0.0	15.2	21.9	15.1	0.0	20.0	12.9
Green Ext Time (p_c), s	0.3	0.0	0.1	1.3	0.3	0.0	0.0	0.8

Intersection Summary	
HCM 6th Ctrl Delay	55.5
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

APPENDIX

F

SimTraffic Outputs

Intersection: 2: Bel Pre Rd & St. Matthew's Driveway

Movement	EB	EB	EB	WB	WB	WB	NB	SB
Directions Served	L	T	TR	L	T	T	LTR	LTR
Maximum Queue (ft)	27	12	12	30	159	157	107	30
Average Queue (ft)	2	0	0	3	31	11	41	6
95th Queue (ft)	15	6	6	18	119	76	87	26
Link Distance (ft)		314	314		638	638	228	190
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	150			125				
Storage Blk Time (%)					2			
Queuing Penalty (veh)					0			

Intersection: 141: MD 97 & Bel Pre Rd

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	T
Maximum Queue (ft)	201	221	216	239	335	322	328	175	172	245	311	295
Average Queue (ft)	114	132	86	40	258	195	193	81	82	135	182	156
95th Queue (ft)	193	199	188	179	372	299	320	224	171	211	302	275
Link Distance (ft)		758			314	314	314				900	900
Upstream Blk Time (%)					13	1	1					
Queuing Penalty (veh)					43	4	5					
Storage Bay Dist (ft)	180		240	240				150	455	455		
Storage Blk Time (%)	2	2	0	0			20	0				
Queuing Penalty (veh)	10	9	0	1			50	1				

Intersection: 141: MD 97 & Bel Pre Rd

Movement	NB	NB	SB	SB	SB	SB	SB	SB
Directions Served	T	R	L	L	T	T	T	R
Maximum Queue (ft)	239	88	109	584	963	952	920	65
Average Queue (ft)	94	3	35	203	700	686	638	46
95th Queue (ft)	222	45	91	587	1393	1354	1269	82
Link Distance (ft)	900				1819	1819	1819	
Upstream Blk Time (%)					2	1	0	
Queuing Penalty (veh)					0	0	0	
Storage Bay Dist (ft)		200	560	560				40
Storage Blk Time (%)	0	0		0	17		42	2
Queuing Penalty (veh)	0	0		0	22		63	11

Network Summary

Network wide Queuing Penalty: 218

Intersection: 2: Bel Pre Rd & St. Matthew's Driveway

Movement	EB	EB	EB	WB	WB	WB	NB
Directions Served	L	T	TR	L	T	T	LTR
Maximum Queue (ft)	16	26	28	39	32	76	98
Average Queue (ft)	1	1	2	9	2	5	34
95th Queue (ft)	10	14	20	31	20	35	70
Link Distance (ft)		318	318		636	636	230
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	150			125			
Storage Blk Time (%)					0		
Queuing Penalty (veh)					0		

Intersection: 141: MD 97 & Bel Pre Rd

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	T
Maximum Queue (ft)	205	794	265	252	302	321	333	175	295	433	553	553
Average Queue (ft)	186	622	232	51	142	127	117	33	137	198	334	334
95th Queue (ft)	245	1010	320	216	274	240	253	146	277	377	577	580
Link Distance (ft)		755			318	318	318				1803	1803
Upstream Blk Time (%)		38			2	1	2					
Queuing Penalty (veh)		0			3	2	3					
Storage Bay Dist (ft)	180		240	240				150	455	455		
Storage Blk Time (%)	36	30	7	0			13	1		0	2	
Queuing Penalty (veh)	222	194	28	1			23	1		0	4	

Intersection: 141: MD 97 & Bel Pre Rd

Movement	NB	NB	SB	SB	SB	SB	SB	SB
Directions Served	T	R	L	L	T	T	T	R
Maximum Queue (ft)	534	225	378	439	461	407	313	69
Average Queue (ft)	309	102	198	229	208	188	145	39
95th Queue (ft)	556	285	392	425	401	371	313	83
Link Distance (ft)	1803				1632	1632	1632	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		200	560	560				40
Storage Blk Time (%)	20	0		0	1		19	1
Queuing Penalty (veh)	40	0		0	1		23	3

Network Summary

Network wide Queuing Penalty: 549

Intersection: 2: Bel Pre Rd & St. Matthew's Driveway

Movement	EB	EB	EB	WB	WB	WB	NB	SB
Directions Served	L	T	TR	L	T	T	LTR	LTR
Maximum Queue (ft)	24	93	90	39	30	34	140	30
Average Queue (ft)	1	8	9	5	8	3	51	5
95th Queue (ft)	11	50	52	28	28	19	122	24
Link Distance (ft)		314	314	2	2	2	595	191
Upstream Blk Time (%)				1	11	1		
Queuing Penalty (veh)				4	37	4		
Storage Bay Dist (ft)	150							
Storage Blk Time (%)		0						
Queuing Penalty (veh)		0						

Intersection: 141: MD 97 & Bel Pre Rd

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	T
Maximum Queue (ft)	204	343	248	246	332	337	336	175	165	224	321	282
Average Queue (ft)	120	135	93	31	256	190	206	88	81	125	185	158
95th Queue (ft)	206	242	204	155	376	315	337	230	169	194	313	285
Link Distance (ft)		758			314	314	314				900	900
Upstream Blk Time (%)					15	1	3					
Queuing Penalty (veh)					49	5	11					
Storage Bay Dist (ft)	180		240	240				150	455	455		
Storage Blk Time (%)	4	2	0	1			24	0				
Queuing Penalty (veh)	18	8	1	1			61	1				

Intersection: 141: MD 97 & Bel Pre Rd

Movement	NB	SB	SB	SB	SB	SB	SB
Directions Served	T	L	L	T	T	T	R
Maximum Queue (ft)	220	143	584	836	827	796	67
Average Queue (ft)	99	34	155	537	522	484	43
95th Queue (ft)	221	96	488	796	778	746	84
Link Distance (ft)	900			1819	1819	1819	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		560	560				40
Storage Blk Time (%)	0		0	10		40	1
Queuing Penalty (veh)	0		0	13		60	8

Intersection: 200:

Movement	EB	EB	WB	WB	WB
Directions Served	T	T	T	T	T
Maximum Queue (ft)	25	31	28	168	147
Average Queue (ft)	3	6	2	57	32
95th Queue (ft)	19	25	18	169	107
Link Distance (ft)	2	2	100	100	100
Upstream Blk Time (%)	2	3		11	1
Queuing Penalty (veh)	3	6		36	4
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 201:

Movement	WB	WB
Directions Served	T	T
Maximum Queue (ft)	193	166
Average Queue (ft)	35	15
95th Queue (ft)	166	108
Link Distance (ft)	1560	1560
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 329

Intersection: 2: Bel Pre Rd & St. Matthew's Driveway

Movement	EB	EB	EB	WB	WB	WB	NB
Directions Served	L	T	TR	L	T	T	LTR
Maximum Queue (ft)	26	197	220	44	24	12	74
Average Queue (ft)	1	18	23	9	2	0	36
95th Queue (ft)	11	107	125	32	18	6	63
Link Distance (ft)		311	311	1	1	1	596
Upstream Blk Time (%)		0	0	4	2	0	
Queuing Penalty (veh)		0	1	7	4	1	
Storage Bay Dist (ft)	150						
Storage Blk Time (%)		1					
Queuing Penalty (veh)		0					

Intersection: 141: MD 97 & Bel Pre Rd

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	L	T	T
Maximum Queue (ft)	205	786	265	252	306	294	304	175	317	479	572	536
Average Queue (ft)	181	542	224	27	135	114	113	25	132	190	359	358
95th Queue (ft)	249	955	328	154	266	210	224	127	264	386	589	582
Link Distance (ft)		755			311	311	311				1803	1803
Upstream Blk Time (%)		25			2	0	1					
Queuing Penalty (veh)		0			4	1	2					
Storage Bay Dist (ft)	180		240	240				150	455	455		
Storage Blk Time (%)	27	32	4	0			7	0			3	
Queuing Penalty (veh)	169	202	18	1			13	0			5	

Intersection: 141: MD 97 & Bel Pre Rd

Movement	NB	NB	SB	SB	SB	SB	SB	SB
Directions Served	T	R	L	L	T	T	T	R
Maximum Queue (ft)	543	225	388	409	402	330	302	65
Average Queue (ft)	339	118	168	198	205	196	152	36
95th Queue (ft)	573	302	321	355	369	343	307	80
Link Distance (ft)	1803				1634	1634	1634	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)		200	560	560				40
Storage Blk Time (%)	22	0	0	0	0		18	1
Queuing Penalty (veh)	45	1	0	1	0		22	3

Intersection: 200:

Movement	EB	EB	WB	WB	WB
Directions Served	T	T	T	T	T
Maximum Queue (ft)	31	78	24	116	100
Average Queue (ft)	4	17	1	19	13
95th Queue (ft)	21	57	12	83	62
Link Distance (ft)	1	1	121	121	121
Upstream Blk Time (%)	3	4		1	0
Queuing Penalty (veh)	12	18		1	0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 201:

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 531

APPENDIX

G

Concept Plans