

US 60 BETWEEN MILE BRANCH RD AND HULL AVE

ROAD SAFETY AUDIT

Regional Intergovernmental Council



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November 2020

Table of Contents

1.0	Executive Summary.....	1
2.0	Purpose and Location.....	2
3.0	Existing Conditions.....	2
4.0	Data Collection.....	6
5.0	Crash Data.....	8
6.0	Existing Capacity Analysis.....	10
7.0	Conclusions and Recommendations.....	11

List of Figures

Figure 1:	Study Area.....	2
Figure 2:	US 60 & Mile Branch Rd. Lane Configuration.....	3
Figure 3:	US 60 & William St. Lane Configuration.....	4
Figure 4:	US 60 & Hull Ave Lane Configuration.....	5
Figure 5:	2020 Peak Hour Adjusted Volumes.....	7
Figure 6:	Frequency of Crashes by Year and Severity.....	8
Figure 7:	Crash Frequency by Crash Type.....	9
Figure 8:	Potential Improvements at US 60 and Mile Branch Road.....	12
Figure 9:	Potential Improvements at US 60 and William Street/Hull Avenue.....	14
Figure 10:	Acceleration Lane on US 60 Westbound.....	15

List of Photos

Photo 1:	Washed Out Pavement on US 60.....	2
Photo 2:	Go-Mart Driveway.....	3
Photo 3:	US 60 & William St. Pavement.....	4
Photo 4:	US 60 & Hull Ave Pavement.....	5

List of Tables

Table 1:	Operational Analysis Results for Existing (2020) Conditions.....	10
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Appendices

- Appendix A – Raw Traffic Counts
- Appendix B – Crash Diagram
- Appendix C – Existing Capacity Analysis
- Appendix D – Detailed Cost Estimates

1.0 Executive Summary

The purpose of this study is to analyze the existing safety and capacity conditions and to determine potential countermeasures to mitigate crashes along E Dupont Avenue (US 60) between Mile Branch Road and Hull Avenue in Cedar Grove, West Virginia. US 60 is a two-lane rural freeway with a speed limit of 50 mph in a mainly residential area. US 60 transitions to a four-lane divided freeway to the east of Hull Avenue. The stop-controlled intersections of US 60 with Mile Branch Road, William Street and Hull Avenue were studied along this corridor.

Crash data from January 1, 2016 to December 31, 2018 was downloaded from the ReportBeam website. Each crash report was reviewed to determine potential factors contributing to crashes. In the three-year study period, there were 14 crashes with seven (50 percent) resulting in injury. The most prevalent crash pattern in the corridor was rear end collisions occurring on US 60 at the intersection with Mile Branch Road. Several fixed object crashes also occurred near this intersection when drivers lost control and ran their vehicle off the road. At the intersection of US 60 and William Street, three crashes occurred in the three-year period. Two were angle collisions involving the west entrance/exit on William Street and one was a rear end collision. At the intersection of US 60 and Hull Avenue, an angle collision occurred when a vehicle turned left out of Hull Avenue into the path of a westbound vehicle. Additionally, a fixed object collision occurred when a vehicle lost control and hit a sign in the median at Hull Avenue.

Traffic analysis was performed at all three of the unsignalized intersections in the area and all stop-controlled approaches were found to be performing at LOS C or better.

In the short-term, to mitigate the rear-end collisions around the US 60 and Mile Branch Road intersection, it is proposed that a right-turn lane be added on the westbound approach of US 60. It is also proposed that the trees surrounding this intersection be trimmed during the summer months as trees and shrubs were overgrown on the rock faces on either side of Mile Branch Road, decreasing visibility at the intersection. Flex posts are also recommended along the wide driveway of the Go-Mart to provide clear access points thus reducing possible conflicts as vehicles are exiting and entering. At the intersection of US 60 and Hull Avenue, DO NOT ENTER signs (R5-1) are recommended to be installed facing Hull Avenue at the junction with the eastbound right-turn slip lane to prevent motorists from driving the wrong way. Yield signs for the right-turn movement from eastbound US 60 to Hull Avenue are also recommended.

Long-term improvements are not currently warranted based on the traffic operations and low crash frequency but could be constructed in the future as traffic volumes increase. The following long-term improvements should be considered in the future:

- Construct an eastbound right-turn lane at William Street.
- Convert William Street to a right-in/right-out (RIRO) configuration by adding flex posts along the centerline of US 60 and the channelizing line between the new eastbound right-turn lane and the eastbound through lane.
- If converting William Street to RIRO, add a turnaround loop at Hull Avenue for vehicles originally turning left from William Street to make a U-Turn to prevent a nearly mile and a half detour through Cedar Grove.
- Reconstruct US 60 to have a single eastbound through lane from William Street to just east of Hull Avenue to enhance visibility to oncoming eastbound traffic for vehicles on Hull Street.

2.0 Purpose and Location

The purpose of this study is to analyze the existing safety and capacity conditions and to determine potential countermeasures to mitigate crashes along E Dupont Avenue (US 60) between Mile Branch Road and Hull Avenue in Cedar Grove, West Virginia. The study area is shown in **Figure 1**.



Figure 1: Study Area

3.0 Existing Conditions

Roadway Conditions

The study area is located within Kanawha County in a primarily rural area. The land use along this corridor is mainly residential with the exception of a Go-Mart gas station located at Mile Branch Road.

US 60 is a two-lane rural freeway with a speed limit of 50 mph. The eastbound direction transitions into two lanes to allow for passing approximately 500 feet west of Hull Avenue. This passing lane then continues for about a half mile to the east. US 60 then transitions to a four-lane divided freeway east of Hull Avenue. Railroad tracks run parallel to US 60 along the south side of the roadway. A rock face is located on the majority of the north side of the roadway and signs are present warning drivers of falling rocks. The pavement is washed out near Mile Branch Road, as seen in **Photo 1**. Signs are present before this section of roadway to warn drivers of the rough road and to lower their speed to 35 mph. US 60 has 10-foot shoulders on either side of the roadway from Mile Branch Road to William Street that become



Photo 1: Washed Out Pavement on US 60

narrower with the addition of the exit lane at William Street. Lighting is not provided through the majority of the corridor.

Intersections Conditions

US 60 and Mile Branch Road

The intersection of US 60 and Mile Branch Road is a three-leg, minor road stop-controlled intersection. The lane configuration is shown in **Figure 2**. There is no stop sign located at Mile Branch Road, and the entrance is slightly hidden by the Go-Mart gas station located on the northwest corner of the intersection. The driveway for the Go-Mart does not have a clearly defined exit or entrance as illustrated in **Photo 2**. The pavement along the road is cracked and damaged in areas along the driveway. The intersection is not lit. Trees on either side of Mile Branch Road obstruct visibility of the intersection and gas station from US 60.



Photo 2: Go-Mart Driveway



Figure 2: US 60 & Mile Branch Rd. Lane Configuration

US 60 and William Street

The lane configuration for the unsignalized intersection of US 60 and William Street is shown in **Figure 3**. Railroad tracks are located just south of the intersection on William Street as illustrated in **Photo 3**. The uneven asphalt between US 60 and Hull Avenue creates a rough transition between the two roads. Warning lights are provided at the railroad crossing and overhead lighting is located at the intersection. There are no turn lane pavement markings, stop signs or yield signs provided. Vehicles were observed to block the west leg of William Street while waiting to turn left onto US 60. Both entrances/exits on William Street are wide enough for only one vehicle, which increases the potential for conflicts at the intersection. However, observations showed that most drivers were familiar with the area and this condition and yielded to other vehicles. There is also poor sight distance for vehicles attempting to turn left due to the skewed angle of the intersection and the steep grade from Hull Avenue to US 60. The add lane from the east leg of William Street creates a weave along US 60 between William Street and Hull Avenue. Field observations showed very low traffic volumes along this segment which reduces the potential of conflicts created by the weave.



Figure 3: US 60 & William St. Lane Configuration



Photo 3: US 60 & William St. Pavement

US 60 and Hull Avenue

US 60 and Hull Avenue is a three-leg, minor-road stop-controlled intersection with the lane configuration shown in **Figure 4**. The eastbound right-turn lane is channelized with a raised concrete island. The movement is presumed to be yield-controlled but there is no signage or pavement markings that indicate this condition. The speed limit on Hull Avenue is 25 mph and provides access to a residential area in the town of Cedar Grove. There is poor sight distance for vehicles turning left onto US 60 from Hull Avenue due to the angle of the northbound approach as shown in **Photo 4**. A three-foot concrete median separates travel directions along US 60. The pavement and pavement markings are in good condition. There is no overhead lighting present at the intersection. US 60 widens to two lanes in the eastbound direction about 500 feet west of the intersection. Field reviews and stakeholder comments indicated that faster moving vehicles speed up to pass slower vehicles as soon as the second lane is formed on US 60. As a result, the vehicles in the right through lane obstruct the sight distance to vehicles in the left through lane for vehicles on Hull Avenue.



Photo 4: US 60 & Hull Ave Pavement



Figure 4: US 60 & Hull Ave Lane Configuration

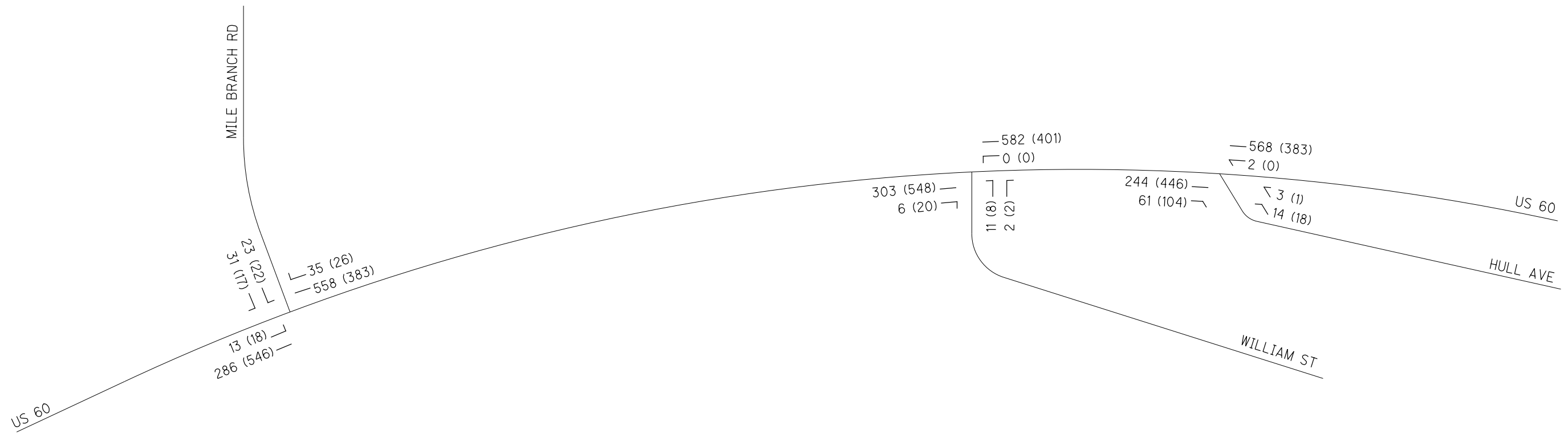
4.0 Data Collection

Turning movement counts were collected for 24 hours on Tuesday June 2, 2020 at the following intersections:

- US 60 and Hull Avenue
- US 60 and William Street

A 24-hour 2019 turning movement count was available for the intersection of US 60 and Mile Branch Road. The AM peak hour was determined to be 7:15 AM to 8:15 AM while the PM peak hour was 4:45 PM to 5:45 PM. The volumes were adjusted to account for the changes in traffic volumes due to the COVID-19 pandemic using existing 24-hour 2019 counts. An adjustment factor of 1.61 and 1.19 was used for the AM and PM peak, respectively. The final adjusted 2020 peak hour volumes are summarized in **Figure 5**. Note that the volumes were increased, balanced, and smoothed where appropriate. Raw traffic counts are provided in **Appendix A**.

XX: 2020 AM PEAK HOUR COUNT 7:15 AM TO 8:15AM
(XX): 2020 PM PEAK HOUR COUNT 4:45PM TO 5:45PM



NOT TO SCALE

US 60 CORRIDOR STUDY
2020 ADJUSTED PEAK HOUR COUNTS

5.0 Crash Data

Crash data from January 1, 2016 to December 31, 2018 was downloaded from the ReportBeam website. Each crash report was reviewed to determine potential factors contributing to crashes. A collision diagram that shows crash patterns by illustrating the approximate location of each reported crash is provided in **Appendix B**. In the three-year study period, there were 14 crashes with seven (50 percent) resulting in injury. The high-speed limit (50 mph) on US 60 is likely a contributing factor to the high injury percentage. No fatalities occurred in the study period. The majority of crashes (86 percent) occurred on dry pavement. **Figure 6** shows the crash breakdown per year by severity. The number of injury crashes has been decreasing over the past three years.

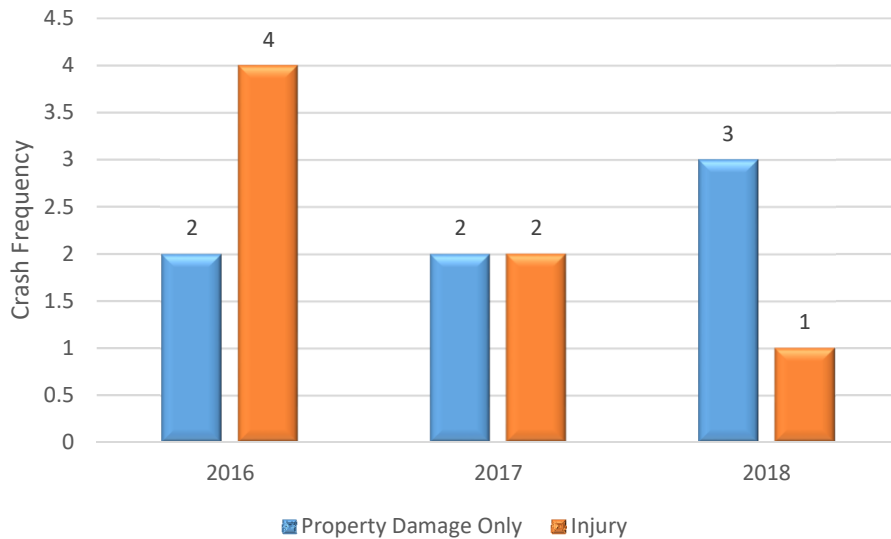


Figure 6: Frequency of Crashes by Year and Severity

Figure 7 illustrates the crash frequency by type of crash. The majority of the rear end collisions occurred near the intersection of US 60 and Mile Branch Road. These crashes occurred when vehicles slowed in the through lane to turn into the Go-Mart or on Mile Branch Road and were rear ended by the vehicle behind them. One of these rear end collisions resulted from a school bus stopping to pick up children from the neighborhood north on Mile Branch Road. The majority of the fixed object collisions (80 percent) also occurred around the area of Mile Branch Road. These crashes happened when drivers lost control and landed in the ditch on the side of the roadway. One fixed object crash occurred when a vehicle hit a rock that had fallen off the cliff and into the roadway.

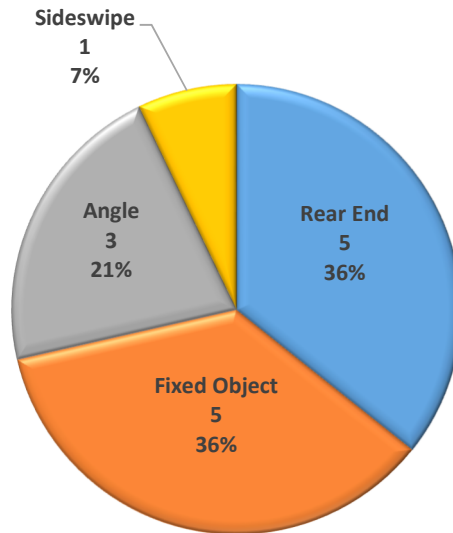


Figure 7: Crash Frequency by Crash Type

Two of the angle crashes occurred at US 60 and William Street at the west entrance/exit to William Street. One crash occurred when a westbound vehicle, for unknown reasons, attempted to turn left in front of another westbound vehicle. The other crash occurred when a vehicle was waiting to turn left out of William Street and a vehicle turned right into them attempting to enter William Street. The third angle crash occurred at US 60 and Hull Avenue when a vehicle turned left out of Hull Avenue into the path of a westbound vehicle.

6.0 Existing Capacity Analysis

Intersection capacity analysis was evaluated to assess existing operations using 2020 traffic volumes, existing lane configurations and traffic control. All intersections in the study were minor road stop controlled. Existing operational analysis results from *Synchro* are summarized in **Table 1** with analysis output provided in **Appendix C**. All stop-controlled approaches are operating at LOS C.

Table 1: Operational Analysis Results for Existing (2020) Conditions

US 60 & Mile Branch Rd				
	Eastbound US 60		Southbound Mile Branch Rd	
	LT		LT	RT
AM Peak Hour				
LOS	A		C	
Delay	9.2		17.2	
v/c	0.016		0.169	
95 th % Queue	47'		61'	
PM Peak Hour				
LOS	A		C	
Delay	8.2		16.5	
v/c	0.016		0.114	
95 th % Queue	40'		51'	
US 60 & William St				
			Northbound William St	
			LT	RT
AM Peak Hour				
LOS	--		C	
Delay	--		16.9	
v/c	--		0.046	
95 th % Queue	--		25'	
PM Peak Hour				
LOS	--		C	
Delay	--		16.1	
v/c	--		0.031	
95 th % Queue	--		23'	
US 60 & Hull Ave				
			Northbound Hull Ave	
			LT	RT
AM Peak Hour				
LOS	--		C	
Delay	--		16.7	
v/c	--		0.058	
95 th % Queue	--		40'	
PM Peak Hour				
LOS	--		C	
Delay	--		17.8	
v/c	--		0.069	
95 th % Queue	--		37'	

7.0 Conclusions and Recommendations

The following short-term and long-term countermeasures were identified along the corridor to improve safety.

Short-Term Improvements

US 60 and Mile Branch Road

- **Add flex posts along the Go-Mart driveway.** Adding flex posts will provide clear access points into Go-Mart, thus reducing possible conflict points.
- **Trim trees surrounding US 60 and Mile Branch Road.** During the field visit, trees and shrubs were overgrown on the rock faces on either side of Mile Branch Road, decreasing visibility of the intersection as vehicles are approaching on US 60 and obstructing sight distances for vehicles turning from Mile Branch Road.
- **Construct a right-turn lane on US 60 and Mile Branch Road.** Several rear end crashes were the result of vehicles slowing down in the through lane along US 60 to turn right into Go-Mart or Mile Branch Road. By constructing an exclusive right-turn lane, slowing vehicles are removed from the through lane thus reducing the potential for conflicts. The existing shoulder can likely accommodate the new turn lane. However, the pavement will likely need to be replaced and built to full depth to accommodate the additional traffic load.

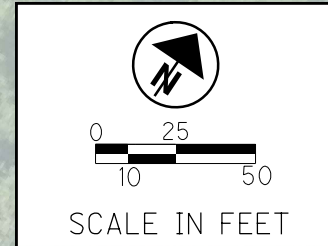
These improvements at Mile Branch Road are shown in **Figure 8** and have an approximate cost of \$175,000. Cost estimates included a 30% contingency and were inflated for a 2025 construction year. They do not include right-of-way costs or utility relocation. Detailed cost estimates are provided in **Appendix D**.

US 60 and Hull Avenue

- **Install “DO NOT ENTER” signs (R5-1) facing Hull Avenue at the junction with the eastbound right-turn slip lane.** Vehicles approaching US 60 from Hull Avenue are aligned with this right-turn slip lane and no signage is provided to alert motorists that this leg is one-way. This intersection could be confusing to drivers who are not familiar with the area. These signs would likely prevent a wrong-way crash from occurring.
- **Install yield signs for the right-turn movement from eastbound US 60 to Hull Avenue.** Field observations indicated that signage was not provided to indicate the control for this lane. While it does not likely happen often because of the low traffic volumes, conflicts could occur between left-turning vehicles from westbound US 60 and right-turning vehicles from eastbound US 60. Left-turning drivers are focused on finding an acceptable gap in eastbound US 60 through traffic and the right-turn lane is separated from the intersection which results in drivers not seeing conflicting right-turning traffic. If right-turning vehicles yielded to the left-turning vehicles, the potential for conflicts is reduced.

RIC RSA
US 60 at Mile Branch Rd.
August 31, 2020

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— GIS RIGHT-OF-WAY/PROPERTY LINES
○ FLEXIBLE DELINEATOR POSTS



Construction Cost Estimate: \$175,000

Notes:

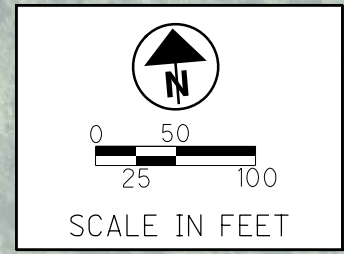
- Cost estimate does not include right-of-way or utility relocations
- Shaded area shown assumed to be full depth pavement
- Add delineator posts to better define ingress and egress for Go Mart

FIGURE
8

Long-Term Improvements

While the following long-term improvements are not currently warranted due to the low crash frequency and vehicle volumes at William Street and Hull Avenue, these could be implemented as needed in the future. A schematic of these improvements is shown in **Figure 9** with a total of cost of \$450,000.

- Construct an eastbound right-turn lane at William Street. Minor widening will need to occur to add this lane.
- Convert William Street to a right-in/right-out (RIRO) configuration by adding flex posts along the centerline of US 60 and the channelizing line between the new eastbound right-turn lane and the eastbound through lane. This improvement will prevent two-way traffic on narrow approaches to William Street.
- If converting William Street to RIRO, add a turnaround loop at Hull Avenue for vehicles originally turning left from William Street to make a U-Turn to prevent a nearly mile and a half detour through Cedar Grove.
- Reconstruct US 60 to have a single eastbound through lane from William Street to just east of Hull Avenue to enhance visibility to oncoming eastbound traffic for vehicles on Hull Street.

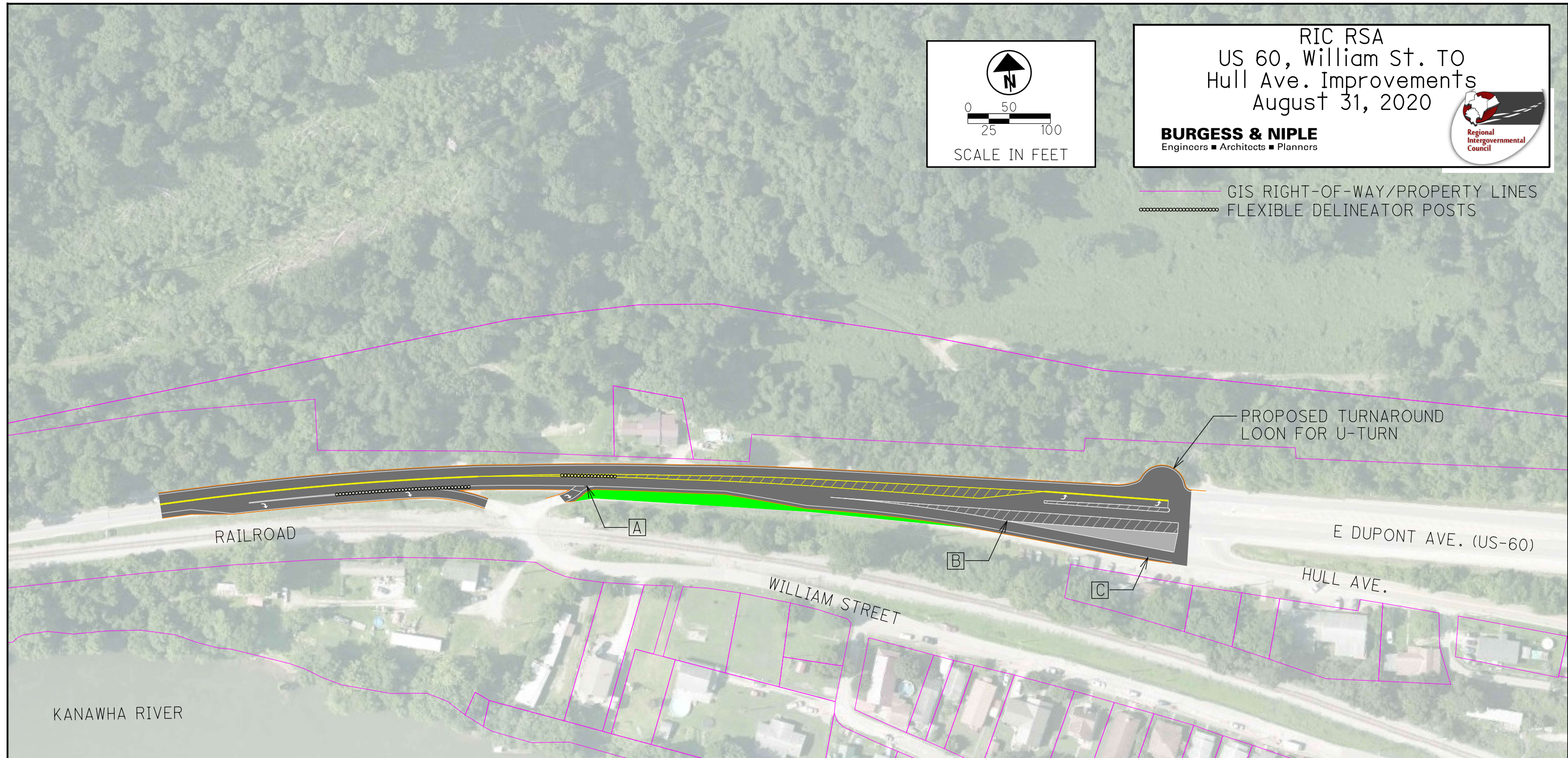


RIC RSA
 US 60, William St. TO
 Hull Ave. Improvements
 August 31, 2020

BURGESS & NIPLÉ
 Engineers ■ Architects ■ Planners



— GIS RIGHT-OF-WAY/PROPERTY LINES
⋯ FLEXIBLE DELINEATOR POSTS



Construction Cost Estimate: \$450,000

Notes:

- Cost estimate does not include right-of-way or utility relocations
- All shading shown is assumed to be resurfacing except minor widening for right turn lane to William Street and U-turn loon
- Right-in-right-out only between US-60 and William Street

- A.) Maintain one eastbound lane for right turn to find gap then bump out lane to Hull Ave to remove existing weave
- B.) Maintain one eastbound lane through Hull intersection to avoid speed increase; Can stripe out pavement, remove pavement, or extend existing concrete median
- C.) Can maintain existing condition for right turn/exit to Hull or keep parallel to eastbound US-60 lane and square up with Hull for more conventional intersection

FIGURE 9

To maintain full access at William Street, improvements could be made to enhance visibility for traffic turning left onto westbound US 60. Westbound US 60 could be widened to provide a receiving lane for William Street traffic to accelerate before merging onto US 60 as illustrated in **Figure 10**. This improvement will require left-turning traffic to only focus on one direction of US 60 at a time. Minor widening may be required to accommodate this improvement.



Figure 10: Acceleration Lane on US 60 Westbound