

# WASHINGTON STREET BETWEEN DOOLEY LANE AND PATRICK STREET ROAD SAFETY ASSESSMENT Regional Intergovernmental Council



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## 1.0 Executive Summary

The purpose of this study is to analyze the existing safety conditions and to determine potential countermeasures to reduce crash frequency along Washington Street between Dooley Lane and Patrick Street in Kanawha County, West Virginia. A particular focus of this study is safety for vulnerable road users. The surrounding study area is primarily residential, with a few commercial businesses surrounding the intersection. A public housing community that generates a high volume of pedestrian and bicycle traffic is located to the west of Rebecca Street. The Kanawha Valley Regional Transportation Authority (KRT) operates bus routes along this portion of Washington Street.

A number of school bus stops were noted in the study area; however, one bus was observed dropping students off in the westbound direction just east of Rebecca Street along a roadway segment without sidewalks. The children were observed walking across Washington Street where there are no pedestrian crossings.

One of the main crossing locations observed during the field review was just west of Cliffview Avenue. Many pedestrians walk from the residential areas at the top of Cliffview Avenue to the Dollar General on Washington Street. Pedestrian stairs are provided at this location but have become dilapidated and unusable. Due to the deterioration of the stairs, pedestrians were observed using a steep dirt path created from consistent use.

Crash data from January 1, 2016 through December 31, 2020 was downloaded from the ReportBeam website. In the five-year study period, there were 39 crashes with 12 (31 percent) resulting in injury and one fatality. The fatality occurred on July 2<sup>nd</sup>, 2016, at 12:37 PM, when a two-year old child was running across Washington Street from a building on the north side of the roadway and was struck by a westbound vehicle near Dooley Lane. Property damage collisions have decreased since 2016, while injury collisions have stayed relatively constant.

Pedestrian collisions were common at the intersection of Washington Street and Rebecca Street, with three occurring in the crosswalk on Rebecca Street. All three collisions resulted in injury. Two of the pedestrian collisions resulted from westbound left-turning vehicles failing to yield to pedestrians in the crosswalk as they turned.

### Short-Term

- Add “yield to pedestrian” signage at Rebecca Street (\$1,000 – 2022 Dollars).
- Add additional speed limit signage in the study area (\$1,000 – 2022 Dollars).
- Restripe high visibility crosswalk at Rebecca Street (\$2,000 – 2022 Dollars).
- Coordinate with Kanawha County Schools to relocate school bus stop.

### Medium-Term

- Widen the sidewalk on the south side of Washington Street between the Dollar General and Patrick Street (\$213,000 – 2025 Dollars). While this improvement is being funded and designed, the northbound left-turns at Patrick Street could be prohibited using flex posts or other temporary devices. Once the sidewalk is widened and sight distance improved, left-turns can be allowed at Patrick Street.
- Construct midblock crossing west of Cliffview Avenue with an RRFB and repair pedestrian stairs (\$215,000 – 2025 Dollars). Improving the stairs is a temporary solution until the ADA accessibility improvements can be funded and designed.

**Long-Term**

- Coordinate with WVDOT to enhance lighting along Washington Street.
- Add sidewalk, on-street parking and a midblock crossing with an RRFB on Washington Street from Dooley Lane to Rebecca Street (\$474,000 – 2027 Dollars).
- Improve ADA accessibility at Washington Street and Cliffview Avenue (\$501,000 – 2027 Dollars).

**2.0 Purpose**

The purpose of this study is to analyze the existing safety conditions and to determine potential countermeasures to reduce crash frequency along Washington Street between Dooley Lane and Patrick Street in Kanawha County, West Virginia. A particular focus of this study is safety for vulnerable road users. The study area is shown below in **Figure 1**.



Figure 1: Study Area

**3.0 Existing Conditions**

The surrounding study area is primarily residential, with a few commercial businesses surrounding the intersection. A public housing community that generates a high volume of pedestrian and bicycle traffic is located to the west of Rebecca Street. The KRT operates bus routes along this portion of Washington Street.

## Roadway Conditions

Washington Street is a two-lane two-way roadway with a speed limit of 30 mph. Continuous sidewalks are present on the southern side of the roadway. Sidewalks on the northern side of Washington Street are only provided to the east of Patrick Street. During the field review, a section of the sidewalk just east of the Dollar General was observed to be missing, shown in **Photo 1**. Occasional overhead lighting is provided along the corridor, but some sections of the sidewalks and roadway have poor lighting. Overhead lighting is only present on the northern side of the roadway to the west of Rebecca Street. A woman and her child are shown walking along the sidewalk at night in **Photo 2**. They are both very difficult to see due to the inadequate lighting in the area. Many pedestrians were observed crossing Washington Street and unmarked crossings along the corridor, shown in **Photo 3**. The main crossing location observed during the field review was just west of Cliffview Avenue. Many pedestrians walk from the residential areas at the top of Cliffview Avenue to the Dollar General on Washington Street. Pedestrian stairs are provided at this location but have become dilapidated and unusable as shown in **Photo 4**. Due to the deterioration of the stairs, pedestrians were observed using a steep dirt path created from consistent use. Pedestrian warning signs are present along the corridor. Many of the businesses on the north side of Washington Street west of Rebecca Street are immediately adjacent to the roadway and have minimal off-street parking locations, shown in **Photo 5**. As a result, vehicles were observed parallel parking in front of the buildings. At the Dollar General, trucks were observed using the sidewalk as a loading zone, blocking access to the sidewalk for pedestrians, shown in **Photo 6**.



**Photo 1: Missing Sidewalk East of Dollar General**



**Photo 2: Inadequate Lighting Conditions at Intersection**



**Photo 3: Pedestrian Crossing Midblock**



**Photo 4: Pedestrian Stairs and Pedestrian Path**



**Photo 5: Buildings on Northern Side of Washington Street**



**Photo 6: Truck Blocking Sidewalk at Dollar General**

## Intersection Conditions

### Washington Street and Rebecca Street

The lane configuration for this signalized intersection is illustrated in **Figure 2**. All signal heads are mounted on a single mast arm. The westbound approach has protected/permissive left-turn operations. Pedestrian push buttons, signal heads and a high visibility crosswalk are provided to cross the northbound approach of Rebecca Street. The crosswalk lines were faded during the field visit, shown in **Photo 7**. Overhead lighting is provided at the intersection.

A number of school bus stops were noted in the study area; however, one bus was observed dropping students off in the westbound direction just east of Rebecca Street along a roadway segment without sidewalks, shown in **Photo 8**. The children were observed walking across Washington Street where there are no pedestrian crossings.



**Figure 2: Rebecca Street Lane Configuration**



**Photo 7: Faded Crosswalk Lines**



**Photo 8: School Bus Stop Location**

### Washington Street and Patrick Street/Cliffview Avenue

The lane configuration for this two-way stop-controlled intersection is illustrated in **Figure 3**. A large black fence blocks the view from northbound vehicles on Patrick Street to eastbound vehicles traveling through the intersection, shown in **Photo 9**. Drivers have to pull into the intersection to see vehicles traveling eastbound, shown in **Photo 10**. The Patrick Street approach is located on a hill, causing the crossing location across Patrick Street to be on a slope. Crosswalks are not provided at the intersection. Overhead intersection lighting is provided at the intersection.

Cliffview Avenue is located to the west of Patrick Street, intersecting Washington Street on a steep grade and at a skew. As a result of the grade and the skew, sight distance is obstructed for vehicles traveling on Cliffview Avenue towards Washington Street. Drivers have to look over their shoulder to see vehicles approaching from the west. Additionally, drivers were observed using both lanes (even the oncoming northbound lane) to turn right from southbound Cliffview Avenue and sometimes encroached on the eastbound lane on Washington Street to complete the turn.



**Figure 3: Patrick Street Lane Configuration**



**Photo 9: Sight Distance Issue at Patrick Street**



**Photo 10: Vehicle Waiting to Turn out of Patrick Street**

## 4.0 Data Collection

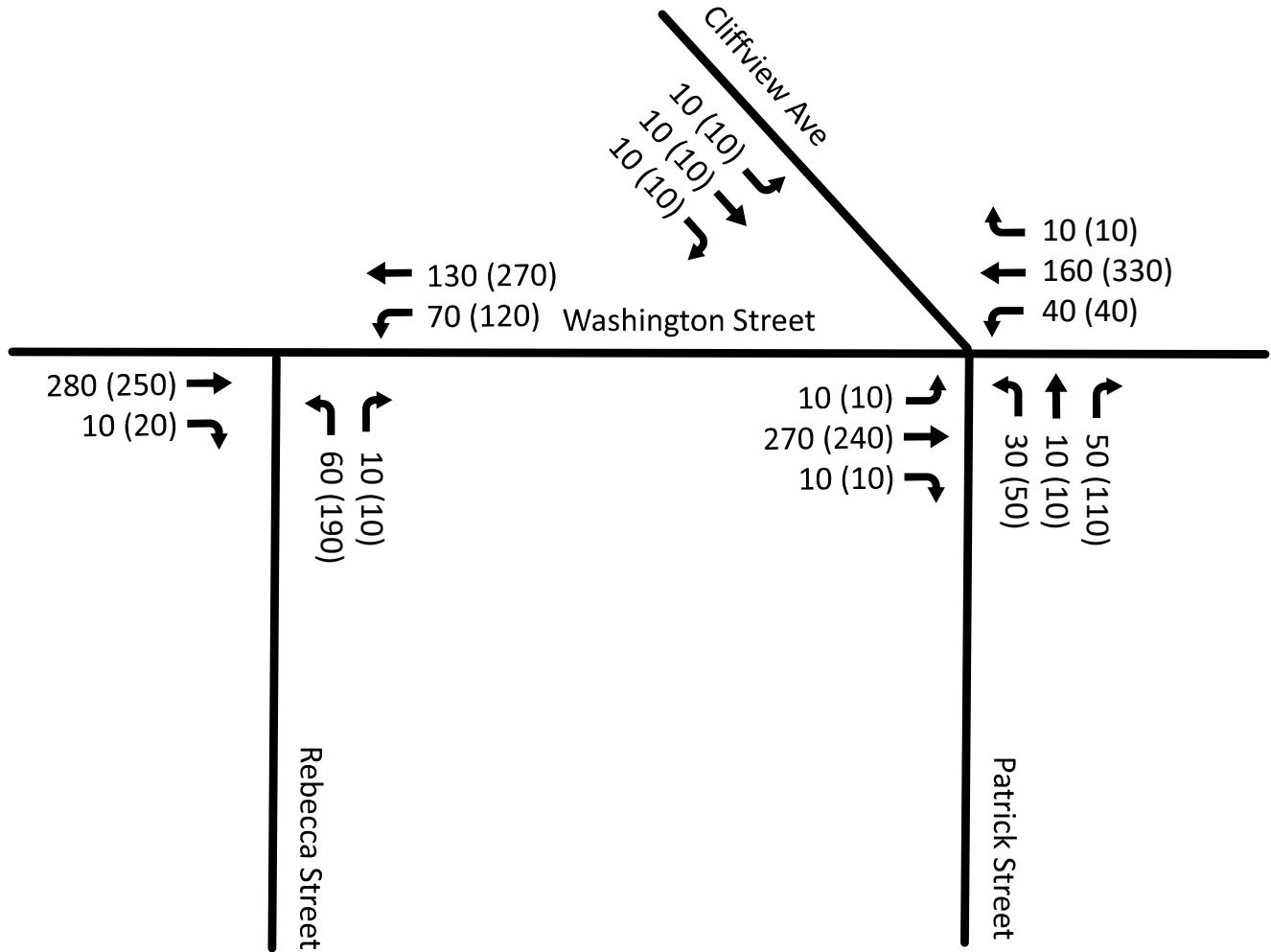
Turning movement and pedestrian counts were collected for 12 hours between 6:00 AM and 6:00 PM on Tuesday, April 5<sup>th</sup>, 2022, by Burgess and Niple for the following intersections:

- Washington Street and Rebecca Street
- Washington Street and Patrick Street/Cliffview Avenue

The corridor peak hours were determined to be 7:15 AM to 8:15 AM and 4:15 PM to 5:15 PM. The rounded peak hour counts are shown in **Figure 4**. The 12-hour pedestrian counts between 6:00 AM and 6:00 PM are summarized in **Figure 5**. Raw traffic counts are provided in **Appendix A**.



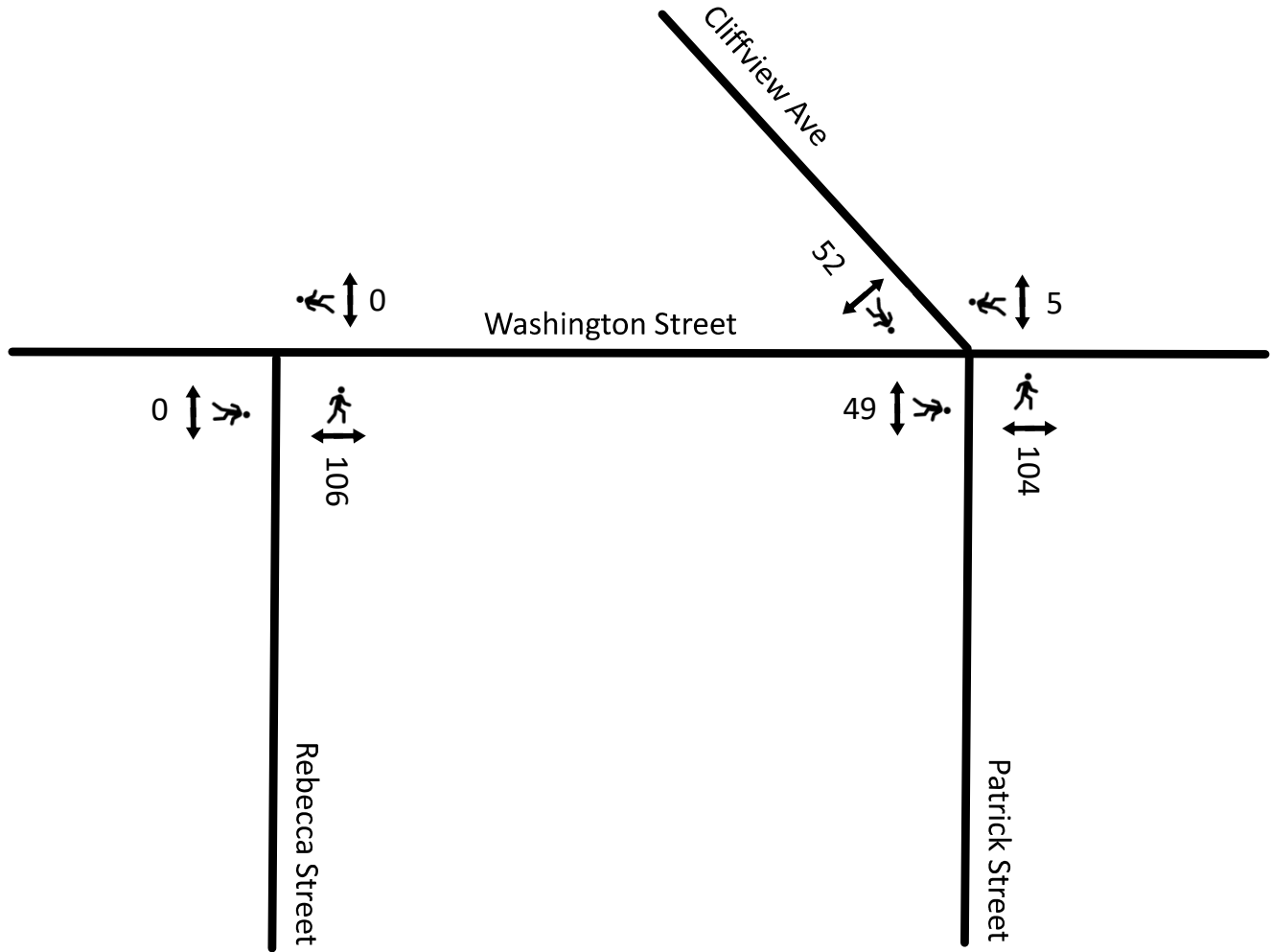
# Adjusted Peak Hour Counts



XX – 2022 AM Peak Hour Volume – 7:15 AM – 8:15 AM  
(XX) – 2022 PM Peak Hour Volume – 4:15 PM – 5:15 PM



# 12-Hour Pedestrian Counts



XX : 2022 12-Hour Pedestrian – 6:00 AM – 6:00 PM

## 5.0 Existing Capacity Analysis

Intersection capacity was evaluated at the intersections of Washington Street at Rebecca Street and Washington Street at Patrick Street/Cliffview Avenue using the existing peak hour traffic volumes, existing lane configurations, and existing traffic control using *Synchro*, version 11. *SimTraffic* was used to obtain 95<sup>th</sup> percentile queue lengths. *SimTraffic* is the microsimulation package included with *Synchro*. The results of five microsimulation runs were averaged together to obtain the results provided herein. Analysis results are from the Highway Capacity Manual (HCM) 6<sup>th</sup> Edition Module within *Synchro*. The existing signal timings were provided for the Rebecca Street signal and were utilized in the analysis. The 2022 existing condition analysis is summarized in **Tables 1** and **Table 2** with analysis output provided in **Appendix B**.

**Table 1: Existing Conditions (2022) Operational Analysis at Washington Street and Rebecca Street**

|                          | Overall Intersection | Eastbound Washington St |      | Westbound Washington St |      | Northbound Rebecca St |    |
|--------------------------|----------------------|-------------------------|------|-------------------------|------|-----------------------|----|
|                          |                      | TH                      | RT   | LT                      | TH   | LT                    | RT |
| <b>AM Peak Hour</b>      |                      |                         |      |                         |      |                       |    |
| LOS                      | A                    | A                       | A    | A                       | A    | D                     |    |
| Delay                    | 9.9                  | 8.0                     | 6.4  | 4.1                     | 3.2  | 37.8                  |    |
| v/c                      |                      | 0.25                    | 0.01 | 0.09                    | 0.11 | 0.31                  |    |
| 95 <sup>th</sup> % Queue |                      | 115'                    | 11'  | 56'                     | 61'  | 89'                   |    |
|                          |                      | A - 8.0                 |      | A - 3.5                 |      | D - 37.8              |    |
| <b>PM Peak Hour</b>      |                      |                         |      |                         |      |                       |    |
| LOS                      | B                    | A                       | A    | A                       | A    | D                     |    |
| Delay                    | 15.5                 | 9.3                     | 7.6  | 4.9                     | 4.2  | 45.1                  |    |
| v/c                      |                      | 0.24                    | 0.02 | 0.16                    | 0.2  | 0.77                  |    |
| 95 <sup>th</sup> % Queue |                      | 140'                    | 24'  | 72'                     | 112' | 188'                  |    |
|                          |                      | A - 9.1                 |      | A - 4.4                 |      | D - 45.1              |    |

Under existing conditions, the Washington Street and Rebecca Street intersection approaches and movements operate at level of service (LOS) D or better during both peak hours. The northbound left-turn movement operates at LOS D during both the AM and PM peak hours as more green time was given to the mainline movements on Washington Street. All other movements at the intersection operate at LOS A during both peak periods.

**Table 2: Existing Conditions (2022) Operational Analysis at Washington Street and Patrick Street/Cliffview Avenue**

|                             | Eastbound<br>Washington St<br>LT/TH/RT | Westbound<br>Washington St<br>LT/TH/RT | Northbound<br>Patrick St<br>LT/TH/RT | Southbound<br>Cliffview Ave<br>LT/TH/RT |
|-----------------------------|--|--|--------------------------------------|---|
| <b>AM Peak Hour</b>         |  |  |                                      |   |
| LOS                         | A*                                     | A*                                     | B                                    | B                                       |
| Delay                       | 7.7                                    | 8.0                                    | 13.0                                 | 13.4                                    |
| v/c                         | 0.01                                   | 0.03                                   | 0.17                                 | 0.07                                    |
| 95 <sup>th</sup> %<br>Queue | 20'                                    | 53'                                    | 75'                                  | 53'                                     |
|                             |  |  | B - 13.0                             | B - 13.4                                |
| <b>PM Peak Hour</b>         |  |  |                                      |   |
| LOS                         | A*                                     | A*                                     | C                                    | C                                       |
| Delay                       | 8.1                                    | 7.9                                    | 15.9                                 | 16.2                                    |
| v/c                         | 0.01                                   | 0.03                                   | 0.36                                 | 0.09                                    |
| 95 <sup>th</sup> %<br>Queue | 5'                                     | 54'                                    | 110'                                 | 53'                                     |
|                             |  |  | C - 15.9                             | C - 16.2                                |

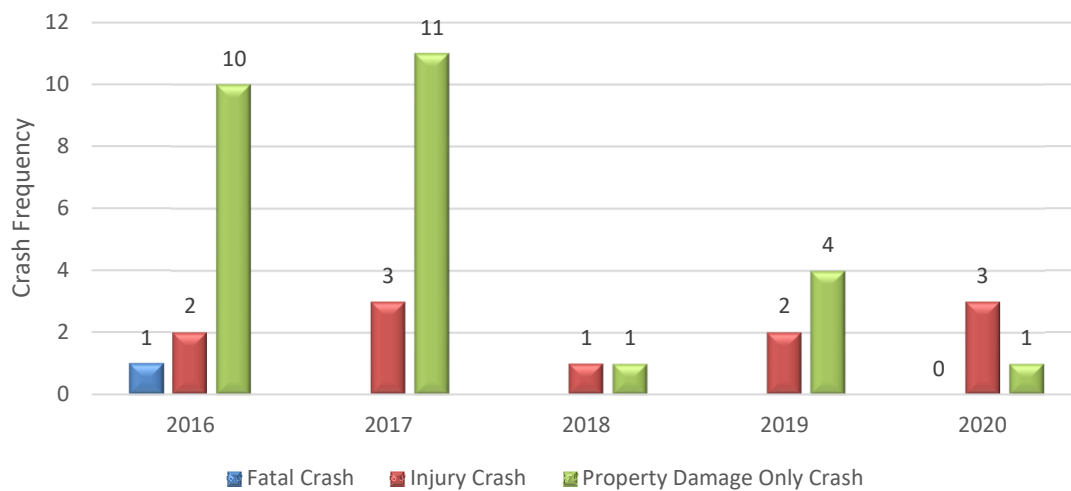
\* Based on LOS for left turn movement

The minor street movements operate at LOS C or better during both peak periods with minimal queuing on the side street approaches. It is important to note that this analysis does not account for the sight distance issues, which may result in longer delays than what are being reported from this analysis on both the Patrick Street and Cliffview Avenue approaches.

## 6.0 Existing Safety Analysis

### Crash Trends and Analysis

Crash data from January 1, 2016 through December 31, 2020 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 C**. In the five-year study period, there were 39 crashes with 12 (31 percent) resulting in injury and one fatality. The fatality occurred on July 2<sup>nd</sup>, 2016, at 12:37 PM, when a two-year old child was running across Washington Street from a building on the north side of the roadway and was struck by a westbound vehicle near Dooley Lane. **Figure 6** shows the frequency of crashes by severity per year. Property damage collisions have decreased since 2016, while injury collisions have stayed relatively constant.



**Figure 6: Frequency of Crashes by Year and Severity**

**Figure 7** shows the crash frequency in the study area by the crash type. Rear end collisions were the most prominent crash type accounting for 15 crashes with three (20 percent) resulting in injury. Angle collisions were the second most frequent crash type with 10 crashes and three (30 percent) resulting in injury.

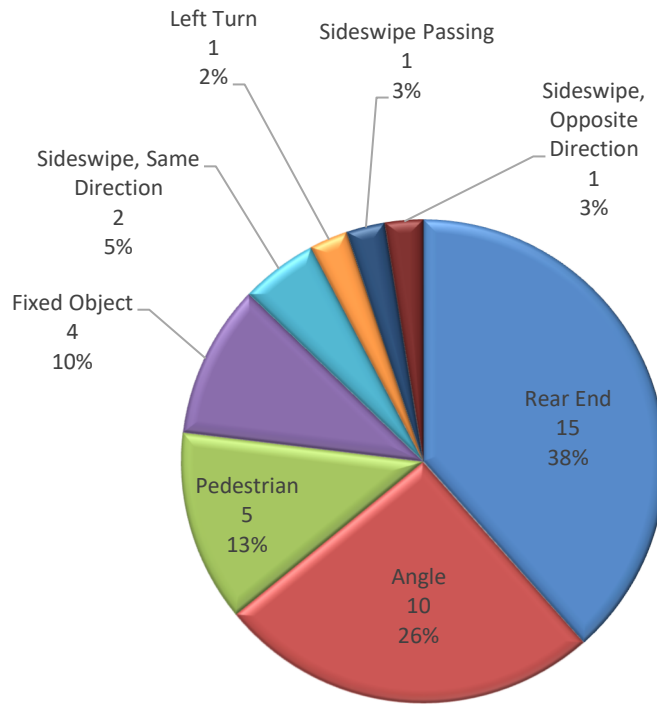


Figure 7: Frequency of Crashes by Year and Severity

### Washington Street and Rebecca Street

The highest crash type at these intersections was rear end collisions, occurring on all approaches of the intersection. These rear end crashes were likely due to driver inattention/distraction and drivers following too closely at the intersection.

Pedestrian collisions were common at the intersection, with three occurring in the crosswalk on Rebecca Street. All three collisions resulted in injury. Two of the pedestrian collisions resulted from westbound left-turning vehicles failing to yield to pedestrians in the crosswalk as they turned.

### Washington Street and Patrick Street

The main crash pattern at this intersection was angle collisions. Three of the seven angle collisions involved vehicles on Patrick Street failing to yield to eastbound vehicles, likely due to the sight distance issues at the intersection. Rear end collisions also occurred on the northbound approach to the intersection, likely due to the starting and stopping of drivers on Patrick Street waiting for an adequate gap in traffic on Washington Street.

## 7.0 Countermeasures for Consideration

The following countermeasures were identified to mitigate crashes and improve safety within the study area.

- **Restripe high visibility crosswalk at Rebecca Street.** The high visibility crosswalk was faded at Rebecca Street. Restriping the high visibility crosswalk on the northbound approach of Rebecca Street is recommended to improve pedestrian safety and alert drivers to the presence of pedestrians.
- **Add “yield to pedestrian” signage at Rebecca Street.** Adding “yield to pedestrian” signage at Rebecca Street is recommended for the westbound left-turn movement and the eastbound right-turn movement due to the three pedestrian crashes that occurred in the crosswalk on the northern approach of Rebecca Street. Future structural analysis will need to be performed on the mast arm to determine if it can handle the additional loading.
- **Add additional speed limit signage:** Speed limit signage is currently not present around the study area. The nearest eastbound speed limit signage is present 0.3 miles east of Rebecca Street and westbound signage is present 1.3 miles east of Rebecca Street. Additional speed limit signage could help encourage drivers to slow down through the study area. The speed at which drivers are traveling can greatly influence the injury severity a pedestrian experiences when struck by a vehicle. The recommended locations for the new speed limit signs would be eastbound just past the signalized intersection of Washington Street with Sissonville Drive/Iowa Street and westbound east of the study area.
- **Coordinate with WVDOT to enhance lighting along Washington Street.** B&N drove the corridor at night and observed that the lighting on the sidewalk on the south side of Washington Street was very poor. Enhancing the lighting in the corridor is recommended. Pedestrian level lighting could be added to improve pedestrian and bicycle safety in the area due to the high pedestrian volume. Two of the pedestrian collisions in the corridor occurred in dark lighting conditions.
- **Coordinate with Kanawha County Schools to relocate school bus stop.** While performing the site review, a westbound school bus dropped students off on the north side of Washington Street, just east of Rebecca Street where there is no sidewalk provided. Students were observed crossing Washington Street between the bus stop and Rebecca Street to reach the public housing community on the northwest corner of the Rebecca Street intersection. Relocating the school bus stop to a location with a sidewalk is recommended.
- **Construct midblock crossing with an RRFB just west of Cliffview Avenue.** A midblock crossing with an RRFB is recommended slightly west of Cliffview Avenue where the pedestrian stairs are located. An RRFB would be used in combination with pedestrian warning signs to alert drivers to the potential of pedestrians crossing Washington Street in the area. Pedestrians were observed traveling to the Dollar General and the KRT bus stop that is located across Washington Street from the stairs during the site visit. The layout is included in **Figure 8**.
  - The pedestrian stairs would need to be repaired/stabilized to allow people to travel more easily down the hill. Additionally, a section of sidewalk would need to be constructed on the northern side of Washington Street to facilitate the midblock crossing curb ramps.
  - **Improve ADA accessibility on the northwest corner of Washington Street and Cliffview Avenue.** The corner could be rebuilt to meet ADA requirements by widening the sidewalk along the northwest corner of the intersection. The improvement would include widening the sidewalk, adding an ADA accessible landing on the corner and adding a retaining wall and pedestrian railing. With these improvements, the

pedestrian stairs would need to be removed as there would not be enough room to maintain them between the two sidewalks. This improvement is shown in **Figure 9**.

- **Reconfigure Washington Street from Dooley Lane to Rebecca Street.** Consider narrowing the lanes on the north side of Washington Street west of Rebecca Street to add sidewalk and on-street parking. Currently there is minimal parking for the properties on the north side of Washington Street. This improvement would allow designated parking locations along Washington Street. Right-of-way would likely need to be purchased to accomplish this improvement. A layout of this improvement is shown in **Figure 10**.
  - **Add a midblock crossing with RRFB north of Dooley Lane by the bus stop shelter.** With the addition of the sidewalk on the northern side of the roadway, a midblock crossing could be added to this location. Pedestrians were observed crossing at this location to walk to the public housing community on the southern side of Washington Street. This location was also where the pedestrian fatality occurred.
  - Sidewalk could be constructed along the entire northern side of Washington Street between Dooley Lane and Patrick Street, but substantial right-of-way would need to be taken as the parcel boundaries extend to the existing edge of pavement of Washington Street.

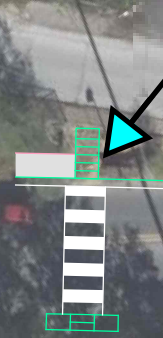
RIC Improvements  
Midblock Crossing at Cliffview Avenue

**BURGESS & NIPLE**  
Engineers ■ Architects ■ Planners



0 20  
10 40  
SCALE IN FEET

REPAIRED PEDESTRIAN STAIRS



REBECCA ST

DOLLAR GENERAL

PATRICK ST

WASHINGTON ST

FIGURE 8

RIC Improvements  
Northwest Corner of Cliffview Avenue  
Improvements

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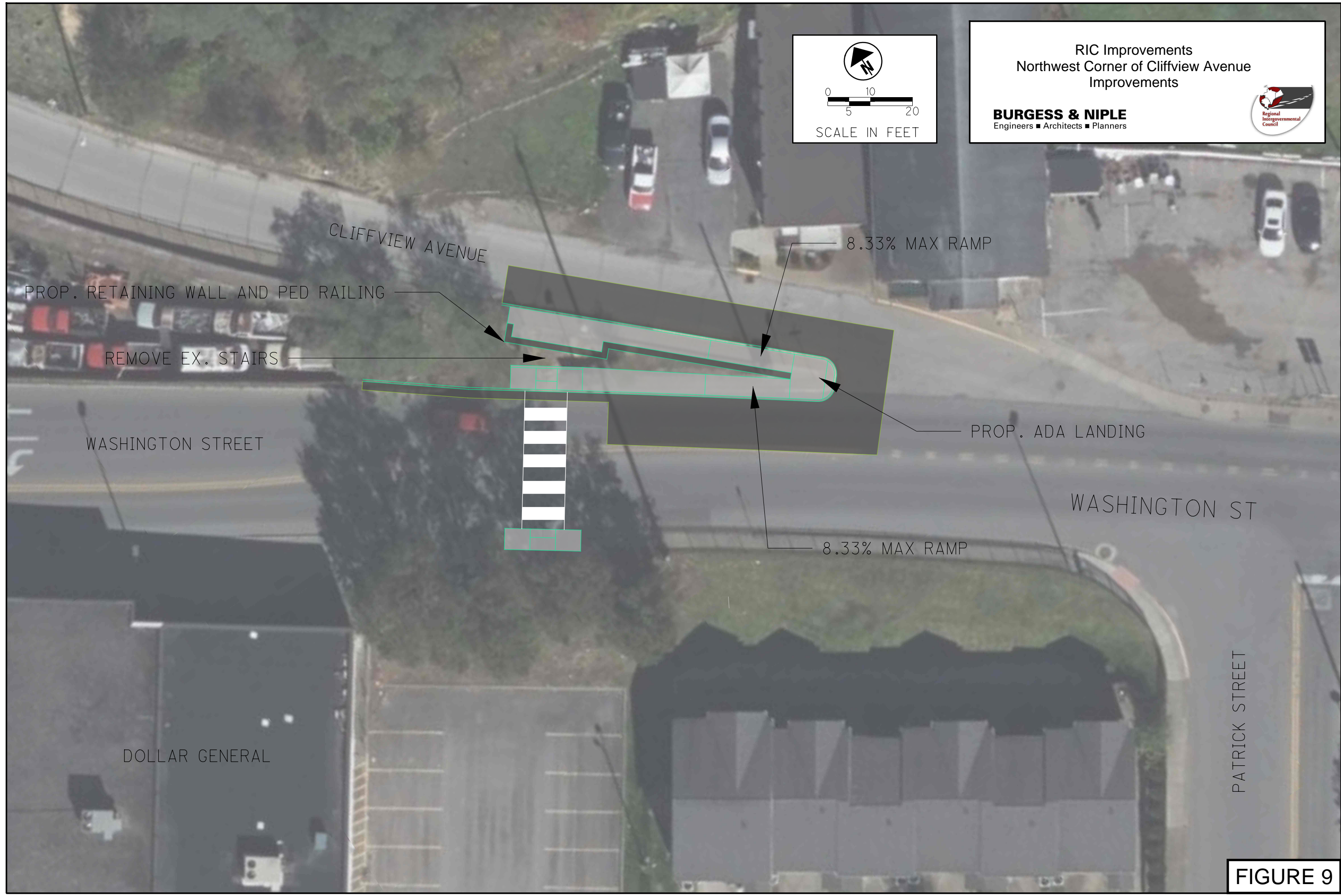
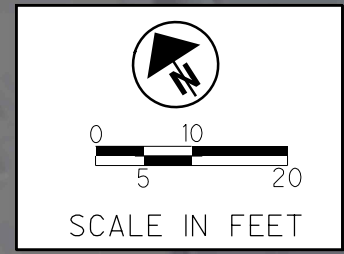
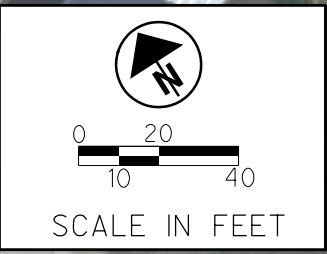


FIGURE 9



**FIGURE 10**

## Washington Street and Patrick Street

- **Consider prohibiting left turns from Patrick Street.** Due to the amount of angle collisions and lack of sight distance caused by the fence on the southwest corner, left turns could be prohibited from Patrick Street. Left-turning traffic will be diverted to northbound Rebecca Street. A channelizing concrete island is recommended to reinforce the left-turn prohibition at Patrick Street. Operational analysis is provided in **Section 8.2** of the report. A layout of this improvement is shown in **Figure 11**.



Figure 11: Prohibit Left-Turns at Patrick Street

- **Repair the sidewalk near the Dollar General.** The sidewalk on the south side of Washington Street is missing a large piece, just east of the Dollar General. Repairing the sidewalk will improve accessibility for disabled pedestrians in the area. Furthermore, trucks use the sidewalk, which is flush with the roadway, to unload. Modifications are recommended to provide curbing and direct trucks for unloading.
- **Widen the sidewalk on the southern side of Washington Street between the Dollar General and Patrick Street.** This modification would provide a more level crossing for pedestrians at Patrick Street. The sight distance would also be improved by moving eastbound traffic further from the fence that is creating the obstruction. Additionally, vehicles on Patrick Street could pull into the intersection to see around the fence but be buffered by the wider sidewalk. The layout of this improvement is shown in **Figure 12**. This improvement could be combined with the midblock crossing to the west of Cliffview Avenue or could be completed as a separate project.

RIC Improvements  
Widen Sidewalk at Patrick Street

**BURGESS & NIPLE**  
Engineers ■ Architects ■ Planners

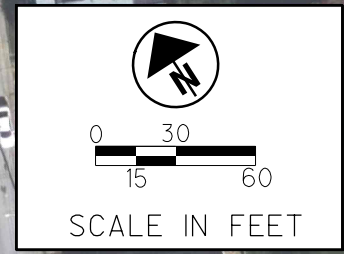


FIGURE 12

## 8.0 Countermeasure Evaluation

### 8.1 Signal Warrant Analysis

A signal warrant analysis was performed for the unsignalized intersection of Washington Street and Patrick Street to determine if the intersection warranted a signal. The signal warrant was performed with the existing lane configurations of the roadway. Based on the signal warrant analysis, the intersection of Washington Street and Patrick Street currently does not meet the criteria to warrant a signal. When a signal is not warranted and vehicles have excessive delay, it may encourage drivers to disregard the signal. Additionally, vehicles may cut through side streets to avoid the unwarranted signal. The detailed signal warrants are provided in **Appendix D**.

### 8.2 Operational Evaluation

#### Prohibit Left-Turns at Patrick Street

Operational analysis was conducted for the countermeasures discussed in **Section 7.0** of this report. The analysis was conducted with *Synchro*, version 7 utilizing the Highway Capacity Manual, 6<sup>th</sup> Edition module. The analysis utilized the 2022 existing traffic volumes for the AM and PM peak hours. The goal of this analysis is to confirm that the safety recommendations at the intersections can operate at acceptable levels of service.

The operational analysis was completed for the left-turn restriction at Patrick Street for the intersections of Washington Street at Rebecca Street and Washington Street at Patrick Street. At Patrick Street, the northbound left-turn movement would be prohibited and would now utilize the signal at Rebecca Street. The signal timings at Washington Street and Rebecca Street were optimized using the Synchro optimization tool. The operational analysis results are shown in **Table 3** and **Table 4**. Detailed results can be found in **Appendix E**.

**Table 3: Operational Analysis Results (2022) –Washington Street and Rebecca Street with Northbound Left-Turns from Patrick Street**

|                          | Overall Intersection | Eastbound Washington St |      | Westbound Washington St |      | Northbound Rebecca St |    |
|--------------------------|----------------------|-------------------------|------|-------------------------|------|-----------------------|----|
|                          |                      | TH                      | RT   | LT                      | TH   | LT                    | RT |
| <b>AM Peak Hour</b>      |                      |                         |      |                         |      |                       |    |
| LOS                      | B                    | B                       | A    | A                       | A    | C                     |    |
| Delay                    | 11.6                 | 12.3                    | 9.4  | 6.5                     | 4.8  | 20.3                  |    |
| v/c                      |                      | 0.36                    | 0.01 | 0.11                    | 0.11 | 0.31                  |    |
| 95 <sup>th</sup> % Queue |                      | 136'                    | 14'  | 60'                     | 63'  | 90'                   |    |
|                          |                      | B – 12.2                |      | A – 5.4                 |      | C – 20.3              |    |
| <b>PM Peak Hour</b>      |                      |                         |      |                         |      |                       |    |
| LOS                      | B                    | B                       | B    | A                       | A    | C                     |    |
| Delay                    | 14.0                 | 14.8                    | 11.6 | 7.8                     | 6.3  | 22.6                  |    |
| v/c                      |                      | 0.38                    | 0.04 | 0.20                    | 0.20 | 0.63                  |    |
| 95 <sup>th</sup> % Queue |                      | 150'                    | 31'  | 76'                     | 103' | 165'                  |    |
|                          |                      | B – 14.6                |      | A – 6.8                 |      | C – 22.6              |    |

The analysis shown above indicates that all movements and approaches at the intersection will operate at level of service (LOS) C or better with the left-turns at Patrick Street moved to Rebecca Street. The operations for the northbound left-turn at the intersection of Washington Street and Rebecca Street improved over existing conditions due to the optimization of the signal timings. The additional left-turns from Patrick Street do not hinder the operations at the signal.

**Table 4: Operational Analysis Results (2022) –Washington Street and Patrick Street/Cliffview Avenue without Northbound Left-Turns at Patrick Street**

|                             | Eastbound<br>Washington<br>St<br>LT/TH/RT | Westbound<br>Washington St<br>LT/TH/RT | Northbound<br>Patrick St<br>RT | Southbound<br>Cliffview Ave<br>LT/TH/RT |
|-----------------------------|---|--|--------------------------------|---|
| <b>AM Peak Hour</b>         |   |  |                                |   |
| LOS                         | A*  | A*                                     | B                              | B                                       |
| Delay                       | 7.7                                       | 8.0                                    | 10.1                           | 13.6                                    |
| v/c                         | 0.01                                      | 0.03                                   | 0.07                           | 0.07                                    |
| 95 <sup>th</sup> %<br>Queue | 19'                                       | 57'                                    | 48'                            | 51'                                     |
|                             |   |  | B – 10.1                       | B – 13.6                                |
| <b>PM Peak Hour</b>         |   |  |                                |   |
| LOS                         | A*  | A*                                     | B                              | C                                       |
| Delay                       | 8.1                                       | 7.9                                    | 10.5                           | 16.4                                    |
| v/c                         | 0.01                                      | 0.03                                   | 0.15                           | 0.09                                    |
| 95 <sup>th</sup> %<br>Queue | 19'                                       | 60'                                    | 61'                            | 53'                                     |
|                             |   |  | B – 10.5                       | C – 16.4                                |

\* Based on LOS for left turn movement

At the intersection of Washington Street and Patrick Street, prohibiting the northbound left-turn movement slightly improves the northbound approach and does not impact the other approaches.

### 8.3 Cost Estimate

The cost estimates for the proposed improvements are summarized in **Table 5**. A detailed breakdown of the construction cost estimates is provided in **Appendix F**. Cost estimates include a 30 percent contingency and 20 percent design cost. The medium-term improvements were inflated for a 2025 construction year and the long-term improvements were inflated for a 2027 construction year. The cost estimates do not include right-of-way costs or utility relocation which may be required as a result of the improvements.

**Table 5: Cost Estimate Summary**

| Short-Term Improvements  |                         |
|--|-------------------------|
|  | Cost Estimate (FY 2022) |
| Yield to Pedestrian Signage  | \$1,000                 |
| Additional Speed Limit Signage   | \$1,000                 |
| High Visibility Crosswalk  | \$2,000                 |
| Medium-Term Improvements   |                         |
|  | Cost Estimate (FY 2025) |
| Prohibit Left-Turns at Patrick Street (including concrete median)                              | \$18,200                |
| Widen Sidewalk near Patrick Street   | \$213,000               |
| Midblock Crossing at Cliffview Avenue with RRFB  | \$215,000               |
| Long-Term Improvements   |                         |
|  | Cost Estimate (FY 2027) |
| Reconfiguration of Washington Street, Midblock Crossings and RRFBs                             | \$474,000               |
| Modify northwest corner of Washington Street and Cliffview Avenue to Improve ADA Accessibility | \$501,000               |

## 9.0 Conclusions and Recommendations

Based on the crash patterns in the study corridor, the following countermeasures are recommended:

### Short-Term

- Add “yield to pedestrian” signage at Rebecca Street (\$1,000 – 2022 Dollars).
- Add additional speed limit signage in the study area (\$1,000 – 2022 Dollars).
- Restripe high visibility crosswalk at Rebecca Street (\$2,000 – 2022 Dollars).
- Coordinate with Kanawha County Schools to relocate school bus stop.

### Medium-Term

- Widen the sidewalk on the south side of Washington Street between the Dollar General and Patrick Street (\$213,000 – 2025 Dollars). While this improvement is being funded and designed, the northbound left-turns at Patrick Street could be prohibited using flex posts or other temporary devices. Once the sidewalk is widened and sight distance improved, left-turns can be allowed at Patrick Street.

- Construct midblock crossing west of Cliffview Avenue with an RRFB and repair pedestrian stairs (\$215,000 – 2025 Dollars). Improving the stairs is a temporary solution until the ADA accessibility improvements can be funded and designed.

**Long-Term**

- Coordinate with WVDOT to enhance lighting along Washington Street.
- Add sidewalk, on-street parking and a midblock crossing with an RRFB on Washington Street from Dooley Lane to Rebecca Street (\$474,000 – 2027 Dollars).
- Improve ADA accessibility at Washington Street and Cliffview Avenue (\$501,000 – 2027 Dollars).