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Kanawha - Putnam Metropolitan Planning Organization
Region 3 Planning and Development Council

Downtown Charleston Traffic Safety Study

Charleston, WV

Mead & Hunt

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1. Executive Summary

The following assessment builds upon multiple priority studies completed by Regional Intergovernmental Council (RIC) MPO and West Virginia Division of Highways (WVDOH) to determine overlap and opportunities to combine priority sections within WVDOH committed and proposed studies.

An intial high level screening was performed of nearly 100 sites in Kanawha and Putnam Counties that were identified through RIC's Comprehensive Safety Action Plan (CSAP) (2023), RIC's Kanawha-Putnam Bicycle & Pedestrian Plan (2020), the WVDOH Vulnerable Road User Study (2022), the WV Strategic Highway Safety Plan, and past RIC traffic studies. A list of potential projects sites and identified funding opportunities with best use recommendations was generated. Recommendations for 22 sites were provided to RIC for potential grants, HSIP funding eligibility or additions into existing WVDOH projects. Two sites, which fall outside **existing WVDOH project limits**, were jointly identified by RIC MPO and Mead & Hunt staff for a more detailed study. This study explores one of those sites in downtown Charleston, WV.

This study consists of an assessment to evaluate and address traffic, mobility, and safety on US 60 and surrounding city streets around the Charleston Clay Center, and the CAMC General Hospital, particularly during the peak hours. The goal of this effort will be to complete an assessment of transportation issues around these locations and identify specific locations to improve safety and accessibility for passenger cars, public transit buses, school buses, pedestrians, and bicycles during the traditional commuter peak hours.

The WVDOH, in developing their 2024 HSIP Implementation Plan, performed a data review and compared it to their expenditures. Areas within the program were identified that could indicate a gap or deficiency and opportunity for improvement the State would take to make significant progress toward meeting its safety performance targets. Two significant actions were recommended: one, that WVDOH will work with RIC to develop more projects in Kanawha County, and two, that WVDOH will implement the recommendations from the Vulnerable Road User plan. In addition, WVDOH's SHSP identified two new emphasis areas that were trending upward: Pedestrians and Intersections. Charleston was among the five cities identified as having the most fatalities and serious injuries in the State that are Intersection or Pedestrian related. West Virginia cannot achieve its goal without investment in Charleston.

The following recommendations will assist in making significant progress towards West Virginia's goal of zero fatalities.

Pedestrians

- Reapply the longitudinal bar crosswalks as needed at intersections
- Widen the longitudinal bar crosswalks from 6' up to the width of the sidewalk at the following intersections: Lewis Street with Morris Street; Washington Street with Morris Street; Washington Street with Leon Sullivan Way; and Lee Street with Leon Sullivan Way
- Upgrade the pedestrian crossing at the intersection of Washington Street and Sentz Street with a high visibility crosswalk, RRFB, pedestrian lighting and advanced warning signs.
- Upgrade the pedestrian crossing at Morris Street and GoMart Ballpark with a high visibility crosswalk, RRFB, pedestrian lighting and advanced warning signs.
- Install crosswalks at intersection of Smith Street and Morris Street, Brooks Street and Lewis Street (excluding I-64 ramps) and Smith Street and Brooks Street
- Relocate crosswalk on Morris Street at Smith Street intersection closer to stop sign for better visibility and to shorten crossing distance.
- Install and upgrade lighting at all intersections and midblock crosswalks to LED
- Improve drainage in area – This countermeasure is complex, and it should be included in a separate drainage review of all streets in Downtown Charleston.
- Work with HSMTF to host a pedestrian safety awareness campaign.
- Increase Police Presence
- Work with WVDOH and KRT to review the possibility of far-side shelters and signs for Transit Stop at the northwest corner of Washington Street E at both its intersection with Morris Street and intersection with Leon Sullivan Way.
- Install Turning Vehicles Stop for Pedestrian (R10-15) sign on the signal mast arms for all approaches.
- Work with WVDOH to explore option of Installing No Right Turn on Red (R10-11B) at the following intersections:
    - Washington Street E & Brooks Street
    - Washington Street E & Morris Street
    - Lewis Street & Morris Street

Traffic Signal Operations:

- Install backplates with reflective trim on all signal heads
- Upgrade accessible pedestrian signal pushbuttons with appropriate signs and audio tones that are compliant with the MUTCD
    - At intersections with exclusive pedestrian phases (sometimes referred to as pedestrian scramble phases), consider a speech WALK message such as "Walk sign is on for all crossings"
- Signal Phasing Improvements:
    - Rephase some or all signals to eliminate the exclusive pedestrian (scramble) phase and allow the pedestrian movements to run concurrently with the associated vehicles phases. Place all pedestrian phases on recall.
        i. This will reduce delay for both pedestrians and vehicles and not require pedestrians to press the pushbutton unless they would like to request audio assistance.
        ii. If exclusive pedestrian phases are kept, consider increasing the pedestrian clearance interval to accommodate diagonal crossings across the entire intersection without creating significant delays for vehicle traffic.
    - Consider implementing a 3-5 second LPI for all pedestrian phases
- Signal Timing Improvements:
    - Implement yellow change and all-red clearance timings to meet minimum requirements in accordance with the MUTCD
    - Implement WALK and pedestrian clearance intervals that are sufficient to accommodate both typical pedestrians (using the default walking speed of 3.5 ft/s) and persons with disabilities (using a reduced walking speed of 3.0 ft/s), given the proximity of the intersections to the CAMC General Hospital and Clay Center where such users are frequently present.
    - For the intersection at Washington and Morris Streets, implement a 3-5 second leading pedestrian interval (LPI) for Washington Street phases 2 and 6 only. (Due to the protected/permissive left-turn phasing on Morris Street, LPIs are not recommended for Morris Street phases 4 & 8, as they could result in conflicts between left-turning vehicles and pedestrians entering the crosswalk during the permissive phase.)
    - Review signal plans and live controller databases to fix coordination faults
    - Develop and implement optimized signal timings to enhance signal

coordination, thereby minimizing stop-and-go conditions and mitigating the potential for aggressive driving behaviors.

2. Background, Purpose, and Safety Location Identification

2.1 Background:

The following assessment builds upon multiple priority studies completed by RIC MPO and WVDOH to determine overlap and opportunities to combine priority sections within WVDOH committed and proposed studies.

An intial high level screening was performed of nearly 100 sites in Kanawha and Putnam Counties that were identified through RIC's Comprehensive Safety Action Plan (CSAP) (2023), RIC's Kanawha-Putnam Bicycle & Pedestrian Plan (2020), the WVDOH Vulnerable Road User Study (2022), the WV Strategic Highway Safety Plan, and past RIC traffic studies. A list of potential projects sites and identified funding opportunities with best use recommendations was generated. Recommendations for 22 sites were provided to RIC for potential grants, HSIP funding eligibility or additions into existing WVDOH projects. Two sites, which fall outside **existing WVDOH project limits**, were jointly identified by RIC MPO and Mead & Hunt staff for a more detailed study. This study explores one of those sites in Downtown Charleston, WV.

2.2 Purpose:

This study seeks to evaluate and address traffic mobility, and safety around Charleston Clay Center and CAMC General Hospital. The goal of this effort will be to complete an assessment of transportation issues around these facilities and identify specific locations to improve safety and accessibility for passenger vehicles, school and public transit buses, pedestrians, and bicycles during traditional commuter peak hours and during any special events at the Clay Center and Ball Park. The following recommendations enable the RIC and other stakeholders to continue to develop engineering, education, and enforcement efforts on a community wide level.

Based on the completed analysis, recommendations will be made to WVDOH for addition to their known Vulnerable Road User Projects in downtown Charleston.

2.3 Safety Location Identification:

Locations in downtown Charleston were identified from the results of multiple safety analyses sponsored by either the WVDOH or RIC:

- WVDOH Vulnerable Road User Assessment
  - High Injury Network (HIN) analysis
  - Systemic Analysis
- RIC Comprehensive Safety Action Plan (CSAP)

The WVDOH used the AASHTOWare Safety system to perform a High Injury Network (HIN) analysis which identified segments of roadway where the highest concentrations of crashes were occurring. WVDOH's HIN analysis was based on two factors: frequency of crashes and severity. To measure severity, the Equivalent Property Damage Only (EPDO) index was utilized. Three sites in downtown Charleston (shown in green in **Figure** 1) were identified within the HIN Top 20.

- Site #2: Washington Street E from Brooks Street to Ruffner Avenue.
- Site #9: Washington Street W from 8th Avenue to Washington Street W
- Site #12: Lee Street E from Clendenin Street to Court Street

WVDOH has programmed a two-phase project for the top 20 sites listed in the HIN ranking. These project scopes include preparation of a design report with recommendations and then preparation of contract plans for all approved recommendations generated from the design report. Highway Safety Improvement Program (HSIP) funds have been set aside to perform this work in 2025-2026.

In addition, the WVDOH performed a systemic analysis. While a HIN analysis focuses on where crashes have already occurred, a systemic analysis is a proactive approach to identify routes that, based on statistical analysis, exhibit characteristics leading to a higher risk for VRU involved crashes. WVDOH examined two key elements: network characteristics and VRU volumes along each route. By analyzing these aspects, routes with inherent risk factors were identified. Once identified, the goal is to mitigate potential VRU crashes before they occur. Three sites in Downtown Charleston (shown in blue in **Figure 1**) were identified in within the Systemic Top 25:

- Site #15 Court Street from Virginia Street to Donnally Street
- Site #16a: Kanawha Boulevard E from Brooks Street to Greenbrier Street
- Site #16b: Virginia Street E from Pennsylvania Avenue to Dunbar Street

WVDOH has programmed a study for the top 25 sites listed in the systemic ranking. These project scopes include preparation of a design report making recommendations for potential projects in future years. Highway Safety Improvement Program (HSIP) funds have been set aside to perform

the studies in 2025-2026.

The RIC CSAP was developed using the Safe Systems Approach criteria to support safety and to allow RIC to capitalize on funding opportunities. Using data and local knowledge, stakeholders identified topics and emphasis areas most pertinent to safety in Kanawha and Putnam Counties. Similar to the state SHSP, the top emphasis areas identified in the CSAP were Intersections, Pedestrians, Roadway Departure, as well as Speed and Aggressive Driving.

The following segments (shown in yellow in **Figure 1**) were identified as RIC's top priorities for pedestrian safety in downtown Charleston:

- Kanawha Boulevard E from Brooks Street to Morris Street
- Washington Street E from Sentz Street to Brooks Street
- Brooks Street from Washington Street E to Lewis Street
- Virginia Street E from Leon Sullivan Way to Brooks Street

The following intersection (shown in purple in **Figure 1**) was identified as RIC's top priority related to intersection safety in downtown Charleston:

- Lee Street E & Leon Sullivan Way

Figure 1 represents a map of priority areas identified for further review in WVDOH's VRU or RIC's CSAP. Priority areas in the CSAP that were not included in the VRU programmed projects were identified, and this study focuses on those segments located on Lee Street, Washington Street, Morris Street, Brooks Street and Leon Sullivan Way (**Figure 2**).

Within the study area, several prominent pedestrian generators exist such as the Clay Center, GoMart Ballpark, and CAMC General Hospital. While the hospital and its associated medical support facilities are the dominant land uses, the area remains a diverse urban zone with a mix of medical, residential, commercial, and entertainment properties. The transportation infrastructure is well-developed and features a continuous sidewalk network as well as ample parking opportunities that include on-street spaces, surface lots, and a parking garage.

Figure 1: *Downtown Charleston Sites Identified for Safety Review*

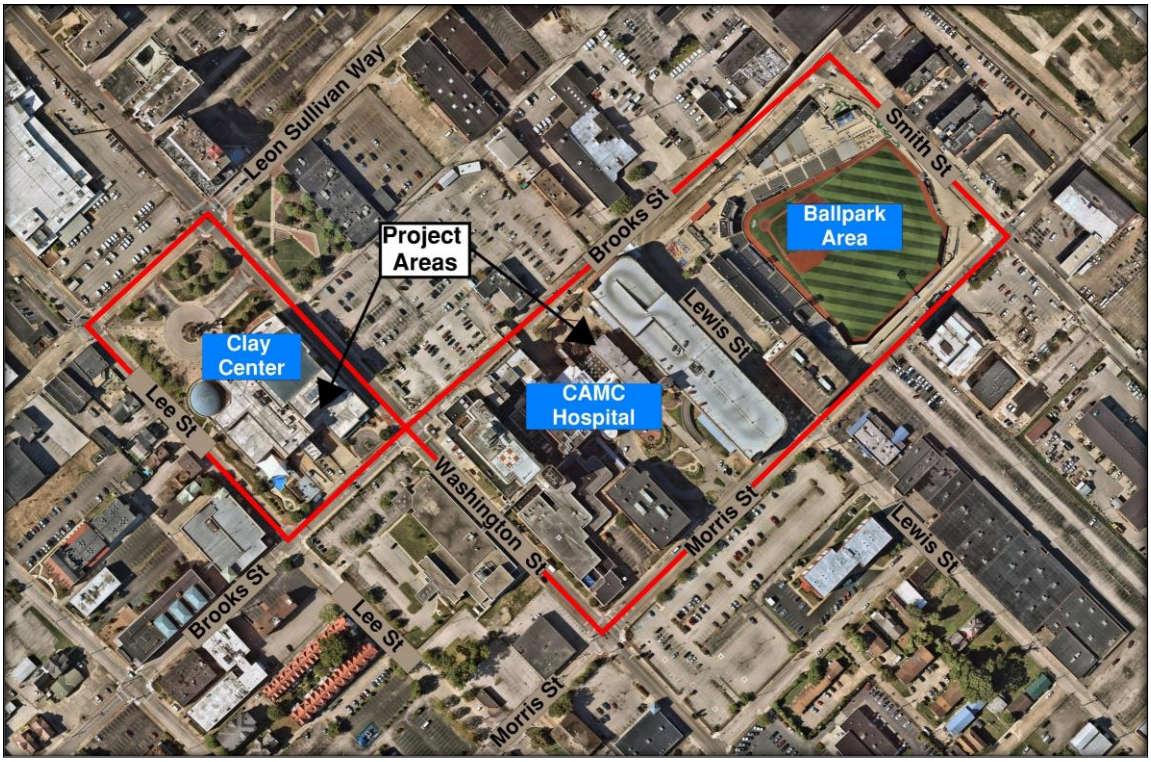

Figure 2: *Project Location (Charleston, WV)*

2.4 Kanawha Boulevard Exclusion from VRU Project Selection

A portion of Kanawha Boulevard was identified by both the WVDOH and RIC as a priority site for pedestrians. In 2024, the City of Charleston was successful in securing a $25 million award through the Federal Rebuilding American Infrastructure with Sustainability and Equity (RAISE) discretionary grant program to transform approximately 3.25 miles of Kanawha Boulevard from Magic Island to the 35th Street Bridge (**Figure 3**) into a complete street along the river waterfront that showcases safer pedestrian crossings, a widened shared-use path, and enhanced streetscapes and public spaces. Considering this grant project, the WVDOH elected not to include Kanawha Boulevard in its VRU project review.

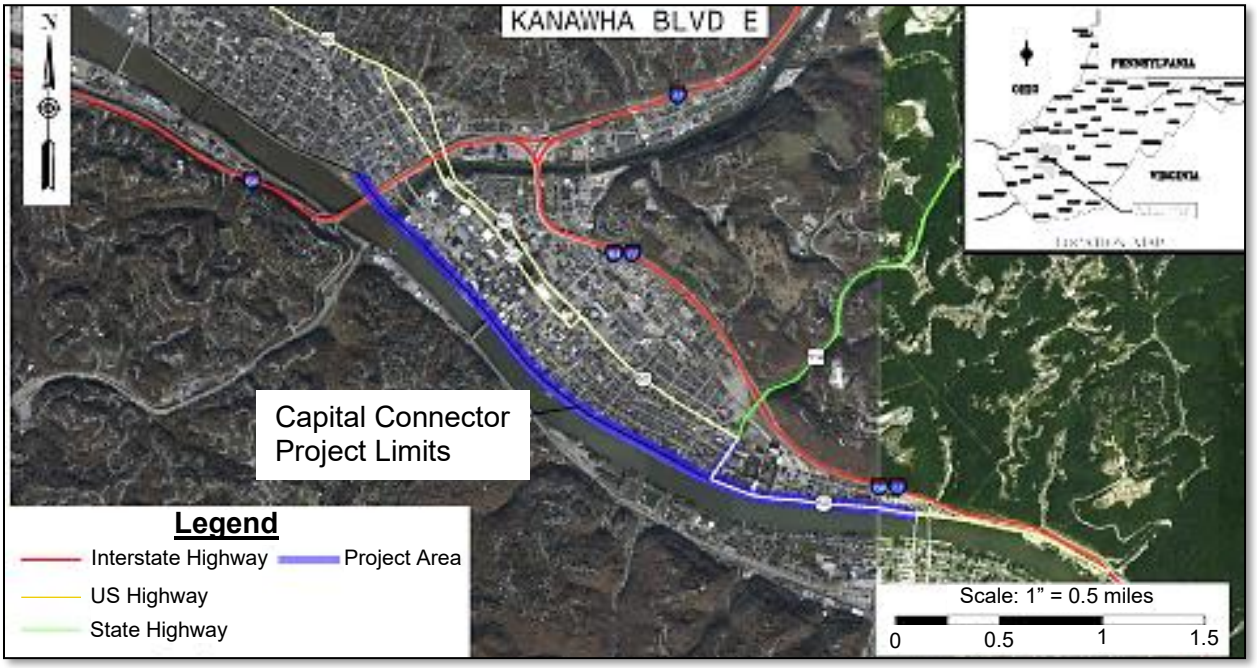

Figure 3: Capital Connector Project (Map provided by WVDOH)

3. Existing Conditions

The study area is within downtown Charleston encompassing the Clay Center, CAMC General Hospital, and GoMart Ballpark. The land use in this area is mainly commercial.

3.1 Roadway Characteristics & Traffic Volumes

Within the project area the existing roadways are a mix of bidirectional and one-way streets laid out in a grid pattern. **Table 1** summarizes the roadway features of each street within the study area (**Figure 2**). All streets have sidewalks on both sides that range from five (5) to 12 feet in width. Notable characteristics are listed below:

- Brooks Street diverges at Lewis Street to form the entrance ramp to I-64 which provides the east side of downtown Charleston with direct connection to the interstate.
    - I-64 Exit 100 off-ramps tie into Leon Sullivan Way.
- Morris Street serves as a north-south connector through Charleston from the river waterfront at Kanawha Boulevard to Piedmont Road which run parallel to I-64. This street provides access to the main entrance of CAMC General Hospital and the GoMart Ballpark
- Lewis Street allows access to the parking garage for CAMC General and the ballpark.

***Table** 1: Summary of Street Characteristics within Study Area*

Street Name	Federal Classification	Traffic Flow Direction	# of Travel Lanes	Speed Limit	On-Street Parking?	I-64 Direct Access?
Lee St (US 60)	Minor Arterial	One Way East	2-3	25	Yes, Both sides	No
Washington St (US 60)	Minor Arterial	Two Way East-West	1-2	25	Yes, Both sides	No
Leon Sullivan Way	Minor Arterial	One Way South	2-3	30	Yes, Both sides	Yes
Brooks St	Minor Arterial	One Way North	2-3	25	No	Yes
Morris St	Major Collector	Two Way North-South	1-2	25	Yes, One side	No
Lewis St	Local Street	Two-Way East-West	1	25	Yes, One side	No
Smith St	Local Street	Two-Way North-South	1	25	No	No

Table 2 summarizes the average annual daily traffic (AADT) volumes derived from 48-hour counts collected in the last three years and obtained from the WVDOH GeoCounts database. **Table 3** presents 2024 StreetLight AADT volumes provided by RIC. StreetLight derives its data from anonymized location data sourced from drivers' smartphones and in-vehicle GPS systems.

***Table 2**: WVDOH GeoCount Traffic Volume Summary*

Street Name	Location	Year	AADT	Truck %
Lee St	West of Dickinson Street	2022	3,500	4.2
Washington St	East of Ruffner Avenue	2022	6,330	4.8
Washington St	East of Dickinson Street	2022	4,720	4.8
Leon Sullivan Way	South of Washington Street	2022	2,830	3.5
Leon Sullivan Way	I-64 Off-Ramp	2024	10,042	3.0
Brooks St	I-64 On-Ramp	2024	6,890	3.3
Smith St	East of Morris Street	2022	1,170	6.7

***Table 3**: 2024 StreetLight AADT Data Summary*

Street Name	Location	2024 AADT
Lee St	Between Leon Sullivan Way & Brooks St	5,060
Washington St	Between Leon Sullivan Way & Brooks St	6,628
Washington St	Between Brooks St & Morris St	7,781
Leon Sullivan Way	Between Lee St & Washington St	3,539
Brooks St	Between Lee Street & Washington St	4,794
Brooks St	Between Washington St & Lewis St	5,932
Brooks St	I-64 On-Ramp	10,276
Morris St	Between Washington Street & Lewis Street	4,276
Lewis St	Between Brooks St & Morris St	5,243
Smith St	Between Brooks St & Morris St	4,411

3.2 Intersection Characteristics

The area of downtown Charleston being analyzed for this study includes nine (9) intersections:

- One (1) minor street yield controlled
- Two (2) all-way stop controlled (TWSC)
- Six (6) signal controlled

The following pages detail the geometric and signal characteristics for each study intersection.

Overall, the study intersections include several features that support safe pedestrian mobility. The intersections are linked by a continuous sidewalk network that feature ADA-compliant curb ramps with detectable warning surfaces. Notably, curb ramps at six of the nine study intersections were reconstructed in 2024. The signal timing at all the signalized intersections is also pedestrian-friendly, where low cycle lengths (85 seconds during the day and 70 seconds overnight) help minimize pedestrian wait times. Additionally, both vehicle and pedestrian signal detection are operational where present, which allows for efficient intersection operations for all users.

However, some notable deficiencies are present. Intersection lighting could be improved. While most intersections have lighting from at least one corner, adequate nighttime visibility typically requires illumination from two opposite corners to ensure full intersection coverage. This coverage is met at only one intersection, leaving the remaining locations under-lit. In addition, crosswalk markings are missing or could be widened to greater than 6 feet to match the width of the sidewalk. Drainage issues were also observed after a heavy rainstorm at a couple locations, including the intersection of Morris and Lewis Streets, where ponding forced a pedestrian to walk in the middle of the street as shown in **Figure 4**.

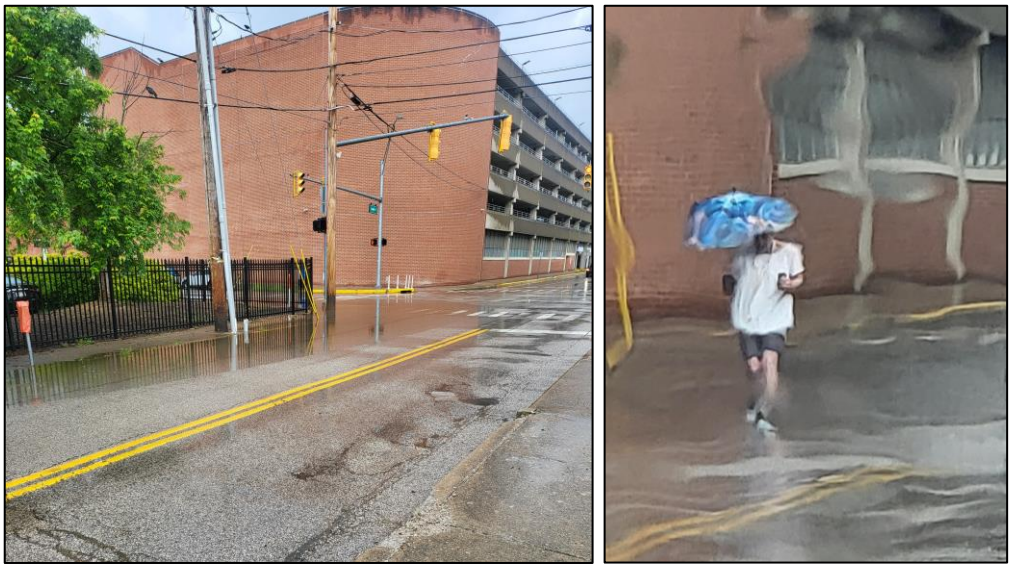

Figure 4: *Pedestrian Walking in Street near CAMC General Due to Ponding*

Lee Street and Leon Sullivan Way

The intersection of Lee Street with Leon Sullivan Way is a four-leg pretimed, coordinated signalized intersection. Both streets accommodate one way travel. All approaches feature a longitudinal bar marked crosswalk with countdown pedestrian signals and pushbuttons. There is an exclusive pedestrian phase that is pushbutton actuated. Intersection lighting is limited to a single city-maintained high-pressure sodium luminaire located in the southwest quadrant.

Figure 5 provides an aerial view of the intersection. **Table 4** provides a summary of the intersection's existing signal timing information.

The following intersection approach characteristics are notable:

Eastbound Lee Street (US 60):

- Three (3) travel lanes:
  - Two (2) 10.5' through lanes
  - One (1) 10.5' exclusive right-turn lane
  - Lee Street transitions from three travel lanes to two travel lanes & one parking lane downstream of the intersection
- An unsigned bus stop exists at far side of the intersection on the south side of Lee Street
- No signal detection for vehicles is present
- Emergency preemption infrared detector is present on the mast arm

Southbound Leon Sullivan Way:

- Three (3) travel lanes and one (1) parking lane:
  - One (1) 9' exclusive left turn lane
  - Two (2) 9' through lanes
- Leon Sullivan Way transitions from three travel lanes to two travel lanes & a parking lane downstream of the intersection
- No vehicle signal detection is present
- Emergency preemption infrared detector is present on the mast arm

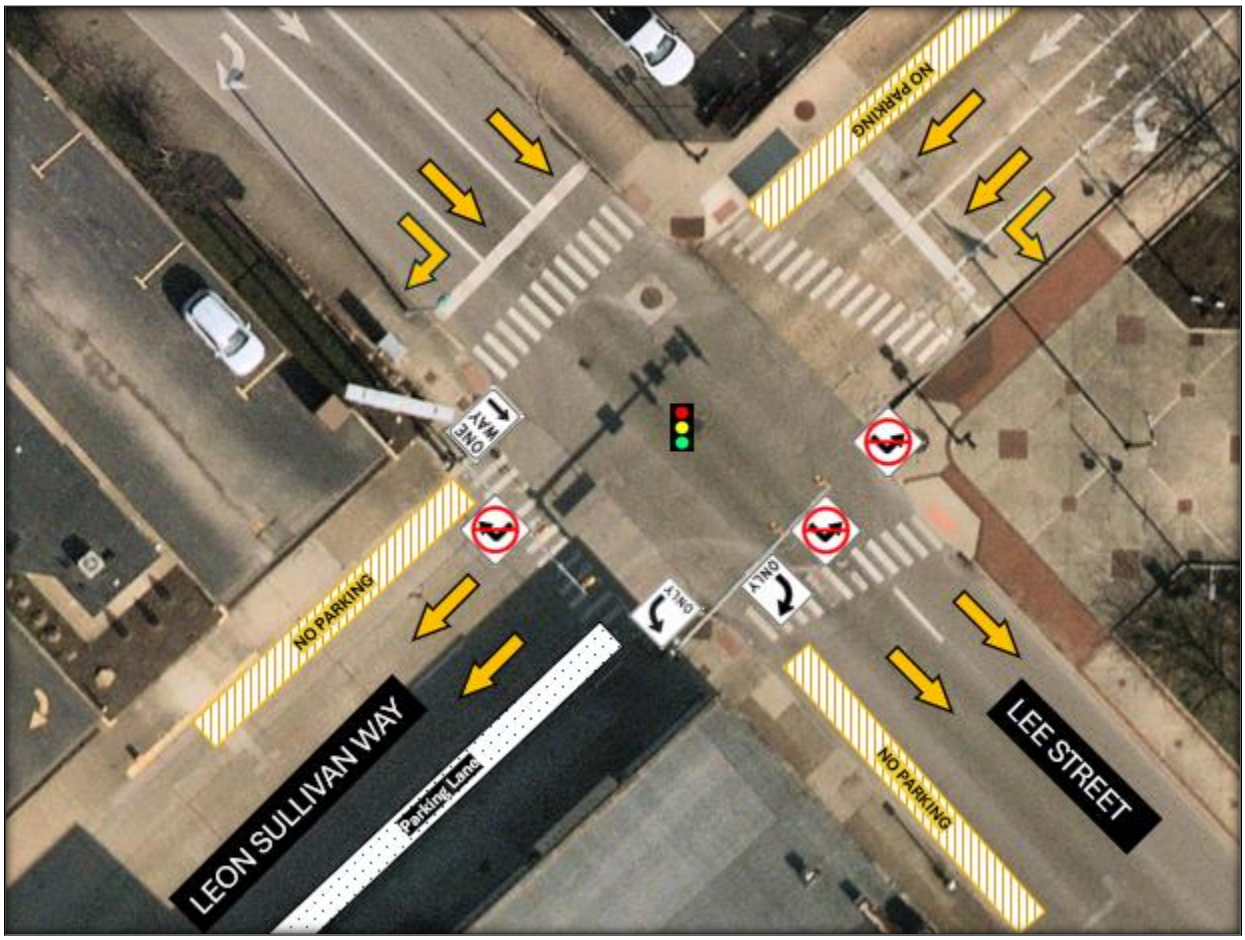

Figure 5: *Lee Street and Leon Sullivan Way Signalized Intersection*

Table 4: *Lee Street and Leon Sullivan Way Signal Timing*

Timing Parameters	Phase 2 (EB LeeSt)	Phase 4 (SB Leon Sullivan Way)	Phase 9 (Exclusive Ped Phase)
Min Green (sec)	12	10	-
Yellow (sec)	3.0	3.0	3.0
Red (sec)	1.0	1.0	-
Walk (sec)	-	-	7
Ped Clearance (sec)	-	-	10
Recall Mode	Max	Max	None
AM Peak Split Timing (sec)	33.0	34.0	18.0
PM Peak Split Timing (sec)	33.0	34.0	18.0
Late Night Split Timing (sec)	27.0	25.0	18.0

Lee Street East and Brooks Street

The intersection of Lee Street and Brooks Street is a four-leg pretimed, coordinated signalized intersection**.** Both streets accommodate one way travel. All approaches feature a longitudinal bar marked crosswalk with countdown pedestrian signals and pushbuttons. There is an exclusive pedestrian phase that is pushbutton actuated. The intersection is illuminated by an LED luminaire fixed atop the signal pole on the south corner of the intersection as well as a decorative lighting pole at the west corner of the intersection.

Figure 6 provides an aerial view of the intersection. **Table 5** provides a summary of the intersection's existing timing information.

The following intersection approach characteristics are notable:

Eastbound Lee Street (US 60):

Two (2) travel lanes and one (1) parking lane:

- One (1) 12' shared through/left turn lane
- One (1) 11' exclusive left turn lane
- Lee Street transitions from two travel lanes to one travel lane with on-street parking lanes on both sides of the street

- No signal detection for vehicles is present
- Emergency preemption infrared detector is present on the mast arm

Northbound Brooks Street:

- Two (2) travel lanes and one (1) parking lane:
  - One (1) 12' through lane
  - One (1) 11' combined through/left turn lane
  - Brooks Street transitions from two to three travel lanes downstream of the intersection
- No signal detection for vehicles is present
- Emergency preemption infrared detector is present on the mast arm

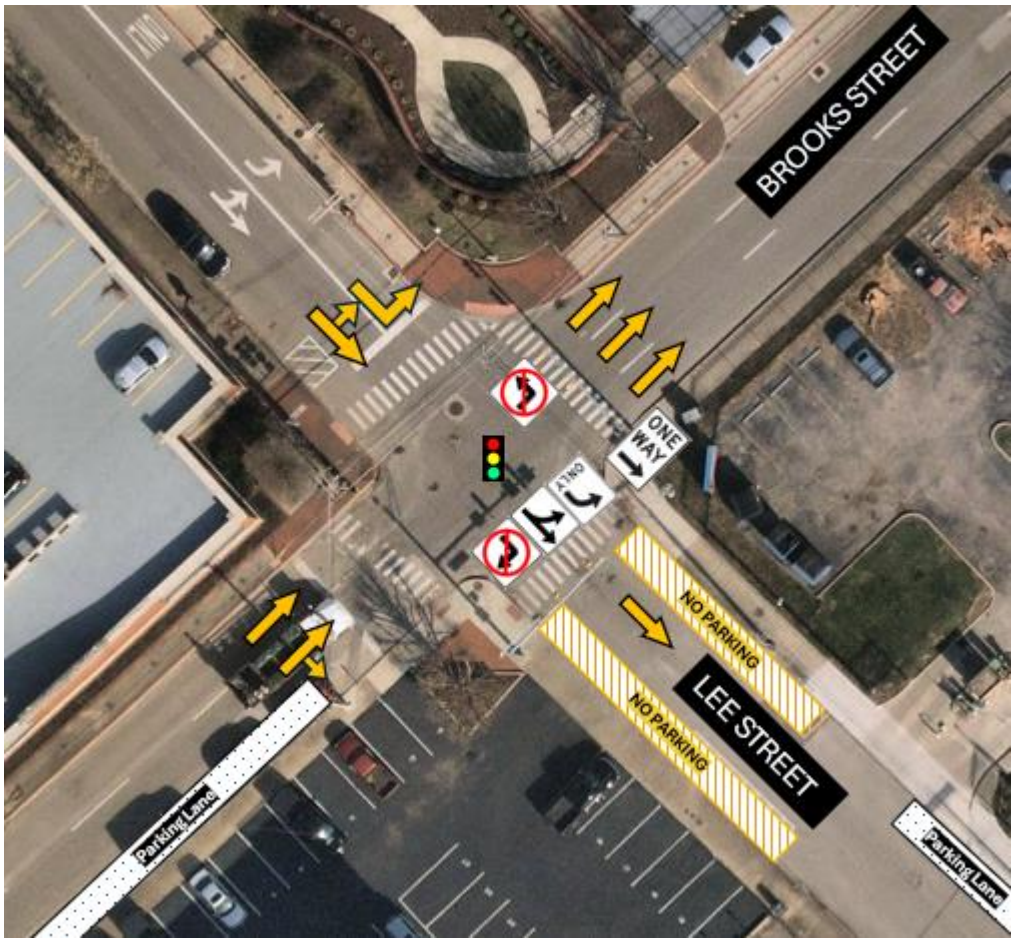

***Figure 6**: Brooks Street and Lee Street Signalized Intersection*

***Table 5:** Brooks Street and Lee Street Signal Timing*

Timing Parameters	Phase 2 (EB Lee St)	Phase 4 (NB Brooks St)	Phase 9 (Exclusive Ped Phase)
Min Green (sec)	12	10	-
Yellow (sec)	3.0	3.0	3.0
Red (sec)	1.0	1.0	-
Walk (sec)	-	-	7
Ped Clearance (sec)	-	-	10
Recall Mode	Max	Max	None
AM Peak Split Timing (sec)	33.0	34.0	18.0
PM Peak Split Timing (sec)	37.0	30.0	18.0
Late Night Split Timing (sec)	27.0	25.0	18.0

Washington Street and Morris Street

The intersection of Washington Street and Morris Street is a four-leg semi-actuated, coordinated signalized intersection**.** Both streets accommodate two-way travel. All approaches feature a longitudinal bar marked crosswalk with countdown pedestrian signals. Pedestrian pushbuttons do not exist, and all pedestrian phases are programmed on max recall. No intersection lighting is present except for a couple of decorative lights at the east approach on Washington Street.

This study intersection experienced the highest amount of pedestrian activity during daytime field observations.

Figure 7 provides an aerial view of the intersection. **Table 6** provides a summary of the intersection's existing timing information.

The following intersection characteristics are notable:

Eastbound Washington Street (US 60):

- One (1) 10.5' combined through/left/right turn lane
- Unsigned nearside bus stop present
- No signal detection for vehicles is present
- Emergency preemption infrared detector is present on the mast arm

Westbound Washington Street (US 60):

- One (1) 10.5' through travel lane
- Unsigned nearside bus stops present
- No signal detection for vehicles is present
- Emergency preemption infrared detector is present on the mast arm

Northbound Morris Street:

- Two (2) travel lanes:
  - One (1) 10' exclusive left-turn lane with protected/permissive phasing
  - One (1) 10.5' combined through/right-turn lane
- Unsigned nearside bus stops present
- Radar stop bar detection for left-turning vehicles only is present
- Emergency preemption infrared detector is present on the mast arm

Southbound Morris Street:

- Three (3) travel lanes:
  - One (1) 11' exclusive left turn lane with protected/permissive phasing
  - One (1) 11' through lane
  - One (1) 11' exclusive right turn lane
- Radar stop bar detection for left turning vehicles only is present
- Emergency preemption infrared detector is present on the mast arm

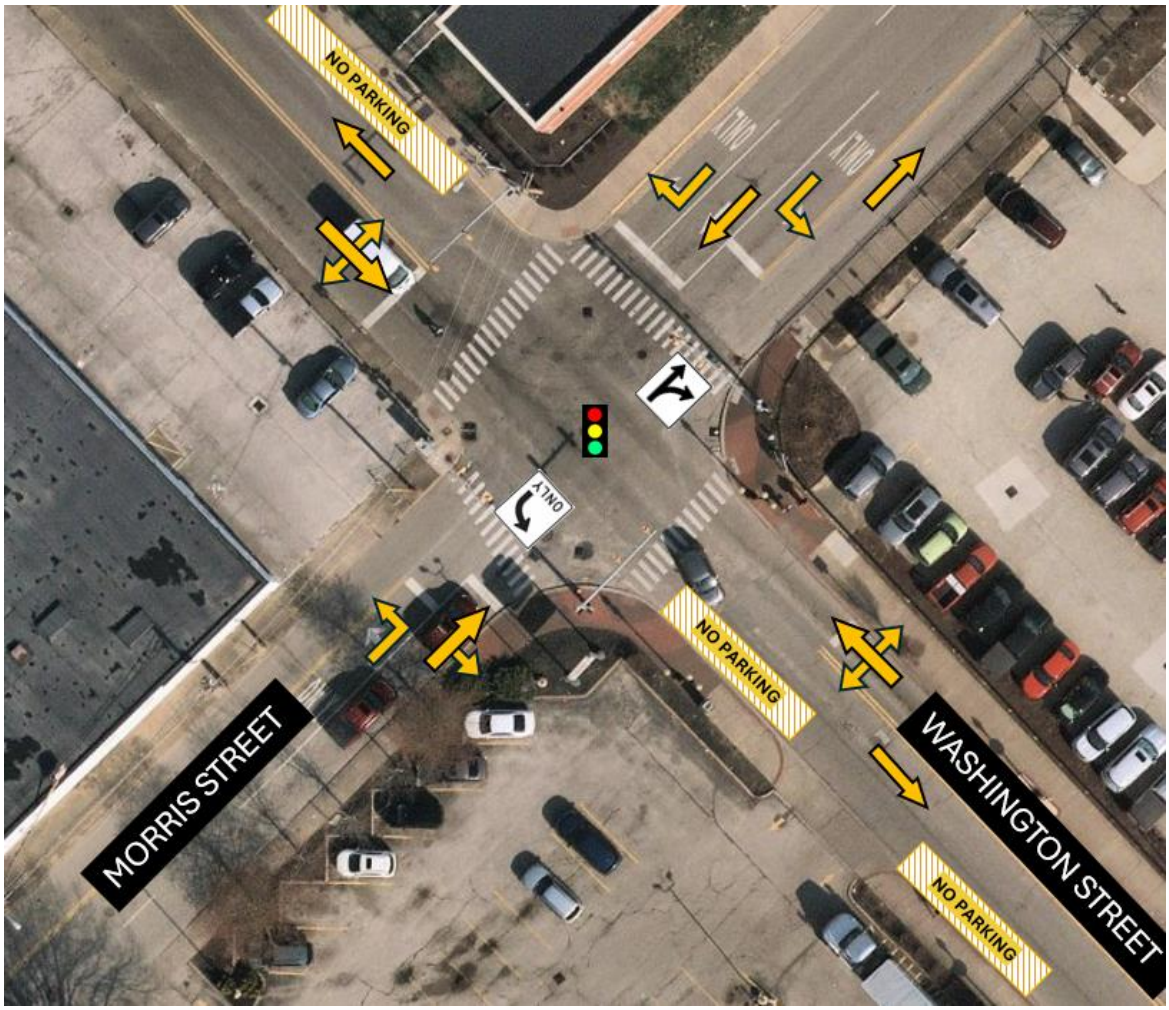

Figure 7: *Morris Street and Washington Street Signalized Intersection*

Table 6: *Morris Street and Washington Street Signal Timing*

Timing Parameters	Phase 2 (WB WashingtonSt)	Phase 3 (NBL Morris St)	Phase 4 (SB Morris St)	Phase 6 (EB Washington St)	Phase 7 (SBL Morris St)	Phase 8 (NB Morris st)
Min Green (sec)	10	6	8	10	6	8
Yellow (sec)	3.0	3.0	3.0	3.0	3.0	3.0
Red (sec)	1.0	1.0	1.0	1.0	1.0	1.0
Walk (sec)	5	-	5	5	-	5
Ped Clr. (sec)	10	-	10	10	-	10
Recall Mode	Max	None	Max	Max	None	Max
AM Peak Split Timing (sec)	45.0	15.0	25.0	45.0	15.0	25.0
PM Peak Split Timing (sec)	40.0	20.0	25.0	40.0	20.0	25.0
Late Night Split Timing (sec)	40.0	10.0	20.0	40.0	10.0	20.0

Washington Street and Brooks Street

The intersection of Washington Street and Brooks Street is a four-leg pretimed, coordinated signalized intersection**.** Brooks Street accommodates one-way travel whereas Washington Street allows two-way travel. All approaches feature a longitudinal bar marked crosswalk with countdown pedestrian signals and pushbuttons. There is an exclusive pedestrian phase that is pushbutton actuated. The intersection is illuminated by an LED luminaire mounted to a utility pole maintained by AEP at the northeast corner of the intersection.

Figure 8 provides an aerial view of the intersection. **Table 7** provides a summary of the intersection's existing timing information.

The following intersection characteristics are notable:

Eastbound Washington Street (US 60):

- One (1) 10.5' through lane
- No turns are permitted onto Brooks Street
- No signal detection for vehicles is present
- Emergency preemption infrared detector is present on the mast arm

Westbound Washington Street (US 60):

- Two (2) travel lanes:
    - One (1) 10.5' through lane
    - One (1) 10.5' exclusive right turn lane
- No signal detection for vehicles is present
- Emergency preemption infrared detector is present on the mast arm

Northbound Brooks Street:

- Three (3) travel lanes:
    - One (1) 10' exclusive left turn lane
    - One (1) 10' through lane
    - One (1) 10.5' shared through/right turn lane
    - Downstream of the intersection, Brooks Street reduces to two lanes
- Emergency preemption infrared detector is present on the mast arm
- No right on red is permitted
- No signal detection for vehicles is present

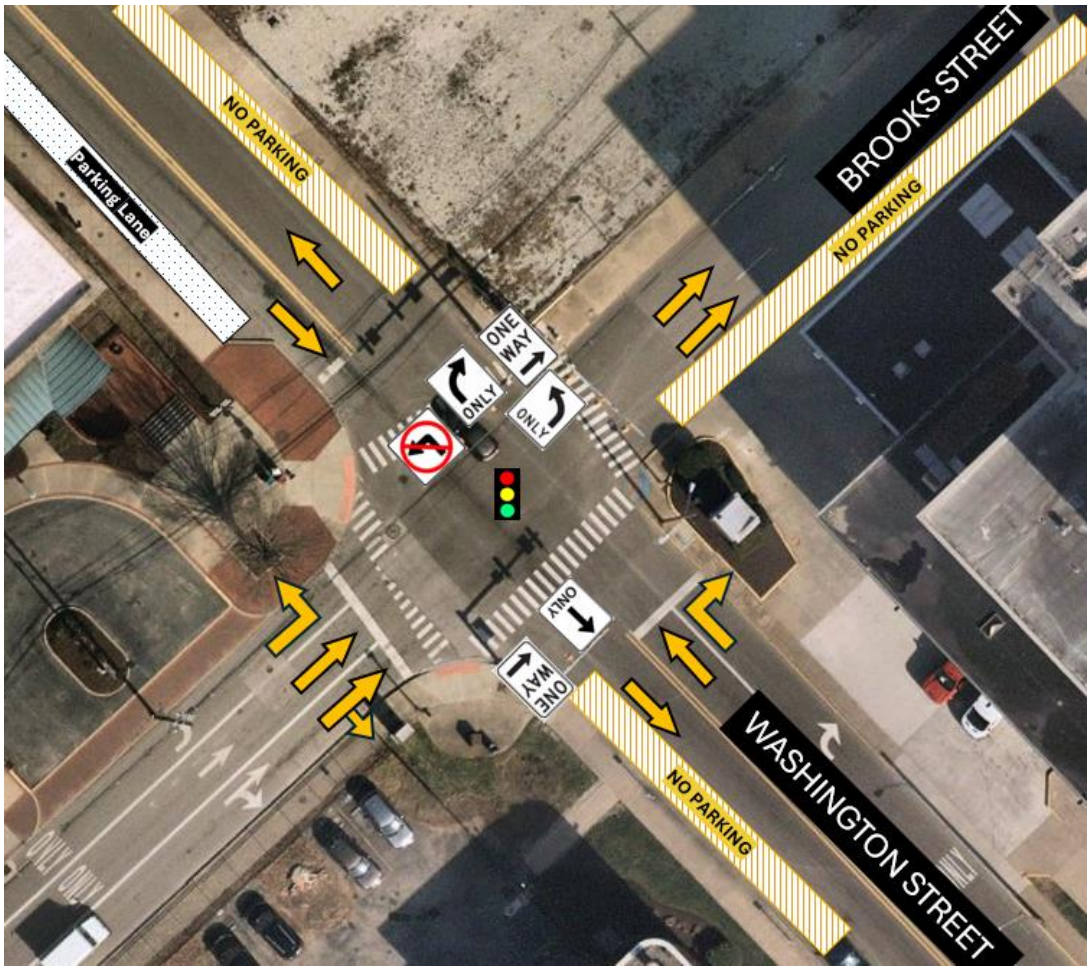

Figure 8: *Brooks Street and Washington Street Signalized Intersection*

Table 7: *Brooks Street and Washington Street Signal Timing*

Timing Parameters	Phase 2 (NB Washington St)	Phase 4 (EB Brooks St)	Phase 6 (SB Washington St)	Phase 9 (Exclusive Ped Phase)
Min Green (sec)	12	8	12	-
Yellow (sec)	4.0	4.0	4.0	3.0
Red (sec)	1.0	1.0	1.0	1.0
Walk (sec)	-	-	-	7
Ped Clearance (sec)	-	-	-	10
Recall Mode	Max	Max	Max	None
AM Peak Split Timing (sec)	35.0	29.0	35.0	21.0
PM Peak Split Timing (sec)	30.0	34.0	30.0	21.0
Late Night Split Timing (sec)	25.0	24.0	25.0	21.0

Washington Street and Leon Sullivan Way

The intersection of Washington with Leon Sullivan Way is a four-leg pretimed, coordinated signalized intersection. All approaches feature a longitudinal bar marked crosswalk with countdown pedestrian signals and pushbuttons. There is an exclusive pedestrian phase that is pushbutton actuated. No intersection lighting is present at this location.

Figure 9 provides an aerial view of the intersection. **Table 8** provides a summary of the intersection's existing timing information.

The following intersection characteristics are notable:

Westbound Washington Street (US 60):

- Two (2) travel lanes:
  - One (1) 12' through lane
  - One (1) 10.5' combined through/left turn lane
- Lane line extensions are present to delineate the continuation of both through lanes.
- An unsigned nearside bus stop exists.
- No signal detection for vehicles is present.
- Emergency preemption infrared detector is present on the mast arm.

Southbound Leon Sullivan Way:

- Three (3) travel lanes:
  - One (1) 12' exclusive right turn lane
  - One (1) 12' combined through/right turn lane
  - One (1) 12' combined through/left turn lane
- Lane line extensions exist to delineate the continuation of the right turn lane
- No signal detection for vehicles is present
- Emergency preemption infrared detector is present on the mast arm

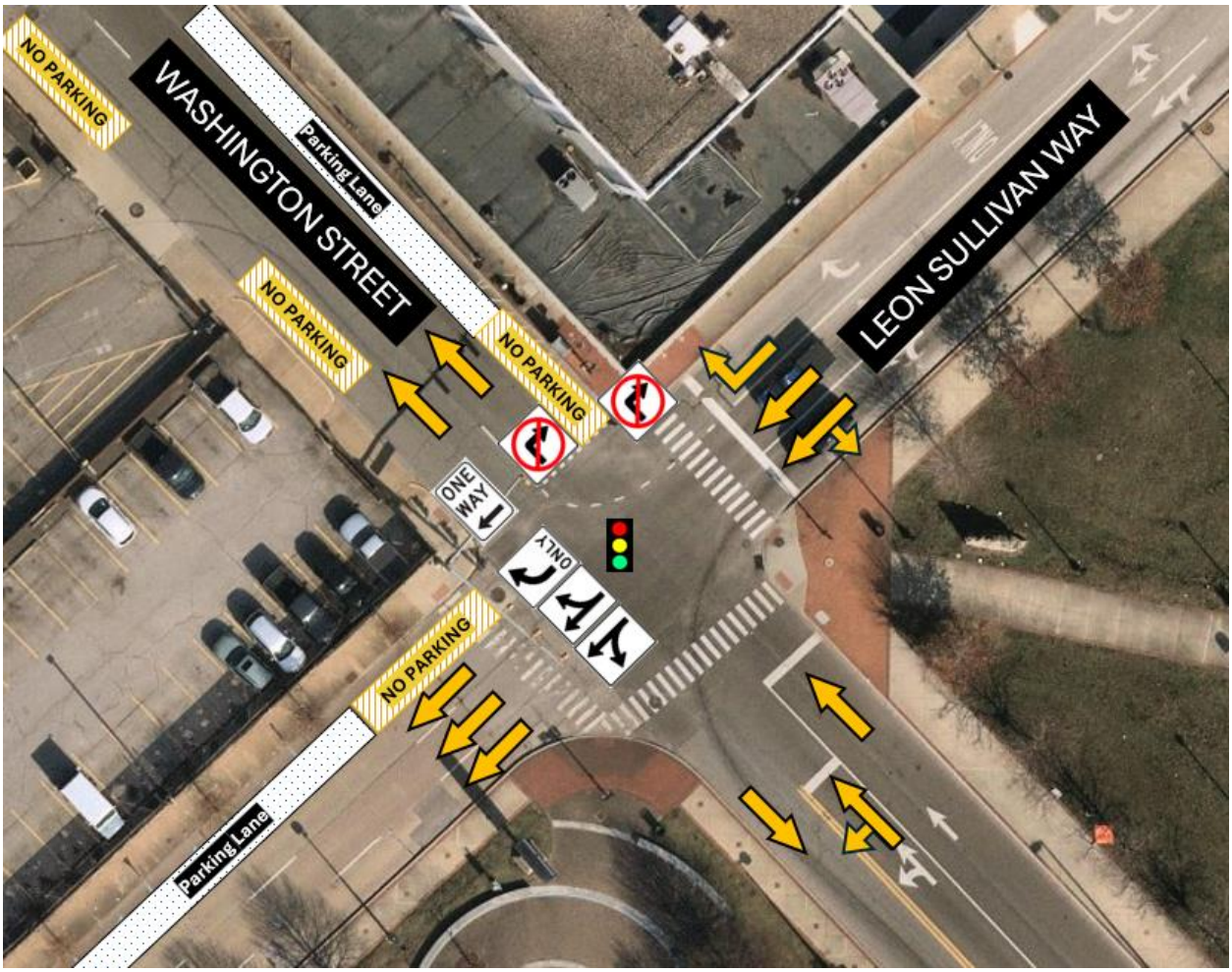

Figure 9: *Washington Street and Leon Sullivan Way Signalized Intersection*

Table 8: *Washington Street and Leon Sullivan Way Signal Timing*

Timing Parameters	Phase 2 (WB Washington St)	Phase 4 (SB Leon Sullivan Way)	Phase 9 (Exclusive Ped Phase)
Min Green (sec)	12	10	-
Yellow (sec)	3.0	3.0	3.0
Red (sec)	1.0	1.0	-
Walk (sec)	-	-	7
Ped Clearance (sec)	-	-	10
Recall Mode	Max	Max	None
AM Peak Split Timing (sec)	33.0	34.0	18.0
PM Peak Split Timing (sec)	33.0	34.0	18.0
Late Night Split Timing (sec)	27.0	25.0	18.0

Lewis Street and Morris Street

The intersection of Lewis Street and Morris Street is a four-leg, fully actuated, uncoordinated signalized intersection**.** Both streets accommodate two-way travel. The intersection is illuminated by an LED luminaire fixed atop the signal poles on both the northwest and southwest corners of the intersection. All approaches feature a longitudinal bar marked crosswalk with countdown pedestrian signals and pushbuttons. There is an exclusive pedestrian phase that is pushbutton actuated.

Figure 10 provides an aerial view of the intersection. **Table 9** provides a summary of the intersection's existing timing information.

The following intersection characteristics are notable:

Eastbound Lewis Street:

- Two (2) travel lanes:
  - One (1) 10.5' right turn lane
  - One (1) 10' combined through/left turn lane
  - Downstream of the intersection Lewis Street reduces to one travel lane
- Radar stop bar detection for vehicles is present
- Emergency preemption infrared detector is present on the mast arm

Westbound Lewis Street:

- One (1) 10.5' combined through/left/right turn lane
- Radar stop bar detection for vehicles is present
- Emergency preemption infrared detector is present on the mast arm

Northbound Morris Street:

- Two (2) travel lanes:
  - One (1) 10' exclusive left turn lane with protected/permissive phasing
  - One (1) 11' combined through/right turn lane
  - Downstream of the intersection Morris Street reduces to one travel lane
- Radar stop bar detection for vehicles is present
- Emergency preemption infrared detector is present on the mast arm

Southbound Morris Street:

- Two (2) travel lanes:
  - One (1) 10' exclusive left turn lane with permissive only phasing
  - One (1) 10' combined through/right turn lane
  - Downstream of the intersection Morris Street reduces to one travel lane
- Radar stop bar detection for vehicles is present
- Emergency preemption infrared detector is present on the mast arm

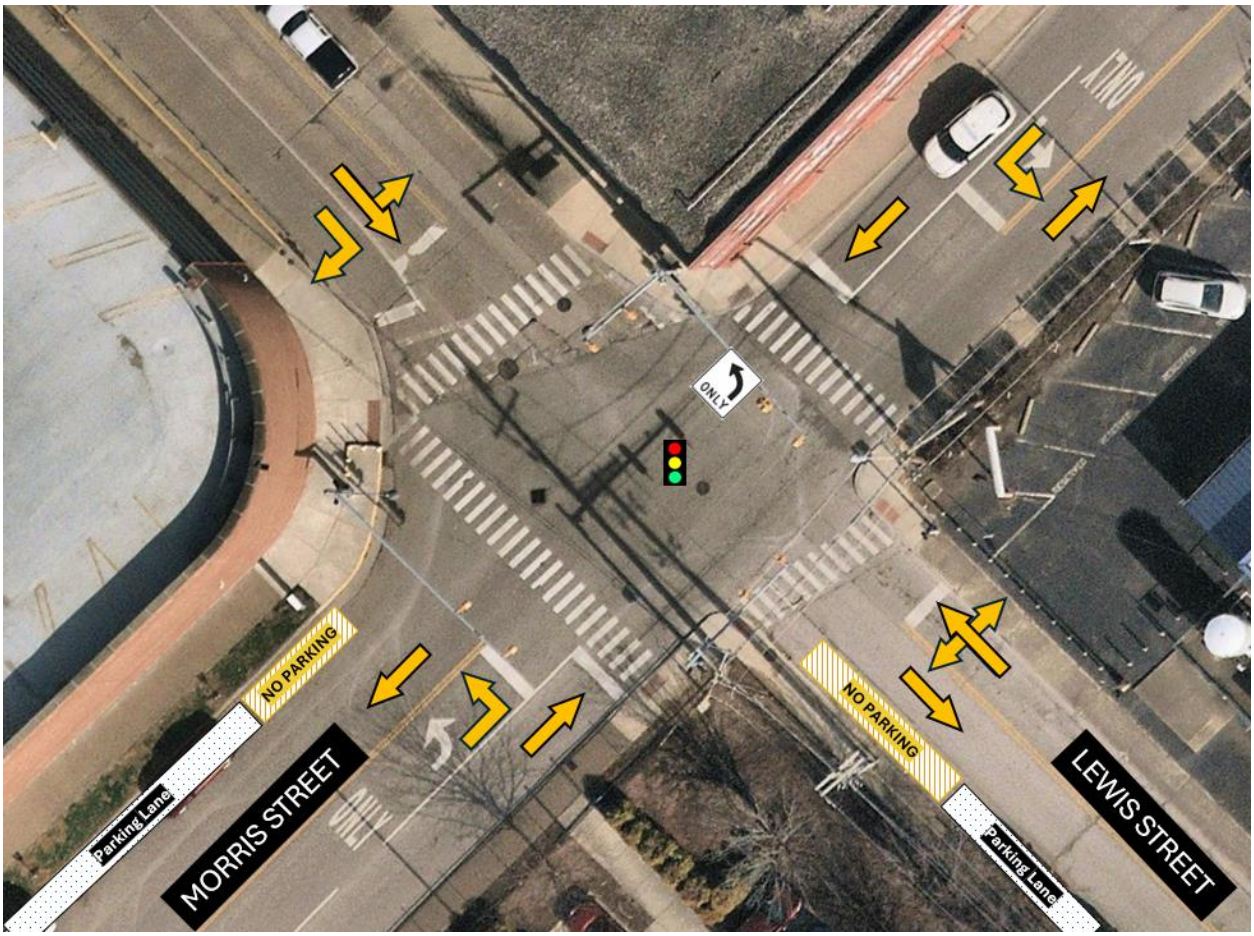

Figure 10: *Morris Street and Lewis Street Signalized Intersection*

Table 9: *Lewis Street and Morris Street Signal Timing*

Timing Parameters	Phase 2 (WB Lewis St)	Phase 3 (NBL Morris St)	Phase 4 (SB Morris St)	Phase 6 (EB Lewis St)	Phase 8 (NB Morris St)	Phase 9 (Exclusive PED phase)
Min Green (sec)	10	6	10	10	10	-
Yellow (sec)	3.0	3.0	3.0	3.0	3.0	3.0
Red (sec)	1.0	1.0	1.0	1.0	1.0	-
Walk (sec)	-	-	-	-	-	10
Ped Clr. (sec)	-	-	-	-	-	12
Recall Mode	N	N	Min	N	Min	N
Max Green (sec)	25	15	35	25	35	

Morris Street and Smith Street

The intersection of Morris and Smith Street is all way stop-controlled **(Figure 11)**. Stop bar markings are absent on all approaches. Only the south approach has a marked crosswalk; however, the crossing is positioned approximately 15 feet behind the posted stop sign. Intersection lighting is provided by a decorative pole at the northwest corner and a high-pressure sodium luminaire mounted on an adjacent utility pole in the same quadrant.

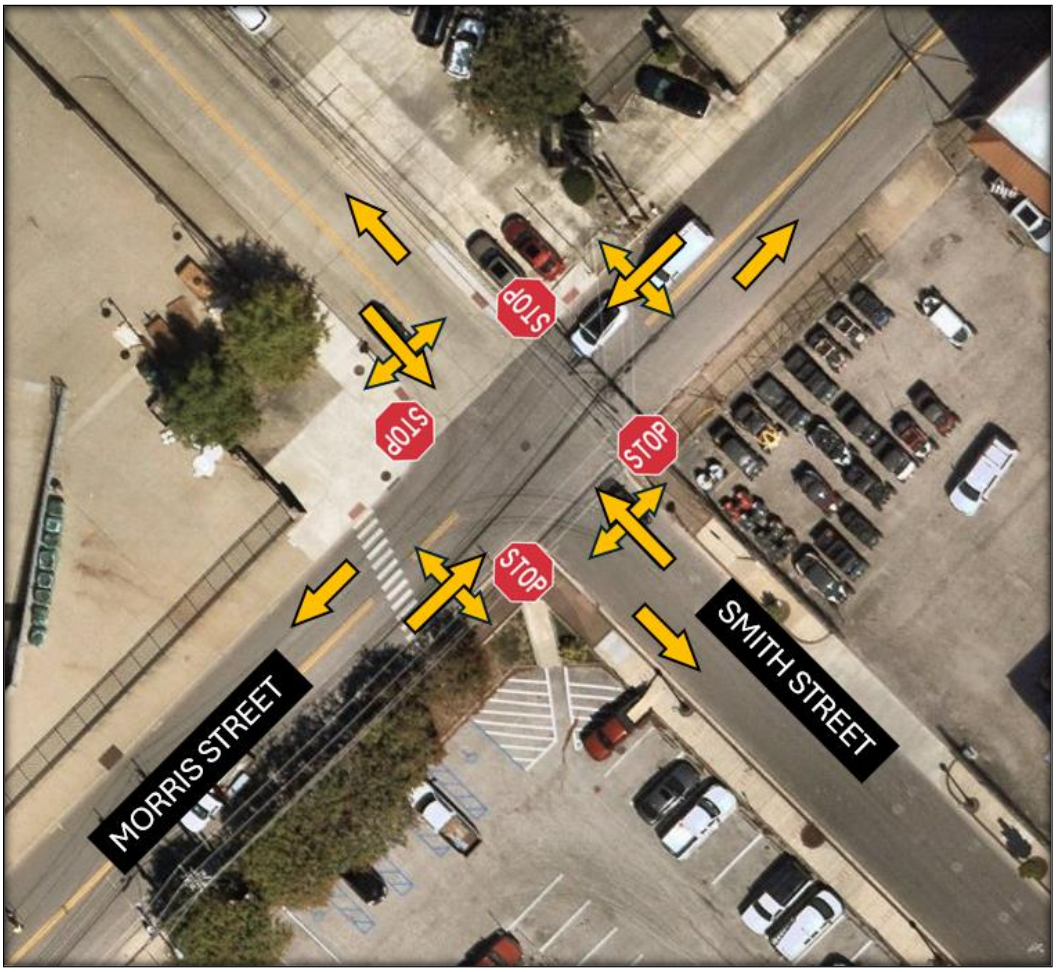

Figure 11: *Morris Street and Smith Street Intersection*

Lewis Street and Brooks Street

The intersection of Lewis Street and Brooks Street (**Figure 12)** is generally configured as a "T" intersection but has multiple legs of which only one is yield controlled (Lewis Street). Brooks Street is uncontrolled with two through lanes that diverge at Lewis Street. The right lane transitions into a dedicated on-ramp to I-64, while drivers that wish to remain on Brooks Street must stay in the left lane**.** Lewis Street permits only channelized right turns but does allow traffic to merge onto the I-64 overpass entrance ramp. A driveway entrance and exit for the Kanawha County Emergency Ambulance Authority exist directly across from Lewis Street. No pedestrian crosswalk markings are present. A high-pressure sodium luminaire mounted to a utility pole is present on the west side of the intersection.

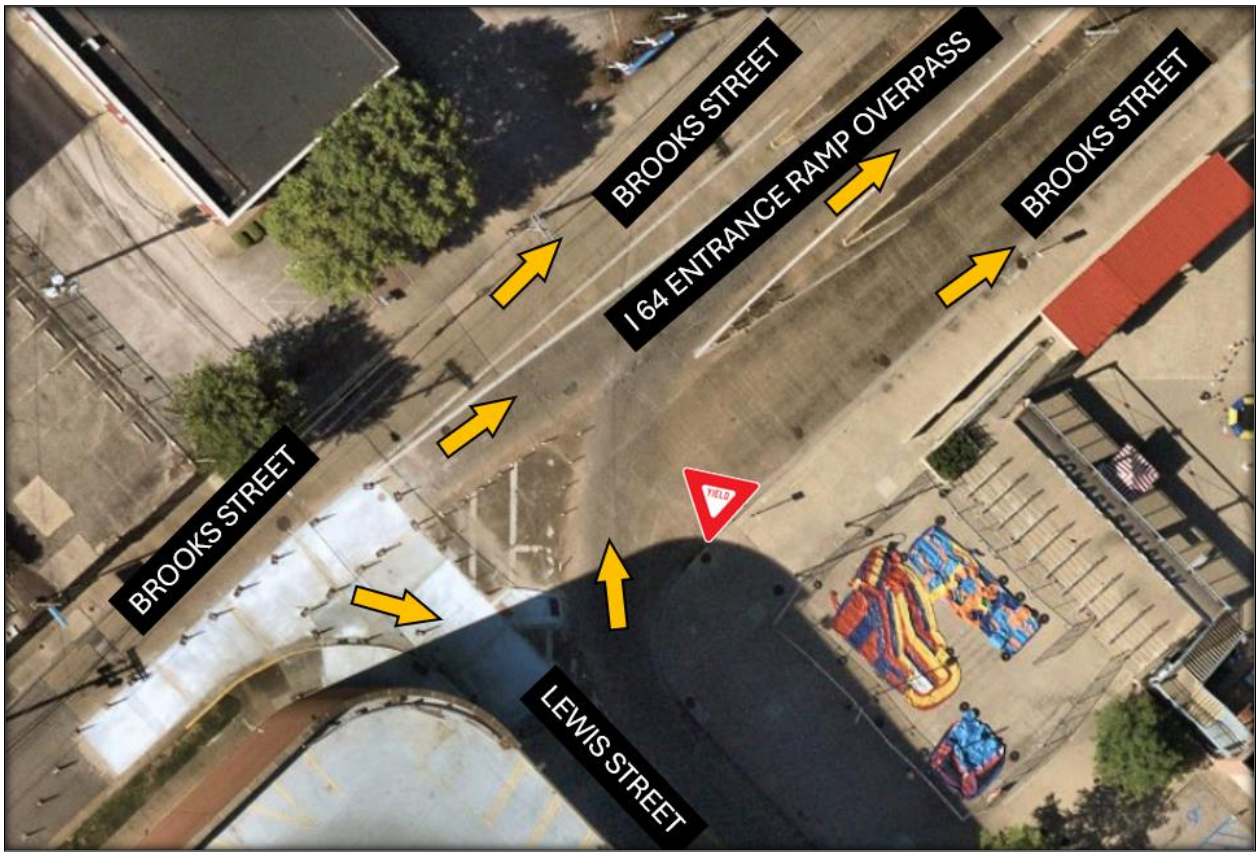

Figure 12: *Brooks Street and Lewis Street Intersection*

Smith Street and Brooks Street

The intersection of Smith Street and Brooks Street is a four-leg all-way stop-controlled intersection (**Figure 13**). No pedestrian crosswalk markings or stop bars exist on Smith Street. Brooks Street has marked stop bars. Recent ADA-compliant curb ramps have been installed. Intersection lighting is provided by overhead fixtures mounted underneath the bridge overpass.

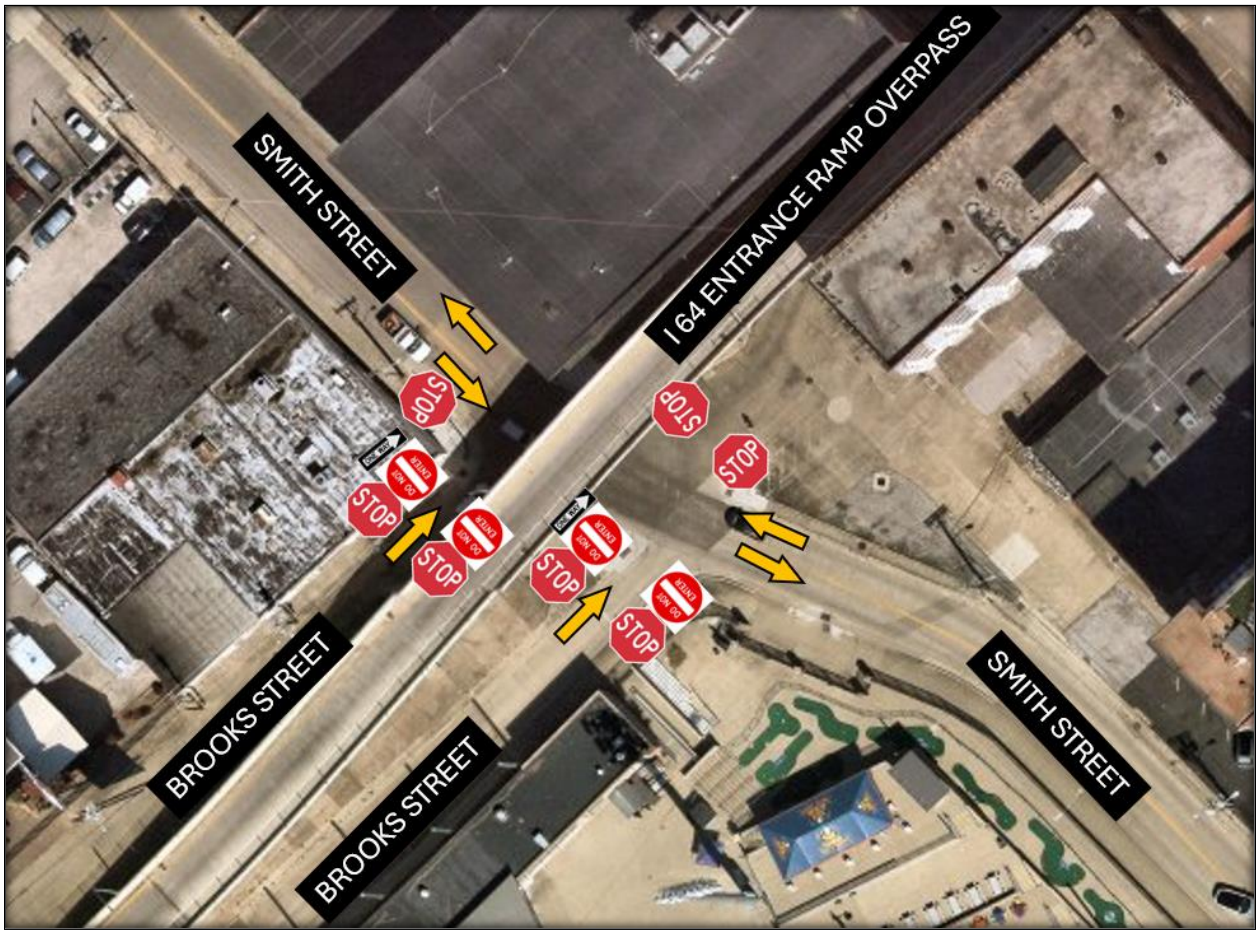

***Figure 13**: Brooks Street and Smith Street Intersection*

3.3 Lighting

There is lighting with in the study area that is owned and maintained by several different entities; the City of Charleston, the West Virginia Division of Highways (WVDOH) and American Electric Power (AEP). Wooden poles are maintained by AEP, decorative poles by the City of Charleson and signal poles or metal poles by WVDOH. Washington Street and the block around the Clay Center is a mixture of decorative and wooden poles with LED light fixtures. **Figure 14** illustrates the absence of intersection lighting at Washington Street and Leon Sullivan Way. The photo also shows a bicyclist traveling on Leon Sullivan Way who is barely visible. Portions of Morris Street, Lewis Street and Brooks Street have high pressure sodium light fixtures on wooden poles sporadically along the roadway. Within these areas, there is not enough lighting to safely illuminate the sidewalks and roadway for pedestrians and drivers.

***Figure 14**: Nighttime View at Washington St. & Leon Sullivan Way (Facing Clay Center)*

3.4 Parking

There is parking within the study area around the hospital and Clay Center. Washington Street has meter parking on both sides of the roadway from Morris Street to Brooks Street and from Leon Sullivan Way to Dickison Street. The Clay Center has a paid parking lot to the north along Washington Street. Morris Street only has meter parking from Lewis Street to Washington Street on the west side of the roadway. CAMC's parking garage along Lewis Street and surface lots along Morris Street are heavily used. Exiting the parking garage and surface lots onto Lewis Street or Morris Street can be challenging. Smith Street has no parking along the roadway. There is meter parking from Quarrier Street to Lee Street on the east side of Brooks Street. Leon Sullivan Way has meter parking on the west side to Lee Street and both sides of the roadway to Quarrier Street. There is meter parking on the south side of Lee Street from Leon Sullivan Way to Brooks Street. On the south side of Lewis Street there is meter parking to Morris Street. A parking garage is located on the south side of Lewis Street. An overview of public parking options is shown in **Figure 15**.

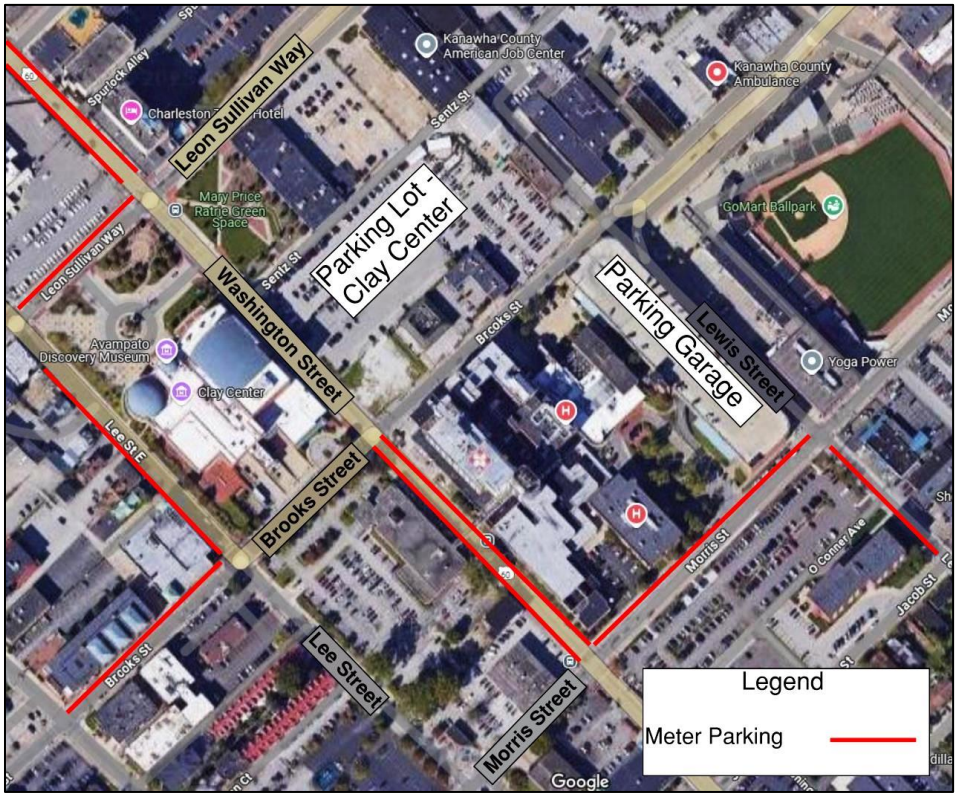

***Figure 15**: Meter Parking within Study Area*

3.5 Public Transit

The Kanawha Valley Regional Transportation Authority (KVRTA), commonly referred to as KRT, is the public transit system serving the Charleston metropolitan area. The system's routes cover roughly 913 square miles and include a fleet of standard transit buses, minibuses, and paratransit vans, supporting both regular and paratransit services, known as Kanawha Alternative Transit (KAT).

According to the Authority's Director of Operations, KVRTA has a fleet of 50 buses that run along 20 fixed routes throughout the service area. Normal transit service for this route operates Monday through Friday from 6:00 AM to 6:00 PM. The KVRTA currently operates five buses along seven designated routes (Route #2, 4, 6, 10 and 11) across Washington Street, Morris Street, Leon Sullivan Way and Smith Street as shown in **Figure 16**. The nearest designated stops to the study area are located along Washington Street at its intersection with Morris Street and its intersection with Leon Sullivan Way, as well as the intersection of Leon Sullivan Way with Smith Street.

KVRTA is expanding their services into new ridership zones and modifying several pre-existing routes. KRT Plus will run as an on-demand service using a mobile app in addition to the pre-existing routes. Routes # 10 and 11 are expected to be modified during this expansion.

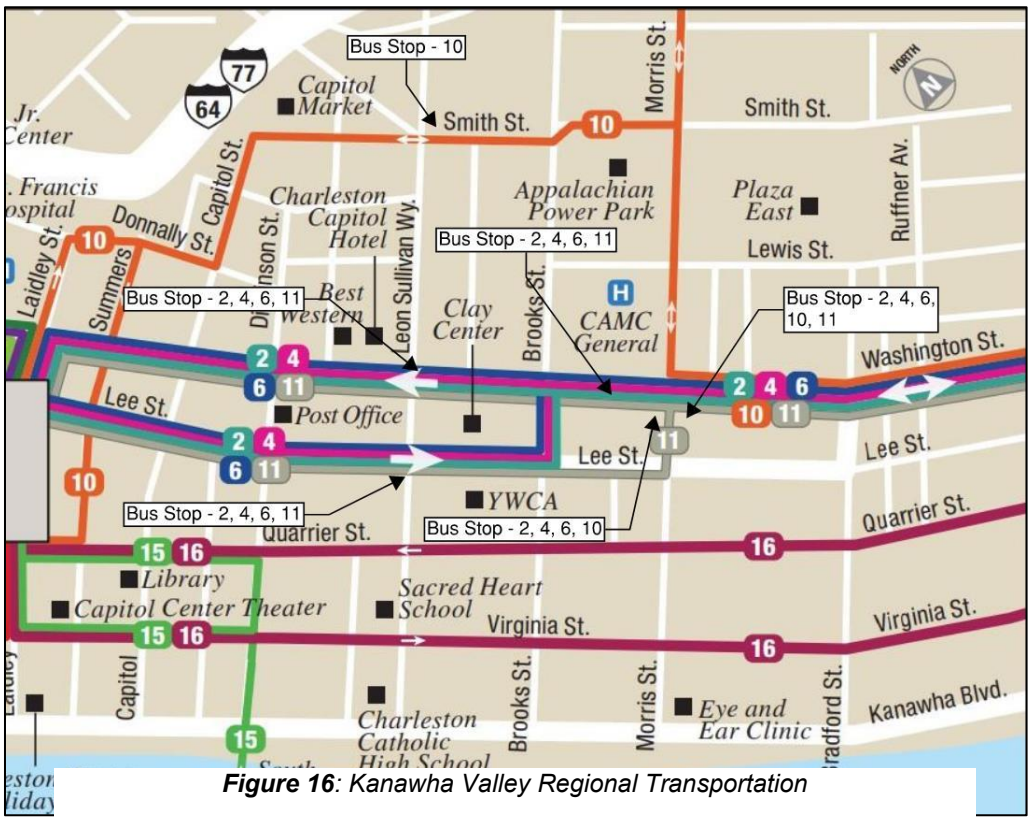

***Figure 16**: Kanawha Valley Regional Transportation*

3.6 School Bus Routes

There are both public and private schools near the project area. The Kanawha County – Elkview Terminal Bus Supervisor was contacted to discuss the bus schedules within the project limits. She stated that 3 buses travel Washington Street to Morris Street turning north towards Piedmont Road for pickup and drop-off. There is 1 bus that travels along Lee Street to Ruffner Avenue to Piedmont Road for morning pickup. The same bus travels Leon Sullivan Way to Lee Street to Bradford Street for afternoon drop-off. These buses travel to Piedmont Elementary School, Ruffner Elementary School, Horace Mann Middle School and Capital High School.

While the Clay Center has no reoccurring school bus route, school field trips are regularly scheduled to the Clay Center during the standard school day hours. During a site visit on May 13th, 2025, buses were observed dropping off students outside of the main entrance in the roundabout section of the parking lot. (**Figure 17**). No children were observed to be crossing the road during this time.

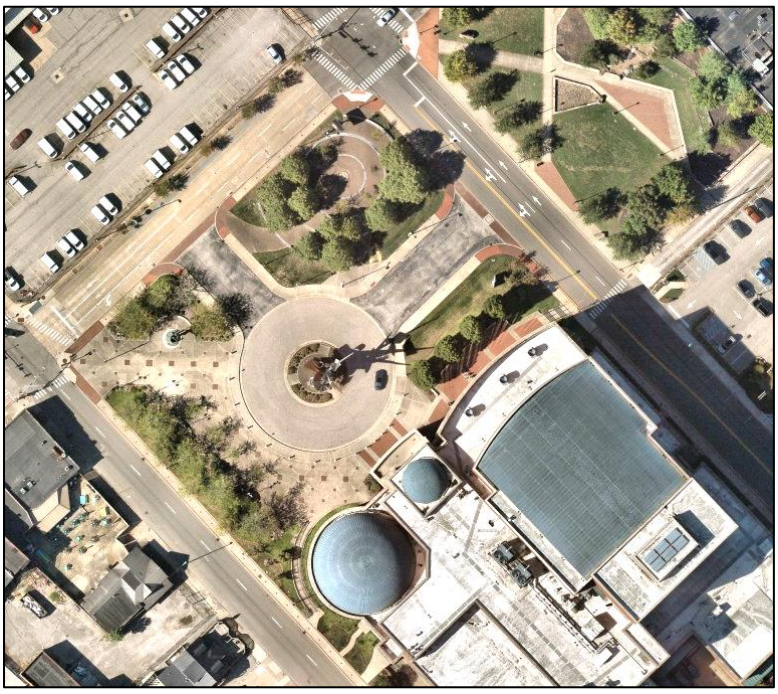

Figure 17: *Aerial of Clay Center*

3.7 Pedestrians

The downtown study area is a hub of activity in Charleston. Whether they are using public transportation, attending a special event at the Clay Center, enjoying nightlife at a local establishment, cheering on their team at GoMart Ballpark, utilizing or visiting the hospital or just sightseeing; pedestrians are actively using the study area during the day and night. To account for all this activity field observations were conducted at different times of the day and during all four seasons. It was observed that three intersections experience a high amount of pedestrian activity.

Average annual daily pedestrian crossing counts for these intersections were provided by RIC and sourced from the 2024 Streetlight data. According to Streetlight and support by observations, the crossings that on average served at least 100 pedestrians per day, are shown below:

1. Lewis Street and Morris Street
    a. NE corner: 172 crossing Lewis Street
    b. SW corner: 388 crossing Lewis Street
2. Washington Street and Morris Street.
    a. NW corner: 418 crossing Morris Street
    b. NE corner: 472 crossing Morris Street
    c. NW corner: 206 crossing Washington Street E
3. Washington Street E and Brooks Street
    a. NW corner: 175 crossing Brooks Street

Two midblock crossings that data revealed a notable number of pedestrians daily are shown below:

1. Morris Street midblock crossing (near GoMart Ballpark)
    a. 269 crossing
2. Washington Street E midblock crossing (near Sentz).
    a. 61 crossing

The pedestrian crossing on Washington Street E near Sentz Street has a longitudinal bar crosswalk pattern with a W11-2 Pedestrian Crossing Sign and flashing beacon. No advanced signing alerting drivers of pedestrians crossing was present, and the signs are a mix of fluorescent and engineering grade supplemental signs. There is a pushbutton available to activate the flashing beacon atop the pedestrian crossing sign, but many of the pedestrians did not press the pushbutton to activate the flashing beacons **(Figure 18).** This crossing is in use during the day; however, it was also observed being used significantly during special events at the Clay Center in the evening.

The patrons of the Clay Center were observed during the WV Symphony-Sounds of the Season concert (December 7, 2024), the Great Gatsby by the World Ballet Company (April 16, 2025) and Pat Benatar and Neil Giraldo in concert (May 9, 2025). The Clay Center had sufficient staff on site to manage the large crowds parking and entering the center from all directions. Pedestrian traffic arriving and departing the events had the right-of-way and vehicles yielded to them crossing midblock.

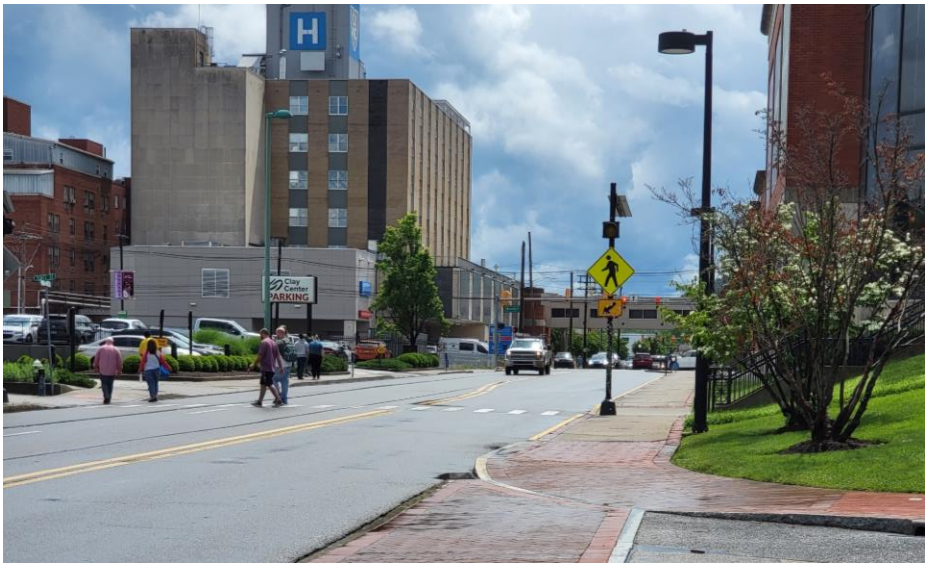

Figure 18: *Pedestrian Crossing Without Lights Flashing*

The crossing at Lewis Street and Morris Street is heavily used during GoMart Ballpark events, as well as the midblock crossing on Morris at the GoMart Ballpark. Like the midblock on Washington Street E, the one on Morris has a longitudinal bar crosswalk with W11-2 Pedestrian Crossing warning signs. However, it does not have flashing beacons installed. No advanced warning signs alerting drivers were present.

The largest events at GoMart Ballpark that were observed were the West Virginia University vs. Marshall University baseball game and Dirty Bird's Light the Night Winter Light Festival. West Virginia University and Marshall University played to a sold-out crowd on April 30, 2025. The largest ever recorded crowd, 9,629 fans, for a WVU vs. MU matchup at GoMart Ballpark. Fans arrived hours before the 6:05 p.m. game and all available parking as far as University of Charleston's football field located on Piedmont Road was overflowing. Large amounts of tailgating were observed and vehicles yielded to pedestrians walking in the street.

Light the Night is West Virginia's biggest winter light festival with over 2.5 million lights choreographed to holiday music, rides, ice skating and more. It ran from November 15, 2024, to January 1, 2025, from 5:00 – 9:00 p.m. Over 120,000 attended the event with 11,263 attendees

breaking the single day attendance record on Saturday, December 14, 2024. Parking was overwhelmed throughout the city that day. Local restaurants and bars before and after the light festival were full. Significant vehicle congestion was observed resulting in vehicles queuing onto I-64/I-77. Charleston City Police were present throughout the area.

In addition to the GoMart Ballpark, the area on Morris Street in vicinity of Lewis Street is heavily used by patients of CAMC. It was observed that several vehicles leaving the parking area on Morris Street had conflicts with pedestrians crossing the street outside of the designated crosswalks. The CAMC General emergency room (ER) is a Level 1 Trauma Center, one of only 2 in West Virginia. It is staffed and equipped to care for all major trauma patients 24 hours a day/7 days a week. Walk-ins to CAMC General ER need a clear path without mobility restrictions. Several pedestrians, possible patients, appeared disoriented and were observed with various issues ranging from injuries and disabilities to likely impairment, walking within the general area.

4. Traffic Operations Analysis

4.1 Speed Analysis

A spot speed analysis was completed on a typical weekday in May, during the off-peak hours, along Lee Street, at the intersection of Brooks Street with Lewis Street, and along Washington Street. The weather was dry and sunny. A total of 264 vehicle speeds were recorded on this day. The analysis results (**Table 10**) show that speeding was not observed to be an issue. The average speed aligned with the posted speed limit, and the 85th percentile fell near (within 5 mph of) the posted speed limit.

Table 10: *Speed Analysis*

Location	Direction	Posted Speed (MPH)	Average Speed (MPH)	85th Percentile (MPH)	% Traveling 10 mph (or more) Over Posted Speed Limit
Washington Street by CAMC Overpass	EB	25	22	26	1.8%
Washington Street by CAMC Overpass	WB	25	22	25	0%
Lee Street (by House of Hounds)	EB	25	25	29	0%
Brooks Street and Lewis Street Intersection	NB	25	23	27	2%

The spot speed reports are provided in **Appendix A**.

4.2 Traffic Signal Operations

Although the City of Charleston maintains all signals, they are operated remotely by the WVDOH Traffic Engineering Division via the agency's centralized signal management system. Most of the signals operate pre-timed, time-of-day plans except one signal that is actuated and uncoordinated located at the intersection of Morris and Lewis Streets. The Traffic Engineering Division downloaded and shared timing plans for all six (6) traffic signals within the study area. Mead & Hunt reviewed the plans and performed field observations to identify opportunities to improve safety with respect to the signal operation. Key observations are summarized below.

Yellow Change & All-Red Clearance Intervals:

The yellow clear and all-red clearance intervals were reviewed to determine if enough time is being provided for vehicles to clear an intersection.

- Most signals currently employ **3.0**-second yellow clear and **1.0**-second all-red clearance intervals for all vehicle phases with the following exceptions:
    - No all-red clearance intervals are programmed for the protected/permissive left-turn phases along Morris Street corridor at Washington Street and Lewis Street.
    - Yellow clear = **4.0** seconds at the intersection of Washington & Brooks Streets for all vehicle phases.
- Leon Sullivan Way has the highest posted speed limit of 30 MPH (as opposed to 25 MPH); therefore, yellow change intervals might be expected to be little longer along this route compared to the other study corridors. However, this is not reflected in the current signal timing. It should be noted that all intersection approaches are relatively flat, so the roadway grade should not greatly influence the yellow change intervals.

Pedestrian Signal Phasing:

- The signal at the intersection of Washington & Morris streets is the only intersection that operates the walk phases concurrently, permitting pedestrian and vehicles to proceed through the intersection at the same time. Leading pedestrian intervals (LPIs) are not enabled at this intersection.
- Five (5) signals employ an exclusive pedestrian walk phase (also commonly referred to as a Pedestrian Scramble) where all vehicles are stopped, and pedestrians are permitted to cross in all directions (including diagonally); however diagonal crosswalk markings are not present at any of these intersections.
    - The pedestrian walk phases are all pushbutton actuated

- The existing pedestrian pushbuttons are VibraWalk2 units which provide a pushbutton locator tone, actuation indicator, information message, and vibrotactile arrow. The locator tone was not consistently audible at all intersections during field observations.
- Observations showed that most pedestrians did not use the pushbutton before crossing. Instead, they typically crossed during gaps in traffic without waiting for pedestrian signal indications, as shown in **Figure 19**. This behavior was also observed among several pedestrians using wheelchairs, as illustrated in **Figure 20**.
    - At the intersection of Lewis and Morris Streets, multiple instances were observed where groups of pedestrians waited for the WALK indication without first pressing the pushbutton. After waiting for nearly a minute with no signal change, they ultimately crossed the street outside of the crosswalk phase. It appears they may not have understood that the walk phase was by pushbutton activation only.

<u>WALK & Pedestrian Clearance Intervals</u>:

The WALK and pedestrian clearance (PCT) intervals were reviewed to determine if enough time is being provided for pedestrians to safely cross an intersection.

- All signals are currently programmed with the following pedestrian intervals:
    - Steady Walk (Walking Person) time = 5-7 seconds
        - Seven (7) seconds is the recommended minimum interval per the latest edition of the Manual of Uniform Traffic Control Devices (MUTCD) which is its two-year adoption phase and has not yet been adopted by WVDOH.
    - Flashing Walk (Upraised Hand) PCT = 10-12 seconds
    - No steady “Upraised Hand” buffer interval was observed that should display before vehicles are released (MUTCD now requires a minimum 2-second buffer)
- Calculations of the minimum required pedestrian clearance times as recommended per the current MUTCD, which has not yet been adopted by the WVDOH (full adoption required in January 2026) were performed. Based on the length of the intersection crosswalks, the intervals currently in operation were found to be insufficient at several of the signalized intersections.
    - Pedestrian clearances were calculated assuming different crossing distances and

walking speeds. **Appendix B** provides minimum calculations for the following inputs:

- Maximum marked crossing distance with 3.5 ft/s walking speed
- Maximum marked crossing distance with 3.0 ft/s walking speed (recommended for pedestrians using wheelchairs)
- Diagonal crossing distance with 3.5 ft/s walking speed
- Note, the buffer interval, which is typically the yellow change interval, can be included to help satisfy the minimum calculated pedestrian clearance time. For all signals in study area, the yellow interval for all pedestrian phases is currently 3 seconds.

***Figure 19**: Pedestrian Jaywalks Across Washington St Near the Clay Center*

***Figure 20**: Person in Wheelchair Jaywalking Across Lewis St*

Signal Coordination:

Synchronized traffic signals reduce stop-and-go traffic, which helps lower rear-end and aggressive driving crashes. Within the study area, the traffic signals were not well-coordinated for at least a portion of the day. For example, vehicles traveling on Leon Sullivan Way between Washington and Lee Streets would frequently stop twice. According to the timing plans, these signals should be coordinated; however, observed cycle-to-cycle variations in coordination suggest that one of the signals may be experiencing a coordination fault, causing it to operate in Free (uncoordinated) mode. Stop-and-go conditions were also observed along Washington Street between Morris Street and Leon Sullivan Way.

Unsafe Driving Behaviors:

Below is a list of unsafe driving behaviors that were witnessed during field reviews.

- A wrong-way vehicle was observed turning from Smith Street onto Brooks Street.
- Vehicles were observed not fully stopping before turning right on red at all signalized intersections. This is particularly concerning for pedestrians.
- Distracted drivers were observed using phones while stopped at intersections.

5. Safety Analysis

5.1 Crash Review

Crash Data for the timeframe including January 1, 2018, through December 31, 2022, was downloaded from AASHTOWare Safety website and WVDOH ReportBeam for downtown Charleston within the project area. During this timeframe, there were 116 crashes **(Figures 21-23)** including one (1) fatality, two (2) serious injuries, eleven (11) minor injuries, sixteen (16) possible injuries and eighty-six (86) property damage only. A few notable crash characteristics are listed as follows:

- One hundred and six (106) collisions were intersection related and ten (10) were segment related.
- One hundred (100) collisions were in daylight, fourteen (14) collisions occurred at dark-lighted, one (1) was at dawn and one (1) at dusk.
- Ninety-nine (99) collisions were in clear conditions, nine (9) were noted as cloudy, six (6) were in the rain, one (1) was in sleet, hail or freezing rain, and one (1) was in snow.
- One hundred and three (103) collisions were on dry pavement, twelve (12) were on wet and one (1) collision was in slush.

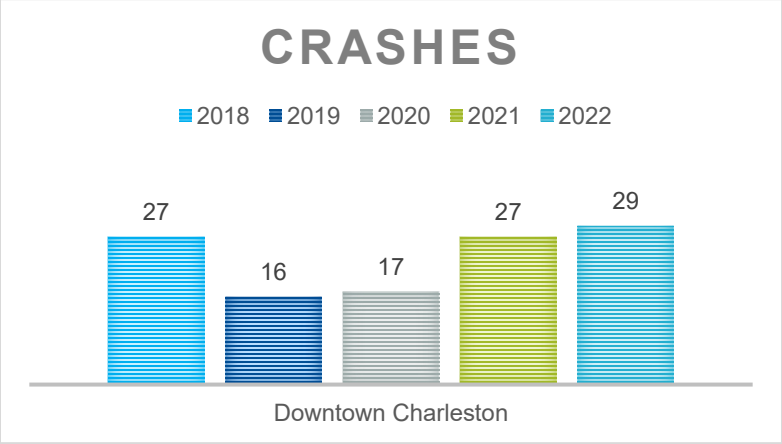

Figure 21: *Crash Occurrence in Study Area*

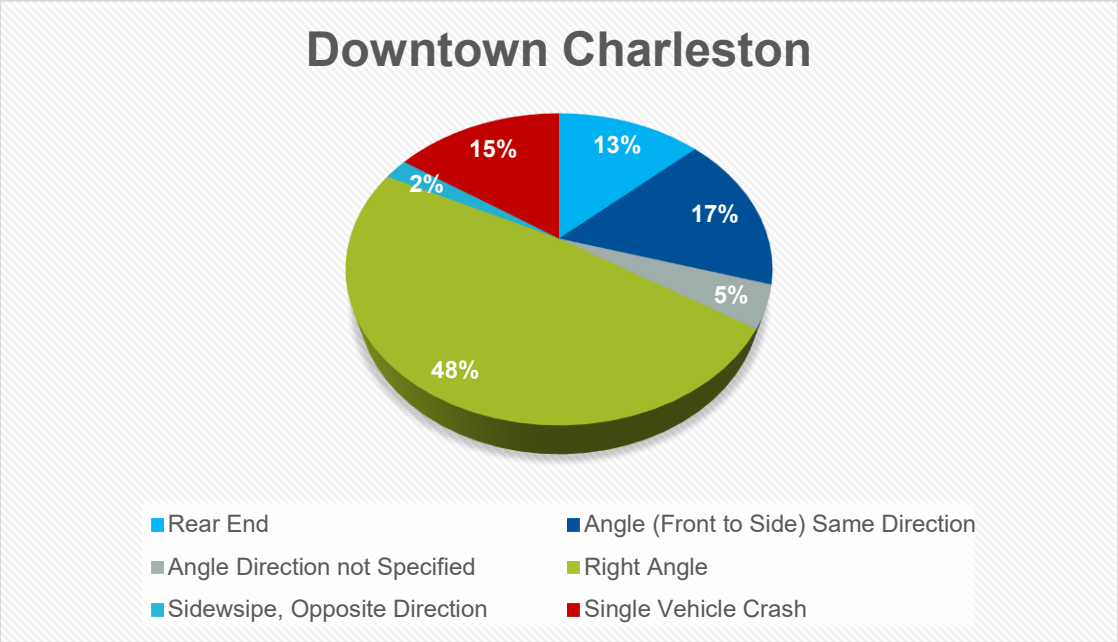

***Figure 22**: Crashes Summarized by Manner of Collision*

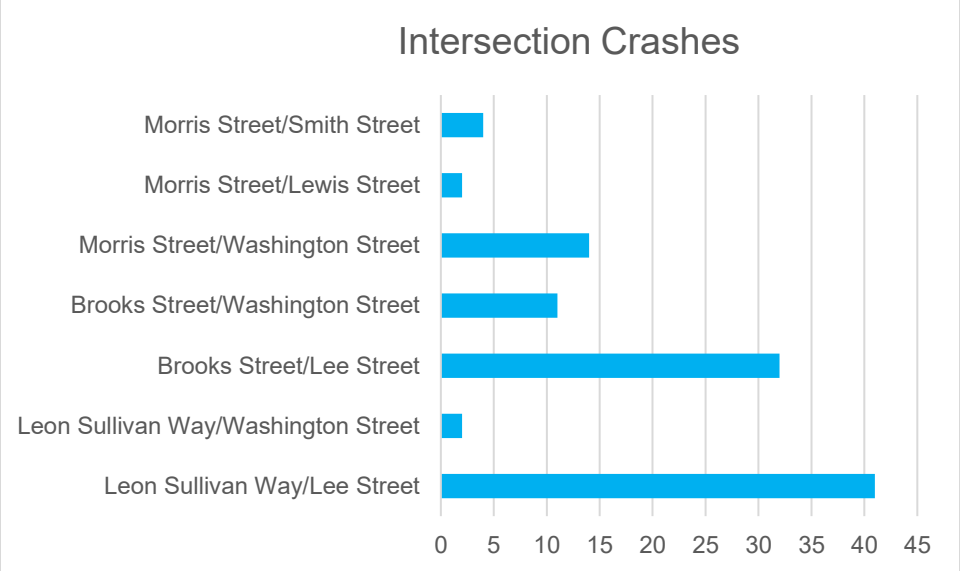

***Figure 23:** Intersection Crashes*

A map showing the location and severity of the crashes in the study area is shown in **Figure 24.**

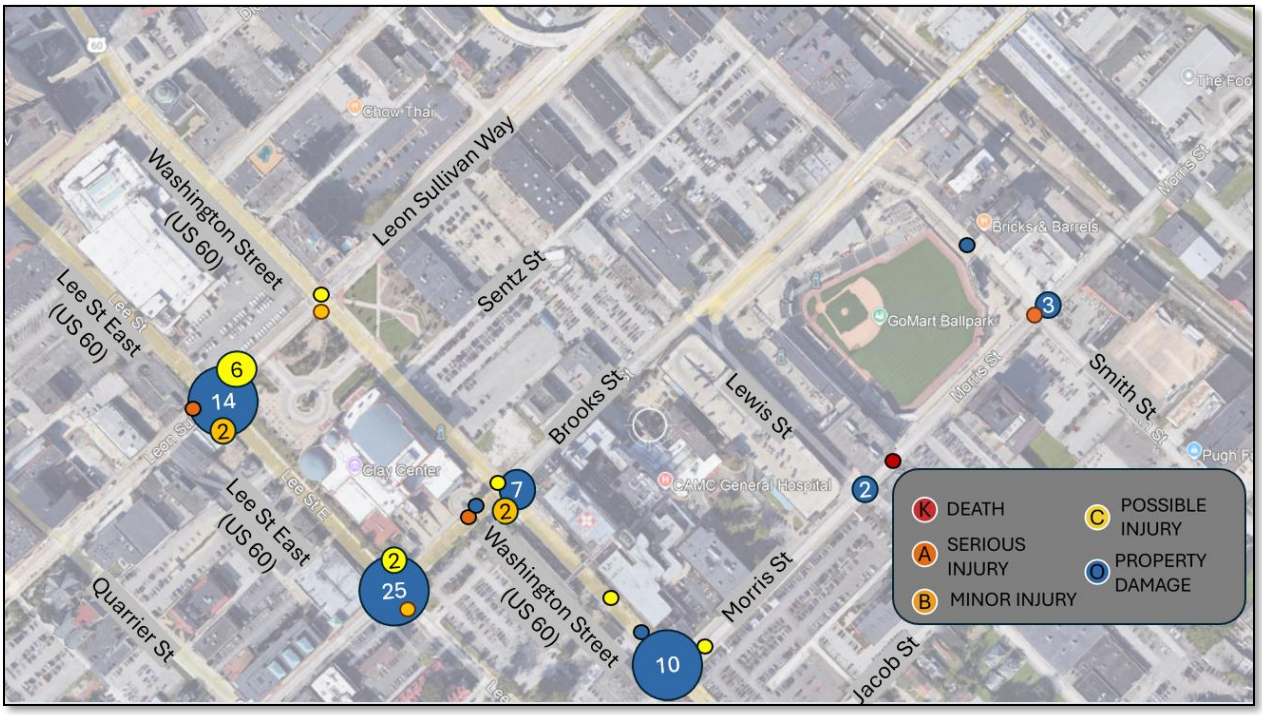

Figure 24: *Crash Locations*

A total of eight (8) collisions involved pedestrians or a motorized mobility device **(Figure 25)**. One collision resulted in a fatality, 6 were minor injuries and 1 was property damage only. A few crash characteristics are listed below for collisions involving Vulnerable Road Users:

- Seven (7) collisions were during the daylight, and one (1) was in dark-lighted conditions
- Seven (7) collisions were on dry pavement, and one (1) was on wet pavement.
- Five (5) collisions were at intersections, one (1) was at an entrance to a parking lot and two (2) collisions involve vehicles driving in their lane.

A fatal single vehicle crash striking a pedestrian occurred on November 11, 2018, at 5:45 p.m. on Washington Street near the intersection with Morris Street. The investigating officer obtained video footage from the Right Aid surveillance system. The officer noted the pedestrian was using the nearby marked crosswalk and driver was suspected of driving while distracted.

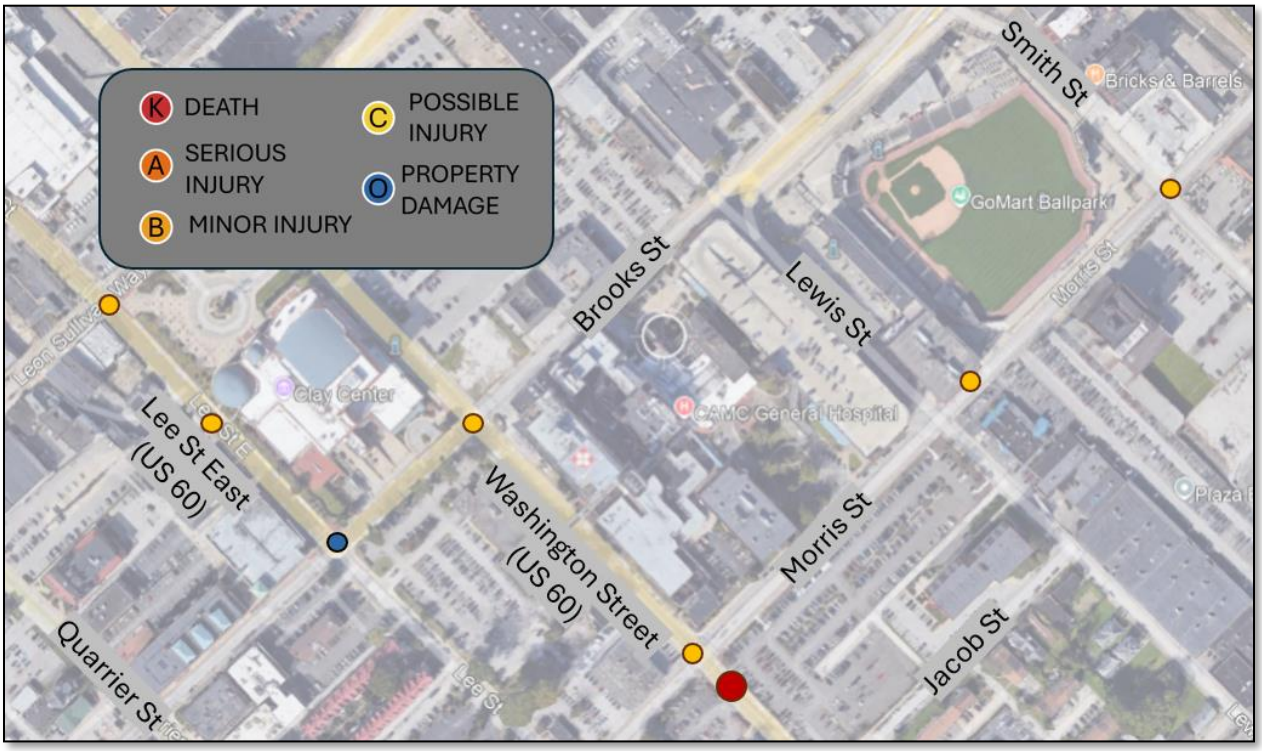

***Figure 25**: Crashes in study area involving VRU*

The crash report summary lists are provided in **Appendix C**.

5.2 Safety Assessment for Every Roadway (SAFER)

As part of WVDOH's desire to facilitate safety discussions for transportation, all WVDOH projects require designers to complete and submit to the Traffic Engineering Division the Safety Assessment for Every Roadway (SAFER) form for the project as part of the Preliminary Field Review and Final Office Review. All WVDOH studies also require completion and submission of the SAFER form. To help streamline incorporating the recommendations in this report within WVODH projects, a SAFER form has been completed and will be submitted to Traffic Engineering Division (with RIC's approval) for consideration and inclusion in upcoming WVDOH projects. The proposed SAFER form can be found in **Appendix D.**

5.3 Countermeasure for Consideration

The following countermeasures were identified as potential solutions to improve safety within the study area:

- Install high visibility crosswalks
- Install raised crosswalks
- Upgrade existing crossing on Washington Street and Sentz Street to a Rectangular Rapid Flashing Beacon (RRFB) with pedestrian focused lighting and advanced warning signs with retroreflective strip on sign support
- Install new street lighting with LED light fixtures for enhanced visibility at crosswalks
- Install high-visibility signage at intersections
- Install longitudinal bar crosswalks where missing
    - Widen existing crosswalk pavement markings to match sidewalk widths
- Install raised crosswalks
- Install backplates with retroreflective borders on all traffic signal heads
- Rephase traffic signals to eliminate pedestrian scramble phases and implement concurrent vehicle / pedestrian phases with leading pedestrian intervals placed on recall.
- Provide a buffer interval consisting of a steady UPRAISED HAND between the pedestrian change interval (flashing DONT WALK/UPRAISED HAND) and the release of conflicting traffic.
- Calculate and implement yellow change and all-red clear intervals using current ITE recommended practices and applicable state guidance.
- Install red light running cameras (the automated enforcement portion of this countermeasure is currently not allowed in West Virginia and would require a change in State Code)
- Increase police presence
- Work with Highway Safety Management Task Force (HSMTF) on an education campaign for safety at intersections

6. Conclusion and Recommendations

The WVDOH, in developing their 2024 HSIP Implementation Plan, performed a data review and compared it to their expenditures. Areas within the program were identified that the State should take to make significant progress toward meeting its safety performance targets. Among the recommendations were two significant actions related to RIC: WVDOH would work with RIC to develop more projects in Kanawha County, and WVDOH would implement the recommendations from the Vulnerable Road Users plan. In addition, WVDOH's 2022 SHSP identified two new emphasis areas that were trending upward: Pedestrians and Intersections. Charleston was among the five cities identified as having the most fatalities and serious injuries in the State in these two categories. West Virginia cannot achieve their goal without investment in Charleston.

The following recommendations will assist in making significant progress towards West Virginia's objective of zero fatalities.

Pedestrians

- Reapply the longitudinal bar crosswalks as needed at intersections
- Widen the longitudinal bar crosswalks from 6' up to the width of the sidewalk at the following intersections: Lewis Street with Morris Street; Washington Street with Morris Street; Washington Street with Leon Sullivan Way; and Lee Street with Leon Sullivan Way
- Upgrade the pedestrian crossing at the intersection of Washington Street and Sentz Street with a high visibility crosswalk, RRFB, pedestrian lighting and advanced warning signs.
- Upgrade the pedestrian crossing at Morris Street and GoMart Ballpark with a high visibility crosswalk, RRFB, pedestrian lighting and advanced warning signs.
- Install crosswalks at intersection of Smith Street and Morris Street, Brooks Street and Lewis Street (excluding I-64 ramps) and Smith Street and Brooks Street
- Relocate crosswalk on Morris Street at Smith Street intersection closer to stop sign for better visibility and to shorten crossing distance.
- Install and upgrade lighting at all intersections and midblock crosswalks to LED
- Improve drainage in area – This countermeasure is complex, and it should be included in a separate drainage review of all streets in Downtown Charleston.
- Work with HSMTF to host a pedestrian safety awareness campaign.
- Increase Police Presence

- Work with WVDOH and KRT to review the possibility of far-side shelters and signs for Transit Stop at the northwest corner of Washington Street E at both intersection with Morris Street and intersection with Leon Sullivan Way.
    - Install Turning Vehicles Stop for Pedestrian (R10-15) sign on the signal mast arms for all approaches.
- Work with WVDOH to explore option of Installing No Right Turn on Red (R10-11B) at the following intersections:
    - Washington Street E & Brooks Street
    - Washington Street E & Morris Street
    - Lewis Street & Morris Street

Traffic Signal Operations:

- Install backplates with reflective trim on all traffic signal heads
- Upgrade accessible pedestrian signal pushbuttons with appropriate signs and audio tones that are compliant with the MUTCD
    - At intersections with exclusive pedestrian (scramble) phases, consider a speech WALK message such as “Walk sign is on for all crossings”
- Signal Phasing Improvements:
    - Rephase some or all signals to eliminate the exclusive pedestrian (scramble) phase and allow the pedestrian movements to run concurrently with the associated vehicles phases. Place all pedestrian phases on recall.
        i. This will reduce delay for both pedestrians and vehicles and not require pedestrians to press the pushbutton unless they would like to request audio assistance.
        ii. If exclusive pedestrian phases are kept, consider increasing the pedestrian clearance interval to accommodate diagonal crossings across the entire intersection without creating significant delays for vehicle traffic.
    - Implement a 3-5 second LPI for all pedestrian phases unless further engineering review/judgement shows otherwise.
- Signal Timing Improvements:
    - Implement yellow change and all-red clearance timings to meet minimum requirements in accordance with the MUTCD
    - Implement WALK and pedestrian clearance intervals that are sufficient to accommodate both typical pedestrians (using the default walking speed of 3.5

ft/s) and persons with disabilities (using a reduced walking speed of 3.0 ft/s), given the proximity of the intersections to the CAMC General Hospital and Clay Center where such users are frequently present.

- For the intersection at Washington and Morris Streets, implement a 3-5 second leading pedestrian interval (LPI) for Washington Street phases 2 and 6 only.
    i. Due to the protected/permissive left-turn phasing on Morris Street, LPIs are not recommended for Morris Street phases 4 & 8, as they could result in conflicts between left-turning vehicles and pedestrians entering the crosswalk during the permissive phase
- Review signal plans and live controller databases to fix coordination faults
- Develop and implement optimized signal timings to enhance signal coordination, thereby minimizing stop-and-go conditions and mitigating the potential for aggressive driving behaviors as resources permit.

7. Resources

- RIC's Comprehensive Safety Action Plan (2023), https://wvregion3.org/wp-content/uploads/2020/07/FULL_CSAP_RIC_reduced.pdf
- RIC's Kanawha-Putnam Bicycle & Pedestrian Plan (2020), https://wvregion3.org/wp-content/uploads/2020/07/RICBikePedPlan-10-Dec-2020-UPDATED_1.pdf
- WVDOH Vulnerable Road User Assessment (2022), https://transportation.wv.gov/highways/traffic/SiteAssets/Pages/default/WV%20VRU%20Assessment.pdf
- WV Strategic Highway Safety Plan https://transportation.wv.gov/highways/traffic/Documents/StrategicHighwaySafetyPlan.pdf
- 2024 West Virginia Highway Safety Improvement Program Annual Report https://highways.dot.gov/sites/fhwa.dot.gov/files/2025-03/HSIP_Report_WEST%20VIRGINIA_2024_508.pdf
- Manual on Uniform Traffic Control Devices (MUTCD) Part 2, 3 and 4 https:\\MUTCD 11th Edition - FHWA MUTCD
- WVDOH Traffic Engineering Division, Traffic Monitoring Unit: https://gis.transportation.wv.gov/aadt/
- WVDOH GIS Division, Functional Classifications: https://gis.transportation.wv.gov/ftp/FunctionalClassMaps/Federal_Functional_Class.pdf
- WVDOH Traffic Engineering Directives, https://transportation.wv.gov/highways/traffic/Pages/TrafficEngineeringDirectives.aspx,

Appendix A

Vehicle Spot Speed Report

WEST VIRGINIA DEPARTMENT OF HIGHWAYS

VEHICLE SPOT SPEED STUDY

SPEED RANGES	NUMBER OF VEHICLES	PERCENT OF TOTAL	PERCENT ACCUMULATION
5	0	0.0%	0.0%
6	0	0.0%	0.0%
7	0	0.0%	0.0%
8	0	0.0%	0.0%
9	0	0.0%	0.0%
10	0	0.0%	0.0%
11	0	0.0%	0.0%
12	0	0.0%	0.0%
13	0	0.0%	0.0%
14	2	3.6%	3.6%
15	3	5.5%	9.1%
16	1	1.8%	10.9%
17	0	0.0%	10.9%
18	3	5.5%	16.4%
19	2	3.6%	20.0%
20	3	5.5%	25.5%
21	8	14.5%	40.0%
22	3	5.5%	45.5%
23	6	10.9%	56.4%
24	8	14.5%	70.9%
POSTED SPEED 25	2	3.6%	74.5%
26	1	1.8%	76.4%
27	3	5.5%	81.8%
28	3	5.5%	87.3%
29	3	5.5%	92.7%
30	2	3.6%	96.4%
31	1	1.8%	98.2%
32	0	0.0%	98.2%
33	0	0.0%	98.2%
34	0	0.0%	98.2%
35	0	0.0%	98.2%
36	0	0.0%	98.2%
37	1	1.8%	100.0%
38	0	0.0%	100.0%
39	0	0.0%	100.0%
40	0	0.0%	100.0%
41	0	0.0%	100.0%
42	0	0.0%	100.0%
43	0	0.0%	100.0%
44	0	0.0%	100.0%
45	0	0.0%	100.0%
46	0	0.0%	100.0%
47	0	0.0%	100.0%
48	0	0.0%	100.0%
49	0	0.0%	100.0%
50	0	0.0%	100.0%
51	0	0.0%	100.0%
52	0	0.0%	100.0%
53	0	0.0%	100.0%
54	0	0.0%	100.0%
55	0	0.0%	100.0%
56	0	0.0%	100.0%
57	0	0.0%	100.0%
58	0	0.0%	100.0%
59	0	0.0%	100.0%
60	0	0.0%	100.0%
TOTAL VEHICLES:	55		

RECORDER: JSH

LOCATION: Brooks Street and Lewis Street Intersection

APPROACH: NE

SURFACE: Dry

WEATHER: Sunny

DATE: 5/14/2025

TIME: 9:51 AM

SURVEY STATISTICS

POSTED SPEED:	25	MPH
AVERAGE SPEED:	23	MPH
MEDIAN SPEED:	22	MPH
MODAL SPEED:	21	MPH
85TH PERCENTILE SPEED:	27	MPH
10 MPH PACE:	20 - 29	MPH
PERCENT IN PACE:	73%	
PERCENT ENFORCEABLE:	2%	

COMMENTS:

WEST VIRGINIA DEPARTMENT OF HIGHWAYS

VEHICLE SPOT SPEED STUDY

SPEED RANGES	NUMBER OF VEHICLES	PERCENT OF TOTAL	PERCENT ACCUMULATION
5	0	0.0%	0.0%
6	0	0.0%	0.0%
7	0	0.0%	0.0%
8	0	0.0%	0.0%
9	0	0.0%	0.0%
10	0	0.0%	0.0%
11	0	0.0%	0.0%
12	0	0.0%	0.0%
13	0	0.0%	0.0%
14	0	0.0%	0.0%
15	1	2.0%	2.0%
16	0	0.0%	2.0%
17	0	0.0%	2.0%
18	1	2.0%	3.9%
19	1	2.0%	5.9%
20	2	3.9%	9.8%
21	1	2.0%	11.8%
22	5	9.8%	21.6%
23	6	11.8%	33.3%
24	7	13.7%	47.1%
POSTED SPEED: 25	3	5.9%	52.9%
26	6	11.8%	64.7%
27	2	3.9%	68.6%
28	5	9.8%	78.4%
29	3	5.9%	84.3%
30	3	5.9%	90.2%
31	4	7.8%	98.0%
32	0	0.0%	98.0%
33	1	2.0%	100.0%
34	0	0.0%	100.0%
35	0	0.0%	100.0%
36	0	0.0%	100.0%
37	0	0.0%	100.0%
38	0	0.0%	100.0%
39	0	0.0%	100.0%
40	0	0.0%	100.0%
41	0	0.0%	100.0%
42	0	0.0%	100.0%
43	0	0.0%	100.0%
44	0	0.0%	100.0%
45	0	0.0%	100.0%
46	0	0.0%	100.0%
47	0	0.0%	100.0%
48	0	0.0%	100.0%
49	0	0.0%	100.0%
50	0	0.0%	100.0%
51	0	0.0%	100.0%
52	0	0.0%	100.0%
53	0	0.0%	100.0%
54	0	0.0%	100.0%
55	0	0.0%	100.0%
56	0	0.0%	100.0%
57	0	0.0%	100.0%
58	0	0.0%	100.0%
59	0	0.0%	100.0%
60	0	0.0%	100.0%
TOTAL VEHICLES:	51		

RECORDER: JSH

LOCATION: Lee Street East by House of Hounds

APPROACH: N/A

SURFACE: Dry

WEATHER: Cloudy

DATE: 5/14/2025

TIME: 9:20 AM

SURVEY STATISTICS

POSTED SPEED:	25	MPH
AVERAGE SPEED:	25	MPH
MEDIAN SPEED:	24	MPH
MODAL SPEED:	24	MPH
85TH PERCENTILE SPEED:	29	MPH
10 MPH PACE:	22 - 31	MPH
PERCENT IN PACE:	86%	
PERCENT ENFORCEABLE:	0%	

COMMENTS:

WEST VIRGINIA DEPARTMENT OF HIGHWAYS

VEHICLE SPOT SPEED STUDY

SPEED RANGES	NUMBER OF VEHICLES	PERCENT OF TOTAL	PERCENT ACCUMULATION
5	0	0.0%	0.0%
6	0	0.0%	0.0%
7	0	0.0%	0.0%
8	0	0.0%	0.0%
9	0	0.0%	0.0%
10	0	0.0%	0.0%
11	0	0.0%	0.0%
12	0	0.0%	0.0%
13	0	0.0%	0.0%
14	1	1.9%	1.9%
15	0	0.0%	1.9%
16	1	1.9%	3.8%
17	3	5.7%	9.4%
18	5	9.4%	18.9%
19	4	7.5%	26.4%
20	7	13.2%	39.6%
21	3	5.7%	45.3%
22	5	9.4%	54.7%
23	4	7.5%	62.3%
24	3	5.7%	67.9%
POSTED SPEED: 25	5	9.4%	77.4%
26	3	5.7%	83.0%
27	2	3.8%	86.8%
28	2	3.8%	90.6%
29	3	5.7%	96.2%
30	1	1.9%	98.1%
31	0	0.0%	98.1%
32	0	0.0%	98.1%
33	0	0.0%	98.1%
34	0	0.0%	98.1%
35	0	0.0%	98.1%
36	0	0.0%	98.1%
37	0	0.0%	98.1%
38	1	1.9%	100.0%
39	0	0.0%	100.0%
40	0	0.0%	100.0%
41	0	0.0%	100.0%
42	0	0.0%	100.0%
43	0	0.0%	100.0%
44	0	0.0%	100.0%
45	0	0.0%	100.0%
46	0	0.0%	100.0%
47	0	0.0%	100.0%
48	0	0.0%	100.0%
49	0	0.0%	100.0%
50	0	0.0%	100.0%
51	0	0.0%	100.0%
52	0	0.0%	100.0%
53	0	0.0%	100.0%
54	0	0.0%	100.0%
55	0	0.0%	100.0%
56	0	0.0%	100.0%
57	0	0.0%	100.0%
58	0	0.0%	100.0%
59	0	0.0%	100.0%
60	0	0.0%	100.0%
TOTAL VEHICLES:	53		

RECORDER: JSH

LOCATION: Washington Street by CAMC overpass

APPROACH: SE

SURFACE: Dry

WEATHER: Sunny

DATE: 5/14/2025

TIME: 10:40 AM

SURVEY STATISTICS

POSTED SPEED:	25	MPH
AVERAGE SPEED:	22	MPH
MEDIAN SPEED:	21	MPH
MODAL SPEED:	20	MPH
85TH PERCENTILE SPEED:	26	MPH
10 MPH PACE:	17 - 26	MPH
PERCENT IN PACE:	79%	
PERCENT ENFORCEABLE:	2%	

COMMENTS:

WEST VIRGINIA DEPARTMENT OF HIGHWAYS

VEHICLE SPOT SPEED STUDY

SPEED RANGES	NUMBER OF VEHICLES	PERCENT OF TOTAL	PERCENT ACCUMULATION
5	0	0.0%	0.0%
6	0	0.0%	0.0%
7	0	0.0%	0.0%
8	0	0.0%	0.0%
9	0	0.0%	0.0%
10	0	0.0%	0.0%
11	0	0.0%	0.0%
12	0	0.0%	0.0%
13	0	0.0%	0.0%
14	0	0.0%	0.0%
15	0	0.0%	0.0%
16	1	1.0%	1.0%
17	3	2.9%	3.8%
18	10	9.5%	13.3%
19	14	13.3%	26.7%
20	8	7.6%	34.3%
21	12	11.4%	45.7%
22	9	8.6%	54.3%
23	10	9.5%	63.8%
24	10	9.5%	73.3%
POSTED SPEED 25	8	7.6%	81.0%
26	7	6.7%	87.6%
27	5	4.8%	92.4%
28	5	4.8%	97.1%
29	1	1.0%	98.1%
30	1	1.0%	99.0%
31	0	0.0%	99.0%
32	1	1.0%	100.0%
33	0	0.0%	100.0%
34	0	0.0%	100.0%
35	0	0.0%	100.0%
36	0	0.0%	100.0%
37	0	0.0%	100.0%
38	0	0.0%	100.0%
39	0	0.0%	100.0%
40	0	0.0%	100.0%
41	0	0.0%	100.0%
42	0	0.0%	100.0%
43	0	0.0%	100.0%
44	0	0.0%	100.0%
45	0	0.0%	100.0%
46	0	0.0%	100.0%
47	0	0.0%	100.0%
48	0	0.0%	100.0%
49	0	0.0%	100.0%
50	0	0.0%	100.0%
51	0	0.0%	100.0%
52	0	0.0%	100.0%
53	0	0.0%	100.0%
54	0	0.0%	100.0%
55	0	0.0%	100.0%
56	0	0.0%	100.0%
57	0	0.0%	100.0%
58	0	0.0%	100.0%
59	0	0.0%	100.0%
60	0	0.0%	100.0%
TOTAL VEHICLES:	105		

RECORDER: JSH

LOCATION: Washington Street by CAMC overpass

APPROACH: NW

SURFACE: Dry

WEATHER: Sunny

DATE: 5/14/2025

TIME: 11:11 AM

SURVEY STATISTICS

POSTED SPEED:	25	MPH
AVERAGE SPEED:	22	MPH
MEDIAN SPEED:	21	MPH
MODAL SPEED:	19	MPH
85TH PERCENTILE SPEED:	25	MPH
10 MPH PACE:	18 - 27	MPH
PERCENT IN PACE:	89%	
PERCENT ENFORCEABLE:	0%	

COMMENTS:

Appendix B

Pedestrian Change & Clearance Interval Calculations

LEON SULLIVAN WAY AND LEE STREET INTERSECTION										
	PHASE #									
	1	2	3	4	5	6	7	8	9	PCT Minus Yellow Change Buffer Meets Min Req. Ped Clearance*
WALK	-	-	-	-	-	-	-	-	7	
PED CLEARANCE	-	-	-	-	-	-	-	-	10	
MIN REQUIRED PED CLEARANCE FOR MARKED CROSSWALK (3.5 ft/s)	-	-	-	-	-	-	-	-	11	YES
MIN REQUIRED PED CLEARANCE FOR DIAGONAL CROSSING (3.5 ft/s)	-	-	-	-	-	-	-	-	16	NO
MIN REQUIRED PED CLEARANCE FOR WHEELCHAIR USER (3.0 ft/s)	-	-	-	-	-	-	-	-	13	YES

LEON SULLIVAN WAY AND WASHINGTON STREET INTERSECTION										
	PHASE #									
	1	2	3	4	5	6	7	8	9	PCT Minus Yellow Change Buffer Meets Min Req. Ped Clearance*
WALK	-	-	-	-	-	-	-	-	7	
PED CLEARANCE	-	-	-	-	-	-	-	-	10	
MIN REQUIRED PED CLEARANCE FOR MARKED CROSSWALK (3.5 ft/s)	-	-	-	-	-	-	-	-	14	NO
MIN REQUIRED PED CLEARANCE FOR DIAGONAL CROSSING (3.5 ft/s)									20	NO
MIN REQUIRED PED CLEARANCE FOR VULNERABLE USER (3.0 ft/s)									14	NO

	Crossing Distance (ft)
Leon Sullivan NB	36
Leon Sullivan SB	38
Lee EB	32
Lee WB	33
Diagonal	56

	Crossing Distance (ft)
Leon Sullivan NB	42
Leon Sullivan SB	40
Washington EB	40
Washington WB	48
Diagonal	70

Appendix C

WVDOH Crash Data Summary

Summary of Crashes on City Streets

Report	Date	Street	Side Street	Crash Severity	Crash Type	Weather	Road Surface	Lighting	Intersection Related	VRU
201809222	4/13/2018	Brooks St	Lee St	O	Sideswipe, Same Direction	Clear	Dry	Daylight	Yes	No
201818042	7/13/2018	Morris St	Lewis St	O	Sideswipe, Same Direction	Clear	Dry	Daylight	No	No
201825064	9/18/2018	Morris St	Washington St.	C	Rear End	Clear	Dry	Daylight	No	No
201900362	1/9/2019	Smith St	Morris St	O	Sideswipe, Same Direction	Clear	Wet	Dark - Lighted	Yes	No
201914790	6/7/2019	Morris St	Smith St	O	Rear End	Cloudy	Dry	Daylight	No	No
201918670	7/23/2019	Morris St	Lewis St	O	Sideswipe, Same Direction	Clear	Dry	Daylight	No	No
202019256	9/15/2020	Smith St	Morris St	O	Sideswipe, Opp Direction	Clear	Dry	Daylight	No	No
202029189	11/9/2020	Brooks St	Near Washington	O	Sideswipe, Same Direction	Clear	Dry	Daylight	No	No
202102636	2/8/2021	Morris St	Washington St.	O	Right Angle	Clear	Dry	Daylight	Yes	No
202112756	6/9/2021	Morris St	Smith St	B	Single Vehicle Crash	Clear	Dry	Daylight	Yes	Yes
202205694	3/11/2022	Brooks St	Washington St.	C	Sideswipe, Same Direction	Clear	Dry	Daylight	Yes	No
202205998	3/18/2022	Brooks St	Washington St.	O	Right Angle	Clear	Dry	Daylight	Yes	No
202214519	6/3/2022	Brooks St	Lee St	O	Sideswipe, Same Direction	Clear	Dry	Daylight	Yes	No
202215142	6/2/2022	Morris St	Smith St	O	Angle (F to S) Opp Direction	Clear	Dry	Daylight	Yes	No
202222405	9/30/2022	Morris St	CAMC Plaza	B	Single Vehicle Crash	Clear	Dry	Daylight	No	Yes
202223800	10/17/2022	Brooks St	Lee St	O	Single Vehicle Crash	Clear	Dry	Dark - Lighted	No	No

Summary of Crashes on City Maintained Streets from January 1, 2018-December 31, 2022

Crash Summary Report of Downtown Charleston State Maintained Streets

CO1 - Date of Crash (Year)		Crash
2022	23	23.00%
2021	25	25.00%
2020	15	15.00%

2019	13	13.00%
2018	24	24.00%
+ 3 more	0	0%

C03 - Crash Severity		Crash
Property Damage Only Crash	74	74.00%
Possible Injury Crash	14	14.00%
Minor Injury Crash	9	9.00%
Serious Injury Crash	2	2.00%
Fatal Crash	1	1.00%

C04 - County		Crash
Kanawha	100	100.00%
+ 54 more	0	0%

C05 - Sign System		Crash
US	100	100.00%
+ 3 more	0	0%

C06 - Location Name		Crash
Kanawha US 60/00	100	100.00%
+ 999 more	0	0%

C07 - Route Direction		Crash
EB	87	87.00%
WB	13	13.00%
+ 2 more	0	0%

C14 - Manner of Collision		Crash
Right Angle	42	42.00%
Sideswipe, Same Direction	16	16.00%
Angle (Front to Side) Same Direction	14	14.00%
Single Vehicle Crash	11	11.00%
Rear End	10	10.00%
Angle - Direction Not Specified	4	4.00%
Angle (Front to Side) Opp. Direction	2	2.00%
Sideswipe, Opposite Direction	1	1.00%
+ 3 more	0	0%

C19 - First Harmful Event		Crash
Motor Vehicle In Transport	78	78.00%
Parked Motor Vehicle	7	7.00%
Pedestrian	6	6.00%
Other Non-Collision	4	4.00%
Other Fixed Object	1	1.00%
Overturn/Rollover	1	1.00%
Pedalcycle	1	1.00%
Traffic Signal Support	1	1.00%
+ 29 more	1	1%

C18 - Location of First Harmful Event		Crash
On Roadway	98	98.00%
Roadside	1	1.00%
Shoulder	1	1.00%
+ 7 more	0	0%

C15 - Lighting Condition		Crash
Daylight	86	86.00%
Dark - Lighted	12	12.00%
Dawn	1	1.00%
Dusk	1	1.00%
+ 2 more	0	0%

C20 - Environmental Contributing Circumstance		Crash
None	98	98.00%
Glare	1	1.00%
Weather Conditions	1	1.00%
+ 4 more	0	0%

C22 - Weather Condition		Crash
Clear	84	84.00%
Cloudy	8	8.00%
Rain	6	6.00%
Blowing Snow	1	1.00%
Sleet, Hail, or Freezing Rain	1	1.00%
Snow	1	1.00%
+ 5 more	0	0%

C16 - Roadway Surface Condition		Crash
Dry	88	88.00%
Wet	11	11.00%
Slush	1	1.00%
+5 more	0	0%

C17 - Road Surface Type		Crash
Asphalt	84	84.00%
Concrete	16	16.00%
+3 more	0	0%

C21 - Road Contributing Circumstance		Crash
None	98	98.00%
Road Surface Conditions (Wet, Icy etc.)	1	1.00%
Work Zone	1	1.00%
+10 more	0	0%

C01 - Date of Crash and Time (Month of Year)		Crash
January	7	7.00%
February	11	11.00%
March	7	7.00%
April	7	7.00%
May	7	7.00%
June	6	6.00%
July	9	9.00%
August	6	6.00%
+4 more	40	40%

C01 - Date of Crash and Time (Day of Week)		Crash
FRIDAY	14	14.00%
MONDAY	15	15.00%
SATURDAY	11	11.00%
SUNDAY	5	5.00%
THURSDAY	16	16.00%
TUESDAY	27	27.00%
WEDNESDAY	12	12.00%

C01 - Date of Crash and Time (Hour of Day)		Crash
2 am - 4 am	1	1.00%

4 am - 6 am	1	1.00%
6 am - 8 am	5	5.00%
8 am - 10 am	13	13.00%
10 am - 12 pm	13	13.00%
12 pm - 2 pm	19	19.00%
2 pm - 4 pm	16	16.00%
4 pm - 6 pm	21	21.00%
+ 4 more	11	11%

C26 - Reporting Agency Type		Crash
Municipal PD	100	100.00%
+ 3 more	0	0%

C23 - School Bus Involved		Crash
No	100	100.00%
+ 2 more	0	0%

C24 - School Zone Related		Crash
No	100	100.00%
Yes	0	0.00%

C25 - Work Zone Related		Crash
No	99	99.00%
Yes	1	1.00%

Appendix D

Safety Assessment For Every Roadway (SAFER)

Downtown Charleston Safety Study-SAFER Study Phase

Thes quesitons are to be answered during before completion of a design study and at the final design preliminary field review

				Yes	No	N/A
VULNERABLE ROADWAY USERS						
1.1	Are there opportunities to enhance crossings based on factors such as	1.1.1	number of lanes crossed,	x		
		1.1.2	Average Annual Daily Traffic (AADT),	x		
		1.1.3	and speeds?		x	
	*Reference: Field Guide for Selecting Countermeasures at Uncontrolled Pedestrian Crossing Locations, Table 1.					
1.2	Are there trail crossing locations that could be improved?				x	
1.3	Is the speed of the roadway conducive to Vulnerable Roadway Users (VRUs) along the corridor?			x		
1.4	Are there traffic calming measures that could be implemented, such as narrow lanes, road diets, or roundabouts?			x		
1.5	Is there sufficient crossing movement time for VRUs? Consider options like leading pedestrian intervals or extended crossing intervals.			x		
1.6	Can vehicle traffic and VRUs be separated effectively? Options include barriers or grade separations.				x	
1.7	Is there an overall bike/ped plan for the community that this project can accommodate?			x		
1.8	Consider improvements near transit stations. Is the transit station located optimally?			x		
1.9	Are there high generators of bike/ped traffic that require additional improvements? This could include bus stops, schools, or tourist areas.			x		
1.10	Are there alcohol establishments nearby that may merit additional improvements? Consider enhanced crosswalk visibility.			x		
1.11	Are improvements identified on the WVDOH ADA transition plan? Can these go beyond ADA to incorporate pedestrian safety?					x
1.12	Are Intelligent Transportation System (ITS) solutions incorporated at mid-block and signalized intersections?				x	
1.13	Are there gaps within the VRU infrastructure that can be made continuous?				x	
1.14	Are there unique road users in the area, such as horse/buggy traffic, schools, or older roadway users?			x		
1.15	Does the location allow for complete street concepts?			x		
1.16	Are there elements of the roadway that block pedestrian view, such as on-street parking or shrubbery?			x		
1.17	Does the local municipality have a complete streets ordinance or policy that should be considered?			x		

		Yes	No	N/A
ACCESS MANAGEMENT				
2.1	What is the primary focus of the corridor (e.g., through traffic, business district, both)?	x		
2.2	Are there opportunities to consolidate or narrow accesses?		x	
2.3	Are there unused driveways that can be removed?		x	
2.4	Is there an opportunity to change access to reduce severe crash risks?		x	

		Yes	No	N/A
ROADWAY ALIGNMENT				
3.1	Do the curves meet WVDOH standards?			x
3.2	Do the driveways/intersections have poor sight distance?		x	
3.3	Do we have adequate intersection sight distance triangles for side roads?	x		
3.4	Are there any skewed driveways/intersections?		x	

		Yes	No	N/A
ROADWAY VISIBILITY				
4.1	Are there any unlit, raised, non-mountable islands/medians?		x	
4.2	Does the lighting change significantly along the corridor?	x		
4.3	Are crosswalks adequately lit and signed?	x		
4.4	Is there sub-standard or insufficient signing along the roadway?		x	
4.5	Can the visibility of pavement markings be improved for wet conditions?	x		
4.6	Is there a need for increased signal visibility?	x		
4.7	Can driver compliance be improved through enhanced sign visibility?	x		
4.8	Are intersection pavement markings in need of replacement?	x		

ROADWAY SURFACE		Yes	No	N/A
5.1	What is the friction need for the corridor/curves ?	x		
5.2	Are we making the safest use of the roadway cross section?	x		
5.3	Consider adding centerline and edge line rumble strips.		x	
5.4	Are there signs of off-tracking at intersections or through curves?		x	
5.5	Are there rutting issues or drainage problems causing water pooling or hydroplaning?		x	

INTERSECTION/INTERCHANGE DESIGN		Yes	No	N/A
6.1	Is this location feasible for an alternative design, such as a Diverging Diamond Interchange (DDI) or roundabouts?			x
6.2	Are there opportunities to reduce conflict points?		x	
6.3	Are bicyclists and pedestrians accommodated at the intersection?		x	
6.4	Are turn lanes warranted? Can offset turn lanes be incorporated?			x
6.5	Could sight distance be improved by reducing angles or trimming vegetation?		x	
6.6	Are there opportunities to reduce/minimize pedestrian crossing distances?	x		
6.7	Are there opportunities to improve alignment and reduce skew?		x	
6.8	Do the thru lanes align with the appropriate receiving lane?	x		
6.9	Does the interchange/intersection design make drivers more prone to wrong-way movements?			x

ROADSIDE		Yes	No	N/A
7.1	Are there opportunities to upgrade crashworthy devices to current standards?	x		
7.2	Is guardrail length of need sufficient? Do bridge approach transitions need updating?			x
7.3	Is there an elevated risk of vehicles crossing the median? Consider guard cable installation.			x
7.4	Are there fixed objects within the right-of-way/sight triangles?	x		
7.5	Are there edge drop-offs that need addressing?		x	
7.6	Can side slopes be adjusted to be more recoverable?			x
7.7	What is the risk of run-off-road crashes? Consider adding shoulders, rumble strips, or delineation.		x	

TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS (TSMO)		Yes	No	N/A
8.1	Is there a need for additional enforcement to address driver behavior?	x		
8.2	Is there a need to provide warning systems to alert drivers of various conditions?	x		
8.3	Is there an opportunity to improve traffic surveillance to assist incident response?	x		
8.4	Is there an opportunity to improve messaging to drivers, such as dynamic message signs (DMS)?		x	
8.5	Can the traffic signal operations be improved? Consider adjustments to signal timing or preemption for emergency vehicles.	x		
8.6	Can Smart Work Zone strategies be considered during construction?		x	
8.7	Is the shoulder wide enough for emergency response? Are additional emergency response operators needed?		x	
8.8	Have maintenance or emergency response operators identified areas of concern?		x	
8.9	Is there a need for fences along the right-of-way to reduce pedestrian crossings?		x	

OTHER CONSIDERATIONS		Yes	No	N/A
9.1	Does the crash history along the corridor indicate trends that could be mitigated?	x		
9.2	Does the project area include any locations identified on Traffic Safety Lists?	x		
9.3	Have we received customer safety concerns in the project area?	x		
9.4	Can future maintenance activities be made safer?			x
9.5	Can existing at-grade railroad crossings be improved to enhance safety?			x
9.6	Can speed management strategies be implemented?	x		
9.7	Has a safety performance assessment been completed, and is there an opportunity to incorporate findings along the corridor?	x		

	Discussion Information (Not required for SAFER submission)
1.1.1	Study area is large. In some cases, number of lanes could possibly be reduced but further study would be required.
1.1.2	Volumes on the City streets range from roughly 1200-6300 vpd and as such some have excess capacity. The I-64 Brooks St entrance ramp is 6900 vpd and Leon Sullivan Way exit ramp at 10,000 vpd which do not lend themselves to reduction.
1.1.3	No, 85th percentile speed on 3 of 4 sites fall within 2 mph of posted speed limit. The outlier was 4mph outside still within reasonable compliance. Average speeds all fall at or under posted SL of 25 mph.
1.2	No trail crossings
1.3	Average speeds fall at or below 25 mph speed limit
1.4	Road diet may be possible but further study would be needed to review potential sites.
1.5	Minor adjustments to pedestrian intervals to improve overall safety and comply with most recent best practices and requirements
1.6	Separation is not a viable option for this segment
1.7	RIC Kanawha-Putnam Pedestrian & Bicycle Plan (2020)
1.8	KRT has stations but not within the specific study area
1.9	Clay Center, GoMart Park and CAMC Hospital
1.10	Bars in the vicinity
1.11	Unknown, many improvements have been incorporated in the study are already through the ADA transition plan projects
1.12	
1.13	Sidewalks exist throughout study area
1.14	Clay Center, GoMart Park and CAMC Hospital (children, aging and mobility restricted pedestrians)
1.15	Some sites within the study area
1.16	Steet Parking
1.17	Charleston is moving forward with Complete Streets through Capital Connector project & addresses CS in Chapter 3 of its Comprehensive Plan-March 2024
ACCESS MANAGEMENT	
2.1	downtown-commercial business access
2.2	Kanawha County Emergency Abulance Authority could use further review
2.3	No alternate access points available.
2.4	One way streets are currently used
ROADWAY ALIGNMENT	
3.1	No significant horizontal or vertical curves in study limits.
3.2	Sight distance is adequate for speed limit
3.3	Intersection sight distance adequate
3.4	No skewed access points

ROADWAY VISIBILITY	
4.1	
4.2	Combination of decorative poles, wooden poles and signal poles with LED
4.3	Could be improved for visibility but some lighting in addition to ambient lighting available currently
4.4	
4.5	Particularly crosswalk markings
4.6	Backplates would be beneficial
4.7	Recommending RRFB for high volume crossing
4.8	Crosswalk markings could be improved.
4.9	Some roadway lighting exists but no specific pedestrian lighting at crossings.
ROADWAY SURFACE	
5.1	Crash data does not indicate wet or roadway departure type crashes
5.2	Sidewalks available. Bicycles share lanes with vehicles
5.3	Crash data does not indicate roadway departure crash pattern
5.4	
5.5	
INTERSECTION/INTERCHANGE DESIGN	
6.1	
6.2	
6.3	Within the study area intersections, crosswalks are not present on all legs of some intersections
6.4	
6.5	
6.6	Better define pedestrian crossing area
6.7	
6.8	If not, lane extensions are in place
6.9	No occurrence in crash data or field observations.
ROADSIDE	
7.1	
7.2	
7.3	
7.4	Utility poles and buildings
7.5	None noted
7.6	
7.7	Crash data does not indicate roadway departure crash problem
TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS (TSMO)	
8.1	Red light running (right on red without stopping) and its effect on pedestrian safety in particular
8.2	Additional signing for midblock crossing on Washington St.
8.3	Infrasture is available to add CCTV; however, fire, police and ambulance are located in the area

8.4

8.5 All intersections have emergency preemption

8.6

8.7

8.8 We are not aware of any

8.9

OTHER CONSIDERATIONS

9.1 Intersection related crashes that may be mitigated by signal timing

9.2 VRU

9.3 City officials, MPO and State

9.4

9.5 no crossing within study area

9.6 Speed and crash data does not indicate it is necessary

9.7 VRU Study

Appendix E

Conceptual Cost Estimate

Programming Level Estimate

Traffic and Transit – no drainage included

LINE	DESCRIPTION	UNITS	ESTIMATED QUANTITY	ESTIMATED COST
1	Crosswalk, 12" X 10'	LF	650	**$ 20,000**
2	Crosswalk, 12" X 6'	LF	400	**$ 8,000**
3	Type V 12' Stripe	LF	150	**$ 2,600**
4	0.080 IN FLAT SHEET SIGN - (R1-1) STOP	SF	70	**$ 1,800**
5	0.080 IN FLAT SHEET SIGN -(R 1-2) YIELD	SF	4	**$ 100**
6	0.080 IN FLAT SHEET SIGN - (R5-1) DO NOT ENTER	SF	25	**$ 700**
7	0.080 IN FLAT SHEET SIGN - (R10-15) Turning Vehicles Stop for Pedestrian	SF	50	**$ 1,300**
8	0.080 IN FLAT SHEET SIGN - (W16-9P) AHEAD	SF	8	**$ 200**
9	0.080 IN FLAT SHEET SIGN - (W11-2) Pedestrian	SF	25	**$ 700**
10	0.080 IN FLAT SHEET SIGN - (R10-11B) No Right Turn on Red	SF	48	**$ 1,200**
11	REFLECTIVE SIGN SUPPORT STRIP	EA	20	**$ 1,000**
12	RRFB Assembly	EA	4	**$ 96,000**
13	0.080 IN FLAT SHEET SIGN - RRFB	SF	80	**$ 1,800**
14	0.080 IN FLAT SHEET SIGN - RRFB supplemental sign	SF	20	**$ 400**
15	Conventional lighting - 9 Poles, 3 Signal Mounts, and change fixture to LED	LS	1	**$ 175,000**
16	Standard 3 Person Bus Shelter with Bench	EA	2	**$ 40,000**
17	Signal Rephasing w/ New APS Pushbuttons - 5 signals	LS	1	**$ 150,000**
18	Install APS Pushbuttons - 1 signal	LS	1	**$ 32,000**
19	Signal Timing Optimization w/ Leading Pedestrian Intervals - 7 signals	LS	1	**$ 25,000**
20	Furnish and Install Signal Backplate - Black with Reflective Border	EA	40	**$ 16,000**
Prepared for:	**Regional Intergovernmental Council**		**SUBTOTAL**	**$ 573,800**
			E&C (20%)	**$ 114,760**
Prepared by:	**Mead & Hunt, Inc. 400 Tracy Way, Suite 200 Charleston, WV 25311**		**TOTAL**	**$ 688,560**
			SAY	**$ 700,000**