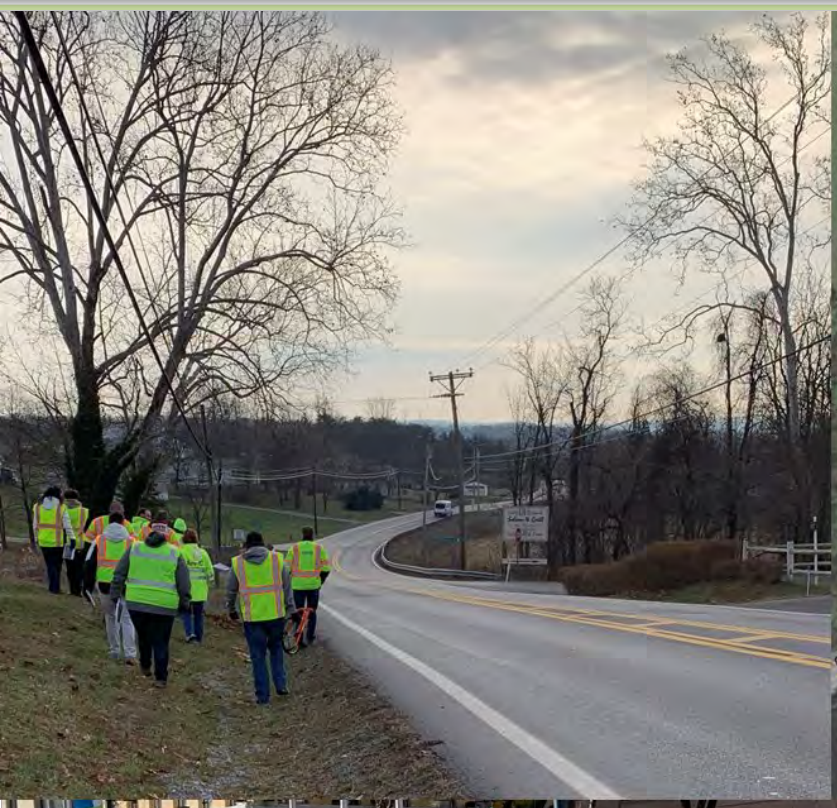

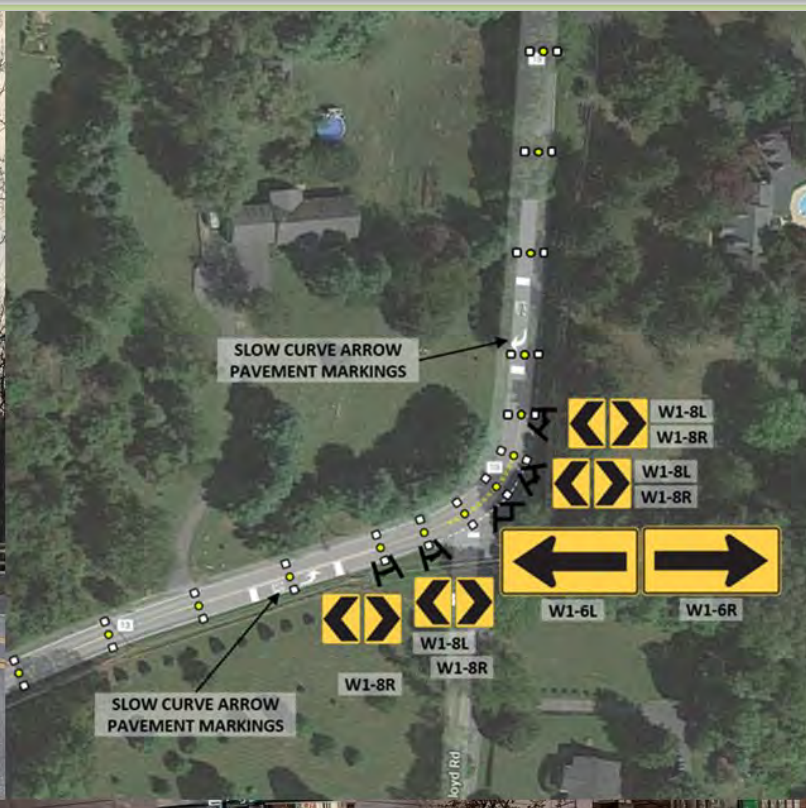

Regional Traffic Safety Study

Prepared for:
Hagerstown / Eastern Panhandle MPO

June 25, 2019

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APPENDICES

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Introduction

Federal transportation funding legislation including the Moving Ahead for Progress in the 21st Century Act (MAP-21) and the Fixing America's Surface Transportation (FAST) Act have incrementally increased State requirements and resources for addressing safety on our nation's roadways. States and Metropolitan Planning Organizations (MPOs) are now required to establish quantifiable targets for safety performance measures that track the number and rate of fatalities and serious injuries. In response, agencies have increased the focus on safety and are taking a proactive approach to roadway planning and design, using performance measures to quantify progress in meeting agency goals. To support these efforts, many local and regional agencies (including MPOs) are developing and implementing safety plans that run in parallel to Federal and State efforts. Resources including the Federal Highway Administration's (FHWA) "*Transportation Safety Planning and the Zero Deaths Vision: A Guide for Metropolitan Planning Organizations and Local Communities*" have recently been developed to help guide such safety planning studies and initiatives.

This study has been completed by the Hagerstown/Eastern Panhandle Metropolitan Planning Organization (HEPMPO) to support safety planning within the MPO region encompassing Washington County in Maryland; and Berkeley and Jefferson Counties in West Virginia. The study is intended to build upon the safety goals, objectives and targets established through the Maryland and West Virginia statewide safety plans and HEPMPO's 2045 Long Range Transportation Plan (LRTP).[1] The study was developed with the following objectives:

Develop a process for HEPMPO to monitor and address safety issues in the future

Conduct a regional safety assessment based on the latest available crash data and public input

Conduct pilot Road Safety Audits as a template for future application at select sites

[1] West Virginia Strategic Highway Safety Plan: https://transportation.wv.gov/communications/Documents/WestVirginiaStrategicHighwaySafetyPlan.pdf
Maryland Strategic Highway Safety Plan: https://www.roads.maryland.gov/Index.aspx?PageId=240
HEPMPO LRTP: https://www.hepmpo.net/documents

Safety and Traffic Advisory Group

This study was conducted in coordination with staff from federal, state, regional and local agencies within the three county HEPMPO region. A Safety and Traffic Advisory Group was established to provide input on the study process, HEPMPO's role in safety planning, the identification of highway and pedestrian safety needs, and Road Safety Audit implementation. The advisory group included the following participating agencies:

Table 1: Participants in the Safety and Traffic Advisory Group

Federal	State	Regional	County-City	Law Enforcement
•FHWA West Virginia Division	•West Virginia Division of Highway (WVDOH) •WVDOH District 5 •Governor's Highway Safety Program (GHSP) •Maryland Department of Transportation •Maryland State Highway Administration	•HEPMPO •Eastern Panhandle Transit Authority (EPTA)	•Jefferson County •Berkeley County •Washington County Department of Planning and Zoning •City of Hagerstown •City of Ranson •Berkeley County Homeland Security & Emergency Management	•Washington County Sheriff's Office •Jefferson County Sheriff's Department

The HEPMPO will continue to coordinate with the Safety and Traffic Advisory Group on future safety planning efforts including the future development of the LRTP. The participating agencies and staff can continue to provide insights on safety issues within the region and viable corridor-level and regional strategies.

HEPMPO's Role in Safety Planning

FHWA has emphasized an increased role for MPOs to promote collaboration and outreach on safety programs across local, regional and state agencies. MPOs are primed to provide leadership in transportation safety planning given their role in providing overall coordination in programming funds for transportation projects and facilitating communication between constituent communities. Local communities are encouraged to actively participate with the MPO in safety initiatives by prioritizing their safety investment needs and coordinating with neighboring jurisdictions on addressing safety issues. With support from the Safety and Traffic Advisory Group, roles have been identified for the HEPMPO to further identify and advance safety initiatives and actions related to the regional transportation system.

Figure 1: Roles for HEPMPO in Safety Planning

1. Monitor Public Insights on Safety Issues and Locations
2. Monitor Regional and Corridor Crash Trends and Performance Measures
3. Evaluate Crash Data at a Planning-Level
4. Prioritize Corridors of Safety Concern
5. Identify Potential Road Safety Audit (RSA) Locations
6. Support RSA Implementation
7. Identify if the Region is Supporting State Goals
8. Document Needs and Progress in the Long Range Transportation Plan

The HEPMPO will continue to develop and enhance these safety action roles within the Transportation Improvement Program (TIP) and LRTP planning process. Some activities including performance measure monitoring and Road Safety Audits may occur outside of the TIP and LRTP. A brief description of these safety action items follows.

1 Public engagement and outreach on transportation needs and projects is one of the primary responsibilities of MPOs. The HEPMPO remains committed to obtaining public input and perceptions on transportation safety issues. This study has included web-based outreach on safety needs. In the future, the HEPMPO will coordinate safety surveys with the LRTP outreach process and conduct separate targeted corridor-level outreach as needed. The HEPMPO will continue to utilize their website to disseminate information on performance measures including the required federal safety performance measures and to collect public comments on specific issues. HEPMPO will also continue to track safety issues identified in regional news stories and editorials.

2-4 The West Virginia Department of Transportation (WVDOT) and the Maryland Department of Transportation State Highway Administration (MDOT SHA) continue to lead efforts in the monitoring of traffic safety performance measures including the federal fatality and serious injury measures. Regional-level data is provided to the HEPMPO for integration into their planning documents. Through this study and continued future efforts, the HEPMPO will supplement the federal performance measures with a more detailed assessment of crash locations. At a minimum, this assessment is expected to occur during the LRTP development process. The focus of the assessment will be to identify high crash corridors or intersections, to evaluate the crash data to identify causes, and to begin assessment of potential strategies. The prioritization of crash corridors can be directly integrated into the HEPMPO LRTP project prioritization process and be used to identify priority areas for future studies or audits. The HEPMPO will continue to monitor safety across all modes of travel including bike, pedestrian, transit and rail. These efforts will require continued coordination with the WVDOT and SHA on the availability and quality (including georeferencing) of crash data and the continued coordination and insights from regional and local stakeholders.

5-6 Traditionally, many MPOs have not been actively involved in the Road Safety Audit (RSA) process. Due to limited resources, Departments of Transportation (DOTs) have focused on corridors of statewide significance. In support of each DOT, HEPMPO's involvement in the RSA process can help facilitate the completion of more RSAs on a timely basis. The HEPMPO can identify priority corridors, assist in assembling and implementing audit teams, and lead the development of the RSA report for select locations.

7-8 Performance-based planning affects many areas of the MPO planning process. The HEPMPO will continue to integrate safety performance measures into the TIP and LRTP process. This will include the documentation of targets and historic performance measure trends. An increased emphasis will be placed on the evaluations of completed safety projects. These efforts will help demonstrate the types of strategies that have been successful and lead to the completion of projects at other high priority locations.

Federal Performance Measures

MAP-21 and the FAST Act have provided the impetus for several recent USDOT rulemakings requiring the monitoring and reporting of defined national performance measures for transportation safety. These requirements attempt to ensure that transportation investment decisions are made by their ability to support established goals including those set forth in the Highway Safety Improvement Program (HSIP). State DOTs are required to set targets for five safety performance measures. FHWA will conduct periodic assessments of progress in meeting the statewide targets.

Statewide Safety Targets

The West Virginia and Maryland DOTs recently adopted safety performance targets as summarized in **Figure 2**. The HEPMPO has endorsed these statewide targets and agreed to plan and program projects that contribute toward the accomplishment of each target. [2]

Safety Measures

- # Fatalities
- # Serious Injuries
- Fatality Rate per 100 Million Vehicle Miles of Travel (VMT)
- Serious Injury Rate per 100 Million VMT
- # of Non-motorized Fatalities & Serious Injuries

The development of statewide targets has been coordinated with the Maryland Strategic Highway Safety Plan and the West Virginia State Highway Safety Plan (SHSP). Each plan has adopted a zero fatality-long-term goal. Statewide targets reflect 5-year rolling average values for each measure. Progress will be monitored using statewide crash and fatality data assembled by each DOT over the same 5-year period. The latest targets represent a 5-year average value covering the years 2016 through 2020. Every two years targets are re-established using a new 5-year reporting period.

FHWA will conduct periodic assessments of progress to determine whether each state has met or made significant progress toward meeting the targets. At least four out of the five safety performance targets must be met to be considered significant process. If a state has not met or made significant process toward meeting the targets, then additional strategy implementation plans and possible increased safety funding would apply to that state. [3] While FHWA will

[2] https://safety.fhwa.dot.gov/hsip/spm/mpo_factsheet.cfm
[3] https://safety.fhwa.dot.gov/hsip/spm/pm_progress_fs.cfm

determine whether a State DOT has met or made significant progress toward meeting HSIP targets, it will not directly assess MPO progress toward meeting targets. However, FHWA will assess MPO performance as part of ongoing transportation planning process reviews including the MPO's certification review. In addition, MPO LRTPs updated on or after May 27, 2018 must include the safety performance measures and targets. MPO TIPs updated on or after that same date must include a description of how the overall TIP projects contribute to achieve the safety performance targets.

Figure 2: Statewide Safety Performance Measures Targets

West Virginia Highway Safety Targets

	2016	2017	2018	2019	2020
Fatalities (total #)	302	289	282	274.2	267
Serious Injuries (total #)	1,542	1,397	1,341	1183.3	1,229
Fatality Rate (# fatalities/100 million vehicle miles traveled)	1.54	1.46	1.37	1.450	1.31
Serious Injury Rate (# serious injuires/100 million vehicle miles traveled)	7.62	6.8	6.33	5.877	5.66
Non-motorized fatalities and serious injuries (Total #)	103	99	94	84.5	85

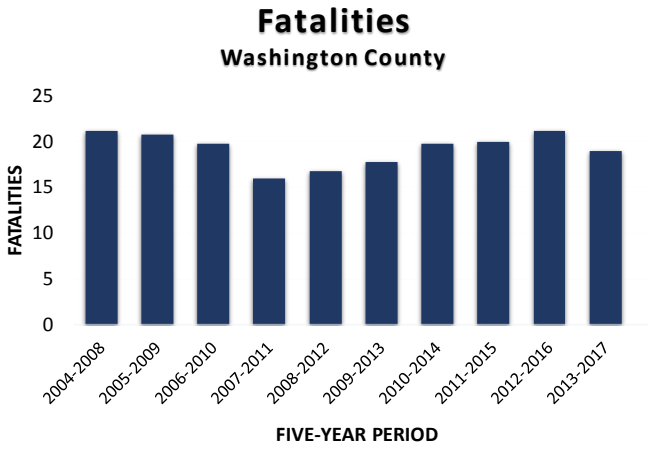
Maryland Highway Safety Targets

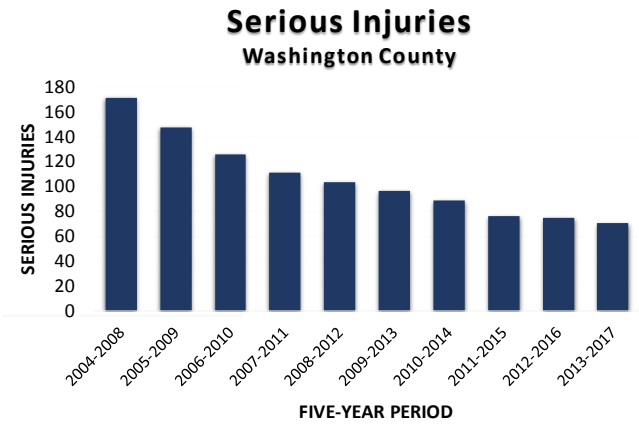
	2016	2017	2018	2019	2020
Fatalities (total #)	442	429	416	435.0	391
Serious Injuries (total #)	3,422	3,294	3,171	3,211.1	2,939
Fatality Rate (# fatalities/100 million vehicle miles traveled)	0.72	0.70	0.68	0.771	0.64
Serious Injury Rate (# serious injuries/100 million vehicle miles traveled)	6.08	5.86	5.64	5.702	5.23
Non-motorized fatalities and serious injuries (Total #)	488	473	459	473.9	433

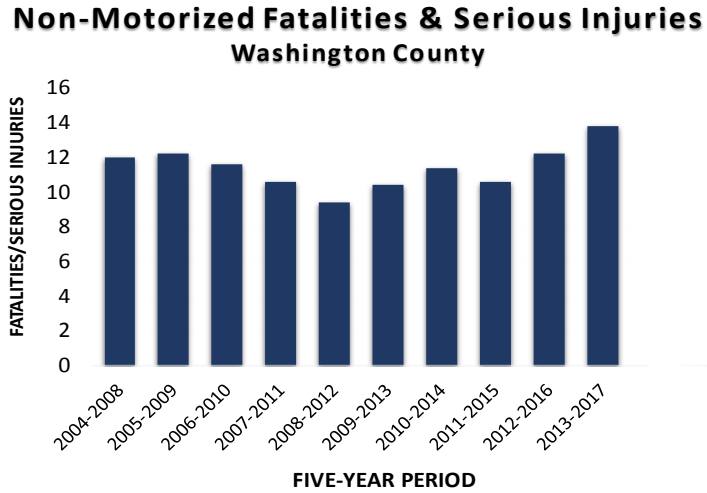
Monitoring Regional Progress

The HEPMPO will continue to monitor safety trends within the region in coordination with efforts conducted by each DOT and the TIP/LRTP planning process. **Figure 3** highlights average yearly fatalities and injuries over 5-year rolling periods from 2008-2017 for Washington County as prepared by MDOT. At the time of this study, 2018 crash data has not been processed and reviewed. The recent trends indicate decreases in serious injuries; however, the data for fatalities and non-motorized injuries do not indicate clear reduction trends. Although not provided in the **Figure 2**, the rate-based federal safety measures provide similar conclusions. WVDOT has not formally distributed regional summaries of the federal safety performance measures to each MPO.

Figure 3: Washington County Average Yearly Fatality and Injury Trends

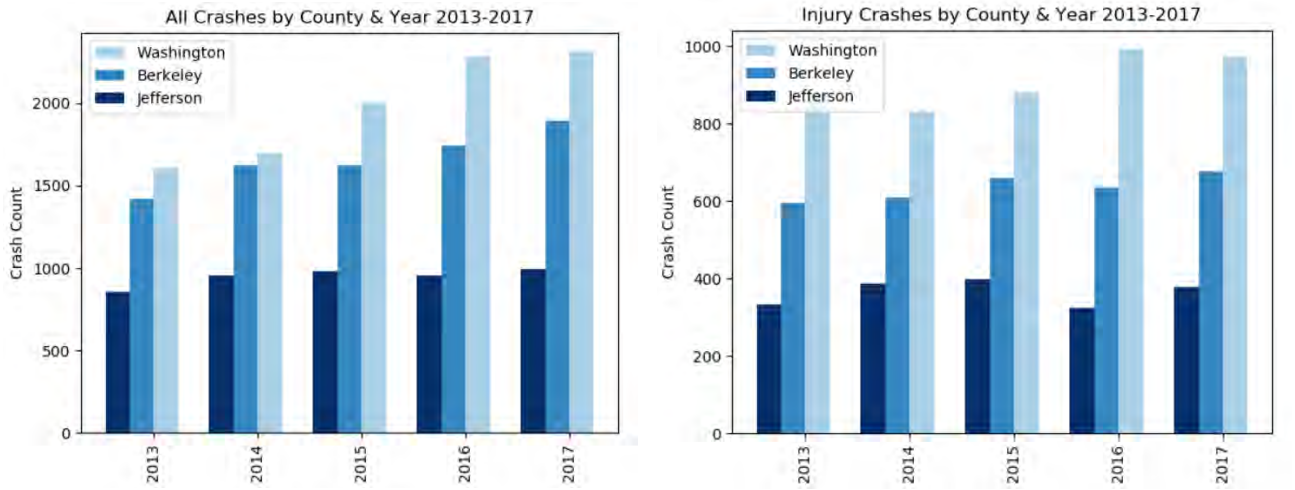






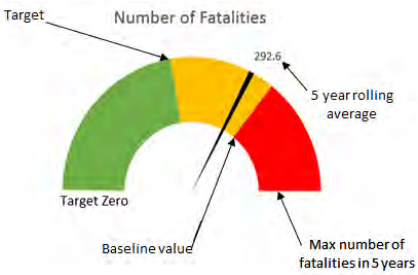
To assess recent county trends within the region (including West Virginia portion), HEPMPO obtained crash data from WVDOT and MDOT for a 5-year period from 2013 to 2017. In addition, 2013 to 2017 fatality information was obtained from the National Highway Traffic Safety Administration (NHTSA) website.[4] **Figure 4** and **Figure 5** illustrated crash and fatality trends from each of the data sources respectively. The measures presented in these figures do not directly align to the federal measures but do provide insights into regional trends.

Figure 4: County Crashes from 2013-2017



Outreach and Coordination on Safety Performance

The HEPMPO remains focused on communicating why safety performance targets are being established, which stakeholders are affected (either directly or tangentially), and how they can be involved in helping establish the targets or in target achievement. HEPMPO currently provides information on the target setting process on their website.[5]



FHWA has developed a safety performance management target setting communication plan and toolkit that provides the HEPMPO potential strategies to improve engagement moving forward.[6] Elements of the toolkit include the development of a dashboard "report card", sample presentation slides to help communicate the target setting process and results, and sample press and social media releases to communicate to the public. The HEPMPO will assess these potential tools to improve outreach and coordination on all performance measures.

[4] https://cdan.nhtsa.gov/STSI.htm
[5] https://www.hepmpo.net/pm
[6] https://safety.fhwa.dot.gov/hsip/spm/fhwasa18006/

Figure 5: HEPMPO County Fatality Trends (NHTSA Data Reports)

Washington County

Fatality Type	Fatalities					Fatalities Per 100,000 Population				
	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017
Total Fatalities (All Crashes)*	21	25	17	18	14	14.09	16.77	11.39	12.02	9.30
(1) Alcohol-Impaired Driving (BAC=.08+) Fatalities	7	8	10	3	3	4.70	5.37	6.70	2.00	1.99
(2) Single Vehicle Crash Fatalities	10	18	11	12	9	6.71	12.07	7.37	8.01	5.98
(3) Large Truck Involved Crash Fatalities	1	3	4	4	4	0.67	2.01	2.68	2.67	2.66
(4) Speeding Involved Crash Fatalities	7	13	6	6	3	4.70	8.72	4.02	4.01	1.99
(5) Rollover Involved Crash Fatalities	4	8	4	5	2	2.68	5.37	2.68	3.34	1.33
(6) Roadway Departure Involved Crash Fatalities	9	15	8	12	5	6.04	10.06	5.36	8.01	3.32
(7) Intersection (or Intersection Related) Crash Fatalities	2	3	2	4	4	1.34	2.01	1.34	2.67	2.66
Passenger Car Occupant Fatalities	7	8	8	9	2	4.70	5.37	5.36	6.01	1.33
Light Truck Occupant Fatalities	6	7	1	1	2	4.03	4.69	0.67	0.67	1.33
Motorcyclist Fatalities	4	3	3	4	3	2.68	2.01	2.01	2.67	1.99
Pedestrian Fatalities	4	6	2	3	3	2.68	4.02	1.34	2.00	1.99
Bicyclist (or Other Cyclist) Fatalities	0	0	1	1	2	0.00	0.00	0.67	0.67	1.33

Berkeley County

Fatality Type	Fatalities					Fatalities Per 100,000 Population				
	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017
Total Fatalities (All Crashes)*	20	12	10	16	10	18.46	10.91	8.97	14.13	8.70
(1) Alcohol-Impaired Driving (BAC=.08+) Fatalities	5	4	2	3	2	4.62	3.64	1.79	2.65	1.74
(2) Single Vehicle Crash Fatalities	17	4	4	12	7	15.69	3.64	3.59	10.59	6.09
(3) Large Truck Involved Crash Fatalities	4	5	0	1	2	3.69	4.54	0.00	0.88	1.74
(4) Speeding Involved Crash Fatalities	6	4	4	4	3	5.54	3.64	3.59	3.53	2.61
(5) Rollover Involved Crash Fatalities	5	1	2	8	2	4.62	0.91	1.79	7.06	1.74
(6) Roadway Departure Involved Crash Fatalities	15	10	7	11	6	13.85	9.09	6.28	9.71	5.22
(7) Intersection (or Intersection Related) Crash Fatalities	1	1	1	0	1	0.92	0.91	0.90	0.00	0.87
Passenger Car Occupant Fatalities	6	4	5	5	5	5.54	3.64	4.48	4.41	4.35
Light Truck Occupant Fatalities	7	6	4	9	3	6.46	5.45	3.59	7.95	2.61
Motorcyclist Fatalities	3	1	0	0	0	2.77	0.91	0.00	0.00	0.00
Pedestrian Fatalities	3	1	1	2	1	2.77	0.91	0.90	1.77	0.87
Bicyclist (or Other Cyclist) Fatalities	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00

Jefferson County

Fatality Type	Fatalities					Fatalities Per 100,000 Population				
	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017
Total Fatalities (All Crashes)*	4	6	11	7	6	7.30	10.82	19.67	12.53	10.65
(1) Alcohol-Impaired Driving (BAC=.08+) Fatalities	1	2	4	3	1	1.82	3.61	7.15	5.37	1.78
(2) Single Vehicle Crash Fatalities	1	5	7	2	4	1.82	9.02	12.52	3.58	7.10
(3) Large Truck Involved Crash Fatalities	1	0	0	0	1	1.82	0.00	0.00	0.00	1.78
(4) Speeding Involved Crash Fatalities	2	1	2	3	2	3.65	1.80	3.58	5.37	3.55
(5) Rollover Involved Crash Fatalities	2	0	2	1	3	3.65	0.00	3.58	1.79	5.33
(6) Roadway Departure Involved Crash Fatalities	1	3	9	6	4	1.82	5.41	16.10	10.74	7.10
(7) Intersection (or Intersection Related) Crash Fatalities	1	1	1	1	2	1.82	1.80	1.79	1.79	3.55
Passenger Car Occupant Fatalities	2	1	5	2	2	3.65	1.80	8.94	3.58	3.55
Light Truck Occupant Fatalities	1	2	4	3	4	1.82	3.61	7.15	5.37	7.10
Motorcyclist Fatalities	1	0	1	2	0	1.82	0.00	1.79	3.58	0.00
Pedestrian Fatalities	0	2	0	0	0	0.00	3.61	0.00	0.00	0.00
Bicyclist (or Other Cyclist) Fatalities	0	1	0	0	0	0.00	1.80	0.00	0.00	0.00

** A Fatality Can Be in More Than One Category. Therefore, Sum of the Individual Cells Will Not Equal the Total*

Local Safety Initiatives and Strategies

Improving highway safety will require coordinated efforts between state, regional and local agencies and will encompass a range of strategies including public education, targeted law enforcement and highway infrastructure improvements. The HEPMPO will continue to coordinate and support local safety initiatives to help achieve the regional and statewide safety goals discussed in the previous sections.

Washington County in coordination with the City of Hagerstown and their respective police departments have developed the *Washington County 2017-2022 Strategic Highway Safety Plan (SHSP)*. Through this plan, the County and stakeholders hope to bring attention to important safety issues in the region including distracted and aggressive driving, impaired driving, pedestrian and bicycle safety issues, unrestrained vehicle occupants, and highway infrastructure issues. Each law enforcement agency has adopted the County SHSP goals and will conduct increased traffic enforcement and support public awareness strategies according to the plan's specific focus areas. The Washington County SHSP Committee will work with state, regional and local partners to conduct public awareness campaigns and identify infrastructure deficiencies that will reduce crashes.

Washington County has developed an action plan to complement the SHSP. This action plan can serve as a potential resource or toolbox for other local agencies that intend to provide a greater role in improving highway safety. **Figure 6** highlights these strategies for each targeted category.

The HEPMPO will continue to work with the County and police agencies to evaluate and monitor what strategies provide the most benefit in meeting regional or corridor safety goals. The evaluation of strategy effectiveness will be based on a combination of crash statistics and public insights. Where possible local safety outreach initiatives will be integrated into HEPMPO's outreach activities as part of the TIP and LRTP planning process.

Figure 6: Safety Strategies Provided in Washington County SHSP

Distracted Driving

- Educate officers on the benefits of enforcing distracted driving laws.
- Conduct increased enforcement of the distracted driving laws.
- Conduct an aggressive media campaign that informs the public on the disastrous results that can occur by being distracted during the time they are driving.
- Conduct public awareness outreach on the laws for use of cell phones, texting, and emails while driving including public service announcements, presentations at civic organizations, posters, and awareness programs at schools and colleges.
- Integrate and foster the use of technologies and engineering applications to address distracted driving infrastructure including advocating for use of bluetooth headsets, devices and apps that allow hands free operation while driving.
- Propose legislation that requires individuals who have been convicted of using electronic devices while driving to attend a distracted driving improvement class.

Aggressive Driving

- Law enforcement should conduct more traffic enforcement, particularly in historic areas of high crashes.
- Encourage the motoring public to report aggressive drivers and have law enforcement provide a more timely response to those reports.
- Use data-driven approaches to identify driver behaviors and target audiences to focus on aggressive and speed-related enforcement, education, engineering, and emergency services.
- Use covert means to conduct enforcement that will identify unsafe driving more readily.
- More law enforcement visibility on Interstate highways and other prominent roadways where significant numbers of crashes occur.
- Identify highways and roadways where the engineering of the roadway has contributed to the increase in unsafe driving resulting in crashes. The work within the Traffic Advisory Council to find engineering solutions to correct these roadway defects.
- Provide posters and billboards with messages aimed at awareness of aggressive driving and that law enforcement will be conducting strict enforcement.
- Promote and support legislation and adjudication to reduce aggressive driving.

Impaired Driving

- Increase efforts by law enforcement to conduct sobriety checkpoints and/or roving patrols in high crash areas.
- Conduct outreach initiatives including, but not limited to, education, training, and media programs to reduce impaired driving. These may include brochures on alcohol related crashes, and presesntations to students at schools, colleges, civic groups and other organizations.

Figure 6: Safety Strategies Provided in Washington County SHSP (continued)

Bicycle and Pedestrian Safety

- Increase law enforcement monitoring of areas for unsafe pedestrian and bicyclists and conduct some education and enforcement.
- Promote safe behaviors of all road users by partnering with emergency services for community outreach regarding public education, training, and media campaigns.
- Create and improve roadway environments for safe walking and bicycling through implementation of engineering treatments, land use planning, and system-wide countermeasures.
- Channel bicyclists to the approved bicycle routes as stated in the city and regional bicycle plans through coordination with bicycle clubs and organizations. Conduct awareness campains on the location of approved bicycle routes.
- Develop, apply, and promote technological approaches, including those in vehicles and emergency response equipment, in order to better prevent and reduce the severity of collisions involving pedestrians and bicyclists.
- Identify and promote safe driving and pedestrian behaviors for all motorists and public safety professional at the scene of emergency events.

Occupant Protection

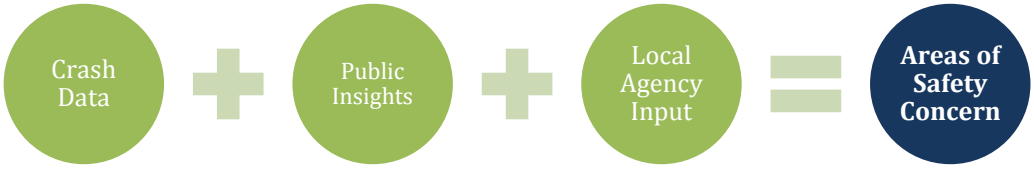
- Increase law enforcement to enforce seatbelt and safety seat laws.
- Conduct meaningful surveys on the level of seatbelt and safety seat use in the county.
- Conduct outreach on occupant protection laws and why they are so important to the protection of the motoring public.
- Conduct outreach for the proper installation of child safety seats through event planning and information on trained personnel and locations to conduct the installations.

Highway Infrastructure Improvments

- Identify intersections where the Crash Severity Index is high and implement safety improvements.
- Identify and target safety improvements along corridors where the Crash Severity Index is high and address roadway elements that contribute to crashes.
- Gather thoughts and ideas from the public during public meetings to improve overall safety across all modes of transportation.

Regional Roadway Safety Assessment

A regional roadway safety assessment has been conducted to identify primary corridors and/or intersections of safety concern. This assessment and future efforts should draw from a combination of resources including crash data available from the Maryland and West Virginia DOTs, public input, and stakeholder input including state, regional and local agencies, and law enforcement.



Crash Data Analysis

Crash data are an essential component in identifying and defining roadway safety problems, developing countermeasures, justifying the need for countermeasures, and evaluating their effectiveness. For this study, the latest available 5-year crash data (2013-2017) was obtained from both MDOT and WVDOT to support the identification of corridors and intersections of safety concern.[7] Crash data obtained from both DOTs include information on injuries and fatalities, roadway surface conditions, weather, time of day, crash type and other contributing factors for all three counties in the region. In addition, traffic fatalities were downloaded for the years 2001 through 2016 from the NHTSA Fatality Analysis Reporting System (FARS).[8]

Several important insights were garnered through the review of the crash data. The crash location information obtained from MDOT appears to be of high quality. Specific coordinates are provided allowing for the mapping of crash locations. Comparisons of assigned coordinate locations match with other location fields provided in the database. WVDOT crash data was not provided in a form that could be easily (or accurately) mapped. At this time, the location information for the West Virginia crash data must be interpreted carefully. The current data has multiple location fields including coordinates (for some records), route numbers, mile post, intersecting streets, and nearby addresses. Based on a review of several sites, the location referencing data has inconsistent information making it difficult to determine the actual location of each crash. In some cases, the provided coordinates were inconsistent with the route and milepost data. For select corridors, the HEPMPO requested crash narratives from WVDOT's ReportBeam system that serves as the electronic highway safety data collection system for all law enforcement agencies in the state. The narratives were very helpful in "manually" assigning

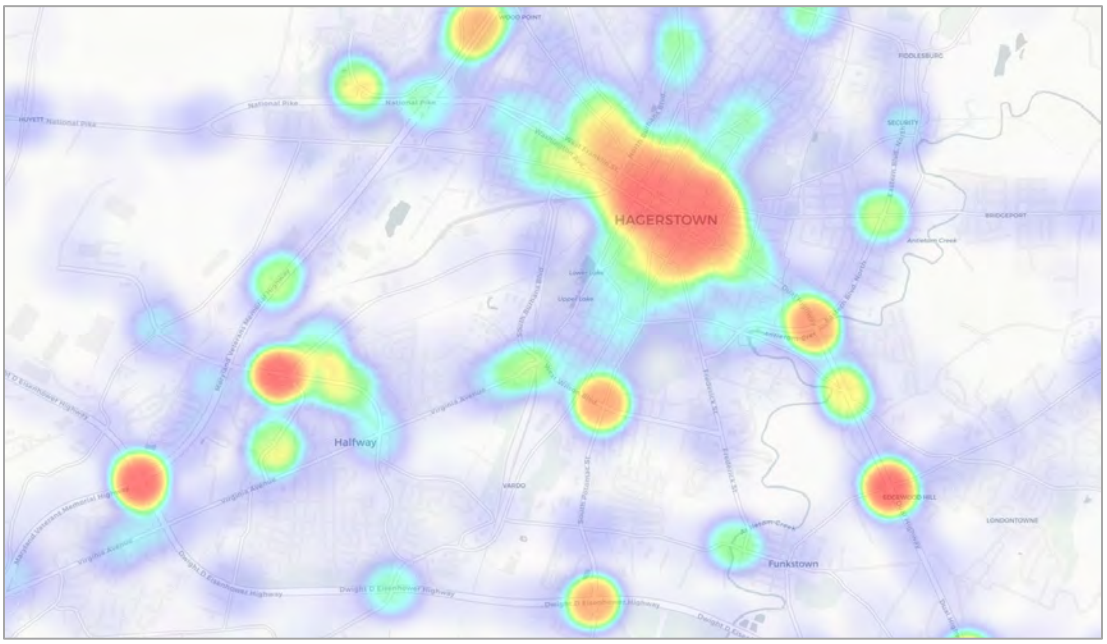
[7] http://www.mva.maryland.gov/safety/mhso/Maryland-Traffic-Safety-Data.htm (Maryland Crash Data Sources)
[8] https://www.nhtsa.gov/research-data/fatality-analysis-reporting-system-fars

crashes to their correct location. These assessments could not be conducted for all areas in West Virginia and were only used for the RSA locations conducted for this study.

The Maryland crash and fatality data were integrated into an interactive map to assess areas of concentrated incidents. As expected, fatalities are concentrated on the roadways with higher speeds and traffic volumes including I-81 and I-70 as well as other key arterials including US 40 and US 11. Total crash data are highly concentrated near urbanized areas and provide insights into potential corridors or intersections of safety concern. **Figure 7** highlights crash densities around the City of Hagerstown.

Figure 7: Illustrative Crash Heat Maps

Hagerstown



Due to the limitations in identifying the exact locations of West Virginia crashes, a methodology was developed to assess and aggregate crash data into corridors that were one mile in length. For consistency, this process was also applied to the Maryland data. The process included the following key steps:

West Virginia Crash Data:

1. Assemble WVDOT crash records into a database
2. Aggregate crash records by creating an index for each crash record that consists of an attribute hash of the county, functional class (FRC), route/sub-route and whole integer

milepost files. For example, a hash id index of 0230045000-14 translates to 02-County, 3-FRC, 0045-Route, 000-Subroute and 14 is the whole mile which the crash occurred.

3. Identify a corresponding traffic volume for the unique county and milepost combinations identified above. Calculate a crash rate using this traffic volume.
4. Rank all the county and whole milepost combinations by total crashes and crash rate. Identify the top 20 one-mile segments in both Berkeley and Jefferson counties.
5. To visualize the location of the above segments, assign the whole mile post segments to the WVDOT GIS roadway segments and highlight those roads on a map. Note, the 1-mile section prioritized may only be a portion of the GIS roadway segment visualized on the map.

Maryland Crash Data:

1. In GIS, plot all crash data locations provided by MDOT.
2. Using GIS routines, identify one-mile segments with the highest concentrations of crashes.
3. Assign a traffic volume for the one-mile segment and calculate a crash rate using the traffic volume.
4. Rank all the one-mile combinations by total crashes and crash rate. Identify the top 20 segments in Washington County.
5. To visualize the location of the above segments, assign the whole mile post segments to the MDOT GIS roadway segments and highlight those roads on a map. Note, the prioritized one-mile section may only be a portion of the GIS roadway segment visualized on the map.

Based on these aggregations the top twenty corridors (Maryland and West Virginia portions of the HEPMPO region ranked separately) were identified for multiple criteria as described in the **Priority Safety Corridors** section of this report. These corridor segments provide approximate locations for further study and assessment of safety issues. Additional information will be required to more specifically identify the location and causes of the safety within each corridor. Such information may include the West Virginia ReportBeam narratives or supplemental crash reports as prepared by each DOT.

Public and Stakeholder Engagement Insights

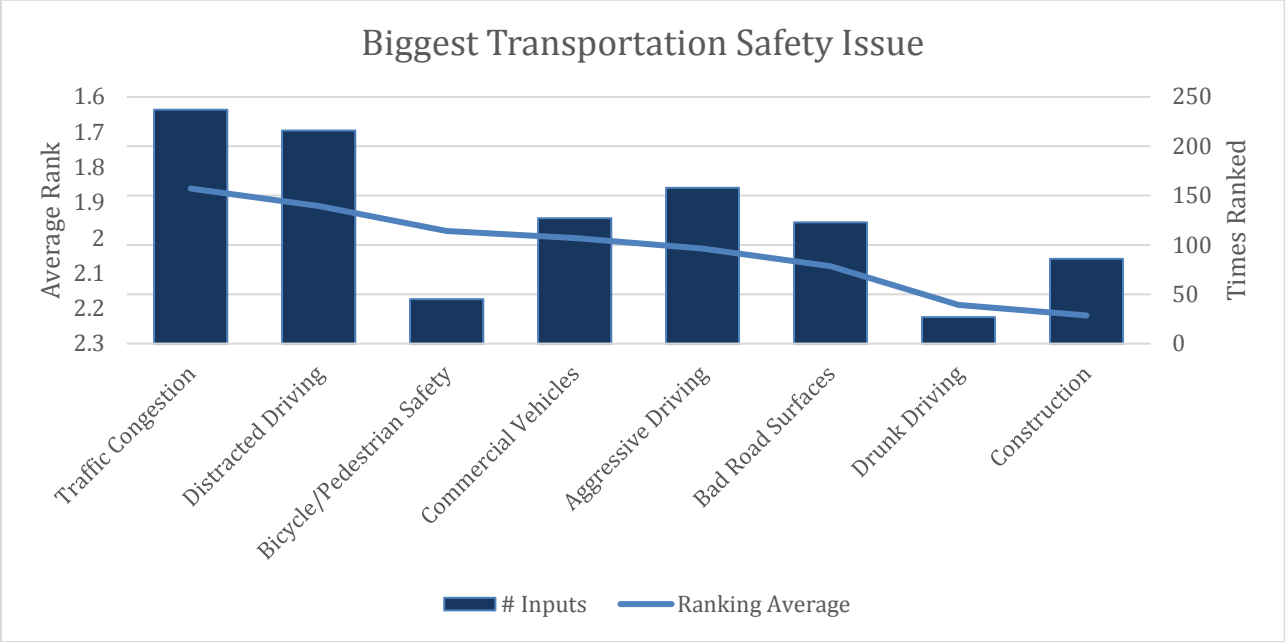
From October 15 to November 15, 2018, both the public and supporting stakeholder agencies as identified in HEPMPO's Public Participation Plan were invited to participate in a web-based survey. The HEPMPO Regional Traffic Safety Survey was an online outreach and mapping tool that consisted of ranking transportation safety issues within the region, mapping of locations of

concerns, and the collection of general safety comments. **Appendix A** provides screen shots of the survey illustrating the key content and questions. The survey form and content may serve as a template for future outreach efforts on safety issues.

During the month in which the survey was open to the public, 400 participants provided responses and input to the survey, including more than 1,000 map markers, providing unique perspectives on transportation safety issues within the HEPMPO region. The comments and map markers were used to identify common themes about transportation safety in the region and locate areas of safety concern. A word cloud of common words found in the comments was produced to identify key issues and concerns based on those that provided input.

Within the survey, respondents identified their top three transportation safety concerns. As shown in **Figure 8**, "Traffic Congestion and Distracted Driving" ranked highly and most frequently. "Bicycle and Pedestrian Safety" had the third highest average rank but was ranked the second fewest amount of times, indicating the issue is extremely important to the smaller subset of the population that may use bicycle and pedestrian facilities.

Figure 8: Top Transportation Safety Concerns Identified in Survey



Respondents also identified locations of concerns using the mapping tool. **Figure 9** shows the resulting map and **Figure 10** summarizes the findings for each category.

Figure 9: Map Comment Locations Received During the Safety Survey

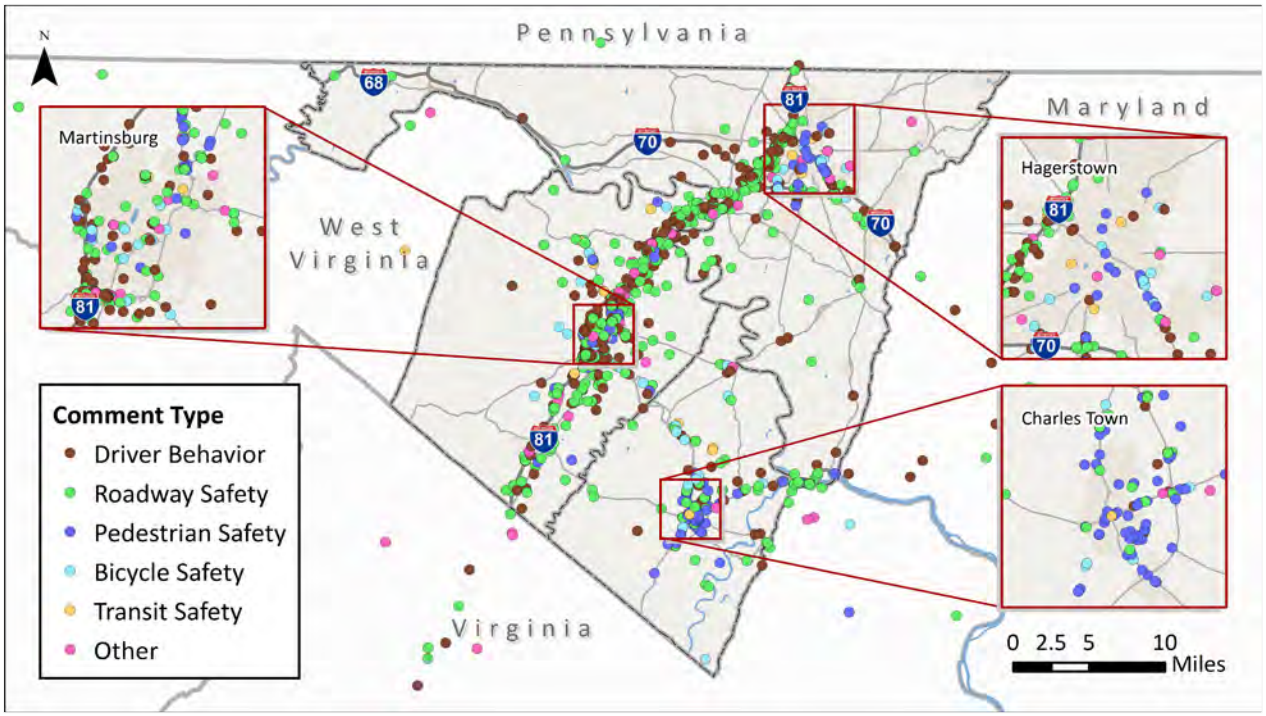


Figure 10: Summary of Map Safety Comments in Survey

Roadway Safety [497 comments on map]

- Construction, congestion, and high truck usage on I-81
- Lots of traffic; railroad crossing; poor signal timing on WV 45
- I-70 and MD 65 interchange is dangerous
- US 340 during weekends, especially in the summer time, and during rush hour is congested

Driver Behavior [283]

- Drivers speed and don't stop for red lights along the Dual Highway
- Red lights are run frequently on WV 45 due to congestion
- Speeding on Kearneysville Pike coming out of Shepherdstown
- 2 to 1 lane merge in Harpers Ferry draws out the worst drivers
- Texting is a big issue within the region

Pedestrian Safety [122]

- Pedestrian safety along US 40; Partial crosswalk at intersections.
- The entire stretch of Edwin Miller should have sidewalks due to the high amount of pedestrians.
- Pedestrians walking from Charles Town and Casino to areas east along US 340 without sidewalks

Other Comments [78]

- Sidewalks in Charles Town need updated. Many are uneven due to tree roots, and other neglect.
- Unsafe crossing of CSX tracks for Appalchian Trail
- During the summer, people attempt to access to the river, with limited parking options, no sidewalk, and heavy traffic along US 340

Bicycle Safety [62]

- Bicycle traffic along Tuscarora Pike, especially on weekends and during summer evenings. No dedicated bike lane causes a hazard.
- Nice bike lane / shoulder features on 40 going into Hagerstown just suddenly end; no more bike lane and no more shoulder.
- Need bicycle lanes throughout Martinsburg

Transit Safety [40]

- Security guards are needed at the Hagerstown Transfer Center
- Bus stops are not well marked in Charles Town

Priority Safety Corridors

The regional assessment of crash data and outreach to project stakeholders and the public has led to the development of an initial set of priority safety corridors for the HEPMPO region. Although traffic safety remains a concern region-wide, the identification of priority corridors can help focus limited financial and labor resources to the areas that have historically experienced the highest numbers or rates of crashes. The identification of priority corridors has been largely influenced by historical crash data. As there are some current limitations in the locational information of those crashes, these initial corridors and intersections will continue to be evaluated and modified as new information becomes available. Additional stakeholder and public comments may be used to redefine the corridors for future updates to this study or during the LRTP planning process.

How Will HEPMPO Use Priority Safety Corridors?

- Locations for future Road Safety Audits
- More focused crash monitoring
- Integration to project prioritization process
- Support future discussion on safety priorities in region with stakeholders and public

Priority corridors have been defined as the top twenty locations in each state (HEPMPO region only) for the following criteria:

- total number of crashes,
- total crash rate (per 100 million VMT),
- number of fatalities and injuries,
- fatality and injury rate (per 100 million VMT). and

Corridors defined using criteria based on the numbers of crashes will result in locations with higher traffic volumes including the interstates and regional arterial routes. Rate-based criteria may highlight lower volume roadways that have had a significant number of crashes. These may include rural two-lane highways with limited shoulders, curves or sight-distance issues. HEPMPO's use of the priority safety corridors will most likely include a combination of the above criteria. These corridors will undergo further evaluation through stakeholder and public review. The priority safety corridors based on 2013-2017 crash data are defined at the end of this section in both tabular and map formats. High crash intersections have also been identified for the HEPMPO counties in Maryland and West Virginia. The intersection ranking is currently based on the total number of crashes at each location. As noted previously, priority corridors and intersections in West Virginia will need further evaluation based on the potential issues in georeferencing the crash data.

Priority Safety Corridors

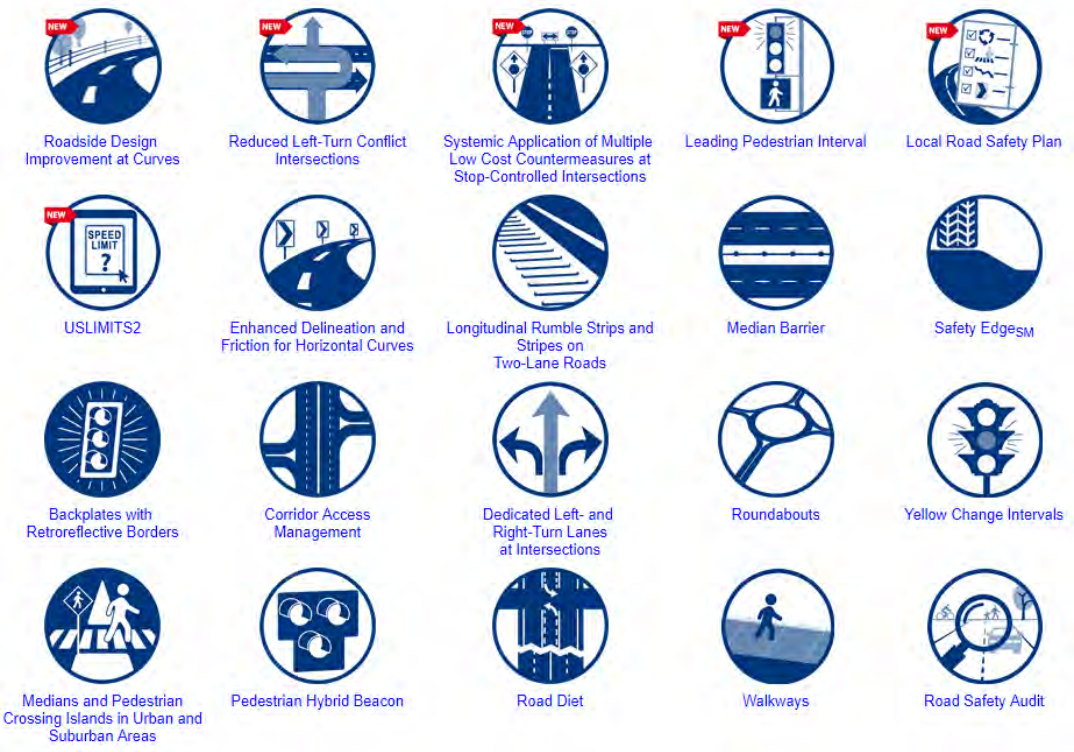
- See maps/tables at end of this section
- Interactive map also available at: http://s3.amazonaws.com/tmp-map/hepmpo/t20/hepmpo-t20-counts.html *(layer button in upper right corner)*

Assessing Infrastructure Countermeasures

Roadway widening, intersection redesign, and other capacity improving projects often provide benefits both to traffic congestion and safety. Through coordinated efforts between local, regional and state agencies, these projects are included in the TIP and LRTP. Safety countermeasures may also include lower cost signing, striping or shoulder improvements. Existing funding sources may be able to provide low cost solutions in a more efficient and timely manner. FHWA's Crash Modification Factors Clearinghouse provides summary tables (in Excel format) that provide a comprehensive inventory of estimated countermeasure costs.[9]

In 2008, FHWA began promoting certain infrastructure-oriented safety treatments and strategies, chosen based on proven cost-effectiveness and benefits, to encourage widespread implementation by transportation agencies to improve safety on the nation's highways. This became known as the Proven Safety Countermeasures initiative, which currently includes twenty treatments and strategies that practitioners can implement to successfully address roadway departure, intersection, and pedestrian and bicycle crashes. Implementation of these countermeasures can accelerate the achievement of federal safety goals.[10]

Figure 11: FHWA Proven Safety Countermeasures



[9] http://www.cmfclearinghouse.org/resources_synthesisofcountermeasurecosts.cfm#home-content
[10] https://safety.fhwa.dot.gov/provencountermeasures/

The Maryland and West Virginia Strategic Highway Safety Plans as previously referenced also provide strategies and countermeasures that each DOT has determined to be viable and effective solutions. The Maryland plan provides "emphasis strategies" for each of six identified areas that include aggressive driving, distracted driving, impaired driving, occupant protection, highway infrastructure and pedestrians/bicyclists. These strategies closely align the local initiatives developed by Washington County as described previously. **Figure 12** highlights general emphasis strategies identified for highway infrastructure. [11]

Figure 12: MD Strategic Highway Safety Plan Strategies for Highway Infrastructure

- Identify and target safety improvements along corridors and intersections where the Crash Severity Index is high and address roadway elements that contribute to crashes.
- Develop and implement system-wide improvements to reduce the number and severity of infrastructure-related crashes (e.g., intersection-related, run-off-the-road, work-zone related, etc.).
- Identify, develop, and implement system-wide improvements that address the safety of vulnerable user groups (e.g., bicyclists, pedestrians, motorcyclists, older and younger drivers, etc.).
- Identify and implement recommended safety initiatives for commercial motor carriers.

In addition, SHA has launched a new urban mobility-focused program tailored to central business districts. As part of this program, the agency is working to improve vehicle and pedestrian safety through traffic calming measures, narrowing lanes, reducing speeds, and constructing high visible crosswalks. SHA continues to identify locations in urban areas where such strategies may be viable.

In West Virginia, roadway departure fatalities are of primary concern especially on many of the state's rural highways. **Figure 13** highlights nine specific strategies outlined in the plan to address these issues.[12] For urbanized areas, complete street improvement concepts also remain and important strategy to address multi-modal safety. Complete street concepts are recognized in the 2013 West Virginia Complete Streets Act, the 2012 Maryland SHA Complete Streets Policy and the 2015 FAST Act. In 2018, the HEPMPO adopted a complete streets policy to recognize

[11] http://www.mva.maryland.gov/_resources/docs/MarylandSHSP_2016-2020-Final.pdf
[12] https://transportation.wv.gov/communications/Documents/WestVirginiaStrategicHighwaySafetyPlan.pdf (Page 15)

the importance of such strategies in meeting the region's transportation goals for mobility and safety.[13]

Figure 13: WV Strategic Highway Safety Plan Solutions for Roadway Departures

Assessing crash data information can provide insights into what measures may be most effective at certain locations.[14] Such information may include whether crashes occur mostly at night, if wet weather is a primary cause, and the type of crash (e.g. head-on, sideswipe, etc.). An initial planning-level crash assessment has been conducted for each of the priority corridors. The assessment is summarized in a table that follows each of the defined priority corridors. Moderate and high thresholds have been setup to highlight specific areas of concern as shown in **Table 2**. These thresholds were developed using engineering judgement and may be further enhanced or modified in future applications. The weekend, peak hour and night thresholds are based on the typical percentages of traffic during those periods. Other thresholds were assigned based on a review of the data and a determination of what levels may be considered significant (e.g. 25%, 45%). Within the HEPMPO region, sideswipe crashes typically are less prevalent than other crash categories. The thresholds for these categories were lowered to at least capture where those types of crashes are most prevalent.

[13] https://docs.wixstatic.com/ugd/116f69_9c6c21d9721a488ab1ba55ad31ec7b3b.pdf
[14] https://safety.fhwa.dot.gov/hsip/resources/fhwasa09029/sec3.cfm

Table 2: Thresholds for Priority Corridor Crash Attribute Assessment

Criteria	Description	Moderate Threshold	High Threshold
Ped-Bike	# of crashes involving a pedestrian or bike injury	≥ 0	≥ 4
Weekend	% of crashes that occur on a weekend	≥ 40%	≥ 45%
Peak Hours	% of crashes during AM (7-9am) or PM (4-6pm) peak	≥ 37%	≥ 45%
Night	% of crashes that were reported during dark hours	≥ 35%	≥ 45%
Wet	% of crashes that were reported on wet pavement	≥ 25%	≥ 45%
RunOff	% of crashes for "single vehicle" and "head-on"	≥ 25%	≥ 45%
RearEnd	% of crashes for "rear end"	≥ 25%	≥ 45%
Angle	% of crashes for "angle", "head-on-left", "Same-dir"	≥ 25%	≥ 45%
Sideswipe	% of crashes for "sideswipe"	≥ 15%	≥ 25%

The crash data can lead to further assessments of potential strategies. Several resources can assist with strategy development. FHWA's Intersection Safety Strategies Brochure identifies potential strategies to address high frequencies of right-angle, rear-end, left-turn. sideswipe, or run-off road crashes at intersections.[15] Crash reductions factors (CRF), similar to Crash Modification Factors (CMF), provide the potential crash reduction that might be expected after implementing a given countermeasure at a site. FHWA's Desktop Reference for Crash Reduction Factors also provides a comprehensive resource for identifying potential strategies by crash type.[16]

Ultimately, the best approach for defining appropriate and viable strategies is through the Road Safety Audit process. The audit process allows for the request and review of more detailed crash data, as well as the discussion of important perspectives of locals who are familiar with the safety concerns and DOT staff who understand the protocols and viability in implementing countermeasures. MDOT SHA can provide more detailed crash data and analysis reports for defined corridors as requested by the HEPMPO. Future reports can be obtained for each of the priority corridors. These more detailed reports assess the crash data and evaluate crashes by type against statewide averages, provide insights into the probable causes, highlight roadway conditions and contributing factors, and provide a detailed crash listing at the exact locations along the corridor.

[15] https://safety.fhwa.dot.gov/intersection/other_topics/fhwasa08008/
[16] https://safety.fhwa.dot.gov/tools/crf/resources/fhwasa08011/

Summary Maps of Priority Corridors for All Criteria

Note: Priority Corridors are defined as one-mile segments referenced by a whole milepost number on the corresponding route. Approximate locations of these corridors are visualized on the maps by identifying the DOT GIS roadway layer segment(s) that contain that whole milepost number.

Figure 14: Maryland Priority Corridors Using 2013-2017 Crash Data

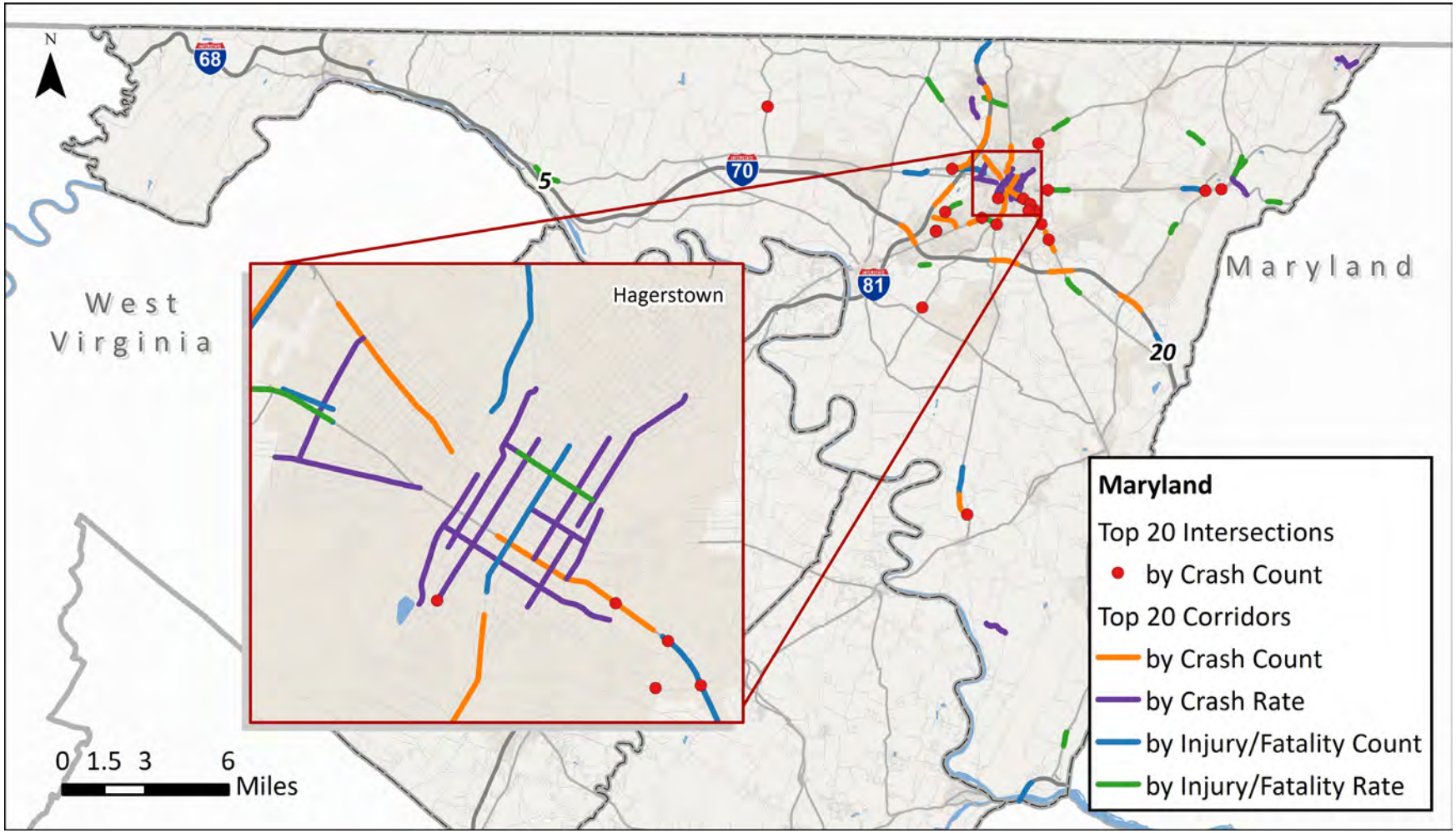
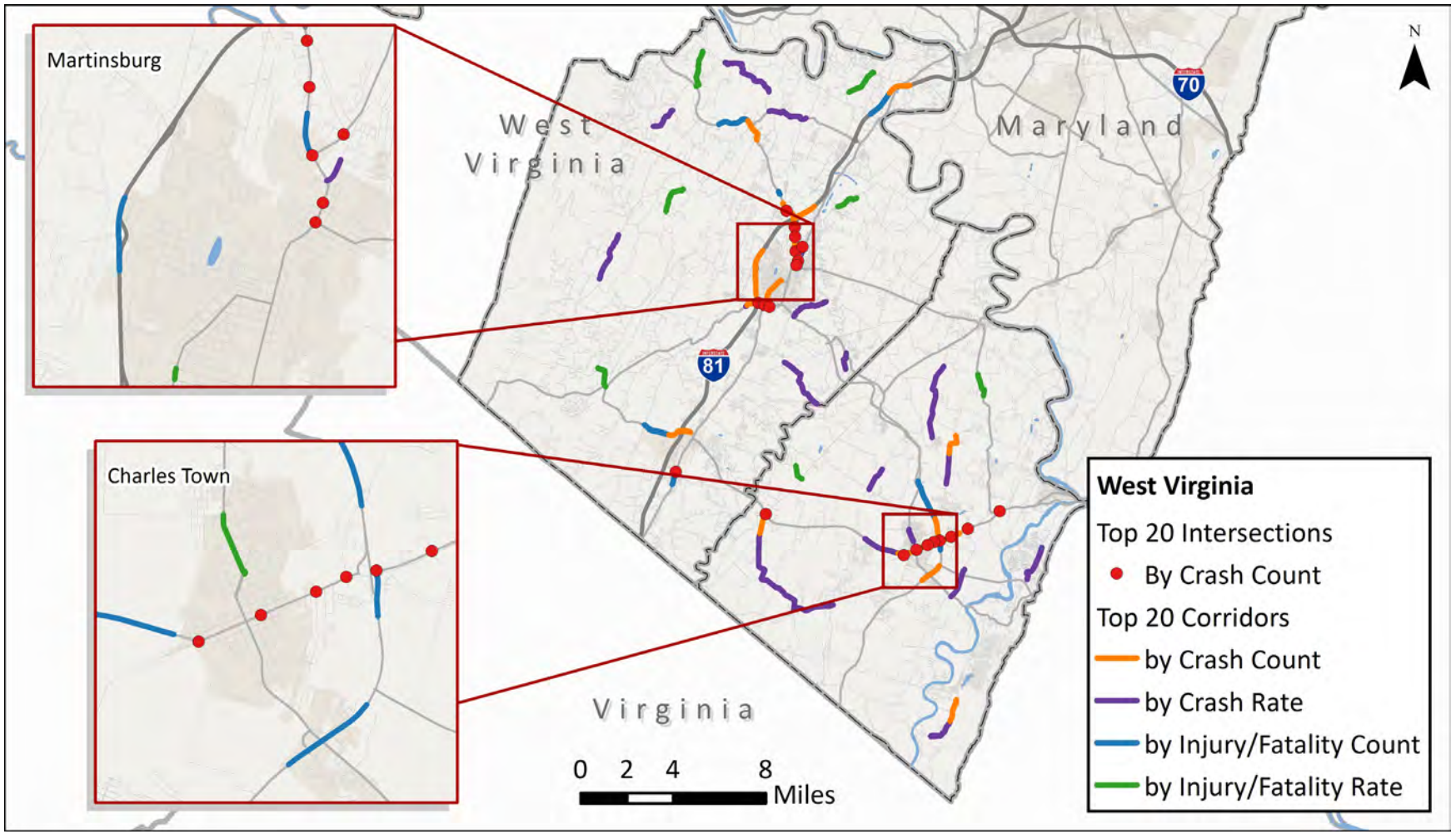


Figure 15: West Virginia Priority Corridors – Total Crashes (2013-2017)



Priority Corridors by Total Number of Crashes

Note: Priority Corridors are defined as one-mile segments referenced by a whole milepost number on the corresponding route. Approximate locations of these corridors are visualized on the maps by identifying the DOT GIS roadway layer segment(s) that contain that whole milepost number.

Figure 16: Maryland Priority Corridors – Total Crashes (2013-2017)

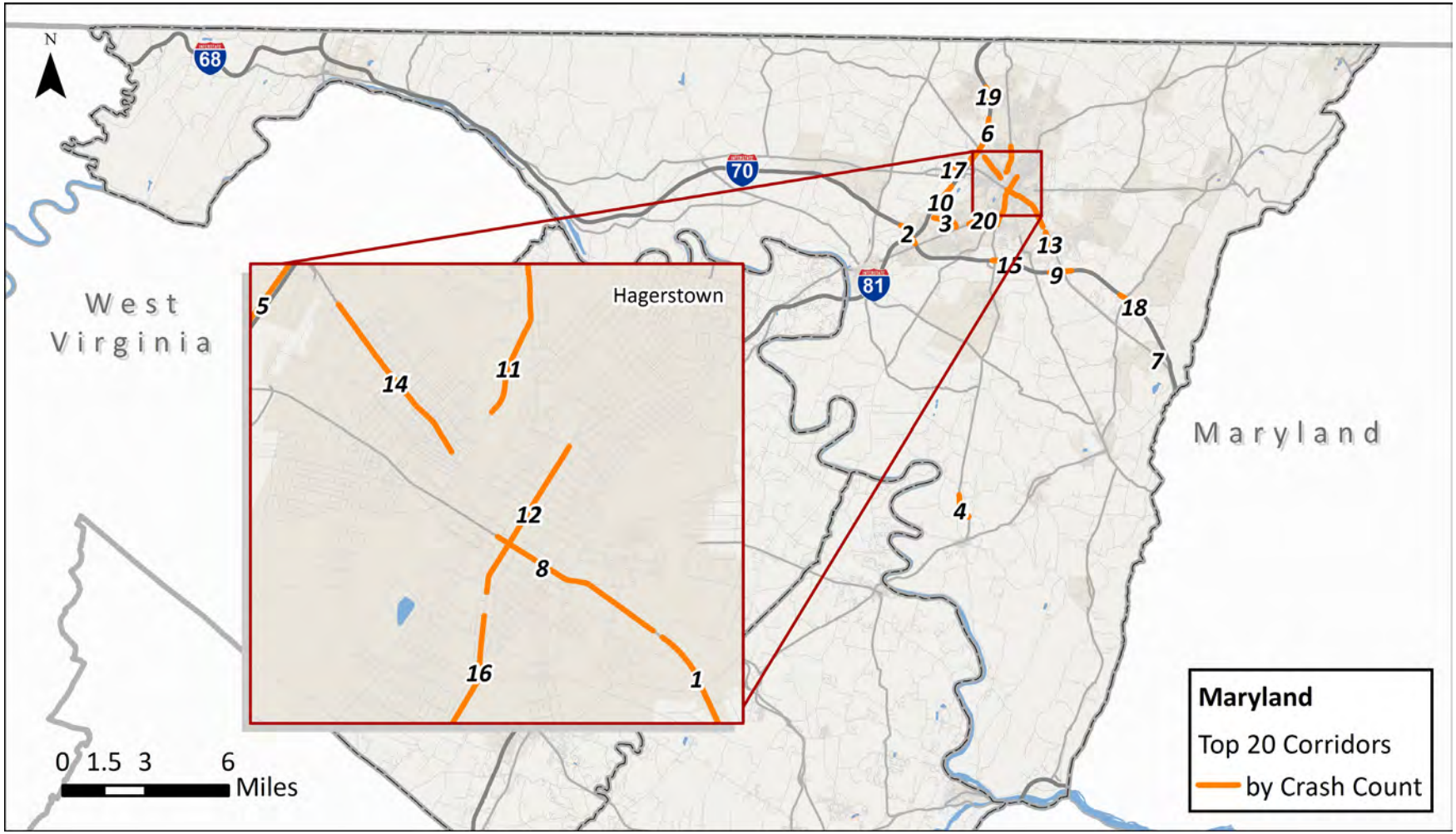


Table 3: Maryland Priority Corridors – Total Crashes (2013-2017)

Map ID*	Corridor Name	Corridor Starting Point	Corridor Ending Point	Location	# of Crashes
1	US 40 EB	Tracys Lane	Covenant Life Church	Hagerstown	134
2	I-70 EB	Mile 26	Mile 27	Hagerstown	133
3	Halfway Boulevard	I-81	Virginia Avenue	Hagerstown	124
4	Maryland 65 (Sharpsburg Pike)	Starke Road	Richardson Avenue	Sharpsburg	113
5	I-81 SB	Exit 8	Mile 7	Hagerstown	105
6	I-81 SB	Mile 9	Exit 8	Hagerstown	104
7	US 40	Crystal Falls Road	The Lodge	Boonsboro	84
8	US 40 EB	Jonathan Street	Tracys Lane	Hagerstown	84
9	I-70 EB	Mile 31	Mile 33	Hagerstown	84
10	I-81 NB	Mile 5	Mile 6	Hagerstown	82
11	US 11 (Pennsylvania Avenue/N. Burhans Boulevard)	Fairview Road	Railroad Tracks	Hagerstown	80
12	S. Potomac Street	Charles Street	Baltimore Street	Hagerstown	79
13	US 40 EB	Crest View Road	Hebb Road	Hagerstown	79
14	Salem Avenue	Kay Circle	Kinslow Street	Hagerstown	75
15	I-70 EB	Exit 29 (MD 65)	Mile 30	Hagerstown	73
16	S. Potomac Street	Lee Street	Wilson Boulevard	Hagerstown	73
17	Garland Groh Boulevard	Barlow Drive	Bulldog Federal Credit Union	Hagerstown	72
18	I-70 EB	Exit 35 (MD 66)	Black Rock Road	Hagerstown	71
19	I-81 SB	Exit 10 (Showalter Road)	Exit 9 (Maugans Ave)	Maugansville	69
20	US 11 (Virginia Avenue)	S. Burhans Boulevard/W. Wilson Boulevard	Harwood Road	Hagerstown	67

** Bold Map ID [RED] means Corridor overlaps with a TIP/LRTP project*

Table 4: Maryland Priority Corridors – Total Crashes (2013-2017)
Crash Attributes for Planning-Level Strategy Assessment

Map ID	Corridor Name	Assessment of Primary Crash Attributes For Corridor *(Note locations may include crashes with all listed attributes)*								
		Ped-Bike	Weekend	Peak Hours	Night	Wet	Run-Off Road	Rear-End	Angle-Turn	Sideswipe
1	US 40 EB	■						■		
2	I-70 EB			■		■	■	■		■
3	Halfway Boulevard					■	■			
4	Maryland 65 (Sharpsburg Pike)	■		■				■	■	
5	I-81 SB					■	■			
6	I-81 SB						■	■		
7	US 40				■		■	■		
8	US 40 EB	■					■	■	■	
9	I-70 EB			■	■		■	■		
10	I-81 NB						■	■		
11	US 11 (Penn.Avenue/N. Burhans Blvd)			■				■	■	
12	S. Potomac Street	■					■			
13	US 40 EB	■					■	■	■	
14	Salem Avenue				■		■	■		
15	I-70 EB			■		■	■	■		
16	S. Potomac Street	■					■	■	■	
17	Garland Groh Boulevard					■	■		■	
18	I-70 EB						■	■		
19	I-81 SB			■			■	■		
20	US 11 (Virginia Avenue)	■							■	

■ = Crash attribute is at a moderate level; ■ = Crash attribute is at a high level (**see Table *2***)

Figure 17: West Virginia Priority Corridors – Total Crashes (2013-2017)

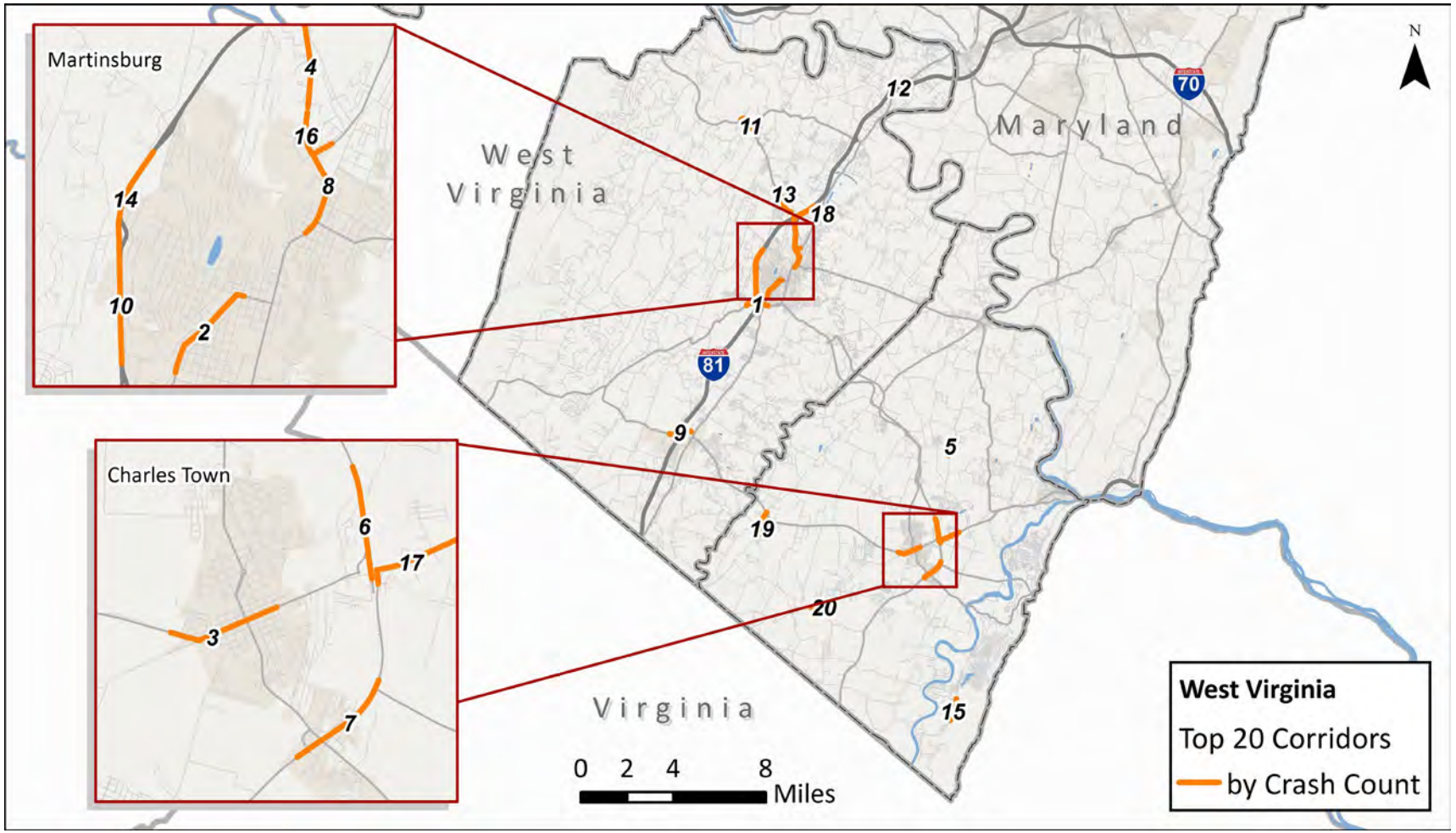


Table 5: West Virginia Priority Corridors – Total Crashes (2013-2017)

Map ID*	Corridor Name	Corridor Starting Point	Corridor Ending Point	Location	County	# of Crashes
1	Route 45 (Apple Harvest Drive)	Advent Drive	New York Avenue	Martinsburg	Berkeley	399
2	US 11 (Winchester Avenue)	Loraine Avenue	Raleigh Street	Martinsburg	Berkeley	237
3	Route 51	Railroad Tracks	N. Seminary Street	Charles Town	Jefferson	144
4	Route 9 (Edwin Miller Blvd)	I-81	Meridian Parkway	Martinsburg	Berkeley	141
5	Flowing Spring Road	Jefferson High School	Duffields Marc Train Station	Shenandoah Junction	Jefferson	138
6	Route 9	Railroad Tracks	US 340	Charles Town	Jefferson	132
7	US 340	Candlewood Drive	Route 9	Charles Town	Jefferson	132
8	US 11 (Williamsport Pike to Edwin Miller Boulevard)	Hinton Court	Union Avenue	Martinsburg	Berkeley	113
9	Route 51 (Gerrardstown Road)	Bentley Drive	Sader Drive	Inwood	Berkeley	111
10	I-81 NB	Exit 12 (Apple Harvest Drive)	Exit 13 (King Street)	Martinsburg	Berkeley	108
11	Route 9 (Hedgesville Road)	US Postal Service	Ben Speck Road	Hedgesville	Berkeley	102
12	I-81 NB	Mile 23	Mile 24	Falling Waters	Berkeley	97
13	Route 9 (Hedgesville Rd/Edwin Miller Blvd)	Welltown Road	I-81	Martinsburg	Berkeley	97
14	I-81 NB	Exit 13 (King Street)	Exit 14 (Dry Run Road)	Martinsburg	Berkeley	92
15	Mission Road	Shannondale Springs Chapel	Speaks Lane	Shannondale	Jefferson	91
16	Route 9 (Edwin Miller Blvd)	ALDI	Raleigh Street/Williamsport Pike	Martinsburg	Berkeley	87
17	US 340	Route 9	Mile 10	Charles Town	Jefferson	80
18	I-81 NB	Exit 16 (Route 9)	Mile 17	Martinsburg	Berkeley	78
19	Leetown Road	Marshall Street	Electrical Substation	Middleway	Jefferson	75
20	Summit Point Road	Lloyd Road	McCormack Lane	Charles Town	Jefferson	73

** Bold Map ID [RED] means Corridor overlaps with a TIP/LRTP project*

Table 6: West Virginia Priority Corridors – Total Crashes (2013-2017)
Crash Attributes for Planning-Level Strategy Assessment

Map ID	Corridor Name	Assessment of Primary Crash Attributes For Corridor *(Note locations may include crashes with all listed attributes)*								
		Ped-Bike	Weekend	Peak Hours	Night	Wet	Run-Off Road	Rear-End	Angle-Turn	Sideswipe
1	Route 45 (Apple Harvest Drive)	■						■	■	■
2	US 11 (Winchester Avenue)	■						■	■	
3	Route 51			■		■	■	■	■	
4	Route 9 (Edwin Miller Blvd)	■				■		■	■	
5	Flowing Spring Road							■		
6	Route 9			■	■		■	■		
7	US 340	■				■		■		
8	US 11 (Williamsport to Edwin Miller Blvd)					■	■			■
9	Route 51 (Gerrardstown Road)	■		■			■	■		
10	I-81 NB	■		■		■	■	■		■
11	Route 9 (Hedgesville Road)	■						■	■	
12	I-81 NB				■	■	■			
13	Route 9 (Hedgesville Rd/Edwin Miller Blvd)	■		■				■	■	
14	I-81 NB	■		■				■		
15	Mission Road	■						■		
16	Route 9 (Edwin Miller Blvd)	■						■	■	
17	US 340	■		■				■		■
18	I-81 NB			■		■	■			
19	Leetown Road	■			■	■	■			■
20	Summit Point Road		■	■		■	■			

■ = Crash attribute is at a moderate level; ■ = Crash attribute is at a high level (see **Table *2***)

Priority Corridors by Total Crash Rate

Note: Priority Corridors are defined as one-mile segments referenced by a w hole milepost number on the corresponding route. Approximate locations of these corridors are visualized on the maps by identifying the DOT GIS roadway layer segment(s) that contain that whole milepost number.

Figure 18: Maryland Priority Corridors – Total Crash Rate (2013-2017)

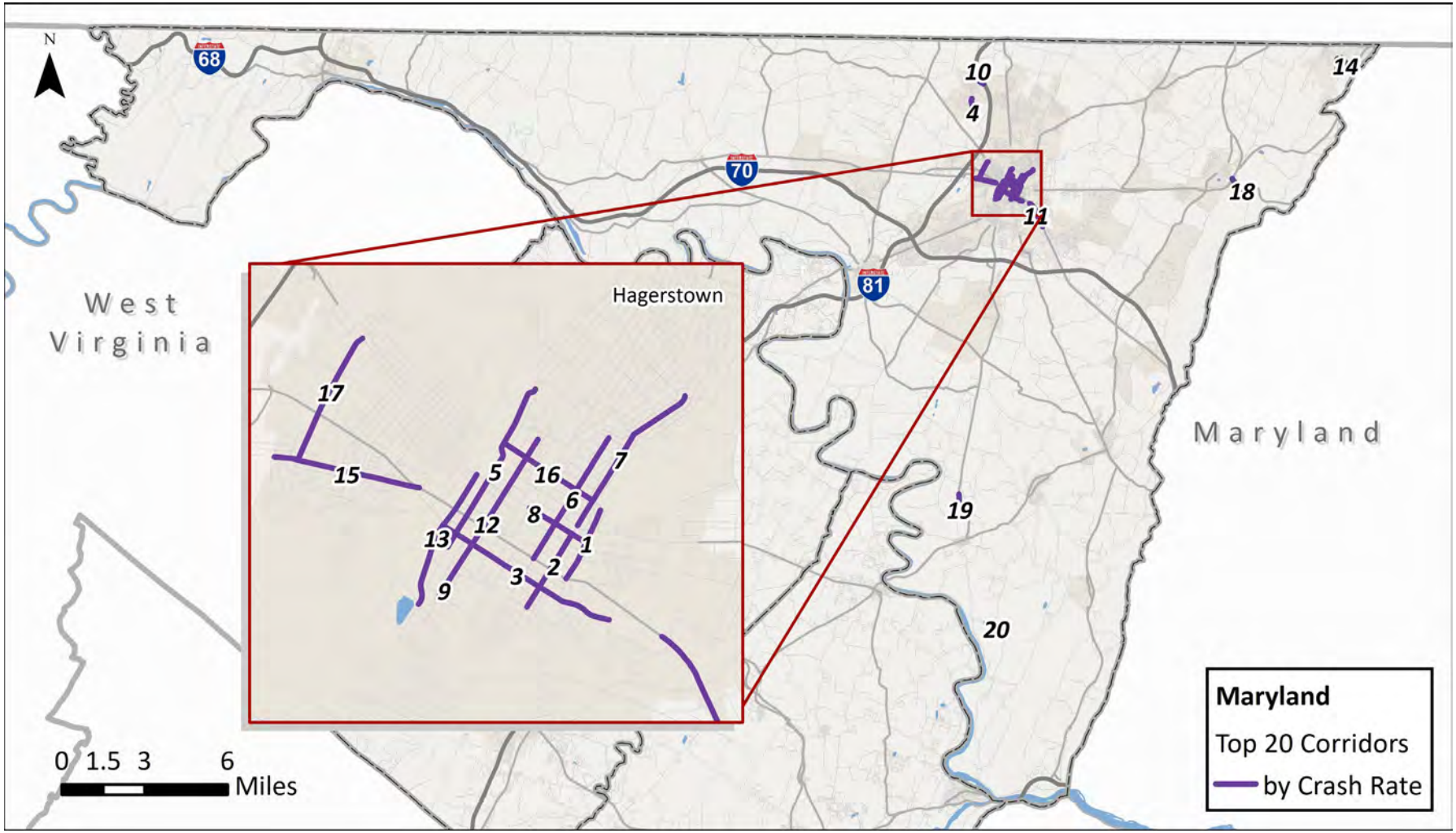


Table 7: Maryland Priority Corridors – Total Crash Rate (2013-2017)

Map ID*	Corridor Name	Corridor Starting Point	Corridor Ending Point	Location
1	N. Cannon Avenue	E. North Avenue	US 40 EB	Hagerstown
2	Mulberry Street	East Avenue	E. Baltimore Street	Hagerstown
3	Antietam Street	S. Walnut Street	S. Cleveland Avenue	Hagerstown
4	Maugansville Road	Garden View Road	Mt. Olive Mennonite Church	Maugansville
5	Prospect Street	Pennsylvania Avenue	Baltimore Street	Hagerstown
6	N Locust Street	Fairground Avenue	US 40 EB	Hagerstown
7	N. Mulberry Street/Mulberry Ave.	Columbia Avenue	Jefferson Street	Hagerstown
8	East Avenue	N. Potomac Street	N. Cannon Avenue	Hagerstown
9	Jonathan Street	US 40 EB	W. Lee Street	Hagerstown
10	I-81 SB On Ramp	Showalter Road	I-81	Maugansville
11	US 40 EB	Tracys Lane	Covenant Life Church	Hagerstown
12	Jonathan Street	Pennsylvania Avenue	US 40 EB	Hagerstown
13	Walnut Street	W. Church Street	Park Circle	Hagerstown
14	Pen Mar Road to MacAfee Hill Road to Military Road	Buena Vista	Royer Road	Highfield-Cascade
15	W. Washington Street	Park Avenue	US 40 EB	Hagerstown
16	North Avenue	N. Prospect Street	N. Mulberry Street	Hagerstown
17	Nottingham Road	Salem Avenue	W. Washington Street	Hagerstown
18	Foxville Road	Smithsburg Pike	Labrador Lane	Smithsburg
19	Maryland 65 (Sharpsburg Pike)	Mondell Road	Richardson Ave	Sharpsburg
20	Harpers Ferry Road	Limeklin Road	Nick Road	Sharpsburg

** Bold Map ID [RED] means Corridor overlaps with a TIP/LRTP project*

Table 8: Maryland Priority Corridors – Total Crash Rate (2013-2017)
Crash Attributes for Planning-Level Strategy Assessment

Map ID	Corridor Name	Assessment of Primary Crash Attributes For Corridor *(Note locations may include crashes with all listed attributes)*								
		Ped-Bike	Weekend	Peak Hours	Night	Wet	Run-Off Road	Rear-End	Angle-Turn	Sideswipe
1	N. Cannon Avenue	■		■			■		■	
2	Mulberry Street	■	■	■			■		■	
3	Antietam Street			■			■		■	
4	Maugansville Road				■	■	■			
5	Prospect Street						■		■	■
6	N Locust Street	■			■		■		■	
7	N. Mulberry Street/Mulberry Avenue				■		■			■
8	East Avenue	■					■		■	■
9	Jonathan Street						■		■	
10	I-81 SB On Ramp			■		■	■			
11	US 40 EB	■						■		
12	Jonathan Street	■		■			■	■		
13	Walnut Street	■					■		■	
14	Pen Mar Road to MacAfee Hill Road		■		■		■			
15	W. Washington Street				■		■			
16	North Avenue			■			■			■
17	Nottingham Road	■		■			■	■	■	
18	Foxville Road			■	■		■			
19	Maryland 65 (Sharpsburg Pike)	■		■				■	■	
20	Harpers Ferry Road			■		■	■			

■ = Crash attribute is at a moderate level; ■ = Crash attribute is at a high level (see **Table 2**)

Figure 19: West Virginia Priority Corridors – Total Crash Rate (2013-2017)

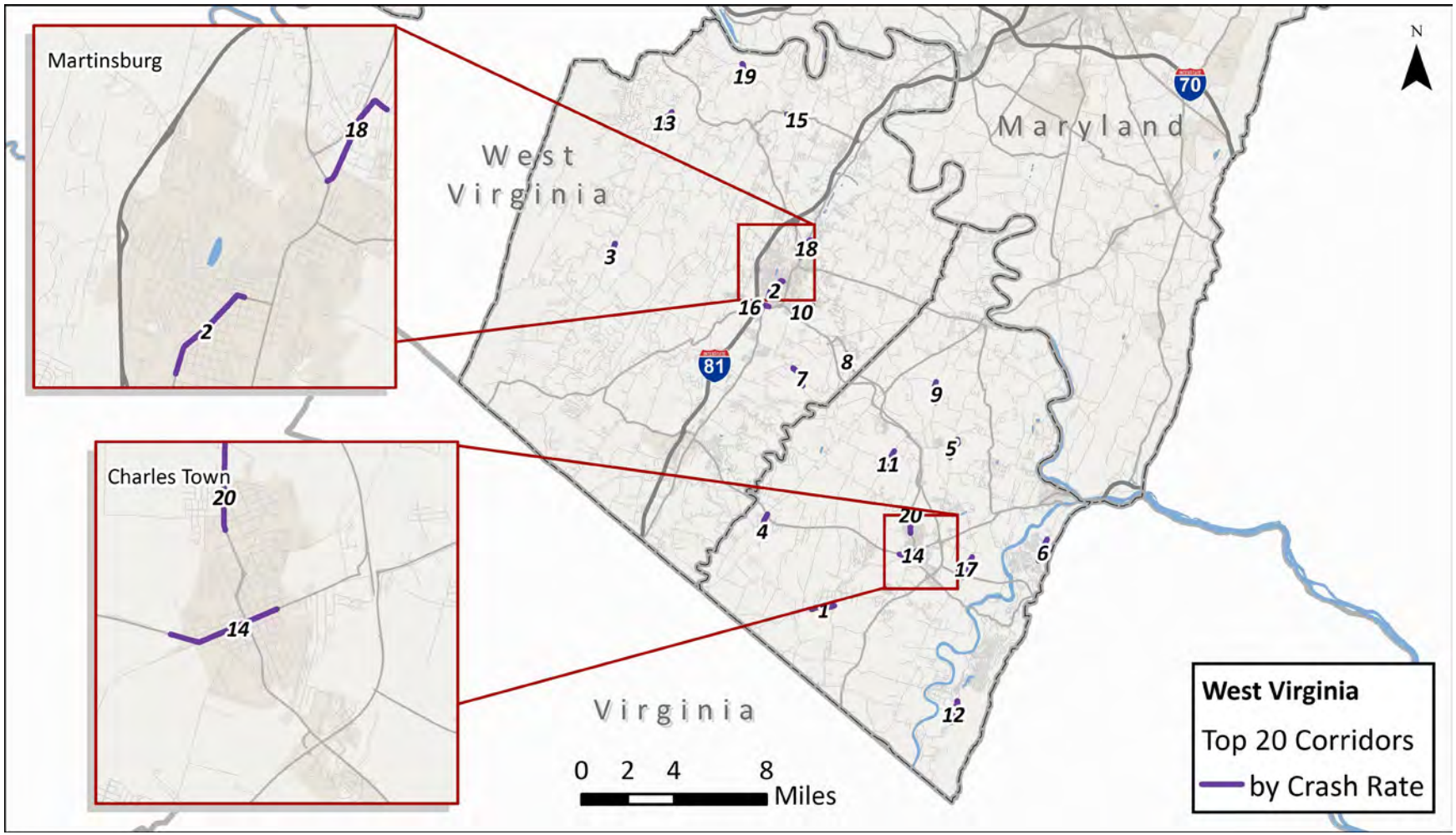


Table 9: West Virginia Priority Corridors – Total Crash Rate (2013-2017)

Map ID*	Corridor Name	Corridor Starting Point	Corridor Ending Point	Location	County
1	Summit Point Road	McCormack Lane	Lloyd Road	Charles Town	Jefferson
2	US 11 (Winchester Avenue)	Loraine Ave	Raleigh Street	Martinsburg	Berkeley
3	Back Creek Valley Road	Messenger Farm Lane	Sleepy Creek Road	Jones Spring	Berkeley
4	Leetown Road	Electrical Substation	Marshall Street	Charles Town	Jefferson
5	Flowing Spring Road	Jefferson High School	Duffields Marc Train Station	Shenandoah Junction	Jefferson
6	Chestnut Hill Road	Mountain View Drive	Grove Springs Lane	Silver Grove	Jefferson
7	Paynes Ford Road	Compassion Drive	Sulphur Spring Branch	Martinsburg	Berkeley
8	Van Metre Drive	Charles Town Road	Short Road	Kearneysville	Berkeley
9	Ridge Road	Edgewood School Road	The Barns at York Hill	Shepherdstown	Jefferson
10	Grapevine Road	Route 9 Charles Town Road	McDaniel Lane	Martinsburg	Berkeley
11	Wiltshire Road	Jefferson County Health Department	Johnstown Road	Charles Town	Jefferson
12	Mission Road	Shannondale Springs Chapel	Speaks Lane	Shannondale	Jefferson
13	Butts Mill Road	Mauve Road	Baxter Road	Hedgesville	Berkeley
14	Route 51	Seminary Street	Railroad Tracks	Charles Town	Jefferson
15	Hammonds Mill Road	Little Georgetown Road	Vineyard Road	Hedgesville	Berkeley
16	Apple Harvest Drive	Advent Drive	New York Avenue	Martinsburg	Berkeley
17	Cattail Run Road	Route 9	Keyes Ferry Road	Mechanicstown	Jefferson
18	Eagle School Road	Edwin Mill Blvd/Queens Street	Belview Drive	Martinsburg	Berkeley
19	Allensville Road	Gough Run	Beards Crossing Road	Hedgesville	Berkeley
20	Mildred Street	E. 10th Avenue	Wescott Drive	Ranson	Jefferson

** Bold Map ID [RED] means Corridor overlaps with a TIP/LRTP project*

Table 10: West Virginia Priority Corridors – Total Crash Rate (2013-2017)
Crash Attributes for Planning-Level Strategy Assessment

Map ID	Corridor Name	Assessment of Primary Crash Attributes For Corridor *(Note locations may include crashes with all listed attributes)*								
		Ped-Bike	Weekend	Peak Hours	Night	Wet	Run-Off Road	Rear-End	Angle-Turn	Sideswipe
1	Summit Point Road		■	■		■	■			
2	US 11 (Winchester Avenue)	■				■	■			
3	Back Creek Valley Road				■		■			
4	Leetown Road				■	■	■			
5	Flowing Spring Road			■		■	■			
6	Chestnut Hill Road	■		■		■		■		
7	Paynes Ford Road					■	■			
8	Van Metre Drive	■						■	■	■
9	Ridge Road			■		■	■			
10	Grapevine Road			■		■		■	■	
11	Wiltshire Road				■	■	■			
12	Mission Road	■					■	■		
13	Butts Mill Road			■			■	■		
14	Route 51				■	■	■			
15	Hammonds Mill Road			■		■	■			
16	Apple Harvest Drive			■		■	■	■		
17	Cattail Run Road				■	■	■			
18	Eagle School Road					■	■			
19	Allensville Road				■		■	■		
20	Mildred Street						■			

■ = Crash attribute is at a moderate level; ■ = Crash attribute is at a high level (see **Table 2**)

Priority Corridors by Number of Fatalities and Injuries

Note: Priority Corridors are defined as one-mile segments referenced by a whole milepost number on the corresponding route. Approximate locations of these corridors are visualized on the maps by identifying the DOT GIS roadway layer segment(s) that contain that whole milepost number.

Figure 20: Maryland Priority Corridors – Fatalities and Injuries (2013-2017)

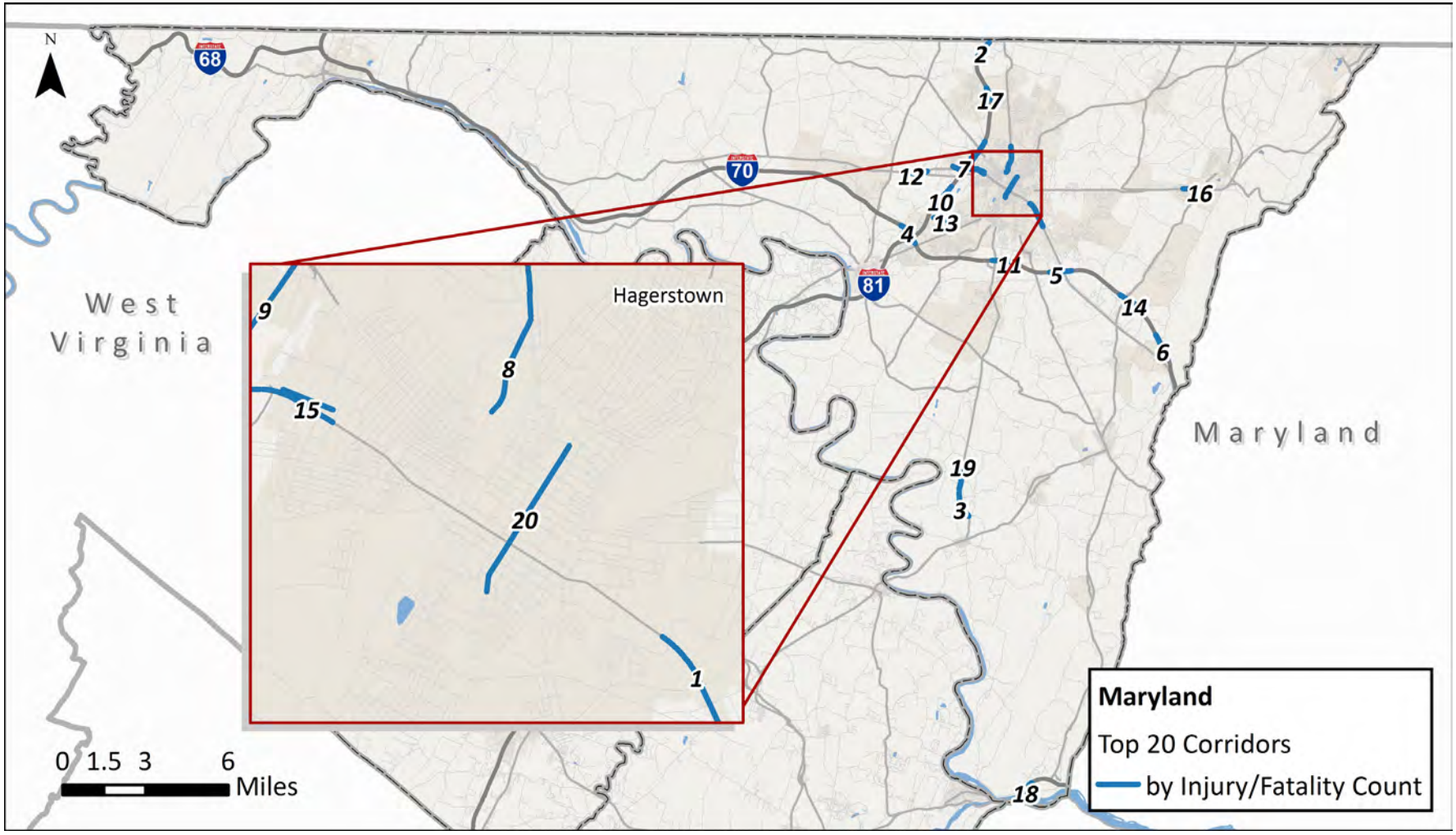


Table 11: Maryland Priority Corridors – Fatalities and Injuries (2013-2017)

Map ID*	Corridor Name	Corridor Starting Point	Corridor Ending Point	Location
1	US 40 EB	Tracys Lane	Covenant Life Church	Hagerstown
2	I- 81 NB	Mile 11	MD/PA State Line	Maugansville
3	Maryland 65 (Sharpsburg Pike)	Starke Road	Richardson Avenue	Sharpsburg
4	I-70 EB	Mile 25	Exit 26 (I-81)	Williamsport
5	I-70 EB	Beaver Creek Road	Exit 32 (US 40)	Hagerstown
6	I- 70 EB	Mile 36	Mile 37	Mt. Lena
7	Garland Groh Boulevard	Barlow Drive	Bulldog Federal Credit Union	Hagerstown
8	US 11 (Pennsylvania Avenue/N. Burhans Boulevard)	Fairview Road	Railroad Tracks	Hagerstown
9	I-81 NB	Mile 7	Mile 8	Hagerstown
10	I-81 NB	Mile 5	Mile 6	Hagerstown
11	I-70 EB	Exit 29 (MD 65)	Mile 30	Hagerstown
12	US 40	Ryeland Lane	W. Washington Street	Hagerstown
13	Halfway Boulevard	I-81	Virginia Avenue	Hagerstown
14	I-70 EB	Exit 35 (MD 66)	Black Rock Road	Hagerstown
15	US 40	I-81	Devonshire Road	Hagerstown
16	Maryland 64 (Jefferson Boulevard)	Iroquois Avenue	Mapleville Road	Smithsburg
17	I-81 NB	Exit 9 (Maugans Ave)	Mile 10	Maugansville
18	US 340	Valley Road	MD/VA State Line	Sandy Hook
19	Maryland 65 (Sharpsburg Pike)	Taylors Landing Road	Starke Road	Sharpsburg
20	Potomac Street	Charles Street	Baltimore Street	Hagerstown

** Bold Map ID [RED] means Corridor overlaps with a TIP/LRTP project*

Table 12: Maryland Priority Corridors – Fatalities and Injuries (2013-2017)
Crash Attributes for Planning-Level Strategy Assessment

Map ID	Corridor Name	Assessment of Primary Crash Attributes For Corridor *(Note locations may include crashes with all listed attributes)*								
		Ped-Bike	Weekend	Peak Hours	Night	Wet	Run-Off Road	Rear-End	Angle-Turn	Sideswipe
1	US 40 EB	■						■		
2	I- 81 NB				■		■			
3	Maryland 65 (Sharpsburg Pike)	■		■				■	■	
4	I-70 EB			■		■	■	■		■
5	I-70 EB			■	■		■	■		
6	I- 70 EB				■		■	■		
7	Garland Groh Boulevard					■	■		■	
8	US 11 (Pennsylvania Avenue/N. Burhans)			■				■	■	
9	I-81 NB					■	■			
10	I-81 NB						■	■		
11	I-70 EB			■		■	■	■		
12	US 40			■			■		■	
13	Halfway Boulevard					■	■			
14	I-70 EB						■	■		
15	US 40	■		■			■	■		
16	Maryland 64 (Jefferson Boulevard)			■				■	■	
17	I-81 NB			■			■	■		
18	US 340						■	■		
19	Maryland 65 (Sharpsburg Pike)	■			■		■	■	■	
20	Potomac Street	■					■			

■ = Crash attribute is at a moderate level; ■ = Crash attribute is at a high level (see **Table 2**)

Figure 21: West Virginia Priority Corridors – Fatalities and Injuries (2013-2017)

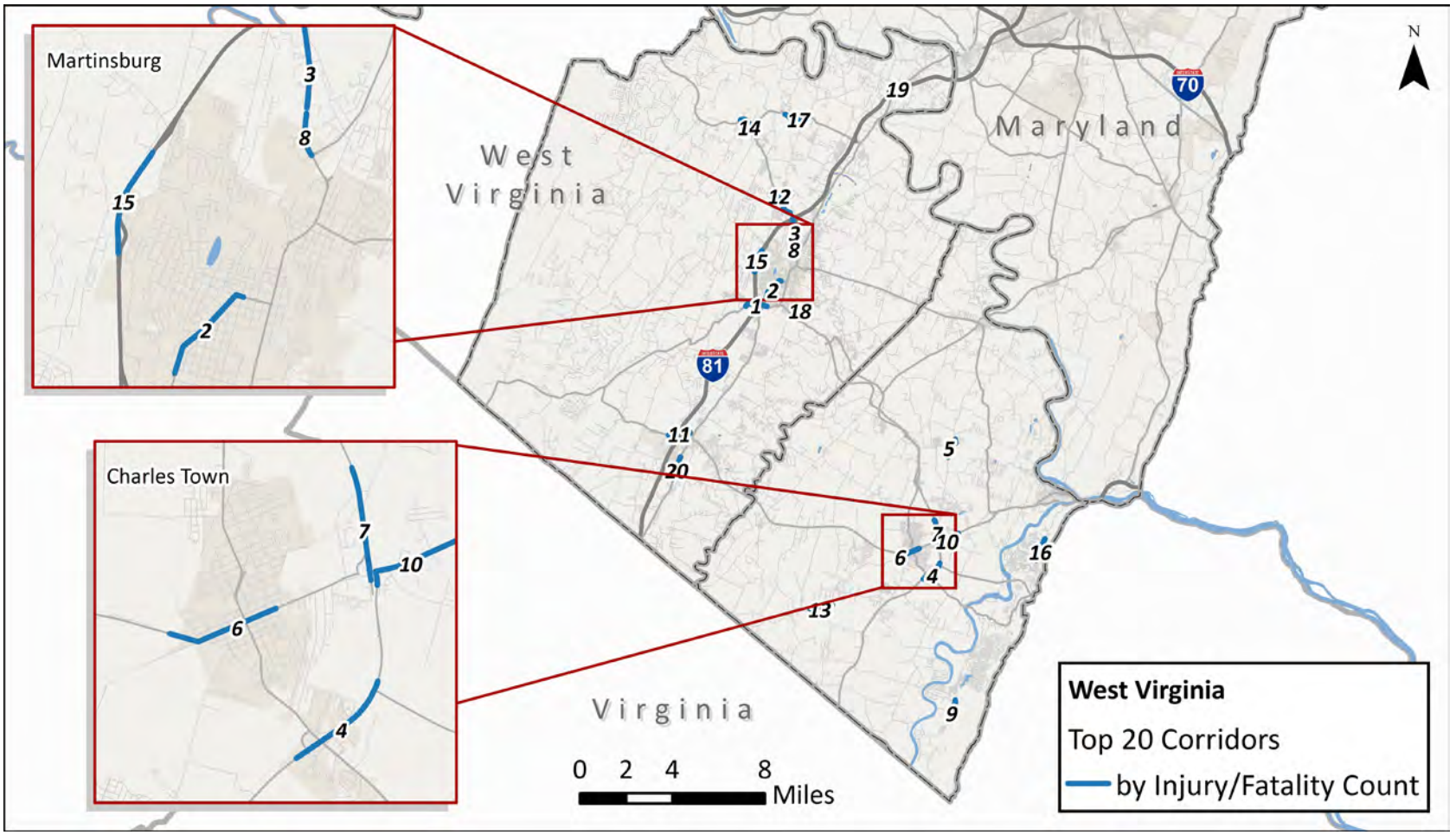


Table 13: West Virginia Priority Corridors – Fatalities and Injuries (2013-2017)

Map ID*	Corridor Name	Corridor Starting Point	Corridor Ending Point	Location	County
1	Route 45 (Apple Harvest Drive)	Advent Drive	New York Avenue	Martinsburg	Berkeley
2	US 11 (Winchester Avenue)	Loraine Ave	Raleigh Street	Martinsburg	Berkeley
3	Route 9 (Edwin Miller Blvd)	I-81	Meridian Parkway	Martinsburg	Berkeley
4	US 340 NB	Candlewood Drive	Route 9	Charles Town	Jefferson
5	Flowing Spring Road	Jefferson High School	Duffields Marc Train Station	Shenandoah Junction	Jefferson
6	Route 51	Railroad Tracks	N. Seminary Street	Charles Town	Jefferson
7	Route 9	Railroad Tracks	US 340	Charles Town	Jefferson
8	Route 9 (Edwin Miller Boulevard)	ALDI	Raleigh Street/Williamsport Pike	Martinsburg	Berkeley
9	Mission Road	Shannondale Springs Chapel	Speaks Lane	Shannondale	Jefferson
10	US 340	Route 9	Mile 10	Charles Town	Jefferson
11	Route 51 (Gerradstown Road)	Bentley Drive	Sader Drive	Inwood	Berkeley
12	Route 9 (Hedgesville Road)	Welltown Road	I-81	Martinsburg	Berkeley
13	Summit Point Road	McCormack Lane	Lloyd Road	Charles Town	Jefferson
14	Route 9 (Hedgesville Road)	US Postal Service	Ben Speck Road	Hedgesville	Berkeley
15	I-81 NB	Exit 13 (King Street)	Exit 14 (Dry Run Road)	Martinsburg	Berkeley
16	Chestnut Hill Road	Mountain View Drive	Grove Springs Lane	Silver Grove	Jefferson
17	Hammonds Mill Road	Little Georgetown Road	Vineyard Road	Hedgesville	Berkeley
18	Grapevine Road	Route 9 Charles Town Road	McDaniel Lane	Martinsburg	Berkeley
19	I-81 NB	Mile 23	Mile 24	Falling Waters	Berkeley
20	US 11	Bunker Hill United Methodist	Mill Creek Intermediate	Bunker Hill	Berkeley

** Bold Map ID [RED] means Corridor overlaps with a TIP/LRTP project*

Table 14: West Virginia Priority Corridors – Fatalities and Injuries (2013-2017)
Crash Attributes for Planning-Level Strategy Assessment

Map ID	Corridor Name	Assessment of Primary Crash Attributes For Corridor *(Note locations may include crashes with all listed attributes)*								
		Ped-Bike	Weekend	Peak Hours	Night	Wet	Run-Off Road	Rear-End	Angle-Turn	Sideswipe
1	Route 45 (Apple Harvest Drive)	■						■	■	■
2	US 11 (Winchester Avenue)	■						■	■	
3	Route 9 (Edwin Miller Blvd)	■						■	■	
4	US 340 NB							■		
5	Flowing Spring Road			■		■	■	■	■	
6	Route 51	■				■		■		
7	Route 9			■	■		■	■		
8	Route 9 (Edwin Miller Boulevard)	■						■		
9	Mission Road				■	■	■			
10	US 340	■		■				■		
11	Route 51 (Gerradstown Road)	■		■				■	■	
12	Route 9 (Hedgesville Road)	■		■				■	■	
13	Summit Point Road		■	■		■	■			
14	Route 9 (Hedgesville Road)	■		■			■	■		
15	I-81 NB	■		■		■	■	■		■
16	Chestnut Hill Road				■	■	■			
17	Hammonds Mill Road					■	■		■	
18	Grapevine Road	■				■	■		■	
19	I-81 NB					■	■			■
20	US 11				■			■	■	■

■ = Crash attribute is at a moderate level; ■ = Crash attribute is at a high level (see **Table 2**)

Priority Corridors by Fatality and Injury Rate

Note: Priority Corridors are defined as one-mile segments referenced by a whole milepost number on the corresponding route. Approximate locations of these corridors are visualized on the maps by identifying the DOT GIS roadway layer segment(s) that contain that whole milepost number.

Figure 22: Maryland Priority Corridors – Fatality and Injury Rates

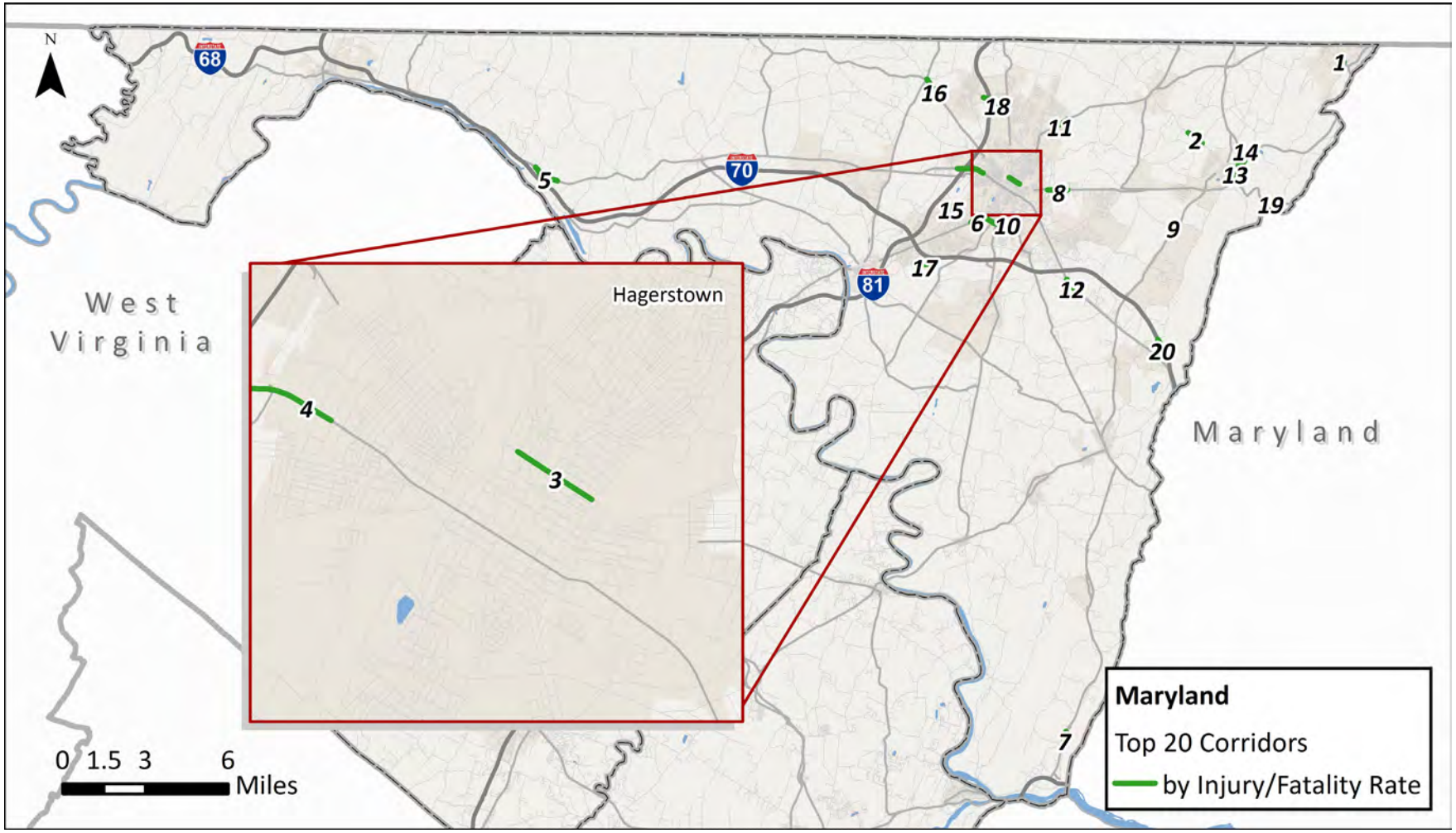


Table 15: Maryland Priority Corridors – Fatality and Injury Rates

Map ID*	Corridor Name	Corridor Starting Point	Corridor Ending Point	Location
1	Pen Mar Road to MacAfee Hill Rd	Buena Vista	Cascade Road	Highfield- Cascade
2	Leitersburg Smithsburg Road	Still Meadow Road	Rowe Road	Smithsburg
3	North Avenue	Sumans Avenue	N. Mulberry Street	Hagerstown
4	US 40 EB	I-81	Devonshire Road	Hagerstown
5	US 40	Licking Creek Road	Ernstville Road	Big Pool
6	US 11 (Virginia Avenue)	S. Burhans Boulevard/S. Wilson Boulevard	Elmwood Road	Hagerstown
7	Rohrersville Road	Harris Hollow Lane	Garretts Mill Road	Knoxville
8	Jefferson Boulevard	Eastern Boulevard	Scott Hill Drive	Hagerstown
9	Mapleville Road	Little Beaver Creek Farm	Pondsville Road	Smithsburg
10	W. Wilson Boulevard	Virginia Avenue	S. Potomac Street	Hagerstown
11	Leitersburg Pike	Orchid Drive	Longmeadow Road	Hagerstown
12	US 40	I-70	Crossfield Road	Hagerstown
13	MD 64 (Smithsburg Pike)	Eagle Nest Road	S. Main Street/Foxwell Road	Smithsburg
14	Raven Rock Road	MD 64 (Smithsburg Pike)	Bath Spring Lane	Smithsburg
15	Wesel Boulevard	Wesel Storage Center	Railway Lane	Hagerstown
16	Cearfoss Pike	Greencastle Pike	Gardenview Road	Hagerstown
17	Sterling Road	Edward Doub Road	Bower Avenue	Williamsport
18	Maugans Avenue	The Columbia Bank	Spriggs Road	Hagerstown
19	Foxville Road	Hopkins Lane	Pleasant Valley Road	Smithsburg
20	I-70 EB	Chrystal Falls Drive	Mile 37	Boonsboro

** Bold Map ID [RED] means Corridor overlaps with a TIP/LRTP project*

Table 16: Maryland Priority Corridors – Fatality and Injury Rates (2013-2017)
Crash Attributes for Planning-Level Strategy Assessment

Map ID	Corridor Name	Assessment of Primary Crash Attributes For Corridor *(Note locations may include crashes with all listed attributes)*								
		Ped-Bike	Weekend	Peak Hours	Night	Wet	Run-Off Road	Rear-End	Angle-Turn	Sideswipe
1	Pen Mar Road to MacAfee Hill Road		■		■		■			
2	Leitersburg Smithsburg Road		■		■		■		■	
3	North Avenue			■		■	■		■	
4	US 40 EB		■				■	■		
5	US 40							■		
6	US 11 (Virginia Avenue)								■	
7	Rohrersville Road								■	
8	Jefferson Boulevard				■	■	■	■	■	
9	Mapleville Road						■		■	
10	W. Wilson Boulevard			■			■	■	■	
11	Leitersburg Pike						■		■	
12	US 40					■	■		■	
13	MD 64 (Smithsburg Pike)		■				■	■	■	
14	Raven Rock Road				■		■	■		
15	Wesel Boulevard								■	
16	Cearfoss Pike			■			■	■		
17	Sterling Road		■	■			■			■
18	Maugans Avenue			■					■	
19	Foxville Road				■	■	■		■	
20	I-70 EB							■		■

■ = Crash attribute is at a moderate level; ■ = Crash attribute is at a high level (see **Table 2**)

Figure 23: West Virginia Priority Corridors – Fatality and Injury Rates

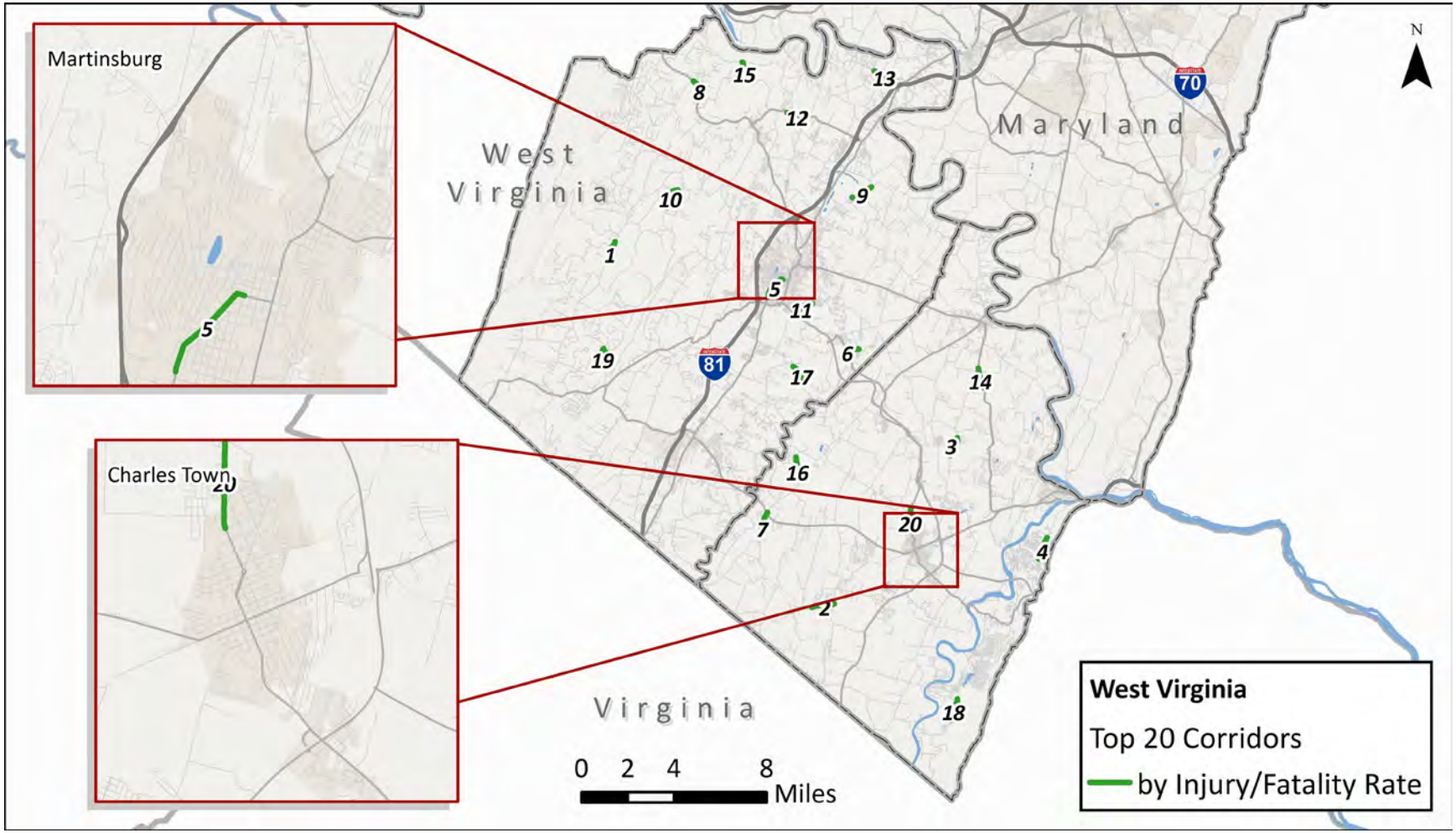


Table 17: West Virginia Priority Corridors – Fatality and Injury Rates

Map ID*	Corridor Name	Corridor Starting Point	Corridor Ending Point	Location	County
1	Back Creek Valley Road	Messenger Farm Lane	Sleepy Creek Road	Jones Spring	Berkeley
2	Summit Point Road	McCormack Lane	Lloyd Road	Charles Town	Jefferson
3	Flowing Spring Road	Jefferson High School	Duffields Marc Train Station	Shenandoah Junction	Jefferson
4	Chestnut Hill Road	Mountain View Drive	Grove Springs Lane	Silver Grove	Jefferson
5	US 11 (Winchester Avenue)	Loraine Ave	Raleigh Street	Martinsburg	Berkeley
6	Van Metre Drive	Shockey Memorial Boulevard	Short Road	Kearneysville	Berkeley
7	Leetown Road	Electrical Substation	Marshall Street	Charles Town	Jefferson
8	Hedgesville Road	Arcadia Road	Zenith Drive	Johnstown	Berkeley
9	Berkeley Station Road	Rankin Circle	Bedington Road	Berkeley	Berkeley
10	Swinging Bridge Road	Sapwood Drive	Dry Run Road	Hedgesville	Berkeley
11	Grapevine Road	Route 9	McDaniel Lane	Martinsburg	Berkeley
12	Hammonds Mill Road	Little Georgetown Road	Vineyard Road	Hedgesville	Berkeley
13	Grade Road	Kitchen Orchard Road	Pepper Tree Road	Falling Waters	Berkeley
14	Shepherdstown Pike	Gardners Lane	Rawhide Lane	Shepherdstown	Berkeley
15	Allensville Road	Gough Run	Beards Crossing Road	Hedgesville	Berkeley
16	Archer Road	Leetown Road	Sulphur Springs Road	Kearneysville	Jefferson
17	Paynes Ford Road	Compassion Drive	Sulphur Spring Branch	Martinsburg	Berkeley
18	Mission Road	Shannondale Springs Chapel	Speaks Lane	Shannondale	Jefferson
19	Buck Hill Road	Ganotown Road	Buck Hill Independent Bible Church	Gerrardstown	Berkeley
20	Mildred Street	E. 10th Avenue	Wescott Drive	Ranson	Jefferson

** Bold Map ID [RED] means Corridor overlaps with a TIP/LRTP project*

Table 18: West Virginia Priority Corridors – Fatality and Injury Rates
Crash Attributes for Planning-Level Strategy Assessment

Map ID	Corridor Name	Assessment of Primary Crash Attributes For Corridor *(Note locations may include crashes with all listed attributes)*								
		Ped-Bike	Weekend	Peak Hours	Night	Wet	Run-Off Road	Rear-End	Angle-Turn	Sideswipe
1	Back Creek Valley Road		■	■		■	■			
2	Summit Point Road				■	■	■			
3	Flowing Spring Road				■	■	■			
4	Chestnut Hill Road	■						■	■	
5	US 11 (Winchester Avenue)			■		■	■	■	■	
6	Van Metre Drive			■		■	■			
7	Leetown Road		■		■	■	■	■		
8	Hedgesville Road					■	■		■	
9	Berkeley Station Road	■				■	■		■	
10	Swinging Bridge Road		■	■					■	■
11	Grapevine Road				■	■	■			
12	Hammonds Mill Road				■	■	■			
13	Grade Road					■	■			
14	Shepherdstown Pike			■		■	■			
15	Allensville Road				■		■		■	
16	Archer Road				■	■	■			
17	Paynes Ford Road			■			■			
18	Mission Road				■	■	■			
19	Buck Hill Road			■	■	■	■			
20	Mildred Street	■			■	■	■		■	

■ = Crash attribute is at a moderate level; ■ = Crash attribute is at a high level (see **Table 2**)

Priority Intersections by Total Number of Crashes in Vicinity

Figure 24: Maryland High Crash Intersections

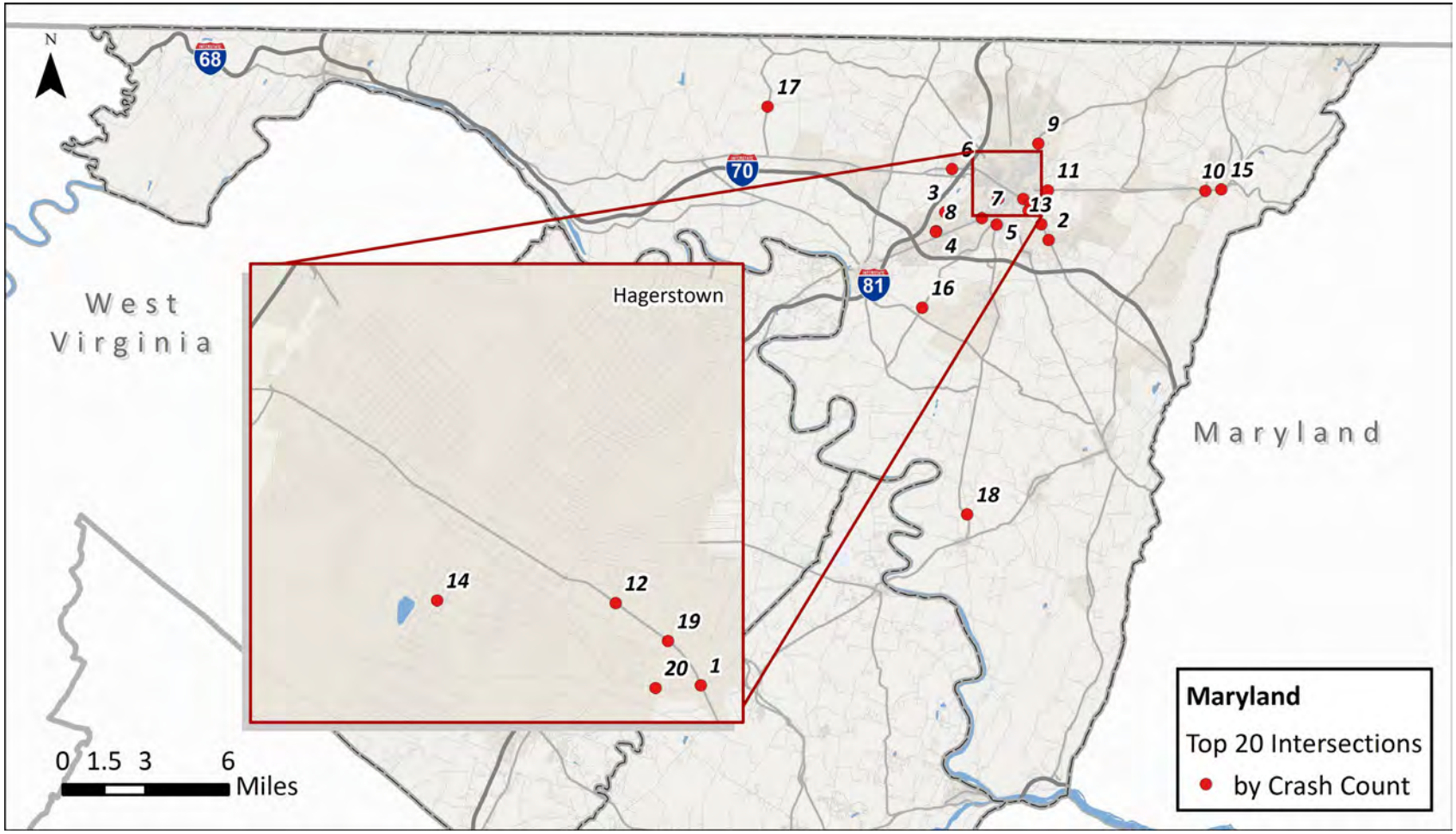


Table 19: Maryland High Crash Intersections

Map ID*	Intersection	Location	Crash Count
1	US 40 at Eastern Boulevard	Hagerstown	27
2	US 40 at Edgewood Drive	Hagerstown	19
3	Wesel Boulevard at Heister Street	Hagerstown	17
4	Massey Boulevard at Cole Road	Hagerstown	17
5	Wilson Boulevard at South Potomac Street	Hagerstown	16
6	US 40 at Garland Groh Boulevard	Hagerstown	16
7	Virginia Avenue at Snyder Avenue	Hagerstown	15
8	Massey Boulevard at Cole Road	Hagerstown	15
9	Leitersburg Pike at Cortland Drive	Hagerstown	14
10	Jefferson Boulevard at Mapleville Road	Smithsburg	14
11	Jefferson Boulevard at Eastern Boulevard	Hagerstown	13
12	US 40 at Cleveland Avenue	Hagerstown	13
13	US 40 at Mount Aetna Road	Hagerstown	13
14	Summit Avenue at Virginia Avenue	Hagerstown	13
15	Jefferson Boulevard at Crystal Falls Drive	Smithsburg	13
16	Downsville Pike at Carty Lane	Hagerstown	13
17	Broadfording Road at St. Paul Road	Clear Spring	12
18	Sharpsburg Pike at Dunker Church Road	Sharpsburg	12
19	US 40 at Tracys Lane/Manor Drive	Hagerstown	11
20	Eastern Boulevard at Hamilton Run (creek)	Hagerstown	11

** Bold Map ID [RED] means Corridor overlaps with a TIP/LRTP project*

*** Further evaluation needed to determine intersection crash rates using approach traffic volumes for each cross-street*

Figure 25: West Virginia Crash Intersections

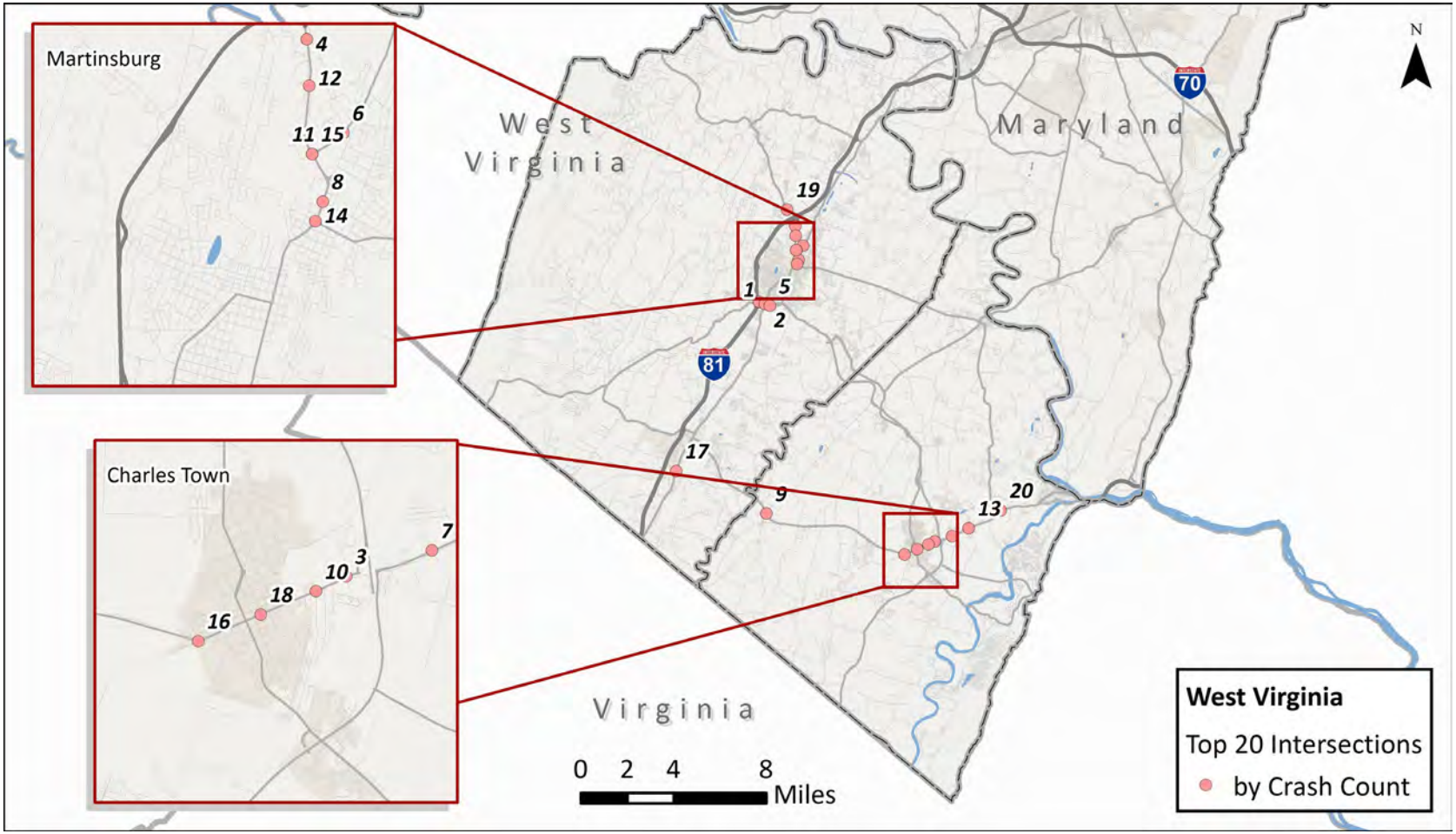


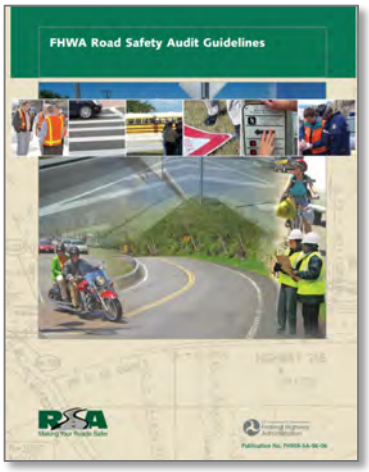
Table 20: West Virginia Crash Intersections

Map ID	Intersection	Location	County	Crash Count
1	William L Wilson Freeway at US 9	Charles Town	Jefferson	116
2	Apple Harvest Drive at Foxcroft Avenue	Martinsburg	Berkeley	55
3	Apple Harvest Drive at Winchester Avenue	Martinsburg	Berkeley	46
4	Washington Street at Flowing Springs Road	Charles Town	Jefferson	33
5	Edwin Miller Boulevard at Warm Springs Avenue	Martinsburg	Berkeley	27
6	Edwin Miller Boulevard at Williamsport Pike	Martinsburg	Berkeley	26
7	Apple Harvest Drive at New York Avenue	Martinsburg	Berkeley	26
8	Williamsport Pike at Meadow Lane	Martinsburg	Berkeley	24
9	US 340 at Patrick Henry Way	Charles Town	Jefferson	21
10	Queen Street at Woodbury Avenue	Martinsburg	Berkeley	20
11	Middleway Pike at Leetown Road	Kearneysville	Jefferson	19
12	Washington Street at Jefferson Avenue	Charles Town	Jefferson	18
13	Edwin Miller Boulevard at Jennings Drive	Martinsburg	Berkeley	12
14	US 340 at Marlow Road	Charles Town	Jefferson	12
15	Queen Street at Moler Avenue	Martinsburg	Berkeley	12
16	Summit Point Road/WV51/W Washington Street at MLK Jr Boulevard	Charles Town	Jefferson	12
17	Winchester Avenue at Henshaw Road	Bunker Hill	Berkeley	11
18	Washington Street at Mildred Street	Charles Town	Jefferson	10
19	Hedgesville Road at Rock Cliff Drive	Martinsburg	Berkeley	10
20	US 340 at Shepherdstown Pike	Charles Town	Jefferson	9

** Bold Map ID [RED] means Corridor overlaps with a TIP/LRTP project*

*** Further evaluation needed to determine intersection crash rates using approach traffic volumes for each cross-street*

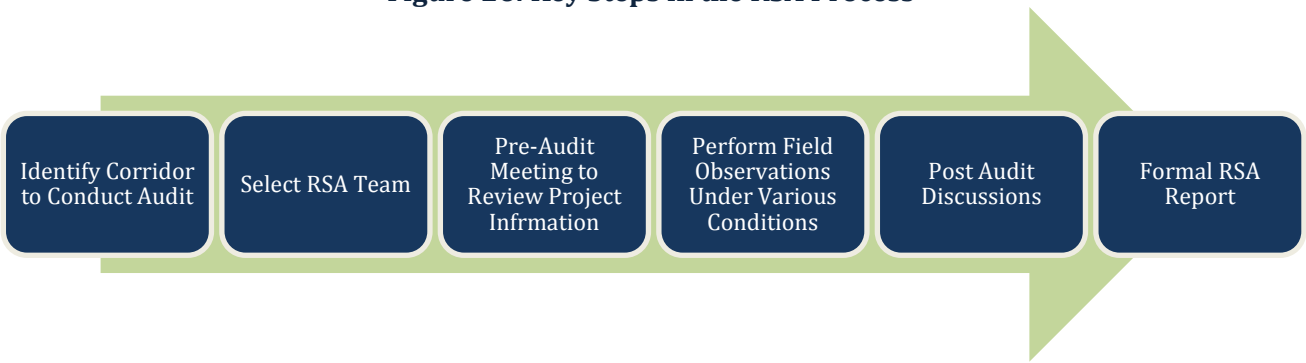
Road Safety Audits



A Road Safety Audit (RSA) is a formal safety performance examination of an existing or future road or intersection by an independent audit team. It qualitatively estimates and reports on potential road safety issues and identifies opportunities for improvements in safety for all road users. The implementation or RSAs has been found to reduce crashes by 10-60%.[17] RSAs represent an additional tool within the suite of tools that currently make up a multidisciplinary safety management system aimed at improving safety.[18] FHWA has developed guidelines for completing RSAs and fully supports the audit process as a means to understand crash causes and identify alternative countermeasures.

Both the WVDOT and Maryland SHA have RSA program guidelines that primarily mirror that of FHWA's guidelines. The RSA consists of one-day field visit to a corridor or intersection using a multi-disciplinary team consisting of DOT engineering, design and planning staff with some expertise in safety. Other participants often include MPO planning staff, city or county engineers, local planning staff, local law enforcement, and supporting consultants if needed. The RSA may include follow-up field visits or data collection as warranted to assist in countermeasure selection. The RSA results in a formal concise report that documents the project location, audit team members, crash history, safety problems and suggested countermeasures or strategies. Audit reports can vary in the detail provided for each strategy. The key steps in the RSA process are illustrated in **Figure 26**.

Figure 26: Key Steps in the RSA Process



[17] https://safety.fhwa.dot.gov/provencountermeasures/road_safety_audit/
[18] https://safety.fhwa.dot.gov/rsa/

RSA recommendations should be considered a site-specific toolbox of potential strategies that can be further prioritized for implementation as stand-alone projects, included as part of future projects, or implemented as part of maintenance projects, or other systematic improvement activities. Typically, the state DOT and city/county engineers will be responsible for the prioritization and implementation of the strategies based on local and regional priorities and available funding. Implementation of strategies may require additional data collection and studies.

HEPMPO RSA Locations

Using only crash data, it is difficult to identify detailed safety countermeasures. The **Priority Safety Corridors** section of this report has provided a planning-level assessment of safety causes on high crash roadway corridors within the region. The RSA process has been identified as an important next step to further investigate crash causes and to identify specific strategies or projects. The HEPMPO intends to play a more proactive role in the RSA process. As indicated earlier in this report, the HEPMPO will continue to work to identify priority corridors where RSAs may be applicable, assist in assembling and implementing audit teams, and lead the development of the RSA report for select locations. All RSA efforts will be conducted in support of WVDOT and MDOT SHA and include local participants with direct knowledge of the corridor. The HEPMPO has worked with the Safety and Traffic Advisory Group to select three pilot RSA locations, one in each county.

Table 21: RSA Locations

County	Washington	Berkley	Jefferson
Roadway	Washington Street	WV 9 (Johnsontown)	Summit Point Road
Limits	Burhans Blvd. to Cannon Ave.	Traver's Country Store to Dollar General	Shirley to Lloyd Road
Length	0.9 miles	0.4 miles	1.4 miles
Audit Team	▪ HEPMPO ▪ Michael Baker International ▪ Hagerstown City ▪ SHA District 6 ▪ Washington County Sheriff's Office	▪ HEPMPO ▪ Michael Baker International ▪ WVDOH District 5 ▪ Berkeley County Planning Department ▪ FHWA-WV Division ▪ Berkeley County Office of Homeland Security and Emergency Management	▪ HEPMPO ▪ Michael Baker International ▪ WVDOH District 5 ▪ Jefferson County Sheriff's Office ▪ FHWA-WV Division

The RSAs were conducted in November and December of 2018 with separate audit teams for each location. Follow-up field visits were conducted to collect traffic counts, assess night-time visibility, and to evaluate vehicle queues during peak hours. RSA reports were prepared for the locations and are included as **Appendices D-F** to this report. Detailed summaries of the observations and recommendations have been prepared to facilitate group discussions and to support further assessment by each DOT.

Lessons Learned from RSA Implementation

The HEPMPO staff and other local participants for each of the pilot RSAs gained a better understanding of the value of a multidisciplinary team field assessment. Observations of existing conditions for each mode of travel and discussions among team members with different expertise resulted in the identification of strategies and countermeasures that would not have been determined based on meetings, and reviews of aerial or street view photography. Other lessons learned from the RSA implementation include those highlighted below.

- Conduct a post-audit discussion to assess viable strategies identified in field
- Provide descriptive documentation of strategies in the audit report with maps and diagrams
- Follow-up activities or field visits may be required to support audit assessments
- Assess crash rates for RSA corridors to support DOT implementation and priortization
- Audits may present multiple alternative measures for further assessment by DOT
- Preparation for the audit field visit is important
- Request additional crash narratives and locations from DOT

Future Steps and Integration

This safety study provides HEPMPO a more detailed assessment of transportation safety issues within the region and will serve as a building block for future updates to HEPMPO's LRTP and future Road Safety Audits. **Figure 27** highlights potential steps to further enhance the identification and assessment of regional safety within the planning process.

Figure 27: HEPMPO Future Implementation Steps

Crash Data Analysis

- Monitor WVDOT efforts on crash data mapping and georeferencing - Revisit analyses as improvements are made to data.
- Acquire MPO access to ReportBeam or work with the WVDOH on protocols for information requests. Work to obtain more detailed crash data summaries from SHA for select priority corridors.
- Enhance methods to evaluate and compare crash rates to statewide averages.
- Conduct spot assessments of intersection crash rates and comparisons to FHWA and DOT crash rate standards based on entering vehicles to intersection. Will require approach volumes for intersections.

Integration of Safety Data into Project Prioritization

- Identify methods to utilize priority corridors within the TIP and LRTP project prioritization process.

Road Safety Audits

- Work with DOTs to identify future audit locations using information from the priority corridor analysis.

Safety Data Monitoring

- Establish a dashboard monitoring section on the HEPMPO website to provide status and trends on federal performance measures.

Continue to Assess Regional Strategies

- Evaluate and support marketing efforts to improve distracted, aggressive and impaired driving. Support efforts to improve safe walking and biking.
- Coordinate with other agencies.

Public Outreach

- Enhance methods to convey safety performance monitoring requirements
- Periodicallly assess public input and issues on transportation safety across all modes