Approved June 15, 2022

visualize 2045

A long-range transportation plan for the National Capital Region

APPENDIX F

Roadway Safety Planning

June 15, 2022

ROADWAY SAFETY PLANNING FOR THE VISUALIZE 2045 UPDATE (2022)
LONG-RANGE TRANSPORTATION PLAN FOR THE NATIONAL CAPITAL REGION
June 15, 2022

ABOUT VISUALIZE 2045 & THE TPB

Visualize 2045 is the federally required long-range transportation plan for the National Capital Region. It identifies and analyzes all regionally significant transportation investments planned through 2045 to help decision makers and the public "visualize" the region's future. The plan is updated at least every four years, the Visualize 2045 update is scheduled for 2022.

Visualize 2045 is developed by the National Capital Region Transportation Planning Board (TPB), the federally designated metropolitan planning organization (MPO) for metropolitan Washington. It is responsible for developing and carrying out a continuing, cooperative, and comprehensive transportation planning process in the metropolitan area. Members of the TPB include representatives of the transportation agencies of the states of Maryland and Virginia and the District of Columbia, 24 local governments, the Washington Metropolitan Area Transit Authority, the Maryland and Virginia General Assemblies, and nonvoting members from the Metropolitan Washington Airports Authority and federal agencies. The TPB is staffed by the Department of Transportation Planning at the Metropolitan Washington Council of Governments (COG).

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A safe transportation system is a foundational element of a livable region. With approximately 260 deaths and nearly 3,000 serious injuries in crashes every year on the region's roads, improving safety of all modes is critical to improving the quality of life for residents and visitors. It requires commitment to a coordinated, collaborative, and comprehensive transportation safety planning process that is informed by analysis of safety data.

Planning for safety is also a federal requirement for metropolitan planning organizations. It is a required federal planning factor and performance area for Performance-based Planning and Programming (PBPP), each established through the Moving Ahead for Progress Act of 2014. The federal planning factor states: *Increase the safety of the transportation system for all motorized and non-motorized users.*

This document supplements the safety discussions and data provided in the 2022 update to Visualize 2045 and in the plan's Appendix D, the Systems Performance Report, to further demonstrate how the TPB complies with federal requirements and responds to the Transportation Planning Board's commitment to roadway safety.

THE TRANSPORTATION PLANNING BOARD'S COMMITMENT TO ROADWAY SAFETY

Two signature programs highlight the Transportation Planning Board's (TPB) commitment to reducing the number of fatalities and serious injuries on the region's roadways; the Street Smart program and the Regional Roadway Safety Program (RRSP). The Street Smart program works to protect vulnerable road users by raising public awareness and promoting enforcement of pedestrian and bicycle safety laws, while the Regional Roadway Safety Program (RRSP) provides short-term consultant services to member jurisdictions and agencies for planning and preliminary engineering projects that address roadway safety issues.

The TPB also ensures that safety is considered throughout the regional transportation planning process. Transportation safety is highlighted in the TPB Vision, included in the Regional Transportation Priorities Plan, considered in the projects that go into Visualize 2045, and addressed as part of this region's Performance-based Planning and Programming (PBPP) requirements.[1] The TPB's Transportation Safety Subcommittee meets regularly to guide ongoing highway safety analysis, identify the most significant highway safety problems, and foster regional coordination.

To better understand the factors contributing to the unacceptable numbers of fatal and serious injury crashes in the region, the TPB commissioned a Regional Roadway Safety Study. The recommendations from this study informed the TPB's development and adoption of Resolution R3-2021 which instituted a regional safety policy and established and funded the RRSP.

Collaboration with TPB safety partners at the Maryland Department of Transportation (MDOT), the Virginia Department of Transportation (VDOT), and the District Department of Transportation (DDOT) is ongoing and essential. TPB staff work with our state partners on the development of each state's Strategic Highway Safety Plan, and our state partners regularly participate in Transportation Safety Subcommittee meetings. Each member state shares safety data and assists with its analysis.

[1] See Chapter 8 and Appendix D of this plan.

Safety also plays a significant role in TPB program areas such as the Congestion Management Process, Systems Performance, Management, and Operations Planning, Bicycle and Pedestrian Planning, Regional Public Transportation Planning, Freight Planning, and the Transportation-Land Use Connections program. The TPB staff also present safety planning information to the TPB's Access for All Advisory Committee, and garner feedback that can inform future planning activities.

STREET SMART

Since 2002, the region's Street Smart pedestrian and bicyclist safety outreach campaign and program has worked to protect vulnerable road users by raising awareness and promoting enforcement of safety laws. The region-wide Street Smart public safety campaign targets drivers, pedestrians, and bicyclists in the District of Columbia, Suburban Maryland, and Northern Virginia. The initiative integrates several components, including purchase and placement of advertising, donated media/public service announcements, media relations, street-level outreach events, digital efforts, and increased law enforcement. Waves of paid and donated media run in the fall and spring in conjunction with changes from and to Daylight Savings Time.

The goals of the Street Smart program are to:

- Reduce pedestrian and cyclist injuries and deaths in the region;
- Educate drivers, pedestrians, and cyclists about safe use of roadways; and
- Use enforcement and related press coverage to raise awareness of pedestrian and bicycle safety laws.

An annual online survey assesses the effectiveness of the campaign. The surveys measure awareness and attitudes among drivers and pedestrians. The groups surveyed are a representative sample of residents living in three geographic areas: the Maryland suburbs, Northern Virginia, and the District of Columbia. The surveys measure recognition of the campaign ads and messaging. A measure of success of the program is that ads created for Street Smart campaigns have been requested to be shared with numerous agencies across the country, and even abroad. Campaign materials can be found on the web site, www.bestreetsmart.net.


HER LIFE IS FRAGILE.
Yield to pedestrians when turning.
STREET SMART
BeStreetSmart.net

REGIONAL ROADWAY SAFETY PROGRAM

TPB Resolution R3-2021 adopted in July of 2020 established the Regional Roadway Safety Program (RRSP) and funded it at a level of $250,000 per fiscal year.

The RRSP provides technical assistance (short-term consultant services) to member jurisdictions or agencies to assist with planning or preliminary engineering projects that address roadway safety issues. Examples include studies, planning, or design projects that will improve jurisdictional or regional roadway safety and lead to a reduction in fatal and serious injury crashes.

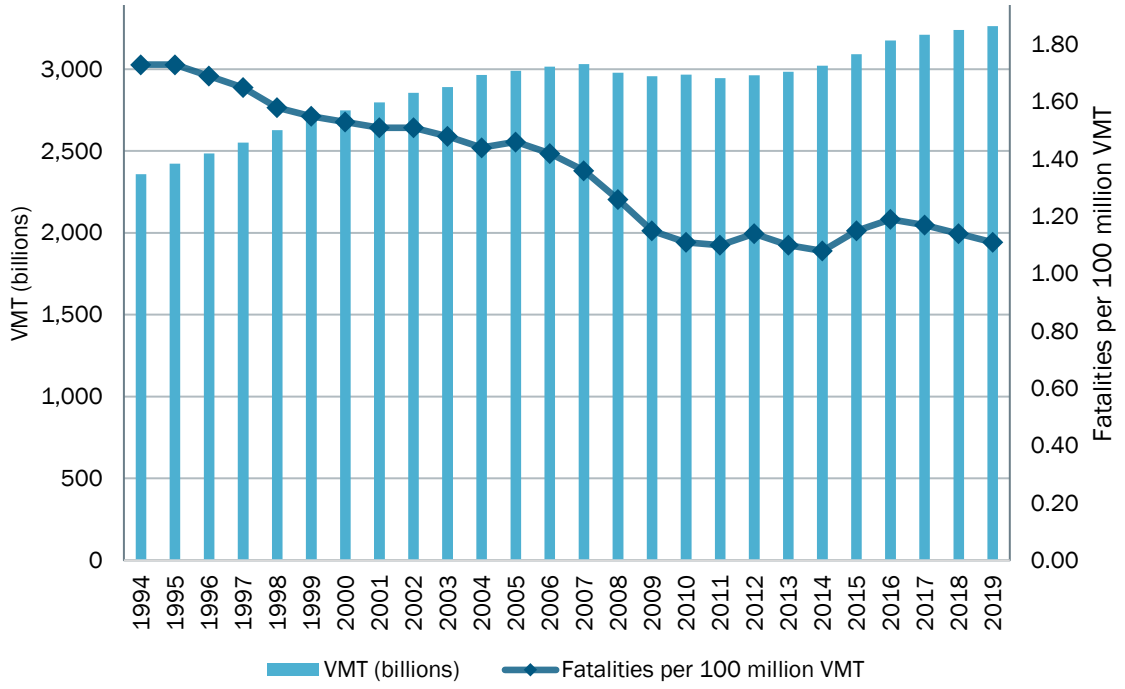
Any TPB member jurisdiction or agency can apply to the program during periodic open application periods. Projects are eligible to receive up to $60,000 in assistance for studies or planning projects and up to $80,000 for design or preliminary engineering projects. Awardees receive short-term consultant services, not direct financial assistance.

As of February 2022, the TPB has awarded $500,000 in RRSP technical assistance to ten projects, five with fiscal year (FY) 2021 funds and five with FY 2022 funds. TPB-approved and funded RRSP technical assistance has included roadway safety audits, preliminary engineering for road diets, roundabouts and complete streets, and development of school zone speed camera guidelines, among others.

NATIONAL AND REGIONAL ROADWAY SAFETY TRENDS

According to data published by the National Highway Traffic Safety Administration (NHTSA) for the United States as a whole, roadway fatalities increased by 1.7 percent from 2015 to 2019, and the fatality rate fell from 1.15 to 1.11 fatalities per 100 million vehicle miles of travel (VMT). A total of 36,096 people lost their lives in motor vehicle crashes in 2019. Most persons killed in traffic crashes were drivers (50 percent), followed by pedestrians (17 percent), vehicle passengers (16 percent), motorcyclists (14 percent), and bicyclists (2 percent). Of the persons who were killed in traffic crashes in 2019, 28 percent died in alcohol-impaired driving crashes. Figure 1 (below) shows the fatality rate per 100 million VMT for the United States from 1994 to 2019.

Figure 1: U.S. Roadway Fatality Rate per 100 million Vehicle Miles of Travel (VMT)



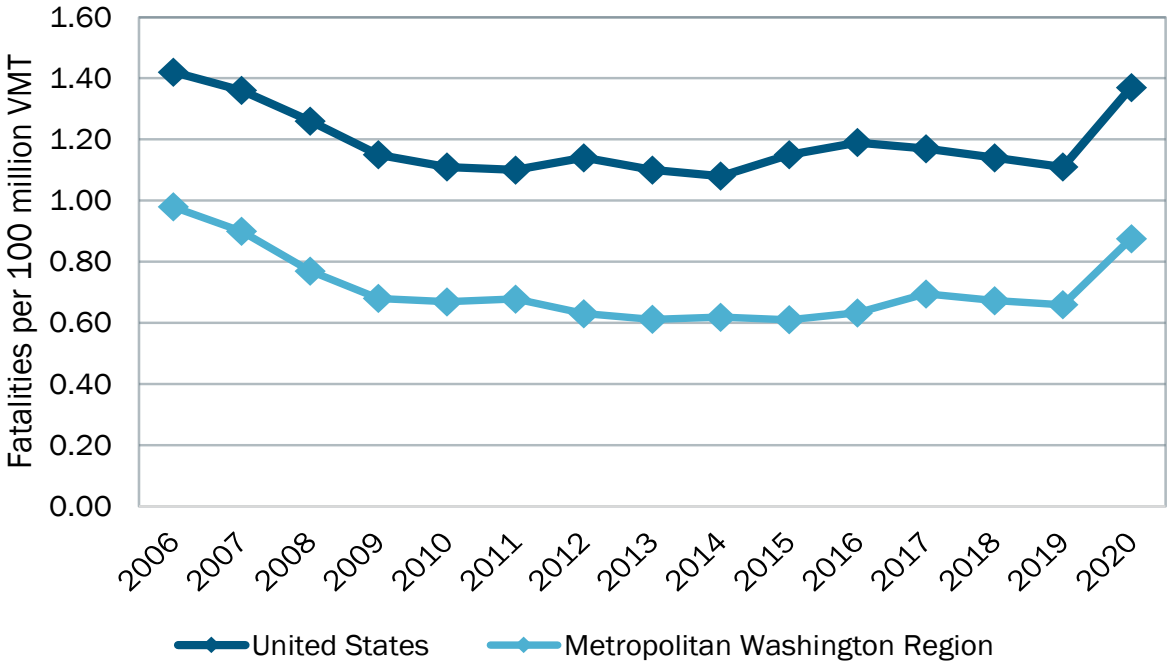
Source: Fatality Analysis Reporting System (FARS), National Highway Traffic Safety Administration

According to NHTSA, driving patterns and behaviors in the United States changed significantly after the declaration of the COVID-19 public health emergency in March 2020. While many fewer drivers were on the road, some of those that remained engaged in riskier behavior, including speeding, failure to wear seat belts, and driving under the influence of alcohol or other drugs.[2] Early estimates from NHTSA indicate 38,680 roadway fatalities nationally in 2020, an increase of 7.2 percent compared to the 36,096 fatalities reported in 2019. VMT decreased by about 13.2 percent between 2019 and 2020 and the combination of lower VMT and higher numbers of fatalities resulted in a rate of 1.37 fatalities per 100 million VMT for 2020, the highest level since 2006. The main behaviors that drove this increase, according to NHTSA's analysis, were impaired driving, speeding, and failure to wear a seat belt.

As shown in Figure 2, the metropolitan Washington region's roadway fatality rate is significantly less than that of the nation overall. Because roadway fatality rates are generally lower in urban areas than rural areas, the lower rate of fatalities for metropolitan Washington likely reflects our region being more urban and less rural than the nation as a whole. Nevertheless, fatality rates increased sharply for both the metropolitan Washington region and the United States in 2020, reflecting the effects of the pandemic as described in the preceding paragraph.

[2] NHTSA Traffic Safety Facts Research Note, *Continuation of Research on Traffic Safety During the COVID-19 Public Health Emergency: January – June 2021*, October 2021

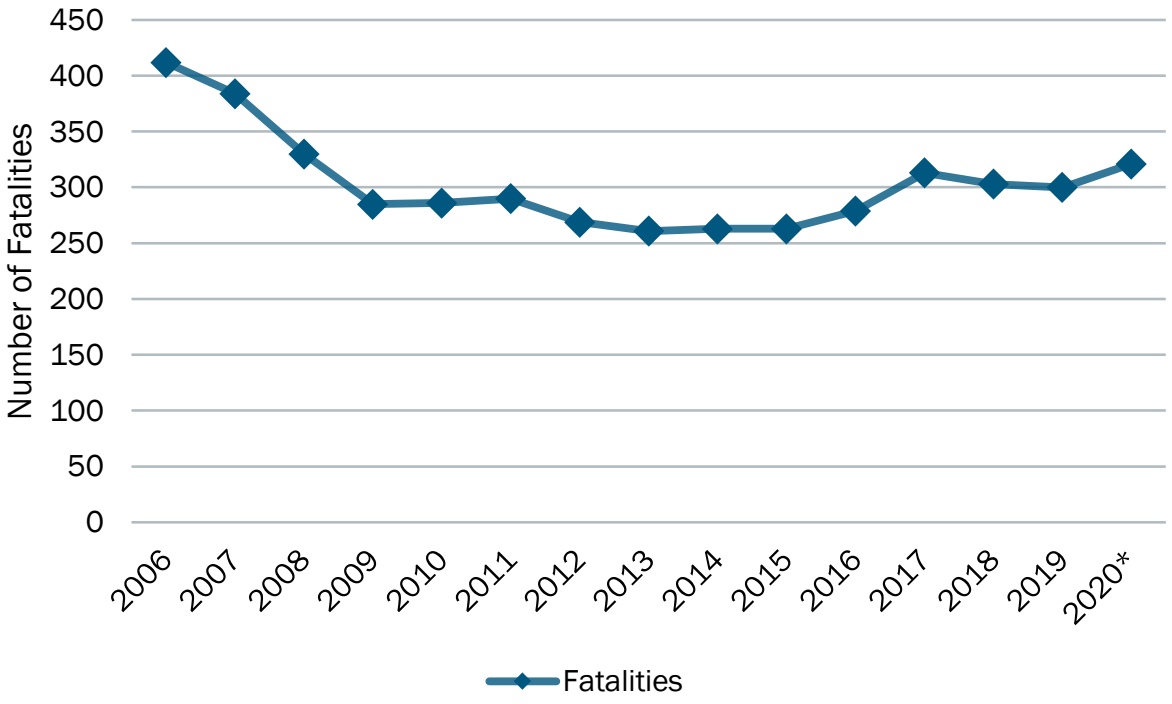
Figure 2: Roadway Fatality Rate per 100 million VMT, U.S. and Metropolitan Washington Region



Sources: TPB analysis of NHTSA and State DOT data

In 2006, 412 people died in crashes on the region's roadways. By 2009, the number of annual fatalities declined to 285. Between 2009 and 2016 the number of roadway fatalities in our region plateaued (see Figure 3 below) to between 260 and 290 annually. Since 2016, however, the number of roadway fatalities has increased to over 300 per year, with a notable increase to 321 in pandemic-affected 2020.

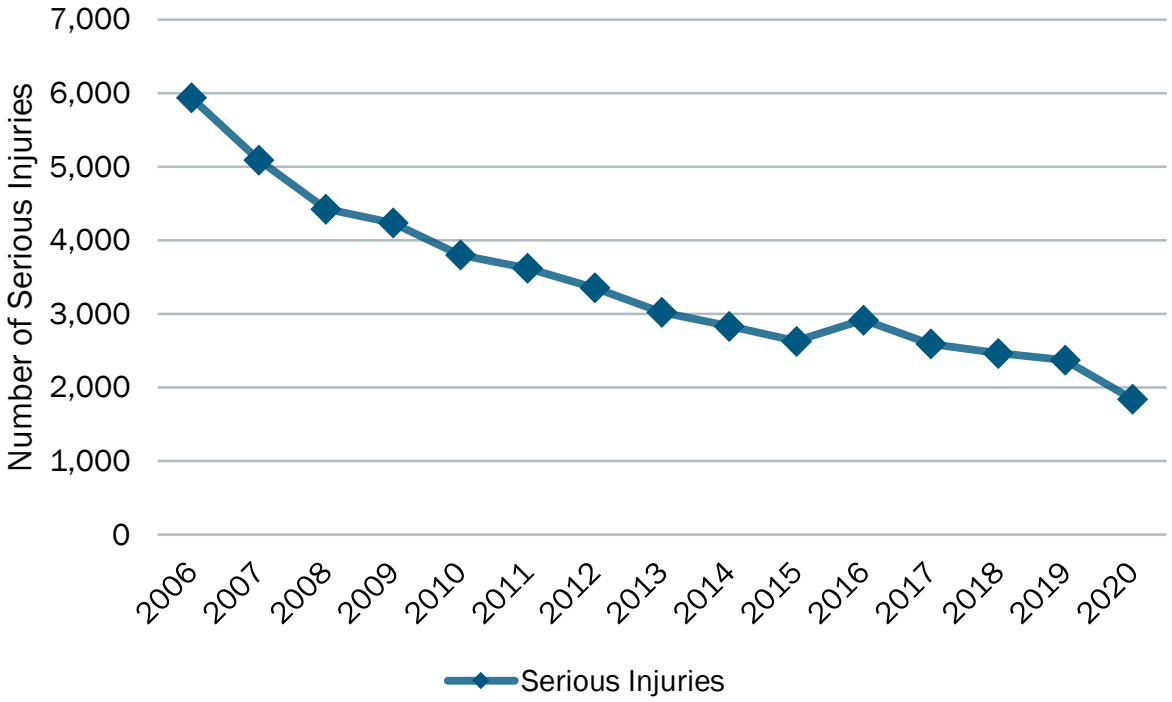
Figure 3: Roadway Fatalities in the Metropolitan Washington Region



Sources: TPB Analysis of NHTSA and state crash data. *Note that MDOT, DDOT, and VDOT crash data were used to compile year 2020 fatalities whereas NHTSA data were used to compile data for the other years.*

The TPB compiles crash data for serious injuries in addition to fatalities. The number of serious injuries in metropolitan Washington has declined steadily in the past decade (see Figure 4). In 2006 there were 5,935 serious injuries in the region and by 2020 the number had declined by more than 68 percent to 1,842.

Figure 4: Roadway Serious Injuries in the Metropolitan Washington Region



Sources: TPB analysis of State crash data

REGIONAL ROADWAY SAFETY STUDY

In 2019, the TPB commissioned a Regional Roadway Safety Study to do the following:

- Understand the factors contributing to fatal and serious injury crashes in the National Capital Region (NCR);
- Determine where crashes on the roadway transportation network are over-represented;
- Compare safety outcomes in TPB Equity Emphasis Areas to safety outcomes in the rest of the NCR;
- Identify and recommend proven effective solutions (policy, programmatic, project);
- Provide the TPB and member jurisdictions specific suggestions to improve safety; and
- Inform future Transportation Safety Subcommittee and Street Smart efforts.

Key findings from the safety study included the results of an analysis of the factors that contribute to the region's roadway fatalities and serious injuries, the differences in safety outcomes between the region's Equity Emphasis Areas (EEA) and the rest of the region, and a list of countermeasures supported by research to be effective in addressing our region's fatal and serious injury crashes.

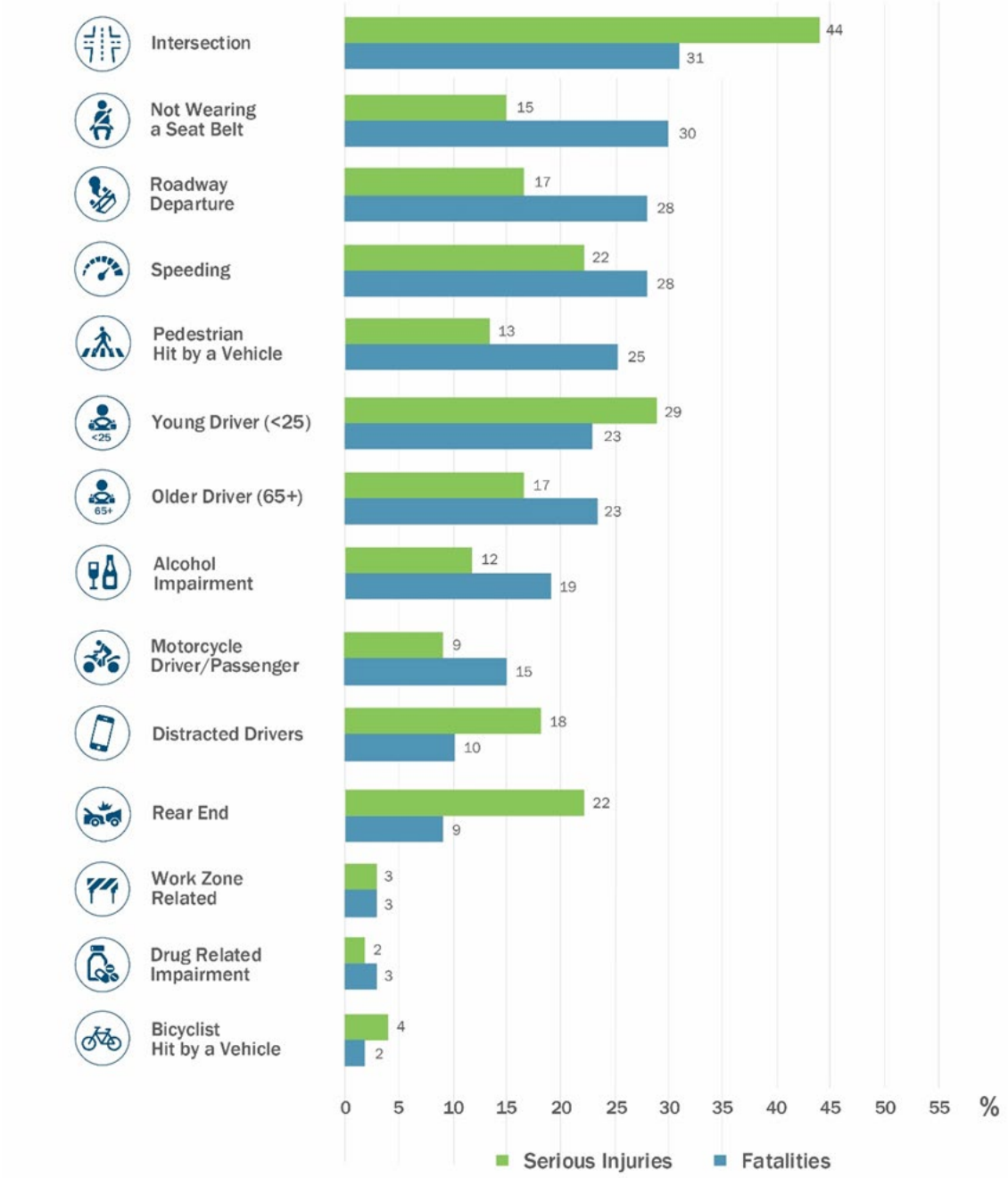
Key Factors that Contribute to Roadway Fatalities and Serious Injuries in the Region

The following figure illustrates the key contributing factors for the region's fatal and serious injury crashes. A contributing factor is something that increases the likelihood of a crash or its severity. Frequently, there are multiple contributing factors behind a crash. Consider the following

hypothetical example where a person under the age of 25 hits and kills a pedestrian while speeding and driving while drunk. That one crash would have four contributing factors; (1) a driver under the age of 25, (2) a driver who is speeding, (3) a driver that is drunk, and (4) a crash involving a pedestrian.

Figure 5 shows the most frequent contributing factors for fatal and serious injury crashes in the region for the years 2013 to 2017. The contributing factor is on the left – the lower (blue) bars show the percentage of fatal crashes where that contributing factor was present, and the upper (green) bars show the percentage of serious injury crashes where that contributing factor was present. This figure profiles which factors most contribute to the fatal and serious injury crashes in our region.

Figure 5: Top Contributing Factors for Roadway Fatalities and Serious Injuries in the Region, 2013-2017



Note that crashes occurring at intersections is the most common contributing factor in fatal crashes (31 percent of all fatal crashes). This is followed closely by crashes involving people not wearing seat belts (30 percent), crashes where the vehicle leaves the roadway (28 percent), crashes where speeding is involved (28 percent), crashes involving a pedestrian (25 percent), and crashes involving either younger (under 25) or older (65 and over) drivers (23 percent each).

Crashes occurring at intersections is also, by far, the most common contributing factor in serious injury crashes (44 percent), followed by crashes involving younger drivers (29 percent), crashes where one vehicle collides with the back of another vehicle (22 percent), and crashes involving speeding (22 percent).

Understanding the underlying factors contributing to fatal and serious injury crashes in the region enables community leaders and safety officials to develop strategies, implement programs, and design improvements to mitigate those factors and lead to fewer roadway fatalities and injuries.

Equity Emphasis Area Analysis of Fatalities and Serious Injuries in the Region

To determine whether roadway fatalities and serious injuries disproportionately impact low-income and/or minority communities, the Regional Roadway Safety Study team calculated the fatality rate per capita both within and outside of Equity Emphasis Areas (EEAs). The results of the analysis show that between 2014 and 2018 (inclusive) there were 6.3 roadway fatalities per 100,000 people within EEAs compared to 4.7 roadway fatalities per 100,000 people in parts of the region that are not within EEAs. Figure 6 shows that the disparity is evident in all parts of the region from the urban core to the outer suburbs.

Figure 6: Fatalities per 100,000 Population Inside and Outside EEAs, 2014-2018

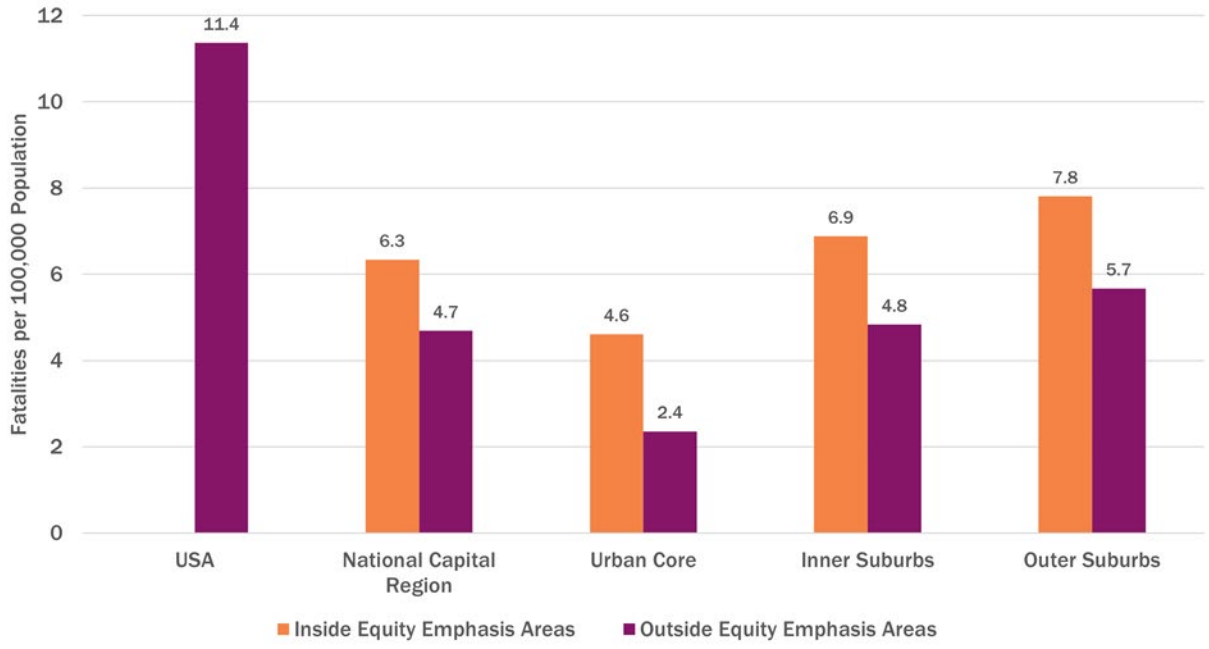
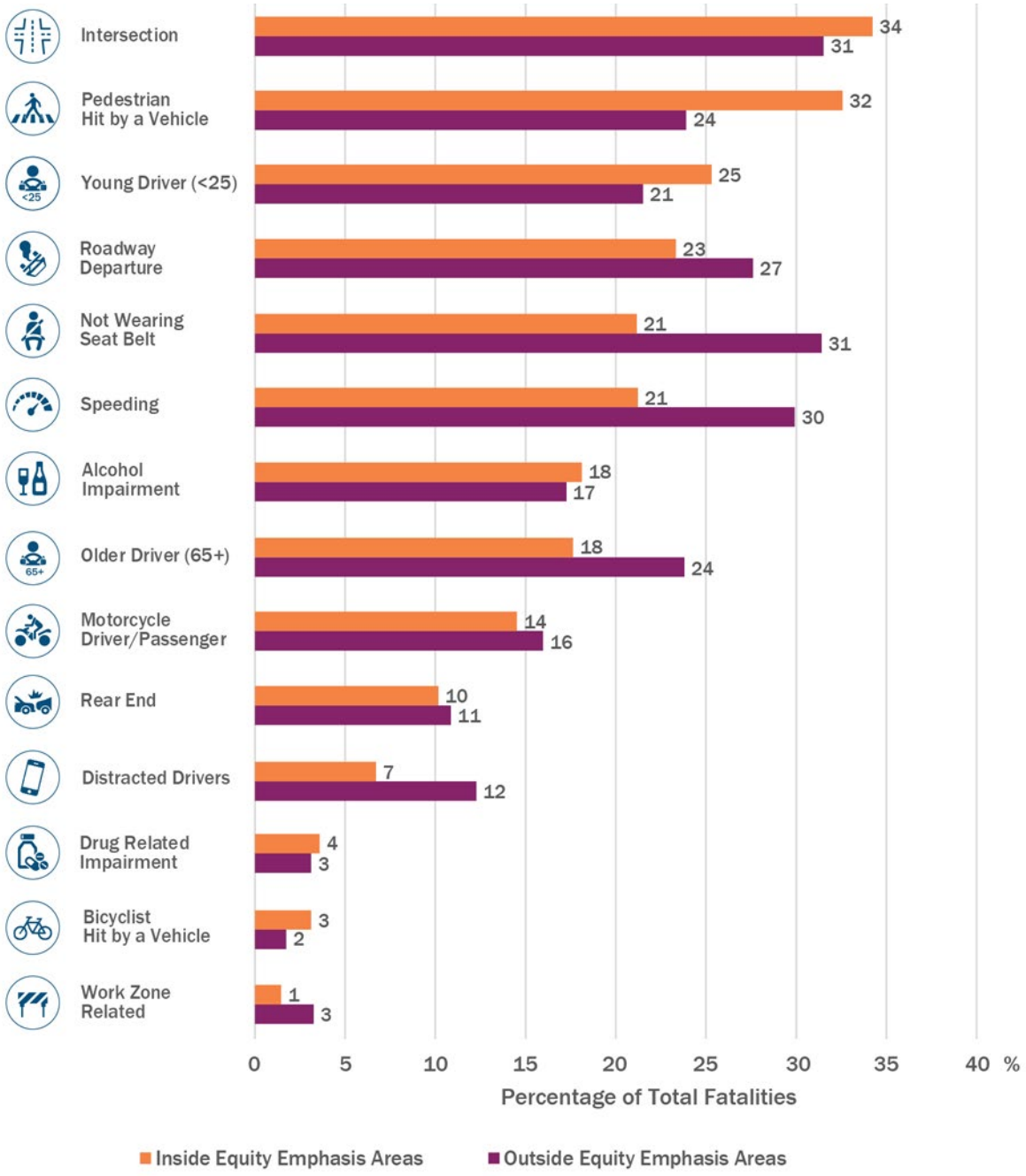


Figure 7 shows the most frequent contributing factors for fatal and serious injury crashes in the region.[3] The upper (orange) bars show the percentage of fatal crashes within EEAs where that contributing factor was present, and the lower (magenta) bars show the percentage of fatal crashes outside of EEAs where that contributing factor was present.

[3] These are the same contributing factors that were presented in Figure 5.

Figure 7: Percentage of Fatalities Inside and Outside EEAs by Contributing Factors, 2014-2018



Source: TPB Regional Roadway Safety Study

Crashes involving pedestrians and young drivers as well as crashes at intersections, result in a greater proportion of fatalities within EEAs, whereas crashes involving vehicle occupants not wearing seat belts, speeding, older drivers, roadway departures, and distracted drivers result in a greater proportion of fatalities outside of EEAs. This information can help transportation planners, engineers, and safety officials develop and implement safety countermeasures that are tailored to the conditions within EEAs.

Regional Roadway Safety Study Recommendations

Based on the findings of the Regional Roadway Safety Study, the TPB adopted resolution R3-2021 in July 2020 that urges its members to reaffirm road user safety as a top priority and prioritize the implementation of projects, programs, and policies that strive to reduce the number of fatal and serious injury crashes on the region's roadways by:

- increasing seat belt use among all motor vehicle occupants;
- reducing unsafe vehicle speeds on all roadways in the region;
- reducing impaired and distracted driving;
- adopting safety goals consistent with Vision Zero or Towards Zero Deaths policies;
- developing local roadway safety plans and ensuring their equitable impacts on all road users;
- (for member states) adopting procedures that increase the use of ignition interlock devices for impaired driving offenders; and
- identifying and implementing applicable countermeasures as appropriate and on a case-by-case basis, especially those outlined in Table 1 on the following page.

The TPB also specifies that the above actions be done in an equitable and non-racist manner, consistent with the TPB's Policy Statement on Equity (shown below).

TPB POLICY STATEMENT ON EQUITY

The TPB and its staff commit that our work together will be anti-racist and will advance equity including every debate we have, and every decision we make as the region's MPO; and The TPB affirms that equity, as a foundational principle, will be woven throughout TPB's analyses, operations, procurement, programs, and priorities to ensure a more prosperous, accessible, livable, sustainable, and equitable future for all residents; and We recognize past actions that have been exclusionary or had disparate negative impacts on people of color and marginalized communities, including institutionalized policies and practices that continue to have inequitable impacts today, and we commit to act to correct such inequities in all our programs and policies.[4]

The following countermeasures (Table 1) are recommended for the metropolitan Washington region based on analyses conducted as part of the Regional Roadway Safety Study. Each of the countermeasures is supported by research and if implemented, can significantly reduce the number of people killed or seriously injured on the region's roadways. The appropriateness of any of these countermeasures should be determined on a case-by-case basis. This list of strategies is not comprehensive and does not preclude the use of other proven effective strategies to improve roadway safety.

[4] TPB Resolution R3-2021

Table 1: Recommended Roadway Safety Countermeasures

Legend

Intersections	Principal Arterials	Roadway Departure
Speeding	Alcohol Impaired Driving	Distracted Driving
Pedestrians	Young Drivers	Older Drivers
Education	Emergency Medical Services	Communications
Rear-end Collisions	Occupant Protection	Enforcement
Legislation		

COUNTERMEASURES TO DESIGN AND OPERATE SAFER INFRASTRUCTURE	
	Install pedestrian hybrid beacon and advanced yield signs, stop markings and signs, high visibility crosswalk markings.
	Implement leading pedestrian interval (LPI) at intersections with high turning vehicle volumes.
	Conduct pedestrian road safety audits in areas with a higher than average crashes.
	Reduce motor vehicle speeds by using data driven, effective, and equitable enforcement methods that utilize available technology, such as automated speed cameras, and other traffic calming strategies such as narrower lanes, adding roundabouts, and implementing road diets.
	Evaluate mid-block crossings with higher rates of fatalities and serious injuries (especially those over 10,000 Annual Average Daily Traffic (AADT)) to determine the need for more improvements such as medians, refuge islands, pedestrian hybrid beacon, and rectangular rapid flashing beacons.

COUNTERMEASURES TO DESIGN AND OPERATE SAFER INFRASTRUCTURE	
	Install pedestrian countdown signals.
	Improve geometry of pedestrian and bicycle facilities at signalized intersections with high frequencies of pedestrian and/or bicycle crashes and on routes serving schools or other generators of pedestrian and bicycle traffic.
	Install lighting at intersection and mid-block crossings to ensure motorists can see pedestrians crossing the road at locations with high pedestrian crashes.
	Evaluate double-right turns at intersections to determine if removal of one right-turn lane is warranted.
	Implement audible pedestrian crossing signals where appropriate.
	Create pedestrian safety zone programs in areas with high occurrences of pedestrian crashes.
	Replace intersections that have high numbers of fatalities and serious injuries with roundabouts, a circular intersection configuration with channelized approaches and a center island that results in lower speeds and fewer conflict points, wherever feasible.
	Utilize multiphase signal operation at signalized intersections with a high frequency of angle crashes involving left turning and opposing through vehicles as well as rear-end and sideswipe crashes.
	Increase change intervals (when the traffic lights change) at signalized intersections at locations where too-short signal change intervals cause rear-end crashes and crashes between vehicles continuing and entering the intersection between phases.
	Improve left-turn channelization (providing definite paths for vehicles to follow) at signalized intersections where left-turn crashes are an issue.
	Improve right-turn channelization at signalized intersections with a high number of rear-end collisions.
	Install LED heads and reflective backplates (reflective borders around traffic lights that make them more visible) in locations with high numbers of signalized intersection fatal and serious injury crashes.

COUNTERMEASURES TO DESIGN AND OPERATE SAFER INFRASTRUCTURE	
	Restrict access to properties using driveway closures or turn restrictions that are near signalized intersections with high crash frequencies related to driveways.
	Restrict or eliminate turning maneuvers (including right turns on red) or employ signal coordination at signalized intersections with a high frequency of crashes related to turning maneuvers.
	Improve signage at unsignalized intersections by ensuring foliage does not block the sign, the lettering is still reflective, and the sign is located where it can be seen by motorists.
	Add reflective material to sign posts at unsignalized intersections.
	Install LED-enhanced stop signs at unsignalized intersections where there are a higher-than-average number of fatal and serious injury crashes.
 	Implement high friction treatment at intersections that have a high number of rear-end crashes.
  	Implement left-turn traffic calming (left turn hardening) to reduce left turn speeds and provide for safe turning behavior at intersections that show a pattern of pedestrian-related left turn crashes and intersection geometry that facilitates high speeds.
 	Implement roadside design improvements such as clear zones, slope flattening, and adding or widening shoulders to improve ability for drivers to safely recover if they leave the travel lane.
 	Implement enhanced delineation treatments to alert drivers in advance of the curve including pavement markings; post-mounted delineation; larger signs and signs with enhanced retro-reflectivity; and dynamic advance curve warning signs and sequential curve signs.
 	Implement improvements including installation of cable barriers, guardrails, and concrete barriers to reduce the severity of roadway departure crashes.
 	Identify areas in the region that could benefit from traffic calming including road diets that reduce the number of traffic lanes and planting trees that encourage reduced speeds.

COUNTERMEASURES TO DESIGN AND OPERATE SAFER INFRASTRUCTURE	
	Install high friction surface treatment (HFST) in locations where the available pavement friction is not adequate to support operating speeds at a sharp curve, inadequate cross-slope design, wet conditions, polished roadway surfaces, or driving speeds in excess of the curve advisory speed.
	Install longitudinal rumble strips and stripes in locations where run-off-the-road crashes are high.
	Install the Safety Edge to eliminate the vertical drop-off at the pavement edge, allowing drifting vehicles to return to the pavement safely.
	Develop a regional Safety Checklist or template as a tool for local jurisdictions to use during planning and project identification efforts