VMTP 2025 Needs Assessment

Safety

During the last five years (2012-2016), there were over 600,000 reported traffic crashes on Virginia's roadways that resulted in 3,735 fatalities and 45,278 serious injuries, with a total economic impact of over $5 billion. These are not just numbers, but actual people who have died or suffered severe injury. These people could be family members, friends, neighbors, or colleagues.

The VTrans2040 Vision document highlights safety as one of the Commonwealth's key transportation goals and sets objectives for reducing motorized *and* non-motorized fatalities and severe injuries. Specifically, the goal seeks to:

> *"Improve safety for all users by reducing fatalities and severe injuries as a result of traffic crashes. Safety improvements can be made by addressing geometric deficiencies in existing roadways, reducing conflict points at intersections and improving user awareness and education."*

The VMTP expands on the VTrans2040 efforts by identifying some of the Commonwealth's most pressing safety needs. This safety assessment is statewide, in nature, and while it does not offer specific recommendations, it does highlight crash trends and locations needing attention for possible infrastructure improvements. The assessment identifies intersections and segments that have Potential for Safety Improvement (PSI), as defined by the Virginia Department of Transportation (VDOT). These PSI locations play a vital role in the SMART SCALE project development, screening and scoring process.

Note: Safety needs are only considered for projects submitted through the District Grant Program (DGP) and only localities are permitted to submit safety projects under this program.

SAFETY NEED LOCATIONS:

I. PSI SCORES

Using the latest Highway Safety Manual (HSM) methods, VDOT conducts a roadway network screening process to identify intersections and segments with Potential for Safety Improvement (PSI). The results of this screening, summarized below, will be used in the SMART SCALE project evaluation process. The maps (below) and tables (Appendix A) identify the top intersections and miles (of highway segments) by VDOT District. These identified locations can serve as a useful resource for localities as they prepare and develop future project submittals for funding.

Potential for Safety Improvements (PSI) Locations

The PSI is a relatively new highway safety method that compares the average "predicted" number of crashes to the observed or "expected" number of crashes on a roadway segment or at an intersection on an annual basis. The "observed" crashes are based on short-term crash counts (for example: a 1-year period) and are modified using the *Empirical Bayes statistical methods* to account for yearly variation and the predicted long term average to determine the "expected" value. Meanwhile, the "predicted" crashes are from functions (statistical equations) that reflect the average number of crashes for a given traffic volume and roadway type (example: arterials and freeways). Segments or intersections with more expected crashes than the predicted average have PSI values greater than zero. Thus, there is potential to reduce crashes down at the location to the average for that roadway or intersection type and traffic volumes. The method may be applied to total crashes or the subset of fatal and injury crashes at a location. The combination of PSI and crash frequency (threshold) is also beneficial for defining safety needs for improvements.

VDOT uses the annual PSI scoring over multiple years to identify the greatest roadway safety needs in each district. These locations are defined as having a VTrans Safety Need with above average crashes (not necessarily the highest frequency of crashes) assessed for five years of data. . Note that additional severe crashes may have occurred in none PSI years and all crashes during the five year analysis period will be considered in the SMART SCALE scoring.

The identified safety needs intersections and segments are shown on the following statewide maps (Figure 1 and Figure 2) and listed in the District-level tables in Appendix A. A Web map is also available on the VMTP Safety site. The ranking within each district used the number of years PSI was greater than zero, the fatal and injury crashes during those years, and the total crashes during those years. PSI years were weighted by 3; fatal and injury crashes by 5; and total crashes by 1. The weighted scores for intersection and segment locations within each district was sorted and ranked by percentile. The web map layers for intersection and segments are color coded by quartile to visualize the ranking range.

Figure 1: Intersections Identified as Safety Need (by District)

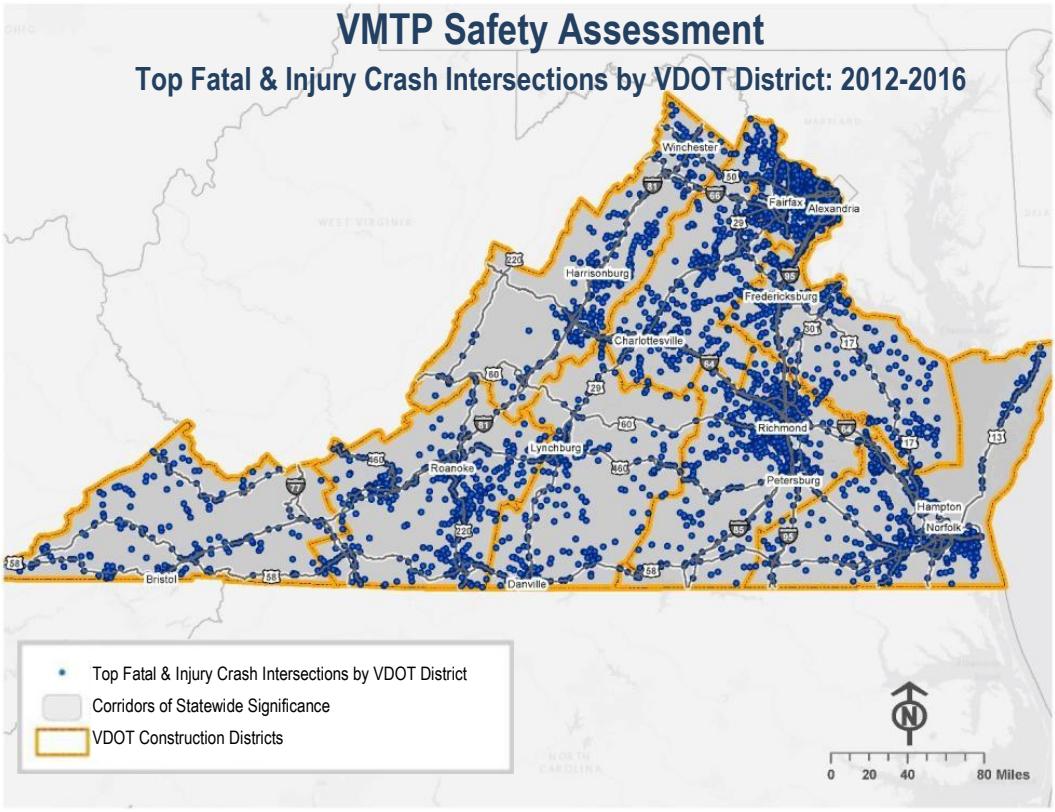
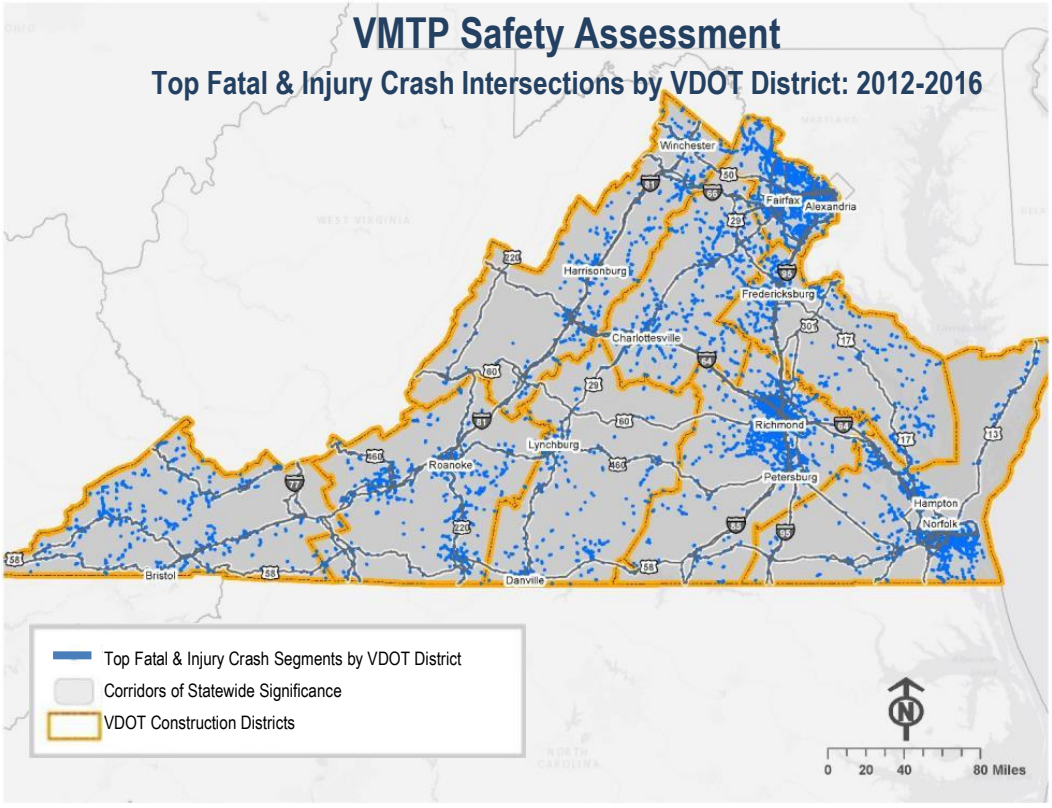


Figure 2: Highway Segments Identified as Safety Need (by District)



The PSI Location Data and Project Identification

Initial SMART SCALE proposed project safety screening will determine if PSI locations are being affected. Projects providing improvements that include PSI locations are deemed to be addressing a VTrans safety need.

While **Intersection PSI** values are developed based on crashes within 250 feet of cross-streets, potential intersection project improvements may extend beyond that influence area. Further, several intersections along a roadway corridor may be identified and targeted for improvements. The expected extent of the improvements should be defined so that all affected crashes may be used to determine benefits scoring at each intersection. To define a VTrans need, the threshold for an intersection inclusion was based on a minimum of two years of PSI and a minimum crash frequency of two fatal and injury crashes over the five year period.

Segments PSI values are based on crashes associated with VDOT's roadway inventory segments, which may be very short (0.1 mile). Given the randomness of fatal and injury crashes, the PSI segments serve as a good starting point for identifying key locations deserving investigation for improvements, but do not necessarily limit the extent of projects to mitigate severe crashes. To address safety and congestion issues, proposed project limits may be much longer or include more than one PSI segment along a roadway corridor. To define a VTrans need, the threshold for a segment inclusion was based on a minimum of two years of PSI and a minimum crash frequency of three fatal and injury crashes per mile in rural areas (or six fatal and injury crashes per mile in urban areas) over the five year period.

II. LOCALLY IDENTIFIED SAFETY NEEDS

Additionally, VDOT Districts, jurisdictions and regional planning organizations may have also identified locations with safety needs based on recent crash analysis or assessment of the roadway design elements (substandard geometry or elimination of conflicting traffic movements). Project locations with a documented safety or geometric concern, such as those locations identified in a Regional Long Range Plan; Roadway Safety Assessment; corridor or project planning; environmental, scoping or design reports, will also be considered to address a safety need for SMART SCALE screening purposes. Documents providing information on the crash analysis or roadway risk assessment must be provided (as a "Planning Study" category) to support the assertion of safety needs. The safety needs identified will be compared to the proposed improvements during the project screening. SMART SCALE safety factor evaluations will be conducted based on fatal and all injury crashes within the proposed project limits. More details on the project safety scoring are provided in the SMART SCALE Resource page technical guide.