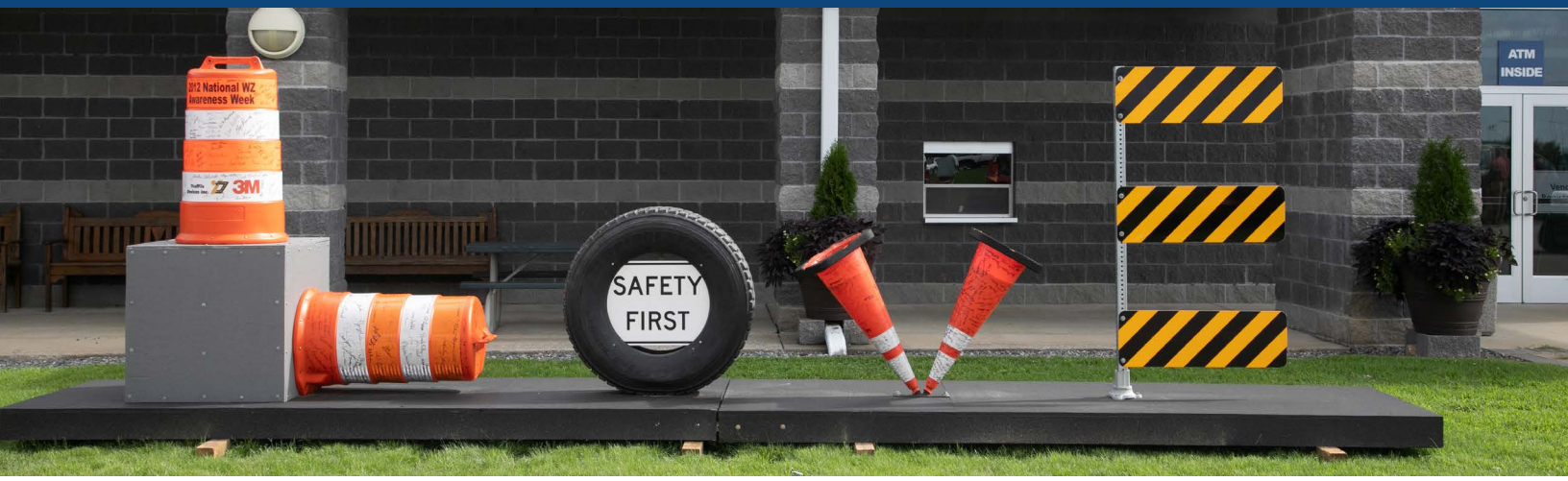

3.10 Need Category: Roadway Safety

Measure: Potential for Safety Improvement (PSI)

What it means: Areas with a higher calculated risk of crashes based on roadway characteristics and observed crash data

Applicable VTrans Travel Market: Statewide

Identification of Needs

- Data Sources:
  - Virginia Department of Motor Vehicles, Five-year crash data by location and severity, including intersection and interchange-related crashes and segment-level crashes between intersections or interchanges on limited Access facilities
  - VDOT Traffic Engineering Division, PSI analysis
- Year of analysis: 2016–2020
- Period of analysis: all days, 24-hour days
- Calculations:
  1. Merge 2016–2020 crash database with PSI table data. With this information, the number of crashes by severity can be calculated and related to the PSI values by location.
  2. Create two sets of tables: One for crashes within 250 feet of an intersection and one for all crashes that occur along segments.
  3. Identify the following attributes:
     - Total crash aggregate five-year PSI
     - Fatal and injury crash aggregate five-year PSI
     - Number of years PSI analysis identifies a location as having crashes
     - Number of years PSI analysis identifies a location as having fatal and injury crashes
  4. Identify segments and intersections using the PSI ranking and crash thresholds as follows:
     - The top 100 (miles for segments, locations for intersections) of VDOT Potential for Safety Improvement (PSI) Intersections and Segments by PSI rank
     - Include additional intersections and segments meeting the following criteria:
       - Locations on PSI List 2+ years out of last five years
       - Locations on Fatal/Injury PSI List 2+ years out of last five years with at least 3+ Fatal or Injury crashes at the intersection or segment over the last five years
  5. **Threshold for Need for Roadway Safety:** Roadway segments and intersections meeting the thresholds in Step 4 above, are identified as those with a VTrans Mid-term Need for Roadway Safety.
  6. Assign intersection safety needs to roadway segments using 150-ft buffers around the intersections.

4.2.9 Prioritization within Roadway Safety Need Category

Applicable VTrans Travel Market: Statewide

Utilized for: Establishing Construction District Priority Locations

Severity of VTrans Mid-term Need for Roadway Safety

- Source data:
  - VDOT Construction District-specific Potential for Safety Improvement (PSI) rankings used to establish VTrans Mid-term Needs for Roadway Safety
- Calculations
  - Assign node-specific PSI rank to roadway segments using 150-ft buffers around the intersections with Need for Roadway Safety.
  - Use unique intersection numbers to differentiate roadway segments where the Need for Roadway Safety was assigned based on an adjacent intersection versus segments that had a stand-alone Need for Roadway Safety. For road segments with an intersection rank and a segment rank, retain the highest rank. For instance, for a road with an intersection rank of 4 and a segment rank of 23, retain the rank of 4.
  - For VTrans Mid-term Needs for Roadway Safety along CoSS: a Severity criterion is not used since VDOT Construction District-specific PSI rankings skew the results.
  - For VTrans Mid-term Needs for Roadway Safety within RN, assign the following values
    - Score 7: PSI rank score: 20 ≥ PSI rank
    - Score 6: PSI rank score: 40 ≥ PSI rank > 20
    - Score 5: PSI rank score: 60 ≥ PSI rank > 40
    - Score 4: PSI rank score: 80 ≥ PSI rank > 60
    - Score 3: PSI rank score: 100 ≥ PSI rank > 80
    - Score 2: PSI rank score: 150 ≥ PSI rank > 100
    - Score 1: PSI rank score: PSI rank > 150

Magnitude of VTrans Mid-term Need for Roadway Safety

- Source data
  - VDOT Traffic Engineering Division, Intersection and roadway segment-specific number of crashes involving serious injuries and fatalities.
- Calculations
  - Assign node-specific counts for crashes involving fatalities or serious injuries to roadway segments using 150-ft buffers around the intersections with Need for Roadway Safety.
  - Use unique intersection numbers to differentiate roadway segments where the VTrans Mid-term Need for Roadway Safety was assigned based on an adjacent intersection versus segments that had stand-alone Need for Roadway Safety.
  - Assign intersection- and segment-specific crashes involving fatalities or serious injuries to roadway segments with VTrans Mid-term Need for Roadway Safety. Sum the resulting intersection- and segment-specific crashes for each road segment.
  - For VTrans Mid-term Needs for Roadway Safety within RN, sort the combined number of crashes involving serious injuries and fatalities for roadway segment-specific needs and intersection-specific needs assigned to roadway segments in descending order and assign the following values as the Magnitude score Mid-term Needs for Roadway Safety within the RN.
    - Score 7: Top 5% of the total mileage
    - Score 6: 5%–10%
    - Score 5: 10.001%–15%
    - Score 4: 15.001%–20%
    - Score 3: 20.001%–25%
    - Score 2: 25.001%–50%
    - Score 1: Bottom 50.001%–100%
  - For Needs for Roadway Safety along CoSS, the combined number of crashes is the Magnitude component.

Consideration of Severity and Magnitude Criteria

- For VTrans Mid-term Needs for Roadway Safety within RN, for both types of roadway segments (segments where the values were assigned based on intersections and those where the values were segment-specific), average the Severity score (based on PSI rank) and Magnitude score (based on number of crashes involving serious injuries and fatalities)

Prioritizing within Roadway Need Category

Prioritization within this VTrans Mid-term Needs Category occurs in the following manner:

- For CoSS, sort the Magnitude in descending order and assign the following values based on mileage[1] to develop statewide *Very High, High, Medium,* and *Low* categorizations for VTrans Mid-term Need for Roadway Safety.
  - *Very High* (Score 7): Top 5% of the total mileage
  - *High* (Score 6): 5.001%–10%
  - *High* (Score 5): 10.001%–15%
  - *Medium* (Score 4): 15.001%–20%
  - *Medium* (Score 3): 20.001%–25%
  - *Low* (Score 2): 25.001%–50%
  - *Low* (Score 1): Bottom 50.001%–100%
- For each VDOT Construction District, sort the average of Severity and Magnitude in descending order and assign the following values based on mileage[1] to develop VDOT Construction District-specific *Very High, High, Medium,* and *Low* categorizations for VTrans Mid-term Need for Roadway Safety within the RN.
  - *Very High* (Score 7): Top 5% of the total mileage
  - *High* (Score 6): 5.001%–10%
  - *High* (Score 5): 10.001%–15%
  - *Medium* (Score 4): 15.001%–20%
  - *Medium* (Score 3): 20.001%–25%
  - *Low* (Score 2): 25.001%–50%
  - *Low* (Score 1): Bottom 50.001%–100%

[1] Where prioritization values do not break exactly at the percentile categories, assign all values to the higher category until there is a new prioritization value. For example, if the top 7% of roadway miles all have the same score, then 7% of miles would be classified as *Very High*.