



MEMORANDUM

TO: VDOT District Highway Safety Partners

FROM: Mark A. Cole, P.E.
VDOT Traffic Engineering
Assistant Division Administrator (Highway Safety)

DATE: 3/25/2022

RE: Highway Safety Infrastructure Investment Plan – Implementation Criteria
Virginia Highway Safety Improvement Plan (VHSIP) VDOT Systemic Initiatives

VHSIP Systemic Initiatives Implementation Criteria

This document summarizes the expectations and implementation criteria for each of the systemic safety countermeasures that are part of [Virginia's Highway Safety Investment Strategy](#). In January 2022, the Commonwealth Transportation Board (CTB) approved the Virginia Highway Safety Investment Strategy that continued deployment of proven systemic and hybrid safety countermeasures across the Commonwealth. The new and updated systemic safety initiatives for VDOT-maintained roads include the following:

- VDOT
 - Expanded Flashing Yellow Arrow
 - Pedestrian Crossings
 - Two-Lane Rural Roads

Below is the general technical guidance on these initiatives, including base expectations and requirements and a list of potential treatments that can be considered for Expanded Flashing Yellow Arrows, Pedestrian Crossings, and Two-Lane Rural Roads initiatives. Districts are expected to evaluate locations and incorporate the most appropriate countermeasures and treatments based on engineering evaluations at identified locations. Additional guidance to support prioritization amongst the many countermeasure treatments (especially for the two-lane rural roads initiative) as well as decision support to promote consistency and design efficiencies are being developed. In all cases, VDOT governance documents including the MUTCD, Virginia Supplement to the MUTCD, the Road Design Manual, Instructional & Informational Memorandum and others remain applicable. In the event of a conflict between this general guidance and a VDOT governance document please contact [Tracy Turpin](#).

VDOT deployed its first systemic safety implementation plan in 2019 that included installation of eight systemic safety countermeasures. The implementation criteria for the first plan ([Eight Systemic Safety Countermeasures](#)) remains in effect for those projects.

The information herein was assembled with the help of representatives from all nine VDOT districts. Several notes are general and listed under general information and guidance section below, followed by detailed expectations for each of the new/updated systemic countermeasures added to the investment strategy in January 2022.

Virginia Highway Safety Improvement Program (VHSIP) General Information and Guidance

Budgets

- Districts should not spend more than allocated for each systemic initiative. If a District has more funds than needed to complete the systemic initiative, the District should advise [Tracy Turpin](#) or [Deepak Koirala](#) in the Traffic Engineering VHSIP Project Delivery team. All surplus safety funds, per CTB policy, shall be returned to the statewide balance entry account for management and redistribution by the Central Office Safety team to fund other systemic safety initiatives at the discretion of the Commissioner and Commonwealth Transportation Board (CTB).
- The total budget for each of the initiatives was determined by multiplying an expected average cost per location treated by the total number of locations planned for treatment. Districts are expected to manage the budget so that the overall initiative for each District stays within the total initiative allocation/budget and every location that meets the eligibility criteria is treated.
- Locations may experience countermeasure implementation costs that are higher or lower than the predefined average cost per location. The expectation is that the implementation costs across all locations for the initiative are within the total initiative budget.
 - Example: If there are 10 total locations that will be implemented with a systemic improvement with an average budget of \$50,000 per location, it is acceptable to have 5 locations with a cost of \$75,000 each and 5 locations with a cost of \$25,000 each.
- All potential improvements listed herein will have ongoing maintenance costs with some treatments resulting in greater maintenance burdens than others. Districts need to holistically consider the long-term maintenance implications of any proposed improvements. However, the needed improvements should not be eliminated from consideration just because of maintenance funding concerns. Instead, the solution may be to fund the improvement first, and then in the future prioritize maintenance of this treatment over maintenance of other existing assets.

Project Delivery

- All contracts are required to be eligible for federal funding.
- Each District should determine the best delivery method to meet the schedule and budget that was approved by CTB to complete implementation of VHSIP initiatives at all VDOT-maintained locations.
- State forces may be used for project delivery. If state forces are used, a finding of public interest must be completed and approved in advance of beginning the work since VHSIP projects are federally funded.
- If on-call contracts are used for delivery, the District should proactively ensure that sufficient on-call contracts are in place to deliver the work per the initiative schedule.
- When initiating VHSIP tasks/activities in VDOT POOL and selecting the right template in Project Web Application (PWA), Districts must follow VDOT's Project [Task and Scheduling Guide](#). VDOT Dashboard will be utilized to monitor all tasks/activities.

Project Tracking

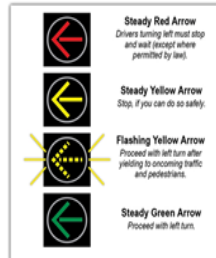
- The District Traffic Engineer or the District VHSIP Manager will be responsible for entering VHSIP project progress for all systemic projects on a quarterly basis. The following SharePoint VHSIP project tracking site will be used to track District's VHSIP project progress: [Systemic Safety Initiative - Home \(sharepoint.com\)](#)
- If there are limitations or issues that prevent the installation of the systemic countermeasure at a pre-selected project location, the reason for the exclusion shall be documented. This exclusion reason should be recorded on the SharePoint VHSIP project tracking site.
- Typical installation location data needed for intersection improvements will include (but may not be limited to) the following: UPC#, District, Jurisdiction (County), RNS Intersection Node ID, Regional Signal ID, GPS Coordinates (Latitude/Longitude), and Major or Minor approach information (Route Number).
- Typical installation location data needed for road segment improvements will include (but may not be limited to) the following: UPC#, District, Jurisdiction (County), Start and End State Milepost Installation Locations, RNS Node ID, and Route Number.

Public Outreach and Additional Information

- A public outreach document will be developed by the Communications and Traffic Engineering Divisions to provide general information to the public on each of the systemic countermeasures that are being deployed as part of this effort. Districts are

responsible for conducting public involvement as needed and as required by VDOT's project development process.

VDOT – Expanded Flashing Yellow Arrow (FYA)



Expectation and Implementation Criteria

Complete the retrofit and installation of all FYA for left turns at VDOT-maintained traffic signals identified for this initiative.

- Initiative includes the remaining FYA locations, after the first systemic FYA project, that were deemed not appropriate due to structural loading capacity concerns, mast arm length, or needing cabinet upgrades. A list of eligible locations will be provided to each District.
- Eligible FYA installations include retrofits of existing green balls or protected-permissive phasing only. Protected-only phasing conversions to FYA are not eligible for funding as part of this project.
- This work should also include the installation of FYA signs if the signal structural analysis allows or if FYA is on a new structure.

Cost and Funding

- An average cost of \$70,000 per intersection was used to set the District budgets for this initiative. This typical cost includes installation of flexible backplates, rebuilding arms, and upgrading the signal cabinet. The cost of installing FYA is also built into the cost estimate.
- The budget for the FYA projects in each District is all inclusive of preliminary engineering, materials, labor, and traffic control to complete the work.
- Locations may experience countermeasure implementation costs that are higher or lower than the predefined average cost per location. The expectation is that the implementation costs across all locations for the initiative are within the total initiative budget.

Additional Installation Criteria

- The preferred FYA type is a traditional four-section head.

- In retrofit situations with a structural or height restriction, three-section, bimodal FYA are allowable. For specific guidance on bimodal arrows, contact Matthew Bonacci in the Central Office traffic signal team at Matthew.Bonacci@VDOT.Virginia.gov.
- A R10-V1 sign should be included, but may be omitted, in order to accommodate structural or height restrictions.
- If necessary to accommodate structure restrictions, the project can also fund removal of the existing overhead street name sign and replacement with a D3-2 "XXX Next Signal" sign or W16-8p street name sign plaque.

VDOT – Pedestrian Crossings



Expectation and Implementation Criteria

The criteria and countermeasures included for the pedestrian crossings initiative are as follows:

- VDOT’s initial systemic safety plan including funding to install pedestrian crossings at all VDOT traffic signals on or within PSAP priority corridors or crash clusters based on [PSAP Version 1](#). As part of VDOT’s update of the systemic plan (December 2021 CTB presentation and January 2022 CTB resolution approval), additional funding was provided to improve pedestrian crossings on PSAP corridors or crash clusters.
- VDOT’s latest [PSAP priority corridor and crash cluster map](#) should be used to identify and review potential signalized, unsignalized, and mid-block locations where pedestrian crossing countermeasures can be installed as part of this effort. Any locations identified to be within a PSAP priority corridor is eligible for funding, but locations should be prioritized based on their top priority corridor % designation.
- VDOT’s Instructional and Informational Memoranda IIM-TE-384 [Pedestrian Crossing Accommodations at Unsignalized Locations](#) and Pedestrian Crossing Accommodations at Signalized Locations (Currently in development - for questions regarding this IIM, please contact [Ritchie Robbins](#) in VDOT COTED) shall be used when determining candidate improvement locations and selecting countermeasures.
- Pedestrians are at much greater risk of crash when crossing the street as opposed to walking along the street. Therefore, the focus of this initiative is on crossings, not sidewalks or shared use paths.
- Treatments that could be considered for funding include:

- Signalized intersections:
 - New or retrofit (standard or high visibility) marked crosswalks with highly reflective materials
 - Pedestrian signal heads with pedestrian countdown signals
 - Stop and or Yield to Pedestrians signage and pavement markings in advance of crosswalks across channelized right turn lanes, as described in the VA Supplement to the MUTCD and the Pedestrian Crossing Accommodations at Signalized Locations IIM
 - Installation/Retrofit of Accessible Pedestrian Signals (APS) and Accessible Pedestrian Signal Detector (APD)
 - ADA-compliant curb ramps
 - Leading pedestrian interval (LPI)
 - Turning Vehicle Yield to Pedestrians and No-Turn on Red signs
 - Curb extensions/bulb-outs
 - Left turn hardening
 - Parking restrictions within the vicinity of the crosswalk (also known as daylighting)
 - Addition of intersection lighting
- Unsignalized intersections:
 - New or retrofit (standard or high visibility) marked crosswalks with highly reflective materials
 - Stop and or Yield to Pedestrians signage and pavement markings in advance of crosswalk as described in the VA Supplement to the MUTCD and IIM-384
 - ADA-compliant curb ramps
 - Pedestrian crossing signage
 - Pedestrian refuge island
 - Enhanced intersection/crosswalk illumination (street lighting)
 - Curb extensions/bulb-outs
 - Parking restrictions within the vicinity of the crosswalk (also known as daylighting)
- Mid-block locations:
 - New or retrofit (standard or high visibility) marked crosswalks with highly reflective materials
 - ADA-compliant curb ramps (only if none currently exist)

- Pedestrian crossing signage (at and in advance of the crosswalk). This can also include pedestrian gateway treatments.
 - Pedestrian refuge island
 - Stop and or Yield to Pedestrians signage and pavement markings in advance of crosswalk as described in the VA Supplement to the MUTCD and IIM-384
 - Curb extensions/bulb-outs
 - Parking restrictions within the vicinity of the crosswalk (also known as daylighting)
 - In-pavement messages (“SLOW”, “PED XING”)
 - Rectangular rapid flashing beacon (RRFB)
 - Pedestrian hybrid beacon (PHB)
 - Pedestrian refuge island
 - Raised crosswalk
 - Enhanced illumination of crosswalk
- Substitutions: these treatments are not an exhaustive list. Varying materials or new treatments are allowable, pending VDOT review and approval, if they provide a similar benefit and function in the same or similar way as the treatments listed in this document.
 - Street lighting should only be included if it can be accomplished within the budget and if it is needed to address an identifiable safety need. Refer to [IIM-TE-390](#) for lighting guidance.

Cost and Funding

- This initiative is only partially funded. The Central Office VHSIP team will establish total District budgets for this initiative.
- An average cost estimate of \$100,000 per crossing location was used for determining District budgets. The estimate is based upon previous-historical similar projects/bid review, consultant review and district recommendations.
- The budget for the pedestrian crossing improvement projects in each District is all inclusive of preliminary engineering, materials, labor, and traffic control to complete the work.
- Locations may experience countermeasure implementation costs that are higher or lower than the predefined average cost per location. The expectation is that the implementation costs across all locations for the initiative are within the total initiative budget.

- VHSIP funds cannot be used for maintenance but can be used to upgrade pavement markings and signage. Replacement of certain elements in-kind, such as thermoplastic crosswalk pavement markings, may be considered on a case-by-case basis if those elements are part of a larger package installation of new or upgraded treatments at that site.

Additional Pedestrian Crossing Installation Guidance

- The focus of this VHSIP systemic project is the installation of marked crosswalks, pedestrian signal heads with pedestrian countdown signals, APS and APD, and ADA-compliant curb ramps. In some situations, easements or right-of-way may be necessary to complete the crossing improvements. Locations that do not require right-of-way or easements should be of highest priority for this initiative.
- Limited sidewalk/shared use path connections necessary to connect to existing sidewalk within approximately 25 to 50 feet of the crossing may be considered as part of this effort. However, more extensive sidewalk connections, curb and gutter improvements and road widening are not included in the scope of this VHSIP funding. If desired, these items may be funded using non-VHSIP sources delivered concurrently with this project.
- Crosswalk improvements may be provided regardless of whether a sidewalk or pedestrian access route exists on both ends of the crossing. If providing crossing improvements where no pedestrian access route exists, curb ramps must be provided on each end of the crossing in curb and gutter locations while a level landing area is required in shoulder and ditch locations, as detailed in Appendix A1 of VDOT's [Roadway Design Manual](#).
- When installing pedestrian crossings at traffic signals as part of this project, a crossing on all legs of the intersection is the preferred treatment. However, in situations where constraints (based on engineering judgment make it impractical to install crossings on all legs of the intersection, at least one crossing of the mainline is required. In cases where crossings are not provided on any leg(s) of the intersection, documentation detailing the rationale behind the engineering judgment should be included in the project file and tracking record.
- Decorative/stamped/brick crosswalks are not eligible for funding under this program. Reference VDOT's [IIM-LD-218](#) on Guidelines for the Use of Solid Paver Units for additional information.
- Streetscaping and landscaping elements (trees, brick paver sidewalks, benches, etc.) are not eligible for funding under the program. However, limited streetscaping elements may be eligible if they are required to tie into existing infrastructure.

- Overhead lighting that provides illumination of the crosswalk area as per Illumination Engineering Society RPS-8 standards is eligible for funding under this program, however post-top decorative lights are not eligible.
- Curb extensions/bulb-outs and left turn hardening treatments may be constructed with pavement markings and physical elements, such as temporary curb, flex post delineators, etc.

VDOT – Two-Lane Rural Roads



Expectation and Implementation Criteria

The criteria and countermeasures included for two-lane rural roads initiative are as follows:

- In the [VTRC Report 21-R10](#) report, researchers developed a systemic safety improvement plan and list of potential countermeasures to reduce the number of roadway departure crashes on two-lane rural roads using low-cost countermeasures. In addition, a list of high-risk two-lane rural roads was developed through this research.
- Per the VTRC Report 21-R10, potential low-cost countermeasures that could be considered for funding include:
 - New or replacement curve warning signs and static chevron signs
 - Retroreflective strips attached to sign posts
 - Retroreflective markers (e.g., on guardrails)
 - Ground-mounted delineators
 - Centerline markings in compliance with the VA Supplement to the MUTCD
 - Regular width edgeline markings if none currently exist
 - Wide edgeline markings if regular edgeline markings currently exist
 - Centerline rumble strips
 - Edgeline rumble strips/stripes
 - Curve symbol and SLOW markings
 - Transverse rumble strips
 - Selective tree removal
- The countermeasures listed above are recommended systemic countermeasures to first consider for this initiative, but there may be other countermeasures that are appropriate for District’s two-lane rural roads based on District knowledge and experience. Other countermeasures may be considered and proposed for funding, but the countermeasure must be low-cost and systemic in scope.

- This initiative provides additional flexibility to Districts to implement these low-cost treatments at pre-identified high-risk two-lane rural roads on both curves and segments throughout each District.

Cost and Funding

- The Central Office VHSIP team will establish total District budgets for this initiative.
- This initiative is only partially funded and will require prioritization of routes for funding and improvement. The Central Office VHSIP team will work with Districts to establish a statewide prioritization process to ensure consistency in application across the state.
- An average cost estimate of \$75,000 per mile was used for determining District budgets and should be used by the Districts to manage the overall budget for the initiative, ensuring that the maximum number of miles are treated. The estimate is based upon assumption of countermeasures to be implemented on a typical two-lane rural road, previous-historical similar projects/bid review, consultant review and district recommendations.
- Locations may experience countermeasure implementation costs that are higher or lower than the predefined average cost per location. The expectation is that the implementation costs across all locations for the initiative are within the total initiative budget.
- The budget for the two-lane rural road improvement projects in each District is all inclusive of preliminary engineering, materials, labor, and traffic control to complete the work.