VIRGINIA DEPARTMENT OF TRANSPORTATION

LOCATION AND DESIGN DIVISION
TRAFFIC ENGINEERING DIVISION

INSTRUCTIONAL AND INFORMATIONAL MEMORANDUM

GENERAL SUBJECT: Large Animal Crash Countermeasures	NUMBER: IIM-LD-262 IIM-TE-396
SPECIFIC SUBJECT: Policy for Determining Areas with a High Risk of Large Animal-Vehicle Crashes and Guidance for Implementing Countermeasures in Projects	DATE: May 11, 2022
	SUPERSEDES:
LOCATION & DESIGN DIVISION APPROVAL: Emmett R. Heltzel, P.E. State Location and Design Engineer Approved May 11, 2022	TRAFFIC ENGINEERING DIVISION APPROVAL: Raymond J. Khoury, P.E. State Traffic Engineer Approved May 10, 2022

Changes are shaded.

CURRENT REVISION(S)

- N/A

EFFECTIVE DATE

- This memorandum is effective for all projects that have not been scoped as of the approval date of this IIM.

BACKGROUND

- Large Animals that inhabit Virginia (i.e., white-tailed deer, black bear, and elk) cross roadways more frequently in areas of favored habitat within a home range.

- Virginia is considered a high risk state for deer crashes.

- Prior evaluations of deer crash data along Interstate 64 and Interstate 81 found that deer crashes are among the highest crash types in many areas, but are under-reported in police crash records. Deer carcass removal data indicate that deer crashes on interstates are 4 to 9 times higher than the number reflected in police records.

POLICY AND PROCEDURES

- To obtain a more accurate estimate of deer crashes, a correction factor of 5 should be applied to police-reported deer crashes to account for non-reported crashes. This correction factor applies only to the number (not the severity) of crashes and to evaluations conducted in the context of this IIM. This correction factor has been determined for interstates but has not been verified for other road types. However, because the severity of crashes is often higher on interstates, they are more likely to be reported to police. Until additional carcass removal data can be gathered, it is therefore assumed that a correction factor would be at least as high on other road types.

- For cases in which a cost/benefit analysis is needed for funding or other purposes, a large animal crash should be valued based on current crash severity costs values used for VDOT Highway Safety Improvement Program analysis and the following approximate crash severity proportions derived from an evaluation of deer and large animal crashes in Virginia between 2014 and June 2021:

    - Fatal Injury - 0.04%
    - Suspected Serious Injury - 0.90%
    - Suspected Minor Injury - 4.63%
    - Possible Injury - 2.94%
    - Property Damage Only - 91.50%

  Contact the VDOT Highway Safety Improvement Program to obtain the most recent crash severity cost values.

- For projects on existing roads, lane additions or major road widening, culvert or bridge replacements, or when an evaluation of wildlife crash risk on an existing road is desired, large animal crash countermeasures should be considered when the following conditions are satisfied:

  1) Posted speed is 45 mph or greater,
  2) The road's functional classification is interstate, freeway, arterial, or major collector,
  3) Within the past five years, there have been a minimum of 2 police-reported large animal crashes per mile per year for a period of two (not necessarily consecutive) years or more, or 10 otherwise known or observed large animal crashes per mile per year.

- For new roads or significant roadway realignment projects, large animal crash countermeasures should be considered during the funding application phase or the project development scoping phase of the project and when the following conditions are satisfied:

1) The new road will intersect habitat or corridors inhabited by large animals (i.e., when the new road bisects large areas of wooded habitat, fragmented wooded habitat, and/or stream corridors connecting areas of wooded habitat). These habitat features are available to VDOT staff via https://vdotmap.cov.virginia.gov by selecting the "Forest Cover" and "Riparian Forest Buffer" layers under the "Land Management" category.

   These layers are available in the map's Layers list, under "NonVDOTLayersProd," select "Land Management," and check the boxes for "Forest Cover" and "Riparian Forest Buffer." (Note: these layers will not be visible until you zoom in to the area of interest.)

2) Design speed will be 45 mph or greater.

- The following implementation measures have a demonstrated crash reduction of 50% to greater than 90%, depending on the measure (See the *Large Animal Crash Countermeasures in Virginia: Technical Guidance and Best Management Practices* document, Chapter 3 - Selecting the Appropriate Large Animal Crash Countermeasure, Figure 1):

  (a) Wildlife crossings with fencing. See Chapter 4 of the Technical Guidance and Best Management Practices. Fencing shall be located outside of the deflection zone of the guardrail or outside of the clear zone. Contact Central Office L&D Division Special Design Section for fencing detail and Central Office Construction Division for fencing Special Provision,

  (b) Enhancing existing structures with wildlife fencing and other measures. See Chapter 4.2 of the Technical Guidance and Best Management Practices,

  (c) Wildlife advisory messages on Changeable Message Signs. See Chapter 5 of the Technical Guidance and Best Management Practices, and

  d) Animal detection driver warning systems. See Chapter 6 of the Technical Guidance and Best Management Practices. *Note: Installations of animal detection systems in Virginia have been conducted for research purposes, but the system is not yet approved for use outside of pilot applications. Any VDOT installation of an animal detection system shall be coordinated between the project team, the applicable VDOT District Traffic Operations Director or designee, and Traffic Engineering Division.*

The above measures are discussed in more detail in the *Large Animal Crash Countermeasures in Virginia: Technical Guidance and Best Management Practices*.

- Wildlife crash countermeasures can be considered at lower crash thresholds and/or on other road systems than those listed above at the discretion of District staff. Factors that should be considered include the cost and ease of implementing the measure.

- Note: These criteria may be considered as part of other VDOT activities (such as maintenance and operations investments and planning). However, this policy does not establish formal requirements outside of the project-specific circumstances described above.

REFERENCE

- Donaldson, B.M.. Large Animal Crash Countermeasures in Virginia: Technical Guidance and Best Management Practices. Virginia Transportation Research Council, Charlottesville, April 2022, which can be accessed at https://www.virginiadot.org/business/resources/LocDes/Large_Animal_Crash_Countermeasures_in_Virginia_April_2022.pdf

RESOURCES

- Donaldson, B.M. and Elliott, K.E.M. Enhancing Existing Isolated Underpasses with Fencing Reduces Wildlife Crashes and Connects Habitat. *Human–Wildlife Interactions*, Vol. 15: Iss. 1, Article 20, 2021.

- Donaldson, B.M., Kweon, Y.J. Deer Advisories on Changeable Message Signs as a Deer Crash Mitigation Tool. *Transportation Research Record*, Vol. 2673, Issue 12, 2019, pp. 548–557.

- Donaldson, B.M. *Improving Animal-Vehicle Collision Data for the Strategic Application of Mitigation*. VTRC 18-R16. Virginia Transportation Research Council, Charlottesville, 2017.

- Donaldson, B.M. and Lafon, N.W. Personal Digital Assistants to Collect Data on Animal Carcass Removal from Roadways. *Transportation Research Record 2147*, Washington, DC, 2010, pp. 18-24.

- Druta, C. and Alden, A.S. *Implementation and Evaluation of a Buried Cable Animal Detection System and Deer Warning Sign*. Report 19-R28. Virginia Transportation Research Council, Charlottesville, 2019.