

SCOPE OF SERVICES

**Missouri Department of Transportation
Design Division - Environmental**

**Task Assignment Distributed to
Qualified Proposers
DBE Goal Assessed: 0%
FHWA WCPP 80%**

Task Assignment: Missouri statewide wildlife vehicle collision (WVC) reduction analysis and hotspot mitigation measure feasibility study project

STATEMENT OF NEED

The Missouri Department of Transportation (MoDOT) needs to conduct a statewide wildlife vehicle collision (WVC) reduction analysis and hotspot ranking and mitigation measure feasibility study.

Based on Missouri State Highway Patrol (MSHP) data from 2012-2021, there were nearly 35,000 reported WVCs on MoDOT owned and maintained routes alone. This number increases to 40,184 when local, county and non-state routes data are included. To date, there have been no uniform statewide WVC analysis, prioritization and feasibility studies to address the WVCs issues in Missouri.

In March 2022, the MoDOT Design Environmental section obtained MSHP data from the Highway Safety and Traffic (HS&T) division. Together with Design GIS staff, MoDOT conducted a preliminary hotspot analysis of WVCs in Missouri. Concurrently, MoDOT utilized the University of California Davis wildlife crossing calculator to conduct a hotspot analysis. While the analysis was beneficial in locating preliminary information on WVC hotspot locations, decisions on locations to address and measures to use need to be based on a rigorous, methodological approach to ensure effective reduction in WVC. Because of widespread hotspots, needs for data and analysis refinements, and lack of current Missouri uniform ranking criteria, MoDOT is proposing to conduct further analysis of available data to effectively identify and address high WVC conflict areas. Results from the study will pave the way for future wildlife crossing work in the state and further the Federal Highway Administration (FHWA) mission: to deliver a world-class system that advances safe, efficient, equitable, and sustainable mobility choices for all while strengthening the Nation's economy.

As stated above, Missouri WVCs are tracked and recorded by MSHP crash reports and are managed and utilized through MoDOT HS&T. Additionally MoDOT records wildlife-vehicle collisions carcass data through customer reports of roadway concerns (e.g. dead animal) calls. MoDOT's internal employees have access to these crash statistic maps and carcass data. Both systems differentiate between wildlife or livestock/domestic animal collisions. The main emphasis of this study is vehicle-wildlife conflicts. A GIS based hotspot analysis is the primary method for identifying a priority list of WVC hotspots. Additional data, such as carcass data, telemetry data, habitat linkage zones, and other sources of relevant information will be used to identify and rank priority WVC conflict areas for mitigation consideration.

A high level study is needed to gather information on existing crash data, carcass data, previously completed studies, wildlife linkage zones, habitat blocks, and industry best-management practices. From the gathered information, potential projects to mitigate the identified vehicle-animal conflicts can be developed that can move forward through MoDOT's transportation planning process. Additionally, projects identified with this study could be eligible for specific funding with additional FHWA Wildlife Crossing Program funds or other alternative funding sources and move forward.

PROJECT OBJECTIVES

The primary goals and objectives of the study are to:

- 1) Identify the significant vehicle-wildlife conflict areas (“hotspots”) throughout the state using ESRI’s Getis-Ord G_i^* hotspot statistics through ArcGIS mapping software or other similar methods;
- 2) Prioritize the significant problem areas – key stretches of highways, including conflict areas with threatened and endangered species or ‘special status’ species;
- 3) Present solutions - mitigation projects, measures or techniques - in an implementation plan that can be applied to the prioritized conflict areas;
- 4) Prepare project-level scopes and cost estimates to implement the highest priority, specifically recommended solutions; and
- 5) Develop a planning approach that allows MoDOT to examine existing and future roads more holistically for wildlife presence and landscape connectivity needs in the face of increasing human populations and traffic.

STUDY AREA

The Study area shall encompass the following:

Route	Begin	End
Various	All MoDOT Districts	All MoDOT Districts

Figure A: Study Area Map can be found here [MoDOT Traveler Information Map](#)

PROJECT MANAGER

Caleb Knerr will serve as MoDOT's project manager and will be the consultant's primary point of contact for the duration of project. The Supplier will confer with the project manager to address concerns and to provide updates monthly or as needed.

A Technical Advisory Committee (TAC) has been established to closely coordinate the Study, consisting of representatives from the following groups:

- MoDOT Research, Transportation Planning, Highway Safety and Traffic, Maintenance, Environmental Planning, Policy and Innovations, and GIS
- MDC Wildlife Management, Cervid, Fisheries, Herpetology, and Policy Coordination
- Missouri State Highway Patrol Field Operations Bureau
- Animal Road Crossing (ARC) Solutions
- National Wildlife Federation Regional Connectivity
- US Forest Service Wildlife
- US Fish and Wildlife Service Ecological Services
- US Geological Survey Research
- Federal Highway Administration Safety and Mobility

It should be assumed that up to 12 meetings will occur throughout the duration of the study, including: one kick-off meeting, and up to 11 monthly TAC progress meetings (via Microsoft Teams or conference call).

The consultant shall be responsible for scheduling a recurring monthly (or less often, as appropriate) progress meeting on a mutually agreeable date for TAC members and distributing electronic meeting agendas, materials, and meeting minutes. Working papers and other project deliverables shall be circulated to the TAC for review and comment. Relevant comments and requests shall be incorporated into the Draft Final Report and Final Report, based on approval by the project manager.

External stakeholders will include the general public, and other agencies or organizations anticipated to become involved in the project via an MoDOT project-specific website. Due to the technical nature of this study and broad geographic coverage, there is less emphasis on in-depth public engagement. The results of this study are intended to inform stakeholder agencies and the general public on the results and recommendations based on the research and field work. Additional public outreach will be completed during the National Environmental Policy Act (NEPA) process occurring in the design and construction

stages of any future, programmed projects.

The TAC and other stakeholders will be disclosed once upon contract execution.

WORK TASKS

Task 1: Introduction, Current Conditions: background data synthesis, hotspot analysis, and working paper 1

Deliverable: Working Paper 1: Current and future conditions. Working Paper 1 will be distributed to the TAC for review. The TAC comments shall be addressed as part of the Draft Final Report.

Note: “**Chapter 1: Executive Summary**” shall be submitted as part of the Draft Final Report, not as part of Task 1.

Chapter 2: Introduction

- I. Need and Purpose of the Study
- II. Study Objectives
- III. Background and History
- IV. Study Process

Chapter 3: Current Conditions

Describe existing conditions related to problematic areas of vehicle-wildlife conflicts.

- I. Inventory of Missouri Crash data
 - a. Review Five- and Ten- Year MSHP crash analysis statewide with intent of identifying roadway segments experiencing the highest frequency of WVCs. Focus on areas where WVCs have been previously identified with and are anticipated to be problematic into the future (to be provided by MoDOT PM).
 - b. Crash Data mapping requirements will be provided (i.e. file formats, information fields, additional copies for stakeholder agencies) (see task GIS Data).
 - c. Use carcass/roadkill reporting data available to determine un-reported WVCs
- II. Major Wildlife Linkage Areas and associated Highway/Corridor features
 - a. High level overview of Missouri state roadways
 - b. Discussion of habitat blocks and linkage zones
 - c. Missouri County-Level Assessments
- III. Review previous/ongoing relevant studies and research current best practices that add value to this project. This review should provide a baseline of useful information related to the overall goals of the project and should not be strictly limited to Missouri information. This review should avoid re-work; it should be a high-level review that can be used to evaluate what needs to be updated or what can be used in this study ‘as-is’.
- IV. Identify road segments with WVCs that may not have the highest number of conflicts, but rather, with state/federal threatened/endangered species or species of conservation concern. Not intended to be an exhaustive listing of all conflicts (see Table 2).

Chapter 4: Environmental Overview

For the top 10 WVC sites identified in Chapter 3, the consultant will prepare an environmental overview, consistent with a scoping-level effort, to identify known environmental resources and include cost estimates to avoid, minimize or mitigate impacts to such resources.

The Study will not require the preparation of environmental surveys or documents meant to comply with NEPA. Mitigation measures do not need to be expressed; those will be developed in the project design stages concurrent with NEPA documents in preparation.

Chapter 5: Future Conditions

Forecast future conditions for the 5-10-20-year planning horizon, including the following:

- I. Projected focal species movement corridors, wildlife concentration areas, fawning/denning movement areas, fall/winter range movement areas, movement associated with climatic changes.
 - a. Projected traffic conditions in areas identified above
 - b. Projected population growth areas in areas identified above
- II. Projected vehicle-wildlife conflict (collisions, run off the road, other) conditions. Include some of the lesser-known species/special status species that still warrant attention:

Table 2: Species to benefit from the proposed WVC analysis and prioritization study

Road Mortality Threat or Documented		
Federally protected or under listing review	MDC Heritage Data showing "Roadkill"	MO Species of Conservation Concern
Alligator Snapping turtle	American Badger	American Badger
Indiana Bat	Bald Eagle	Eastern Massasauga Rattlesnake
Blanding's turtle	Black-tailed Jackrabbit	Kirtland's Snake
Western chicken turtle	Franklin's Ground Squirrel	Northern Leopard Frog
Aquatic Organism Passage Issues	Great Plains Toad	Eastern Tiger Salamander
	Indiana Myotis	13-Lined Ground Squirrel
Niangua Darter	Least Weasel	MDC Focal Species
Topeka Shiner	Long-tailed Weasel	
T&E Plants Dispersed by Mammals	Plains Spotted Skunk	Whitetailed Deer
	Western Foxsnake	American Blackbear
Pondberry	Western Mudsake	Elk

- III. Summary of future conditional needs and risks
 - a. Recommend at what point in time the need should be addressed
 - b. Discuss risk factors to be considered; change in land use, land ownership, funding availability for wildlife mitigation, climate change-induced conditions affecting wildlife.
- IV. Plan for incorporation of WVC priority list into MoDOT's long rang transportation planning process

Chapter 6: Statewide List of Wildlife-Animal Crossing Needs

- I. Based on previous study recommendations, available data, and Technical Advisory Committee input, the consultant will compile a statewide list of known wildlife-animal crossing needs.
- II. The list will include project locations only at this stage.

Task 2: Working Paper 2 – Evaluation, Alternatives, Recommendations, Public Involvement and Implementation Plan

Deliverable: Working Paper 2: Plan of Improvements

Chapter 7: Evaluation Criteria, Alternatives Analysis, and Recommended Improvements

Describe animal-related mitigation measures appropriate for the top 10 highest priority road segments for animal-vehicle collision reductions identified in Task 1 above.

- I. The consultant shall develop Evaluation Criteria to prioritize all statewide vehicle-wildlife conflicts and solicit input from the TAC. This shall be roughly based on Arizona DOT's Evaluation Criteria in the Arizona Statewide Wildlife-Vehicle Conflict Study (Appendix C).
- II. The consultant shall perform field trip(s) of the top 10 Statewide road segments with animal mitigation experts to review.
 - a. MoDOT will provide traffic control if the study panel in consultation with MoDOT Safety concludes that it is warranted for a specific monitoring or field survey activity.
- III. The consultant shall provide site-specific mitigation solutions for the 10 highest priority sites. These must include high-level design recommendations, including some general visualizations, and, where appropriate, will include both short- and long-term solutions. Provide reasonable cost estimates for each site-specific solution.
- IV. The consultant shall provide recommend strategies for monitoring of any mitigation measures to assess their effectiveness.

- a. Identify the limits/boundaries of each proposed improvement(s)/project(s),
 - Including if limited English proficiency population (LEP), minorities, Area of Persistent Poverty*, Historically Disadvantaged Communities**low-income, or minority owned businesses exist in and around the hotspot.
 - b. If there are multiple alternatives for any recommended improvement(s)/project(s), describe: 1) each alternative; 2) the alternatives analysis and evaluation criteria used to prioritize alternatives; 3) why alternatives were eliminated from further review; and 4) the preferred alternative
 - c. Recommended improvements (could include but not limited to): fencing, signage, lighting, culvert and/or drainage improvements, vegetation clearing/plantings, infrastructural assets (overpasses, underpasses) and/or other safety upgrades or improvements.
 - d. Any proposed structures the consultant shall provide either a description or drawing of type, size and location.
 - a. Recommended improvements shall comply with all MoDOT and FHWA policies and engineering standards. If design exceptions are recommended, it must be noted.
- V. Complete a benefit-cost analysis of the top 10 projects.
- a. An estimate of benefits must include predicted reduction in wildlife-vehicle collisions while taking into consideration crash severity, crash costs (to the state), value of big-game and other applicable benefits. Costs of a potential project must consider the nature of the project including any proposed crossing structure construction, annual maintenance costs, and other applicable factors. The consultant could propose their own approaches for use in this analysis.

Chapter 8: Public Involvement and Project Webpage Development

There will be no public involvement meetings on this project. The project information will be available on a MoDOT WVC Planning Studies webpage throughout the study duration. The webpage will identify a supplier email address where the public may send comments on the working papers. The supplier will collect any comments and include them in subsequent deliverable(s). The results of the study will be used to inform stakeholder agencies and the general public on the results and recommendations brought forward.

Deliverables:

* defined as: (1) any county that has consistently had greater than or equal to 20 percent of the population living in poverty during the 30-year period preceding November 15, 2021, as measured by the 1990 and 2000 decennial censuses (see <https://www.census.gov/data/tables/time-series/dec/census-poverty.html> for county dataset) and the most recent annual Small Area Income Poverty Estimates as estimated by the Bureau of the Census; (2) any census tract with a poverty rate of at least 20 percent as measured by the 2014-2018 5-year data series available from the American Community Survey of the Bureau of the Census (see <https://data.census.gov/cedsci/table?q=ACSST1Y2018.S1701&tid=ACSST5Y2018.S1701&hidePreview=false> for 2014-2018 5-year data series from the American Community Survey); or (3) any territory or possession of the United States.

** defined to include (1) certain qualifying census tracts identified by the Climate and Economic Justice Screening Tool (see <https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5>) as disadvantaged due to categories of environmental, climate, and socioeconomic burdens, and (2) any Federally Recognized Tribes or Tribal entities, whether or not they have land.

- I. The consultant shall coordinate with MoDOT Communications Division and the TAC to develop a 508 compliant MoDOT webpage to house the project and supporting documentation, interactive maps, project updates, final report, contact information and relevant project information.
- II. The consultant will prepare deliverables (content). All content will be review by the TAC.
- III. The consultant will coordinate with MoDOT Communications to create and update the MoDOT project webpage to include all informational materials and project details.
- IV. The TAC will develop a Stakeholder list.
- V. The Working Papers and Draft Final Report will be posted on the MoDOT Studies webpage. Public comments (if any) will be solicited and included in the Draft and Final Report documents.
- VI. A fact sheet will be prepared to educate and inform the agency stakeholders and general public on the results and recommendations of the WVC Study.
- VII. Information about WVC data collection apps such as ROaDS will be made available through the website.

Chapter 9: Implementation Plan

The consultant will prepare a prioritized project list for the top ten recommended mitigation projects. The projects shall include:

- I. Scoping-level cost estimate, including all construction, benefit-cost analysis, right-of-way, utilities, future maintenance plans/costs

- II. Anticipated environmental considerations – what might be included in future NEPA documentation and/or mitigation for acquisition of federal funding? This is a high-level ‘fatal-flaw’ analysis and not a NEPA document.

The consultant shall describe implementation of the projects as short-mid- or long-term time frame and a brief description of the rationale. Additional funding beyond traditional federal, state, and local funding sources must be stated as possibilities (e.g. Highway Safety Improvement Program, America’s Transportation Infrastructure Act, grant funding, others), if applicable.

Task 3: Draft Final Report/Revised Implementation Plan

Deliverable: The Draft Final Report (508 Compliant)

In addition, the outcomes of this research will provide preliminary site-specific mitigation recommendations for the highway segments identified as having the greatest cost-benefit. These recommendations will directly inform project designs in these segments. Finally, the compiled best practices for mitigating WVCs will be used to guide transportation project planning and design wherever there are concerns regarding wildlife and motorist conflicts, as the research considers both current conditions and project growth and travel demand.

The Draft Final Report will include the following and will be distributed to the TAC for review and comment:

- I. Chapter 1: Executive Summary
 - a. Include project objectives, activities and tasks completed, study area description, wildlife-vehicle conflict problem areas identified, and evaluation criteria used to identify prioritized mitigation projects.
 - b. Include a recommended project list with short, mid, and long-term recommendations
- II. Revised Chapters 2-7 from Working Papers 1 and 2
- III. Chapter 8: Public Comments Summary
- IV. Chapter 9: Final Prioritized Recommended Projects and Conclusions
- V. Appendices (including Final Mitigation Projects and Cost Estimates). All comments provided by the TAC on Working Paper 1, Working Paper 2, the Public feedback, and Draft Mitigation Projects and Cost Estimates must be highlighted/annotated, or a Comment Matrix must be provided.

The report must be 508 compliant.

Task 4: Final Report/Final Mitigation Projects

Deliverable: The Final Report (508 Compliant)

The Final Report must address the TAC’s comments on the Draft Final Report. All comments provided by the TAC to Draft Final Report must be highlighted/annotated, or a Comment Matrix must be provided.

Task 5 FINAL: GIS Data and Study Closeout File

GIS data used during the Study shall be provided in the electronic Study close-out file via MoDOT External Sharing folder or similar method in a format acceptable to the Commission of secure data transfer or thumb drive. An additional copy can also be submitted either by the consultant or MoDOT to the Local Public Agency (LPA) or Tribal Government representative as applicable.

Such data will be in the format of a geodatabase containing all spatial and related data used in the Study. The data will be in the coordinate system: **NAD 1983 StatePlane Missouri Central FIPS 2402 (US Feet)** for all geospatial data submitted. The GIS Attributes Table will use the exact format and field names as provided by the MoDOT GIS Team. Please do not alter the field names, order, or format at all so MoDOT staff can easily consolidate all proposed projects derived from all planning studies completed. Please complete an attributes table for each proposed project recommended by the study.

GIS Metadata Standards: GIS metadata helps to incorporate all known characteristics of a dataset so that those that are not familiar with the data can gain from its knowledge. GIS metadata must be delivered as an XML file. The metadata must include information on, but is not limited to the following:

- Data summary
- Data description
- Data credits (if from existing data what modifications were made?)
- Data creation methods
- Purpose for creating the data
- Contact information for questions
- Updates schedule
- Data steward
- Data extent (i.e. statewide, county wide, etc.)
- Data type (i.e. point, line, or polygon, raster, etc.)
- Limitations of the data
- Scale range (if any)
- Include any associated domain values
- Tags (i.e. searchable words for this data)

Tasks designated in the Task Assignment Document were designed to minimally reach project objectives. Tasks in the final approved work plan are expected to accomplish project objectives. Modifications to approved tasks are permissible to add additional project locations, duration, or repetitions using the same scope of work, including location-specific modifications. Adding tasks, products, or deliverables is permissible if critical to reaching the stated Project objectives. Modifications must be requested by the Project Manager, approved by the Budget Owner, verified by Contracts, and accepted by MoDOT Procurement; and a revised purchase order must be issued prior to engaging in the work.

Deliverable: In the event permissible modifications are requested, submit a revised Identification Page; revised work plan; schedule, and Budget that clearly demonstrates the original award, the changes needed, and a justification for the changes. Such a modification must be requested by the Project Manager, approved by the Budget Owner, verified by Contracts, and accepted by MoDOT Procurement; and a revised purchase order must be issued prior to engaging in the work.

Deliverables:

Working Paper 1

Working Paper 2

Chapter 8: Webpage (see deliverables list above for details)

The Draft Final Report (508 Compliant)

The Final Report (**508 Compliant**)

GIS Closeout

Services Provided by Commission:

MoDOT will work with Consultant to develop MoDOT WVC webpage (Chapter 8)

MoDOT will provide traffic control if the study panel in consultation with MoDOT Safety concludes that it is warranted for a specific monitoring or field survey activity.

MoDOT to provide list of available data sources and facilitate data exchange of MoDOT, MDC and MSHP data after execution of consultant agreement

Period of Service: The consultant will complete the scope of services within 558 calendar days from the issuance of the notice to proceed inclusive of necessary review time. Anticipated NTP is June 1, 2024.