



## Montana Department of Transportation

2701 Prospect Avenue  
PO Box 201001  
Helena, MT 59620-1001  
www.mdt.mt.gov

### Stage 2 - Research Topic Statement

Print Form

#### RESEARCH PROGRAMS USE ONLY

RESEARCH IDEA NO:	22-013
DATE OF RECEIPT:	Apr 30, 2021
TOTAL MDT COST W/ICAP:	

## RESEARCH PROGRAMS

Please submit completed forms via e-mail to [MDTResearch@mt.gov](mailto:MDTResearch@mt.gov). All fields are required, except the last field: XVIII, Sponsor(s). Incomplete forms will not be accepted.

TITLE (required): Evaluate MDT Electrified Wildlife Deterrent Mats

#### TOPIC STATEMENT:

Wildlife-vehicle collisions (WVC) can cause motorist fatalities, injuries, and property damage to vehicles. One way to reduce the risk of these collisions is through the use of wildlife exclusion fence in conjunction with wildlife crossing structures. To ensure that wildlife utilize crossing structures rather than crossing at grade, wildlife fence is used to guide animals to the structures or to safer crossing locations. Wildlife fence in combination with crossing structures has been determined to be the most effective and robust strategy to improve human safety through reducing collisions with large mammals, and to provide safe crossing opportunities for wildlife. Detering wildlife from entering the "highway side" of the fence and addressing wildlife end-runs of the fence are important considerations in proper implementation of this strategy. Although wildlife fence is effective in reducing WVC, limited research is available on the effectiveness of state of the art technology fence end treatments such as electrified wildlife deterrent mat systems installed at the fence ends to prevent wildlife from entering the "highway side" of the fencing.

To fill this gap in knowledge, applicable to Montana and elsewhere, this study will use video cameras, thermal imaging, and analytic software to examine the following:

- 1) the effectiveness of embedded electrified concrete mat in deterring wildlife from entering the fenced road corridor
- 2) wildlife behavior at the mats and the end of the fencing
- 3) the performance of the wildlife deterrent mats under various environmental conditions

To answer the research questions, the team will investigate the electrified concrete mat wildlife deterrent systems recently installed on MT 200 (East of Thompson River - East) and MT 287 (Toston Structures).

Documenting the effectiveness of the wildlife deterrent mats is expected to translate into reduced risk for wildlife-vehicle conflict in treated areas, increased motorist safety, benefits of investment in innovative technology. This research will be useful to MDT and other departments of transportation and stakeholders planning for wildlife accommodation projects.

#### RELATED RESEARCH SUMMARY FROM STAGE 1:

While there are several studies that have investigated the effectiveness of wildlife deterrent measures, none of them have investigated the effectiveness of this newest wildlife deterrent mat technology used on MT 200 and MT 287 to prevent wildlife from entering the "highway side" of the fencing at the fence ends. To date, there are no studies that investigate our research topic statement specifically related to this application and technology.

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### RESEARCH PROPOSED:

This research will study the effectiveness of embedded electrified concrete mat in deterring wildlife from entering the fenced road corridor; wildlife behavior at the mats and the end of the fencing; and the performance of the wildlife deterrent mats under various environmental conditions. The research will use analytic software and thermal imaging to recognize wildlife and trigger video recording. This is an important component of the research as the research focuses on the roadway and screening the traffic vehicles from animal movement is critical to efficient and accurate analysis. Video clips will allow researchers to conduct qualitative and quantitative data analysis of the interaction between wildlife, roads and electrified mats. Imaging would observe wildlife behavior at a) the right of way (approach to the road), b) the roadway and c) the electrified mat.

#### Research Goals:

- 1) View the area (a,b & c above) 24 hrs/day 7 days/week over the research period
- 2) Collect data (video clips) when wildlife is detected in areas a, b & c above
- 3) Store data on-site for periodic retrieval from site control cabinet
- 4) Analyze the data and determine the three goals identified in the research statement
- 5) Compare the performance and efficiency between the MT 200 (solar) and MT 287 (power) sites

#### Minimum Requirements:

- 1) Thermal video camera mounted at a proper height and distance to view a), b), and c) above, simultaneously. One camera for each side of road at each mat location.
- 2) Video analytics software to detect wildlife and trigger video recordings. This software will screen wildlife from vehicles and other non-target moving objects.
- 3) Continuous recording over selected duration to observe wildlife behavior (Crossing/Not Crossing/Avoidance/Reaction to Corrective Shock).
- 4) Selectable "regions of interest" to filter out vehicle recordings unless wildlife are present.
- 5) System capable of solar powered or A/C powered operation.
- 6) Data storage device with sufficient capacity to store video clips between data retrieval visits.
- 7) Site control cabinet to securely house and control the electronics.
- 8) Researcher to download and analyze the data from the video clips to answer the research questions.

Note: The Toston location has ample existing power and cabinet storage capacity for the research equipment. The Thompson Falls location might need supplemental power and storage capacity.

### RESEARCH PERIOD (Time to complete research project.):

Fall 2021 - Fall 2023

**IT COMPONENT: Identify if the project includes an IT component (purchasing of IT hardware, development of databases, acquisition of existing applications, etc.). If so, describe IT component in as much detail as possible.**

thermal video cameras, video analytics software, electronic hardware (laptops, wiring, etc.), power connections - purchase or rental/lease of the majority of these items is an option

### FEASIBILITY, PROBABILITY OF SUCCESS, AND RISK:

The research objectives and data collection methods are straight forward and efficient, therefore we expect a high probability of success with low risk. There is the normal risk expected with the use of electronics.

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**URGENCY, IMPORTANCE, AND EXPECTED BENEFITS/PAY-OFF:** Address urgency, timeliness, and importance of the research. Identify if the research is required for any federal or state initiative or compliance. This section must include a description of how this research will help to meet MDT's mission (i.e., serve the public by providing a transportation system and services that emphasize quality, safety, cost effectiveness, economic vitality and/or sensitivity to the environment).

Given MDT's commitment to wildlife accommodations and public engagement, a better understanding of the performance and effectiveness of electrified wildlife deterrent mats to prevent wildlife from entering the "highway side" of the fencing at the fence ends is essential to reduce WVC and inform our public. Evaluating this innovative technology in a timely manner is needed to inform cost-effective and efficient wildlife accommodation recommendations in the future.

**IMPLEMENTABILITY, IMPLEMENTATION PLAN, AND RESPONSIBILITY:** Address the implementability of the expected results from the proposed project. Identify products that will enhance implementation. Identify any known implementation barriers and how these barriers might be eliminated or reduced. Identify MDT office or entity outside of MDT responsible for implementation. Describe initial implementation plan, include timeframe for implementation.

If the proposed electrified wildlife deterrent mats are effective in keeping wildlife out of the fenced road corridors, they will continue to be recommended as an integral part of wildlife accommodation strategies. Specific project recommendations will follow MDT Wildlife Accommodation Process.

**MDT PRIORITY FOCUS AREAS:** MDT may, as often as annually, identify priority research focus areas. These focus areas will be listed on <http://www.mdt.mt.gov/research/unique/solicit.shtml>.

None at this time.

**TOTAL COST ESTIMATE (If the project proposal comes in at a higher cost, it may require further approval and may be delayed.):**

Research \$50K  
Equipment Purchase \$280K (four mat locations)  
Equipment Rental/Lease \$350K (four mat locations)

**MDT FUNDING SOURCE (If MDT Research, enter SPR):** SPR

**FUNDING MATCH SOURCE AND AMOUNT:**

**FUNDING PARTNER(S):**

**POTENTIAL TECHNICAL PANEL MEMBERS (At this time, individuals do not necessarily need to be identified; rather, MDT offices and outside entities can be named. However, if known, individuals may be named):**

Possibilities include: Environmental, Maintenance, Traffic & Safety, Preconstruction, FHWA, Construction, FWP Wildlife

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<b>SUBMITTED BY: (required)</b>	
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**CHAMPION: Must be internal to MDT, feel strongly that the research will benefit the Department, and is willing to chair the technical panel. Note: If a champion is not identified by you or Research staff, this topic statement will not move forward.**

<b>NAME:</b>	Deb Wambach
<b>TITLE:</b>	Butte District Biologist
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**SPONSOR(S) (optional): Must be internal to MDT (Division Administrator or higher) and willing to ensure implementation occurs, as appropriate. If a sponsor is not identified by you or Research staff, this topic statement will not move forward.**

<b>NAME:</b>	
<b>TITLE:</b>	
<b>AFFILIATION:</b>	
<b>ADDRESS:</b>	
<b>PHONE NO.:</b>	
<b>E-MAIL:</b>	

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