Montana Department of Transportation

Stage 2 - Research Topic Statement

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

Print Form

RESEARCH PROGRAMS USE ONLY	
RESEARCH IDEA NO:	21-009
DATE OF RECEIPT:	Apr 30, 2020
TOTAL MDT COST W/ICAP:	

RESEARCH PROGRAMS

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

TITLE (required): Safety Evaluation of Sinusoidal Centerline Rumble Strips

TOPIC STATEMENT:

Centerline Rumble Strips (CLRS) are a proven safety feature to reduce high severity cross-over type crashes on rural and suburban roadways. Although the primary crash type reduced are head-on and sideswipe opposite direction crashes, studies have shown a reduction for all crash types. When traversed, conventional CLRS create significant additional traffic noise which can travel several hundred feet and create a nuisance to nearby residents. Previous studies show a quieter CLRS option is the sinusoidal centerline rumble strip (SCLRS). Currently there are no studies to quantify the crash reduction effects of the SCLRS. This proposed project will investigate the effectiveness of sinusoidal centerline rumble strips in lowering the number of observed crashes.

RELATED RESEARCH SUMMARY FROM STAGE 1:

Centerline Rumble Strips (CLRS) are nationally recognized as a cost-effective tool for reducing lane departure crashes. While conventional CLRS are effective, they can produce what is perceived as excessive exterior noise, particularly in areas with frequently-used passing zones adjacent to residences. Many states have explored the use of modified rumbles strips, also known as sinusoidal rumble strips to lessen exterior noise impacts. A number of studies have shown sinusoidal rumbles strips provide for significantly-reduced exterior noise levels. Studies have also quantified changes to interior noise and vibration levels of sinusoidal rumble strips with the assumption that these would correlate with changes to driver response. Real-world performance testing using actual crash data has not yet been conducted for sinusoidal rumble strips.

MDT proposes to use two planned CLRS projects to conduct a before and after crash comparison for approximately 600 miles of sinusoidal CLRS on highways in Western Montana.

RESEARCH PROPOSED:

The proposed research will analyze two SCLRS projects using safety performance function (SPF) modeling with Empirical Bayes methodology. This will aid in determining the effectiveness of SCLRS on a variety of roadway for multiple crash types. The type of roadways to be studied are Rural Flat & Rolling 2-Lane Undivided Highways and Rural Mountainous 2-Lane Undivided Highways. Crash types to be analyzed include total crashes, injury crashes, single vehicle run-off the road total and injury crashes, and head-on and sideswipe opposite direction total and injury crashes. Achieving the objective of the research will be a three-part process. First, SPFs will be created and calibrated for the specific roadway and crash types. Five years of pre-installation crash data along with three to five years of post-installation data will then be collected at the identified sites. Finally, utilizing the specific SPFs, the before-installation crash rate will be compared to the after-installation crash rate.

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The research plan will include having the research team on board during construction so they can note any issues or anomalies that could skew the data. The plan will also include documenting any issues during or after construction such as issues with centerline pavement joints.

RESEARCH PERIOD (Time to complete research project.):

The project duration is 42 to 66 months following initial SCLRS installation which is planned for November 2021. Pre-installation crash data for all routes in question is already collected. A minimum of 36 months up to 60 months will be required to collect post-installation data followed by up to six months to review and interpret data and finalize the research report.

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.

No new IT components should be required.

FEASIBILITY, PROBABILITY OF SUCCESS, AND RISK:

Two SCLRS projects covering 600 miles on multiple roadways in Western Montana are planned for construction next year (2021). Since project identification is complete, funding for installation is secured, and data collection means and methods are already established, the research project is considered feasible. As previously stated, studies have demonstrated a significant noise reduction with sinusoidal rumble strips when compared to traditional rumble strips; however, there are no known studies which directly measure the ability of sinusoidal rumble strips to reduce crashes. Therefore, success in this case can be narrowly defined as accurately quantifying safety benefits as measured by crash reduction. Given the size and scope of the SCLRS projects and the corresponding sample size of data, the probability of success is high while the corresponding risk of not accurately quantifying risk is expected to be moderate. Measures to account for statistical variations in data can help mitigate risk to a degree.

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).

Improved safety of the traveling public is a high priority for MDT and critical to achieving the goals of Vision Zero. This proposed research project will provide MDT and other states important information on the use of an alternative rumble strip option. Favorable crash reduction may allow the installation of centerline rumble strips in noise-sensitive areas deemed infeasible for conventional rumble strips which would further reduce crashes and save lives.

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.

The final report for this project will include confirmation of sinusoidal centerline rumble strip design along with crash modification factors for applicable crashes. This information will be used by MDT to determine if more widespread use of sinusoidal centerline rumble strips is recommended. Depending upon SCLRS' degree of effectiveness in reducing crashes, SCLRS may be a viable alternative to standard rumble strips in noise sensitive areas, but may also replace conventional rumble strips depending upon the relative crash reduction associated with sinusoidal strips compared with conventional. Other states will have the ability to review the SCLRS design and report findings and may consider

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implementation or continue research on the application of sinusoidal rumble strips.

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.

According the web-page there are "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.):

$200,000

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

FUNDING MATCH SOURCE AND AMOUNT: State funds estimated at $40,000 assuming an 80/20 split.

FUNDING PARTNER(S): MDT Research

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):

MDT Research, MDT Construction, MDT Highways Bureau, MDT Traffic Safety, MDT Maintenance

SUBMITTED BY: (required)	
NAME:	Gabe Priebe
TITLE:	Traffic and Safety Engineer
AFFILIATION:	Montana Department of Transportation
ADDRESS:	2701 Prospect Avenue, Helena MT 59620
PHONE NO.:	(406) 444-9252
E-MAIL:	gpriebe@mt.gov

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.

NAME:	Gabe Priebe
TITLE:	Traffic and Safety Engineer
AFFILIATION:	Montana Department of Transportation
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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.

NAME:	Dwane Kailey
TITLE:	
AFFILIATION:	
ADDRESS:	
PHONE NO.:	
E-MAIL:	

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