



Montana Department of
Transportation
PO Box 201001
Helena, MT 59620-1001

Memorandum

To: RRC Members
Mike Bousliman, Administrator/Information Services Division
Kevin Christensen/Chief Operations Officer
Larry Flynn, Administrator/Administration Division
David Kack, Director/WTI
Dwane Kailey, Administrator/Highways and Engineering Division
Shane Mintz, Administrator/Glendive District
Bob Seliskar/FHWA
Jon Swartz, Administrator/Maintenance Division
Mike Tooley/Director
Duane Williams, Administrator/Motor Carrier Services Division
Pat Wise/Deputy Director
Lynn Zanto, Administrator/Rail, Transit, and Planning Division

From: Susan C. Sillick, Manager
Research Programs

Date: June 11, 2020

Subject: June 24, 2020 RRC Meeting Agenda (9:00 am - 12:00 pm Skype Meeting)

Action items are in red.

RRC Members Present: Mike Bousliman, Kevin Christensen, David Kack, Dwane Kailey, Shane Mintz, Sue Sillick, Jon Swartz, Mike Tooley, Duane Williams, and Pat Wise

Others Present: Stephanie Vaneza Callejas, Bobbi deMontigny, Jeff Jackson, Doug McBroom, Kirsten Seeber, and Jim Wingerter

1. **Budget Report:** Attached
 - a. No comments
2. **Research Projects - current listing**
 - a. Technical Panel members for new projects - Last call

Jon Swartz will provide Sue with technical panel names.

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| Safety Evaluation of Sinusoidal Centerline Rumble Strips |
| Effective Wildlife Fences through Better Functioning Barriers at Access Roads and Jump-Outs |
| Artificial Intelligence (AI) Based Tool to Estimate Contract Time |
| Exploration of UHPC Applications for Montana Bridges |
| Feasibility of Non-Proprietary Ultra-High Performance Concrete (UHPC) for Use in Highway Bridges in Montana: Implementation |

3. **Reports:** Available (except progress reports) on Research [website](#)

- a. Consultant Research Project Managers – Monthly Progress Reports

No discussion on the reports.

4. **Proposed Research Projects (attached):**

- a. A Feasibility Study of Road Culvert/Bridge Deck Deicing Using Geothermal Energy

Jeff Jackson, as chair of the technical panel, attended this meeting to present this proposal, which is recommended by the project technical panel for funding.

The proposed research program will investigate the feasibility of using a ground-coupled system, which utilizes heat energy harvested from the ground as an alternative for deicing bridges and culverts. In addition, if the bridge deck/culvert temperature is greater than 0°C during the operation of the system, the deicing system could also be used for anti-icing in winter. The ground-coupled system relies on circulating fluid through pipes, placed underground (either vertically or horizontally), to utilize the natural heat retained by the earth. The heat may not completely melt the ice but help melt and help the maintenance folks with the icy roads.

The objectives for this project are to 1) investigate the feasibility of the use of a ground-coupled system that utilizes heat energy harvested from the ground as an alternative for deicing bridges and road culverts (with both internal and external heating systems), 2) study the use of bio-mediated soil improvement, such as Microbially-Induced Calcite Precipitation (MICP), and higher thermal conductive concrete to improve the efficiency of ground source heat pump systems, and 3) define important design requirements and operational considerations.

Discussion of some project tasks:

Initial Stage

Task 0: Project Management

Task 1: Literature Review

The technology is gaining traction and has been investigated for use at airport runways.

Research Stage

Task 2: Geotechnical and Geochemical Testing and Analysis

This task will use lab testing to look at how heat can transfer through the different types of MT soils. The researchers will use samples previously collected from other projects, so as not to put additional work on MDT staff. The researchers will also look at mix designs to see how thermal properties work, as well as collect RWIS data from around the state (available online).

Task 5: TP Meeting #3.

The technical panel will discuss the results of the project through Task 4 and determine if they want to move forward.

Task 6: Pilot-Test Design

The researchers will design a pilot study, which may be pursued in a follow up project. No construction on a project or bridge is included in this project. The next phase of the project would be putting it into place in the field.

The cost of the project is \$210,701.

Dwane Kailey asked how this project would affect deck cracking issues. Jeff Jackson said that while deck cracking is not the main focus of the project, it will be addressed. The thought is that decks crack because they cure too fast. This proposed ground-coupled system may slow down the curing process, which is included in the research. This could be a huge benefit to MDT.

Jon Swartz made a motion to approve funding for the project. The motion was seconded by Dwane Kailey, and all RRC members present voted in favor. The motion passed.

b. Validation and Refinement of Icy Road Forecast and Alert (IcyRoad) System using MDT RWIS Sites

Doug McBroom, as chair of the technical panel, attended this meeting to present this proposal, which is recommended by the project technical panel for funding.

The Icy Road Forecast and Alert system (IcyRoad), an innovative technology developed by SpringGem Weather Information, LLC is based on numerical weather forecasts, remote sensing observations, cloud computing and data mining to provide ice information to users for any road across the US, 24 hours a day, 7 days a week, with 24-hour lead time. The University of Montana (UM) will work with SpringGem Weather Information through this project to validate and refine the IcyRoad scientific algorithm, in particular the black ice algorithm, using MDT Road Weather Information System (RWIS) data and UM's drone-based ice detection technology.

Objectives:

The objectives for this project are 1) to validate IcyRoad forecast using RWIS across Montana as well as using data from additional sensors on strategic road sections without RWIS information, and 2) To confirm the use of UAV hyperspectral technology to detect icy road conditions and validate the IcyRoad forecast. The drone will be calibrated at the Subzero Research Lab.

Doug McBroom stated that if the algorithm accurately predicts ice formation, it will be incorporated in to the TMC operations. Messages would be put on the Variable Message Signs to warn drivers that ice is predicted. It will also inform MDT's maintenance operations so the snowplows can get out in advance of winter weather to put chemicals down to prevent ice from forming.

Budget:

The cost of the project is \$74,369.

Dwane Kailey made a motion to approve funding for the project. The motion was seconded by Mike Tooley, and all RRC members present voted in favor. The motion passed.

5. Implementation/Performance Measures/Technology Transfer: None

6. Department/Division Hot Topics - RRC Members Roundtable Discussion

No discussion on hot topics.

If you have any additions to the agenda, please contact me at 444-7693 or ssillick@mt.gov. You will be notified of any last-minute additions to the agenda by E-mail.

Copies: Craig Abernathy/Research Section
Stephanie Brandenberger, P.E./Bridge Bureau
Vaneza Callejas/Consultant Research Project Manager
James Combs/Highways Bureau
Ryan Dahlke/Consultant Design Bureau
Jim Davies/Materials Bureau Chief
Bobbi deMontigny/Research
Lisa Durbin/Engineering Operations Bureau
Ed Ereth/Data and Statistics Bureau
Bill Fogarty/District Administrator-Butte District
Jake Goettle/ Highways and Engineering Division
Jeff Jackson/Geotech and Pavements Bureau
Paul Jagoda/Construction Engineering Services Bureau
Janet Kenny/Grants Bureau
Damian Krings/Highways Bureau
Tom Martin/Environmental Services Bureau
Rod Nelson/District Administrator-Billings
Gabe Priebe/Traffic & Safety Bureau
Darin Reynolds/Construction Contracting Bureau
Dustin Rouse/Highways and Engineering Division
Kirsten Seeber/Research Consultant
Jim Skinner/Planning and Policy Analysis Bureau
Rob Stapley/Right of Way Bureau
Carol Strizich/Multimodal Planning Bureau
Matt Ulberg/LTAP
Bob Vosen/District Administrator-Missoula
Jim Wingerter/District Administrator-Great Falls File