



Montana Department of
Transportation
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Memorandum

To: RRC Members
Mike Bousliman, Administrator/Information Services
Division Kevin Christensen/Chief Operations Officer
Larry Flynn, Administrator/Administration Division
David Kack, Acting Director/WTI
Shane Mintz, Administrator/Glendive District
Dwane Kailey, Administrator/Highways and Engineering
Division 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: October 29, 2019

Subject: August 30, 2019 Research Review Committee (RRC) Meeting Notes

Action items are in red.

RRC Members Present: Kevin Christensen, David Kack, Dwane Kailey, Kevin Kauska (for Mike Bousliman) Shane Mintz, Sue Sillick, Jon Swartz, Duane Williams, and Lynn Zanto

Others Present: Stephanie Brandenberger, Stan Brelin, Dave Hedstrom, Bobbi deMontigny, Bill Fogarty, Jeff Jackson, Will Kline, Doug McBroom, Chad Richards, Kirsten Seeber, Brandi Shepherd, Matt Ulberg, Bill Weber, and Doug Wilmot

1. **2020 FFY Solicitation and Work Plan (attached):** Champions requesting funding will present to the RRC and DAs, who, at this meeting, will determine which projects will move forward to technical panels (in the case of those projects resulting from the 2020 FFY solicitation) and those projects that will be funded (partnering projects). Annual evaluations were distributed with the agenda for all continuing partnering projects, but champions will only present if they are requesting funding.
 - a. Pooled Fund Solicitation 1483: Design Guidelines and Mitigation Strategies for Reducing Sedimentation of Multi-Barrel Culverts

This project was removed from funding consideration.

- b. Pooled Fund Solicitation 1490: Precipitation Frequency Estimates for ID, MT, OR, WA and WY (NOAA Atlas 14 Volume 12)

Dave Hedstrom, as the potential technical representative to the Technical Advisory Committee, attended this meeting to present this proposal for funding.

This project will provide precipitation estimates (rain only) for five northwest states: ID, MT, OR, WA and WY. The rest of the country has this information already and are on their second or third round of updates. NOAA will conduct the study, which will focus on rainfall precipitation. Montana will use the data for storm drain design, spread and storage calculations, and culvert sizing.

The most current data for Montana from NOAA is from 1973. The data from the study will greatly improve the accuracy and reliability of the data Montana is currently using, which was developed in-house in 1995. Montana attempted to update the 1995 data in 2014, but because some of the methods and data from 1995 were not documented, there is uncertainty about the validity of the 2014 data.

This new NOAA study will include the additional 46 years of data using state-of-the-art statistical analysis and will enable Montana to produce more accurate, economical, and defensible designs. The data will be viewed via a web-based map that will reside on the NOAA website. Users will be able to pick a point anywhere in Montana and it will report the precipitation values.

The commitment amount for this pooled fund study is \$133,524/year for three years. If all five states do not join the study, then the cost for a single state increases by 10%. FHWA will lead the study.

- c. TPF-5(316) Traffic Control Devices (TCD) Pooled Fund Stud

Stan Brelin, as the current technical representative to the Technical Advisory Committee, attended this meeting to present this proposal for funding.

The purpose of this study is to assemble a consortium composed of regional, state, and local entities; other appropriate organizations; and FHWA to establish a systematic procedure to select, test, and evaluate approaches to novel TCD concepts as well as incorporation of results into the Manual on Uniform Traffic Control Devices (MUTCD). Past research resulted in significant changes that were incorporated into the 2009 MUTCD.

Recent projects have included research reports on Intersection Conflict Warning Signs, sign legibility, guide signs and signs in conjunction with pavement markings. Recommendations from these reports are then forwarded to the National Committee on Uniform Traffic Control Devices (NCUTCD). Recent projects are being considered for incorporation into the next edition of the MUTCD.

The commitment amount for this study is \$10,000/year. MDT has committed \$10,000/year since 2016. FHWA leads the study.

d. TPF-5(353) Clear Roads

Doug McBroom, as the current technical representative to the Technical Advisory Committee, attended this meeting to present this proposal for funding.

The Clear Roads pooled fund study has been active for 15 years and currently has 36 partners. The main purpose of the study is to provide ongoing research for snow and ice operations. Clear Roads conducts four to five research projects each year.

MDT has had two recent project ideas selected as full research studies. These include a defensive driving program that examines the root cause of snowplow hits and develops mitigating operator behavior, and the efficiency of a tow plow and where to place it during winter operations.

Clear Roads now maintains the Qualified Product List. It is an advantage for MDT to have products they use on this list because this assures the products are safe, environmentally friendly, cost-effective, and high performing.

Clear Roads also conducts an annual survey of member states on the types and amounts of winter materials they used the previous winter. MDT uses this information when talking to the legislature about funding. They can show that MDT uses less product than other states.

The commitment amount for this study is \$25,000/year. MDT has committed \$25,000/year since 2012. Minnesota leads the study.

e. 20-003: Determining Preliminary Engineering Cost Estimates

Chad Richards attended this meeting to present this project to the RRC for approval to move this project to the Technical Panel Stage.

This project will build a tool that would estimate preliminary engineering costs for design projects. This will ensure consultants are appropriately compensated and reduce the production of hastily prepared designs that could contain errors. This tool will also assist MDT in determining how many projects can be designed in-house and how many should be outsourced. The tool would update automatically based on past projects.

Lynn Zanto asked if this tool could be used for more than design costs. Chad said it will mine the MDT database and look at all activity costs. If MDT can provide good variables, then the tool can distill the costs.

Dwane Kailey is concerned that the tool will be building a model based on historic data that may no longer be valid. We are changing the way we do things, so would the model be accurate if the data is not relevant? Lynn would like the tool to build a

framework on how to go about estimating and it should be forward-looking. The researcher is looking at an artificial intelligence model so that the tool will be dynamic and not static. If activities are coded correctly then the model should work properly. Chad will not support a tool that solely relies on old data.

The FFY 2020 funding request for this project is \$133,000.

- f. 20-004: Analyze Business Models for Implementation and Operation of a Statewide GNSS RTN

Brandi Shepherd and Bill Weber attended this meeting to present this project to the RRC for approval to move this project to the Technical Panel Stage.

MDT and the State Library are leading an effort to develop a Statewide GNSS (Global Navigation Satellite System) RTN (Real-Time Network). The purpose of this project is to produce a report to be used as a tool for determining a business model that will be implemented for operation and maintenance of a Statewide RTN. A summary report consumable by administrators from different public and private agencies and industries would be beneficial to support RTN development and operation.

The goal is to provide a statewide RTN network covering most of the Montana geographical area that 1) provides survey-grade RTN survey and mapping services minimally to public and private network partners and preferably offered as a public service to subscribers as well, and 2) is a fiscally sustainable business operation.

MDT is taking the lead in setting up the RTN network but does not know what the ultimate model will be. Staff are working with the governor's office because several state agencies could use the network. The State Library will operate and maintain the network, but they need a partner to help them get there.

Lynn Zanto noted that figuring out long-term funding for the network is crucial. Dwane Kailey indicated there is still a fair amount of infrastructure will need to be built for the network to provide full coverage across the state. MDT shouldn't pay for all the buildout and will need to find partners, especially in the private industry since they use the network themselves.

The FFY 2020 funding request for this project is \$88,000.

- g. 20-007: Economic Benefits of Improving Montana's Transportation Infrastructure (EBIMTI)

Lynn Zanto presented this project to the RRC for approval to move this project to the Technical Panel Stage.

Highway construction projects have positive economic and social impacts. This project will estimate the economic gains to Montana of improving infrastructure to raise the state's ASCE grade from a C- to a B. These findings may be used by MDT to inform

policymakers and stakeholders about the economic impacts associated with MDT infrastructure improvement.

The project will update and build on a 2002 study about how bridges and roads contribute to Montana's tax base. The study will use two approaches to identify and calculate the economic benefits of additional Montana highway infrastructure investments. The first method will utilize the economic models prepared by Regional Economic Models Inc. (REMI) and IMPLAN (IMpact Analysis for PLANing). The second method estimates the total rate of return and the productivity gains of additional roadway investment and maintenance over a 10-year period.

Lynn expressed concern with the approach because the researchers want to tie it to the ASCE Infrastructure Report Card. When MDT has tried to use the Infrastructure Report Card, the agency couldn't get to an apples-to-apples comparison because the report card looks at all public roads (state and local). The researchers indicated that they would look at all infrastructure and break out the state investment.

Dwane Kailey asked if someone from the Chamber of Commerce could be on the project panel so that it would ultimately have better support in the legislature. Sue indicated that should the project be funded, Research will ask the RRC what other areas should be represented on the panel and the Project Champion will try to find appropriate panel members.

The FFY 2020 funding request for this project is \$83,000.

h. 20-008: A Feasibility Study of Road Culvert/Bridge Deck Using Geothermal Energy

Jeff Jackson attended this meeting to present this project to the RRC for approval to move this project to the Technical Panel Stage.

This project will 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 culverts. The ground-coupled system relies on circulating water through pipes, placed underground either vertically or horizontally, to utilize the natural heat retained by the earth.

The biggest direct benefit of the project will be to maintenance operations, but it could also help bridge engineering staff.

The final report will be used to design a bridge deck and/or roadway culvert pilot study for an existing site within MDT's network. The pilot study may be designed at the end of this project with construction taking place thereafter.

The committee would like a cost-benefit analysis included in the project. It might be beneficial to phase this project so that Phase 1 would be lab work only and Phase 2 would be construction of a pilot site.

The FFY 2020 funding request for this project is \$233,000.

i. 20-011: Development of Deterioration Curves for Bridge Elements in Montana

Stephanie Brandenberger attended this meeting to present this project to the RRC for approval to move this project to the Technical Panel Stage.

This project is in response to FHWA's objective of implementing a transportation management plan for the National Highway System. It will support the development of an asset management plan for structures that will include a predictive model for bridge deterioration.

The objective of the research is to 1) develop deterioration models specific to Montana using inspection data related to time-dependent element deterioration, operation practices, and annual average daily traffic (AADT), 2) identify existing or new data that could be used to improve the accuracy of the deterioration curves, and 3) compare the results from Montana-specific data with data from the National Bridge Inventory to identify similarities and differences in the deterioration models.

Pavement Management has been using this type of model for years, but Structures hasn't caught up. This is due to the different materials used and that bridge materials last longer than pavement materials. Good models, which are needed to make predictive capabilities work, require a high level of mathematics to synthesize the data on all bridges.

The FFY 2020 funding request for this project is \$83,000.

j. 20-014: Icy Road Forecast and Alert (IcyRoad): Validation and Refinement Using MDT RWIS Data

Doug McBroom attended this meeting to present this project to the RRC for approval to move this project to the Technical Panel Stage.

This project is to collaborate with faculty at the University of Montana to validate and refine the IcyRoad forecast algorithm using Montana Road Weather Information System (RWIS) sites with a focus on black ice detection.

Predicting black ice on a thermal mass is difficult. Roadways are 2-3 degrees higher than the air temperature in fall and 2-3 degrees lower than the air temperature in the spring. IcyRoad has a 70% success rate in predicting black ice.

Doug would like the traffic management center to have this information so alerts can be put on dynamic message signs and distributed via other messaging methods. The information can also assist operations staff to help them decide where to treat black ice.

Dwane Kailey suggested that this could be a good pooled fund project as other states would benefit. Doug responded that TPF-5(347), Development of Maintenance Decision

Support System, looks at weather predictions and proposes treatment scenarios. The cost to join the pooled fund is \$100,000 to \$125,000. The pooled fund focuses on winter operations in total and not solely on black ice.

The FFY 2020 funding request for this project is \$66,000.

k. Project rankings

The RRC members individually ranked the projects and Sue Sillick compiled the results. The projects selected for FFY 2020 funding, in rank order are:

- ★ TPF-5(353) Clear Roads
- ★ 20-004: Analyze Business Models for Implementation and Operation of a Statewide GNSS RTN
- ★ TPF-5(316) Traffic Control Devices (TCD) Pooled Fund Study
- ★ 20-007: Economic Benefits of Improving Montana's Transportation Infrastructure (EBIMTTI)
- ★ Pooled Fund Solicitation 1490: Precipitation Frequency Estimates for ID, MT, OR, WA and WY (NOAA Atlas 14 Volume 12) **Funding includes 10% extra if MDT does this as a solo pooled fund study.**
- ★ 20-008: A Feasibility Study of Road Culvert/Bridge Deck Using Geothermal Energy
- ★ 20-014: Icy Road Forecast and Alert (IcyRoad): Validation and Refinement Using MDT RWIS Data
- ★ 20-011: Development of Deterioration Curves for Bridge Elements in Montana – **This project will be tied into the annual bridge program and will use additional funding from Bridge as there are not enough Research funds to cover the entire cost. It will still follow the research process.**

A motion was made and seconded to approve these projects.

Project 20-003: Determining Preliminary Engineering Cost Estimates was not funded for FFY 2020 due to the concerns listed above.

2. **Budget Report:** Attached

No discussion.

3. **Research Projects - current listing**

- a. Bridge Deck Cracking Evaluation: RFP Issued; WJE Selected; Proposal approved by RRC via Email Ballot

This project is under contract.

- b. Developing a Methodology for Safety Improvements on Low-Volume Roads

in Montana: Proposal Approved by RRC via Email Ballot

This project is under contract to Montana State University.

- c. Monitoring Streamflow Using Video Equipment: Proposal Approved via RRC Email Ballot

This project is under contract to U.S. Geological Survey.

- d. Thin Polymer Overlays for Bridge Decks: SOW approved by RRC and RFP Issued

Proposals for this project are due soon.

- 4. **Reports:** Available (except progress reports) on Research [website](#).
 - a. Alkali-Silica Reactivity in the State of Montana (18-018) – Task 1 and Quarterly Progress Reports
 - b. Concrete-Filled Steel Tube to Concrete Pile Cap Connection – further Evaluation/Improvement of analysis/Design Methodologies (18-017) – Quarterly Progress Reports
 - c. Consultant Research Project Managers – Monthly Progress Reports
 - d. Developing a Methodology for Safety Improvements on Low-Volume Roads in Montana
 - Quarterly Progress Reports
 - e. Effective Production Rate Estimation and Monitoring of Controlling Activities Using Daily Work Report Data (15-013) – Final Report and Production Rates Estimation Tool and User’s Manual
 - f. Feasibility of Non-Proprietary Ultra-High Performance Concrete (UHPC) for Use in Highway Bridges in Montana – Phase 2: Field Application (18-016) – Quarterly Progress Reports
 - g. Guidelines for Chemically Stabilizing Problematic Soils (15-008) - Tasks 5 and 7, and Quarterly Progress Reports
 - h. Large-Scale Laboratory Testing of Geosynthetics in Roadway Applications (18-007) - Task 2 Report, Annual Meeting Presentation, and Quarterly Progress Reports
 - i. LTAP – Quarterly Progress Reports
 - j. Regional Regression Equations Based on Channel-Width Characteristics to Estimate Peak Flow Frequencies at Ungauged Sites Using Data Through Water Year 2011 (15-015)
 - Quarterly Progress Reports
 - k. Testing Wildlife-Friendly Fence Modifications to Manage Wildlife and Livestock (18-009) -Quarterly Progress Reports
 - l. Traffic Safety Culture Pooled Fund:
 - i. Guidance for Evaluating Traffic Safety Culture Strategies – Quarterly Progress Reports
 - ii. Guidance on Messaging to Avoid Reactance and Address Moral Disengagement

- Quarterly Progress Reports
- iii. Key Information for DUIC Policy – Final Report, Presentation, Talking Points, Poster, and Infographics: 1) Effects of Cannabis on Traffic Safety and 2) Cultural Factors that Predict the Frequency of Driving within 4 hours of Using Cannabis in the Past 12 Months. A webinar will be held on 11/6/19
- iv. Traffic Safety Citizenship Primer and Communication Tools – Quarterly Progress Reports
- v. Traffic Safety Culture Primer – Quarterly Progress Reports
- vi. Understanding Law Enforcement Attitudes and Beliefs about Traffic Safety – Final and Project Summary Reports, Dialog Guide and Speaking Points, and Webinar Presentation and Recording

No discussion on reports

5. **Proposed Research Projects (attached):** None

6. **Implementation/Performance Measures/Technology Transfer: (attached)**

a. Wildlife Accommodations Implementation Planning, and Documentation Form

This project is using the new Implementation Planning and Documentation form. There are four parts to this form. Part A contains general project information and is completed when a project is contracted. Part B contains general implementation information and Part C lists the details of each and every implementation activity. Parts B and C are completed when the research is done. Part C is updated until all implementation activities are complete, or it is clear there will not be any additional implementation. Part D is the sign off by the project Champion and Sponsor.

David Kack stated that there is a big push from the current administration that research should be put into practice. Their projects that use Center on Mobility funds need to show implementation activities, so they go back to their researchers every six months to get updates. The federal government wants to see that they aren't spending money on only writing research reports. Sue Sillick asked how basic research might be impacted if it doesn't involve implementation and therefore not getting credit. David said that their research is mostly applied with some basic research. Basic research will work its way into becoming applied research eventually.

7. **Department/Division Hot Topics – RRC Members Roundtable Discussion**

- ★ Lynn Zanto – Federal transportation authorization bill. Initial work has begun in the Senate. There was a unanimous vote to get it out of committee. There is additional funding and it is keeping the formula share. Funding is being directed toward certain programs so overall funding is flat. The House hasn't done anything with its bill.
- ★ David Kack – In regard to reauthorization of the Surface Transportation Bill, many people will consider the EPW bill a “floor” and funding will only likely be higher than

the amounts in other draft bills.

- ★ Sue Sillick – Panel members for new projects. **Please review the approved projects and send Sue the names of panel members by 9/27/19.**

Copies: Craig Abernathy/Research Section
Audrey Allums/Grants Bureau
Stephanie Brandenberger, P.E./Bridge Bureau
Kevin Christensen/Chief Operations Officer
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
Will Kline/Consultant Research Project Manager
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
Robert Vosen/District Administrator-Missoula
Doug Wilmot/District Administrator-Great Falls
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