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

Memorandum

To: RRC Members
Steve Albert/WTI
Debbie Alke, Administrator/Aeronautics Division
Mike Bousliman, Administrator/Information Services Division
Jeffery M. Ebert, P.E./District Administrator-Butte
Larry Flynn, Administrator/Administration Division
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: February 27, 2018

Subject: May 31, 2017 RRC Notes

RRC Members Present: Mike Bousliman, Jeff Ebert, Dwane Kailey, Sue Sillick, Jon Swartz, Duane Williams, and Pat Wise.

Others Present: Kent Barnes, Fred Beal, Paul Bushnell, Chance Sparrow (intern), Kris Christensen, Jim Davies, Mike Dyrdahl, Becky Duke, Genevieve Houska (LTAP), Jeff Jackson, Andrew Jakes/UM, Tim Mahlum, Oak Metcalfe, Matt Needham, Darin Reynolds, Wyatt Roberts (intern), Larry Sickerson, Matt Strizich, and Jim Wingerter.

1. **Budget Report:** Attached

   No discussion

2. **Research Projects – current listing**

   No discussion

3. **Reports:** Available on Research website

   a. MDT Wildlife Accommodations Process (14-031)- Task 1 Report

b. Development of Strategic Enterprise Architecture Design for MDT (14-016)- Final, Project Summary, Implementation, and Final Report Addendum
c. LTAP- April 2017 Quarterly Progress Report
d. Statewide Rockfall Hazard Rating Process Update- Task 5 Report
e. Traffic Safety Culture Pooled Fund – April 2017 Quarterly Progress Report

No discussion

4. **Proposed Research Projects (attached) –**
   a. 2017-2018 LTAP Annual Work Plan

It was noted that a new LTAP Director, Matt Ulberg, was hired to replace Steve Jenkins. Also, with House Bill 473, the state gas tax funding for LTAP was increased from $100,000 to $150,000. This amount now provides the required match for the $150,000 in federal funds. In addition, there is a request for $80,000 in SPR funds.

Genevieve Houska attended to present the SFY 2018 LTAP work plan. Genevieve indicated that LTAP is increasing coordination with MACO, the League of Cities and Towns, MDT, FHWA, and ND LTAP. In addition, LTAP has begun offering monthly safety webinars, which are recorded and available to anyone on LTAP's website, and plans to expand webinar offerings in cooperation with the National Center for Rural Road Safety, which is also housed at WTI.

They've also expanded their staff to provide necessary services.

The overarching methodology within LTAP is as follows:
1. **Coordinate with all stakeholders to meet training and technology transfer needs;**
2. **Integrate training and technology transfer resources and services and into a centralized location at LTAP; and**
3. **Accelerate distribution of transportation technology by passing along training opportunities within the LTAP program, and those provided by stakeholders and neighboring state programs, communicating current information on new resources, and getting timely information into the hands of constituents.**

The mission of LTAP is a guided by the four focus areas as directed by FHWA: 1) Safety, 2) Workforce Development, 3) Infrastructure Management, and 4) Organizational Excellence.

Dwane Kailey made a motion to fund LTAP with $80,000 in SPR funds. Duane Williams wanted to know if this would decrease the funding for the projects that will be presented today. Sue indicated that LTAP runs on the SFDY and a contract and funds need to be programmed by 7/1/17 the $80,000 is accounted for in the budget, decreasing the available funds for projects to be approved for FFY 2018. Sue offered that she could contract for the FHWA and state gas tax by 7/1/17 and the RRC could wait until their next meeting to determine SPR funding for LTAP as a part of the new FFY 2018 work plan development process. After some discussion, Pat Wise seconded the motion. All RRC members present voted in favor of funding the work plan.

Jim Wingerter added support for LTAP, stating that LTAP picks up a lot of work zone training needed by MDT and contractors.

5. **Implementation/Performance Measures/Technology Transfer:**

   a. Montana Weigh-in-Motion and Automatic Traffic Recorder Strategy – Final, Project Summary, and Implementation Reports

      Becky Duke attended to present the final results of this project.

      Becky presented a handout.

      Mike Bousliman asked if Becky's Section was coordinating with Maintenance to extend her staff, more effectively supporting her Section. Mike stated the same crew could fix a WIM site today, a RWIS site tomorrow, etc. Becky stated they have reached out to Maintenance as time allows. She is not opposed to the concept and are moving in this direction to a certain degree.

      Pat Wise asked if we are getting to the point of where we do not have to hire interns and can use an algorithm to obtain data, using our historical data. Becky said this would work well in urban areas, but not so well in rural areas. Becky also stated that we use hoses for the majority of the data, supplemented by WIM and ATR; she said we would be missing the bulk of our data. We still need these short-term counts. Dwane indicated there should be a discussion among staff who collect traffic data to eliminate and duplication of efforts. The Traffic and Safety Bureau have several signals with cameras in urban areas, which could provide additional traffic data.

   b. Development of a New Specification for ¾-inch Crushed Base Course, Type A- Final Results Presentation

      Matt Strizich attended to present the final results of this project.

6. **Federal Fiscal Year 2018 Work Plan Development:** See attached budget report, page 1

   Please note: After this meeting, Sue learned that the following AASHTO Technical Services Programs will have cost increases in FFY 2018.

   APEL increase from $1,200 to $2,500 ($3,000 with ICAP)
   DAMS increase from $5,000 to $10,000 ($12,000 with ICAP)
   LRFDSM increase from $10,000 to $15,000 ($17,000 with ICAP)

   Pooled Funds

   ★ TPF-5(299), Improving the Quality of Pavement Surface Distress and Transverse Profile Data Collection and Analysis, $15,000/year, 3 years @ $45,000 (no ICAP): This pooled fund is expected to improve the quality of pavement surface distress and transverse profile data collection and analysis. Also, it helps with identifying data collection

integrity and quality issues. Presented by Matt Strizich. See Research Partnering Funding Request.
Dwane indicated that increasing consistency in the data collected is huge.

★ TPF-5(313), Technology Transfer Concrete Consortium and National Concrete Consortium, $12,000/year, 3 years @ $36,000 (no ICAP): This pooled fund facilitates technology and information sharing with other state representatives and industry. These interactions have led to pooled fund research efforts, and coordinated research and implementation of technology. Presented by Paul Bushnell. See Research Partnering Funding Request.

★ TPF-5(349), Western Alliance for Quality Transportation Construction (WAQTC), $12,000/year, 3 years @ $36,000 (no ICAP): WAQTC is focused in three main areas: standardizing test methods (WAQTC, AASHTO, and ASTM), accreditation of the Transportation Technician Qualification Program (TTQP), and working together on national programs of significance including research, training, and technology deployment. WAQTC's TTQP provides a cost-effective means to meet the requirements of 23 CFR 637.209 b, which requires "all sampling and testing data…be executed by qualified sampling and testing personnel." Presented by Matt Strizich. See Research Partnering Funding Request.

AASHTO Technical Services Programs (TSP)

★ AASHTO Innovation Initiative (AII), $7,000/year, 3 years @ $21,000 (includes ICAP): Many new and emerging technologies, offering improved performance/effectiveness, are continually becoming ready for operational implementation. Some of these technologies have been developed through rigorous research and may have been demonstrated in "real world" applications. Some may have been gleaned from international technology scanning tours. Others evolved within practice, but were not previously shared. The purpose of AII is to identify and champion the implementation and deployment of a select few proven technologies, products, or processes that are likely to yield significant economic and qualitative benefits to users. Sue Sillick attached a listing of the focus technologies and additionally selected technologies. MDT has implemented or is implementing a number of these technologies resulting in improved effectiveness and cost-savings. Some have been or are experimental features. It is envisioned that MDT will continue to reap the benefits of this AASHTO Technical Services Program. Presented by Sue Sillick. See Research Partnering Funding Request.

★ AASHTO Re:Source (formerly AMRL), $23,000/year, 3 years @ $69,000 (includes ICAP): This program is MDT's mechanism for maintaining an accredited central materials lab facility as required by 23 CFR 637.209. This covers three phases: inspection, testing, and

evaluation. Records are maintained to provide quality control and assurance. Presented by Oak Metcalfe. See Research Partnering Funding Request.

★ AASHTO Product Evaluation List (APEL), $1,400/year, 3 years @ $4,200, beginning FFY 2018, the annual cost has increased to $3,000 (includes ICAP): Participation in the APEL program gives MDT access to other DOT's public interest findings (PIF), State Certified Products (synchronicity or no other suitable option), and independent research conducted by APEL. States are encouraged to use the APEL to post their PIF's, although it is not required by FHWA. Presented by Oak Metcalfe. See Research Partnering Funding Request.

★ Develop AASHTO Materials Standards (DAMS), $6,000/year, 3 years @ $18,000, beginning FFY 2018, the annual cost is $12,000 (includes ICAP): The DAMS program provides funds necessary in the drafting, editing, and publishing of the AASHTO Materials Book. MDT relies on this publication for many of our specifications and test methods. These funds also allow one MDT representative to travel to and participate in the Subcommittee on Materials annual meeting each year. At this meeting, most of the discussion with other states, FHWA, and industry on revisions to existing standards, publication of new standards, and the casting of preliminary votes on said changes takes place. Presented by Oak Metcalfe. See Research Partnering Funding Request.

★ Equipment Management Technical Services Program (EMTSP), $3,400/year, 3 years at $10,200 (includes ICAP): The purpose of this AASHTO technical Services Program is to establish nationwide contacts with other equipment managers and to be able to access report data and research projects that affect equipment, maintenance, and construction in today's atmosphere. Presented by Tim Mahlum. See Research Partnering Funding Request.

★ Load and Resistance Factor Design Specification Maintenance and Development (LRFDSM), $12,000/year, 3 years @ $36,000, beginning FFY 2018, the annual cost is $17,000 (includes ICAP): This is an ongoing program for the maintenance and upgrading of the primary bridge design specifications. These specifications are used daily in the Bridge Bureau. FHWA mandates that NHS bridges be designed to these specifications. Presented by Kent Barnes. See Research Partnering Funding Request.

★ National Transportation Product Evaluation Program (NTPEP), $19,000/year, 3 years @ $57,000 (includes ICAP): MDT is using NTPEP more and more each year. The basic premise of NTPTP is the consolidation of effort and cost in materials testing. NTPEP coordinates with independent labs or DOT's to consolidate testing. For example, MDT uses the NTPEP data for accepting pavement markings. We require all paint manufacturers to submit paint samples to NTPEP for laboratory and field testing. Once

the testing is complete, it's published on the NTPEP website where it's available to all. This program has allowed MDT to more efficiently use its resources when it comes to field and lab testing.

Dwane asked for a listing of all NTPEP products we are currently using and the materials that NTPEP evaluates. View e-mail here.

Presented by Oak Metcalfe. See Research Partnering Funding Request.

★ Transportation System Preservation Technical Services Program (TSP2), $23,000/year, 3 years @ $69,000 (includes ICAP): Participation in the /rocky mountain West partnership provides contacts and networking opportunities with 12 other state agencies as well as some local areas regarding pavement preservation. Attendance to the annual meeting offers training and updates on the latest research and practical application of materials and processes in pavement preservation. Presented by Matt Strizich. See Research Partnering Funding Request.

Annual Solicitation Topic Statements: Twenty topic statements were submitted. Seven were championed and sponsored. These are described below. The above linked document also lists the topic statements that did not have a champion and/or a sponsor. Note: 18-008 was subsequently dropped, leaving six topic statements for ranking along with the above requests for pooled funds and AASHTO Technical Services Programs.

★ 18-007, Large-Scale Laboratory Testing of Geosynthetics in Roadway Applications, $422,000 (includes ICAP): Darin Reynolds presented this topic. See fact sheet handout. Geotextiles can be used to enhance a roadway typical section, much like rebar in concrete. There are geotextiles and geogrids. Geotextiles can be either woven or non-woven. This project will measure and quantify the benefit of geotextiles incorporated below the base. Past research focused on geogrids in paved sections and geotextiles in unpaved applications as stabilization. The MSU facility in Belgrade contains a 9' X 40' test pit, with dual wheel 9,000 lb. loading capability; this will simulate a low volume primary or secondary. The test sections will be trafficked several hundred thousand times. Performance of sections will be measured and compared. The goal is to determine if non-woven geotextiles provide structural benefit and to quantify the benefit in terms of extended service life or ability to reduce gravel thickness. There is increased demand on aggregates in eastern and north central Montana due to the Bakken oil development. The research results could be used today in decision-making and project development. There is the potential to save hundreds of thousands of dollars in capital investments.

★ 18-008, Digital Project Data Exchange and Transfer Matrix for Transportation Assets, $189,000 (includes ICAP): Mike Dyrdahl was present to discuss this topic.

The purpose of this proposed research is to enhance the data and information sharing practices during the life-cycle of transportation assets. The emerging implementation of advanced computerized technologies such as three-dimensional (3D) modeling, LiDAR,

and Geographic Information Systems (GISs), E-Construction, and Automated Machine Guidance (AMG) has enabled transportation asset data to be increasingly available in digital format. *However, in the current fragmented practices, digital data and information of transportation assets are being archived and managed independently in proprietary formats by separate project participants*. The lack of interconnection between distinct actors is one of the key reasons for the significant data loss and re-creation issues.

This proposed research aims to develop a comprehensive guide to help MDT better understand and define data exchange requirements during the life-cycle of various type of transportation assets including pavements, bridges, culverts, signs, guardrails, etc. More specifically, *the research objective is to develop digital data life-cycle matrices that specify but not limited to: (1) what data to be shared by whom and to whom, (2) levels of detail of data exchange in each pair of sender-receiver, and (3) data formats, software applications and tools involved*. The proposed study is expected to enhance data sharing effectiveness and reusability throughout the project delivery process including the asset management stage and consequently, help to reduce wastes in data re-creation and re-collection

Mike expressed his confidence that the results would be implemented. He stated this work is timely and necessary.

Dwane indicated there may be potential ancillary benefits that might address our current data storage challenges and reducing duplication of efforts.

Mike Bousliman indicated he is unclear as to whether this project is more technically or more administrative in nature. With the recently completed Enterprise Architecture project, we need to move forward with an enterprise direction. He's concerned with a project on data governance for one slice of the pie. He would like the entire administrative staff to weigh in on this topic. The topic statement is scoped around Engineering business, but it is a much larger issue. He also indicated the cost is high for this project and, if it is moved forward, would like to see a competitive process.

Dwane indicated he believes this project is more technical in nature rather than high level governance. Mike stated he believes this is a little bit of both: data governance and more technical data management. Dwane stated that the more we delay, the longer it will take to implement the results of the enterprise architecture project. It's all related and this is a part of the agency approach to data governance and architecture. Mike indicated we can pick off technical aspects, but he reiterated he would like all of the administrative staff to weigh in on this topic.

★ 18-009, Testing "Wildlife-Friendly" Fence modifications to Manage Livestock and Wildlife Movements, $62,000 (includes ICAP): Larry Sickerson and Andrew Jakes were present to discuss this topic. This request for research funding has the potential to be returned to the Department and to our Stakeholders 100's of times over, through the use and targeted application of the recommended fence designs resulting from Andrew Jakes work. These fence designs are being documented and recommended for use because of their benefit to landowners and wildlife alike.

Andrew Jakes is a leading authority on wildlife migrations and how current fences on the landscape effect migrations and movement from the Blackfeet Reservation to the North Dakota Line. In fact, MDT has already used Mr. Jakes expertise and data during the design and construction of flashing wildlife crossing signs on US Highway 2 and 191, which were installed in north central Montana in 2016. Today's request for funds is for the continuation and completion of Mr. Jakes work; that is currently a large collaborative work effort of which the USFWS, U.S. Bureau of Land Management, the Sage Grouse Initiative, and the National Fish & Wildlife Foundation are just a few entities on a long list of supporters.

Wildlife overpasses and underpasses are expensive to develop and to construct, and likely socially unacceptable and economically infeasible in many areas across the state. But the fence designs being recommended by Mr. Jakes research, who's effectiveness is backed up with GPS data, photographic evidence, and with first hand experiences from MT Ranchers are very cost effective, more socially acceptable, and can provide a larger benefit across a much larger area of MT. Application of this research would demonstrate responsible environmental stewardship in keeping with the same goal in the updated transportation plan that is currently out for public comment.

Personnel from the USFWS Partners for Wildlife Program and the U.S. Bureau of Land Management are already using Mr. Jakes information and recommendations when discussing the application of wildlife friendly fences with area ranchers, and with those who graze livestock on BLM allotments. As a result, the knowledge and use of wildlife friendly fence designs is growing and is becoming more acceptable every day. Mr. Jakes is willing to do his part in continuing this trend by presenting his findings and recommendations to livestock and agricultural groups and boards across the state, as recommended by Dwane Kailey recommended during our presentation.

This work will effectively supplant the current wildlife friendly fencing guidelines offered by state and federal agencies, who's current recommendations may not have been so critically tested or reviewed for their ability to safely pass wildlife while effectively containing livestock. In addition, the large-scale fence density analysis that is a critical part of this work by Mr. Jakes, will allow MDT to target specific areas across the state for the application of these recommended fence designs, thereby allowing MDT to be even more responsible in the use of its limited funding.

For every recommended fence design agreed to and constructed as right of way fence, the Department could see a $1.00 - $1.50 per linear foot cost savings over our present fence designs. The ultimate result of which would be a cost savings to the department of hundreds of thousands of dollars annually, based on MDT average bid prices from 2016. Making this data and the recommendations available to MDT Designers and Right-of-Way personnel could start paying the Department these dividends as early as 2019. The added value to wildlife and the positive public relations MDT would receive will increase the cost-to-benefit ratio resulting from this research.

Dwane suggested that land owners should be involved in the process to obtain buy-in. It was also suggested that the ROW agents need this information to use in their

discussions with land owners. The livestock association should be included on the panel if this project moves forward.

★ 18-016, Feasibility of Non-Proprietary Ultra-High Performance Concrete (UHPC) for Use in Highway Bridges in Montana: Phase II, $139,000 (includes ICAP): Kent Barnes was present to discuss this topic. A previous research project focused on proprietary UHPC mixes, which are costly to implement. With non-proprietary products becoming available, the focus of this research is on such non-proprietary products. The immediate interest is in field-cast joints between precast concrete deck panels. UHPC has a psi of 20,000 as compared to the 4,000 found in conventional mixes. The use of UHPC is this application will reduce development lengths, and subsequently reduce the requisite spacing between decks and improve the overall performance of the bridge.

★ 18-017, Concrete-Filled Steel Tube to Concrete Pile Cap Connections- Further Evaluation/Improvement of analysis/Design Methodologies, Phase 1 - $45,000, Phase 2 - $122,000, and total - $167,000 (include ICAP): Kent Barnes was present to discuss this topic. Kent stated we have had a number of research projects on this topic. Towards the end of these projects, we came up with a design that works. However, there is a limited setoff data and there is the concern that there are limits that we don't really understand. Lenci Kappes conducted some of this research and is in a good position to determine how we move forward.

There are two stages to this research, but there was only one cost provided. Kent will obtain a cost breakdown by stage.

★ 18-018, Alkali-Silica Reactivity in the State of Montana, $73,000 (includes ICAP): Matt Strizich was present to discuss this topic. Concrete can be susceptible to expansive reactions with alkalis in Portland cement and silicas in aggregates, which can ultimately reduce the lifespan of the concrete resulting in costly repairs or even replacement. Matt explained that this research, partnering with the MCA, would identify if there is an issue with ASR in Montana and to develop a testing protocol for identifying potential reactive aggregates.

★ 18-020, Unmanned Aerial Vehicle (UAV) Applications for Montana Transportation Corridors, Stage 1 - $64,000, Stage 2 - $95,000, and total cost - $159,000 (includes ICAP): Fred Beal was present to discuss this topic. He stated UAVs are an emerging technology that have already been shown to have several useful applications, such as surveying/mapping, infrastructure inspection, construction monitoring/earthwork measuring, and vegetative health assessments. In August 2016, the FAA published a new rule – Part 107- that created rules for safe operation of UAVs and greatly simplified the process for obtaining FAA certification to operate UAVs commercially.

The goal of this project is to identify the best ways to apply this technology by MDT to increase efficiency (lower costs) and improve quality. There are two stages to this project. Stage 1 includes documentation on the current use of UAVs elsewhere and how these uses might meet MDT's needs. This will include a synthesis of domestic and international literature, survey of states and Canadian provinces, survey of MDT staff to

identify areas where use of UAVs is well-suited, and to assess the methods for processing UAV data. This last task will include a review of information on software, hardware, and personnel resources required for data storage, analytics, and maintenance. Stage 2 would include an on-site demonstration of typical UAV capabilities, survey and structured interviews with demonstration observers to further inform the research regarding MDT's specific needs. Fred indicated we could use the construction program to demonstrate uses.

Dwane indicated there are ROW and other uses for this technology, but wanted to express his concern in regard to resources. Currently, MDT only has two certified UAV pilots. While the UAVs are not expensive, we will need to manage the priorities.

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

Due to time constraints, hot topics were not discussed.

Copies: Craig Abernathy/Research Section
Audrey Allums/Grants Bureau
Kent M. Barnes, P.E./Bridge Bureau
Kevin Christensen/Highways and Engineering Division
Kris Christensen/Research Section
Ryan Dahlke, P.E./Consultant Design Bureau
Lisa Durbin/Construction Administration Bureau
Mike Dyrdahl/Engineering Operations Bureau
Ed Ereth/Data and Statistics Bureau
Doug Wilmot/District Administrator-Great Falls
Paul Jagoda, P.E./Construction Engineering Services Bureau
Tom Martin, P.E./Environmental Services Bureau
Kraig McLeod/Multimodal Planning Bureau
Shane Mintz/District Administrator-Glendive
Roy Peterson, P.E/Traffic & Safety Bureau
Suzy Price/Contract Plans Bureau
Dustin Rouse, P.E./Highways and Engineering Division
Ed Toavs/District Administrator-Missoula
Lesly Tribelhorn, P.E./Highways Bureau
Jim Skinner/Planning and Policy Analysis Bureau
Rob Stapley/Right of Way Bureau
Jerry Stephens, P.E./WTI MSU
Stefan Streeter, P.E./District Administrator-Billings
Matt Strizich, P.E./Materials Bureau
Matt Ulberg, P.E./LTAP
File