MEMORANDUM

To: RRC Members
Debbie Alke, Administrator/Aeronautics Division
Mike Bousliman, Operations Manager
Jeffery M. Ebert, P.E./District Administrator-Butte
Larry Flynn, Administrator/Administration Division
Jennifer Jensen, Operations Manager
Dwane Kailey, Operations Manager
Jim Lynch, Director
Bob Seliskar/FHWA
Jerry Stephens, P.E./WTI MSU
Jon Swartz, Administrator/Maintenance Division
Duane Williams, Administrator/Motor Carrier Services Division
Lynn Zanto, Administrator/Rail, Transit, and Planning Division

From: Susan C. Sillick, Manager
Research Programs

Date: June 3, 2011

Subject: 5/25/2011 RRC Meeting Notes

Action items are underlined.

RRC Members Present: Debbie Alke, Jeff Ebert, Larry Flynn, Dwane Kailey, Sue Sillick, Jerry Stephens, Duane Williams, and Lynn Zanto.

Others Present: Craig Abernathy, Kent Barnes, Kris Christensen, Bill Cloud, Lorelle Demont, Pam Buckman, Chris Dorrington, Becky Duke, Mike Dyrdahl, Steve Jenkins/LTAP, Doug McBroom, Doug Moeller, Priscilla Sinclair, and Deb Wambach.

1. **Research Project Solicitation:** Champions presented their research topics to the RRC and DAs who then voted after each presentation whether to recommend to Jim Lynch to move each topic forward to the technical panel stage, approve/modify the proposed technical panel, and determine priorities. No funding is being committed at this time. SOWs and/or Proposals will be presented to the RRC for funding approval at a later date.

SUBJECT AREA	PROB NO.	PROBLEM TITLE	CHAMPION
Planning	11-005	Montana Weigh-in-Motion Strategy	Bill Cloud
Planning	11-006	Making Best Use of Federal Programs to Reduce Transportation Related Traffic Congestion and Improve Air Quality in Montana	Doug McBroom
Environmental	11-007	Improving Safety and Wildlife Connectivity on US Highway 287 in the Madison Valley	Deb Wambach
Highway Traffic Safety	11-009	A Peer-to-Peer Traffic Safety Campaign Program	Priscilla Sinclair

Sue Sillick noted that the number of topic statements received and moved forward to the RRC was less than half as compared to 2010. She indicated it was probably due to a number of factors, including the late request for topic statements, moving the solicitation period from November and December to March and April, and the additional requirements for the topic statement.

11-005 – Montana Weigh-in-Motion Strategy

As champion, Bill Cloud was present to discuss this topic. The purpose of this project is to refine the strategy for MDT's weigh-in-motion program in terms of equipment, equipment placement, and data use.

This research project will focus on improving the efficiency and breadth of the existing WIM program. In keeping with MDT's mission, an efficient WIM program results in dollar savings from more efficient pavement design, proper road sizing, the ability to better identify vehicle size and weight trouble areas for enforcement purposes as well as the related safety benefits that come from efficient enforcement activities. The cost savings related to more accurate pavement design and improved enforcement (less pavement damage) has been estimated at about $4.8 million per year (2005). This project also aims to fully realize the freight and other benefits of WIM technology. Savings from truck activity reporting systems come from these broad areas:

- Roadway geometric and pavement design
- Commercial vehicle enforcement
- Public-private partnerships such as PrePass
- Private benefits due to more efficient transportation systems
- Provide real-time and detailed data for freight management

An evaluation of the State Truck Activities Reporting System (2005) estimated annual financial benefits of implementing a Montana traffic recording system at $4.8 million per year. That figure is not reflective of current conditions, and the scope of the study did not mesh completely with this one, but it does indicate the scale of what is possible. WIM

programs provide real-time and detailed data for freight management that are at the foundation of this potential.

Dwane Kailey suggested this research may be a little premature as MCS doesn't have a strategic plan. He also asked if we could conduct this research in-house. Bill responded that the research could be done in-house, but time is constrained and he would like third party, unbiased reporting. Lynn Zanto suggested this research can help frame strategic goals for MDT in this area. Dwane indicated he would like ATR evaluation included in this research and would like to move toward a more automated process to get staff out of harm's way and to make the program more lean and mobile.

The RRC voted to recommend to Jim Lynch this project move forward to the technical panel stage and also recommend the proposed technical panel be expanded to include staff from the Highways and Engineering Division. The technical panel to be recommended to Jim is Bill Cloud/Planning, Becky Duke/Planning, Ted Little/Planning, Hal Fossum/Planning, Dennis Hult/MCS, Dan Hill/Materials, Kent Barnes/Bridge, MDT Road Design staff, Jerry Stephens/WTI, Jeff Patten/FHWA, and Research staff.

11-006 – Making Best Use of Federal Programs to Reduce Transportation Related Traffic Congestion and Improve Air Quality in Montana

As champion, Doug McBroom was present to discuss this topic. MDT uses federal funds to address traffic-related air and congestion problems through the Montana Air and Congestion (MACI) program. Changes in federal rules, as well as new knowledge and technologies suggest the need to reassess program strategies to ensure that the program remains as effective and flexible as possible.

Air quality in non-attainment zones and areas considered "at risk" for non-attainment can have a significant negative impact on public health. Breathing particulate matter has been linked to significant health problems, including respiratory illness such as aggravated asthma and chronic bronchitis, and particularly affects the vulnerable elderly and children. Investments made through the CMAC program directly address public transportation systems resulting in enhancements to the environment, safety and vitality of Montana communities. Additionally, increasing air quality creates more amenable places to live attracting business and residents alike.

This program needs periodic evaluation and review to ensure that it delivers the best bang for the buck. Local jurisdictions, through competitive applications to the program, make proposals to the program for mitigating environmental air quality problems. It is up to this program to be able to assess technical proposals in light of changing guidance and proven strategies. This research effort would keep the program oriented to high-value investments.

The RRC voted to recommend to Jim Lynch this project move forward to the technical panel stage and also recommend the proposed technical panel be expanded to include local participation. The panel to be recommended to Jim is Doug McBroom/Planning, Janet

Kenny/Planning, John Buchanan/Materials, Cora Helm/Environmental, local government Representative(s) Lloyd Rue/FHWA, and Research staff.

11-007 – Improving Safety and Wildlife Connectivity on US Highway 287 in the Madison Valley

Deb Wambach is the champion for this project, which involves data collection and analysis to guide design modifications and mitigation strategies to allow wildlife to safely cross the highway (US 287).

This project was already approved by Jim L.to move forward to the technical panel. The technical panel includes Deb Wambach/Environmental, Kraig McLeod, Traffic Safety, Julie Cunningham/MT FWP, John O'Mara, ISD, Brian Hasselbach/FHWA, and Research staff.

Dwane indicated funding from others should be pursued. He also asked about I-15. Deb indicated the Defenders of Wildlife is currently doing research on I-15. All of the research we and others are conducting on wildlife and roadways is creating a pool of information for use in Montana.

11-009 – A Peer-to-Peer Traffic Safety Campaign Program

As champion, Priscilla Sinclair presented this topic to the RRC.

This research project will focus on improving safety by decreasing teen crashes through implementation and evaluation of a peer-to-peer safety campaign. The evaluation part of this effort is important, as it should provide measures of program outcomes and effectiveness which can be used to ensure that limited resources are being optimally used to collectively meet the Department's safety priorities. Also, this project will help to meet Montana's goal and objectives outlined in the Comprehensive Highway Safety Plan (CHSP): Goal: Reduce the fatalities and incapacitating injuries by half by 2030; Objectives: 1) Increase safety belt use to 90%, 2) Reduce statewide alcohol and drug impaired fatal and incapacitating injury crashes, 3) Reduce and mitigate the consequences of single vehicle run off the road fatal and incapacitating injury crashes, 4) Reduce young driver (under age 21) fatal and incapacitating injury crashes, 5) Reduce fatal and incapacitating injury crashes involving trucks, 6) Reduce fatal and incapacitating injury crashes in urban areas, and 7) Reduce motorcycle fatal and incapacitating injury crashes. In addition, this project specifically addresses the following strategies within the Young Driver emphasis area: YD-1 Provide tools and incentives to incorporate traffic safety education in elementary and junior high schools and YD-6 Distracted Driving – explore ways to address distracted driving among young drivers.

As seen nationally, teen drivers in Montana are involved in a disproportionate share of motor vehicle crashes. As a result, there is a concerted effort underway in Montana and across the country to identify and implement effective programs specifically to reduce young driver traffic crashes, injuries and fatalities.

The impact of teen automobile crashes extend beyond the emotional tragedies and physical injury, with costs that can extend to employers, families, the government, and society overall. A study released in June of 2009 by Allstate Insurance Company found that teen drivers in rural parts of the country are more than twice as likely to be involved in a fatal crash compared to their urban peers (51.47 out of every 100,000 teen drivers on rural roadways, compared to 25.4 for urban roadways). A 2006 study by AAA found that teen crashes cost American society more than $34 billion annually in medical expenses, lost work, property damage, quality of life loss and other related costs. Also, according to AASHTO, unless there is a change in crash rates, six out of 10 children born today will be injured in motor vehicle crashes during their lifetime, and one in 84 will die violently on roadways.

Texas realized an estimated benefit-to-cost ratio of over 100 to 1, with their peer-to-peer safety campaign program costing only $2 per teen to deploy in mass in Texas, and teen fatalities and injuries have continued to decline in Texas. The Texas program will be reviewed for best practices to implement in Montana.

The RRC voted to recommend to Jim that this project move forward to the technical panel stage and also recommends the proposed technical panel for approval. The technical panel includes Lorelle Demont/Highway Traffic Safety, Pam Buckman/Highway Traffic Safety, Fran Penner-Ray/OPI, Lonie Hutchison/Missoula City/County Health Department, Bobbi Perkins/DPHHS, Marcee Allen/FHWA, Laura Stanley/WTI, and Research staff.

2. **Budget Report:** Attached

   No discussion.

3. **Research Project – current listing:** Attached

   a. **Status of proposals presented at 1/19/11 RRC Meeting**

      1. **The Montana Graduated Licensing Program: *Evaluating its Effectiveness in Reducing Crashes of Teenage Drivers***

      Sue reported this proposal was recommended for funding by the RRC, but was rejected by the Director. This project was not funded.

      2. **New Arch Bridge Technology for Short Spans** (10-002)

      Sue reported this project was recommended for funding and was approved by the Director. This project is funded, a contract is in place, and work has begun.

      3. **Next Generation Transportation Construction Management** – Pooled-Fund Study

      Sue reported this pooled-fund study was recommended for funding by the RRC and was approved by the Director. Funds have been committed and will be obligated as soon as the required funding threshold has been reached.

4. **Performance-Based Evaluation of Advanced Warning Systems Using a Virtual Intersection Test-Bed** (10-006)

   This project was not recommended for funding by the RRC and was rejected by the Director. This project was not funded.

5. **Testing & Evaluation of Recovered Traction Sanding Material** (09.008)

   This project was recommended for funding by the RRC with MDT conducting all materials tests, rather than WTI conducting or contracting the materials testing. The Director approved this project as modified. This project is funded, a contract is in place, and work has begun.

4. **Reports:** Available Upon Request

   No discussion.

   a. **Automatic Crash Notification** – March 2011 Progress Report
   b. **Evaluation of New Arch Bridge Technology for Short Spans** (10-002) – April 2011 Progress Report
   c. **Feasibility of Reclaimed Asphalt Pavement (RAP) in Portland Cement Concrete Pavements (PCCP)** (09.004) – January and March 2011 Progress Reports
   d. **Ground Penetrating Radar Analysis – Phase II** (08.013) – May 2011 Progress Report
   e. **LTAP** – December 2010 and March 2011 Progress Reports
   f. **Montana Intercity Bus Service** (10-015) – Monthly Progress Reports starting December 2010 and Task 1 Report
   g. **Livability Benchmarks for Montana Transportation** (10-021) – January 2011 Progress Report and April 2011 Interim Report.
   h. **Steel Pipe Pile/Concrete Pile Cap Bridge Support Systems: *Confirmation of Connection Performance*** (09.016) – March 2011 Progress Report
   i. Steep Cut Slope Composting: *Field Trials and Evaluation* (05.010) – Final Report
   j. **US 93 North Post-Construction Wildlife-Vehicle Collisions and Wildlife Crossing Monitoring and Research** – March 2011 Progress Report
   k. **US 93 South Wildlife Monitoring** (04.016) – 2010 Annual Report, and January and April 2011 Quarterly Progress Reports

5. **Contract Extensions:** Attached

   a. **Steel Pipe Pile/Concrete Pile Cap Bridge Support Systems: *Confirmation of Connection Performance*** (09-016) – Project Scope Amendment

   Kent Barnes was present to request a $31,572 contract amendment for this project on behalf of the technical panel. This project was originally funded at $56,589.

By investigating the design and behavior of steel pipe pile-to- concrete pile cap connections, the critical lifeline performance of this bridge support system following a seismic event can be assured.

While MDT has found steel pipe piles connected at the top by a concrete pile cap to be a very cost effective support system for short and medium span bridges, little information is available across the engineering design community on the strength and ductility of the pile to pile cap connection under extreme lateral loads that could occur during seismic events. The strength and ductility of these connections is important to the survival of the bridge they support during a seismic event and its subsequent usability following the event, both in the short term during emergency operations and in the long term as normal transportation functions resume.

In light of this situation, MDT has sponsored research to study the behavior of various pile to pile cap connection configurations to obtain the information required to develop and validate the performance of design procedures for these connections. To-date, this work has provided essential information on the basic ultimate strength and ductility of various connection configurations. This information has and is being used to refine the Department's design procedure for these connections. That being said, current results indicate that some additional work is merited on the cyclic response of the connection at loads below its ultimate capacity (as could occur during a seismic event), as well as on a possible simple design enhancement, before the current phase of this effort is concluded.

This contract amendment for $31,572 was approved for funding recommendation to the Director.

6. **Proposals:** Attached

   a. **Determination of Material Properties and Deflection Behaviors for Contemporary Prestressed Beam Design** (10-009)

   Kent Barnes was present to request funding for this project on behalf of the technical panel.

   By better understanding the non-elastic properties of prestressed concrete girders, we should be able to modify designs to use less material to bridge longer spans than previously constructed.

   Advances in materials and design methodologies have made it possible to further capitalize on the outstanding durability and longevity already offered by prestressed concrete bridge girders by allowing the use of more efficient structural configurations capable of bridging longer spans. Perhaps even more important than the economies realized by implementing these new designs at span lengths where prestressed girders are already used, prestressed concrete girder systems become a viable alternative at longer span lengths where other structural systems and materials (which may not offer the same long service lives and low maintenance requirements) historically had to be

used. Already in at least one instance, for a longer span structure, steel girders were used in lieu of the probably preferred prestressed concrete girder system, not because of strength concerns, but due to uncertainties in their deflection behavior.

To fully implement these more efficient designs, better knowledge of the non-elastic properties of the girders is needed. This knowledge is primarily needed to better predict the deflection behavior of the girders over time. Structurally, bridges are designed to meet three criteria: strength, usability (typically, deflection related), and economy. These new designs have been developed to ensure adequate strength/safety, and the fundamental economy of prestressed concrete girders is well established (and will be further improved with the implementation of these new designs). However, with these new designs, as well as with the increasing use of staged construction, deflection behavior of the girders has emerged as an important design consideration. Deflection behaviors are related to the non-elastic properties of the concrete used, which are sufficiently unique to the materials used at a given location to require investigation at a local/regional level.

Dwane made a motion to recommend this proposal for funding to the Director. Lynn Zanto seconded the motion. All present voted in favor. The motion passed; this proposal for $128,104 (total project cost is $147,928; WTI match is $19,824) will be presented to the Director for final funding approval.

b. **LTAP FY 2012 Proposal**

Steve Jenkins/LTAP Director presented the LTAP Work Plan and Budget. The budget includes $141,000 pass-through federal funds that have to be matched 1:1, $100,000 pass-through state gas tax funds, and $80,000 SPR funds. The latter two funding categories are used as match to the federal funding. Steve discussed the FY 2011 accomplishments, presented his work plan for FY 2012 LTAP, and requested approval of $80,000 SPR funds to help match the federal funding.

Dwane made a motion to approve funding LTAP with $80,000 in SPR funding. Lynn seconded the motion. All present voted in favor. The motion passed. A contract will be executed and funds will be programmed.

7. **Implementation/Technology Transfer:**

Sue told the RRC that Research staff is working on formalizing the implementation process this year, which will lead to improved implementation and reporting, including the development of performance measures, such as benefit/cost ratios.

a. **Montana Rest Area Use: *Data Acquisition and Estimation***

Chris Dorrington was present on behalf of the technical panel to present results from this project. The purpose of the project was to quantify design criteria for rest areas in Montana as compared to the AASHTO design standards. This was done by collecting

and analyzing data related to water use (assumed to be equal to wastewater generation), number of patrons per vehicle, and dwell times by vehicle type and time of day. Water use was determined to be 1.5 to 2 gallons per patron (GPP) as compared to 3.5 GPP recommended by the AASHTO design standards. This will result in more efficient rest area design in Montana. Chris felt the greatest achievement of the project was the time series data (i.e., peak period – annual and daily, water use, and number of patrons) collected. This data will continue to be collected by Planning staff for further fine-tuning of Montana rest area design.

b. **Steep Cut Slope Composting:** ***Field Trials and Evaluation***

Sue presented the implementation results for this project as Phil Johnson was unable to attend.

Compost has been used for the purpose of enhancing the development of plant cover on steep slopes associated with MDT road construction for well over 10 years. During this time, varying application rates and application methods have been utilized in an effort to maximize the benefits with the minimal amount of compost.

The second and final phase of the compost research conducted by WTI and the Reclamation Research Group tested two application rates and several methods of compost retention techniques.

The results of the study and findings of the principal investigators verified the benefits of compost in establishing desirable plant growth, and provided an objective evaluation of the most economical and effective means of retaining the compost on the slope for long enough duration for the vegetation to fully utilize the benefits afforded by the compost.

Briefly, the study showed that compost applied at a thickness of ½ inch, coupled with the application of a guar-based hydraulic tackifier provided acceptable results.

Prior to the completion of this research, MDT had awarded numerous independent contracts to reseed and recompost steep cut and fill slopes on construction projects where the initial reclamation efforts failed. Using the recommended application rate of ½ inch, we have seen 100% success in establishing targeted levels of plant cover.

Based on the success of the work to date, general road reconstruction project specifications now contain seeding special provisions that call for compost use at the recommended rate of 65 cubic yards per acre – which is equivalent to a thickness of ½ inch.

It should be mentioned that most of the reclamation contractors who conduct work on MDT projects have now either purchased or have available the type of equipment that is necessary to apply compost in the volumes recommended in the report.

Recent bid tabulations show that contractors are submitting bids of between $60 and $80 per cubic yard to furnish and apply the compost – which is roughly equivalent to $4000 to $6000 per acre.

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

Sue asked the RRC if they would prefer receiving the RRC agendas via e-mail or would like to continue receiving hard copies for the meetings. Committee members indicated they would like to continue receiving RRC agenda materials in hard copy.

No other hot topics were discussed.

cc: Craig Abernathy/Research Programs w/attachments
Kent M. Barnes, P.E./Bridge Bureau
Kevin Christensen/Highways and Engineering Division
Kris Christensen/Research Programs w/attachments
Tim Conway, P.E./Consultant Design Bureau
Lisa Durbin/Construction Administration-Bureau
Mike Dyrdahl/Highways and Engineering Division
Paul R. Ferry, P.E./Highways Bureau
Paul Jagoda, P.E./Construction Engineering Bureau
Michael P. Johnson/District Administrator-Great Falls
Tom Martin, P.E./Environmental Services Bureau
Ray Mengel/District Administrator-Glendive
Doug Moeller/District Administrator-Missoula
Roy Peterson, P.E/Traffic & Safety Bureau
Suzy Price/Contract Plans Bureau
Timothy W. Reardon/Legal Services
Rob Stapley/Right of Way Bureau
Stefan Streeter, P.E. /District Administrator-Billings
Matt Strizich, P.E./Materials Bureau
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