

Rocky Mountain West Pavement Preservation Partnership Task Force on Performance Measures for MAP-21

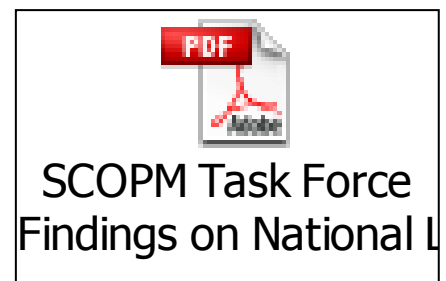
The Rocky Mountain West Pavement Preservation Partnership (RMWPPP), at its annual meeting held August 27-30, 2012 in Nashville, TN, formed a special task force to recommend national performance measures to support pavement preservation. This was partly in response to a presentation made by Thomas Van of FHWA on the topic. Mr. Van's presentation explained aspects of the law related to pavement preservation, and the rulemaking process that will be used to develop performance measures. FHWA is charged with preparing proposed rules, and seeks the input of individual states, groups, AASHTO, the regional pavement preservation partnerships, and other interested parties as it goes about its duty to prepare those proposed rules. The RMWPPP therefore thought it prudent to form a task force to study the issue and offer input to the FHWA. The task force was therefore formed with **Lloyd Neeley** (Utah DOT) and **Steve Mueller** (FHWA) nominated to lead the group, and the following as additional members: **Larry Scofield** (ACPA), **Jim Horn** (Alaska DOT), **Pat Kennedy** (City and County of Denver), **Mark Wheeler** (Idaho Transportation Department), **Anita Bush** (Nevada DOT), **Mafiz Mian** (Arizona DOT), and **John Coplantz** (Oregon DOT). Additional members joined the task force subsequent to the August 30 meeting, including **Mary Gayle Padmos** (Montana DOT), and **Reed Ryan** (Utah Asphalt Paving Association).

The Task Force held a meeting via conference call on November 15, 2012 to take up its task. The remainder of this document represents the minutes of that meeting, along with further input that was received thereafter.

RMWPPP MAP-21 Performance Measures meeting 11-15-12

Attendees: **Jim Horn (AK), John Coplantz (OR), Larry Scofield (ACPA), Lloyd Neeley (UT), Mark Wheeler (ID), Mary Gayle Padmos (MT), Robert Kvam (for Anita Bush, NV), Mafiz Mian (AZ), Steve Mueller (FHWA), Thomas Van (FHWA)**

Prior to the meeting, task force members reviewed a document produced by a special task force of the AASHTO Subcommittee on Performance Measurement, which laid out some recommendations for MAP-21 performance measures in all areas (full document included here as an embedded object). We focused on the recommended performance measures for pavement condition. During the meeting, we discussed our thoughts on performance measures to support pavement preservation in general, and on those in the SCOPM document in particular, with comments as follows:



Alaska (Jim Horn) - doesn't measure friction at this time for the network. Roadway aggregate is not polished due to 7.5 months of studded tire use yearly. They don't feel they have a problem with low friction values. In Alaska, cracking is mostly weather related. Structural cracking is present, but the majority of cracks are thermally induced. Rutting is mainly from studded tires, and is aggressive in and around the major population centers. Elevated IRI values exist everywhere in Alaska, but the Northern region tends to have the highest IRI values, mostly due to permafrost related issues. Preservation treatments have little effect resolving the northern IRI values created from frost heaving or thaw consolidation. Alaska collects automated IRI and rut data yearly (entire network) and windshield survey bi-annually for cracking (NHS only). All data collection is by contractor. Crack data is collected per HPMS reporting guidelines/requirements. Alaska has a calibration site per ASTM E-950 for the automated data collection equipment. **We are comfortable using IRI and rutting data and have a 15-year database.**

Oregon (John Coplantz) - Supports the six principles for performance measures described in the SCOPM document. Okay with use of IRI as a performance measure on Interstate (urban and rural) and also rural higher speed NHS, but not lower speed urban routes due to collection issues and smoothness constraints from grade constraints. Don't want to use ProVal for IRI handling. It is better suited for project level analysis than for network level use. **Cracking is too undefined to propose as a performance measure.** Don't want to use friction as a national performance measure. Thought is that this is more of a local or regional issue depending on aggregate supply, and that safety performance measures will already make states manage this issue. Using regional data collection contractors doesn't seem like a viable suggestion. Many states have invested in their own data collection equipment and would prefer to do it themselves and cost is probably lower in the long run. **Suggests also using the "Lane-Mile-Year" calculation, as described in "A Quick Check of your Highway Network Health" as a performance measure.** This would help to assure that a State's program of projects is sufficient to counteract the natural aging of the network on an annual basis. For example, the performance measure would look at lane-mile-years required versus that going into the pavement network from preservation, rehab and maintenance programs. Ideally, the number of lane-mile-years going in is 100% of that required, but we could consider perhaps a lower number like 70% over an X-year window if the state is financially constrained and must manage a declining system.

Idaho (Mark Wheeler) - **Okay with using IRI.** IRI is also appropriate for high speed facilities (i.e. Interstates) in the urban areas. Proposes maybe a **check box for crack sealing** (yes or no) to ensure that from a pavement preservation perspective, we are keeping our cracks sealed and keeping water out. **We could report percentage of network that is crack sealed.**

After the meeting, Mark offered the following by way of expansion and clarification of his ideas:
The comments from the (SCOPM) Task Force were interesting and I would agree that IRI, Cracking, and Rutting are good indicators of Pavement Condition and necessary as part of Performance Management, or a risk based Asset Management Program. The recommendations though, do not seem to emphasize Pavement Preservation per se, which I suppose is part of our function. I would add an additional Performance Measure to the

list with the purpose of establishing Pavement Preservation as the foundation of a plan for states to meet their Performance Targets in the area of pavements. The measure would be: **Percent(%) of NHS System Sealed.**

The three most destructive factors affecting pavement life, Moisture Intrusion from cracking; Rutting, which channels truck forces into narrow wheel paths; and Roughness, which adds to dynamic forces in pavements, can all be corrected with common, relatively inexpensive Pavement Preservation techniques.

With this in mind some years ago I added a 'Cracks Sealed' or 'Not Sealed' check box to our Pavement Condition Rating data in Idaho, so when cracking became visible initially, or again after a previous treatment and marked as, "Cracks Not Sealed", the section could be tagged for a preservation treatment. The type of treatment depended on the extent of each deficiency. If only sealing was necessary then a Seal Coat was selected, if rutting was also present, a Micro-Surface to correct both deficiencies, and if all three conditions were evident, Milling and a Thin Bonded Wearing Course was chosen as a remedy for all three. The goal was to keep all pavements statewide, sealed against moisture damage as much as possible for the life of the pavement, and also take care of the other threats to pavement life if money was available. With MAP-21 I think part of the money issue is addressed. This I believed was a functioning Pavement Preservation program and more efficient than one based on a Life Cycle Cost Analysis approach which is designed around arbitrary time lines.

Lastly if you suffered through the preceding, Percent Sealed is an easy item to include in a State's PMS.

Other things I thought during and after our phone call; If we are supposed to be helping to deliver a plan to help the State's reach their PM targets, I believe a Pavement Preservation Program (maybe not the one from above) but a Preservation Plan would meet the requirement.

Cracking should be a Performance Measure and AASHTO should revisit the issue and recommend the standard. Rutting should be a PM and AASHTO should review the minimum requirements for data collection and reporting. Urban IRI is a problem for now and should be excluded, but soon to be remedied. Decent faulting data, we could not arrive at in Idaho, at least a few years ago.

Montana (Mary Gayle Padmos) - **Currently collects all the data items that have been mentioned.** Uses an overall pavement index that uses all of the individual indices, but weights them. Agrees that ProVal is not appropriate for processing network level data, but the data should be compatible for use with ProVal. Cracking data directly from the state's pavement management system is variable, whereas in HPMS the data is converted to their format, in theory.

Arizona (Mafiz Mian) - **comfortable with IRI as a measure.** Having more issues with the pavement structural health index. Cracking is too variable, and not an indicator of structural health. Rutting also not always a structural issue.

Nevada (Robert Kvam) - no comments

Utah (Lloyd Neeley) - **Comfortable with using IRI as a performance measure.** IRI, although a lag indicator, is already widely used, and data collection protocols are well established. It is what the traveling public feels in the seat of their pants, literally. **Managing to the IRI on a network level encourages a pavement preservation strategy.** Utah also feels that IRI is an appropriate measure for high speed urban facilities (i.e. Interstates and Expressways). **Utah supports the idea that Larry Scofield brought forward of using skid index as a performance measure.**

Steve Mueller (FHWA) - on rutting, a lot of variability on data collection protocols. Do we want to specify a particular protocol? John (OR) says the difference in reported results between a 5-laser setup and a continuous scanning system is not significant. Jim Horn feels that 5 sensors as a minimum would be a good standard (they use 7). Montana agrees. Arizona uses a 5-sensor system.

Steve Mueller offered these additional comments after the meeting (thoughts that were expressed during the meeting but not captured in the initial notes):

It was noted in the discussion that “Structural Health Index” may not be the best or most accurate term to describe the distresses contained in the performance management report. There are multiple causes for pavement cracking, and several of the more common types of cracks contained in the LTPP Distress manual are non-structural. Longitudinal, transverse, and edge cracks are examples of non-structural cracks in asphalt pavements.

There was a question as to whether a more common measure from a State’s Pavement Management System might be a better tool than a new index. Why not use a Present Serviceability Rating (PSR), Present Serviceability Index (PSI), Condition Index, or some other fairly common measure that is collected by the States and stored in the PMS, rather than calculating a value from HPMS data? Couldn’t the HPMS data be used as a Quality Assurance check on the information in the PMS?

Larry Scofield (ACPA) - submitted a written set of comments. **Very hard to do forward thinking pavement management with lagging statistics.** Friction still an important measure, because it also affects safety.

Following are the comments that Larry Scofield submitted prior to the meeting:

I realize that I am preaching to the choir here but I would offer the following comments regarding the AASHTO document. First, I think they have done an excellent job and I think the format and content are very good. I also think AASHTO did a really good job in developing the six over- arching principles. However, I would offer up two more categories for the over arching principles and for development of additional performance measures.

Contrary to what many people think, I believe the state DOTs have done a very good job constructing the greatest transportation system in the history of mankind. We seem to forget that fact and are

always looking across the pond for ideas and how to sell off our system when we still have the best around. Talking about innovation and change are exciting and career building, but viewed from a realistic perspective, it's like chasing a dream instead of focusing on reality. The civil engineering profession has always been innovative and few things discussed today are actually new.

What the DOTs have done well is to develop comprehensive data bases of system attributes. This is the traditional approach and how we currently manage our systems. However, this is simply a management of distress as they occur from a pavement perspective. That is, we respond to the system needs as they develop with little ability for anticipation of change.

Perhaps another option is to anticipate the future and manage it along with the distresses which will always be the reality check. With this approach, at least two more overarching principles are necessary with the attendant performance measures to be developed for them.

- **Looking Thru the Windshield Instead of the Rear View Mirror:** Using historical data to predict future trends does not necessarily allow adequate reaction to changing conditions. For example, managing distresses relies on the distress that occurred as a result of existing traffic patterns and cannot account for changing traffic demands in a timely manner. Using five year averages tend to mask any significant changes through the moving average approach. This filter or “sunglasses” approach needs to be tempered with a view of the future at the same time. **Instead of considering only remaining service life we also need to be considering and measuring remaining capacity.** That is, with the introduction of the MEPDG we now have the ability to have an actual cradle to grave management system for pavements. We have a specified design traffic rate and distress prediction levels that we can management against using our traditional performance measures. If a pavement is under designed, and or the traffic was under predicted, remaining capacity can indicate a problem in a corridor before we ruin the pavement by simply managing distresses. This approach allows the fulfillment of a complete pavement management system (cradle to grave) which considers the design, materials, construction, environment, actual traffic levels, and maintenance practices to refine specifications and practices along with managing pavements.
- **How Many Pennies in My Pocket:** Perhaps the most difficult subject of all to monitor and discuss is the buying power of the construction and preservation dollar. Politically taboo, it simply goes unmentioned and unmanaged. Since no new gas taxes have occurred since 1993, our buying power has declined to 30% of what it once was. In addition, we now live in a world with significantly escalating cost increases which vary by commodity. The old days of using consumer price indexes as the standard are simply not realistic or acceptable anymore. **Agencies need to be able to view the ever changing cost increases and buying power reductions and factor that back into realistic performance goals and preservation strategies.** These indexes need to be published and openly discussed by engineers and managers alike. By bench marking these indexes it then becomes possible to better address future options, which simply may be fostering better competition, better utilization of existing resources through their design options, etc. It should also detail reality in a much more significant manner. The option of

simply ignoring this aspect is quite simply a plan for failure. These issues need to be managed along with distresses, safety, delay, congestion, etc

It also appears that pavement friction has been ignored in regards to the pavement condition measures. Not sure why this is.

Larry also offered this in an email to the group:

Hi All,

I promise I will shut up after this. Below is an excerpt regarding the recent GAO report that was in the AASHTO subscription surface. Unfortunately it seems (haven't read it yet) to advocate innovation again but the point is the economics and how different the future is going to be

"Further, the major source of federal surface transportation funding--federal motor fuel tax revenues deposited into the Highway Trust Fund--is eroding. The Congressional Budget Office estimates that, as of March 2012, to maintain current spending levels and account for inflation from 2013 to 2022, the Highway Trust Fund will require more than \$125 billion over what it is expected to take in during that period.

As a result, state highway agencies, the entities that are ultimately responsible for keeping most major highways in good repair, will need to develop strategies for doing so at reduced costs. One potential strategy is using more cost-effective materials and practices. With this in mind and in response to your request, this report describes (1) selected materials and practices that states can use or are using to improve the performance of pavements, including what is known about their costs and benefits, if any, and (2) challenges, if any, to using these materials and practices."