Final Minutes
Joint Meeting of Aurora & AASHTO Winter Maintenance Technical Service Program
Wednesday, December 5, 2007
Crowne Plaza Hotel at Union Station
Indianapolis, IN

Aurora Attendees

Max Perchanok, Chair, Ontario MOT
Mike Adams, WI DOT
Chris Albrecht, ISU/CTRE
Kirk Carpenter, IN DOT
Diana Clonch, OH DOT
Joe Doherty, NYSDOT
Tina Greenfield, IA DOT
Dawn Gustafson, MI DOT
Bill Hoffman, NV DOT
Dean Kernan, IL DOT
Mike Kisse, ND DOT
Curt Pape, MN DOT
Ralph Patterson, UT DOT
Kevin Petty, NCAR
Dan Roosevelt, VA DOT
Lee Smithson, AASHTO
Jack Stickel, AK DOT&PF
Jeff Tilley, UND

WMTSP Attendees

Rick Nelson, Chair, NVDOT
John Burkhardt, IN DOT, TRB rep
Dennis Burkheimer, IA DOT
Bret Hodne, WDSM, IA, APWA rep
Bill Hoffman, NV DOT, HSCOM rep
Mike Lashmet, NYSDOT
Wilf Nixon, U of IA
Greg Parker, IA Co Engr, NACE rep
Paul Pisano, FHWA
Dan Roosevelt, VA DOT
Lee Smithson, AASHTO

Guests

Dennis Belter, Chair, Clear Roads, IN DOT
Bill Hyman, SHRP 2
Tom Maze, ISU/CTRE
Charles Meyer, AASHTO

Rick Nelson opened the meeting with introductions and a review of the agenda.

SHRP 2 PROGRAM OVERVIEW

Bill Hyman, Senior Program Officer, SHRP 2 TRB, made a power point presentation, "Relationship of Reliability and Other Research Programs to Weather". The purpose of the presentation was to acquaint Aurora and WMTSP members with the SHRP 2 program and for Bill to understand the Aurora and WMTSP programs. Bill provided an overview of the SHRP 2 program, its governance, structure, described the four focus areas of Safety, Renewal, Capacity, and Reliability, projects under contract, and those being developed. Bill spent time on Reliability Performance Measures, travel time index, planning time index, buffer time and buffer index. Questions from the audience concerned how weather and the messages were being used for snow conditions. One of the members of the Clear Roads Consortium explained a project they had underway called "Ice and Snow, Take It Slow", where the emphasis is slow down and travel more safely. Bill discussed a graph showing "Effects of Incidents and Weather on Reliability" for Route 520 in Seattle.
He then discussed the Research Program focused on reliability. There were four themes: 1). Data, metrics, analysis and decision support; 2) Institutional change, human behavior and resources needs; 3) Incorporating reliability in planning, programming and design; and, 4) Future

needs and opportunities. Bill also discussed Safety, Renewal and Capacity. During the discussion of the focus areas it was apparent that there was a need to emphasize the importance that atmospheric and road weather have on each of the areas. A copy of Bill's power point is attached to these minutes. More detailed program briefs can be found at http://www.trb.org/shrp2 .

REVIEW AND EDITING OF THE NATIONAL PEER EXCHANGE RESEARCH STATEMENTS

The remainder of the meeting was spent in a group discussion of each of the 27 research needs statements that were shown in the draft of the "2007 National Winter Maintenance Peer Exchange Final Report". These 27 research needs statements were a consolidation of the 70 one line statements that were recorded during the focus group discussions at the Peer Exchange. A preliminary title is shown in bold face all capital letters, then several one line statements or questions appear under the preliminary title. These one line statements or questions were taken verbatim from the recorders meeting notes. These minutes attempt to capture the various points of discussion that will aid in the development of a comprehensive research problem statement.

1. GUIDELINES FOR ANTI-ICING AND DEICING

How to determine the proper timing and frequency of anti-icing and deicing?
Develop anti-icing, deicing and pre-wetting implementation guidelines
Are the FHWA TE-28 anti-icing guidelines accurate, appropriate, effective?

The discussion began by asking is this a technology transfer problem or a research problem? Wilf Nixon believes even though there may be a few details that could be improved upon, there is generally sufficient research on the subject for an agency to implement an anti-icing program. It is mostly a matter of education and the willingness of the agency to change. Perhaps developing a Best Method Practice process would add more credibility and acceptance. There is also some reluctance to try new methods because of the legal implications, especially if something fails, so that needs to be considered. Some do not understand that the TE 28 application rates are for anti-icing conditions and were not intended for deicing. In deicing where the road condition has an ice/pavement bond, the NCHRP Report 529 provides the guidance for more appropriate treatment strategies. Several people commented that while the current research covers most situations, there are some conditions that aren't covered in the storm scenarios and more research to increase the number of weather events would be helpful as well as add value to the basic research. Dan Roosevelt feels the rest of the country is counting on organizations like Aurora, Clear Roads, TRB and WMTSP to provide the needed guidelines and technical assistance and to get anti-icing into standard practice. He felt we needed to look at and appreciate the lack of knowledge we see reflected in these three statements and determine what needs to be done to fill that void. Dan would like to see us concentrate on the top five research problem statements, do them well and see if there is time and resources available to then start on the remaining ones. Dean Kernan feels his people need both the best practice guidance and help in selecting the correct chemical. Wilf Nixon feels perhaps we need to develop a step by step program for people to follow.

He sees merit with the Iowa DOT approach which uses a set of laminated cards in the cab of each truck. Mike Kisse pointed out that implementing anti-icing also brings a problem that needs attention which is being able to purchase the equipment to do the step by step program. Bret Hodne has asked field folks why they aren't using the anti-icing technologies, and finds that just changing overwhelms them (the needed training, new equipment, doing things differently, and additional facilities, etc). Rick commented that MDSS does an excellent job with the technical side by pulling all the sciences together. Paul Pisano discussed the value from the lessons learned last winter from the Maine study. While the MDSS did a good job of putting the sciences together, those sciences did not cover all situations. We are learning more as additional field evaluations are analyzed, and as new chemicals and equipment become available. Updates and revisions will be the name of the game to optimization. Mike Adams feels another project is needed to study the barriers to implementation. Wilf discussed some the weaknesses of MDSS that must be investigated and the science deepened so that the treatment strategies can be modified. Paul feels that the "Maine Lessons Learned" will help guide the process. There was general feeling that this problem is much broader than what Clear Roads should be expected to handle and the project should be assigned to SICOP. Rick Nelson agreed that SICOP would take the lead on this project. He felt we should go to agencies that claim they can't get the desired results and learn why. There might be problems with the treatment strategies or it may be something else in the system, but we need to understand the problem before trying to come up with the solutions. Bret pointed out when he finds a problem he also finds they don't understand dilution curves and other basics of anti-icing. Jack Stickel suggested that the Rural ITS scheduled for September 2008 would be a good place to put in a workshop since they will have a varied audience of state and local governments participating. Rick Nelson wrapped up discussion on this project by summarizing that SICOP would take the lead, this would likely be an overarching project resulting in the need for other more specialized projects that might end up coming back to Clear Roads or Aurora for help.

2. STAFFING

Synthesis of unconventional staffing strategies to meet increasing demands
Developing Tools for Outreach
Meeting increasing training challenges
Synthesis of retaining trained personnel
Synthesis of innovative methods to compete with industry

John Burkhardt gave a summary of the projects and asked for any other additions that need to be considered. Diana Clonch points out that these are reoccurring issues with both state and local governments. The only staffing guidelines she has found are in the SICOP Snow and Ice Guide. Rick Nelson pointed out that downsizing and fleet reductions are moving government to outsourcing to help fill the gaps during emergencies and storms. Bret Hodne feels that local governments need data to show how they compare with other agencies and be sure their needs are in line with other public agencies. The project fits well into a synthesis project and fits into two Transportation Research Board (TRB) Maintenance Committees missions and scopes. The synthesis

needs to also consider what type of post high school or college career path training is needed. Testing is an important part of the training program. It would be helpful for maintenance personnel to know what percentage of typical maintenance budget dollar and time allocation gets put into the training effort so that they can compare to others. Pay is also a consideration to be able to attract both permanent and temporary personnel. How to keep the people will be an important item to include. Are there data on how much it costs to bring people on board, get them trained, only to loose them in six months or a year? How does pay compare with others in the region? The synthesis needs to also look at how to provide training to contractor personnel if the work is outsourced. Max Perchanok felt separate synthesis are needed, one for staffing and the other for training. There is a responsibility to keep the others informed as the research problem statement gets developed so more than just one agency is listed on the funding request to help emphasize the importance of the project. John summarized the discussion by agreeing that the TRB Winter Maintenance Committee (AHD65) which he chairs would take the lead on this project. He and Lee Smithson will collaborate with and involve the TRB Committee Maintenance and Operations Personnel (AHD15) in the development of this project. The Winter Maintenance Committee Scope addresses the issues of the training needs of snow-fighting personnel, performance measures, and level of service. The Maintenance and Operations Personnel Committee's Scope addresses, "…personnel policies of the various transportation organizations relative to maintenance and operations; the salaries and wages of positions in such groups; and the selection and training of maintenance and operations personnel."

3. LOS DETERMINATION

Road prioritization formula for winter maintenance LOS
Case studies on ensuring consistency in winter maintenance practice across state borders
Establish seamless boundaries for winter information across states
Develop a national LOS to better transition motorists across boundaries without sudden change in conditions
FHWA should develop pilot or demonstration projects of seamless operations. This would include LOS, winter messages, RWIS, and other technologies.
Develop a road prioritization formula to determine LOS and see if it can be used nationwide.

Discussion began on this project noting there were two NCHRP projects going on which might have some applicability and guidance so need to be considered to avoid duplicative efforts. The NCHRP Project 06-17, "Performance Measures for Snow and Ice Control Operations" is finished and the draft report is being reviewed. Also NCHRP 20-74A, "Development of Service Levels for the Interstate Highway System" will begin soon. The project scope does include some winter maintenance. The project includes a literature review, and the various performance measures being used. The 511 Coalition progress needs to be included in this process. The attendees felt this should become a SICOP project. Rick Nelson agreed and felt it should be assigned to the AASHTO HSCOM Snow and Ice Task Force. Bill Hoffman, Snow and Ice Task Force leader was tasked to take the lead and start by calling Andy Lemer, NCHRP Project Manager and request that a WMTSP member be included on the panel of the NCHRP 20-74A project.

One outcome should be a set of definitions for road condition description or maybe a template that would include elements that a state could plug into in developing a level of service.

4. FUNDING

Determine staffing and funding for core maintenance activities
Identify long-term impacts of not funding maintenance fully for summer and winter activities
How do we establish appropriate dedicated funding levels for maintenance?

Attendees felt this project was a good fit for TRB Maintenance Committees. The Maintenance and Operations Management Committee (AHD10) with a committee scope, "This Committee is concerned with all aspects of managing the maintenance and operations of highway transportation facilities" would be a logical first contact. John Burkhardt and Lee Smithson will attend the AHD10 Committee meeting in January 2008 and discuss the possibilities of them taking the lead for this project. Probably need a synthesis to look at states (like Washington and Kansas) who have had success in convincing their management and the legislature to staff and fund the longer term maintenance needs.

5. COMMUNICATION WITH PUBLIC AND LEGISLATORS

Develop tools to manage and communicate LOS, expectations and costs associated to urban, sub-urban and rural routes
Best practices for balancing politics and performance
Synthesis of how to effectively relay and communicate winter maintenance budget's needs to upper management and legislature
How to most effectively communicate performance measures and associated costs to internal staff, operators and stakeholders
Inform stakeholders of the critical activities and impacts of maintenance on daily lives

Attendees felt this project needs to be guided by public relations people to apply their expertise to this research. Charles Meyer will talk to Sunny Schust, AASHTO Director of Communications and Publications since she is also the AASHTO Staff to the AASHTO Public Affairs Committee and see if this is a good fit.

6. VEHICLE TO CENTER COMMUNICATION

Seamless wireless communication for transferring data from vehicle to maintenance garage
Development of standards for in-vehicle equipment
Innovative solutions for real-time vehicle-to-center data communications
Develop standard specifications for components and communications

Dennis Belter led the discussion on this project. Attendees felt this is more than just communication, it is using the basic maintenance truck as a source of road condition information, reporting current maintenance activities such as snow and ice control operations, fleet location for emergency management and incident response operations, etc. Minnesota has the goal equipping an area for MDSS field testing and eventually the entire fleet to see where it can take them (asset management, stockpile replenishment, time sheet reporting, etc). This project needs to be coordinated with the VII test evaluations and MDSS. Is the cost of real time communication worth the investment? The issue of communications standards should be coordinated through the NTCIP meetings. Curt Pape has attended some of the NTCIP meetings says that there is a lot of vendor posturing at these meetings so progress is slow. One of the vendors at the 2007 National Winter Maintenance Peer Exchange pointed out that Europe has common standards that should be evaluated as a model in the U.S. The SICOP web site has a posting of AVL being used in the U.S. The SEMSIM link also has an updated list of AVL contacts. Clear Roads is similar to Aurora when RWIS was just entering the winter maintenance arena, they are the voice and the advocate. Dennis Belter, Chair of Clear Roads, felt that Clear Roads is the appropriate leader for this project.

7. PERFORMANCE MEASUREMENT

Develop standardized performance measure for snow and ice
Develop a state winter severity index as a tool to compare materials use and costs
Feedback of customers' expectations on winter maintenance

John Burkhardt led the discussion for this project. The discussion began with a look at work that has been done in this area. Wilf Nixon has developed a storm index, Aurora has worked in this area and IN DOT is working on a winter index. TRB Winter Maintenance Committee (AHD65) should take the lead for this project and include Aurora in the discussion of the project. Consider moving Individual Rank #4 into the LOS Determination Group Rank #3 or establishing a strong collaboration link. NCHRP funded a workshop on Performance Measures. The results from that workshop did not get much visibility, but might have some use in this project. Note on #4 "Develop standardized performance measure for snow and ice" was #4 overall indicating it is very important, so AASHTO Snow and Ice Task Force should take the lead on that. Aurora can help on Individual Rank #36 and possibly find some funding. Individual Rank #59 should have a strong collaboration link to Group Rank #5, Communication with Public and Legislators.

8. WEATHER AND RWIS EDUCATION

Develop more training on how to use RWIS and weather forecasting to help decision making
Improvement for chloride sensor for integration into the decision making process

Develop a way to educate more forecasters about what maintenance needs in a forecast and how to speak our language
Develop a plan for improving forecasts
Training for maintenance personnel to interpret forecasts
Training for how to use technologies
Education about microclimates

Max and Tina led the discussion for this project. This will be an Aurora project and likely needs to have a brochure developed to cover the various offerings. FHWA has two web-based training programs being developed by NOAA which will address Individual Rank #47. These will be completed in early 2008. FHWA is developing a web-based version of the old NHI course.

9. SALINITY SENSOR

Develop on-vehicle salinity sensor
Develop better in-pavement chemical sensor

Max and Tina led the discussion for this project. This will be an Aurora project, but the on-vehicle portion of the project may need to be a joint program with Clear Roads. Dan Roosevelt felt that the states should be surveyed to see if the states have an interest in purchasing and using on-vehicle chemical sensors and if so, at what price and how many? Aurora should determine the need, develop the specification and search for a vendor to develop and sell a sensor that would not be copyrighted.

10. LIGHT PRECIPITATION FORECASTING AND SENSING

Improvements in sensing and forecasting of ice, freezing rain and frost conditions
Developing improved and affordable precipitation sensor
Improvements in forecasting of low-elevation weather conditions

Max and Tina led the discussion for this project. This will be an Aurora project. Aurora already has a project 2007-04 “Development and Demonstration of a Freezing Drizzle Algorithm” under way (10% complete).

11. CONCEPT VEHICLE

Develop next generation concept vehicle and optimized plow design
Optimize the ergonomics for snowplow operators
Determine the ideal lighting for snowplow to see and be seen
Optimization of the in-vehicle driver interface and how this information is presented

Dennis Belter led the discussion for this project. Clear Roads will be the lead, but there is a question as to the amount of money needed for a project. There currently is some

funding available from the Concept Vehicle Pooled Fund that would at least get the project started.

12. **POST STORM MEETINGS**

Need literature search needs to be conducted and analyzed to determine what type of information is most valuable to document and share
Develop best practices in winter maintenance performance

Dennis Belter led the discussion for this project. This will be a Clear Roads project for a literature search and synthesis. The AASHTO AI/RWIS CBT has some material on the importance of the post storm meetings and items that should be considered in the meetings.

13. **FIELD TESTING**

Build a test facility to provide objective data regarding the effectiveness of various winter maintenance treatments. Need national test center which would establish a rigid set of research guidelines, protocols and procedures which would make results more accurate.
Pursue objective testing to verify the effectiveness of innovative maintenance treatments.
Standardized tests for winter maintenance equipment

Rick Nelson led the discussion on this project. It will be a SICOP project. The project is a commitment to continuous improvement and would imply highly instrumented facilities are required. Joe Doherty believes the project should be a consortium of testing facilities i.e. CRREL, Blacksburg, NDSU, WTI, etc, and building on the capabilities of the existing experience and physical facilities base. Another idea that should be explored is a single location to coordinate the testing with multiple partners to perform the tests and evaluations. Wilf emphasized the importanace of a location that has guaranteed winter weather, such as Canada. ASTM might be a business model to examine since they administer many tests at multiple contractor sites. Study would begin with a survey of what sites and capabilities are already available. Next we need to determine what testing needs are required.

14. CHEMICALS AND REFREEZE

Conduct extensive laboratory and field tests on different deicing products to determine under what conditions the product caused slipperiness on the roadway surface and then determine optimum application rates for pre-wetting and anti-icing.
Investigate what factors influence refreezing on the road.
Investigate refreeze due to over application and some easy-to-use rules to help practitioners properly use phase diagrams

Dave Wells, reported that the Pacific Northwest Snowfighters at their November 2007 meeting agreed to taking the lead for this project.

15. CONSISTENT DESCRIPTIONS OF ROAD CONDITIONS

Develop standard ratings and descriptions for road conditions
Develop acceptable dynamic messages for snow and ice

Rick Nelson led the discussion for this project. This will be a SICOP project. The 511 Coalition pooled fund met and agreed on their descriptions for use on 511. Pete Costello and Jim Wright should be contacted to review what has been accomplished and what needs to be done to get the various levels of government to adopt standard descriptions for road conditions and dynamic messages for snow and ice related road conditions.

16. COST BENEFIT FOR EQUIPMENT

Develop a standard method to measure the cost/benefit of adding different components like wings, guidance systems, GPS, additional sensors, etc and determining expected service life of the new equipment
Determine the true cost of data collection and determine the pay back

Dennis Belter led the discussion for this project. This will be a Clear Roads project.

17. TRAINING

Develop methodologies for evaluating training efforts
Determine the state of the practice for using driving simulators, how are they being implemented into the training system, can results be measured and is there a pay off

Dennis Belter led the discussion for this project. This will be a Clear Roads project and will focus initially on the L3 driving simulators currently being used by several state DOTs. So far Arizona State University has completed an evaluation project for the Arizona DOT and Iowa State University has completed an evaluation project for the Iowa DOT. It was suggest that the Washington DOT may also have completed a training evaluation study.

18. PEER EXCHANGE

Is there support for another peer exchange?

Attendees of the Peer Exchange completed a feedback survey that strongly supported another Peer Exchange. Attendees at the Aurora/WMTPS meeting also supported a future Peer Exchange possibly in 2009 or 2010. Frequency and funding have not been solved. Each consortium needs to discuss this at their next meeting and decide on frequency and scope needed and the amount of funding they might be able to provide. SICOP will take the lead for coordinating this effort.

19. ENVIRONMENTAL

Develop guidelines for BMPs to achieve attainment in areas of concern
Need a tool to provide or ensure funding is available to cover salt/sand stockpiles and secondary containments for liquids

This project was originally assigned to Pacific Northwest Snowfighters. This project needs to be coordinated with efforts currently underway at AASHTO's Center for Environmental Excellence. NCHRP 25-25, Task 29 was completed this past fall. The purpose of this work was to create and test a process for identifying best practices from "Environmental Stewardship Practices, Procedures, and Policies for Highway Construction and Maintenance Compendium" and to establish recommended procedures for updating the Compendium on an ongoing basis. Chapter 8 of the Compendium is titled, "Winter Operations and Salt, Sand and Chemical Management". AASHTO is in the process of evaluating the recommendations from this NCHRP study. PNS and WMTSP need to coordinate with the appropriate staff at AASHTO and collaborate on how to proceed with this project.

20. REDUCING CORRISION

Synthesis of best practices for reducing corrosion on winter maintenance equipment and use of corrosion resistant materials, coatings, etc and their cost effectiveness

Pacific Northwest Snowfighters agreed to take the lead on this project.

21. BLADE INSERTS

Investigate alternative blade inserts and determine a method to evaluate and compare different blades and blade design to determine their wear

Dennis Belter led the discussion for this project. This is a Clear Roads project and will be considered at their January 2008 meeting.

22. CHEAP FRICTION

Develop low-cost, simple friction measuring device or other methods to determine slipperiness and transmit that information to users to assist in decision making
Pilot evaluation of virtual pavement sensors and on-board friction devices

Max Perchanok led the discussion on this project. Aurora already has a similar project underway, Project 2007-02, "Cold Weather Testing of Halliday Unit" and will take the lead on this project.

23. COLLISION AVOIDANCE

Investigate collision avoidance systems for snowplows

Dennis Belter led the discussion for this project. This will be a Clear Roads project. NV DOT is exploring this technology with heads-up display, but it is very expensive.

24. HIGH-DEF IMAGING/SENSING OF ROAD CONDITIONS

Explore use of highly detailed satellite imagery in winter maintenance operations

Max Perchanok led the discussion on this project. This will be an Aurora project. This project may have some relation to Group Rank #10 which is also an Aurora project.

25. FORECAST ACCURACY

Develop measures of forecast accuracy

Max led the discussion on this project. This is an Aurora project. Wilf believes there should have an impact factor which would consider even if it is not accurate but does not cause operational impairment versus an inaccurate forecast that does result in operational problems and has a great impact.

26. BOILERPLATE LEGAL LANGUAGE

Develop boilerplate language for data sharing because concerns over litigation have slowed down the ability of states to share data

Rick Nelson led the discussion for this project. Paul reported that Mitretek did a search of state DOT web sites to determine what data they are providing. FHWA has been speaking with the National Conference of State Legislature, and they are willing to do a scan of current State laws regarding data sharing along with related work about data. A contract has not yet been finalized, but FHWA is moving in that direction. Paul will send some additional material for consideration. This will be a SICOP project.

27. SNOWFENCES

Best practices for snow fences, including cost benefit considerations, guidelines for various types of live snow fence, understanding political challenges, etc

Dennis Belter led the discussion for this project. This will be a Clear Roads project. The computer-based training program “Blowing Snow Mitigation” is nearly completed. It will contain the latest blowing snow research and input from a Technical Working Group that has considerable experience in living and man made snow fences and blowing snow mitigation. The CBT needs to be evaluated to see if it fulfills the requirements of this proposed research need statement

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