

## 2011 Winter Maintenance Peer Exchange Prioritized Research Needs Statements

Progress Updated to June 2012. Questions or update information can be directed to Lee Smithson, 515-239-1519 or leland.smithson@dot.iowa.gov

Rank	Short Title	Number of Votes	Problem Statement	Research Group	Progress to Date
1	How Effective Are Existing Application Rates for Salt?	46	Look at how effective the existing application rates are for salt. Address what measurable differences exist from 250lbs/ lane mile compared to 300 lbs/ lane mile. The goal is to develop and implement consistent application rates that gather acceptance from a level of services perspective as well as the operational forces. It is difficult to communicate these significant differences of material application rates without good data to support it.	Clear Roads/	-Salt gradation being considered in RNS #24 may have some overlapping attributes that need to be considered in this RNS. <b>Update: This project has been selected for funding in 2012 by Clear Roads. Monty Mills &lt;millsm@wsdot.wa.gov&gt; and Paul Brown &lt;Paul.Brown@mhd.state.ma.us&gt; are the project champions.</b>
2	Synthesis of Outsourcing Benefits & Risks	31	Many state agencies are getting pushed to contract more snow and ice control operations to private vendors. There are risks and benefits to doing this. Our question is where can we go to consult with another state or states that have done this or tried to do this? Are there reports, papers, syntheses that are available for review?	Clear Roads/ SICOP	Clear Roads determined this is a good candidate for a <b>Synthesis Report</b> . Note: Outsourcing goes beyond snow and ice, however, it should focus on snow and ice, while also looking at other areas for additional information. SICOP is also interested in pursuing this. Caleb Dobbins <cobbins@dot.state.nh.us> is the contact person for Clear Roads. NCHRP 20-7, Task 329 is currently being organized and should address portions of this research needs. Gabe Guevara <gabriel.guevara@dot.gov> is the SICOP contact person.
3	The Use Of Social Media in Winter Operations	25	Determine the uses and application of social media tools in communicating winter maintenance to the public. Of specific concern is understanding new technologies, social norms and expectations. This would be determined by evaluating best practices and case studies. Other implications include ethics and legal liability issues associated with social media.  Since the very first peer exchange, one of the topics has been communication with road users. With the explosion of social media, the winter maintenance community should join those talking about transportation using social media. Evaluate opportunities to carry the winter maintenance message to interested participants/ motorists using social media through the following: 1- Links to published material (newspaper articles, or other public information materials) 2 - notice of preparation steps ("we're ready for the storm") 3 - activities and alerts during the storm ("watch out for ...").	All	Contact persons for Clear Roads are Tim Peters <Tim.Peters@illinois.gov> and Allen Williams <Allen.Williams@VDOT.Virginia.gov>, for Aurora <Leigh Sturges <leighsturges@utah.gov> and Travis Lutman <tlutman@nd.gov>, and for SICOP Rick Nelson <rnelson@dot.state.nv.us> and Wilfrid Nixon <wilfrid-nixon@uiowa.edu>. Clear Roads piloted a Facebook and Twitter page and found that it was not an effective way to promote research to our target audience, because so many agencies block access to these sites. There is likely still a role for social media in winter operations, but not for promoting research per se. Aurora has funded Project 2012-04 – Communicating and Publicizing Road Weather and Operations Information to Decision Makers and Public Stakeholders to address this issue. This research will compile the best practices on how road weather information is being transferred to stakeholders. In addition, it is important to identify the best method(s) for notifying the public/media and operations staff of current RWIS data. It is not clear how much information is needed to inform the public and government officials of "current" operations during a storm. This project would ultimately identify the optimum methods for communicating road weather information to this diverse stakeholder base can maximize the benefits of the road weather program.
4	Mobile Road Weather Sensor Standards	23	Develop mobile road weather sensor standards and protocols. Standards for accuracy, calibration frequency and reporting frequency for mobile weather data. Mobile weather sensing is an emerging technology. Integrating mobile weather data with RWIS and other data is a challenge transportation agencies face.	Aurora	Both Aurora and Clear Roads have started efforts that address this research need. Aurora project 2010-02: Mobile-Weather Data Collection Guidelines with Curt Pape <Curt.pape@state.mn.us> as project champion and a companion project 2010-04: RWIS Sensor Density Grid with Max Perchanok <max.perchanok@mta.gov.on.ca>, champion and Annette Dunn <annette.dunn@dot.iowa.gov> is leading an effort to refine and implement Plug and Play specifications developed by Clear Roads.
5	GIS Based Route Optimization	23	Develop a GIS-based route optimization adaptable from patrol/station level to state-wide. An objective process/program to optimize routes similar to trash collection business that takes into account multiple variables such as equipment, depot locations, etc. Help supervisors tweak their routes within the equipment and infrastructure constraints that exist.	Clear Roads	Clear Roads determined this is a good candidate for a <b>Synthesis Report</b> . Note: The school bus industry, UPS, etc. are all good resources. Iowa DOT is also working on this. Annette Dunn <annette.dunn@dot.iowa.gov> is the Clear Roads project person.
6	Research Design Concepts That Can Be Incorporated into Roadway Construction to Assist in Winter Operations	19	Research what design concepts can be incorporated into roadway construction to assist in winter operations. For instance, how to design the high side of a super elevated roadway section so that the shoulder doesn't drain back to the roadway.	SICOP	Some work on blowing snow mitigation has been accomplished and tested in New York. The New York State DOT used SNOWMAN software that brought the science of engineered mitigation of blowing and drifting snow to a CAD-Microsoft application. One project was designed and has been successfully tested in two winters. Contact person for this project is Mike Lashmet <mlashmet@dot.state.ny.us>. Other states have looked at the SNOWMAN program, but have not yet tried to install the program on their system. Attributes of SNOWMAN, because it is an environmentally friendly solution, should be introduced into the sustainability arena for study and evaluation of benefits.

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7	<b>Cameras and Operational Impact of Remote Road Condition</b>	18	UDOT with a private contractor has developed a low-cost live PTZ camera system to monitor road conditions at locations not covered by conventional traffic cameras or RWIS sites. The purpose is to identify if treatment is needed or not. The outcome is that the local manager can decide whether a truck needs to go out or not. The system has had impacts on how dispatch is done and when trucks are dispatched. This project would identify efficiencies gained, impacts on road condition, costs, cost avoidance, and document the model for other agencies to follow.	<b>Aurora</b>	Aurora champions for this project are Leigh Sturges <leighsturges@utah.gov> and Travis Lutman <tlutman@nd.gov> and from Clear Roads, Lynn Bernhard <lynnbernhard@utah.gov> will also work with Aurora on this project.
8	<b>Mechanical Snow Removal Strategies and Opportunities</b>	17	Instead of focusing so much on chemical removing snow and ice from pavement, this study would research how to remove snow and ice mechanically from the pavement. It would be less costly, less corrosive/deleterious to our bridges and equipment, as well as, more environmental responsible. It would make sense to work with our pavement engineers to design a material (bituminous, PCC, etc) that would allow us to more easily remove snow and/or ice. It would also make sense to get equipment, plow, blade, pavement engineers, pavement marking, etc professionals together to design an efficient system to remove snow and ice mechanically.	<b>Clear Roads</b>	Charlie Goodhart <cgoodhart@state.pa.us> has developed a research proposal which he has submitted to NCHRP for consideration.
9	<b>Quantifying Salt Concentration On Pavement (alternative to sensors)</b>	17	Earlier Peer Exchanges showed the need for a mobile and/or more accurate surface salinity sensor. So far, none has been found. An alternative is to develop a better way to predict the salt concentration on the pavement considering the records of application rate, time plowing, precipitation type and rate, surface temperature, traffic, pavement type, wind speed, etc.	<b>Clear Roads/ Aurora/SICOP</b>	Annette Dunn <annette.dunn@dot.iowa.gov> from Clear Roads, Tina Greenfield <Tina.Greenfield@dot.iowa.gov> from Aurora, and Lee Smithson <leland.smithson@dot.iowa.gov> from SICOP are teaming up on this project to determine internationally what might be available. A search for world-wide technology was made using the SICOP List Serve. Several mobile, fixed and portable sensors, using freeze/thaw and refractometer technologies were discovered in that search and are being used in Japan and Europe. Results will be considered by Aurora and Clear Roads at their March 2012 combined meetings for funding and inclusion in the 2012 program. Promising candidate technology will be interfaced with AVL/GPS for field trials during the winter of 2012-2013.
10	<b>OGFC Applications</b>	17	Research needs to be advanced on the effects of open-graded pavements in winter. There currently is a research paper in Europe but needs to be validated in the US across the various regions (west, mid-west, east coast).	<b>Clear Roads</b>	Clear Roads has selected this project for 2012 funding. Paul Brown <Paul.Brown@mhd.state.ma.us> and Mike Lashmet <mlashmet@dot.state.ny.us> are the project champions.
11	<b>Synthesis of Best Marketing Practices for Winter Operations</b>	16	There is increasing value in having winter maintenance marketing tools to help get the media (ie., news, weather) on the side of winter operations staff.	<b>SICOP</b>	Steven Lund <steven.lund@state.mn.us> member of SICOP and Task Force Leader of the AASHTO Highway Subcommittee on Maintenance, Highway Safety & Reliability Technical Working Group is leading the efforts on this project. He is currently establishing an effective liaison with the AASHTO Subcommittee on Public Affairs as they work on informing the public about the importance of transportation and all weather mobility.
12	<b>Create A Winter Maintenance Experts Bureau</b>	15	Practitioners need access to experts on detailed subjects beyond scope of SICOP discussion. Create a list of experts to be available to a variety of stakeholders (officials, managers, media) in each state for in depth question and answer sessions. This could be web-based and would require a group to vet experts and identify/recruit experts in a variety of areas.	<b>All</b>	Lynn Bernhard <lynnbernhard@utah.gov> will champion this effort by preparing a Research Proposal for 2012. Aurora with Chris Albrecht <calbrech@iastate.edu> and SICOP with Lee Smithson <leland.smithson@dot.iowa.gov> will assist Lynn and provide follow through.

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13	Communicating Road Weather Information to Decision Makers	15	Road weather systems are designed to meet a broad array of stakeholder needs. Key stakeholders include winter weather maintenance operations, first responders, emergency managers, value-added forecast providers, commercial trucking operations, transit and the traveling public. Information delivery to this stakeholder base may include data feeds, tabular listings, graphical presentations and weather data integrated with other data sources, eg., real-time traffic data. Having an understanding of the stakeholder's key operational weather thresholds and how stakeholders make decisions based on these thresholds can help transportation agencies tailor a road weather information system program to meet the stakeholder needs. Identifying the optimum methods for communicating road weather information to this diverse stakeholder base can maximize the benefits of the road weather program. Typically agencies look at how other weather programs transfer weather information to stakeholders and how they can increase the value of road weather information. The research need is to compile the best practices on how road weather information is being transferred to stakeholders. The innovative value-added communication techniques for both current and archived data, and forward looking data integration techniques that provide effective decision-making tools. Further the research should look at how new operational processes and sensor output can be quickly adopted to communicate road weather information.	Aurora	Aurora has funded an effort under FY2012. Project champions are Jack Stickle <jack.stickle@alaska.gov > and Joe Doherty <jdoherty@dot.state.ny.us>.
14	Salt Brine Primer	14	A primer to address the following questions: Do you make your own brine and other mixes, under what conditions do you use it, application rates, etc.	Clear Roads	Clear Roads member state Pennsylvania DOT has funded a project to develop a Salt Brine Primer and will share the results when it is complete.
15	Improved Winter Severity Index	14	There is a need for standard indexes for both individual storms and for seasons to allow effective comparisons of performance.	Aurora	Aurora Project 2012-02 – Winter Weather Severity Index, Phase 2 will build upon the system developed under Aurora Project 2004-04. If this system can be expanded in use by other non-Aurora agencies, the team can determine if revisiting the index is necessary. Noting that there are several indices out there and some new ones that might help the 'individual storm' component, this may be a technology transfer issue. The existing index was not designed to help the problem of quantifying individual storms. The Aurora champion for this project is Tina Greenfield <Tina.Greenfield@dot.iowa.gov>.
16	Cost Benefit of Salt Use in Preventing Accidents	13	Quantifying the cost/benefit of utilizing anti-icing technology, chemicals, to reduce crashes. Also look at cost/benefit of using brine in savings of granular salt usage and LOS compared with negative impacts of brine on vehicles. Overall goal to quantify that using deicers allows you save X amount of work/ man hours and increase public safety.	All	Clear Roads determined this is a good candidate for a <b>Synthesis Report and submitted it to NCHRP; however, it was declined.</b> Note: Need to talk to the Salt Institute and review any studies they have. Resulting information needs to be posted on the wiki knowledge base. Monty Mills <millsm@wsdot.wa.gov> will represent Clear Roads in this effort. SICOP contact person is Gabe Guevara <gabriel.guevara@dot.gov> and will assist Monty. This future of this project will be discussed at the Clear Roads 2012 Fall meeting.
17	Validate the Accuracy of Pavement Condition Predictions from Various Sources	13	MDSS of various types have been implemented in approximately 15 highway agencies. They combine RWIS forecasts with rules of practice, real-time plow and salt records and other information to predict the current and future snow/ice status of the pavement during storm conditions. Successful operations require that their predictions are accurate. Few if any studies have been completed to validate the accuracy of the pavement condition predictions and provide confidence in the MDSS recommendations. There is a need to close the loop on the "open loop" status of pavement forecasting.	Aurora	Aurora Project 2012-01 – Validate the Accuracy of Pavement Condition Predictions from Various Sources will validate the accuracy of the pavement condition predictions and provide confidence in the MDSS recommendations. Aurora project champions are Max Perchanok <max.perchanok@mta.gov.on.ca> and Dawn Gustafson <gustafson@michigan.gov>.

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18	Field Validation of Lab Research	13	US, Canada and Europe (Sweden) all have projects underway to compare lab and field results of the effectiveness of anti-icing/deicing chemicals. Knowledge can be advanced and research leveraged through an international workshop devoted to field validation of lab tests of snow and ice control chemicals.	SICOP	Two members of SICOP, Max Perchanok <max.perchanok@mto.gov.on.ca> who is chair of TRB Winter Maintenance Committee and Wilf Nixon <wilfrid-nixon@uiowa.edu> chair of the TRB Surface Transportation Weather Committee are co-hosting the 2012 International Conference on Winter Maintenance and Surface Transportation Weather to be held in Iowa City, Iowa in May 2012. Abstracts have been submitted which address many aspects of the research needs identified in this problem statement. The resulting technical papers will receive a comprehensive assessment to bring forth useful information to address this RNS. The next step will be for SICOP to promote findings from these technical papers, determine any unmet research needs and get those unmet needs to Aurora, Clear Roads or other appropriate research agencies for consideration in future work programs.
19	Cathodic Protection of Maintenance Vehicles to Reduce Corrosion	11	How to protect winter maintenance vehicles from corrosion. Washing equipment does not seem to be enough. The focus of this needs statement is to assess cathodic protection.	Clear Roads	WTI/Alaska/Clear Roads are already doing a comprehensive corrosion best practices project. Need to wait on the results of that project. For further updates contact Colleen Bos of Clear Roads <colleen.bos@ctcandassociates.com>.
20	Synthesis of Best Practices for Maintenance Change Implementation	9	Develop a replicable model for maintenance change implementation. Identify successful case studies' identify case studies of failures; follow up on studies beyond the "honeymoon period" for lessons learned. Look at experiences outside the transportation industry and find out the what was successful or not; look at the cost-benefit ratio of change projects. Develop a report with a bulleted easy-to-use "strategies that work." and a contact list of change agents that have been successful.	All	This research needs has two parts that need to be addressed. The first part is stated in the first sentence "Develop a replicable model for maintenance change implementation" was addressed in FHWA National Highway Institute 134073 "Leap, not Creep: Accelerating Innovation Implementation" and covers the path of an innovation from the identification of a need to mainstreaming an innovation into standard practice. Clear Roads determined the remainder of the RNS is a good candidate for a <b>Synthesis Report</b> . Note: This could be a CBT directed towards managers. Contact people for SICOP are Greg Parker <gparker@co.johnson.ia.us> for county governments, Mark DeVries <rmdevries@co.mchenry.il.us> for municipal governments, and Michael Fitch <michael.fitch@vdot.virginia.gov> for state DOTs.
21	Determine the Effect of CDL Medical Card Requirement	9	Determine the effect on states and municipalities should the requirement of a CDL medical card be imposed on these entities. How would it effect both the current workforce as well as future hires.	Clear Roads/ AASHTO	Determine the effect on states and municipalities should the requirement of a CDL medical card be imposed on these entities. How would it effect both the current workforce as well as future hires. Caleb Dobbins <Cdobbins@DOT.STATE.NH.US> and Allen Williams <Allen.Williams@VDOT.Virginia.gov> represent Clear Roads and Greg Parker <gparker@co.johnson.ia.us> and Mark DeVries <rmdevries@co.mchenry.il.us> will represent SICOP. This project should also include the concerns listed in #30 below "Criminal Background Checks".
22	Propose NCHRP Synthesis of Systems, Processes and Plans to Manage a Winter Storm Successfully	9	Propose a synthesis for managing winter operations. Every state manages their winter storms differently. What systems, processes, plans, policies, etc do they have in place to manage a winter storm successfully? Do they manage the storm systematically utilizing the NIMS or a related process? Or do they leave it up to their field staff to manage the storm? What measures of success do states have in place to measure efficiency, effectiveness, etc of operations? It would be every helpful to do a synthesis on this topic so states would know who to benchmark against.	SICOP	Since state roads pass through various governmental jurisdictions, the "... systems, processes, plans, policies, etc..." called for in this RNS need to be coordinated with local and state governmental operations. To ensure each governmental unit is considered in this RNS, team contact people from those jurisdictions have been selected as follows: Steven Lund <steven.lund@state.mn.us> Minnesota DOT State Maintenance Engineer and Task Force Leader of AASHTO Highway Subcommittee on Maintenance, Highway Safety and Reliability Task Force, Greg Parker <gparker@co.johnson.ia.us> Johnson County Engineer, Mark DeVries <rmdevries@co.mchenry.il.us>, Chair of APWA Winter Maintenance Committee.
23	Chip Seal Effects to Plow Blades	7	Maintenance supervisors have reported that chip seals using granite or quartzite or other hard minerals with high angularity "tear up plow blades." The proposed study would determine the actual effect on blade wear of various chip seal materials quantitatively. If a correlation is found, mitigation strategies to reduce blade wear when using the hard aggregates should be explored.	Clear Roads	Mike Mattison <mike.mattison@nebraska.gov> submitted this to Clear Roads for 2012 funding consideration, but it was not selected. It may be reconsidered at a later time.
24	Cost-benefits of Gradation Specification for Mined Salt	7	Determine the costs and benefits associated with using a gradation specification for mined salt. Specifically, does cost increase associated with gradation result in benefits associated with less scatter, equipment, application rates, and consistency? Furthermore, does a gradation avail itself to advanced spreader technology?	Clear Roads	Clear Roads feels this should be about more than just mined salt. All salt should be included. Questions include: What's the best thing to make brine? What's the optimum gradation? This research needs should become part of RNS#1 above.
25	Synthesis of Best Practices for Pass Operations	5	There is a need to identify best practices for winter operations dedicated to keeping mountain pass highways open to travel. Much of the winter budget in states with mountain passes is obligated to this function.	Clear Roads	David Wieder <David.Weider@dot.state.co.us> submitted this to Clear Roads for 2012 funding consideration, but it was not selected. It may be reconsidered at a later time.

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26	<b>Tow Plow Training</b>	4	Develop training to address the following questions: when to use it, what type of highway and do you have an operator that can use it?	<b>Clear Roads</b>	MoDOT has a lot of training already and it should be made available via the Clear Roads website. WisDOT is also doing a 2 year study and gather ideas about where they work and where they don't. Clear Roads members should followup with Mike Sproul <michael.sproul@dot.state.wi.us> and he will collect their questions and issues and build them into his study.
27	<b>Make the Aurora Winter Severity Index Available to All, and Extend the Length of Record</b>	4	Make the Aurora winter index available to anyone and extend the length of the record from the current period (2002-2008). Develop technology transfer sessions at APWA or AASHTO	<b>Aurora</b>	Aurora project champion is Tina Greenfield <Tina.Greenfield@dot.iowa.gov>.
28	<b>Publicizing RWIS &amp; Operations Info</b>	3	What is the best method for notifying the public/media and operations staff of current RWIS data? How much information is needed to inform the public and government officials of "current" operations during a storm?	<b>Aurora</b>	Aurora project champions are Jack Stickle <jack.stickle@alaska.gov > and Joe Doherty <jdoherty@dot.state.ny.us>.
29	<b>Consistent (Across Borders) Preparations- aka- Preseason Preparation Plan</b>	3	Need to make pre-season preparation plans available to other states as a resource	<b>Clear Roads</b>	Colleen Bos <colleen.bos@ctcandassociates.com> will look at what has already been accomplished and make some recommendations to the Clear Roads TAC
30	<b>Criminal Background Checks</b>	0	Checking operator criminal background and clearing them per Homeland Security	<b>Clear Roads</b>	This will be addressed in the "Determine the Effect of CDL Medical Card Requirement" #21 study above.