



MINUTES

Clear Roads 2012 Technical Advisory Committee Spring Meeting:

Pooled Fund Project #TPF-5(218) - Test and Evaluation of Materials, Equipment and Methods for Winter Highway Maintenance

Tuesday- Thursday, March 27-29, 2012
Hotel Monaco, Salt Lake City, Utah

Attendees:

David Frame, California DOT	Tim Chojnacki, Missouri DOT	Allen Williams, Virginia DOT
Ron Wright, Idaho DOT	Justun Juelfs, Montana DOT	Monty Mills, Washington DOT
Annette Dunn, Iowa DOT	Mike Mattison, Nebraska DOT	Jeff Pifer, West Virginia DOT
Brian Burne, Maine DOT	Caleb Dobbins, New Hampshire DOT	Mike Sproul, Wisconsin DOT
Paul Brown, Massachusetts DOT	Mike Lashmet, New York DOT	Cliff Spoonemore, Wyoming DOT
Tim Croze, Michigan DOT	Larry Gangl, North Dakota DOT	Rudy Persaud, FHWA
Tom Peters, Minnesota DOT	Charles Goodhart, Pennsylvania DOT	John Scharffbillig, APWA
Troy Whitworth, Kansas DOT	Lynn Bernhard, Utah DOT	Colleen Bos, CTC & Assoc.

Aurora Attendees at Joint Session:

Jack Stickel, Alaska DOT	Leigh Jones, Utah DOT
Tina Greenfield, Iowa DOT	Robbie Prezioso, Virginia DOT
Dawn Gustafson, Michigan DOT	Mike Adams, Wisconsin DOT
Curt Pape, Minnesota DOT	Steve Albert, WTI
Travis Lutman, North Dakota DOT	Neal Hawkins, ISU/CWIMS
Max Perchanok, Ontario MOT	Chris Albrecht, ISU/CWIMS
Jason Norville, Pennsylvania DOT	

Materials Distributed

- Clear Roads Budget Overview
- Summary of Operating Procedure Changes: Membership and Participation
- Clear Roads Operating Procedures (changes tracked)
- 2012 Research Proposals
- 2012 Research Proposal Ranking Sheet
- Clear Roads Status Report
- 2011 Peer Exchange Problem Statements
- Clear Roads Social Media Plan: Subcommittee Recommendations

Tuesday, March 27, 2012 – Clear Roads Only

Introductions and Meeting Objectives

Chairperson Cliff Spoonemore kicked off the day with introductions of all attendees and a review of objectives:

- To select new projects for funding and RFP development, and;
- Meet jointly with Aurora to update each other on new and in-progress projects.

Cliff also presented Paul Brown with a letter and certificate honoring him for his past service as Chair.

Cliff welcomed the new members who were attending for the first time, David Frame from California DOT, Ron Wright from Idaho DOT, and Justun Juelfs from Montana DOT. He also welcomed Jeff Pifer who attended for the first time on behalf of the West Virginia DOT.

Lynn Bernhard also welcomed the members of the Technical Advisory Committee (TAC) to Utah.

Clear Roads Budget

Colleen Bos provided an overview of the Clear Roads budget, including amounts committed and obligated, amounts contracted, and estimated planned expenses. Clear Roads has approximately \$790,792 to spend on research this year.

Discussion and Ranking of Research Proposals

Each Clear Roads member that had proposed a project to be considered for funding in 2012 described the goal and scope of their proposed project. The entire group discussed the merits of each proposed project and then submitted individual rankings to determine funding selections. See the table at the end of this document for the details of the discussions that took place.

The TAC approved six projects for funding and identified two projects that would be addressed through unfunded activities:

Funded

- 1. Pacific Northwest Snowfighters**
Subcommittee: Monty Mills, Ron Wright, Justun Juelfs, Lynn Bernhard, David Wieder
Funding: \$25,000 for 2 years of funding at \$12,500 per year.
- 2. Establishing Effective Salt and Anti-icing Application Rates**
Subcommittee: Paul Brown, Monty Mills, Annette Dunn, Larry Gangl, Allen Williams, David Wieder, Max Perchanok, Mark DeVries
Funding: \$150,000
- 3. Snow and Ice Chemical Application Rate on Open Graded Friction Course Pavements, Gap Graded Pavements and Nova Chip Treated Roads.**
Subcommittee: Mike Lashmet, Tim Chojnacki, Paul Brown, Tim Croze, Cliff Spoonemore, Troy Whitworth
Funding: \$200,000
- 4. Snowplow Operator and Supervisor Training**
Subcommittee: Mike Sproul, Justun Juelfs, David Wieder, Troy Whitworth, Curtis Sanchez (UDOT), Mike Lashmet, Cliff Spoonemore, Monty Mills, Dave Frame
Funding: \$100,000

5. Comparison of Salt Distribution Systems

Subcommittee: Tim Croze, Lynn Bernhard, Paul Brown, Mike Mattison, Tim Chojnacki, Allen Williams, Tim Peters, Jack Mason (UDOT)
Funding: \$150,000

6. Improving Snow Plow Design

Subcommittee: Annette Dunn, Randy Gray (Maine DOT), Caleb Dobbins, Mike Mattison, Steve Spoor (Idaho DOT), John Scharffbillig, Lynn Bernhard, Jeff Pifer.
Funding: \$50,000

Unfunded Support

The following projects were ranked highly by the Clear Roads group but are being supported through unfunded efforts.

1. Sustainable Snow Removal System

Charlie Goodhart will submit this project to NCHRP for consideration due to its size and scope.

2. Salt Brine Primer

Charlie Goodhart is posting an RFP through PennDOT for a similar project, which will address this need.

>>Action Items

- *CTC & Associates*: Follow up with project champions and subcommittees to scope all selected projects and/or address any other next steps.
- *Monty Mills*: Serve as project champion for the Pacific Northwest Snowfighters efforts.
- *Paul Brown*: Serve as project champion for the Establishing Effective Salt and Anti-icing Application Rates
- *Mike Lashmet*: Serve as project champion for the Snow and Ice Chemical Application Rate on Open Graded Friction Course Pavements, Gap Graded Pavements and Nova Chip Treated Roads. project.
- *Mike Sproul*: Serve as project champion for the Snowplow Operator and Supervisor training project.
- *Tim Croze*: Serve as project champion for the Comparison of Salt Distribution Systems project.
- *Annette Dunn*: Serve as project champion for the Improving Snowplow Design project.

Social Media

The TAC reviewed the pilot usage of social media to promote winter maintenance and Clear Roads activities. The group discussed and agreed on the following:

- Facebook and Twitter have not proven to be useful channels to get out our message.
- Linked In seems to have good professional potential and a Clear Roads page should be established.
- Newsletters are driving a lot of traffic to the Clear Roads website. These should be posted on the Linked In page.
- All members should get involved with Linked In, if their state allows access to the site.

>>Action Items

- *CTC & Associates*: Deactivate Facebook and Twitter accounts and set up a Linked In page for Clear Roads.
- *All*: Get involved in winter maintenance discussions on Linked In.

AASHTO Tow Plow TIG Request

Tim Chojnacki conveyed a request on behalf of the AASHTO Technology Implementation Group (TIG) to establish a link from the Clear Roads website to the AASHTO TowPlow TIG website. TIG has a Lead States Team that has compiled useful information about the benefits of using TowPlows. They held a closeout meeting this month to wrap up a project they did evaluating the TowPlow as a focus technology. As part of their transition plan, they identified Clear Roads as a possible partner in continuing to support the use of the TowPlow. The Safety and Reliability Technical Working Group of the Subcommittee on Maintenance will also continue to support the results of this project.

Cliff Spoonemore moved to have a link established and Annette Dunn seconded the motion. The TAC agreed to link it to the Welcome page in the "What's New" section initially and to also have a long-term link on the Partnership page.

>>Action Items

- *CTC & Associates*: Establish the links on the Welcome and Partnership pages.

AASHTO SCOM Meeting

Clear Roads voted via email in February to have booth at the AASHTO Subcommittee on Maintenance meeting. The group discussed plans for the booth, which will be shared jointly with Aurora. They agreed upon the following:

- Those members attending the meeting should try to schedule time to drop in at the booth.
- Colleen will also have a list of Clear Roads members, titles and contact information with the members in attendance highlighted. This will allow non-members to identify members they can talk to even if members are not able to be at the booth.
- Someone should attend the Winter Maintenance Technical Service Program meeting on Saturday, July 14, 2012 to represent Clear Roads. Colleen will follow up with members of the Winter Maintenance Technical Service Program to see which Clear Roads members can attend.

>>Action Items

- *CTC & Associates*: Follow up with members of the Winter Maintenance Technical Service Program to see which Clear Roads members can attend.

Wednesday, March 28, 2012 – Clear Roads Only

Membership Definition Discussion

Paul Brown reviewed changes proposed by the membership subcommittee to the Clear Roads operating procedures based on a conversation last fall regarding the potential to include foreign members and what role vendors or contractors could have with Clear Roads. The subcommittee had recommended the following:

- That membership should not be limited to North America, although it should be clarified that members must be government agencies.
- That membership is not open to vendors, though Clear Roads reserves the right to invite them as guests on an ad hoc basis.

The TAC suggested the following clarifications to the revised operating procedures:

- Specify that membership fees are in US dollars.
- Clarify that "additional travel costs may apply" for members traveling from outside the US.

>>Action Items

- *CTC & Associates*: Update the operating procedures and send to the TAC for final approval.

Clear Roads Growth

Cliff Spoonemore addressed the growth of Clear Roads and the potential for the organization to grow larger. The group discussed whether changes were needed to the structure of meetings, projects and the research cycle due to the increase in members.

The group agreed that:

- Clear Roads is functioning well in its current format.
- It was important to encourage new members to get involved in projects.
- CTC should follow up with the three members who were unable to attend to encourage them to get involved in the new projects.

>>Action Items

- *CTC & Associates*: Follow up with members of the TAC who were not in attendance to see if they'd like to join a subcommittee for any of the new projects.

Computer-Based Training

The latest modules of the Computer-Based Training (funded by AASHTO, Clear Roads, Aurora and others) need review. Lee Smithson requested volunteers for review. Paul Brown, Lynn Bernhard, Troy Whitworth and Cliff Spoonemore volunteered.

>>Action Items

- *CTC & Associates*: Let Lee Smithson know that Paul Brown, Lynn Bernhard, Troy Whitworth and Cliff Spoonemore volunteered to review.

Future Meetings

Colleen Bos reviewed the challenges in finding hotel and meeting space in Charleston, West Virginia, and the group agreed that the meeting should be moved to Maine or New York. The meeting will be held September 25-27, 2012.

The group agreed that the Spring 2013 meeting will be held April 2-4, 2013 in Vancouver, Washington. CTC should check the AASHTO, APWA, TRB and other calendars to ensure there are no conflicts.

>>Action Items

- *CTC & Associates*: Check all appropriate calendars and proceed with meeting arrangements for Fall 2012 and Spring 2013.

Field Trip

The TAC visited three kinds of new intersections in the Salt Lake City area and learned about how UDOT plows each of them.

Wednesday, March 28, 2012 – Clear Roads and Aurora

Aurora 2012 Funded Projects Review

Chris Albrecht from Aurora reviewed the 5 projects funded for 2012:

1. **Validating the Accuracy of Pavement Condition Prediction from Various Sources (Max Perchanok)**
2. **Winter Weather Severity Index, Phase 2 (Tina Greenfield)**
3. **Cameras and Operational Impacts of Road Conditions (Leigh Sturges)**

4. **Communicating and Publicizing Road Weather and Operations Information to Decision Makers and Public Stakeholders (Joe Doherty)**
5. **Seasonal Weight Restrictions Demonstration (Max Perchanok)**

Aurora and Clear Roads discussed the potential to jointly develop a Pass Operations project if there is interest in 2013.

Clear Roads 2012 Funded Projects Review

See the table at the end of this document for details on each of the selected Clear Roads projects below.

1. **Pacific Northwest Snowfighters (Monty Mills)**
2. **Establishing Effective Salt and Anti-icing Application Rates (Paul Brown)**
3. **Snow and Ice Chemical Application Rate on Open Graded Friction Course Pavements, Gap Graded Pavements and Nova Chip Treated Roads (Mike Lashmet)**
4. **Snowplow Operator and Supervisor Training (Mike Sproul)**
Aurora has a related, but complementary project led by Tina Greenfield. The goal of that project is to develop a computer-based training and evaluation course for supervisors that includes a simulator to present them with complex situations involving bad forecasts, morphing weather and other challenges. Mike and Tina will keep each other informed on the progress of each project.
5. **Comparison of Salt Distribution Systems (Tim Croze)**
Max Perchanok noted three TRB reports that provide some background for this project. Minnesota, Ontario Sweden and Denmark have also done related research.
6. **Improving Snow Plow Design**

>>Action Items

- *Mike Sproul and Tina Greenfield:* Keep each other informed on the progress of these two complementary training projects.
- *Max Perchanok:* Provide references for the research related to the Comparison of Salt Distribution Systems project.

Aurora Research in Progress

Chris Albrecht reviewed their projects in progress:

1. **Benchmarking the Performance of RWIS Forecasts**
2. **Benefit/Cost Analysis and Instruction for Migrating to Open RWIS**
3. **Determining RPU and Sensor Failure**
4. **Development and Demonstration of a Freezing Drizzle Algorithm for ESS**
5. **Development of a National Road Weather Testing Program**
6. **Enhancements of AI/RWIS CBT**
7. **Funding Sources Identification**

8. **Further Development of PPAES**
9. **MDSS Demonstration in Ontario**
10. **Mobile Weather Data Collection Guidelines**
11. **Multiple-Use ITS Data Collection Practices**
12. **Results-Based Winter Maintenance Standards**
13. **Road Weather Education Enhancements and Dissemination**
14. **RWIS Equipment Monitoring System, Phase 2**
15. **RWIS Sensor Density Grid**
16. **RWIS Training Tool**
17. **Study of MDSS Costs**
18. **Summary and Comparison of the Lufft R2S and Other Sensors**

Additional information on each of these projects is available here: <http://www.aurora-program.org/projects-underway.cfm>

Clear Roads Research in Progress

Clear Roads Project Champions reviewed their projects in progress:

1. True Costs of Winter Maintenance

Paul Brown described the progress on this project. Currently the PI is gathering cost data from pilot states and analyzing it. It's not easy to find states with robust enough data, and one outcome of the research may be that we discover states are not tracking the costs necessary to understand true costs.

Paul requested additional states (especially western and Midwestern) to submit their data for the pilot phase. Iowa, Utah, Montana, Kansas and Missouri all indicated a willingness to explore whether the data they track could be useful for the pilot. .

2. Mapping Weather Severity Zones

Paul Brown also described this project, which is related to the True Costs of Winter Maintenance. The project is progressing well, although Meridian has found that some western states have sparser data on past weather events. The group discussed that this project is not developing a winter severity index per se, although the result will be an applied index that displays historical data in a graphical format, similar to plant hardiness zones.

Aurora is interested in the outcome of this project. It might influence their weather indexes. Aurora indexes could also help deliver different kinds of maps for comparison.

3. Cost-Benefit Toolkit: Phase II

Paul Brown described this project, which builds on the Cost-Benefit Toolkit delivered in 2010. It fixes some issues and expands the functionality. WTI is currently conducting a survey to determine what topics will be included in Phase II development. Paul asked everyone to make sure that they respond to the survey.

4. Toxicity of Deicing Materials

Ron Wright provided an update on this project to toxicity rankings of deicing chemicals. The subcommittee has identified the chemicals for testing.

5. Totally Automated Spreading System

Charlie Goodhart described the goal of this project to automate salt dispensing as much as possible. The project looks at both how to enhance current systems and how make the best use of the latest technology to build an automated system from scratch.

The results of this project may prove useful for the Sustainable Snow Removal Project that Charlie is submitting to NCHRP. He will be requesting review of his proposal by both Clear Roads and Aurora members before it goes on to SICOP and then NCHRP.

6. Environmental Factors Causing Fatigue in Snowplow Operators

Allen Williams reviewed the goals of this project, which will look at the environmental stimuli that contribute the most to operator fatigue and recommend practical, low-cost mitigation solutions. A vendor has been selected and MnDOT is working to get a contract in place.

7. Snow Removal at Extreme Temps

Mike Sproul explained this project to review best management practices for maintaining clear roads at extremely low temperatures and develop some cost effective strategies for getting the roadway to a bare/dry condition in extreme temperatures. This project is just getting under way.

>>Action Items

- *CTC & Associates*: Connect Annette Dunn, Lynn Bernhard, Justun Juelfs, Troy Whitworth and Tim Chojnacki with Andrew Cadmus to determine if they can supply data for the True Costs project.
- *CTC & Associates*: Keep Aurora updated on the progress and outcome of the Weather Severity Mapping project.

National Winter Maintenance Peer Exchange - 2011 and 2013

2011 Peer Exchange

Clear Roads and Aurora meeting attendees reviewed the status of the projects assigned to each pooled fund. Both pooled funds continue to make progress on assigned projects. Details on the progress can be found on the Western Transportation Institute's website:

<http://www.westerntransportationinstitute.org/professionaldevelopment/peer-exchange/default.aspx>

Colleen noted that several projects that were assigned to Clear Roads and not funded for 2012 seemed appropriate for synthesis reports. Clear Roads will be working with member agency research programs to see if they are willing to do synthesis reports to address some of these topics.

2013 Peer Exchange

The group discussed the possibility of a 2013 Winter Maintenance Peer Exchange. Lee Smithson (AASHTO) is willing to take the lead on planning and is tentatively considering Lewistown, Montana as a location. Clear Roads and Aurora discussed the following:

- It may be possible to streamline both the Peer Exchange agenda and the Clear Roads and Aurora meeting agendas, so that the events could be combined and travel minimized for members of those organizations.
- Technology transfer seems to be an issue with winter maintenance research. The challenge is to get states that are not a part of Clear Roads or Aurora more updated on the materials that exist. Many of their suggested research topics are not still research needs so the word is not getting out about existing research results. The Peer Exchange should attempt to address technology transfer.

- The Case Studies presented in the evening had a lot of impact. There should be more of peers reporting to each other and sharing best practices. Perhaps each state (or at least Clear Roads/ Aurora members) could bring an innovation to share for 2013.
- There is also a concern that the peer exchange needs to either target a “director” level that has more decision-making power or include a component to help guide attendees on how to share the information they gather from the Peer Exchange both upwards and downwards in their organization.

The following attendees volunteered to assist in planning the 2013 Peer Exchange: Monty Mills, Annette Dunn, Allen Williams, Charlie Goodhart, Dawn Gustafson, Jason Norville, Mike Adams.

>>Action Items

- *CTC & Associates:* Make sure Lee Smithson is aware that Monty Mills, Annette Dunn, Allen Williams, Charlie Goodhart, Dawn Gustafson, Jason Norville, and Mike Adams are willing to help with planning the 2013 peer exchange.

Thursday, March 29, 2012 – Clear Roads and Aurora

Clear Roads and Aurora Round Robin State Reports

Each attendee presented briefly on challenges and successes with their state’s winter maintenance programs and some consistent themes were presented:

Common Challenges

- Staff reductions due to the aging workforce; losing staff to retirement buyouts and downsizing.
- Difficulty recruiting and retaining quality staff given the wages and benefits offered, as well as the administrative requirements for hiring.
- Training new people effectively with so much staff turnover.
- Budget cutbacks require agencies to do more with less; many states are minimizing pavement preservation programs.
- Contracting maintenance out to third parties, which requires the development of effective performance metrics for such contracts.
- Older SSI and Vaisala systems getting obsolete and requiring transition to a more modern RWIS system.
- Salt storage is an issue because of the light winter and most agencies using much less than anticipated.
- Finding the best way to automate data collection, so you can gather and deliver the right information quickly.

Effective Solutions

- Updating performance measures for snow and ice maintenance and engaging in more comprehensive reporting and tracking.
- Implementing training and practices to reduce salt usage, including reporting on individual driver usage.
- Starting to use more salt brine and purchasing brine-making equipment.
- Piloting and further implementing MDSS.
- Implementing more RWIS stations and updating networks.
- Developing apps for consumers for iPhones and Androids.
- Implementing AVL systems.
- Piloting towplows, which helps with staff reductions.

Environmental Impacts

Paul Brown led a discussion regarding the environmental impacts of snow and ice control. The Northeastern region of the country is facing a lot of challenges given the high levels of service

expected combined with the concerns about environmental impacts. The group discussed some of the challenges and opportunities in addressing these issues, which are likely to reach other regions in the future.

Challenges

- Providing safe roads without resulting in too much chloride in the water supply.
- Permits can hold up construction projects, yet state agencies are often only responsible for 15% of chloride impacts in a given area.
- The responsibility for chloride loading is placed on state agencies rather than private companies that have more impact.
- As more states work with contractors, it can be more difficult to control the amount of salt they put down.

Opportunities

- Agencies can focus on being good stewards of the environment and highlight the positive practices to interested stakeholders.
- Be proactive and conduct testing before permits or regulations require it. This helps stakeholders to recognize that you are concerned and are being proactive.
- Develop standard operating procedures on salt management, including storage (which can be a significant hazard).
- Work with other states in your region to help educate the environmental agencies and other interested groups on your efforts and the best strategies for reducing chloride impacts from winter maintenance.
- Structure contracts to provide incentives for contractors to use less salt.
- Use technology, such as MDSS and AVL to help gather the data necessary to explain your level of service and use of materials.

>>Action Items

- *CTC & Associates*: Gather salt management plans from all states and save them in the Members Only section of the Clear Roads website.

Research Project Presentation Discussion

Title	Summary	Proposed by	Notes
Synthesis of Best Practices for Pass Operations	The goal of this project is to identify best practices for winter operations dedicated to keeping mountain pass highways open to travel. Mountain states dedicate a large part of their winter budget to these operations, so there are also large opportunities for savings. The project would explore bank cutting, shoulder widening, drift prevention, avalanche mitigation and other practices used on mountain pass highways.	David Wieder, Colorado DOT	<p>Background</p> <ul style="list-style-type: none"> • Clear Roads has seven states with mountain pass operations and this project would synthesize their best practices. <p>Questions and Discussion</p> <ul style="list-style-type: none"> • Since towing operations, chain enforcement, and crew scheduling could all have broader appeal, this would benefit more than just the mountain states. • The TAC discussed whether this was just a synthesis or whether analysis and recommendations were needed. • The group also discussed whether this should be focused on the US or internationally.
Installation and Evaluation of Mobile Salinity Sensors and Data Integration	This project would examine international salinity sensor systems technology. Specifically it would look at freeze/thaw technology being used in Sweden and refractometer technology being used in Japan. These technologies have been employed in both countries for several years to help optimize their snow and ice control operations. The tasks would include installing sensors and related equipment, integrating data flow into maintenance management systems, and performing field evaluations.	Annette Dunn, Iowa DOT	<p>Background</p> <ul style="list-style-type: none"> • Iowa has been trying to find salinity sensors to put into their GPS/AVL system in Iowa, but the two available models are expensive, so they would like to do a pilot. • The sensors have the potential to help them reduce their salt usage. <p>Questions and Discussion</p> <ul style="list-style-type: none"> • The group discussed whether this should be an Aurora project. • The TAC discussed whether other sensors could also be tested as a part of the pilot.

Research Project Presentation Discussion

Title	Summary	Proposed by	Notes
Improving Snow Plow Design	The goal of this project is to identify new materials, technologies, designs and other components for snow plows and rate them according to performance criteria. Researchers would develop a matrix of the designs, materials and technologies tested and their performance characteristics. The proposed matrix would help agencies determine which of the latest commercially available innovations could be used to optimize their snow removal operations.	Annette Dunn, Iowa DOT	<p>Background</p> <ul style="list-style-type: none"> • This project was funded in 2011, but there were no proposals submitted for the project as originally scoped. • For 2012, the subcommittee would like to develop a more streamlined scope. <p>Questions and Discussion</p> <ul style="list-style-type: none"> • The group discussed folding this project into the sustainable snow removal system project.
Snow and Ice Chemical Application Rate on Open Graded Friction Course Pavements, Gap Graded Pavements and Nova Chip Treated Roads.	The goal of this project is to identify the best methods for treating Open Graded Friction Course pavements, Gap Graded pavements and Nova Chip treated roads. Currently, field personnel are reporting several issues relating to pavement performance when applying deicing chemicals on these pavements. For example, the road appears to refreeze more quickly, stays wet longer, and requires 25-30% more de-icing chemical. This project would investigate these concerns and propose mitigating treatment options.	Paul Brown, Massachusetts DOT; Mike Lashmet, New York State DOT	<p>Background</p> <ul style="list-style-type: none"> • There are challenges with chemical application to the Open Graded Friction Courses, Gap Graded pavements and Nova Chip treated roads. • One Swedish study indicates these pavements require 30% more salt, but they are very popular. <p>Questions and Discussion</p> <ul style="list-style-type: none"> • Quantifying the costs of maintenance for these types of roads would allow agencies to weigh the costs and benefits of using them. • Best practices for maintaining these roads are also needed. • Porous pavements may also need to be evaluated. • A comparison of different pavement types could be helpful as well.

Research Project Presentation Discussion

Title	Summary	Proposed by	Notes
Establishing Effective Salt and Anti-icing Application Rates	This goal of this project is to establish new guidelines for applying the latest methods, procedures and materials available in snow and ice operations. Researchers would establish effective material application rates for a broad range of chloride-based anti-icing and de-icing products, develop a crosscheck list to recommend alternative products to chlorides that provide similar results, and develop guidelines for the use of these products, including when best to apply them and how much is effective for specified winter storm categories.	Paul Brown, Massachusetts DOT; Monty Mills, Washington State DOT	<p>Background</p> <ul style="list-style-type: none"> • This project was ranked very highly at all three peer exchanges. <p>Questions and Discussion</p> <ul style="list-style-type: none"> • The goal is to update TE 28 with information on new materials. Traffic volumes and different pavement types may also be elements that need an update. • The TAC discussed the need to adjust and tailor recommendations to each state's conditions. Providing a range of rates and some additional operational guidelines would help provide appropriate guidance. • Technology transfer will be a very large part of this project both to promote TE 28 and also the additional updates. • Both anti-icing and deicing will be addressed in this project, but the emphasis will be on anti-icing strategies. Pre-wetting will be addressed as well.

Research Project Presentation Discussion

Title	Summary	Proposed by	Notes
Comparison of Salt Distribution Systems	The goal of this project is to determine which salt distribution systems are the most effective at reducing bounce and scatter. The scope would involve finding as many types of salt distributions systems in use as possible and then picking several of the most common types of systems to perform a field evaluation at different application speeds.	Tim Croze, Michigan DOT	<p>Background</p> <ul style="list-style-type: none"> • Michigan has 12 different salt distribution systems around the state and would like to identify and study as many delivery systems as possible used by state agencies to determine which is most efficient and effective. • They would conduct field testing for the most common types, looking at placement and retention. • They would also like to document pictures, benefits and contacts for each system. <p>Questions and Discussion</p> <ul style="list-style-type: none"> • MnDOT may have some testing that could provide some initial findings. • MnDOT has some video from their testing that should be added to the Members Only section of the Clear Roads website.
Plowing During Whiteout Conditions	The objective of this research is to identify the technology available to equip a snowplow truck to operate in “auto pilot” during conditions of zero or near zero visibility. Such technology would keep the vehicle moving in the predetermined path and also include crash avoidance capabilities.	Tim Chojnacki, Missouri DOT	<p>Background</p> <ul style="list-style-type: none"> • When interstates are closed down the impact on commerce is huge. MoDOT would like to find a way to keep plows moving when they ordinarily have them pull over due to safety. <p>Questions and Discussion</p> <ul style="list-style-type: none"> • CalTrans and Alaska DOT are doing some research on this topic, so a synthesis report could be useful. • MnDOT also has a limited project to explore allowing trucks to keep moving in whiteout conditions. • Infrared and radar are technologies being used for avoiding collisions.

Research Project Presentation Discussion

Title	Summary	Proposed by	Notes
<p>Determining the Effect of Pavement Surface Type on Snowplow Blade Life</p>	<p>This project will compare blade life in controlled field tests on chip sealed highways for different types of aggregates. Based on the results researchers will develop strategies to mitigate the impacts of the aggregates on blade life, such as through blade selection, operator technique, skid plates and other solutions. The cost of more frequent blade replacement will be compared with the cost of aggregate options and mitigation strategies. The project will also document advantages and trade-offs of the various options, as well as the effect of each mitigation strategy on snow plow damage to road surfaces.</p>	<p>Mike Mattison, Nebraska DOR; Troy Whitworth, Kansas DOT</p>	<p>Background</p> <ul style="list-style-type: none"> • Certain pavements (especially granite and quartzite chip seals) cause greater wear and tear on plow blades, especially in the first few years. Different aggregates have different impacts on plow blade life. • The goal is to look at what type of materials selections or mitigation strategies could help address these issues. <p>Questions and Discussion</p> <ul style="list-style-type: none"> • Field testing would be a necessary component. • The project needs to provide more scientific analysis of whether there is a tradeoff between the costs of pavement and the costs of blades. • Testing would be conducted on dry pavement, so that it was not necessary to plan around storm activity. • There would be logistical challenges to finding a long, controlled route that has the right pavement type.

Research Project Presentation Discussion

Title	Summary	Proposed by	Notes
Sustainable Snow Removal System	<p>This goal of this study is to design a Sustainable Snow Removal System that:</p> <ul style="list-style-type: none"> • Reduces the use of chemicals • Reduces the energy it takes to perform services • Reduces highway accidents/fatalities • Maintains or increases the level of winter service • Increases the life of pavement markings-RPMs-paint lines • Reduces the damage to pavement surfaces, and • Reduces deleterious impacts to the environment, highways, bridges, appurtenances and equipment. <p>The researcher would work with pavement and materials engineers, truck/body manufacturers, plow/blade manufactures, pavement marking firms, spreader control manufactures, weather forecasters or MDSS providers, etc. to develop and design a Sustainable Snow Removal System.</p>	Charles Goodhart, Pennsylvania DOT	<p>Background</p> <ul style="list-style-type: none"> • The goal is to work with a variety of stakeholders to develop and design a sustainable snow removal system according to multiple criteria to mechanically remove snow from the pavement as effectively as possible. <p>Questions and Discussion</p> <ul style="list-style-type: none"> • This is so large it may need to be an NCHRP study. Clear Roads could try to assist in getting it funded by NCHRP.

Research Project Presentation Discussion

Title	Summary	Proposed by	Notes
<p>Measuring Road Surface Friction from Tire Slip Differential</p>	<p>The goal of this project is to identify a reliable and repeatable means of measuring road surface friction that would provide roadway maintenance organizations with the data to better measure performance and direct snow/ice removal operations. Researchers would collect tire slippage data from thousands of vehicles on the roadways and use it to develop an indication of road surface friction.</p>	<p>Allen Williams, Virginia DOT</p>	<p>Background</p> <ul style="list-style-type: none"> • Virginia has tried to measure the grip surface friction using a number of devices previously. Newer vehicles that have traction control anti-lock brakes could provide this data. • This appears to be the best way to understand the condition of the whole network rather than just testing one location. <p>Questions and Discussion</p> <ul style="list-style-type: none"> • Curt Pape and Gabe Guevara are already doing something like this via the Connected Vehicle Data Capture and Management project.
<p>Suitability of Salt Loving Plantings along Roadways and Their Usability to Recycle for Deicing</p>	<p>This study would determine if plants that absorb and hold salts within their biological structure (halophytic plants) could be planted along roadsides, harvested after absorbing salt from winter operations, and then converted into a de-icing agent (biochar) as a means of recycling the salts placed on the roadways. The scope would include a field evaluation of four roadway treatments (biochar only, salt-rich biochar only, biochar combined with salt, and salt only).</p>	<p>Allen Williams, Virginia DOT</p>	<p>Background</p> <ul style="list-style-type: none"> • There is always a push to minimize and remove chlorides from the environment while still maintaining a good level of service. • This study would look at salt-loving plants that can be used along the roadsides that would take up salt and recycle it. <p>Questions and Discussion</p> <ul style="list-style-type: none"> • The state of Ohio and Dow Chemical (Jim Gall) have both done studies on salt-loving plants. • Such plants are often invasive species in the Snowbelt and when they get into a low salt environment they breed aggressively. They could cause more problems.

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Pacific Northwest Snowfighters (PNS)	The purpose of this project is to identify funding for PNS and to structure a relationship between PNS and Clear Roads. Without a steady and reliable source of funding to continue its core mission, PNS could lose the ability to keep the specifications and the Qualified Product List (QPL) viable as a standard for other states and provinces to rely upon. This project would ensure that PNS could continue to coordinate materials testing and standards for deicing chemicals.	Monty Mills, Washington DOT	<p>Background</p> <ul style="list-style-type: none"> • Most of the PNS states have joined Clear Roads. • In 2011 Clear Roads had approved funding to allow PNS to continue deicer testing, but additional discussion was needed on the administration of the funding and partnership. • Updated cost estimates were developed to cover lab testing, website support and a travel stipend. • An administrative process has been identified for transferring the funding to the PNS pooled fund – TPF-5(035). <p>Questions and Discussion</p> <ul style="list-style-type: none"> • PNS would like to provide travel funding to the annual PNS meeting for a couple of “at large” Clear Roads members. • PNS would appreciate input from other states on what new products they would like to see tested. • PNS would do an annual report for Clear Roads on their activities. • PNS would make sure that the Clear Roads name is on the PNS website. • The goal is to provide on-going funding, renewing it every two years.

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Snowplow Operator and Supervisor Training	The objective of this project is to create training courses for operators and supervisors using all the best training materials and practices from all the Clear Roads states. It would organize them into classroom courses that could be utilized by any Clear Roads member state.	Michael Sproul, Wisconsin DOT	<p>Background</p> <ul style="list-style-type: none"> • Wisconsin did a synthesis report on training materials and realized there is a lot of great training material in use by state agencies. • The goal of this project would be to develop a curriculum using the best of the training that exists. <p>Questions and Discussion</p> <ul style="list-style-type: none"> • This would be complimentary to the existing CBT. • Ideally there would be a core curriculum and there would be flexibility to tailor it to each states needs. • The project would result in booklets and supporting materials as well. • The group discussed providing some kind of official “qualification” designation at completion of the training.
Salt Brine Primer	The goal of this project is to consolidate information on the formulation, production, storage, application, methods and application rates for sodium chloride brine. Researchers would gather the best available information on salt brine, including the identification of brine blends, admixtures, enhancements, etc. that may be used as a guide for future research and reference.	Kyle Stollings, West Virginia DOT	<p>Background</p> <ul style="list-style-type: none"> • West Virginia just started using salt brine and could see the value of a handbook for agencies just getting started with it. <p>Questions and Discussion</p> <ul style="list-style-type: none"> • PennDOT has an approved research project to develop a manual on making quality salt brine.

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LOS for Winter Mobility	<p>The goal of this project is to develop a level of service (LOS) for snow and ice control based on traffic speed and congestion. RWIS data, traffic speed measurements and traffic counts can all be used to relate road and weather conditions to speed and congestion. This will enable DOTs to have a clearer picture of the impacts and costs associated with varying levels of service during snow and ice operations.</p>	David Wieder, Colorado DOT	<p>Background</p> <ul style="list-style-type: none"> The goal is to focus on traffic speed and level of congestion to measure level of service. <p>Questions and Discussion</p> <ul style="list-style-type: none"> This project is looking at both societal and agency costs with respect to assessing levels of service.