



MINUTES

Clear Roads 2017 Technical Advisory Committee Spring Meeting:

Pooled Fund Project #TPF-5(218) & TPF-5(353)

Tuesday – Thursday, April 25-27, 2017

Clarion Suites, Anchorage, Alaska

Attendees:

Mike Coffey, Alaska DOT	Brian Burne, Maine DOT	Jason Humphrey, South Dakota DOT
Tom Renninger, Alaska DOT	Sandi Sauter, Maryland SHA	Brandon Klenk, Utah DOT
Mark Trennepohl, Arizona DOT	Russell Yurek, Maryland SHA	Todd Law, Vermont AOT
David Frame, California DOT	Sam Salfity, Massachusetts DOT	Allen Williams, Virginia DOT
Kyle Lester, Colorado DOT	Justin Droste, Michigan DOT	James Morin, Washington State DOT
John DeCastro, Connecticut DOT	Tom Peters, Minnesota DOT	Jeff Pifer, West Virginia DOT
Alastair Probert Delaware DOT	Todd Miller, Missouri DOT	Jim Hughes, Wisconsin DOT
Ron Wright, Idaho TD	Anita Bush, Nevada DOT	Cliff Spoonemore, Wyoming DOT
Tim Armbrecht, Illinois DOT	David Gray, New Hampshire DOT	Rick Nelson, AASHTO
Tony McClellan, Indiana DOT	Patti Caswell, Oregon DOT	John Scharffbillig, APWA
Craig Bargfrede, Iowa DOT	Jon Fleming, Pennsylvania DOT	Paul Pisano, FHWA
Clay Adams, Kansas DOT	Joe Bucci, Rhode Island, DOT	Greg Waidley, CTC & Associates

Materials Distributed

Agenda	Research/Synthesis Ranking Sheets
Attendees List	Project Mgmt – Roles/Responsibilities
Clear Roads Budget Overview	Project Subcommittee Members
TAC Contact List	MnDOT RFP Development Process
2017 Research/Synthesis Proposals	Research In-Progress

Tuesday, April 25, 2017

Welcome

Steven Hatter, Deputy Commissioner, Alaska DOT/PF, provided opening remarks and a welcome to Alaska.

Introductions and Meeting Objectives

Chairperson Justin Droste kicked off the day with introductions of all the attendees, a brief re-cap of the changes in TAC membership since the fall meeting, and a review of the objectives for day 1.

Changes in TAC membership:

States Added

- Maryland, Sandi Sauter

TAC Members Replaced

- California – David Frame replaces Chris Smith
- Illinois – Tim Armbrecht replaces Ruben Boehler
- Indiana – Tony McClellan replaces Drew Storey
- Montana – Doug McBroom replaces Tony Strainer
- New Hampshire – David Gray replaces Caleb Dobbins
- South Dakota – Jason Humphrey stands in for Dan Varilek
- Wisconsin – Jim Hughes stands in for Mike Sproul
- Nevada – Anita Bush attends as a guest of Clear Roads

Every Day Counts

Paul Pisano, FHWA, asked the states to give consideration to what they're doing to meet the goals of EDC.

Clear Roads TAC Vice Chair

With Justin Droste completing his 2 year term as Chair, Brian Burne will become the new Chair. Therefore, Clear Roads needs to nominate and vote for a new Vice Chair.

Justin Droste re-opened the nomination process for Vice Chair. The following TAC members were nominated:

- James Morin
- Patti Caswell

James Morin was elected Vice Chair via a paper vote.

Discussion and Ranking of Research Proposals

The group presented and discussed 15 research proposals submitted by TAC members. The notes detailing the proposals and the discussions that followed can be found at the end of the minutes. After all the proposals were presented, each voting member of the TAC submitted rankings for each proposal, based on each project's own merit, using a 1-5 scale (5 being the greatest need). Those votes were tallied after day 1 of the meeting and presented at the beginning of day 2. The list of research proposals submitted and brief notes on each are included at the end of the minutes.

The goal was to focus on larger projects, combining projects as able - ideally 3-4 projects per year. Discussions of funding also took place to ensure adequate funding for any modifications to the project scopes.

Discussion of Synthesis Projects

The group presented and discussed ten synthesis project proposals. This includes two proposals carried over from the fall 2016 meeting and a renewal of the Winter Maintenance Data Statistics project. The latter was not represented using a proposal form – only a verbal discussion. The notes detailing the proposals and the discussions that followed can be found at the end of the minutes. Votes were submitted by the end of day 1, tallied, and presented at the beginning of day 2.

The process for approving synthesis projects at this meeting included reviewing research project ideas and then synthesis ideas, as there is potential overlap between the two discussions. The TAC then voted on synthesis projects with the same 1-5 scale. The TAC voted yes or no for each synthesis after research projects were selected.

Clear Roads Budget

Greg Waidley provided an overview of the Clear Roads budget, including amounts committed and obligated by the states, as well as the expenses from research, meetings, and administration. Clear Roads has \$659,930 to spend on new research projects from TPF-5(353) and an estimated \$39,220 from TPF-5(218), which may help to pay for new synthesis projects as only \$1,619.50 remains on Task 4 (Information Services).

Updating Operating Procedures

Justin Droste noted the need to update Clear Roads operating procedures, which was last done two years ago. A committee will be formed to review and suggest modifications to update and clarify the operating procedures to more effectively manage a larger and more complex research group.

Committee members: Tom Peters, Brian Burne, James Morin, Clay Adams, Jon Fleming, Allen Williams, and Tom Renninger.

- This committee will work with the Implementation Committee as appropriate.

Kyle Lester proposed a new way of doing business to ensure implementation of research results. In addition to the semi-annual meetings, Kyle proposes that we conduct regional meetings (perhaps peer exchanges) to focus on the dissemination of research results to district staff.

- Allen Williams noted that his district personnel are interested in adopting change but that his central office is much harder to convince.
- James Morin suggested that there may be opportunities to share our research efforts with other national or regional meetings/conferences.
- Patti Caswell noted that Clear Roads doesn't need to be pay for this kind of regional meeting if we use the Pacific Northwest Snowfighters as a model.
- Webinars are an excellent way to share information on state of practice, though it lacks some of the benefit of face-to-face communication.
- Clay Adams noted that we already do project closeout webinars. Those webinars typically have no more than 20 sign-ins. This means that there are close to 80 sign-ins available for the invitation of district staff.
- David Gray asked why we can't add a day to the regular meetings with webinar capability.
- Brian Burne noted that we need to be cognizant of burdening the lead state with additional logistical support of an additional meeting.
- Mike Coffey asked if we could do a hot topics section on the agenda where we cover items of interest in an impromptu manner.
- Paul Pisano noted that FHWA conducts Regional Roundtables (sometimes virtual).
- Clear Roads could add a webinar to some portion of the agenda to share information/best practices.
 - Several members observed that supervisors wouldn't sit down to participate in a webinar.
- Patti Caswell asked if states are currently sending their employees to winter conferences. If so, we could be targeting these venues.

- Allen Williams said that Clear Roads used to track all the conferences and try to send someone to each of them. At times, Clear Roads would also sponsor a booth.
- Kyle Lester would like to see an implementation plan attached to each Clear Roads project, as appropriate. This plan would target a deliverable that would ensure some kind of implementation.
- Perhaps Clear Roads can sponsor small site visits to allow more experienced states to share with less experienced states on topics particular interest.

ACTION ITEM: Greg Waidley will convene the newly formed committee to review/update operating procedures to begin addressing these concerns.

State Reports

Clear Roads representative presented initiatives/projects that have a potential impact on practice.

- Arizona: Mark Trennepohl

Wednesday, April 26, 2017

Selection of FY 2017 Research Projects

Based on the rankings received, the TAC approved the following five projects with total funding estimated at \$550,000. Subcommittee members were also assigned. The names underlined below will serve as co-chairs for the subcommittees. A ‘*’ denotes that a subcommittee member is a non-voting member.

A Comprehensive Guide to Pre-Wet

- Subcommittee: James Morin, Patti Caswell, Melissa Longworth, Brandon Klenk, David Gray, Mark Trennepohl, Tony McClellan
- Funding: \$250,000

Winter Preparedness Webpage

- Subcommittee: Brian Burne, Cliff Spoonemore, Jeff Pifer, Todd Miller, Frank Sharpe, Tom Renninger
- Funding: \$50,000

Integrating Advanced Technologies into Winter Operations Decisions

- Subcommittee: Kyle Lester, Jon Fleming, Sandi Sauter, Anita Bush*, Todd Law, John DeCastro, Melissa Longworth
- Funding: \$100,000

Standard Specification for Carbide Insert Blades

- Subcommittee: Cliff Spoonemore, Brian Burne, Ron Wright, Allen Williams, Tony McClellan, Clay Adams, Jason Humphrey*
- Funding: \$50,000

Aftermarket Cameras in Winter Maintenance Vehicles- Quantity and Location

- Subcommittee: Todd Miller, David Frame/Russell Modrell/Lisa Kutzman* (uncertain at this time which person from California will serve), John Scharffbillig*, Dan Varilek, Alastair Probert
- Funding: \$100,000

Selection of Spring 2017 Synthesis Projects

The TAC approved the following synthesis projects, by a “yes/no” vote, to be completed by CTC & Associates. The subcommittees will work with CTC & Associates to scope and complete the projects. A ‘*’ denotes that a subcommittee member is a non-voting member.

Accuracy of Salt Application Equipment

- Subcommittee: David Gray, Scott Lucas, Allen Williams, Cliff Spoonemore, Tom Renninger
- Funding: TBD

Use of Solid Materials for Anti-icing/Pre-treatment

- Subcommittee: James Morin, Patti Caswell, Brandon Klenk, David Gray, Jeff Pifer
- Funding: TBD

Effective Snow and Ice Personnel and Equipment Storm Activation

- Subcommittee: John DeCastro, Clay Adams, Joe Bucci, Sam Salfity, Todd Miller
- Funding: TBD

Website Search Function/Website Re-organization

- Subcommittee: Brian Burne, Jon Fleming, Tom Peters, Patti Caswell, John Scharffbillig*
- Funding: TBD

Annual Survey of State Winter Maintenance Data

- Subcommittee: Scott Lucas, Brian Burne, Allen Williams, James Morin, Melissa Longworth, Tom Peters, Jay Wells*, Pat Casey*

Role of Project Champion and Subcommittee Members

Per the document entitled Project Management – Roles and Responsibilities, Justin Droste emphasized the important role of a project champion and a co-champion in terms of keeping the project on track and the importance of selecting 5-7 committee members that are highly interested and fully engaged in the project. If a TAC member rotates off of Clear Roads, his or her replacement should fill the exiting member’s role on the project subcommittee. Champions and subcommittee members are also responsible to complete project closeout and Research Use surveys. At each meeting, subcommittees will be reviewed by the TAC and replacements will be assigned.

Next Steps in the Project Development Process

Greg Waidley briefly reviewed the next steps involved in developing the RFPs, including project scoping; posting RFPs; receiving, reviewing, and voting on the proposals submitted; and awarding the projects.

Research In-Progress Project Updates

For each active project, the TAC reviewed subcommittee members and assigned new members as necessary. Non-TAC members will be kept on the list, but names will include an asterisk. They will still receive project communications at their DOT emails, if appropriate.

- **12-03 Understanding the Chemical and Mechanical Performance of S&I Control Agents on Porous or Permeable Pavements**
 - Contractor: WTI
 - Subcommittee members: Mike Lashmet, Paul Brown*, Tim Croze*, Cliff Spoonemore, Clay Adams
 - End Date: February 2018
 - The research team is currently working on task 6, which is to analyze chemical and mechanical interactions. This includes a statistical data analysis to quantify the differences between porous/permeable pavements and dense, graded pavements. The PI is still working on drafting a white paper on the chemical and mechanical interactions, which she plans to complete this quarter. This project has an amendment in for extension to Feb. 2018 because of family medical leaves of both her supervisor and statistician.
- **12-04 Snowplow Operator and Supervisor Training**
 - Contractor: University of Minnesota
 - Subcommittee members: Mike Sproul, Clay Adams, Mike Lashmet, Cliff Spoonemore, Monty Mills*, Dave Frame
 - End Date: April 2017
 - All 21 modules (including one on driver education) are complete. The final report is being completed for subcommittee review. CTC is working on creating a home for the files on the Clear Roads website. For now they are available on an FTP site provided by the PI.
 - How do we incorporate the comments in the future? The group will meet by phone to further discuss the plan for managing the training materials.

ACTION ITEM: CTC will set up conference call for how to deal with comments.

- **14-02 Quantifying the Impact that New Capital Projects Will Have on Roadway Snow and Ice Control (RSIC) Operations**
 - Contractor: University of Vermont
 - Subcommittee members: Todd Law, Joe Bucci, Kyle Lester, Brad Darr*, Larry Gangl,
 - End Date: July 2017
 - Conducted the second round of field data for four case study routes in New Hampshire and Minnesota and began the development of the MS Excel decision-support tool. This project will be complete by the summer and will include the completion of the second round of case studies, the decision-support tool, and a report which contains recommendations for incorporating RSIC operations and maintenance considerations into the AASHTO Green Book.
- **14-03 Developing a Training Video and Manual for Best Practices and Techniques in Clearing Different Interchange Configurations and Other Geometric Layouts**
 - Contractor: Southern Illinois University, Edwardsville
 - Subcommittee members: Justin Droste, Mike Sproul, Jeff Pifer, Scott Lucas
 - End Date: September 2017
 - The animations for the nine developed intersection/ interchange diagrams are almost complete. The subcommittee has reviewed and provided comments on a sample reference card and the first five chapters of the practice manual. The research team will complete the animations, reference cards, and practice manual this summer.
 - Tom Peters has received interest from District staff. The project should be done by summer – in time for fall training.

- **15-01 Synthesis of Material Application Methodologies for Winter Operations**
 - Contractor: WSU
 - Subcommittee members: Paul Brown*, Jeff Pifer, John DeCastro, James Morin, Monty Mills*, Rick Nelson*, Max Perchanok*, Mark DeVries*, Wilf Nixon*
 - End Date: November 2017
 - Eighteen interviews were conducted with DOTs, cities, counties, and international transportation agencies. A memo providing the methods and highlights of the results was recently provided to the subcommittee for their review. The PI has recently begun work on the handbook.

- **15-02 Identification and Recommendations for Correction of Equipment Factors Causing Fatigue in Snowplow Operators**
 - Contractor: Virginia Tech
 - Subcommittee members: Allen Williams, Cliff Spoonemore, Patti Caswell, Todd Miller, Todd Law, Tom Renninger, John Scharffbillig*
 - End Date: November 2017
 - The project team shut down the online questionnaire in March. Approximately 1,000 operators completed the online version of the questionnaire. They also received approximately 900 paper versions of the operator questionnaire, for an estimated total of 1,900 respondents. The subcommittee provided the project team with contact information for equipment manufacturers in February. VTTI researchers are currently conducting phone interviews with these equipment manufacturers and anticipates this will be complete by end of April. A descriptive analysis of the responses from the questionnaire and interviews will be complete by the end of May. A prioritized scale of equipment fatigue factors will follow soon thereafter. The research team will consult the subcommittee to gather information regarding the costs associated with the identified solutions. The costs of implementing each solution will include all non-recurring costs (e.g., the initial cost of the equipment, installation, and initial training) as well as all recurring and operational costs (e.g., maintenance and training).

- **16-01 Utilization of AVL/GPS Technology: Case Studies**
 - Contractor: AECOM
 - Subcommittee members: Patti Caswell, Todd Miller, Mindy Heinkel, Craig Bargrede, Mike Lashmet, Mark Trennepohl, David Gray, Scott Lucas, Todd Hanley*
 - End Date: July 2018
 - This project was put under contract in early February and the kickoff meeting was held in late February. The literature review is almost done and the research team has initiated survey design.
 - A breakdown of the tiered approach to conducting the case studies was given in addition to an emphasis on the need to pay special attention to detail on the survey.

- **16-03 Standards and Guidance for Using Mobile Sensor Technology to Assess Winter Road Conditions**
 - Contractor: SRF Consulting
 - Subcommittee members: Kyle Lester, Cliff Spoonemore, Frank Sharpe, James Morin, Allen Williams, Dan Varilek, Jakin Koll*
 - End Date: April 2019
 - This project was put under contract in early February and we held the kickoff meeting on March 1. The research team has begun the literature review.

- This project seeks to rigorously test sensors and develop a national standards for their performance evaluation.
- The next step is to acquire devices and Colorado has offered to pay for devices if the donation of devices is a slow moving process. We want to have the devices ready to be tested by this winter.
- **16-04 Emergency Operations Methodology for Extreme Winter Storm Events**
 - Contractor: University of Vermont
 - Subcommittee members: Mike Lashmet, John DeCastro, Joe Bucci, Jon Fleming, Mike Sproul, Todd Law, Rick Nelson*
 - End Date: June 2018
 - This project was put under contract in early March and we held the kickoff meeting in late March. The research team has begun the development of the survey.
- **16-05 Weather Event Reconstruction & Analysis Tool**
 - Contractor: The Narwhal Group
 - Subcommittee members: Brian Burne, Patti Caswell, Alastair Probert, Todd Miller, Tom Renninger, Jeff Pifer, Joe Bucci
 - End Date: January 2019
 - This project was put under contract in early February and we held the kickoff meeting in late February. The research team has conducted an electronic survey of the subcommittee and submitted a list of data requirements based on the outcomes of the survey.
- **16-06 Training Video for the Implementation of Liquid-Only Plow Routes**
 - Contractor: Stonebrooke Engineering
 - Subcommittee members: Jeff Pifer, Scott Lucas, Tony McClellan, Brandon Klenk, Clay Adams, Paul Brown*, Anne Brown*
 - End Date: April 2018
 - This project was put under contract in early January and we held the kickoff meeting in late January. The research team has completed the literature review and is working on the survey of practice and collecting high resolution action footage.
 - Tom Peters stated that the footage is of liquid for pre-treatment in Minnesota. Also, there are not a lot of experts on the research team related to winter maintenance.
- **Pacific Northwest Snowfighters** (Ron Wright)
 - Subcommittee members: Ron Wright, James Morin, Patti Caswell, Kyle Lester, Brandon Klenk, Doug McBroom
 - PNS provides third party testing on the Qualified Products List (QPL) list. Send some testing to an independent laboratory in addition to what they do in-house. Eight products are waiting for evaluation.
 - Many states rely on the QPL. And the QPL has identified some vendor fraud. This just validates what the vendors are already reporting themselves - a safety net.
 - Ron Wright has encouraged people to use the website and to contact him if they have any problems or questions. PNS has received about six new products in the past five or six months.
 - Patti Caswell emphasized the great work of Ron Wright and how often states use the PNS as a resource for responding to public inquiries.
 - PNS has a balance of about \$105k. Depending on the needed work coming up, we will revisit the funding issue this coming spring. The PNS is going through a closing out of the pooled fund and opening a new one. CR will receive back a portion of their last \$30k. It will

be up to MnDOT to transfer those funds to the new pooled fund. The CR contribution primarily funds the QPL.

- **CR 13-05 Test Bed Software**
 - Tom and Greg provided an update on the test bed project, which has yet to be contracted.
 - Add Mark Goldstein, Melissa Longworth to this project.

Kyle Lester proposed that Clear Roads post RFPs states are advertising on our webpage. It was agreed by TAC members that this would be a good idea.

ACTION ITEM: Greg Waidley will create a list of links to state-sponsored RFPs for projects of interest to Clear Roads on the Members Only portion of the Clear Roads website.

SICOP and PIARC Report

Rick Nelson presented on the SICOP and PIARC organizations and their activities.

- AASHTO redesign of the SICOP website is underway.
- Launching social media products
 - SICOPTalksWinterOps.com
 - Facebook.com/aashtosicop
- Three-Year National Strategic Winter Maintenance Plan
 - Emphasis area is developing in Connected Vehicles/Automated Vehicles
- Social & Behavioral Science in the Weather Environment project wrapping up (NAS).
- National Winter Maintenance Peer Exchange
 - Double Tree by Hilton Hotel & Suites, Downtown Pittsburgh.
 - Week of September 11, 2017.
 - Tom Renninger asked when invited guests will arrive at the Peer Exchange as they may be able to attend the CR meeting as well. The TAC confirmed that state guests are okay but vendors will not be allowed to attend our meeting. Rick Nelson will check on this with Aurora, which is handling many of the logistics efforts of the Peer Exchange. Any limitations would likely have more to do with the availability of rooms available than anything else.

APWA Report

- New Executive Director: Scott Grayson
- APWA Winter Maintenance Subcommittee
 - Dan Schacher, Chair and Kevin Hensley, Vice Chair.
 - Two new members: Wayne Owens – Greenville, SC. and Bryan Beitzel – Village of Buffalo Grove, IL.
- 2017 APWA North American Snow Conference
 - Des Moines, IA – April 23-26.
 - Winter Maintenance Subcommittee meeting was held Saturday, 4/22 from 3-5 pm.
 - Future APWA North American Snow Conference Sites
 - 2018 – Indianapolis
 - 2019 – Salt Lake City
- 2017 Public Works Expo
 - Orlando, FL – August 27-30.
 - At least three winter maintenance sessions.
- 2017 Winter Maintenance Supervisor Certificate Schedule

- APWA Conference on April 23.
- APWA Western Snow Conference in Loveland, CO on Sept. 28-29.
- APWA Minnesota Chapter, Minneapolis, MN on November 15.

FHWA Report

- Two solutions for Weather-Savvy Roads
 - Pathfinder
 - Integrating Mobile Observations (IMO)
 - Minnesota IMO System Framework was provided as an example of implementation.
 - Provided US map of state involvement in Pathfinder and/or IMO programs.
 - Provided FHWA Team Leaders for each US region as a reference.
 - Next steps for Weather-Savvy Roads is to discuss state profiles with FHWA Division Offices.
 - FHWA conducts one-on-one talks with state DOTs to lay out an action plan.
 - Weather-Savvy Roads team will then...
 - Refine the product plan based on the high level action plans.
 - Get a technical support contractor in place.
 - Prepare for Road Weather Management Stakeholder Meeting (June 20-22, 2017 in Minneapolis).
- Weather Data Environment (<https://wxde.fhwa.dot.gov>)
 - Provides a shared repository for quality-checked road weather data and forecasts.
 - Provides road weather data for CV research, application development, and pilot demos.
 - Demonstrates and provides tools for agency road weather data management.
- Integrated Modeling for Road Condition Prediction (IMRCP) project objectives
 - Develop and integrated predictive system that...
 - Incorporates real-time and/or archived data and results from an ensemble of forecast and probabilistic models (atmospheric and road weather and hydrology; traffic; work zones and winter maintenance zones; incidents; special events; and demand).
 - Fuses them in order to predict the current and future overall road/travel conditions.
 - Intended for travelers, transportation operators, and maintenance providers.
- Stakeholder Meeting
 - June 20-22, 2017 in Minneapolis, MN.
 - FHWA will cover travel for two people per state DOT.
 - Topics will cover all aspects of Road Weather Management with a focus on Weather-Savvy Roads.
- Other Notables:
 - Road Weather Capability Maturity Framework (CMF) Workshops (Texas, Alaska, New Hampshire, Arizona, Illinois, and Nevada)
 - Deployment Guidelines for CV-Enabled Weather Responsive Traffic Management.
 - <http://ntl.bts.gov/lib/61000/61000/61004/FHWA-JPO-17-478.pdf>
 - 2017 RWM Performance Measures Survey
 - Road Weather Performance Management Tool is posted on the OSADP website at www.itsforge.net.

State Reports

Clear Roads representatives presented initiatives/projects that have a potential impact on practice.

- Arizona: Mark Trennepohl
- Rhode Island: Joe Bucci
- Kansas: Clay Adams

Thursday, April 27, 2017

Future Meetings

Spring 2018

Nominations: Arizona (Flagstaff/Phoenix/Tucson), Iowa (Des Moines), Colorado (Colorado Springs), Indiana (Indianapolis)

Vote: Arizona (Spring 2018), Iowa (Fall 2018)

If issues arise with Arizona, then Iowa would be a fall back in spring 2018. The Arizona city to hold the spring 2018 meeting will be worked out through discussion with Mark Trennepohl.

Fall 2017 (Peer Exchange)

The TAC decided that the Thursday afternoon session for consortia groups to meet will be used for a tour of snow and ice facilities in Pittsburgh or travel home. The joint meeting Thursday afternoon should be satisfactory for reviewing research problem statements.

Invited States:

- James Morin proposed that the TAC pay for Norway's participation (one guest) to the Clear Roads fall meeting/NWMPE or the 2018 spring meeting.
 - Clay Adams motioned that Clear Roads pay for the travel expenses/hotel for one guest from Norway to the fall 2017 CR/NWMPE. Motioned was seconded by Brian Burne. The TAC voted in approval.

ACTION ITEM: Greg Waidley will work with Brian Burne, James Morin, and Tom Peters to invite Norway to send a representative to the fall Clear Roads meeting/NWMPE.

Outcomes of Recently Completed Projects

- ***Plug and Play, Phase 2*** (Allen Williams)
 - Agency Survey
 - 16 states, four international agencies, and several local municipalities responded to the survey.
 - Many agencies are using wireless communications.
 - Industry Survey
 - Difficult to collect these responses due to proprietary data.
 - One entity that provides services to industry was able to respond and provide some valuable insight.
 - Determined gaps where data needs be collected but are not at this time.
- ***Snow Removal Performance Metrics*** (Allen Williams)
 - The objective was to learn more about what data states are collecting to develop performance metrics and how those metrics are being used to improve winter operations.

- Through this project, a lot of good data was collected and is included in the appendix to the final report. However, the TAC did not learn a lot about how performance metrics are used to improve winter operations.
- Project Subcommittee approved the final revised report.
- **Snowplow Route Optimization (Clay Adams)**
 - An overview of the research methodology and conclusions was provided. Then, three states talked about their route optimization efforts. All three states agreed that optimizing their plow routes resulted in very significant savings. Those states and their representatives were:
 - Utah, Brandon Klenk
 - Company – Spatial Matters (\$80k of maintenance funding); sole source
 - Base map – UT has a GIS group now but not at that time.
 - Wisconsin, Jim Hughes
 - Dane County/WisDOT contracted with C2 Logix for \$170k just for Dane County but this included obtaining licenses for the software and training. This is now being used to train additional counties at \$10k per county.
 - Base map – started with WISLR program.
 - Delaware, Alastair Probert
 - Also contracted with C2 Logix.
 - Kyle Lester and Brad Darr have talked about route optimization as well and are intending to send a proposal to AASHTO.
 - Greg Waidley will put Larry Gangl/Brad Darr in touch with the previous states to assist North Dakota with their efforts. ND had submitted a research proposal in the implementation of route optimization that did not receive funding.
- **North American Study on Contracting Snow and Ice Response (Justin Droste)**
 - Reasons for states moving to contracted services include:
 - Lack of agency resources
 - Legislative/executive pressure to reduce state workforces
 - Difficulty in retaining/replacing skilled workers
 - Added lane mileage
 - Effective practices include:
 - A working partnership between the state and contractor, either public or private.
 - Clear communication strategies and contract terms and conditions.
 - Lessons learned include:
 - The primary observation for contract success is communication.
 - The goals of the contractor and agency need to be same to ensure success.
 - Contract language and type is also a determinant of success.

2015 Clear Roads Project Proposals – Notes from TAC Discussion

Research Projects

#	Title	Est. Cost	Est. Duration	Project Summary/Discussions	Presented by
1	Reclaimed Water as an Alternative Water Source in the Production of Salt Brine	\$100,000	12 months	<p>This research will include a synthesis of current sources of water for brine production; an analysis of the chemical composition of wastewater effluent for its suitability for salt brine; a look at the environmental regulations and permitting necessary; and infrastructure needed to transport wastewater to brine production facilities.</p> <p><i>MD has a plan in place to reduce salt usage. They're down about 60% in five years. Therefore more reliant on liquid applications. Others are tasked with the responsible disposal of gray water, so can we use it for salt brine? Logistics evaluation may include looking at a brine farm at the treatment plant.</i></p> <p><i>CA – Should we just do a synthesis prior to going into a full research project?</i></p> <p><i>TR – Will each state have their own environmental regulations? So, will this be transferrable to all CR states?</i></p> <p><i>RW – There are also cost issues associated with the logistics. See WI's attempt to use bi-products of cheese production for salt brine.</i></p>	Group 1 Sandi Sauter, Maryland DOT

2015 Clear Roads Project Proposals – Notes from TAC Discussion

#	Title	Est. Cost	Est. Duration	Project Summary/Discussions	Presented by
2	Reducing Snow Plow Driver Fatigue by Modifying Human Behavior	\$200,000	18 months	<p>This project would confirm or reject the link between drivers’ quality of rest and driver fatigue. If confirmed, the investigator would develop a series of training materials for managers and drivers to help improve the quality of rest for drivers as well as practices managers can use during operations to identify and relieve the fatigue in drivers.</p> <p><i>AW – Currently looking at the equipment factors. This is related to human factors.</i></p> <p><i>SS – MA is seeing more accidents with spreaders due to driver fatigue.</i></p> <p><i>JD – Difficulty with agency enforcement.</i></p> <p><i>JB – Operators (vendors) don’t want to split shifts.</i></p> <p><i>PC – Sees this as a management issue.</i></p> <p><i>CA – There is plenty of training available related to OTR operators that states can apply.</i></p>	Group 1 Allen Williams, Virginia DOT

2015 Clear Roads Project Proposals – Notes from TAC Discussion

#	Title	Est. Cost	Est. Duration	Project Summary/Discussions	Presented by
3	Aftermarket Cameras in Winter Maintenance Vehicles- Quantity and Location, Snow Build up Prevention, Rear Facing Plow Cam, and Screen Fatigue	\$100,000 +	18 months	<p>The goal of this project is to have a synthesis and a set of guidelines that can be used by department of transportations and other winter maintenance agencies to guide applying aftermarket camera systems.</p> <p><i>Caltrans is going to AVL. This is more focused on the use of camera technology for the operator's benefit.</i></p> <p><i>JD – Interested in estimated costs to equip trucks.</i></p> <p><i>CB – This might be better as just a synthesis.</i></p> <p><i>Technology is changing so fast that after an 18 month project, the technology may have changed drastically.</i></p> <p><i>PC – Scope creep could end up being an issue. We really need to be specific about what the purpose of looking at the cameras is for. Meaning, is this for the benefit of the operator or the public?</i></p> <p><i>BB – There is also potential look at the hidden cost of this equipment (replacement frequency/cost, etc.).</i></p> <p><i>PC – End title with “quantity and location.”</i></p>	Group 2 David Frame/ Chris Smith (Lisa Kunzman), California DOT

2015 Clear Roads Project Proposals – Notes from TAC Discussion

#	Title	Est. Cost	Est. Duration	Project Summary/Discussions	Presented by
4	The Mona-Lisa of Pre-Wet	\$250,000	24 months	<p>The goal of this project is to: a) Identify optimal rates to meet pre-wet goals, b) Identify pre-wet delivery systems that are most effective at coating materials and c) Evaluate liquid product performance in meeting pre-wet goals.</p> <p><i>JD – Is there a look at the pre-wetting of stock piles?</i> <i>AW – Many variables involved in looking at how pre-wetting occurs – difficult to cover in this project.</i> <i>JM – This project is going to look at bounce and scatter to determine the optimal amount of pre-wetting to minimize the amount of salt going in the ditch.</i> <i>JD – How is the bounce and scatter test going to be conducted (in what environments)?</i> <i>JM – Testing to determine bounce and scatter, corrosion inhibition, and bond formation.</i> <i>CS – There is also a capacity issue in the truck (material and liquid capacity).</i> <i>MC – Is this going to look at pre-wetting sand as well?</i> <i>JD – Title: The Comprehensive Guide to Pre-wetting.</i></p>	Group 2 Patti Caswell, Oregon DOT James Morin, Washington State DOT
5	Clear Roads Program to Test/Compare Snow and Ice Equipment	\$100,000	12 months	<p>To develop and establish testing and evaluation standards for the unbiased review of snow fighting equipment.</p> <p><i>JD – How will this equipment be evaluated/scored?</i> <i>JP – Manufacturer would send in product for testing.</i> <i>TR – Talked previously on partnering with AASHTO with the SC on Equipment. Kim L. was going to follow up? Or EMTSE group. Clear Roads can pledge funds for AASHTO to get project funded through NCHRP?</i> <i>PC – Is this looking more at performance standards? Would prefer to tell the manufacturers what the CR states would like to see in terms of performance.</i> <i>RW – AASHTO’s NTPEP already does this.</i></p>	Group 2 Jeff Pifer West Virginia DOT

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6	Managing Resources (manpower and equipment) to Improve Operational Efficiency	\$150,000- \$175,000	18 months	<p>There's a critical need to match an agency's qualified manpower with the right, available equipment resources. The product of this research would be a set of recommendations for how to address equipment and personnel issues developed using case studies and communicated through a clear, easy to read document and PPT slides for the buy in of upper level management.</p> <p><i>AW – This comes down to \$\$ and most states don't have accurate enough data on funds spent (see True Costs of Winter Maintenance).</i></p> <p><i>PC – Thinks this might be an opportunity to point the finger at the need to collect more data.</i></p>	Group 3 Mark Trennepohl, Arizona DOT
7	Integrating Advanced Technologies into Winter Operations Decisions (BMP for Future of Winter Maintenance)	\$75,000- \$100,000	12 months	<p>The goal of this research is to develop a BMP guide spelling out the technologies available for winter operations; what these technologies measure; how to incorporate them into a winter maintenance operations strategy; and how to make the technology successful.</p> <p><i>PP – This might tie into the Weather Savy Roads program.</i></p> <p><i>JD – This project can sell to management the benefit of moving to new technologies for winter maint.</i></p> <p><i>KL – How do these technologies REALLY impact your operations?</i></p> <p><i>For a limited amount of funds, there would need prioritization to determine the most important technologies to address. A phase two might be needed to continue to tackle other technologies.</i></p> <p><i>TP/PP – FHWA assesses states' accomplishments in certain technologies.</i></p>	Group 3 Justin Droste, Michigan DOT

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8	Traffic Demand Management during Storms through Use of Variable Message Sign-mounted Cameras	\$100,000	18 months	<p>The goal is to provide messaging on a closer to real time basis than is now practicable, enabling better decision-making by drivers about whether to travel and what routes to use.</p> <p><i>JD – Could end up being a synthesis of best practices on how best equip VMS signs and conduct training.</i> <i>JH – Connecting this to winter operations only may be a bit short-sighted.</i></p>	Group 3 Mike Lashmet, New York State DOT
9	Using New Technologies to Train Snowplow Operators	\$125,000- \$150,000	18 months	<p>Develop a guide to assist trainers who are updating or developing training programs to incorporate the use of new technologies and social media as a supplement to the traditional educational delivery method.</p>	Group 3 Jon Fleming, Pennsylvania DOT
10	Combined Impacts of Magnesium, Calcium, and Sodium Chloride on Chloride Migration	\$200,000	24 months	<p>To determine the amount of chloride MgCl₂ and NaCl deicers potentially released into the environment and determine if combined use of these deicers influence total chloride releases or impact chloride mobility in the environment.</p>	Group 4 Patti Caswell, Oregon DOT
11	Standardized Specifications/Subject-Based Web Pages	\$10,000- \$20,000 each	6 to 12 months each	<p>Establish Clear Roads as a national resource for snow and ice information and specifications via web pages dedicated to specific categories that include information on research, specifications, product experience, and other information as applicable.</p> <p>This will promote better consistency and predictability for the various suppliers and contractors.</p> <p><i>Voted to remove this from the project list and treating this as an administrative project with CTC to scope out and conduct this project.</i></p>	Group 5 Brian Burne, Maine DOT

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12	Winter Preparedness Web Page	\$50,000	6 to 12 months	<p>Educate the masses in a clear, consistent, and professional manner via web pages dedicated to specific topics such as snow tires vs. all-season tires, tire chains, driving around plows, preparing your vehicle for winter, driving in snow, staying off the roads, etc. Also, provide a resource for driver education and an informative web link for each of our state DOT web sites.</p> <p><i>Should be developed such that not only can states view the webpage but also gain access to that information and modify it for their own purposes.</i></p> <p><i>Vendor would collect the information and provide it to Clear Roads so that CTC can upload onto the website.</i></p>	Group 5 Brian Burne, Maine DOT
13	Guide to Implementation of Snowplow Route Optimization	\$50,000	12 months	<p>Develop a process or guide to assist states, which have not yet optimized their snowplow route system, describing how to proceed with the implementation of that process.</p> <p><i>Now that we've determined which states have route optimization tools, this project would help states take the first steps in terms of implementing their own optimization tool.</i></p>	Group 5 Larry Gangl, North Dakota DOT
14	Online pre-treatment advisor	\$75,000	6 months	<p>The goal of this project is to have an online tool that will allow a person to enter data such as chemicals available for pretreating, and the road and weather conditions, and the output of the tool will be to provide an effective pretreatment plan.</p> <p><i>TP – May be short on time allotted.</i> <i>JD – Would like to incorporate anti-icing in the title.</i> <i>KL – There is a CODOT project on the “do’s and don’ts” for anti-icing.</i> <i>Go to 12 months.</i></p>	Group 5 David Gray, New Hampshire DOT

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15	Standard Specification for Carbide Insert Blades and Carbide Insert	\$15,000	6 months	<p>To goal will be to allow the manufacturing industry to reduce their costs for carbide blades and pass those savings on to the State DOT's. With one common specification for all 34 Clear Road States, the buying power connected to a single agreed upon specification would be greater. Inventory management would also be less complicated. Counties and cities would also be able to take advantage of this single specification. Using one standard specification would potentially allow for Procurement Coalitions to bid one uniform standard for carbide blades.</p> <p><i>JD – The art is in the braising of the inserts – even if the products meet the spec. Increase cost to \$50k and nine months.</i></p>	Group 5 Cliff Spoonemore, Wyoming DOT Brian Burne, Maine DOT

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Synthesis Projects

#	Title	Information the Synthesis Will Compile	Presented by
1	Geothermal Heating of Pavement for Snow and Ice Control	Literature on geothermal pavement heating and state/airport practices and their level of success using this technology. Iceland seems to have used this technology, as well as some countries in Europe, and they could be good sources of information.	Group 2 Frank Sharpe Illinois DOT
2	Accuracy of Salt Application Equipment	Survey states to find out if they have measured the accuracy of their liquid and granular equipment calibrations; what level of confidence do they have in the accuracy of the calibrations; do they have a separate form of measuring the accuracy of deicer distribution separate from the spreader hydraulic system i.e. on-board truck scales, in ground scales system, particle scanners or loader scales? How often do they calibrate their equipment and how is that calibration performed? Perform a literature search to locate any other projects that have been performed to measure the accuracy of liquid and granular deicer equipment.	Group 2 Scott Lucas, Ohio DOT Allen Williams, Virginia DOT David Gray, New Hampshire DOT
3	Pre-wetting Solid Materials for the Pre-Treatment of Roadways	State practices and practices related to anti-icing with solid products. Collect any research on this topic that may be available.	Group 2 James Morin, Washington State DOT
4	Synthesis of BMPs on the Implementation of Chloride Monitoring Programs	State practices for water quality monitoring either by the DOT or the DEQ. What are they monitoring, what waterways are being sampled (groundwater/surface water), when are samples collected, how are samples collected, how are samples tested and what are they tested for, and how are they informing your program, if at all?	Group 4 Patti Caswell, Oregon DOT
5	Flexible Equipment for Different Material Applications	Literature search, state practices related to vehicle flexibility in switching from salt to other materials such as abrasives. Including a review of various spreader types to identify multi-purpose equipment. <i>Somewhat related to the completed project on the Evaluation of Spreader Types.</i>	Group 4 Patti Caswell, Oregon DOT

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#	Title	Information the Synthesis Will Compile	Presented by
6	Effective Snow and Ice Personnel and Equipment Storm Activation	<p>The right time to activate snow and ice personnel and equipment as it is an important factor in both safety and budgeting. Determining the right time and percentages is relative to many factors.</p> <ul style="list-style-type: none"> - Collect and compile information from all 34 Clear Road States and others - List all common factors - Present a draft to the TAC for review and edit - Review any research currently documented 	Group 5 John DeCastro, Connecticut DOT