MINUTES

Clear Roads 2022 Technical Advisory Committee Meeting
Pooled Fund Project TPF-(479)

Tuesday, April 12 to Wednesday April 14, 2022 (Online Meeting)

Pat Carroll, Alaska DOT/PF Kevin Duby, Arizona DOT John Oliva, Caltrans Jamie Yount, Colorado DOT Aidan Neely, Connecticut DOT Steve Spoor, Idaho TD Laura Shanley, Illinois DOT Craig Bargfrede, Iowa DOT Jeremy McGuffey, Indiana DOT Clay Adams, Kansas DOT Brian Burne, Maine DOT Christopher Landry, Maine DOT Sandi Sauter, Maryland DOT/SHA Mark Goldstein, Massachusetts DOT	Justin Droste, Michigan DOT Tom Peters, Minnesota DOT Todd Miller, Missouri DOT Doug McBroom, Montana DOT Tom Renninger, Nebraska DOT Jasmine Dondlinger, Nebraska DOT John Angel, Nevada DOT Nathan Morian, Nevada DOT David Gray, New Hampshire DOT Tina Crowley, New York State DOT Bill Jennueh, Pennsylvania DOT Scott Lucas, Ohio DOT Patti Caswell, Oregon DOT Joe Bucci, Rhode Island DOT Matt Ouellette, Rhode Island DOT	Daniel Varilek, South Dakota DOT Matthew Heinze, Texas DOT Rhett Arnell, Utah DOT Todd Law, Vermont AOT James Morin, Washington State DOT Emil Juni, Wisconsin DOT Jeff Pifer, West Virginia DOT Kevin Hensley, APWA Tony Coventry, FHWA Rick Nelson, SICOP Brian Hirt, CTC & Associates Kirsten Seeber, CTC & Associates Greg Waidley, CTC & Associates Not able to attend: Delaware North Dakota Wyoming

Materials Distributed

Agenda
Budget
Research Proposal List
Research Scoring Sheet
Projects In-Progress
Project Subcommittee Members
TAC Email List
TAC Contact List

April 12, 2022

Introductions and Meeting Objectives

Research and Synthesis Proposal Presentations

Eleven (11) research proposals and five (5) synthesis proposals were presented and discussed by TAC members. After all the proposals were presented, each voting member of the TAC submitted scores for each project/synthesis, based on each project's/synthesis' own merit, using a 1-5 scale (5 being the greatest need). Those votes were tallied after day one of the meeting and presented at the beginning of day two.

1. **Synthesis – Use of Dashboards for Winter Operations**
   - **Presenter:** Kevin Duby, Arizona
   - **Goal:** As technology advances, so does the methods and efficiency of winter operations. States such Iowa DOT, Arizona DOT, etc., have begun utilizing dashboards for managers and legislative personnel. With the use of dashboards, the DOT's / Public Works could be seeing an increase in their operations LOS, while possibly reducing overall cost and usage of salt. However, states might have different matrices that are measured and different uses overall. Having a clear understanding of how public works departments and DOTs utilize dashboards can enhance the use of effectiveness of current dashboards. This can assist entities that currently do not have dashboards but want to implement process to enhance their agency/ public works.

2. **Synthesis – Best Practices for Application of Traction Laws & Chain Requirements**
   - **Presenter:** Jamie Yount, Colorado
   - **Goal:** State transportation networks with severe winter weather and steep mountain passes rely on traction and chain laws to keep motorist and commercial vehicles moving and safe during snow events. These laws and requirements are implemented and enforced in a variety of different ways between states and agencies. The goal of this synthesis is to summarize the current state of traction law definitions, implementation strategies, enforcement methods, and penalties. Information from this analysis would be used to define current industry best practices.

3. **Synthesis – Locations and Experiences Using Virtual RWIS Stations**
   - **Presenters:** Doug McBroom, Montana
   - **Goal:** There are multiple companies that provide real-time weather data on a section of road using a predictive algorithm with various levels of accuracy. These companies typically charge a fee for each location that is usually less than the cost of utilities to an existing RWIS station per month. This synthesis will provide states with an inexpensive alternative to brick-and-mortar RWIS stations, which would increase the density of these stations. This in turn would provide better information about when and how to treat the roads saving labor hours, materials, and equipment costs. Understanding the general accuracy and benefit of using this service to increase the density of RWIS stations is important information for states that conduct snow and ice removal.

4. **Development of a Centralized Winter Maintenance Research Database**
   - **Presenter:** Jeremy McGuffey, Indiana
   - **Goal:** Field (winter maintenance) is very disjointed in that there are many groups, universities, and investigators conducting research resulting in best practices. However, we do not have a truly central place to access them all. The goal of this project is to develop and host a “free to use” central database/directory to contain, classify, and link all winter maintenance research.

5. **Synthesis – Post-Storm Snow Removal**
   - **Presenter:** Scott Lucas, Ohio and Justin Droste, Michigan
   - **Goal:** The purpose of the synthesis is to gather recommended practices, policies, or training resources employed by state and other road maintenance agencies related to how they manage post-storm snow removal. Resources can be written documents or video/animation on cleaning techniques and practices. What practices and equipment are utilized? What are the resource costs and timeframes used to clear gore areas and shoulders, which include bridge decks,

median barrier walls, and guardrails? Also, what are the factors that drive each agency's policy on post-storm/beyond traveled lanes clearing?

6. **Evaluation of DLA of Salt Brine vs Granular Salt as Measured through Various Performance and Safety Measures**
   - **Presenter:** Emil June, Wisconsin
   - **Goal:** Throughout the years, winter maintenance strategies have been shifting to include salt brine as part of the standard anti-icing/deicing process. Different studies have successfully shown the benefit of using salt brine, usually in terms of cost savings and environmental improvement, but public perception exists that salt brine use is less efficient and less safe for the traveling public compared to traditional use of granular salt. The goal of this project is to analyze data from prior studies and conduct a field analysis to show the differences in various performance and safety metrics between direct liquid application (DLA) of salt brine (by itself or after incorporating additives) as compared to that of granular salt.

7. **Driver's Side Salt Spreader Chute Location Savings Quantification**
   - **Presenter:** Todd Miller, Missouri
   - **Goal:** The goal of this project is to quantify the savings, if any, related to the application of salt using a V-bottom or tailgate spreader with the chute located on the driver's side. This would be compared to that of a traditional spreader with the chute located on the centerline of the truck chassis on a crowned section of 2-lane road.

8. **Zero-Velocity Spreader Savings Quantification**
   - **Presenter:** Todd Miller, Missouri
   - **Goal:** The purpose of this project is to quantify the savings, if any, related to the application of salt using a zero-velocity spreader compared to a traditional spreader.

9. **Effects of Additives in Lowering the Freezing Point**
   - **Presenter:** Rhett Arnell, Utah
   - **Goal:** Some solid deicing salts (Category 4 on QPL) have additives (MgCl, CaCl, etc.) and claim they are a better deicing salt because of this. However, there are no definitive test results to substantiate this claim. The goal of this project is to compare the Eutectic points of various mixed salts to regular white salt to determine how much colder these products will work and if they are worth the higher costs.

10. **pH Waiver for Deicing Products and the Qualified Products List**
    - **Presenter:** Patti Caswell, Oregon
    - **Goal:** Currently, the Clear Roads Qualified Products List (CR QPL) describes a 'waiver' request process for products that do not meet the pH requirements due to high organic compound content. The lowest pH threshold listed in the specifications document is 6.0. There is concern that CR lists certain products that do not meet the pH spec because of high organic content and the resultant formation of a 'weak' acid. The goal of this project would be to help CR determine the appropriate pH range for deicing products on the QPL. Once determined, test select categories of products – especially those with high organic content – to determine their eligibility to remain on the QPL. If the project confirms that not all 'low pH' products are equal, it will include the development of a process to determine infrastructure and environmental risk

separate from pH. In other words, it will develop a process for determining whether a waiver should be provided.

11. **Developing Standard Winter Maintenance Language**
    - **Presenter:** Patti Caswell, Oregon
    - **Goal:** Clear Roads is in a position to drive the language of winter maintenance because of the highly functional committee and leadership role for state departments of transportation. Language around winter maintenance materials and methods is inconsistent nationally (and even internationally) and CR has an opportunity to lead the way by providing definitions for commonly used terms. Some terms that come to mind include: anti-icing, deicing, pre-wet, abrasives (or sand? Or rock?). Terminology for transportation assets that are connected to winter maintenance, such as equipment and highway designations should also be considered for inclusion. The purpose of this project is to define commonly used terms and industry standard for methods where it makes sense.

12. **Synthesis – Corrosion and Connectors Don't Mix**
    - **Presenter:** Cliff Spoonemore, Wyoming
    - **Goal:** The goal of this synthesis is to identify the various wing plow light setups/connectors used by CR members. The project will determine if anyone is succeeding in keeping the lights operating for an entire winter season and identify a setup/connector that is most likely to operate for an entire snow season.

13. **Liquid Chloride Storage and Pump System BMPs**
    - **Presenter:** Brian Burne, Maine
    - **Goal:** Most state DOTs manage liquid chloride tanks and pump systems. The purpose of this project is to document the standard systems that are being used, including the specific components. The project will document and share optimal system designs, as well as the management practices used to support the replacement components or other system decisions that contribute to safe, sustainable, and cost-effective liquid storage systems.

14. **Vehicle Restrictions During Storm Events**
    - **Presenter:** Brian Burne, Maine
    - **Goal:** Tractor-trailers crashing during snowstorms can block highways, trap motorists, and prevent DOTs from being able to successfully clear roads and keep the traffic flowing. The purpose of this project is to identify and document the extent of the problem, potential causes, and the thresholds and considerations that influence potential restrictions for certain types of vehicles.

15. **Update to CR 14-02: Quantifying the Impact that New Capital Projects will have on Roadway Snow and Ice Control Systems**
    - **Presenter:** Todd Law, Vermont
    - **Goal:** The purpose of the project is to improve upon CR 14-02 by updating the tool and including additional capital project types to quantify additional resource needs because of the capital project.

16. **Comprehensive Guide to Prewet**
    - **Presenter:** James Morin, Washington and Patti Caswell, Oregon

- **Goal:** The goal of this project is to develop recommendations for pre-wetting rates and evaluate the difference between applying pre-wet in the chute v. on the chain flight or in a mix chamber. This involves a follow up on the synthesis CR 18-04 that was recently completed by WSU. The synthesis looked at prewet practices and case studies and identified needed research to identify effective and efficient materials, equipment, and procedures for pre-wet. This effort would address those needs as well as identify specifics including rates and notable results from two different pre-wetting methods.

Clear Roads Budget and Available Funds

- Income through FFY22 – $925,000
- Expenses through FFY22 - $235,000
- Funds available for research - $690,000

April 13, 2022

Selection of FY 2022 Research Projects

Based on the rankings received, the TAC approved the following six projects, including five projects for RFP and one synthesis to be completed by CTC. The total funding is estimated at $630,000. TAC members volunteered to serve on project subcommittees. The names underlined below will serve as co-chairs for the subcommittees. A '*' denotes that a subcommittee member is a non-voting member.

CR 22-01: Comprehensive Guide to Prewet

- Subcommittee members: James Morin, Patti Caswell, Kevin Duby, Jeremy McGuffey, Aidan Neely, Doug McBroom, Tina Crowley, Dan Varilek, and Tom Peters
- Funding: $200,000

CR 22-02: Liquid Chloride Storage and Pump System Best Management Practices

- Subcommittee members: Brian Burne, Mark Goldstein, Clay Adams, Nathan Morian, Bill Jennueh, Jamie Yount, James Stevenson, and Tom Peters
- Funding: $90,000

CR 22-03: Effects of Additives in Lowering the Freezing Point

- Subcommittee members: Rhett Arnell, Steve Spoor, Kevin Duby, Tom Renninger (Jasmine Dondlinger*), Jeremy McGuffey, Doug McBroom, Patti Caswell, and Tom Peters
- Funding: $125,000

CR 22-04: Evaluation of DLA of Salt Brine vs Granular Salt as Measured through Various Performance and Safety Metrics

- Subcommittee members: Emil June, James Stevenson, John Oliva, Justin Droste, Tina Crowley, Jeff Pifer, and Tom Peters
- Funding: $125,000

CR 22-05: Synthesis – Use of Dashboards for Winter Operations

- Subcommittee members: Kevin Duby, Doug McBroom, Rhett Arnell, Emil Juni, Aidan Neely, Scott Lucas, Craig Bargfrede, Tina Crowley, Todd Law, David Gray, Paul Denkler, and Tom Peters
- Funding: $75,000

CR 22-06: Synthesis – Corrosion and Connectors Don't Mix

- Subcommittee members: Cliff Spoonemore, Jeff Pifer, Steve Spoor, Tom Renninger, Chris Landry, Dan Varilek, and Tom Peters
- Funding: $15,000 to $75,000
- Scoping: To be scoped / kicked off after the other five projects are scoped.

Motion (Clay Adams; Craig Bargfrede seconds) – The TAC accepts the above six projects. Motion passed.

APWA Industry Report
See presentation posted on members only page.

Update on Projects in Progress

18-02: High Performance Blade Evaluation

- **Contractor:** University of Akron
- **Subcommittee Members:** Craig Bargfrede, James Morin, Joe Bucci, Scott Lucas, Justin Droste, Aiden Neely, David Gray, Tom Peters
- **End Date:** July 2022
- **Status:** Based on field test results, Clear Roads will produce a Quick Reference Guide outlining the features and specifications of each blade along with key field test results and cost-benefit ratios in an easy-to-read format. These tests will also be repeatable with future-developed high-performance blades as a standard test protocol will also be developed.

18-06: Standard Test Procedures for Ice Melting Capacity of Deicers

- **Contractor:** Washington State University
- **Subcommittee Members:** Tom Renninger, Jeff Pifer, Doug McBroom, Patti Caswell, James Morin, Scott Lucas, Jeremy McGuffey, Jasmine Dondlinger, Dave Hanson, Tom Peters, Rick Nelson*
- **End Date:** February 2023
- **Status:** The research team completed round robin testing and drafted an interim report that summarized their findings. The project subcommittee, however, found a number of issues with the testing and documentation of that testing. Therefore, the research team is repeating the round robin testing at no cost to Clear Roads. That repeat of the round robin testing is still ongoing and looks like the results will be in by late April 2022. While awaiting the results of the testing, the PI has begun work on Task 3 (Standard Test Procedure Development).

20-02: Understanding the NaCl Phase Diagram

- **Contractor:** Western Transportation Institute, Montana State University
- **Subcommittee Members:** Brian Burne, Doug McBroom, James Morin, Rhett Arnell, Dan Varilek, Aidan Neely, Shannon McIntyre, Tom Peters
- **End Date:** June 2022
- **Status:** The research team has completed the lab testing and one-page fact sheet. The education video has been drafted and reviewed by the subcommittee and is currently being finalized by WTI.

20-03: Indoor Stockpile Measurement

- **Contractor:** Subcommittee recommends CTC & Associates

- **Subcommittee Members:** James Morin, James Stevenson, Todd Miller, Rhett Arnell, Scott Lucas, Jeremy McGuffey, Emil Juni, Alastair Probert, Justin Droste, Tom Peters
- **End Date:** November 2022
- **Status:** CTC has completed the literature search and industry review (Task 2) as well as the survey and interviews (Task 3). Measurement systems and sites have been selected (DE: Carlson, Skydio drone + Carlson software, Skydio drone + Pix4D software; TX: Stockpile Reports; WA: Stockpile Reports) and data collection is currently in progress. Conducted two vendor webinars in March to provide CR update on the systems and state agency feedback to this point.

20-04: Expanded Use of AVL/GPS Technology

- **Contractor:** AECOM
- **Subcommittee Members:** David Gray, Steve Spoor, Aidan Neely, Justin Droste, Jeremy McGuffey, Mark Peters, Laura Shanley, Tom Peters, Kevin Hensley*
- **End Date:** August 2022
- **Status:** The literature review (Task 1) and Survey (Task 2) are complete. Case studies have been conducted and are being reviewed by the studied agencies. A meeting with the project subcommittee is currently being scheduled to review those case studies.

20-05: Using GIS to Highlight Highway Segments Sensitive to Deicing Materials

- **Contractor:** SRF Consulting
- **Subcommittee Members:** Joe Thompson, Mark Goldstein, Patti Caswell, Rhett Arnell, Bill Jennueh, Brian Burne, Jamie Yount, Laura Shanley, Tina Crowley, Tom Peters
- **End Date:** July 2022
- **Status:** The survey of practice and analysis of results are complete. The research team has also developed the resource prioritization matrix and is currently working on creating the geospatial tool. A meeting to review progress on the tool is currently being scheduled.

20-06: Salt Shed Design Template

- **Contractor:** Wilfred Nixon and Associates
- **Subcommittee Members:** James Morin, Cliff Spoonemore, Dan Varilek, Craig Bargfrede, Todd Miller, Joe Bucci, Alastair Probert, Tom Renninger, Tom Peters, Pat Jeffrey, Jim Rogers
- **End Date:** January 2023
- **Status:** PI experienced difficulties executing a contract with his subcontractor. Work seems to be back on track again. The literature review is complete, and the PI recently submitted a list of draft survey questions, which are currently being reviewed by the project subcommittee.

21-01: Grip Sensor Technology and Salt Applications

- **Contractor:** Western Transportation Institute, Montana State University
- **Subcommittee Members:** Kevin Duby, James Morin, Jeremy McGuffey, Patti Caswell, Emil Juni, James Stevenson, Justin Droste, James Roath*, Tom Peters
- **End Date:** August 2023
- **Status:** Project kickoff meeting was conducted on April 5th.

21-03: Efficacy, Cost, and Impacts of Non-Chloride Deicers

- **Contractor:** Western Transportation Institute, Montana State University

- **Subcommittee Members:** Doug McBroom, Craig Bargfrede, Jasmine Dondlinger, Patti Caswell, Rhett Arnell, Laura Shanley, Jeremy McGuffey, Tom Peters
- **End Date:** September 2023
- **Status:** The contract was recently executed, and a project kickoff meeting is currently being scheduled for after the spring meeting.

21-04: Training Module Development for Evaluation of Storm Severity Index and Winter Severity Index Variables

- **Contractor:** Focus EduVation
- **Subcommittee Members:** James Morin, Todd Miller, Bill Jennueh, Kevin Duby, Justin Droste, James Roath*, Scott Rattay, Kevin Hensley*, Tom Peters
- **End Date:** June 2023
- **Status:** The research team is acquiring an SME and we're in the process of scheduling a kickoff meeting for the week of 4/18.

21-05: Evaluation of Electric Vehicle Technologies and Alternative Fuels for Winter Operations

- **Contractor:** Matrix Consulting Group
- **Subcommittee Members:** Justin Droste, Joe Bucci, Aidan Neely, Scott Lucas, Jeff Pifer, James Stevenson (Zeke Reyna* and James Kuhr*), Jeremy McGuffey, Tom Peters, Mike Cirks*
- **End Date:** March 2023
- **Status:** Conducted project kickoff meeting on March 11. Research team is currently soliciting responses to their RFI from Clear Roads membership and the AASHTO Snow and Ice Listserv.

Clear Roads Qualified Products List Update

- Vendor Online Product Submission Form: Ready for beta testing. Once testing is complete and any final fixes made, the online form will be live. CTC updates to the system are not limited to the submission form, but also include a backend management system to more effectively manage the submissions and their review as well as communicate with others on the subcommittee and with the vendors as well.
- Working to find a way to scan and catalogue old product submissions, which are currently in paper form and in boxes at the Idaho TD.
- Guidance Document for Material Qualified Products List, Specifications, Test Methods, and Product Purchasing: Added pH requirements to Table 1 and limits to categories A-1-4, L, and S. This is a living document. Modifications are listed in the document after the table of contents.
- Most products currently have a December 2024 expiration date. Vendors need to send Clear Roads a letter stating that they are still producing their products and that the formula has not changed. Other products will fall off the list. Could be a good time to ask about products' pH.

Iowa State Report

See presentation posted on members only page.

Roundtable Discussions

- Michigan – direct liquid application
- Oregon – sensors for material application -and- material bridging
- Iowa – experience with IntelliTreat
- Utah – quality of salt mine products

April 14, 2021

Clear Roads Product Experience

- Only two states have submitted products that they've tested in the last two winter seasons.
- There are several other sources of similar information, so are members still using this as a resource?
    - Many new members were not aware of it. Other members had lost track of it. Still, many were interested in using it.
    - Greg will send out a call for products tested this past winter after the spring meeting.
    - Will make this a standing agenda item for the fall meetings.

FHWA Industry Report

AASHTO (SICOP) Industry Report

See briefing posted on members only page.

Winter Maintenance Product Proficiency Program Update

See presentation of members only page.

- Action items:
    - AASHTO Admin Task Group approval – done
    - Recruit vendors for products – done
    - Soft launch fall 2022 – pending… need five labs.
    - Registration Procedure – AASHTO will handle, but Clear Roads will schedule and facilitate information meeting.
    - Webpage on Clear Roads website – AASHTO will create much of the content.

Maine State Report / AWSSI Online Tool Update

See presentations posted on members only page.

Future Meetings

2022

- **Fall meeting** will be at a DOT facility to avoid restrictive contracting provisions. Members will need to book their own hotel rooms and submit for reimbursement as part of expense reimbursement forms after the meeting. Targeting Austin, TX but we'll need back up plans. Oregon and Indiana are possibilities.

2023

- **Spring meeting** in Annapolis, Maryland. Backup – Boise, ID. Dates are the week of April 17th.
    - **Motion** – Motion (James M) to hold meeting the week of 4/17. Seconded by Kevin D. Opposed – none. Motion passed.
- **Fall meeting** will likely be in coordination with the National Winter Maintenance Peer Exchange – potentially Montana.