MINUTES

Clear Roads 2021 Technical Advisory Committee Meeting
Pooled Fund Project TPF-(353)

Tuesday, April 13 to Wednesday April 15, 2021 (Online Meeting)

Pat Carroll, Alaska DOT/PF Kevin Duby, Arizona DOT Mark Peters, Caltrans Jamie Yount, Colorado DOT Aidan Neely, Connecticut DOT Alastair Probert, Delaware 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 Mark Goldstein, Massachusetts DOT	Justin Droste, Michigan DOT Tom Peters, Minnesota DOT Todd Miller, Missouri DOT Doug McBroom, Montana DOT Tom Sands, Nebraska DOT Jasmine Dondlinger, Nebraska DOT Larry Gangl, North Dakota DOT David Gray, New Hampshire DOT Joe Thompson, New York State DOT John Izzo, New York State DOT Jon Fleming, Pennsylvania DOT Scott Lucas, Ohio DOT Patti Caswell, Oregon DOT Joe Bucci, Rhode Island DOT Daniel Varilek, South Dakota DOT	James Stevenson, Texas DOT Rhett Arnell, Utah DOT Todd Law, Vermont AOT James Morin, Washington State DOT Cody Churchill, Wisconsin DOT Emil Juni, Wisconsin DOT Jeff Pifer, West Virginia DOT Cliff Spoonemore, Wyoming DOT Kevin Hensley, APWA Rick Nelson, SICOP Josh Casey, CTC & Associates Brian Hirt, CTC & Associates Kirsten Seeber, CTC & Associates Greg Waidley, CTC & Associates

Materials Distributed

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

April 13, 2021

Introductions and Meeting Objectives

New representatives

- Mark Peters, Caltrans
- Aidan Neely, Connecticut DOT
- Justin Droste, Michigan DOT
- Tom Sands, Nebraska DOT (Interim member until Ty Barger's position is filled.)
- Joe Izzo, New York State (Interim member until Joe Thompson's position is filled.)
- Joseph Williams, Virginia DOT

Research and Synthesis Proposal Presentations

Sixteen (16) research proposals and four (4) 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 – Best Practices for Managing Impurities in Liquid Deicers**
   - **Presenter:** Scott Lucas, OH DOT
   - **Goal:** As liquid deicers settle in their holding tanks, sediments fall out of suspension. Whether the sediment was part of the deicers or foreign objects, materials that fall out of suspension can cause issues. They can form a layer of slime or hard pack that must be physically removed from the bottom of the tank or they can plug application filters and nozzles. This causes extra work with crews for cleanup and can cause breakdowns during snow and ice operations if the materials plug application equipment. The mixing of deicers can also cause the "fallout" of material in the application equipment or storage tanks as well. Knowing which materials will cause a fallout issue, at what concentration and at what temperature, is important.

2. **Synthesis – Evaluation of Electric Vehicle Technologies for Winter Operations**
   - **Presenter:** Justin Droste, MI DOT
   - **Goal:** With auto industry moving to electric (GM plans to have entire electric fleet by 2040), what is the future for larger equipment including winter maintenance trucks? A better understanding of the inventory of current technologies and industry objectives for implementing electric replacement of current diesel large fleet is desired, with particular emphasis on considerations for winter maintenance environment and operations

3. **PSA Library**
   - **Presenters:** David Gray, NH DOT and Scott Lucas, OH DOT
   - **Goal:** The goal of this project is to host a library of Clear Roads videos that a state can pick from to post to their social media accounts. They would be short "Winter Maintenance 101" style videos that would be posted on the Clear Roads Winter Preparedness website, whose audience is the traveling public.

4. **Synthesis – Dynamic Message Signs and Connected Vehicle Alert Systems**
   - **Presenter:** Mark Peters, Caltrans
   - **Goal:** Caltrans experiences delays notifying the public of changes in road conditions/restrictions due to weather as we rely on manual sign changes at many locations. Law enforcement is limited by delays in manual sign changes. Caltrans would like to achieve public and worker safety through remotely programmed changeable electronic signage that immediately and simultaneously alerts connected vehicle operators of restrictions or conditions.

5. **Calculating Plow Cycle Times from AVL Data**
   - **Presenter:** Jamie Yount, CO DOT
   - **Goal:** The goal of this project is to develop a methodology and map-based tool and dashboard to calculate plow cycle times quickly and easily from AVL data for post-storm analysis and also view in a real-time dashboard display.

6. **Extendable Plow Pilot Study**
   - **Presenter:** James Morin, WS DOT
   - **Goal:** This project will evaluate the use of a recently developed extendable plow as an alternative to a standard right side wing plow. Identify operational applications and procedures for the extendable plow. Evaluate the current design and make design modifications as appropriate. Provide a cost benefit analysis of the extendable plow compared to:
     - Standard front plow
     - Combination front plow/wing plow

7. **Evaluation of Most Effective DOT Vehicle Lighting**
   - **Presenter:** Jeff Pifer, WV DOT
   - **Goal:** The goal of this project is to determine the most effective (visibility, conspicuity) colors and configurations of vehicle safety lighting for DOT vehicles.

8. **Create a QPL for Carbide Plow Blades**
   - **Presenter:** Cliff Spoonemore, WY DOT
   - **Goal:** This project will provide a list of quality assured and quality controlled vendor products for carbide plow blades. In the future, the same guidance will be applied for new blade types or high performance blades.

9. **Using Rear-facing Radar to Avoid Collisions with Motoring Public**
   - **Presenter:** Cliff Spoonemore, WY DOT
   - **Goal:** The goal of this project is to reduce snow plow rear end crashes. A system that would potentially alert the driver of the vehicle behind the plow, and the plow operator, to the approaching vehicle. With better notification methods, rear end collisions should be reduced or even eliminated.

10. **Grip Sensor Technology and Salt Applications**
    - **Presenter:** Kevin Duby, AZ DOT
    - **Goal:** This project will develop a program/matrix that can ingest road data from mobile grip sensors and to utilize that data in real-time for plow drivers along with recommendations. Recommendations would also be based off of the precipitation type, black Ice, freezing rain, light, medium and heavy snow, temps.

11. **Determining Best Practices for the Management of Fuels for Winter Maintenance Equipment**
    - **Presenter:** Clay Adams, KS DOT
    - **Goal:** The goal of this project is to determine the best methods of sampling and testing fuel for winter use. To determine how to troubleshoot fuel issues in trucks and in storage tanks. To test different methods of maintaining tanks so the fuel we put in them does not degrade.

12. **Update to CR 13-04: Best Practices for Protecting DOT Equipment from the Corrosive effect of Chemical Deicers**
    - **Presenter:** Todd Law, VTrans
    - **Goal:** This project would update the section of Chapter 5.4 of the guidance document with a comparison of the many coatings available to provide resistance to corrosion due to salt and other chemicals used in snow and ice control.

13. **Update to CR 14-02: Quantifying the Impact That New Capital Projects Will Have on Roadway Snow and Ice Control Operations**
    - **Presenter:** Todd Law, VTrans
    - **Goal:** This project would improve upon the previous project by updating the tool and including additional capital project types into the tool to quantify additional resource needs because of the capital project.

14. **Determining the Migration of Chloride-based Deicers through Different Soil Types Adjacent to Chloride-treated Roadways**
    - **Presenter:** Aiden Neely, CT DOT
    - **Goal:** The goal of this project is to determine the migration of chlorides in different soil types used by most of the Clear Roads' states. The research should include no more than three different chloride-based deicers, a lab-based study to assess how chlorides migrate through different surface and subsurface materials commonly found in Clear Roads states.

15. **Synthesis – Plowing Coordination between Jurisdictions**
    - **Presenter:** David Gray, NH DOT
    - **Goal:** Many times when traveling between States, districts, and maintenance sheds, there is a drastic difference in road conditions during a storm. Due to the difference in time when roads are plowed or treated between sections this can cause safety issues to the public. When the neighboring sheds, districts, or states do not coordinate plow and treatment plans road surfaces can go from black and wet to snow covered with several inches at the lines of treatment areas.

16. **OGFC VS HMA and Winter Performance Metrics**
    - **Presenter:** Mark Goldstein, MA DOT
    - **Goal:** This project will compare roadway surface performance parameters (i.e., grip, surface condition) under similar deicing treatment regimens performed on adjacent installations of OGFC and hot-mix asphalt (HMA) pavements.
17. **Snow Plow Blade Cutting Edge Videos**
    - **Presenter:** Brian Burne, ME DOT
    - **Goal:** This project is about education. The goal of the project is to allow people to easily understand what's available on the market, what it is intended to do, and what some of the trade-offs might be.

18. **The Efficacy and Environmental Impact of Non-Chloride Deicers**
    - **Presenter:** Doug McBroom, MT DOT
    - **Goal:** The goal of this project is to identify as many non-chloride-based deicers and determine their efficacy for winter snow and icer removal operations. Additionally, research and testing should be done to determine the environmental risks.

19. **Training Module Development for Evaluation of SSI/WSI Variables (CR 18-03)**
    - **Presenter:** James Morin, WS DOT
    - **Goal:** The goal of this project is to develop training modules and materials to address this topic for three general audiences. While the topic is the same, the audiences require varying degrees of specificity. This material could be applied to a number of different formats. For instance, the second bullet (Manager) could be incorporated into the NHI Leadership training curriculum as part of their snow andice topic coverage. The third bullet (Supervisor) could be incorporated into the

APWA Supervisor Training program. Both of these could be incorporated into TC-3. Ideally, we would include representatives from NHI and APWA and TC-3 in this effort.

- Division Director/Manager
- Snow and Ice Manager (state or local)
- Supervisor

20. Friction Data Use in Winter Maintenance Programs

- **Presenter:** James Morin, WS DOT
- **Goal:** Investigate current state of friction data use in the snow and ice industry in the US and other countries. The research team would evaluate the use, develop case studies and recommendations and best practices for the use of friction data for winter maintenance operations in the United States.

Clear Roads Budget and Available Funds

- Income through FFY21 – $4,509,914
- Expenses to date - $3,723,923
- Funds available for research - $785,991

April 14, 2021

Selection of FY 2021 Research Projects

Based on the rankings received, the TAC approved the following seven projects, including six projects for RFP and one synthesis for RFP. The total funding is estimated at $675,000. TAC members volunteered to serve on 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 21-01: Grip Sensor Technology and Salt applications/Friction Data Use in Winter Maintenance Programs

- Subcommittee members: Kevin Duby, James Morin, Jeremy McGuffey, Patti Caswell, James Stevenson, Emil Juni, Justin Droste, James Roath*, and Tom Peters
- Duration and Funding: 18 months and $150,000

CR 21-02: Update to CR 13-04: Best Practices for Protecting DOT Equipment from the Corrosive effect of Chemical Deicers

- Subcommittee members: Todd Law, Steve Spoor, Joe Bucci, Jeff Pifer, Brian Burne, Cliff Spoonemore, and Tom Peters
- Duration and Funding: 12 months and $50,000

CR 21-03: The Efficacy and Environmental Impact of Non-Chloride Deicers

- Subcommittee members: Doug McBroom, Craig Bargfrede, Jasmine Dondlinger*, Tom Sands (until new person arrives), Rhett Arnell, Laura Shanley, Jeremy McGuffey, and Tom Peters
- Duration and Funding: 18 months and $100,000

CR 21-04: Training Module Development for Evaluation of SSI/WSI Variables (CR 18-03)

- Subcommittee members: James Morin, Todd Miller, Jon Fleming, Kevin Duby, Justin Droste, James Roath*, Scott Rattay*, Kevin Hensley*, and Tom Peters
- Duration and Funding: 18 months and $50,000

CR 21-05: Synthesis – Evaluation of Electric Vehicle Technologies for Winter Operations

- Subcommittee members: Justin Droste, Joe Bucci, Aidan Neely, Scott Lucas, Jeff Pifer, James Stevenson, and Tom Peters
- Duration and Funding: 15 months and $75,000

CR 21-06: Calculating Plow Cycle Times from AVL Data

- Subcommittee members: Jamie Yount, David Gray, Jon Fleming, Emil Juni, Dan Varilek, Rhett Arnell, Steve Spoor, Patti Caswell (will bring in a staff member from OR DOT*), Kevin Hensley*, and Tom Peters
- Duration and Funding: 18 months and $125,000

CR 21-07: Determining the Migration of Chloride-based Deicers through Different Soil Types Adjacent to Chloride-treated Roadways

- Subcommittee members: Aidan Neely, Doug McBroom, Mark Goldstein, James Morin (will bring in a staff member from WS DOT*), Patti Caswell, John Izzo, Jeremy McGuffey, and Tom Peters
- Duration and Funding: 18 months and $125,000

Motion (Doug McBroom) – The TAC accepts the above seven projects. Motion passed.

Update on Projects in Progress

17-03: Aftermarket Cameras in Winter Maintenance Vehicles

- **Contractor:** SRF Consulting Group
- **Subcommittee Members:** Todd Miller, Dan Varilek, Alastair Probert, Craig Bargfrede, Tom Peters, Kevin Hensley*
- **End Date:** June 2021
- **Status:** All tasks save for the Final Report and Webinar (Task 7) and the Pilot Deployment (Task 8) are complete. For the pilot project, SRF will interview the district (supervisors and truck operators) to get feedback on how the system with the CabCam cameras has worked going into its second winter, compare it to the setup with the MS Foster cameras, and help determine the cost-benefit analysis of using cheaper cameras in combination with the wash system.

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:** December 2020 (January 2022)
- **Status:** Due to difficulties with the intended field testing during the 2019-2020 winter, the contract is currently being amended to extend the project to January 2022. The refined scope of work will include a focus on laboratory testing as opposed to field testing as was the case with the previous version.

18-04: Review and Summary of Pre-wet Methods and Procedures

- **Contractor:** Washington State University
- **Subcommittee Members:** James Morin, Patti Caswell, Todd Law, Alastair Probert, Cliff Spoonemore, Doug McBroom, Mark Goldstein, Tom Peters
- **End Date:** June 2021
- **Status:** The research team recently submitted the revised Interviews and Case Studies (Task 3) deliverable, which included eight states and one city. They are now working on Outreach to Manufacturers (Task 4). The final synthesis report (Task 5) will complete the project.

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

- **Contractor:** Washington State University
- **Subcommittee Members:** Ty Barger, Jeff Pifer, Doug McBroom, Patti Caswell, James Morin, Scott Lucas, Jeremy McGuffey, Tom Peters, Rick Nelson*
- **End Date:** May 2022
- **Status:** COVID-19 has delayed this project perhaps more than other projects due to the element of lab testing as access to the WSU lab has been limited over the past year. The PI shipped seven liquid deicer samples, along with the test protocol) to four peer labs who agreed to join the Round Robin Testing Program. Results from one of the labs have been received, while the others are still testing.

19-01: Expanding Application Rate Guidance for Salt Brine Blends for Direct Liquid Application and Anti-Icing

- **Contractor:** University of Wisconsin-Madison
- **Subcommittee Members:** Emil Juni, David Gray, Ty Barger, Doug McBroom, Aiden Neely, James Stevenson, Scott Lucas, Jeff Pifer, Tom Peters, Rick Nelson*, Kathleen Schaefer*
- **End Date:** December 2021
- **Status:** The Literature Review (Task 1), Survey (Task 2), and Field Testing Protocol (Task 3) and all complete. Data collection from the 2020-2021 winter is wrapping up.

19-02: Recruitment and Retention of Hwy Maintenance Workers

- **Contractor:** Western Transportation Institute, Montana State University
- **Subcommittee Members:** Cliff Spoonemore, Brian Burne, David Gray, Joe Bucci, Scott Lucas, Jeremy McGuffey, Tom Peters, Rick Shomion*
- **End Date:** July 2021
- **Status:** The Literature Review (Task 1) and Survey (Task 2) are complete. The draft document for the Interviews (Task 3) was submitted in mid-March for subcommittee review.

19-03: Measuring the Efficiencies of Tow and Wing Plows

- **Contractor:** University of California-Davis
- **Subcommittee Members:** Doug McBroom, Steve Spoor, Cliff Spoonemore, David Gray, James Morin, Jon Fleming, Justin Droste, Jeff Pifer, Tom Peters, Kohl Skalin*
- **End Date:** July 2021
- **Status:** The research team has completed the Literature – Product Review (Task 1), Survey (Task 2), Recommendations and Test Plan (Task 3), and Simulation Tool (Task 4). The research team is currently working with several different states to complete the Peer Review of Simulation Results (Task 5).

19-04: Synthesis of Technical Requirements and Considerations for an Automated Snowplow Route Optimization RFP Template

- **Contractor:** University of Vermont
- **Subcommittee Members:** Scott Lucas, Clay Adams, Brian Burne, Todd Law, Justin Droste, Jamie Yount, Tom Peters, Kevin Hensley*, Jakin Koll*
- **End Date:** October 2021
- **Status:** The Literature Review (Task 1) and Survey of Practice (Task 2) have been completed. The Interviews (Task 3) have been conducted and the project team met in late February to discuss this deliverable. The PI is currently checking in with KTC and DelDOT on the status of the implementation of their plow route optimizations programs.

20-01: Entry-Level Driver Training for Maintenance Equipment Operators

- **Contractor:** Virginia Tech
- **Subcommittee Members:** Scott Lucas, Jeremy McGuffey, Clay Adams, Kevin Duby, Joe Bucci, Steve Spoor, Tom Peters, Rick Shomion*, Marv Hayes*, Brian Barott*
- **End Date:** September 2021
- **Status:** Review ELDT Regulation / FMCSA Requirements and Kickoff Webinar (Task 1), Literature Review and Survey of Clear Roads States (Task 2), Document a Process for Joining the TPR and Maintaining Compliance (Task 3), and Interviews with Clear Roads Agencies (Task 4) are complete.

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, Tom Peters
- **End Date:** January 2022
- **Status:** Conducted the kickoff meeting with the research team on January 26, 2021. The next meeting will be in early spring 2021.

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:** January 2022
- **Status:** CTC has provided a draft scope of work for subcommittee review and comment. Comments are currently being addressed.
- **Motion:** CTC & Associates lead this amended project scope. Motion passed.

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:** TBD
- **Status:** The contract has been awarded but is still in negotiations. The project is running two months behind.

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, Jon Fleming, Brian Burne, Jamie Yount, Laura Shanley, Tom Peters
- **End Date:** TBD
- **Status:** The contract has been awarded but is still in negotiations.

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, Ty Barger, Alastair Probert, Tom Peters, Pat Jeffrey, Jim Rogers
- **End Date:** July 2022
- **Status:** Conducted the kickoff meeting with the research team on January 25, 2021. The PI is currently assembling the Literature Review (Task 1).

20-07: AWSSI, Phase 2

- **Contractor:** University of Illinois
- **Subcommittee Members:** Brian Burne, Jon Fleming, Justin Droste, Kevin Duby, Tom Peters, Tina Greenfield*, Neal Hawkins*, Zach Hans*
- **End Date:** December 2021
- **Status:** Conducted the kickoff meeting with the research team on January 25, 2021. The PI is currently in the process of adding more stations to the AWSSI Tool.

April 15, 2021

Annual Survey of Winter Data Statistics

- The survey is a multi-year project to systematically gather, compile and analyze a range of data, including winter resources, materials and costs from state DOTs related to their winter operations.
- Doug McBroom – Would like to find a way to normalize the data in survey to make state-to-state comparisons, especially related to materials usage practices. Doug proposes to add the Accumulated Winter Season Severity Index AWSSI score from each state into the statistics. The AWSSI score includes snowfall amounts and temperatures.
- Brian Hirt – The TAC needs to make decisions on the data. CTC displays the data on the website and the states make their own calculations and draw their own conclusions. There would be an additional metric to add to the map, which wouldn't take a lot of time. CTC would get the data from Midwest Regional Climate Center (MRCC).

Salt Usage Legislation

- Craig Bargfrede - Iowa leadership wants to hear about legislation in other states related to salt usage. A salt reduction bill was introduced in Iowa that would direct the DOT and all other government entities to reduce salt by 5% for five years and increase usage of agricultural-type deicing products by 5% by five years. Annual reporting to the legislature would be required and the DOT would be the point of collection for all usage.
- Craig Bargfrede will poll the TAC about his issue and ask for supporting documentation.

Clear Roads Test Bed Portal – Next Steps/Recommendations

- Craig Bargfrede – The test bed allows you to log in and check spreader controllers compliance to the Clear Roads standard protocol and that controllers and AVL units can communicate properly. To date, only a couple of companies have successfully managed their way through the portal.
- Parsons is managing the portal and their contract ends 9/30/21. The cost of the contract for the first year was $30,000. The cost for the second year has been minimal. The subcommittee is recommending that Clear Roads not renew the contract with Parsons.
  - **Motion** – Terminate the contract no later than 9/30/21. Motion passed.
  - Clear Roads will retain the ownership of the work done to date.

Qualified Products List

- Patti Caswell provided an update on the current status of the QPL, including its recent history, status, and discussion of procedures for how to handle the submission of products / testing results.

Clear Roads Equipment Online Database – Pifer/Burne

- Brian Burne – Clear Roads created a database (accessible on the website) for TAC members to list their equipment inventories.
- Brian Hirt - The TAC should review the database and let CTC know about changes or additional fields they would like added, such as contract information. The database will be ready for members to populate in early-to-mid summer.

Future Meetings

2021

- Fall meeting in Madison, WI; Sept. 21 – 23, 2021.
- A poll indicated that at least 15 members feel they will be able to travel to Madison, WI in the fall. This is enough to plan for a hybrid in-person/virtual meeting.
- **Motion** – Keep the options open and plan to have a hybrid meeting (in Madison with a virtual option) in fall 2021. Greg Waidley will communicate with the hotel. The executive committee will make the final decision in a few months. Motion passed.

2022

- Spring meeting in Salt Lake City or Park City, UT? Backup – Boise, ID. Dates TBD.
  - **Motion** – Move the spring meeting location to Austin, TX in 2022. Attempt to hold the fall 2022 meeting (NWMPE?) in UT. Motion passed.

Election of Vice Chair

- The vice chair serves for two years and then will become chair for two years.
- Nominations
  - Tom Peters nominated Craig Bargfrede.
  - Jeff Pifer nominated Scott Lucas.
- After an anonymous vote, it was determined that Scott Lucas will be the new vice chair.