



**MINUTES**

**Clear Roads 2016 Technical Advisory Committee Fall Meeting:**

Pooled Fund Project #TPF-5(218)

**Tuesday – Wednesday, September 20-21, 2016**

**Magnolia Hotel, Omaha, Nebraska**

**Attendees:**

- |                                 |                                  |                                   |
|---------------------------------|----------------------------------|-----------------------------------|
| Michael Coffey, Alaska DOT      | Mark Goldstein, Mass DOT         | Joe Bucci, Rhode Island, DOT      |
| Mark Trennepohl, Arizona DOT    | Justin Droste, Michigan DOT      | Brandon Klenk, Utah DOT           |
| Durval Avila, California DOT    | Tom Peters, Minnesota DOT        | Todd Law, Vermont AOT             |
| Kyle Lester, Colorado DOT       | Todd Miller, Missouri DOT        | Allen Williams, Virginia DOT      |
| Mike O’Neil, Colorado DOT       | Tony Strainer, Montana DOT       | James Morin, Washington State DOT |
| John DeCastro, Connecticut DOT  | Tom Renninger, Nebraska DOR      | Jeff Pifer, West Virginia DOT     |
| Alastair Probert Delaware DOT   | Mike Lashmet, New York State DOT | Chris Ohm, Wisconsin DOT          |
| Timothy Armbrecht, Illinois DOT | David Gray, New Hampshire DOT    | Cliff Spoonemore, Wyoming DOT     |
| Drew Storey, Indiana DOT        | Larry Gangl, North Dakota DOT    | Rick Nelson, AASHTO               |
| Craig Bargfrede, Iowa DOT       | Scott Lucas, Ohio DOT            | Kevin Hensley, APWA               |
| Clay Adams, Kansas DOT          | Patti Caswell, Oregon DOT        | Greg Waidley, CTC & Associates    |
| Brian Burne, Maine DOT          | Jon Fleming, Pennsylvania DOT    |                                   |

**Materials Distributed**

- |                             |                                   |
|-----------------------------|-----------------------------------|
| Attendees List              | 2016 Synthesis Problem Statements |
| TAC Contact List            | Synthesis Ranking Sheets          |
| Clear Roads Budget Overview | Research In-Progress              |
| PDH certificates            |                                   |

**Tuesday, September 20, 2016**

**Welcome**

Tom Renninger, video – “The World (Nebraska) from Above”  
Moe Jamshidi, Deputy Director of Operations, Nebraska DOR, provided opening remarks and a welcome to Nebraska.

**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 and affiliated personnel since the spring meeting, and a review of the objectives for day 1.

### TAC Members and Affiliated Personnel Replaced

- California – Durval Avila replaces Chris Smith for this meeting only.
- Illinois – Timothy Armbrrecht replaces Ruben Boehler until new hire, Frank Sharp, is in place.
- Indiana – Drew Storey permanently replaces Tony McClellan.
- Massachusetts – Mark Goldstein permanently replaces Sam Salfity.
- Missouri – Todd Miller permanently replaces Tim Chojnacki.
- Montana – Tony Strainer permanently replaces Douglas McBroom.
- South Dakota – Danny Varilek permanently replaces John Mehlhaff.
- Wisconsin – Chris Ohm replaces Michael Sproul for this meeting only.
- APWA – Kevin Hensley replaces John Scharbillig for this meeting only.

### **Open TAC Discussions of the Proposals to the FY 2016 RFPs**

Fifteen proposals were submitted in response to the five RFPs posted by MnDOT. See below for the RFP titles and the responses received.

- Utilization of GPS/AVL Technology: Case Studies
  - AECOM
  - SRF Consulting
  - University of Akron
  - University of Vermont
- Standards and Guidance for Using Sensor Technology to Assess Winter Road Conditions
  - SRF Consulting
  - Washington State University
- Emergency Operations Methodology for Extreme Winter Storm Events
  - Montana State University
  - University of Vermont
- Weather Event Reconstruction & Analysis Tool
  - The Narwhal Group
  - Synesis Partners
  - University of Vermont
  - Wenck Associates
- Training Video for the Implementation of Liquid-Only Plow Routes
  - Montana State University
  - Southern Illinois University – Edwardsville
  - Stonebrooke Engineering

### **Knowledge Management**

How does Clear Roads want to gain responses to and store the responses to quick turnaround queries?

- This is currently being done via internal emails to all TAC members. The summaries, which are created by the TAC member submitting the queries, are then posted on the password protected members page of the Clear Roads website.
  - The problem with using this method of communication is the constant “reply all” emails that flood inboxes.
- Alternative: The use of Google Groups.

Might Clear Roads be interested in posting its research in other national forums?

- The National Operational Centers of Excellence (NOCE) invests approximately \$1M into their own knowledge base. Aurora research will be added soon. NOCE has the resources to do all that is necessary to professionally store, catalogue, and query research projects.
- Clear Roads research is currently entered into TRID by MnDOT library personnel.

**ACTION ITEM:** Prior to the spring meeting, CTC will provide further information on how Google Groups would work for communicating quick turnaround queries.

**ACTION ITEM:** CTC will add an item onto the spring agenda to discuss which option might best suit Clear Roads.

## Clear Roads Budget and New TPF Number

### TPF-5(218)

CTC presented the Clear Roads budget current status as of September 2016. This included total anticipated income of \$4,833,248.86, and expenses of \$4,799,178.02, for a balance of \$34,070.84. Included within this balance is \$9,389 available for CTC synthesis projects.

### TPF-5(353)

CTC also provided a snapshot of the current status of the new pooled fund moving forward beginning in FY 2017. The pooled fund has been approved by FHWA and has received the pooled fund number, TPF-5(353).

Total funds committed to date is \$1,060,000. Total funds committed for 2017 is \$425,000.

## Synthesis Problem Statements

The group presented and discussed three synthesis problem statements submitted by TAC members. 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 by the TAC at this meeting included reviewing synthesis ideas, scoring the synthesis projects on a 1-5 (higher number = higher priority) scale, then voting yes or no for each synthesis project.

The three synthesis problem statements submitted, the state submitting them, and their average scores included:

1. **Best Practices for the Use of Abrasives**, Mark Trennepohl, Arizona  
Average Score: 2.5
2. **Automatic Anti-Icing Systems on Bridge Decks**, Tony Strainer, Montana  
Average Score: 3.3
3. **Best Paint Color and Conspicuity Tape Patterns for DOT Equipment**, Jeff Pifer, West Virginia, Mark Goldstein, Kyle Lester.  
Average Score: 3.5  
Subcommittee includes: Jeff Pifer, Mark Goldstein, and Kyle Lester.

The TAC decided to fund #3 with the current synthesis balance of \$9,389. Synthesis problem statements #1 and #2, year 3 of the winter data statistics project, and any other new synthesis problem statements, will all be considered candidates for funding at the spring meeting.

### **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.

### **Understanding the Chemical and Mechanical Performance of Snow and Ice Control Agents on Porous or Permeable Pavements (CR 12-03)**

- Research team received cores from MassDOT and made two pavement slabs for laboratory testing.
- Began lab testing to assess MassDOT OGFC pavements for friction and strength of snow bond using solid salt, pre-wet salt (with salt brine), and salt brine.
- Will submit Task 6 (Analyze Chemical and Mechanical Interactions) next quarter.

### **Snowplow Operator and Supervisor Training (CR 12-04)**

- Revisions to all 18 modules are complete.
- Final comments are being incorporated to finalize them.
- An amendment had been processed for 6 additional modules, including one on winter driver education.
  - Two of those modules (Snow Disposal and Assistance to Motorists) were deemed unnecessary. Funding for those two modules is being used to incorporate Record Keeping into the all modules.

**ACTION ITEMS:** Put the presentations on the CR public site. These will be in pdf format so that no one can make modifications to these. Additionally, we will have slides in that are able to be edited, which will have a Watermark to indicate Clear Roads ownership. Include statement on website suggesting those who want an editable version of the PPT need to contact CTC and complete a form stating for what they will be used.

### **Quantifying the Impact that New Capital Projects Will Have on Roadway Snow and Ice Control (RSIC) Operations (CR 14-02)**

- The survey of AASHTO's snow and ice community to determine the 6 to 10 roadway configuration changes that are common across Snowbelt states is complete.
- The research team also used STIPs of states that completed the survey and nearby states to supplement the survey results. From the survey results and the STIPs, a total of 8 case studies were selected in Minnesota, New Hampshire, and Vermont. Each of these case studies is a project that is expected to be completed or substantially completed in 2016.
- Detailed second-by-second GPS data was collected from the plow trucks in New Hampshire and Minnesota that cover these project areas to examine the effort that it takes currently to service these routes. This data collection will be repeated next winter.
- In Vermont, the 4 case studies were investigated using the statewide RSIC simulation to assess the more far-reaching impacts of these projects.
- Work on the RSIC simulation model used for this analysis was completed.
- The project is effectively "on hold" until winter when the last of the GPS data will be collected, and the final deliverables will be completed.

### **Developing a Training Video and Manual for Best Practices and Techniques in Clearing Different Interchange Configurations and Other Geometric Layouts (CR 14-03)**

- Based upon the 9 developed intersection/interchange diagrams and the gathered common practices for clearing snow from these geometries, the research team has begun to develop animations and scripts for all 9 configurations. These are due 11/30/16.

### **Plug and Play, Phase II (CR 14-04)**

- The research team has completed and summarized the results of their surveys of both the agencies and industry.
- The industry survey did not get as many responses as the team had hoped. The research team gained some valuable insight from a representative of PeopleNet but needs approval from the subcommittee on how those responses are appropriately applied to this report.

### **Snow Removal Performance Metrics, Phase I: Synthesis (CR 14-05)**

- The research team developed a survey to send to the snow and ice states to gather information about their use of performance measures. They received 51 responses.
- When the subcommittee reviewed the summary of responses in the analysis and draft final report, they were not completely satisfied with the detail of those responses. Specifically, they wanted more “actionable” information such as how the states were using the data they acquired to improve their snow removal operations.
- The research team is currently speaking a second time with some of the prior interviewees to get this more specific information.

### **Identifying Best Practices for Snowplow Route Optimization (CR 14-07)**

- The PI has completed the draft route optimization matrix for subcommittee review.
- The matrix currently includes 5 route optimization projects from Vermont Agency of Transportation; Wisconsin DOT; Kentucky Transportation Cabinet; City of Centennial, CO; and the Village of Niles, IL.

### **Synthesis of Material Application Methodologies for Winter Operations (CR 15-01)**

- The consultant has worked with the subcommittee to develop the interview questions.
- The research team has experienced early success as interviews have been conducted at the AASHTO Subcommittee on Maintenance in July and the APWA Public Works Expo in August.
- Next interview opportunities come at the Western Snow and Ice Conference and Rodeo in late September and the TRB Annual Meeting in January.

### **Identification and Recommendations for Correction of Equipment Factors Causing Fatigue in Snowplow Operations (CR 15-02)**

- The project team held a kick off meeting, assembled an advisory board, and submitted a draft version of the literature review.
- The team now has an approved list of equipment and technologies to investigate for this project.

### **North American Study on Contracting Snow and Ice Response (CR 15-03)**

- The literature review is complete.
- The survey was conducted and a summary of the responses received was submitted to the subcommittee. Those responses came from state DOTs, county and municipal public works organizations, and even a private maintenance contractor.

## Project Proposal Generation

This discussion revolved around the idea of an innovative process for generating new project ideas. Because it is often times difficult to generate ideas on your own, some states struggle to submit project ideas each spring. Therefore, the idea of assembling five groups of six or seven states in each group to meet and collectively brainstorm and develop research ideas was proposed.

The TAC decided this was a good idea. The name of each state was written on a piece of paper and put in a bag. Justin then pulled the state names out of the bag randomly (one by one) and they were assigned one of the five groups. The plan is for each group to submit approximately two to three project ideas. This way, the TAC has about 10 to 15 projects to consider and vote on at the 2017 spring meeting. However, the current Clear Roads policy of each state being allowed to submit 2 research ideas is still going to be observed. This means, in theory, we could still have much more than 10 to 15 ideas.

**ACTION ITEM:** CTC will begin to facilitate group discussions in January 2017. Each group will meet about 2 or 3 times in order to generate their research ideas. This may vary depending on the group.

See groups below:

Group 1	Utah	Vermont	Virginia	Montana	Minnesota	South Dakota	
Group 2	Washington	Indiana	Illinois	W. Virginia	California	Ohio	Massachusetts
Group 3	Michigan	Colorado	Arizona	New York	Missouri	Pennsylvania	
Group 4	Idaho	Iowa	Delaware	Wisconsin	Nebraska	Oregon	Rhode Island
Group 5	Maine	Alaska	Wyoming	Connecticut	N. Dakota	Kansas	N. Hampshire

## State Reports

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

- New York: Mike Lashmet
- Pennsylvania: Jon Fleming

## Wednesday, September 21, 2016

### Clear Roads Collaboration with the Winter Maintenance Community

SICOP Report

- 2017 National Winter Maintenance Peer Exchange update – planning calls are just kicking off.
  - Where: Pittsburgh, PA.
  - When: Either the week of Sept. 11 or 18.
  - Theme: Research to Operations (R2O).
- Aurora projects
  - Completed:
    - RWIS Network Planning: Optimal Density & Location
    - Aurora AccuWeather Index
  - In Progress
    - Results-Based Winter Road Standards
    - Storm Simulator Training
    - Improving estimates of Real-Time Traffic Speeds During Weather for Winter Performance Measurement
    - Seasonal Weight Restrictions

- Quantifying Salt Concentration on Pavement, Phase 2
    - Snow Liquid Water Equivalent for PWD Sensors
    - Review Synthesis for Alternate Power Supplies
  - Being Scoped
    - Best Practices for Data Storage
    - Utah Snow & Ice Performance Measure Tool for Aurora
    - Aurora AccuWeather Index with Clear Roads
    - RWIS Network Planning: Optimal Density & Location, Phase 2
- SCOM submitted idea to Domestic Scan program entitled, ***Best Practices in Maintenance Support, Facility Site Layout and Design Features to Promote Safe, Efficient, and Effective Operation and Environmental Stewardship.***
- Subcommittee on Transportation System Management and Operations (STSMO) update.
  - 20-7 project – Roadmap for an Operations Guidebook to supplement the Green Book.
  - V2I Deployment Coalition
  - VSL projects
- FHWA initiatives
  - Every Day Counts – Weather Savvy Roads
  - CV Pilot Deployments
  - IMO and the Weather Data Environment (WxDE)
  - Vehicle Data Translator (VDT – aka Pikert System)
  - Capability Maturity Framework (CMF) for Road Weather Management
  - Weather-Responsiveness Traffic Management (WRTM)
  - Performance Management Tools
- NAS projects
  - NCHRP 14-34: Guide for Performance Measures in Snow and Ice Control Operations – designed to take what has already been done by Clear Roads and take it a step further and put it into the form of a guidebook.
  - Advancing Social and Behavioral Science Research and Application within the Weather Enterprise: A NAS Project.
- Recap of 2016 International Winter Maintenance & Surface Transportation Weather Conference - Outcomes/presentations will likely be posted in October and Rick will forward this information to Clear Roads.
  - Training details
  - Simulation
  - Is Fixed RWIS a dinosaur?
  - Privatization of weather information
  - Big data issues
  - Climate and resilience
  - Decision support systems
- Recap of 2016 Standing International Road Weather Commission (SIRWEC Conference)
  - Road weather management systems
  - Novel technologies in road weather
  - Decision support systems and road weather
  - Integrating road weather information and operations
  - Moving RWIS forward
  - All presentations can be viewed on the SIRWEC website: <http://www.sirwec.org>
- PIARC updates
  - Transportation management during winter events

- De-icing salt and brine treatments, interventions, and best practices
- Updates to the Snow and Ice Data Book
- Preparation for the 2018 International Winter Road Congress in Gdansk, Poland.

#### APWA Report

- 2015 Phoenix Seminar: Long Term Thinking to Winter Maintenance (DeVries, Nixon, and Nelson)
- North American Snow Conference – Hartford, CT, May 2016 (1614 in attendance).
  - Winter Maintenance Supervisor Certificate Program
    - 2016 workshops through early September (~ 420 participants)
  - APWA Media Fact Sheet: “Brine Fact Sheet – Spring 2016”
- Public Works Expo (PWX) – Minneapolis, MN, August 2016
  - 11 winter maintenance sessions
- “Click, Listen, and Learn” on November 2, 2016. Training is the theme. Kevin Hensley will forward along info when he receives it.
- APWA Reporter – October issue will focus on Snow and Ice.
- New Executive Director – Scott Grayson.
- Future meetings:
  - 2017 North American Snow Conference, April 23-26 (Iowa chapter sponsorship)
  - 2018 Indianapolis, IN
  - 2019 Salt Lake City, UT

### Outcomes of a Recently Completed Project

#### *CR 14-01 Synthesis of GPS/AVL Equipment Used for Winter Maintenance*

- Literature Review
- Survey
  - Responses: 36 individuals from 26 states, 4 cities, 1 county, and 1 manufacturer.
  - Among the highest reported use of GPS/AVL data was for plowing and material application decisions, tracking data to create shift reports or summary reports for managers.
  - States reported having equipped an average of 35% of their vehicles with AVL.
- Equipment Guide
  - Fleet and AVL Characteristics
  - AVL System Communication Performance
  - AVL Data and Uses
  - Observed Issues
  - Operations and Cost

### Next PNS Conference

Patti and James presented the idea of doing a joint Pacific Northwest Snowfighters/Clear Roads conference in 2018. PNS membership includes OR, WA, ID, CO, and MT. PNS meets once per year. PNS is interested in keeping it a regional forum. Clear Roads is a contributing member.

The CR meeting would be 2.5-3 days and the PNS would be 1.5-2 days. This would be an opportunity to share research with agency practitioners. The TAC is willing to skip the state reports in order to save time and combine meetings. Patti and James suggested it needs to be held in OR, WA, or ID (states that are PNS and CR members). Most likely locations within those states are Spokane or, even more likely, Portland.



## **Future Meetings**

### Spring 2017

Moving forward with Anchorage, Alaska for spring 2017 meeting. Will be held the week of April 24<sup>th</sup>, 2017. A request for bid for hotels in downtown Anchorage was sent to MnDOT on September 15<sup>th</sup>.

**ACTION ITEM:** CTC will inform the group of the hotel selected as soon as it is known.

### Fall 2017

Clear Roads meeting will be held in conjunction with the 2017 National Winter Maintenance Peer Exchange. Pittsburgh will be the location. Either the week of Sept. 11 or 18. Theme is Research to Operations (R2O).

Planning calls are just kicking off. The Clear Roads members on the NWMPE planning committee are Brian Burne, Allen Williams, Mark Trennepohl, and Paul Brown. Add Clay Adams to the committee.

## **FHWA Report**

Every Day Counts (EDC) – Weather Savvy Roads. This is only one of 11 EDC initiatives.

Two initiatives

1. Pathfinder – Goal is to strengthen the working relationships across state DOTs and the Weather and Climate Enterprise for the dissemination of road weather information to travelers.
  - a. Core Partners include: National Weather Service, private sector weather providers, state DOTs, and state emergency managers.
  - b. Innovation Deployment Team will develop and promote an implementation plan and a workbook.
2. Integrated Mobile Observations (IMO) – Goal is to deploy advanced, vehicle-based technologies to collect, transmit, and use weather, road condition, and related vehicle data for improved transportation system management.
  - a. Innovation Deployment Team will develop and promote an implementation tool kit and IMO final reports.

Seven upcoming Every Day Count Summits (October – December).

EDC-4 Funding Opportunities

- Accelerated Innovation Deployment Demonstration
- State Transportation Innovation Council
- Increased Federal-share for Project-level Innovation

## **State Reports**

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

- Michigan: Justin Droste
- Oregon: Patti Caswell
- California: Durval Avila
- North Dakota: Larry Gangl

## **Tour**

The group toured the Nebraska DOR Traffic Operations Center and a maintenance yard.

**2016 Clear Roads Synthesis Proposals – Notes from TAC Discussion**

#	Title	Information the Synthesis Will Compile	Presented by
1	Best Practices for the Use of Abrasives	<p>State practices, policies, and a literature search to determine best practices for using abrasives, to include using abrasives conservatively.</p> <p><b>Overview:</b> Need guidance on when to use abrasives; what works well; impacts on operations; and clean up. This can include salt blends. Call it a “State of Practice.”</p> <p><b>Questions:</b></p> <p><b>Discussion:</b> Can obtain info from the winter statistics project. Be aware that there is some info on this topic in the CR 13-01 project. Also a 2008 CTC article was written on the limitations of abrasives.</p>	Mark Trennepohl, Arizona DOT
2	Automatic Anti-Icing Systems on Bridge Decks	<p>State practices concerning some of these issues. What are the current systems in use? Are they being used in conjunction with new structures or were they retrofitted to fit existing structures? What type of chlorides are they using and what effect do they have on the bridge decks? How soon after the structures were built did they start using the chlorides? Long term effects on bridge decks. Maintenance issues with the systems. Any other information that may be helpful in determining what system fits the best.</p> <p><b>Overview:</b> Some states employ these systems, yet other states used to have them and got rid of them due to maintenance issues. Why? What is the consideration in terms of dollars spent on the system to that of lives saved?</p> <p><b>Questions:</b></p> <p><b>Discussion:</b></p>	Tony Strainer, Montana DOT
3	Best Pain Color and Conspicuity Tape Patterns for DOT Equipment	<p>Industry studies, research, and literature regarding the best color schemes, including retroreflective taping patterns, for DOT vehicles and equipment to maximize conspicuity in both winter and summer operations?</p> <p><b>Overview:</b> Is there enough information currently available to allow us to make informed decisions or is a research proposal warranted?</p> <p><b>Questions:</b></p> <p><b>Discussion:</b></p>	Jeff Pifer, West Virginia DOT