

**Aurora Board Meeting
March 8-10, 2011 – Boulder, Colorado, USA**

Individuals Participating in the Meeting:

Dawn Gustafson, Michigan DOT
Joe Doherty, New York State DOT
Tina Greenfield, Iowa DOT
Jason Norville, Pennsylvania DOT
Dean Kernan, Illinois DOT
Mike Adams, Wisconsin DOT
Curt Pape, Minnesota DOT
Max Perchanok, Ontario MOT
Mike Kisse, North Dakota DOT
Jack Stickel, Alaska DOT&PF
David Wieder, Colorado DOT
Paul Pisano, FHWA
Gabe Guevera, FHWA
Sheldon Drobot, NCAR
Mike Chapman, NCAR
Ralph Patterson, University of Utah
Chris Albrecht, Iowa State University

I. Open and General Items

Introductions and Review and Approval of Agenda – Joe Doherty began the meeting by welcoming everyone and asking the board members to briefly review the draft meeting agenda. After a few comments, the agenda was approved as the order of business for the meeting. *A copy of the agenda is attached to these minutes.*

Review of Previous Minutes and Actions – Chris Albrecht asked the board to review the draft board minutes from the December 2010 and February 2011 board web meetings. No comments were provided, and the minutes were approved. Chris also asked for any outstanding issues concerning past meetings and actions. None were noted.

II. Project Updates

Chris provided the board with a summary of the latest status report on each project. *A copy of this summary is attached to these minutes as Attachment A.* Details of project-specific discussions, including information on mini-meetings held on March 8, follow:

Project 2000-01 – Benchmarking the Performance of RWIS Forecasts: Max Perchanok reviewed this effort, noting it was approximately 75% complete. He also noted that a mini-meeting was held on the day prior, wherein the project team discussed how the product of this project will lead into Project 2010-04. Max also noted that Sheldon Drobot would have his comments on the data back to the project team by April 1.

Project 2003-04 – Intelligent Image-Based Winter Road Condition Sensor - Phase III: Chris Albrecht reviewed this effort, noting that he was still waiting on a more detailed, conclusive summary of this effort from Dan Eriksson, but he had been trying to schedule a call with him.

Project 2006-01 – Support of the *Clarus* Initiative: Tina Greenfield noted that the board had participated in the *Clarus* meeting prior to the board meeting, so she had little additional to report on this effort. A short discussion followed, wherein both Max Perchanok and Mike Adams stated that they would be available to travel to review of any *Clarus* results. The board agreed to keep the project account open to support their possible travel.

Project 2006-08 – Low Cost Mobile RWIS: Chris Albrecht noted that the final report was currently being produced.

Project 2007-01 – RWIS Equipment Monitoring System – Phase II: Jack Stickel noted that this project was being combined with Project 2005-01, as noted during the earlier project mini-meeting. He also noted that he was in the process of combining the scopes of the two efforts and would send the revised scope to the project team by March 18, 2011.

Project 2007-02 – Cold Weather Testing of the Halliday Road Grip Unit: Tina Greenfield stated that she had been somewhat disappointed by the results of this research, noting that the draft report was not a very good product. A lengthy discussion followed. The board agreed to wait to see how much the final report would be improved by the team's suggestions before deciding what to do with the contract.

Project 2007-04 – Development and Demonstration of a Freezing Drizzle Algorithm: Max Perchanok discussed this research, noting that the project was about 85% complete. He went on to note that there had been issues with the second part of the UND research, as were discussed in a mini-meeting, which was now on its third extension. After another discussion of the data analysis being done by UND, the board agreed to have Tina Greenfield draft a letter to UND asking for clarification on their progress.

Project 2007-05 – Multiple-Use ITS Data Collection Sites: Jack Stickel reviewed this project. He noted that a mini-meeting was held the day prior and a new direction was decided on by the project team. Specifically, he noted that the product would be a state-of-the-practice review that would involve an initial survey of several agencies.

Project 2008-01 – Development of a National Road Weather Testing Facility: Tina Greenfield noted that there were no new developments to report, and that the effort will likely focus on incorporating some of this project's goals into the "wiki" site.

Project 2008-03 – MDSS Demonstration in Ontario: Max Perchanok reviewed this project. He noted several accomplishments, but also noted that the project would be delayed until the fall of 2011.

Project 2009-01 – Evaluation and Inter-Comparison of the Lufft R2S Sensor: Chris Albrecht reviewed the history of this project, noting that the project team decided to re-scope it during the mini-meeting. He went on to say that the team felt that several agencies had been using the R2S, so a survey of user experiences with a variety of sensors would be more useful to Aurora. The group also discussed several potential questions that they may ask of users, then approved Dawn Gustafson as the new project champion.

Project 2009-03 – Knowledge Base: Jack Stickel noted that many issues concerning this effort had been discussed during the project meeting and over the last few months via project conference calls. Chris Albrecht also reviewed the latest changes in structure and elements of the “wiki” site.

III. Project Updates (continued)

Project 2009-04 – Road Weather Education Enhancements and Dissemination: Dawn Gustafson reviewed this project, noting that there was considerable overlap with this effort and the knowledge base “wiki” site. She also reviewed the latest decisions by the project team, noting that a training section would be added under the knowledge base site.

Project 2009-05 – Further Development of Pavement Precipitation Accumulation Estimation System (PPAES): Chris Albrecht and Ralph Patterson reviewed progress on this effort. They noted that the effort would need a new champion and some new team members. After a short discussion, Jason Norville and Mike Adams were added to the team. No champion was decided upon, the board decided, until a status report can be provided from UND.

Project 2009-06 – Salinity Sensor Improvements and Development: Tina Greenfield reported on this project, noting that the team had kept the project open until they were sure there would not be an effort possible under Aurora. After a lengthy discussion, the board agreed that Aurora had clearly conveyed this need to the private sector and would continue to do so. As a result, the board voted to discontinue this project. Chris Albrecht noted that the remaining \$5,000 would be rolled into the general program fund.

Project 2010-01 – Enhancements of AI/RWIS CBT: Tina Greenfield noted that this project was progressing well, with GanTek working on CBT version related to anti-icing and RWIS.

Project 2010-02 – Mobile-Weather Data Collection Guidelines: Chris Albrecht reviewed what he understood as the focus of this effort, noting that Bill Hoffman had moved to a different position in Nevada DOT outside of winter maintenance. After a discussion on where to take this effort, the board appointed Curt Pape as the new champion and added Joe Doherty to the project team. Chris noted that the he would help the team schedule a project call as soon as possible.

Project 2010-03 – Results-Based Winter Road Maintenance Standards: Max Perchanok reviewed this effort. He noted that they had received additional funding from MTO recently and that Dr. Fu had been making good progress.

Project 2010-04 – RWIS Sensor Density Grid: Chris Albrecht note that, again, Bill Hoffman had been the project champion for this effort. After a short discussion, it was decided that Max Perchanok would replace Bill as champion and that Mike Kisse would be added to the team. Eventually, Max noted, this project would be developed into an RFP and would build on the results of project 2000-01.

Project 2010-05 – Determining RPU and Sensor Failure: Jack Stickel noted that he had been working with someone though NCHRP about leveraging an existing effort by Purdue University that might fulfill this project's goal.

Project 2011-01 – Third Peer Exchange: Chris Albrecht noted that plans for the event were moving ahead nicely.

Project 2011-02 – RWIS Training Tool: Tina Greenfield reported on this project, noting that the scope was ready for review by the team. In addition, Jack Stickel and Mike Adams were added to the project team.

Project 2011-03 – B/C and Instruction for Migrating to Open RWIS: Nothing new had progressed under this effort, noted Tina, but Mike Kisse and Jason Norville were added to the project team.

Project 2011-04 – Study of MDSS Costs: Mike Adams noted that he had a plan to survey all of the states involved in MDSS at the end of the current winter season.

Project 2011-05 – Funding Source Identification: Jack Stickel reviewed the scope of this project, noting that sources such as the Department of Homeland Security and safety funding could be possible avenues to explore. In addition, Jason Norville and Lee Smithson were added to the team for this project.

IV. Program Administration and Financial Status

Chris Albrecht briefly reviewed membership payments, noting that the program was in good shape to date, except for questions he had with past payments from Nevada. He then asked if there were any questions or issues the board would like to discuss. None were noted.

V. National Initiatives and Partnerships

Chris Albrecht noted that he had reviewed national-level issues during the joint *Clarus* event prior to the full board meeting. *A copy of Chris' presentation from that session is attached to these minutes as Attachment B.*

VI. Future Aurora Meetings and Calls

The board then discussed dates and times of future meetings. As a result, the following events were set:

- Board web meeting on Thursday, May 19, 2011 (12:00 p.m. CDT)
- Board web meeting on Thursday, July 7, 2011 (12:00 p.m. CDT)
- Board meeting on September 19-23 in Bozeman, Montana

Chris Albrecht noted that additional meetings, such as another board call or administrative calls, would be arranged at a later date as needed.

VII. Member Agency Updates

Next, each agency gave a brief review of their recent winter maintenance and road weather-related activities. Chris Albrecht provided a handout that each agency had filled out ahead of time. *This handout is attached to these minutes as Attachment C.* Following is a brief summary of additional items that were discussed.

Alaska Department of Transportation and Public Facilities – Jack Stickel reviewed recent activities in Alaska, noting that they had about 50 RWIS sites statewide. He also noted that he had been working on using Campbell Scientific data loggers recently and asked Ralph Patterson for some assistance. He also detailed a new RWIS site that would be utilized mainly for rescue operations, the use of solar power at remote sites, and his attempts to create a data business plan for Alaska.

Illinois Department of Transportation – Dean Kernan noted that Tim Peters would likely be his replacement with Aurora once he retires later in 2011.

Iowa Department of Transportation – Tina Greenfield mentioned that Iowa was now doing weather briefings with their statewide operations staff.

Minnesota Department of Transportation – Curt Pape noted that Mn/DOT was replacing their ScanWeb service with Navigator. A long discussion followed. He also noted that they are moving ahead with MDSS implementation.

New York State Department of Transportation – Joe Doherty noted that NYSDOT has 35 RWIS. He also noted that the statewide budget issues continue to impact everything related to winter maintenance.

Ontario Ministry of Transportation – Max Perchanok reviewed MTO's network of RWIS and the province's extensive use of AVL. He also discussed seasonal load restrictions, FAST sites, and winter operations standards.

VIII. Member Agency Updates (continued)

North Dakota Department of Transportation – Mike Kisse reported that NDDOT has 25 RWIS statewide and that an ITS engineer at NDDOT had recently retired.

Pennsylvania Department of Transportation – Jason Norville noted that PennDOT's statewide RWIS network overhaul is in a "holding pattern" pending a review by the new governor's administration. He also detailed some of the specifics of Pennsylvania's two micro-FAST systems.

Wisconsin Department of Transportation – Mike Adams noted that he has processed all of Wisconsin's 300 MDSS routes.

Michigan Department of Transportation – Dawn Gustafson noted that MDOT added several new sites this past year, with more planned for 2012. She also discussed specifications for RWIS, the statewide TOC, and in-house RWIS maintenance.

IX. 2011-2012 Work Plan

Chris Albrecht then reviewed the process and schedule highlighting what he had planned for updating the work plan in the coming months. He also reviewed a list of potential research ideas for FY2012 that he had sent to the board in early March. A long discussion followed, wherein the board provided input on these potential ideas. In some cases, ideas were dropped. The remaining research ideas and likely proposal lead contacts included:

- Open-Graded Surface and Anti-Icing Chemicals Traction (Doherty)
- Frost Depth and Load Restriction Issues (Perchanok)
- Expanding Traveler Information Across Jurisdictions to Commercial Vehicles (Stickel)
- Micro-MDSS (Perchanok)
- Preventing Low-Visibility Crashes (Kisse)
- Salt Use and Environmental Sustainability (Perchanok)
- Effects of Diurnal Inversion Boundary Layer Migration on Pavement Icing (Drobot)

Chris noted that these ideas would be developed, along with any new ideas that may come out of the peer exchange, for consideration in late 2011.

X. Aurora Communications Plan

The board briefly discussed this topic, noting that the work being done at the University of Waterloo would be a goods topic for a future e-news. In addition, both Jack Stickel and Max Perchanok asked that Chris send them brochures prior to the next ITS Canada meeting. Chris noted that he would print them and send them on.

It was also noted that Colorado should be followed up with concerning possible membership. Chris noted that he and Joe Doherty would do so with Ken DePinto.

XI. Other Aurora Items

The board also discussed adding the University of Utah as an associate member. After a short discussion, the board agreed to add them.

Agenda

Aurora Program Board Meeting

March 8-10, 2011

National Center for Atmospheric Research, Boulder, Colorado, USA

AGENDA

Tuesday, March 8, 2011:

- 1:00 Joint Meeting with *Clarus* Participants**
- 1:00 Introductions and Preview of Meeting Purpose/Goals Chris Albrecht
1:30 National Road Weather Initiatives and Partnerships All
- 2:30 Break**
- 2:45 Joint Meeting with *Clarus* Participants (continued)**
- 2:45 Review of *Clarus* Progress and Use Cases Paul Pisano
3:15 Review of Aurora Program Research Progress Joe Doherty
3:45 Questions and Open Discussion All
- 4:45 Adjourn Joint Meeting**
- 6:00 Group Business Dinner**

Wednesday, March 9, 2011:

- 8:00 Project Mini-Meetings**
- 8:00 Project 2000-01 Max Perchanok and Team
Team includes: Adams, Drobot, Pape, and Tilley
- 8:30 Project 2007-04 Max Perchanok and Team
Teams include: Adams and Pape
- 9:00 Project 2007-01 Jack Stickel and Team
Teams include: Adams, Doherty, Greenfield, Gustafson, and Pape
- 9:30 Project 2007-05 Jack Stickel and Team
Teams include: Doherty, Greenfield, Gustafson, and Pape
- 10:00 Break**
- 10:15 Project Mini-Meetings (continued)**
- 10:15 Project 2009-01 Ralph Patterson and Team
Teams include: Doherty, Kernan, Pape, and Stickel
- 10:45 Project 2010-04 Max Perchanok and Team
Teams include: Adams, Gustafson, Greenfield, Kernan, Norville, and Stickel
- 11:15 Project 2009-03 Jack Stickel and Team
Teams include: Perchanok and Pape
- 12:00 Group Business Lunch**

I.	1:00	Open and General Items	
	1:00	Introductions and review/approval of agenda	Joe Doherty
	1:10	Review of previous minutes and actions	Chris Albrecht
II.	1:15	Project Updates	
	1:15	2000-01 - Benchmarking ... RWIS Forecasts	Max Perchanok
	1:25	2003-04 - Intelligent Image-Based, Phase 3 ...	Chris Albrecht
	1:30	2006-01 - Support of the Clarus Initiative	Tina Greenfield
	1:40	2006-08 - Low Cost Mobile RWIS	Chris Albrecht
	1:45	2007-01 - RWIS Equipment Monitoring 2	Jack Stickel
	2:00	2007-02 - Cold Weather Testing of Halliday Unit	Max Perchanok
	2:10	2007-04 - Freezing Drizzle Algorithm	Max Perchanok
	2:20	2007-05 - Multiple Use ITS Sites	Jack Stickel
	2:30	2008-01 - National Testing Program	Tina Greenfield
	2:35	2008-03 - MDSS Demo in Ontario	Max Perchanok
	2:45	2009-01 - Evaluation of the Lufft R2S	Chris Albrecht
	2:50	2009-03 - Knowledge Base	Jack Stickel
	3:00	Break	
III.	3:15	Project Updates (continued)	
	3:15	2009-04 - Road Weather Education Enhancements	Dawn Gustafson
	3:25	2009-05 - Further Development of PPAES	Bill Hoffman
	3:35	2009-06 - Salinity Sensor Improvements and Development	Tina Greenfield
	3:40	2010-01 - Enhancements of AI/RWIS CBT	Tina Greenfield
	3:45	2010-02 - Mobile-Weather Data Collection Guidelines	Chris Albrecht
	3:55	2010-03 - Results Based Maintenance Standards	Max Perchanok
	4:20	2010-04 - RWIS Sensor Density Study	Chris Albrecht
	4:30	2010-05 - Determining RPU and Sensor Failure	Jack Stickel
	4:35	2011-01 - Third Peer Exchange	Lee Smithson
	4:40	2011-02 - RWIS Training Tool	Tina Greenfield
	4:45	2011-03 - B/C of Open RWIS	Tina Greenfield
	4:50	2011-04 - Study of MDSS Costs	Mike Adams
	4:55	2011-05 - Funding Source Identification	Jack Stickel
	5:00	Adjourn	
	6:00	Group Business Dinner	

Thursday, March 10, 2011:

- IV. 8:00 Program Administration and Financial Status** Chris Albrecht
8:00 Discussion of membership payments, contributions, and agreements
8:15 Discussion of program expenditures
8:20 Discussion of contracting issues
8:25 Discussion of management contract
- V. 8:30 National Initiatives and Partnerships (5 minutes each)**
ENTERPRISE, MDSS, NTCIP Curt Pape
TRB Task Forces and Committees, ITS America Max Perchanok
AMS Sheldon Drobot
Clear Roads Jason Norville
AASHTO/SICOP, PNS, SIRWEC Chris Albrecht
Other Initiatives/Groups All
- VI. 9:15 Future Meetings and Calls** Joe Doherty
- VII. 9:30 Round Robin/Member Agency RWIS Updates** All Participants
10:00 Break
- VIII. 10:15 Round Robin/Member Agency RWIS Updates (continued)** All Participants
12:00 Group Business Lunch
- IX. 1:00 2011-2012 Work Plan and Research** Chris Albrecht
1:00 Discussion of plan sections to review
1:30 Initial discussion of project ideas for FY 2012
2:15 Assignment of candidate project teams for FY 2012
2:30 Break
- X. 2:45 Aurora Outreach and Communications** Chris Albrecht
Aurora E-Newsletter
Strategic Marketing of Aurora
Peer Exchange Survey Results
New Members and Associates
- XI. 3:15 Other Items** All
3:30 Adjourn

Aurora Program Board Meeting

March 8-10, 2011

National Center for Atmospheric Research, Boulder, Colorado, USA

ATTENDING

<u>Name, Agency</u>	<u>Arrive / Depart</u>	<u>Nights (Confirmation)</u>
Jason Norville, Pennsylvania DOT	7 th am / 10 th pm	3 nights * (131033)
Dean Kernan, Illinois DOT	7 th am / 12 th pm	5 nights * (131034)
Joe Doherty, New York DOT	7 th pm / 10 th am	3 nights * (131025)
Dawn Gustafson, Michigan DOT	7 th pm / 10 th pm	3 nights * (131035)
Tina Greenfield, Iowa DOT	7 th pm / 10 th pm	3 nights * (131036)
Mike Adams, Wisconsin DOT	7 th pm / 10 th pm	3 nights * (131037)
Curt Pape, Minnesota DOT	7 th pm / 10 th pm	3 nights * (131038)
Mike Kisse, North Dakota DOT	7 th pm / 10 th pm	3 nights * (131039)
Jack Stickel, Alaska DOT&PF	7 th pm / 11 th am	4 nights * (131040)
Chris Cluett, Battelle	6 th pm / 8 th pm	2 nights (131042)
Deepak Gopalakrishna, Battelle	6 th pm / 8 th pm	2 nights (131043)
Leon Osborne, Meridian	6 th pm / 8 th pm	2 nights (131044)
Bobby Haas, SAIC	6 th pm / 8 th pm	2 nights (131775)
Chaz Harris, Noblis	6 th pm / 9 th am	3 nights (131045)
Bob Hart, Meridian	6 th pm / 9 th am	3 nights (131046)
John Mewes, Meridian	7 th am / 8 th pm	1 night (131047)
Mark Askelson, UND	7 th am / 8 th pm	1 night (131048)
Jennifer Hershey, UND	7 th am / 8 th pm	1 night (131049)
Ralph Patterson, University of Utah	7 th pm / 10 th am	3 nights (131050)
Max Perchanok, Ontario MOT	7 th pm / 10 th pm	3 nights (131051)
Chris Albrecht, ISU/CWIMS	7 th pm / 11 th am	4 nights (131052)
David Wieder, Colorado DOT	-	-
Paul Pisano, FHWA	-	-
Gabe Guevara, FHWA	-	-
Darien Davis, NOAA	-	-
Sheldon Drobot, NCAR	-	-
Mike Chapman, NCAR	-	-
Rick Glassco, Noblis	-	-
Brenda Boyce, Mixon-Hill	-	-
Chris Hill, Mixon-Hill	-	-

* indicates room paid through ISU account

March 3, 2011

Attachment A

Aurora Program - Ongoing Project Status

March 4, 2011

FY 2000 through FY 2007

- 2000-01: Benchmarking of RWIS Forecasts (\$50,000 in-kind) = 75% complete
- 2003-04: Intelligent Image-Based Sensor, Phase 3 (\$75,000 in-kind) = 95% complete
- 2006-01: Support of the Clarus Initiative (\$25,000) = 75% complete
- 2006-08: Low Cost Mobile RWIS (\$50,000 in-kind) = 95% complete
- 2007-01: RWIS Equipment Monitoring System, Phase 2 (\$135,000) = 5% complete
- 2007-02: Cold Weather Testing of the Halliday Road Grip Unit (\$40,000) = 90% complete
- 2007-04: Development of a Freezing Drizzle Algorithm (\$85,000) = 85% complete
- 2007-05: Multiple-Use ITS Data Collection Sites (\$15,000) = 10% complete

FY 2008

- 2008-01: National Road Weather Testing Program (\$11,000) = 20% complete
- 2008-03: Next Generation RWIS for Canada (\$75,000 in-kind) = 55% complete

FY 2009

- 2009-01: Evaluation and Inter-comparison of the Lufft R2S (\$55,000) = 5% complete
- 2009-03: Knowledge Base for RWIS (\$20,000) = 95% complete
- 2009-04: Road Weather Education Enhancements (\$20,000) = 30% complete
- 2009-05: Further Development of PPAES (\$83,000) = 25% complete
- 2009-06: Salinity Sensor Improvements and Development (\$5,000) = 5% complete

FY 2010

- 2010-01: Enhancements of AI/RWIS CBT (\$50,000) = 20% complete
- 2010-02: Mobile-Weather Data Collection Guidelines (\$25,000) = 10% complete
- 2010-03: Development of Models for Standards (\$120,000) = 35% complete
- 2010-04: RWIS Sensor Density Grid (\$100,000) = 5% complete
- 2010-05: Determining RPU and Sensor Failure (\$5,000) = 5% complete

FY 2011

- 2011-01: Third Peer Exchange (\$30,000) = 15% complete
- 2011-02: RWIS Training Tool (200,000) = 5% complete
- 2011-03: Benefit/Costs and Instruction for Migrating to Open RWIS (\$75,000) = 5% complete
- 2011-04: Study of MDSS Costs (\$20,000) = 5% complete
- 2011-05: Funding Sources Identification (\$5,000) = 5% complete

Project Status Report

February 8, 2010

Project: 2000-01: Benchmarking the Performance of RWIS Forecasts

Champion: Max Perchanok, Ontario Ministry of Transportation

Status:

- The hard drive was sent on November 10.
- Agencies that provided data, that was included on the hard drive, are as follows:
 - British Columbia, Alberta, Newfoundland, Nova Scotia, New Brunswick
 - Pennsylvania, Iowa, Alaska
 - Finland
- Ontario will be provided later this month.
- A project mini-meeting is scheduled for the March 2011 in Boulder, where the team will discuss review and schedule NCAR's component.

Approximate % Complete: 75 %

Barriers/Issues: None.

Recommendations: X continue as planned
 continue with modifications
 discontinue

Additional Comments:

- The project is expected to be complete in early 2011.
- This is an in-kind project for Ontario Ministry of Transportation.
- Project Team: Max Perchanok (champion), Mike Adams, Scott Roeder, Bill Hoffman, Curt Pape, Jeff Tilley, Dave Lahn, Sheldon Drobot, Dan Huang

Project Status Report

February 11, 2011

Project: 2003-04: Intelligent Image-Based Winter Road Condition Sensor, Phase 3

Champion: Dan Eriksson, Swedish Road Administration

Status:

- This project involves a third phase of the intelligent image-based winter sensor project. The first two phases have shown to be very promising. The third phase involved continuing research and movement of the test site to a new location to acquire more research data.
- Because of the lack of trained nets for the actual installation point, this first year has mainly had the task of retrieving pictures to be used for future training of the neural networks. Results from the two approximate nets have not been reliable.
- One could also note that the computer used for image classification has been exchanged one time during this year. The usage of industrial computers with operating systems such as Microsoft Windows 2000 has shown to be crucial for the system functionality. The field tests have shown that standard PC operating systems needs to be rebooted at least once per month in order to be kept running. For a wider future field usage, it would be better to implement the image classification analysis into the embedded system in the field stations.
- During 2004-2005, the pictures retrieved during the season 2003-2004 should be used to train new neural nets. It is not until then we know more precise what accuracy we could get from the field image classification system.
- Five classes of road conditions are possible to detect this winter 2005/2006. Dry, wet, snow, ice and tracks.
- We are in the planning process of putting out a second camera to verify that the neural network is operational in any location, not only in the test site.
- The critical second camera test site to verify that the neural network is operational in any location, not only in the test site, has been tested this last winter season and the result was not what we had expected. The accuracy on road classification from the field image classification system was far too low to be acceptable.
- The team was still waiting for a report detailing the research results.
- Chris Albrecht has and Dan Eriksson will schedule a time to finish the final report summary.

Approximate % Complete: 95 %

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This is an in-kind project for the Swedish Road Administration.
- Project Team: Dan Eriksson (champion), Max Perchanok, Dan Roosevelt

Project Status Report

December 3, 2010

Project: 2006-01: Support of the *Clarus* Initiative

Champion: Tina Greenfield, Iowa Department of Transportation

Background: *Clarus* is a FHWA initiative designed to collect, quality check, and make available via the Internet this nation's public investments in atmospheric and pavement observations which support surface transportation operations. The purpose of this project is to influence the *Clarus* initiative and assist with its early implementation through funding costs 1) for member participation in the *Clarus* project when the *Clarus* Initiative does not cover costs 2) associated with drafting and submitting a proposal to be the test location for the Multi-state Regional Demonstration.

Strategy/Approach: Once the system design is complete, it will be necessary to implement, integrate, and test *Clarus* in a Multi-state Regional Demonstration. This demonstration will be conducted at a selected location so that system components, core functions, and information management processes may be tested and improved. Aurora supports this initiative. Active participation in the design and demonstration phases will allow Aurora members to influence the product, gain knowledge of the details involved with implementation, and help promote this system.

Status:

- Proof-of-Concept test involved Aurora members UT, AK and MN.
- Iowa was awarded one of the Concept of Operations (ConOps) projects. IL, IN, and OH are Aurora members on this team. Aurora supported this application.
- Aurora agreed to fund other Aurora states participation in other ConOps projects.
- The study report for all three ConOps teams are at <http://www.clarusinitiative.org/regional.htm>.

Approximate % Complete: 75 %

Barriers/Issues: None.

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$50,000 in FY 2006.
- The project funding was reduced to \$25,000 at the September 2010 board meeting.
- Project Team: Tina Greenfield (champion), Jack Stickel, Kirk Carpenter, Dean Kernan, Mike Adams, Scott Roeder, Sheldon Drobot

Project Status Report

February 11, 2011

Project: 2006-08: Low Cost Mobile RWIS

Champion: Claude Lapointe, Quebec Ministry of Transportation

Purpose: The objective is to build low cost mobile RWIS station with an open architecture to mix different sensors of different constructors. The project will involve the use of sensors on a vehicle and the use of an in-vehicle display and cell phone-based communications.

Status:

- Final project materials have been provided by Quebec.
- InTrans/CWIMS publications staff is editing them for a final review by the board.

Approximate % Complete: 95 %

Barriers/Issues: None.

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This is an in-kind project for the Quebec Ministry of Transportation.
- Project Team: Claude Lapointe (champion), Curt Pape, Kirk Carpenter, Dan Roosevelt, Dennis Burkheimer, Rudy Persaud

Project Status Report

February 11, 2011

Project: 2007-01: RWIS Equipment Monitoring System, Phase 2

Champion: Jack Stickel, Alaska Department of Transportation and Public Facilities

Objective: Expand the *RWIS Equipment Monitoring System* in four areas:

- Include in-commission rate reports with the percent of time the site was fully operational or degraded by no data received, incomplete data, or incorrect/suspicious data.
- Implement the specific changes to the RWIS Data and Reporting System proposed by the Aurora member states.
- Evaluate how site performance by sensor can be added to the application.
- Complete a Concept of Operations, system architecture, implementation plan, and deployment (assuming sufficient funding) for ingesting Clarus System quality checking output online.
- This project has also discontinued Project 2005-01: Development of a RWIS Quality Assurance Monitoring System, that was intended to develop a system that is modular to allow installation with different host organizations and platforms, expandable for incorporating additional quality assurance modules, accessible via the web, and holds historical database of quality assurance reports for future reference.

Status:

- The proposal will incorporate the Clarus System quality checking output for objective #4.
- A detailed analysis of the Clarus System quality checking output will be completed in May. A draft scope of work will follow.
- This project was combined with Project 2005-01.
- A mini-meeting has been scheduled for the March meeting in Boulder.

Approximate % Complete: 5 %

Barriers/Issues: Final Scope of Work for RFP

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$25,000 in FY 2007.
- This project was funded for an additional \$10,000 funding under FY 2008.
- This project has been combined with Project 2005-01 and its funding of \$100,000.
- The total project budget is \$135,000 as of the September 2010 board meeting.
- Project Team: Jack Stickel (champion), Dawn Gustafson, Curt Pape, Mike Adams, Ralph Patterson, Tina Greenfield, Joe Doherty

Project Status Report

February 7, 2011

Project: 2007-02: Cold Weather Testing of the Halliday Road Grip Unit

Champion: Diana Clonch, Ohio Department of Transportation

Status:

- Jeff Tilley is preparing a final report for presentation at the TRB show next June in Indianapolis.
- Ohio DOT brought the RT3 unit back from North Dakota last week.
- A presentation on results will be made at the 4th National Conference on Surface Transportation Weather in Indianapolis.
- Jeff Tilley would try to send a final report to Scott Roeder prior to the Albuquerque meeting.
- Participating states gave their comments on the draft final report, and additional technical comments were anticipated after Max Perchanok's revisions.
- Max submitted comments to Jeff Tilley early in April 2009 and a portion of these requested changes would be made by early June. Some comments were beyond the scope and would need to be addressed so the two planned a call.
- Waiting to hear back from UND.
- UND had expressed some security concerns with sharing the extra data collected on this project. It was agreed that Jeff Tilley would gather this data and forward it on to Chris Albrecht where it could be accessible upon request.
- Max noted that Quebec did a friction report and that the two devices should be compared.
- The draft report is being finished.
- A mini-meeting was held Des Moines on September 21, 2010.
- Tina Greenfield sent a note to the UND contract office a few months ago about finding a successful conclusion to this project, but has not heard a response plan from UND.

Approximate % Complete: 90 %

Barriers/Issues: None.

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$40,000 in FY 2007.
- An in-kind contribution from Ontario MOT is also a part of this effort.
- Project Team: Diana Clonch (champion), Mike Kisse, Max Perchanok, Tina Greenfield, Bill Hoffman, Lee Smithson

Project Status Report

November 30, 2010

Project: 2007-04: Development and Demonstration of a Freezing Drizzle Algorithm for ESS

Champion: Max Perchanok, Ontario Ministry of Transportation

Status:

- The purpose of this project is to test/optimize the Rosemont freezing precipitation sensor for detecting freezing drizzle (freezing drizzle is defined as very light freezing rain) in roadside situations.
- The approach is to operate the sensor in conjunction with various 'ground truth' sensors (mainly Geonor heated rain gauge) and to develop statistical measures of its accuracy under different ambient conditions (temperature, storm type, season) and with or without filtering the data using other sensors.
- Phase 1 was completed in October 2008. This remaining work is Phase 2.
- Geonor quality control was completed in October, review of Geonor and NCAR data are now underway.
- The report will include analysis of the corrected data from both seasons stratified into 2 or 3 synoptic types, and will compare results from the stand-alone Rosemont with results obtained when the Rosemont data are pre-classified using Geonor precipitation rate data.
- The report will include a chapter on calibration of the Rosemont including both theoretical and practical aspects.
- A mini-meeting has been scheduled for the March 2011 meeting in Boulder.

Approximate % Complete: 85 % (Phase 2)

Barriers/Issues: **None.** Work was delayed in Sep/Oct waiting for contract extension and is now underway with delivery expected by end of 2010.

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$15,000 in FY 2007 and \$70,000 in FY 2008.
- Project Team: Max Perchanok (champion), Curt Pape, Mike Adams

Project Status Report

February 11, 2011

Project: 2007-05: Multiple-Use ITS Data Collection Sites

Champion: Jack Stickel, Alaska Department of Transportation and Public Facilities

Status:

- The overall objective of this project remains the same – use RWIS sites for different types of data collection. The goals, however, have been slowly evolving over the past two years. The current project goal is to integrate non-intrusive traffic data collection devices into a RWIS site. There is a realization that each DOT has unique IT infrastructure, power, communication, traffic data needs, and contractual relationships. There needs to be different, specific solutions to meet these challenges. Therefore, the two goals for project are:
 - Document existing DOT programs for non-intrusive traffic data collection among AURORA states. This would include Utah, New York, and Iowa.
 - Develop a software solution for full Wavetronix integration for the SSI Linux RPU (LX-RPU). A prototype would be deployed for an AURORA state (Alaska); other AURORA states would be eligible to follow on at a reduced cost. Alaska DOT has a quote for the LX-RPU integration and is ready to go to work.
- The non-intrusive RWIS traffic integration from other states could be documented as part of Aurora Project 2009-03 “*Knowledge Base for RWIS*”.
- Other options for this project would include air quality monitoring for: Ozone O3, Nitrogen Dioxide O2, Carbon Monoxide CO, Volatile Organic Compounds VOC, Carbon Dioxide CO2, Sulphur Dioxide SO2, Hydrogen Sulphide H2S, Particulate PM10, PM2.5
- A concept of operations is pending.
- A mini-meeting has been scheduled for March 9, 2001 in Boulder.

Approximate % Complete: 10 %

Barriers/Issues: Final scope of work for RFP

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$35,000 in FY 2007. This amount was reduced to \$15,000 at the September 2010 board meeting, with the other \$20,000 being rolled into the general fund.
- Project Team: Jack Stickel (champion), Tina Greenfield, Joe Doherty, Ralph Patterson, Curt Pape, Dawn Gustafson

Project Status Report

March 2, 2011

Project: 2008-01: Development of a National Road Weather Testing Program

Champion: Tina Greenfield, Iowa Department of Transportation

Objective: The purpose of this project is to fund Aurora to market the idea of a national testing facility to various audiences and sources of support. A national facility can help states and agencies find appropriate and well-suited providers for transportation weather research.

Status:

- This project was first mentioned at the National Winter Maintenance Peer Exchange in Ohio in August of 2007. Other winter maintenance testing needs were also brought up in the Peer Exchange round-table discussions. These needs were assigned to AASHTO/SICOP at the December, 2007 meeting.
- After hearing support for a national facility from Clear Roads members, Tina helped arrange a conference call between champion members from Clear Roads, AASHTO, SICOP, PNS, and Aurora to discuss possible cooperation and coordination on our “national facility” projects. This group decided cooperation was beneficial and began working on a draft document describing the facility.
- The idea of a single facility morphed into the idea of a consortium or board of experts which can help requestors of research find appropriate facilities.
- Clear Roads has committed funding. The group was waiting to hear back about additional funding from PNS.
- Chris Albrecht forwarded materials concerning a testing facility database to the project team.

Approximate % Complete: 20 %

Barriers/Issues: None

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$1,000 in FY 2008.
- This project was funded for an additional \$10,000 in FY 2009.
- Project Team: Tina Greenfield (champion), Jack Stickel, Max Perchanok, Lee Smithson

Project Status Report

November 30, 2010

Project: 2008-03: MDSS Demonstration in Ontario

Champion: Max Perchanok, Ontario Ministry of Transportation

Objective: The purpose of this project is to review available MDSS systems in comparison with conventional RWIS, to identify those that best support winter operations planning, performance monitoring and contract administration, and to implement them on a limited basis.

Status:

- An MDSS demonstration and evaluation is planned for 2 sites in partnership with contractor.
 - Installation of AVL on contractor trucks to obtain detailed road temperature and spreader data.
 - Implementation of a treatment advisory function in hindcast mode using AVL and RWIS archival data from storms in winter 2010-11, to compare service level and salt use from actual treatments with those from recommended treatments. Work to be completed and reported in spring 2011 as a benefit/cost study.
- Seasonal Load Advisory
 - Comparison of forecast with actual restriction dates showed benefits of Lakehead/MnDoT approach over UWaterloo index approach.
 - Web site will be revised in December 2010, replacing Waterloo prediction approach with Lakehead prediction approach..
 - Relationship of frost depth to pavement modulus (strength) is progressing as new measurements come in.
 - TempW finite-element heat-flow models was prepared and borehole data were obtained from most sites to help calibrate prediction models to geotech conditions at each load restriction site.
- Highway Frost Potential mapping
 - Not currently planned aside from MDSS
- Highway Planning and Design applications.(Weather Data Interface)
 - Precip sensors installed at most sites
 - Year-round data polling is in place
 - Planning is underway to define data and statistical summary needs for Construction, and Planning & Design

Approximate % Complete: 55 %

Recommendations: X continue as planned
 continue with modifications
 discontinue

Additional Comments:

- Funding of \$75,000 in-kind will cover Ontario's membership for FY 2008 through FY 2010.
- Project Team: Max Perchanok (champion), Ralph Patterson, Curt Pape, Dawn Gustafson, Jack Stickel, Sheldon Drobot

Project Status Report

February 7, 2011

Project: 2009-01: Evaluation and Inter-comparison of the Lufft R2S Sensor

Champion: Ralph Patterson, Utah Department of Transportation

Objective: The purpose of this project is to fund Aurora to market the idea of a national testing facility to perform an evaluation (including cross-comparison with other pre-existing precipitation sensors) of the R2S's capabilities and utilities over a full annual cycle (thus providing information on its utility to distinguish between very light drizzle and fog/mist droplets, as well as various frozen precipitation types).

Status:

- Minnesota and New York are in the process of conducting tests.
- The group planned to give multiple awards for completion of sensor analysis.
- It was considered that the approach change to comparison of outputs from multiple sensors.
- The project is on hold:
 - Awaiting feedback from Curt's efforts on a similar project currently in progress.
 - Development of a multi-award contract to be sent out to agencies, universities, and private companies who are interested and capable to bid Aurora projects focused on instrumentation testing and analysis.
 - Considering a comprehensive study summarizing different agencies' experiences with the sensor.
- A mini-meeting has been scheduled for the Boulder board meeting.

Approximate % Complete: 5 %

Barriers/Issues: None

Recommendations: X continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$55,000 in FY 2009
- Project Team: Ralph Patterson (champion), Curt Pape, Jack Stickel, Dean Kernan, Joe Doherty

Project Status Report

December 3, 2010

Project: 2009-03: Knowledge Base for RWIS Programs and Environmental Data Loggers

Champion: Jack Stickel, Alaska Department of Transportation and Public Facilities

Objective: The objective of this project is to develop a web-enabled knowledge base (wiki-like) that allows sharing and retrieval of road weather information, with specific emphasis on data loggers. The application will have a search capability, various levels of administrative update control, be easy to update, and include capabilities for adding/replacing material. The knowledge base might have links to web-based information, stand alone articles, user manuals, and frequently asked questions. The data logger knowledge base may contain:

- commonly user sensor configurations, setup, and operation
- Site setup and environmental considerations
- Data logger programs
- Troubleshooting information
- Best practices

Status:

- A conference call was held with CTRE support staff and the project team to discuss options for completing the project.
- CTRE has the capability to produce the knowledge base, and a budget and scope were prepared and sent to Jack Stickel.
- The team held another call to discuss further the desired capabilities for the site, and Jack will prepare a draft Concept of Operations that was distributed for the group to review.
- A conference call was held on September 16, 2010.
- A mini-meeting will be scheduled for the board meeting in Boulder.

Approximate % Complete: 95 %

Barriers/Issues: None

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$20,000 in FY 2009
- Clear Roads recently approved \$9,000 in additional funding for this effort.
- Project Team: Jack Stickel (champion), Ralph Patterson, Bill Hoffman, Max Perchanok, Curt Pape, Jeff Tilley

Project Status Report

September 22, 2010

Project: 2009-04: Road Weather Education Enhancements and Dissemination

Champion: Dawn Gustafson, Michigan Department of Transportation

Objective: The objective of this project is to develop methods and/or materials to disseminate existing road weather and RWIS educational materials. This project idea stemmed from the 2007 peer exchange, and it was considered to present this topic for discussion again at the 2009 peer exchange for additional input into the project's focus.

Status:

- Questions that need answers
 1. What materials need to be covered by this umbrella?
 2. What materials are out there, but are difficult to access?
 3. What educational materials are lacking and need to be developed?
- Mike Adams had shared that the Wisconsin DOT library would be able to perform a literature search and assist in developing and distributing a survey for the group free of charge, so the group agreed to proceed through them for Phase I. The literature search completed by Wisconsin DOT. In general, most information obtained showed heavy use of AASHTO AI/RWIS training. Does this provide what is needed? Can we set up some guidance as to what training would be helpful for AI or RWIS (individually)?
- Project mini meeting was held in Salt Lake City. Another is scheduled for Des Moines.
- To date, it has been decided that:
 - A training section will be included under the 'wiki'
 - Include all materials such as power points, hand outs, etc. Each must be dated
 - After materials are collected, answer - "What gaps still exist?"
 - Review TCCC website and Peer Exchange information
 - Each survey respondent will be contacted to see if they are willing to share training materials.

Approximate % Complete: 30 %

Barriers/Issues: None

Recommendations: X continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$20,000 in FY 2009
- Project Team: Dawn Gustafson (champion), Max Perchanok, Ralph Patterson, Jeff Tilley, Mike Adams, Bill Hoffman

Project Status Report

January 7, 2011

Project: 2009-05: Further Development of Pavement Precipitation Accumulation Estimation System

Champion: Ralph Patterson, Utah Department of Transportation

Objective: The two primary objectives of this project are the utilization of RWIS data within PPAES and the blending of PPAES products produced using different observation platforms.

Status:

- Algorithm Development:
 - Precipitation rate analysis software (that uses both *Clarus* and MADIS surface observations) completed.
 - Blending of radar and surface precipitation occurrence and rate analyses software completed.
 - Visualization software for blended products completed.
 - A model-based virga identification routine was incorporated into the radar and surface precipitation occurrence and rate blending software.
- Validation Activities: Software testing and validation is being performed incrementally as new software modules are developed.
- Challenges Encountered:
 - In the utilization of surface-observation present weather information, determining appropriate weights for the second and/or third type of precipitation, specifically when multiple precipitation types are reported, has been a challenge.
 - Another challenge was designing a routine to appropriately weigh analysis values produced using radar and surface data when blending radar- and surface-observation-based analyses. This is an aspect of PPAES that is actively being tested.
 - We are running into limitations of our present disk storage capacity. We have made a request to the Project Champion to approve purchase of a 2Tb external disk drive in order to allow for the validation to proceed at the planned pace.
- Schedule: During first quarter of 2011: Complete flat terrain testing of the current version of PPAES, including validation (with contingency table-based and summary performance metrics) and subsequent refinement based on the results of the validation. Begin work on software to handle complex terrain issues. This is a task which will involve multiple quarters of work.

Approximate % Complete: 25 %

Barriers/Issues: None

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$83,000 in FY 2009
- Project Team: Ralph Patterson (champion), Jack Stickel, Dean Kernan, Bill Hoffman

Project Status Report

September 22, 2010

Project: 2009-06: Salinity Sensor Improvements and Development

Champion: Tina Greenfield, Iowa Department of Transportation

Objective: The objective of this project is to survey state transportation agencies to gauge interest in purchasing and utilizing on-vehicle chemical sensors, and if so, how many and at what price. Clear Roads would be a likely partner on such an effort.

Status:

- It was considered that this project be done with a pooled fund-type scope
- CTRE could complete a survey baring in mind the following questions:
 1. What are the needs?
 2. How will this be used?
 3. What amount of payment would be reasonable?
 4. What quantity would be needed?
- Recent discussions have pointed to the vendor community as the primary force behind this idea.
- Tina Greenfield talked to Monty Mills from PNS, and he said they've not done any work on salinity sensing. He talked to Paul Brown, and both think that industry needs to take the lead.
- The project team considered ideas for this project, but ultimately decided that the vendor community has to address this. Aurora is not well suited for sensor development, but we have mentioned it at the last two Friends of Aurora vendor conferences and will hold it up as an unmet need as far as we are concerned.
- The direction of this project was discussed in Des Moines on September 22, 2010.
- A member of Clear Roads (Cliff Spoonemore) talked to Tina Greenfield in December about reviving the sensor project – Annette or Jason will have to let us know if that project was accepted. If so, we'll have to figure out how to work together on it.

Approximate % Complete: 5 %

Barriers/Issues: None

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$50,000 in FY 2009
- Funding was reduced to \$5,000 at the April 2010 board meeting.
- Project Team: Tina Greenfield (champion), Max Perchanok, Dean Kernan, Mike Kisse, Jeff Tilley

Project Status Report

September 22, 2010

Project: 2010-01: Enhancements of AI/RWIS CBT

Champion: Tina Greenfield, Iowa Department of Transportation

Status:

- This was the #1 Ranked Peer Exchange Project from 2009.
- A conference call was held in March to discuss this project.
- Lee Smithson and Tina Greenfield are working to get more money funded for the project.
- The team is in the scoping phase for splitting the AI/RWIS CBT and we've held some meetings with GanTek and the other stakeholders about this. The hang-up is money right now. We have a number of changes in mind, but not the funds to do them yet according to the quotes from GanTek.
- Lee Smithson, Steve Lund, and Bill Hoffman presented a resolution (asking permission) at the Summer AASHTO SCOM Meeting this past July in Savannah, to have AASHTO ask State DOT's to Contribute \$3,750 for this CBT enhancement. They should get an answer from AASHTO within the next couple of months.
- A mini-meeting may be necessary in Boulder.

Approximate % Complete: 20 %

Barriers/Issues: None

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$50,000 in FY 2010
- Project Team: Tina Greenfield (champion), Dawn Gustafson, Dean Kernan, Mike Adams, Max Perchanok, Jeff Tilley, Bill Hoffman
- Partners include Clear Roads and AASHTO representatives as well.

Project Status Report

September 23, 2010

Project: 2010-02: Mobile-Weather Data Collection Guidelines

Champion: Bill Hoffman, Nevada Department of Transportation

Status:

- Bill Hoffman has suggested teaming up with the AASHTO equipment group.
- This project is just underway.
- This project is a sister project 2010-04.
- The first step will likely be a synthesis.
- Paul Brown, Clear Roads Chair, will be hosting a vendor workshop at the Clear Roads Winter Meeting in Virginia to discuss how the Vendors will begin working with DOTs on Open Architecture and Open Data Platforms. We should get some very good information on how best to create guidelines for Mobile Weather Data Guidelines.
- A mini-meeting may be necessary in Boulder.

Approximate % Complete: 10 %

Barriers/Issues: None

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$25,000 in FY 2010
- Project Team: Bill Hoffman (champion), Max Perchanok, Dean Kernan, Curt Pape, Gabe Guevera, Li Fu, Jeff Tilley, Sheldon Drobot

Project Status Report

November 30, 2010

Project: 2010-03: Results Based Winter Road Maintenance Standards

Champion: Max Perchanok, Ontario Ministry of Transportation

Status:

- Three-year agreement is in place for MTO funding, and graduate students are at work.
- Major components:
 - Evaluation and Intercomparison of road surface condition monitoring and prediction tools, and their sampling regimes
 - Modeling of safety and mobility in relation to road surface condition
 - Development of tools to analyze and evaluate the relation between alternative winter maintenance performance standards, and outcomes of safety and mobility.
- Progress in previous 4 months:
 - Development of a cost-benefit framework for the project
 - Development of Road Surface Index and conversion of MTO road report archive to RSI format.
 - Completion of RSI-based analysis on sample Class IV and V highways
 - Expanded weather-road condition-traffic-accident database to 34 Class I and II highways across Ontario
- Change in personnel for mobility component (new grad student)
- Progress in past 4 months:
 - Planning field work and developing instrumentation for winter 2010-11
 - Intercalibration of Haliday, Pon-Cat, Coralba, DSC111, video measurements
 - Calibration of measurement technology to visual RSI and BP reports
 - Initial review of WSI; to account for winter severity in setting performance measures
 - Snow removal performance (RSI or road conditions)
 - Salt management performance (annual salt application)
 - AURORA and MTO-BP index
 - Short term RSI prediction model
 - Working on simple, empirical cost-benefit model prior to developing predictive model.

Approximate % Complete: 35 %

Recommendations: X continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$120,000 in FY 2010
- Project Team: Max Perchanok (Champion), Bill Hoffman, Dawn Gustafson, Joe Doherty, Sheldon Drobot, Neil Hawkins

Project Status Report

September 22, 2010

Project: 2010-04: RWIS Sensor Density Grid

Champion: Bill Hoffman, Nevada Department of Transportation

Status:

- This project is new for FY 2010.
- The team is planning a kickoff meeting.
- One approach may be to have InTrans staff do a literature review.
- A mini-meeting has been scheduled for the Boulder board meeting.

Approximate % Complete: 5 %

Barriers/Issues: None

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$100,000 in FY 2010
- Project Team: Kirk Carpenter (champion), Jack Stickel, Ralph Patterson, Dawn Gustafson, Max Perchanok, Sheldon Drobot, Mike Adams, Jason Norville, Dean Kernan, Tina Greenfield

Project Status Report

September 22, 2010

Project: 2010-05: Determining RPU and Sensor Failure

Champion: Jack Stickel, Alaska Department of Transportation and Public Facilities

Status:

- This project is new for FY 2010.
- The team is scheduling a meeting to coordinate the approach.

Approximate % Complete: 5 %

Barriers/Issues: None

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$5,000 in FY 2010
- Project Team: Jack Stickel (champion), Ralph Patterson, Tina Greenfield, Jason Norville, Sheldon Drobot

Project Status Report

October 29, 2010

Project: 2011-01: Third Peer Exchange

Champion: Tina Greenfield, Iowa Department of Transportation

Background: Aurora has been actively researching a number of surface transportation weather projects; while Clear Roads is researching materials, equipment, and practices related to winter maintenance operations. Unfortunately, information and research results sometimes do not reach end users in all states or at different agency levels. The winter maintenance community needs to be more aware of the research conducted by Aurora and Clear Roads and other research organizations and take a more active role in requesting research to meet winter operational needs. Therefore, the objective of this project is to conduct a National winter maintenance meeting for Aurora, Clear Roads, SICOP, PNS and the FHWA to share research results from the Peer Exchanges held in 2007 and 2009, get updates from each snow-belt state, and discuss other issues related to winter snow removal operations. Each state would send two representatives to the meeting that are most actively involved with the areas covered by Aurora, Clear Roads, PNS, SICOP and FHWA efforts.

Status:

- This project is new for FY 2011.
- Lee Smithson is scheduling a meeting to coordinate the approach.
- The event will be held in September 2011.

Approximate % Complete: 15 %

Barriers/Issues: None

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$30,000 in FY 2011.
- Aurora, Clear Roads, PNS, SICOP and FHWA would be equal partners in developing the agenda for the multi-day meeting.
- Project Team: Tina Greenfield (champion), Bill Hoffman, Dawn Gustafson, Dean Kernan

Project Status Report

February 7, 2011

Project: 2011-02: RWIS Training Tool

Champion: Tina Greenfield, Iowa Department of Transportation

Background: It is often the case across states and even within states that winter maintenance supervisors or foremen do not have a consistent understanding of RWIS and weather information in real-world decision making. Training may be administered but it is difficult to determine how much is retained, whether understanding was reached, and which parts of the training were successfully integrated into decision making practice. Therefore it is difficult to assess supervisor/foremen competency and it is difficult to tailor training to their needs. This is especially a problem when hiring new staff or hiring contractors because there are few tools to evaluate their ability to perform as required. This project involves the creation of a supervisor evaluation tool which can measure a supervisor's ability to incorporate RWIS and risk management into their decision making process.

Status:

- This project is new for FY 2011.
- This project is estimated to last 3 years.
- A draft scope/concept drawing was sent to the team for review. Tina needs their comments so we can get the project going.

Approximate % Complete: 5 %

Barriers/Issues: None

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$200,000 in FY 2011.
- Project Team: Tina Greenfield (champion), Dean Kernan, Bill Hoffman, Max Perchanok, Sheldon Drobot

Project Status Report

October 29, 2010

Project: 2011-03: Benefit/Costs and Instruction for Migrating to Open RWIS

Champion: Tina Greenfield, Iowa Department of Transportation

Background: The objective of this project is to create a do-it-yourself guide for RWIS sensors, servers, data bases, web displays, etc. This project concept could possibly be added as an extension to the 2009-03 Wiki database project.

Status:

- This project is new for FY 2011.

Approximate % Complete: 5 %

Barriers/Issues: None

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$75,000 in FY 2011.
- Project Team: Tina Greenfield (champion), Ralph Patterson, Bill Hoffman, Dawn Gustafson, Jack Stickel

Project Status Report

October 29, 2010

Project: 2011-04: Study of MDSS Costs

Champion: Mike Adams, Wisconsin Department of Transportation

Background: This project concept was presented as a concern at the 2009 Peer Exchange and ranked at #9 among those ideas. The objective of this effort is to determine the upfront costs vs. long-term benefits for implementing MDSS systems. Also, determine necessary equipment, how to best equip the trucks, and quantify secondary benefits of equipping the fleet for MDSS. Initially this project will require a survey of the states. Aurora will team up with Clear Roads and MDSS Pooled Fund to realize this project's goals.

Status:

- This project is new for FY 2011.
- This project was funded for \$20,000.

Approximate % Complete: 5 %

Barriers/Issues: None

Recommendations: continue as planned
 continue with modifications
 discontinue

Additional Comments:

- This project was funded for \$20,000 in FY 2011.
- Project Team: Mike Adams (champion), Mike Kisse, Jason Norville, Sheldon Drobot

Project Status Report

October 29, 2010

Project: 2011-05: Funding Sources Identification

Champion: Jack Stickel, Alaska Department of Transportation and Public Facilities

Background: Road weather management programs and Road Weather Information Systems (RWIS) can tap into various federal funding sources. This includes standard funding allocations and grant allocations. These sources are not well known to all agencies. This project will compile potential funding sources and approaches that state department of transportation agencies can tap to fund the road weather management program. This would include funding partnerships, grants, standard allocations, and shared cost opportunities.

Status:

- This project is new for FY 2011.
- This project was funded for \$5,000.
- This will involve surveying the Aurora member agencies on the funding sources they use, how to tap into them, and the processes they use to secure the funding
- The resulting document would be posted on the Knowledge Base web site.

Approximate % Complete: 5 %

Barriers/Issues: None

Recommendations: continue as planned
 continue with modifications
 discontinue

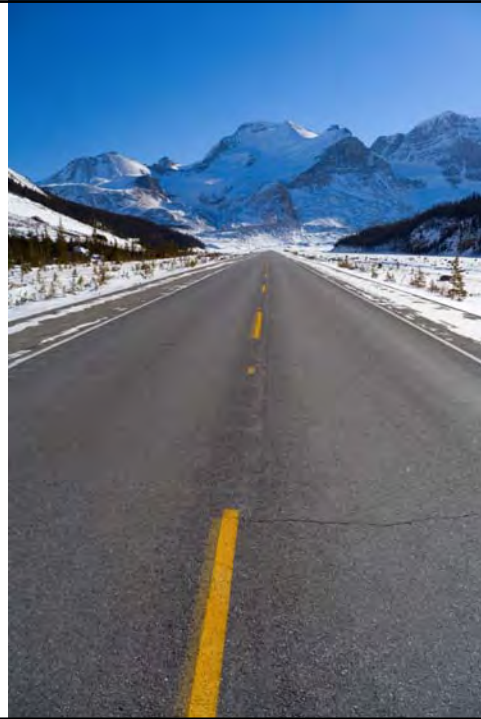
Additional Comments:

- This project was funded for \$5,000 in FY 2011.
- Project Team: Jack Stickel (champion), Joe Doherty, Bill Hoffman

Attachment B

Aurora Program / *Clarus* Joint Meeting

March 8, 2011



Agenda

1:00 Joint Meeting with *Clarus* Participants

1:00 Introductions and Preview of Meeting Purpose/Goals

1:15 National Road Weather Initiatives and Partnerships

2:30 Break

2:45 Joint Meeting with *Clarus* Participants (continued)

2:45 Review of *Clarus* Progress and Use Cases

3:15 Review of Aurora Program Research Progress

3:45 Questions and Open Discussion

4:00 Adjourn Joint Meeting

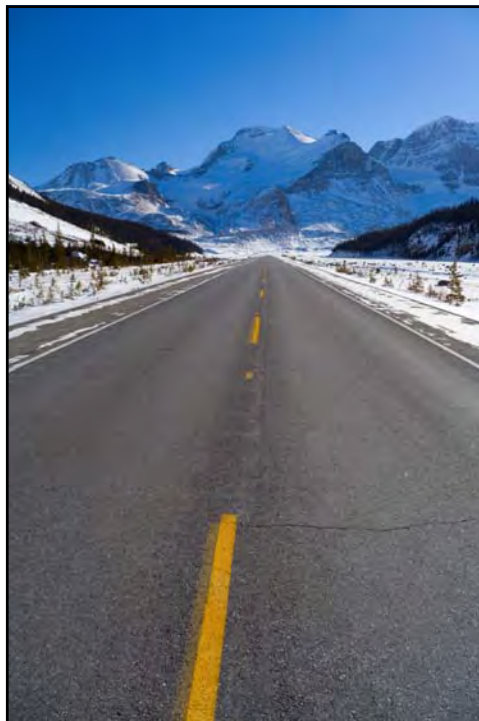
Introductions

National Initiatives

- ENTERPRISE
- MDSS
- NTCIP
- TRB Task Forces and Committees
- ITS America
- AMS
- Clear Roads
- AASHTO/SICOP
- PNS
- SIRWEC
- Other Initiatives/Groups

Clarus Progress and Use Cases

- ❑ Use Case #1: Enhanced Road Weather Forecasting Enabled by Clarus
- ❑ Use Case #2: Seasonal Weight Restriction Decision Support Tool (DST)
- ❑ Use Case #3: Non-winter Maintenance & Operations Decision Support Tool (DST)
- ❑ Use Case #4: Multi-state Control Strategy Decision Support Tool (DST)
- ❑ Use Case #5: Enhanced Road Weather Content Enabled by *Clarus*



Aurora Program Update

Aurora/Clarus Joint Meeting

March 8, 2011



*What is
Aurora?*

Aurora is an international partnership of public agencies who work together to perform collaborative **research activities, **development**, **advocacy**, and **deployment** in the area of road weather information systems (RWIS).**



Aurora *Participants*

Iowa DOT (administrator)	Ontario M of T
Québec M of T	Swedish NRA
Alaska DOT	Ohio DOT
Pennsylvania DOT	North Dakota DOT
Utah DOT	Virginia DOT
Minnesota DOT	Wisconsin DOT
New York DOT	Illinois DOT
Michigan DOT	Indiana DOT
Nevada DOT	



Aurora *Participants*

- **Affiliates/Partners**
 - National Center for Atmospheric Research (NCAR)
 - Meteorological Service of Canada
 - Swedish Meteorological and Hydrological Institute
 - Penn State University
 - University of North Dakota
 - University of Minnesota
 - University of Wisconsin
 - Purdue University
 - Massachusetts Institute of Technology
 - Iowa State University
 - Ohio University
 - University of Waterloo
 - University of Gotenburg

Aurora Program Website - Microsoft Internet Explorer

Address: http://www.aurora-program.org/

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working to advance road weather information systems technology

Welcome to the Aurora Program web site

Aurora is an international partnership of public agencies who work together to perform joint research activities in the area of road weather information systems (RWIS). This website is designed to introduce the program, the partners, and our collaborative research projects.

Board Chair
 Dennis Bester
 Indiana DOT

Members
 Alaska DOT & Public Facilities
 Indiana DOT
 Illinois DOT
 Iowa DOT
 Minnesota DOT
 New York State DOT
 North Dakota DOT
 Ohio DOT
 Ontario Ministry of Transportation
 Pennsylvania DOT
 Québec Ministry of Transportation
 Swedish National Road Administration
 Utah DOT
 Tennessee DOT
 Virginia DOT
 Wisconsin DOT

Join Aurora

- to help set the agenda for collaborative research, development, and deployment of road and weather information systems (RWIS).
- to multiply your agency's financial resources to address its most pressing RWIS-related challenges.
- to develop relationships with national and international, public and private leaders in RWIS equipment, decision support systems, standards, and training.

Aurora News and Resources

- An [article](#) on road weather technologies from the September 2006 issue of Better Roads.
- The [final report](#) of the Guidelines for Testing, Installation, Maintenance, and Calibration of Pavement Sensors is now available online.
- A [database](#) of RWIS specifications and users survey results is available online.
- The [Minnesota Lake report](#) for improved frost forecast model - Phase II.
- The [Hot Plate Snow Gauge final report](#) is now available online.
- The [final report](#) for Integration of Road Weather Information with Traffic Data is now available online.
- The [Pavement Temperature Sensor Accuracy final report](#) is now available online.
- A road weather research report, [Transportation Weather Research and Development Needs to Support ITS](#), prepared for ITS America as part of a project sponsored by the Weather Information and Applications Special Interest Group is now available online.
- The [MOSS Functional Specifications Template and Procurement Guidance](#) document is available online.

Calendar of Upcoming Events

- Monday, December 11, 2006 in Salt Lake City, Utah - **Friends of Aurora Reception**
- Tuesday, December 12, 2006 in Salt Lake City, Utah - **Friends of Aurora Meeting**
- Tuesday and Wednesday, December 12-13, 2006 in Salt Lake City, Utah - **Aurora Board Meeting**

For further information on the Aurora Program and our research projects, please contact Program Administrator [Dennis Bester](#), Iowa DOT Office of Maintenance. Questions or comments about this website? Contact [Chris Albrecht](#), Transportation Research Specialist, Center for Transportation Research and Education.

Aurora Program Completed Projects - Microsoft Internet Explorer

Address: http://www.aurora-program.org/projects.cfm

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Completed Projects

Projects completed by Aurora include

- Adaptation of the Local Climatological Model in New Areas
- Compilation of RWIS Specifications
- Computer-Based Training Development
- Expert System for Maintenance Decision Support
- Hot Plate Snow Gauge Demonstration
- Improved Frost Forecast Model - Phase I
- Institutional Issues Committee
- Integration of Road Weather Information with Traffic Data
- Intelligent Image-Based Winter Road Condition Sensor - Phase I
- Intelligent Image-Based Winter Road Condition Sensor - Phase II
- International Traveler Information Guidance
- Pavement Temperature Sensor Accuracy
- Road Weather Roadshow
- Road Weather Training Program for Improved Winter Response
- RWIS Communications Standards
- RWIS Data Integration and Sharing Guidelines
- Standardized Testing Methodologies for Pavement Sensors
- Standardized Weather and Road Condition Information Presentation
- Synthesis of National Road Weather Forecasting

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**Aurora
Projects**

- 25 Ongoing Projects, covering areas of:
 - Equipment Evaluation
 - Standards / Architecture
 - Site Operations / Quality Assurance
 - Information Outreach
 - Decision Support / Modeling
 - Road Condition Monitoring

*Reviewed during “project updates” portion
of each board meeting*



**Aurora
Projects**

- Ongoing Projects
 - 2011 National Winter Maintenance Peer Exchange
 - Benchmarking the Performance of RWIS Forecasts
 - Benefit/Cost Analysis and Instruction for Migrating to Open RWIS
 - Co-Funding Winter Road Research
 - Cold Weather Testing of the Halliday Road Grip Unit
 - Determining RPU and Sensor Failure
 - Development and Demonstration of a Freezing Drizzle Algorithm for ESS
 - Development of a National Road Weather Testing Program



- Ongoing Projects (continued)
 - Enhancements of AI/RWIS CBT
 - Evaluation and Inter-Comparison of the Luftt R2S Sensor
 - Funding Sources Identification
 - Further Development of PPAES
 - Intelligent Image-Based Winter Road Condition Sensor, Phase 3
 - Knowledge Base for Road Weather and Winter Operations
 - Low Cost Mobile RWIS



- Ongoing Projects (continued)
 - MDSS Demonstration in Ontario
 - Mobile Weather Data Collection Guidelines
 - Multiple-Use ITS Data Collection Sites
 - Road Weather Education Enhancements and Dissemination
 - RWIS Equipment Monitoring System, Phase 2
 - RWIS Sensor Density Grid
 - RWIS Training Tool
 - Salinity Sensor Improvements and Development
 - Study of MDSS Costs
 - Support of the Clarus Initiative



*Further
Info*

Aurora Program Web Site:

www.aurora-program.org

Aurora Program Chair:

Joe Doherty, New York State DOT

Attachment C

Aurora Program

Member Agency Updates

Alaska Department of Transportation and Public Facilities:

Jack Stickel

- Notes: _____

Illinois Department of Transportation

Dean Kernan

- The Snow & Ice Committee has not met since the chairman of that committee left IDOT.
- Illinois participating in the ICAT Conference held in Peoria each April. There is a one day breakout session used strictly for Snow fighting and other related topics. Dean still serves on this committee and has presented there in the past.
- Illinois along with Iowa has participated in the Fed Con-Ops testing two of the 5 accepted concepts. The “scheduler” seemed to work well for those who used it. However the Multi-jurisdictional tool hasn’t panned out as well as it could. More testing will sure be needed.
- RWIS equipment in Illinois continues to be managed by Vaisala (formerly SSI.) IL decommissioned the nine district collectors and a server that IDOT had to rent from CMS. The new server, purchased through the Clarus project, collects all the data. It is housed in St Louis at the former SSI offices. Illinois has negotiated a contract with Vaisala to house and maintain. They also contracted a bulk dialing fee to take care of any long distance charges since many of the RPU’s are still dial up. We are saving many thousands of communication costs by doing so.
- Illinois continues to contract with Telvent/DTN for their weather forecasting. DTN has access to our RWIS data and it is displayed in their Weather Sentry product that is available to all IDOT personnel. A few of the technical staff have access to the mobile version.
- Illinois has decided to continue with the Aurora Program and _____ will serve as the Aurora representative when Dean Kernan retires on April 30, 2011.
- Illinois continues to seek funding to replace the aging system. However many districts have taken it upon themselves to upgrade as any construction project occurs near any site. The upgrades include Linux platforms with cell modems instead of dial up, some new road & bridge sensors and Pantel cameras. District 2 (NW Illinois) has already upgraded their 5 sensors.
- Notes: _____

Indiana Department of Transportation

Kirk Carpenter

- Notes: _____

Iowa Department of Transportation

Tina Greenfield

- The development of our revamped public weather website, Weatherview (<http://weatherview.iowadot.gov>) is starting to draw to a close. A new alert feature, radar and some tweaks to existing products are the newest products. The vendor is still on contract for another year to address any changes or new ideas. Weatherview's server system was still pretty minimal this year as the server upgrades were delayed. We've still not advertised it until this can take place. It was featured in the Directions Magazine webinar series in February.
- This is the first year that all of our new mini and portable RWIS were sending data to Weatherview. So far they've been doing very well. Unfortunately, one of our portables was stolen.
- We are still trying to get the RFP out for the traffic-based winter analysis tool. We've contracted the ISU statistics department to fine-tune the algorithms, and further study its performance under various situations.
- We now have 20 plows equipped with our new GPS/AVL system. They'll be sending back all sorts of observations, including pavement temperature. IT is working on a reporting system for all of this data. We chose Locations Technologies out of Kansas City for the equipment.
- Notes: _____

Minnesota Department of Transportation

Curt Pape

- Notes: _____

New York State Department of Transportation

Joe Doherty

- We have been required by our Technology Council to complete a Business Case for a statewide MDSS/RWIS deployment. After several iterations the document is nearly complete. Although we included favorable benefit/cost projections, the dire state of New York's budget may preclude investment in the project in the near term.
- In order to be able to move forward "quickly" when/if funding becomes available, we are finalizing the first draft of an MDSS/RWIS RFP with assistance from our NYSTEC consultant. It will feature a single award "umbrella contract" covering the operation of an MDSS model, RWIS design/installation/O&M and meteorological services.
- We continue to participate in the Meridian PFS and AmeriTrak continues to supply AVL support for the project.
- We continue to provide data to Clarus from the limited number of RWIS sites (approximately 30) currently operating. Traffic Technology 2000 continues to be our contractor for 3rd party web hosting services.
- Notes: _____

North Dakota Department of Transportation

Mike Kisse

- NDDOT continues to participate in the pooled fund MDSS development project. We entered into our first state contract with Meridian for MDSS services for the current winter season.
- NDDOT also continues to develop an AVL program to feed MDSS. We currently have 35 trucks with AVL units collecting data. We recently expanded to include at least two AVL units in each district (8 districts total) so all areas of the state can get some experience with the AVL units. Cameras are also being added in the cab of 22 of the AVL trucks to display an image of the road conditions out the front windshield of the truck. Our AVL, RWIS and camera information is being displayed in MDSS.
- NDDOT is preparing a project for a 2012 bid opening date to deploy a series of ESS and other ITS devices using safety funds to warn travelers of high water around the Devils Lake area. Devils Lake is a closed basin that has been rising for several years. The roadway network connects an Indian reservation to the city of Devils Lake. Many times these roads need to be closed during high winds due to debris on the roadway.
- NDDOT is preparing a statewide plan to upgrade old RWIS technology and add new ESS sites to the network. Not all sites will be a complete ESS station. Some may only have pavement temp, wind sensor, and camera.
- NDDOT is planning to increase the number of fixed cameras around the state. Plans are being developed to add cameras to view road conditions at locations where high speed internet and power is currently in place.
- NDDOT continues to deploy permanent dynamic message signs along interstate and US highways. Seven new message boards are planned to be installed during the 2011 construction season.
- NDDOT continues to see a large increase in truck traffic in our dynamic oil producing region of the state. A network of Wavetronics sensors are being considered to be installed on many roadways in the region to monitor traffic.
- Notes: _____

Ohio Department of Transportation

Diana Clonch

- Notes: _____

Ontario Ministry of Transportation

Max Perchanok

- Notes: _____

Pennsylvania Department of Transportation

Jason Norville

- PennDOT is in its third year of using a statewide weather forecasting service to provide weather services for our Winter Maintenance Operations.
- PennDOT is in the first year of a multi-year pilot of the Maintenance Decision Support System technology utilizing the Meridian Environmental GUI.
- Due to changes in administration and key leadership positions, Pennsylvania’s overhaul of its RWIS network has been put on hold until the new administration can review the plans.
- Currently developing an RFP for a statewide deployment of an AVL/MDC solution.
- Notes: _____

Utah Department of Transportation

Ralph Patterson

- Notes: _____

Virginia Department of Transportation

Dan Roosevelt

- Notes: _____

Wisconsin Department of Transportation

Mike Adams

- Major effort has been on MDSS this winter.
 - Have input over 300 routes and will have all in system by next year
 - Two training cycles—Fall and Winter
 - Trying to use as a maintenance management system
- New mini weather station developed by UWM
- Have started integrating weather briefings into DOT storm planning process
- New contract with Lufft—first two sites installed.
- Unhappy with Vaisala maintenance, looking into new ideas.
- Notes: _____
