# Clear Roads Project Proposals (DRAFT)
**April 2004**

## Top 5 Proposed Research Projects

| Project Title | Description | Ranking Rationale | Related Research |
|---|---|---|---|
| Temporary Snow Fences | Identify and test temporary snow fences that can be installed and taken down by one person. | Low cost<br><br>Quick turnaround<br><br>Immediate application of results<br><br>Addresses nationwide budget cuts | |
| Optimum Snowplow Design | Provide a background on past research done on plow designs and materials and investigate new materials and designs that may be better suited for a more pro-active approach to snow removal. Research would address attack angle of the blade, proper throat dimensions and possible additions to the plow (slush blade, squeegee, broom, blower, etc.) that would enhance performance of the plow. | Universal appeal of improved technology<br><br>Direct impact on road safety | University of Minnesota Intelligent Transportation Systems Institute Specialty Vehicle Initiative, 2000<br>http://www.its.umn.edu/research/ivifieldtest/<br><br>"Clearing the way with new technology," Snow and Ice Manager, 2001<br>http://industryclick.com/microsites/Newsarticle.asp?newsarticleid=253542&srid=10121&instanceid=2872&pageid=669&magazineid=&siteid= |
| Cutting Edge Specifications & Testing | Investigate the performance, wear life, and cost effectiveness of various snow plow blades and develop tests that could be used by independent laboratories to test snow plow blades on behalf of manufacturers. | Little work done in this area<br><br>Universal problem of performance not matching expectations | Maine DOT Technical Memorandum: "Field Testing of Alternative Carbide Edge Snow Plow Blades," 2004, Contact at Maine DOT: Bill Thompson, Phone: 207-624-3277, e-mail: william.thompson@maine.gov<br><br>Final Report of Snow Plow Cutting Edge Test and Evaluation Program, Iowa Institute of Hydraulic Research, 1999<br>http://www.iihr.uiowa.edu/products/cold_regions/publications/ld277.pdf |
| Calibration Accuracy of Ground Speed Controlled Salters | Compare and document ground speed controller settings with actual salt discharge amounts collected from discharge point of a salt spreader. | Addresses economic and environmental issues associated with incorrect salt application<br><br>Little work done in this area by manufacturers | |
| Use of Fine Graded Salt for De-icing and Anti-icing Applications | Conduct a study of prewetted, fine graded salt for anti-icing applications that would be a Phase II of a 1997 FHWA-sponsored study. This research would look at different gradations and document their performance on the road during winter weather conditions as compared to standard de-icing salting techniques. | Builds on previous work<br><br>Low cost technology with potential for big impact | Previous FHWA sponsored study performed in 1996-1998 in two states and reported in TRR 1741, 2001.<br><br>SHRP-H-385, "Development of Anti-Icing Technology", 1994 and "Test and Evaluation Project 28, Anti-icing Technology", 1996<br><br>"Anti-Icing Activities in Finland", TRR 1387, 1993 |

## Additional Proposed Research Projects

| Project Title | Description | Ranking Rationale | Related Research |
|---|---|---|---|
| Manufactured Low Cost Chemical De- and Anti-icer | Research and design a manufactured chemical that would meet desired specifications (de-icing and anti-icing effectiveness, low cost, readily available, easy to handle, environmentally friendly). | Research currently being conducted in this area could be used as baseline for future projects. | "Guidelines for the Selection of Snow and Ice Control Materials To Mitigate Environmental Impacts" (research in progress), http://www4.trb.org/trb/crp.nsf/All+Projects/NCHRP+6-16<br><br>"Anti-Icing Chemical Guide," Wilfrid Nixon, 2001, http://www.anti-ice-guide.com |
| Anti Icing SMART Overlay | Evaluate the effectiveness of anti-icing overlays as a means of preventing chemicals from washing off the pavement as ice melts. | Applications currently being evaluated. Will monitor these research efforts. | Michigan Tech Keweenaw Research Center, Institute of Snow Research, Contact: Russ Alger<br>Several installations of SMART being monitored in Wisconsin, Michigan, O'hare Field, Atlantic City Airport<br>http://www.mtukrc.org/elastomeric.htm, http://www.mtukrc.org/current.htm,<br>http://www.admin.mtu.edu/urel/breaking/2001/alger.html<br><br>Italgrip (overlay system Wisconsin is currently evaluating), http://www.italgrip.com |
| Friction Measurements as a Winter Performance Measure | Test and evaluate available friction measurement equipment to determine which meters are the most cost effective and appropriate for winter operations. | Very expensive project, though lot of interest in pursuing at a later point. Will monitor these research efforts. | "Feasibility of Using Friction Indicators to Improve Winter Maintenance Operations and Mobility", NCHRP 6-14, November, 2002<br><br>Automated Winter Road Maintenance Using Road Surface Condition Measurements, Rajesh Rajamani, Univ. of Minnesota Mechanical Engineering Department. Proposed Project, 2004<br>http://www.dot.state.mn.us/maint/research.html (see "Project Summaries" link)<br><br>Highway Maintenance Concept Vehicle, Phase IV, DRAFT, CTRE, June, 2002<br><br>Relationship Between Winter Road Surface Conditions and Vehicular Motions Measured by GPS-Equipped Probe Vehicles, Takashi Nakatsuji & Akira Kawamura, TRB Annual Meeting, January, 2003<br><br>"Variable Slip Friction Measurement Techniques for Snow and Ice Operations," Ed Fleege, J.C. Wambold, and Z. Rado, TRB 4th International Symposium on Snow Removal and Ice Control Technology, August, 1996<br><br>Ohio DOT is field testing a friction sensor developed by Halliday Technologies from Powell, Ohio. Contact: Doug Burke at 614-351-2836 or Doug.Burke@state.dot.oh.us. www.hallidaytech.com |
| Comparison of Bridge Deicer Systems | Test and evaluate bridge deicer systems in use around the country to provide a comprehensive report of their benefits, drawbacks, maintenance issues, downtime, acceptance and usage from field personnel, training requirements, malfunctions, etc. | Research underway already to evaluate de-icing systems. Results could guide future proposed studies.<br><br>Possible partnership with SICOP or Aurora. | CERF to Evaluate the FreezeFreeTM Highway Anti-Icing System<br>http://www.cerf.org/about/press/4_28_03.htm<br><br>Dan Roosevelt is currently proposing NCHRP synthesis report on fast systems.<br><br>SICOP developed a list of states with automatic de-icing systems.<br>http://www.sicop.net/FAST%20Project.pdf |
| Automated Response Material Application Controls and Management | Utilize current RWIS technology and winter maintenance equipment to effectively control the amount of chemicals applied for de-icing and anti-icing based on current pavement conditions. | Potential for joint project with Aurora. | Salt Miser evaluation conducted in Wisconsin yielded negative results.<br><br>Force America makes ground speed controllers that have programmable salt application rates based on pavement temperature sensors. |
| Pavement Surface Chemical Concentration Sensors | Research and develop of a real time, on-board chemical concentration sensor that would notify a truck operator of an overabundance of chemicals on the pavement surface. | Potential for joint project with Aurora or Iowa Concept Vehicle project. | Iowa State University Center for Transportation Research, Winter Concept Maintenance Vehicle<br>http://www.ctre.iastate.edu/Research/conceptv/index.htm, http://www.ctre.iastate.edu/reports/concept4.pdf |
| Economic Impact of Snow Removal | Conduct an extensive survey and evaluation of the impact of winter maintenance operations on a selected corridor to determine the economic impacts of reduced travel on winter roads. | Didn't fit scope of pooled fund project. | "User Benefits of Winter Maintenance—Intercity Traffic During Winter Storms"<br>http://www.ctre.iastate.edu/mtc/projects/2003-01.htm<br><br>"A Business Case for Winter Maintenance Technology Applications: Highway Maintenance Concept Vehicle," http://www.ctre.iastate.edu/pubs/midcon2003/KroegerConcept.pdf |
| Effectiveness and Efficiency of Underbody Plows | Determine if the removal of snow pack is more cost effective when scraping with an underbody plow blade or when using a higher salt application rate. | | |