

Snow Removal and Ice Control Research Objectives for the Future

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The concluding session devoted time to a discussion of research needed over the next 10 years to improve present capability for removing snow and ice from highways, and for ensuring an all-weather capability for guideway systems, communication facilities, and aircraft and their ground facilities. Discussion was led by Dr. Ronald A. Liston, CRREL. Discussions during the other sessions also revealed areas of study that needed to be initiated or expanded, although not all of these were brought up in the concluding session.

Most discussion revolved around highway snow and ice control. The scope was enlarged, however, to approach the problem as one of increasing winter traction and trafficability, whether by reducing or eliminating snow and ice accumulation, or by improving the coefficient of friction between tires and the winter surface. To this end, it was recommended that research be directed to improve tire designs and materials, and the work done by Caltrans showing that graphite fiber tire additives significantly increase the friction coefficient was cited.

Continuation of current research underway until it is translated into practice was recommended. This includes development of physical and non-chloride chemical approaches to snow removal and ice disbonding, and the operational procedures required to integrate new materials and techniques into an effective, cost-saving system. Further work on electronic monitoring of road surface conditions in high traffic density areas to provide real-time information for traffic control and treatment level was suggested. Fundamental work on the mechanism by which disbonding agents weaken or destroy the ice-pavement bond, followed by determination of optimum chemical application rates and development of methods of applying precisely metered quantities in a controlled pattern, will have relevance to both highway and guideway practice.

Decision makers need better information and methodology to make economic determinations of snow-removal system operation and effectiveness. As an example, an economic model for impact of delays of variable durations on local or regional economy, and the cost function for the various treatment levels will enable selection of the least-cost option. System optimization by computer modeling

needs further work and refinement and translation into a practical format for wide use by large and small winter maintenance organizations.

Traffic speeds and accident rates for traffic of specified density and mix as a function of depth of snow on the road are not well known. An improvement in this information, coupled with improved values for costs of delay time, will permit selection of an optimum time for commencing snow clearance or other remedial action. Traffic action can remove light snowfalls or some types of snow, but the conditions under which this can occur are not clearly known. Research on the response of snow to trafficking by rubber tires will provide answers to this question.

Improvement in the design of snow clearing equipment, both displacement plows and rotary plows (snowblowers) was recommended.

Non-chemical, or at least non-chloride, methods of snow and ice control on advanced guideway systems were stated as pressing needs which require research. Automatic controls on present and future guideway systems are intolerant of snow and ice, and either design of components to avoid accumulation, or development of positive means of removal, are proper research objectives.

Data on traction of high-pressure rubber tires such as are used on automated guideway systems, as well as on buses and trucks, are not readily available. An effort to gather together scattered data, and to perform the research necessary to fill in the gaps, was recommended. It was also recommended that joint participation by rail, airport, guideway, and other non-highway transportation modes in winter operations conferences such as represented by this symposium be continued.

Recent standards for errant vehicle restraints have virtually eliminated the use of cable guard in many Snow Belt states in favor of metal plate beam guardrail. Plate beam guardrail is often placed at the top of embankments and this, combined with its approximate height of 2 ft creates aerodynamic conditions ideal for causing snow drifts on adjacent pavement. The safety device itself creates a winter hazard. Study is needed to develop effective vehicle restraint designs with aerodynamic characteristics that will not cause the drifting of snow.

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