

Overview of the Highway-Railway

GRADE CROSSING RESEARCH PROGRAM



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Working for innovation in transportation

Background

The Highway-Railway Grade Crossing Research Program is part of Direction 2006, a ten-year national initiative with the goal of halving the number of grade crossing collisions and railway trespassing incidents by 2006. Direction 2006 partners include Transport Canada, provincial and municipal governments, law enforcement agencies, safety organizations, and railway companies and their unions. Direction 2006 is focussed on seven key result areas (KRAs): research, education, enforcement, engineering, legislation, resources, and communications. Each KRA is guided by a committee representing the principal stakeholders.

Initiated in 1999, the grade crossing research program responds to the Research KRA's mandate. It is designed to develop a better understanding of the factors contributing to grade crossing collisions and trespassing incidents and to enhance the effectiveness and range of countermeasures.

Objective

The objective of the program is to increase the safety and cost-effectiveness of grade crossing systems through technological, operational, and human factors research.

Organization

Transport Canada, the major Canadian railways, and several provincial authorities are the primary research sponsors, with other stakeholders providing cash and in-kind contributions. The \$1.3 million base budget includes monetary, but not in-kind, contributions from all program partners. The Research Committee is seeking additional support from provinces, municipalities, industry associations, and research institutes, as well as from technology- and product-oriented partners.

Transport Canada's Transportation Development Centre (TDC) is the lead agency for development and implementation of the research program, on behalf of the department's Rail Safety Directorate. TDC is also responsible for securing funding, in partnership with the

Direction 2006 executive and research committees and other key stakeholders. The program is coordinated with the activities in other Direction 2006 KRAs. Consultation with all partners will continue throughout the program and plans will be adapted in response to the research findings, evolving priorities, and the availability of funding and working partnerships.

Targeted research

The research is focussed on the application of new technologies and other improvements to existing systems, based on enhanced understanding of technological, operational, and human factors aspects.

Projects fall into eight broad categories: program and research development; risk mitigation methodologies; driver, pedestrian, and vehicle behaviour; enforcement technologies; active-warning crossings; passive-warning crossings; signal lights and structures; and train-based warning systems.

The program is expected to result in the following:

- an integrated and accessible database of railway crossing collisions and trespassing incidents
- a methodology for risk analysis and evaluation of risk mitigation measures applicable to railway crossings
- identification of factors associated with technological and design elements of crossings and warning systems, railway operations, human factors, and road user characteristics that contribute to grade crossing collisions and trespassing incidents
- cost-effective countermeasures to the primary contributing causes of collisions and incidents and, where these are not feasible or cost-effective, identification of the reasons and of any further research required; risk mitigation measures should address issues associated with rail, road, and pedestrian users
- prototype equipment, concept systems, design standards, specifications, and methodologies

Overview

Project status

Completed

Grade crossing contraventions and motor carrier safety assessment

Project report available December 2001:
Transport Canada Publication TP 13792E

In progress

Postgraduate university-based research

Analysis of the human factors contributing to grade crossing incidents in Canada

Identifying highway-railway grade crossing black spots

Development of an automated tool for remote access and analysis of crossing collisions and trespassing incidents

Second train warning at grade crossings

LED technology for improved conspicuity of signal lights at grade crossings

Locomotive horn study

Under development

Trespassing incidents and countermeasures strategy

Impacts of heavy trucks and tractor-trailers on crossing safety

Risk mitigation approach to grade crossing safety

Crossing collisions causal analysis and countermeasures effectiveness

Pilot evaluation of automated grade crossing signal enforcement

Planned

Eye tracking behaviour and conspicuity/ effectiveness of crossing elements

Low-cost warning system for trains approaching grade crossings

Field measurement of the luminous intensity of grade crossing signal lights

Advance warning to road users on approach to passive grade crossings

Advance warning of approaching trains at grade crossings

Cost-effective cantilever structure for grade crossing signals

Other activities

The first annual program workshop, held in Ottawa in November 1999, gave participants an opportunity to discuss the status of grade crossing research in North America at that time and to develop recommendations for program priorities.

The first meeting of the Program Steering Committee was held in Montreal, in May 2000. Members determined priorities and coordinated program activities with those of various stakeholders.

In June 2000, the Volpe National Transportation Systems Center and the Federal Railroad Administration, two U.S. Department of Transportation organizations involved in highway-railway grade crossing safety, agreed to regularly exchange information on research activities with the Research Program Committee. They also agreed to work with the committee on selected projects.

In October 2000, the research program was introduced to members of the Transportation Association of Canada at their annual meeting in Edmonton, Alberta, and a technical paper on the work was presented at the Sixth International Symposium on Railroad-Highway Grade Crossing Research and Safety, in Knoxville, Tennessee. The representatives of several organizations expressed interest in participating in the program.

At the second program workshop, held in Montreal in November 2000, participants included representatives of Canadian and U.S. governments; rail carriers, suppliers, and associations; and research institutes. They discussed progress to date, and made presentations on a variety of topics, including the development of incident databases and the human factors involved in crossing collisions and trespassing incidents. In an open forum they tabled ideas for research, proposed program improvements, and debated problem areas.

Meetings of the Program Steering Committee and the Direction 2006 Executive Committee were coordinated with this workshop. This arrangement proved so successful that it will be continued throughout the program.

Conclusion

The cooperative nature of this program and the emphasis on dissemination of the findings are expected to promote broad acceptance and application of the research results. Through such applications, the Highway-Railway Grade Crossing Research Program will help Direction 2006 to reach its goal.



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