

# EVALUATION OF GRADE CROSSING HAZARD RANKING MODELS

OHIO UNIVERSITY AND TEXAS A&M TRANSPORTATION INSTITUTE

## BACKGROUND

The railroad network of Ohio includes more than 5,300 miles of active mainline rail lines and more than 5,760 at-grade highway-railroad crossings. Approximately one-third of Ohio's grade crossings are controlled by passive warning devices (i.e., crossbuck signs). The Ohio Rail Development Commission (ORDC), an independent commission within ODOT, manages several programs to provide funding for grade crossing warning device improvements. Regulatory oversight falls under the authority of the Public Utilities Commission of Ohio (PUCO).

State agencies involved with grade crossing safety must allocate available funding to projects which are considered the most in need for improvements. Mathematical models provide a ranking of hazard risk at crossings and support the project selection process. An understanding of the various grade crossing hazard ranking models currently in use among the states will enhance the project selection process used by the ORDC, either by affirming the adequacy of existing practices or improving the process to better account for minor differences in crossing locations.

*The funding programs managed by the ORDC and the PUCO have been effective at reducing crashes, injuries, and fatalities at Ohio's highway-railroad grade crossings.*

## RESEARCH APPROACH

The approach for this project consisted of three key activities:

- A **literature review** to identify methods used by state DOTs and other organizations for modeling grade crossing hazard ranking and warning device project prioritization.
- **Interviews of state DOT personnel** at eight states to obtain details about hazard ranking models with respect to ease of use, reliability, data needs, and other relevant factors.
- **Detailed evaluation** of certain hazard ranking models. The evaluation included a comparison of the rankings of Ohio grade crossings obtained using each hazard ranking model including and comparing the model ranking as well as an evaluation of how the models could be accommodated within the existing practices of ORDC and PUCO.

## RESEARCH CONTEXT

- 78 percent of states utilize some type of hazard ranking model to assist with warning device project prioritization.

## EXISTING HAZARD RANKING MODELS:

- U.S. DOT Accident Prediction Model; currently used by 19 states for hazard ranking, including Ohio.
- New Hampshire Hazard Index
- NCHRP 50 Accident Prediction Model
- Florida DOT Safety Hazard Index
- Missouri DOT Exposure Index
- North Carolina DOT Investigative Index
- Texas DOT Priority Index

## KEY VARIABLES INCLUDED IN MODELS:

- Type of Warning Device Present
- Highway Traffic Volume (AADT)
- Train Volume
- Maximum Train Speed
- Number of Highway Lanes
- Number of Train Tracks
- Crash History





## RESEARCH FINDINGS AND RECOMMENDATIONS

Based on the analysis performed in this project, there is no evidence to indicate that a different model than the U.S. DOT Accident Prediction Model would provide a more superior hazard ranking of highway-railroad grade crossings in Ohio. Consequently, the Ohio University research team presents the following recommendations:

- The ORDC and the PUCO should continue use of U.S. DOT Accident Prediction Model for hazard ranking to assist with warning device project prioritization in the state.
- Hazard index models such as the Missouri DOT Exposure Index or the North Carolina DOT Investigative Index should be considered to provide a secondary ranking for passive crossing locations after the initial ranking and diagnostic review process has been completed for the annual program.
- The existing field diagnostic review process should be updated to obtain better information about the available sight distance at a highway-railroad grade crossing.
- ORDC should consider revising its warning device project development process to include a larger number of crossings on the preliminary list of project locations.
- ORDC and PUCO should consider developing a formal written protocol or framework to ensure that key variables in the Ohio grade crossing inventory database are updated and maintained.

## OHIO HIGHWAY-RAILROAD GRADE CROSSING SAFETY FACTS

- An average of 67 crashes occur each year at Ohio grade crossings.
- On an average day, there are an estimated 13,900,000 highway vehicle interactions and 77,300 train interactions with Ohio's 5,760 highway-railroad grade crossings.
- A majority of the highway and train traffic occurs at crossings with active warning devices; however, approximately one-third of crashes are at locations with passive devices.

## FOR MORE INFORMATION:

### *Evaluation of Grade Crossing Hazard Ranking Models*

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