

Technology Transfer Brief

Develop an Improved Selection Methodology for Safety Improvements at Public Highway-Railroad Grade Crossings Project



SPONSORS

Iowa Highway Research Board (IHRB Project Number TR-732)
Iowa Department of Transportation

PRINCIPAL INVESTIGATORS

Co-Principal Investigator and Project Manager, Chris Goepel, B.A.
<https://orcid.org/0000-0001-7475-1841>
HDR Engineering, Inc. | 816.360.2759 | Christian.Goepel@hdrinc.com

Co-Principal Investigator and Economics Lead, Chris Williges, M.S., MCRP
<https://orcid.org/0000-0001-6663-5461>
HDR Engineering, Inc. | 415.546.4222 | Chris.Williges@hdrinc.com

Traffic and Safety Planning Lead, Richard Storm, P.E., PTOE
<https://orcid.org/0000-0001-7075-3145>
HDR Engineering, Inc. | 763.591.5480 | Richard.Storm@hdrinc.com

RESEARCH PROBLEM

The Iowa Department of Transportation (Iowa DOT) has been prioritizing highway-rail grade crossing safety improvement projects and funding statewide through a benefit-cost analysis (BCA) methodology developed by department staff in 2006. That evaluation methodology using the benefit-cost ratio includes highway and grade crossing characteristics, highway and train traffic, accident history, societal costs, and anticipated cost of improvements. The Iowa DOT Office of Rail Transportation realized that there are other variables and approaches available that the current methodology does not include, and wanted to investigate if appropriate data and methods of analysis are utilized to identify grade crossings in the state that are most in need of future safety improvements and would receive the most public benefits from the limited Federal Highway-Railroad Grade Crossings (Section 130) Program grant funding (about \$5.5 million annually) that the State of Iowa receives.

MORE INFORMATION

HDR Engineering, Inc.
8404 Indian Hills Drive
Omaha, Nebraska, 68114
www.hdrinc.com | 402.399.1000

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Research

Background

The purpose of this Develop an Improved Selection Methodology for Safety Improvements at Public Highway-Railroad Grade Crossings project by Iowa DOT and its consultant HDR Engineering, Inc., is to **conduct research and develop findings that will help to inform Iowa DOT of the most current approaches to identify and prioritize public highway-railroad grade crossing improvements** which will aid in developing recommendations and actionable steps for implementing changes into Iowa’s current prioritization methodology.

The research results and the tools developed during the project are expected to provide Iowa’s highway authorities, railroads, and other stakeholders with an enhanced means of identifying needs and opportunities for potential improvements to the public highway-railroad grade crossings under their jurisdiction, and streamlining the process to pursue Section 130 program grant funds through Iowa DOT to develop these improvements. Iowa DOT can apply the research results and tools to drive internal processes and maximize the positive impact of Iowa’s highway-railroad grade crossings safety program and its partnerships with the state’s highway authorities and railroads.

Potential Benefits Expected from Application of Research and Tools



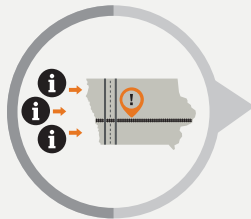
SAFETY PROGRAM IMPROVEMENTS

Improved identification of public highway-railroad grade crossing investment priorities in Iowa to drive increased value for the state’s highway-railroad grade crossing safety program.



INCREASED PUBLIC SAFETY

Increased public safety at Iowa’s public highway-railroad grade crossings, which is expected to reduce rates of fatalities, injuries, and property damage.



ENHANCED EFFICIENCIES

Enhanced process efficiencies and leveraging of existing data from variable sources for the Iowa highway-railroad grade crossing safety program.



ENRICHED STAKEHOLDER COORDINATION TO TARGET AREAS OF GREATEST RISK

Enriched program coordination and cooperation between Iowa DOT and the state’s roadway authorities and railroads, which would enhance meaningful and lasting communication between all parties with regard to the relative risks of public highway-railroad grade crossings and to encourage funding applications for the state’s highway-railroad grade crossing safety program that would target the grade crossings that are potentially the greatest safety risk.

Research Plan Objectives

ASSESS

Assessed the Iowa Department of Transportation's current methodology and related processes and policies for maintaining the Section 130 program in Iowa and the internal and external process for identifying and prioritizing investment for grade crossing improvements statewide. Assessment included interviews and ongoing coordination with various Iowa DOT offices and staff; a survey of select Iowa highway-rail grade crossing stakeholders to ascertain opportunities to improve the methodology and approach to grade crossing investment in Iowa; and engagement with a Technical Advisory Committee (TAC) consisting of Iowa highway-rail grade crossing stakeholders that was established by Iowa DOT to guide the project.

REVIEW

Completed a literature review of representative current research and methodologies to identify methods, approaches, best practices, and innovative strategies used by other state DOTs and public agencies for modeling grade crossing hazard ranking and identification and prioritization of grade crossing improvements related to active warning devices and other measures.

COORDINATE

Coordinated with a Class I railroad serving Iowa and another state DOT to gain an understanding about their processes and methodology for prioritizing grade crossing investment.

RECOMMEND

Developed recommendations for actionable steps to implement changes into Iowa's current prioritization methodology and develop related enhanced or new tools for prioritizing and achieving desired improvements through coordination with Iowa DOT and the project TAC.

PRIORITIZE

Developed additional datasets for identifying and prioritizing grade crossing investments, communicating relative grade crossing risks to Iowa's highway authorities, determining the most advantageous projects to present to the Iowa Transportation Commission for Funding, and potential Iowa Section 130 program policy and process enhancements.

Research Conclusions

Conclusions Made From Key Findings

1

DATA EXCLUSIONS

The timeliness, reliability, and completeness of the data used to support the identification and prioritization of grade crossings in Iowa for improvement was not maintained. It was noted that the current statewide highway-rail grade crossing inventory did not include certain data categories (e.g., sight distance, skew angle, presence of sidewalks, etc.).

2

LIMITATIONS TO GRADE CROSSING INVESTMENT LEVELS OF IMPROVEMENT

The list of countermeasures for grade crossing investment does not consider the full scope of potential levels of improvement.

3

OUTDATED COSTS

Crash costs, coefficients, and constants used in the benefit-cost analysis are inconsistent with the latest practices.

4

FUNDING APPLICATIONS NEED TO INCORPORATE SAFETY EVALUATION NEEDS

The existing methodology used to support Section 130 funding applications places an emphasis on a narrow number of grade crossings, and the threshold that identified grade crossings that have the greatest need for safety investment should be evaluated.

5

STAKEHOLDER INPUT

According to stakeholders, the most important approval criteria for identifying and prioritizing grade crossing investment and accruing public benefits of these investments are the amount of highway traffic and intersection crash numbers.

6

ENGAGEMENT & APPLICATION SELECTION PROCESS NEEDS IMPROVEMENT

The current process to engage eligible applicants (e.g., highway jurisdictions, railroads, and public agencies) and supply them with the information necessary to complete a Section 130 grant application and the current application selection process may need improvement. Enhanced communication and public education with regard to the Section 130 program, the application process, and application status were identified. Grade crossing field diagnostics and related inputs and outputs are an essential component of the process to identify and prioritize grade crossing investment, yet they are not typically completed until late in the process to advance Section 130 grant applications to the Iowa Transportation Commission for funding. It was also noted that there is a backlog of Section 130 grant applications, that some applications were up to 30 years old, and that one process improvement could include shorter-term applicability and an expiration time (e.g., 5 years) on grant applications.

Summary of Recommendations & Activities Implemented

Following completion of the research, HDR developed recommendations via a list of activities that Iowa DOT could undertake through the remainder of the project. Iowa DOT selected the specific action items based on the highest priorities of Iowa DOT and determined a related final workplan for HDR.

Through this approach, Iowa DOT addressed its most important needs, achieved its highest objectives, and provided the most initial value in terms of enhanced safety and public benefits to Iowa.

Activities Implemented



1 STUDY REPORT

Developed a Study Report that captured all research, analysis, coordination, outreach, and work developed throughout the study.



2 HAZARD RANKING TOOL & DATABASE DEVELOPMENT

Hazard ranking analysis and development of the database involved analyzing hazard ranking models used by other state DOTs to determine a best-fit for a revised Iowa DOT hazard ranking model based on available datasets. Developed a tool to identify available, complete, and clean Iowa DOT datasets and linked to their location. Ranked relative hazards for each grade crossing on a statewide, countywide, and railroad basis. Analysis and tool was developed in coordination with Iowa DOT, the TAC, and HDR.



3 PROJECT PRIORITIZATION TOOL

Economic Analysis and Development of a Revised Project Prioritization Tool: analysis of benefit-cost and cost-effectiveness factors (including thresholds, values, and benefit categories) and development of a tool with interface to the separate database/hazard ranking tool that identifies and prioritizes the highway-rail grade crossings that are most in need of future improvements and would receive the most benefits from limited Section 130 funding.



4 ADDITIONAL RECOMMENDATIONS ACTIONABLE IN THE FUTURE

Identify recommendations for potential additional datasets for identifying and prioritizing grade crossing investments, communicating relative grade crossing risks to Iowa's highway authorities, determining the most advantageous projects to present to the Iowa Transportation Commission for Funding, and potential Iowa Section 130 program policy and process enhancements.

<https://iowadot.gov>
See the *Develop an Improved Selection Methodology for Safety Improvements at Public Highway-Railroad Grade Crossings Report* for additional details related to the research plan and objectives, findings, conclusions, recommendations, and implementations of the project.

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