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FRA OFFICE OF RESEARCH, DEVELOPMENT & TECHNOLOGY

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2017 GRADE CROSSING RESEARCH NEEDS WORKSHOP

SUMMARY

In August of 2017, the Federal Railroad Administration (FRA) held the fourth Grade Crossing Research Needs Workshop in St. Louis, MO. This workshop brought together national and international subject matter experts to collaborate, identify and prioritize specific research needs. The attendees included representatives of Federal, State, local, and international governments, as well as railroad, labor unions, academia, non-profit organizations, and consultants.

Workshop participants identified and shared existing industry best practices and explored new grade crossing abatement and mitigation strategies that the rail industry can adopt to reduce the number of highway-rail grade crossing incidents and fatalities. Results will be documented in an FRA Technical Report.

BACKGROUND

Based on the success of the 2009 workshop [1], FRA sponsored a follow-on workshop on August 15–17, 2017, in St. Louis, MO, to continue this effort.

OBJECTIVES

1. To identify and share existing industry leading practices and explore new strategies that the rail industry could pursue to reduce the number of rail grade crossing incidents and fatalities.
2. To bring together subject matter experts to share information, collaborate, identify, and prioritize specific recommended actions to facilitate the reduction of grade crossing incidents and fatalities.

Figure 1. Opening Session at the 2017 Grade Crossing Research Needs Workshop

METHODS

A steering committee composed of staff from the U.S. Department of Transportation (DOT) and stakeholder organizations was nominated by FRA to develop the agenda, topic areas and speakers, and participate in the workshop.

The workshop commenced with a welcome address by former FRA Deputy Administrator Heath Hall. This was followed by 16 technical presentations across five topic areas: Engineering/Technologies, Human Factors, Community Outreach and Education, Enforcement, and Hazard Management.

The workshop concluded with the development of prioritized recommended actions within each topic area developed by working groups, each composed of 30 to 50 workshop attendees.

RESULTS

The topic area groups generated numerous ideas ranging from expanded initiatives to new

research projects, and three to five recommended actions were put forth by each group. This report outlines the 22 high-priority recommended actions as reported and described by the working groups (e.g., Description; Rational; Benefits). Note: some descriptions are summarized.

Engineering/Technologies

1. *Wireless Technology for Crossing Activation*: Leverage the existing Positive Train Control (PTC) network for activating grade crossings; more reliable train detection and crossing warning times; to mitigate loss of shunt and activation failure and improve station stop warning times.
2. *Research and Develop Vehicle to Vehicle and Vehicle to Infrastructure to Inform, Warn, and Force Stop Motor Vehicle*: In vehicle warning using connected vehicle infrastructure with the ability to enforce stopping; take advantage of existing technologies/infrastructure.
3. *Research Alternative Railroad Warning Devices*: Enhanced warning devices to grab motorist attention (e.g., embedded strobe lights, different color lights, different frequency pattern); to grab motorists' attention by varying operation of warning devices.
4. *Intelligent Traffic System Application for Motor Vehicles*: Enhance pre-emption techniques and queue cutting/traffic management; to decrease vehicles stopped at a crossing and improve traffic flow through crossing.
5. *Research Vehicle Activated Enhanced Advanced Warning Sign*: Vehicle triggered advanced pre-warning to alert motorist on approach to grade crossing; to provide motorists additional warning time and distance; to improve safety especially at passive crossings.

Human Factors

1. *Improve Close Call/Near Miss Reporting (People or Vehicle Strike)*: Phase 1: Develop a process to systematically collect and categorize vehicle and person near miss events. Phase 2: Extract more detailed information from near miss events (e.g., behaviors); we do not understand the whole population of unsafe behaviors; more accurate data, and reduction in unsafe acts. Proactive safety through analysis for better resource management cost reduction.
2. *Integration of Rail Safety Messages into Driver Education and Licensing*: Expand both commercial and private driver education and testing to more accurately reflect the interaction of railroads in driving environment; there is currently an education gap; more compliance by drivers in rail settings.
3. *Incorporate Rail Safety Professionals into Development/Planning Process*: Incorporate rail safety input into community development or planning processes to identify potential increases in rail safety hazards, possibly in the environmental assessment; proactive strategy for identifying potential hazards; incorporated as part of existing railroad safety certification program.
4. *Educate Youth to Educate Adults*: Similar to the National Highway Traffic Safety Administration Model on Seat Belts. Change culture of how kids and families see railroads; it worked with the seat belt “click it or ticket” campaign; increase in safety awareness, personalized understanding, and reduction in unsafe behaviors.

Community Outreach and Education

1. *Trespasser Identification, Motivation and Messaging*: Identify types and reasons for trespassing and develop modes and methods to test messaging aimed at trespassers; provide communities with tools for deterring trespassing; better targeting of messaging based on demographics, geography and reasons for trespassing.
2. *Research into the Efficacy of Social Media Platforms and Messages*: Research appropriate social media platforms based on

target audiences; assist stakeholders in choosing the most effective social media platform and offer messaging based on target audiences; reach more people using social media.

3. *Driver Education (General and Commercial Driver License)*: Evaluate driver education programs for grade crossing safety content and investigate effective distribution of crossing safety messaging to drivers; human factors is a key contributor to grade crossing incidents; better driver understanding of safe crossing procedures, resulting in fewer incidents.

Enforcement

1. *Technology Opportunities for Law Enforcement*: Identify technologies that law enforcement can use to be more effective in identifying and enforcing grade crossing laws; law enforcement must be able to use technology to be as effective as possible. Decrease violations and 'noncompliant' behavior.
2. *Funding Opportunities for Law Enforcement*: Designate funding sources for law enforcement that is specific to crossing enforcement; create mechanisms that allow for law enforcement agencies to apply for crossing enforcement funds; when competing against many other law enforcement related issues and their respective campaigns, law enforcement agencies might be more apt to focus their efforts if monies exist.
3. *Uniformity of Highway-Railroad Grade Crossing Laws*: Push for actual legislation requiring States to have uniform grade crossing laws; currently, there is no consistency among the various States; creates understanding of how drivers should approach and negotiate grade crossings, regardless of location.
4. *Development of National Grade Crossing Law Enforcement Campaign*: Develop national safety/enforcement campaign to garner national attention and buy-in from both the public and the law enforcement community; seek recognition by those associations that often manage funding (e.g., Governor's Highway Safety Association) for support/funding; garner buy-in from State/local law enforcement focused on grade crossing enforcement.
5. *Closure of Highway-Railroad Grade Crossings*: Research effective strategies to close grade crossings that have higher rates of 'noncompliance,' especially when viable alternate access exists; standardized matrix to identify and incent communities to address problem or redundant crossings that do not exist; create funding sources used to encourage grade crossing closures.

Hazard Management

1. *Additional Train Approaching Warning System*: Identify and evaluate potential solutions to alert road users of the approach of a second train; further analysis on various traffic control device concepts may be warranted; expected to reduce frequent cause of pedestrian collisions usually resulting in fatalities.
2. *Grade Crossing Hazard Matrix*: Develop a matrix that shows the annual number of incidents, types of hazards, injuries and deaths, and indicate which treatment will prevent or mitigate the hazard; conduct a 'deep dive' data-trend analysis to potentially mitigate and/or eliminate crossing incidents; develop standard operating procedures, long-term planning, improved coordination and seamless project completion.
3. *Model Communication Process*: Improve communication and coordination between various agencies and railroads; effort would assist with project development, long-term planning efforts, engineering design coordination, and long-term budgeting for big projects; provides standard operating practices, improved coordination and seamless project completion.
4. *Enhanced Data Exchange Between Vehicle Control Systems and Train Control Systems*:

Determine the list and type of information required by vehicle control systems from train control systems and vice versa; safety and efficiency improvements of both systems; increased and long-term safety of highway crossing, as well as improvement of highway traffic flow.

5. *Updating Evaluation Tools for Rail/Highway Grade Crossing Improvements*: Modernize both the Accident Prediction and Severity model and GradeDec.net; grade crossing technology and the railroad operating environment and available data have changed; help ensure that grade crossing resources are directed to the areas of greatest benefit and risk reduction—thereby, saving lives. It may even end up justifying an increase in spending on crossing improvements.

CONCLUSIONS

The conference was successful. Workshop participants identified and shared existing industry best practices, and explored new grade crossing abatement and mitigation strategies.

FUTURE ACTION

This workshop provided FRA with future research topics. FRA will leverage this conference to increase our research in this area.

REFERENCES

[1] Carroll, A. A., DaSilva, M. P., and Ngamdung, T, "USDOT Federal Railroad Administration's Third Research Needs Workshop on Highway-Rail Grade Crossing Safety and Trespass Prevention: Volume I - Summary of Results," U.S. Department of Transportation, Washington, DC, 2010.

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CONTACT

Sam Alibrahim
Supervisor General Engineer
Federal Railroad Administration
Office of Research, Development and Technology
1200 New Jersey Avenue, SE
Washington, DC 20590
(202) 366-0372
sam.alibrahim@dot.gov

Michail Grizkewitsch
Transportation Analyst
Federal Railroad Administration
Office of Railroad Safety
1200 New Jersey Avenue, SE
Washington, DC 20590
(202) 492-1320
Michail.grizkewitsch@dot.gov

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