Grade Crossing Enhancement Opportunities with Public Agencies

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Outline

1. General Grade Crossing Basics
2. How to Review Existing Grade Crossing Operations from a Roadway User Perspective
3. Traffic Engineering Basics
4. Case Examples: Immediate and Longer Term Safety Enhancements
5. Benefits of Successful Partnerships with Public Agencies
General Grade Crossing Basics

Section 1
Grade Crossing Collision Statistics

- Most grade crossing collisions are caused by motorist error.
- Proper traffic control can reduce the number of collisions.
- Motor vehicle highway-rail incidents at public crossings:

  - Stopped on Tracks: 482 (29%)
  - Did Not Stop: 593 (36%)
  - Drove Around Gate: 212 (13%)
  - Other: 228 (14%)
  - Stopped, Proceeded: 71 (4%)

Source: AAR Analysis of Highway-Rail Incident Database for 2013 (March 2014).
What is Traffic Control for Grade Crossings?

- Traffic control for grade crossings includes all **signs**, **signals**, **markings**, and other warning devices, along grade crossing approaches to promote safety and effective operation of rail/highway traffic at grade crossings.

*The Manual of Uniform Traffic Control Devices (MUTCD) is published by the Federal Highway Authority (FHWA) and used by transportation professionals to standardize traffic control devices nationally in the United States.*
MUTCD on Grade Crossings

Manual on Uniform Traffic Control Devices (MUTCD)

• The **appropriate traffic control system** to be used at a highway-rail grade crossing **should be determined** by an engineering study involving both the **highway agency and the railroad company**.

  MUTCD 8A.02

• Before any new highway-rail grade crossing traffic control system is installed or before modifications are made to an existing system, approval shall be obtained from the highway agency with the jurisdictional and/or statutory authority, and from the railroad company.

  MUTCD 8A.02
State MUTCD Adoption Information

MUTCD is the Federal Standard on traffic control devices. States have the legal ability to adopt their own standards. This map indicates the standard in each state.

Source: www.fhwa.dot.gov
Data Collection

- Basic information to collect:
  - # of trains/day
  - Train Speed
  - FRA Incident Report
  - Call Center Data
  - Roadway Average Daily Traffic (ADT) RR Signal Maintainer Input/Observations
  - For Active Crossings – existing RR Warning Time & Type of Train Detection
  - Proposed Highway Authority Improvements – Plans, Studies
  - Google Earth Aerial and Street View

FRA Inventory Form

FRA Incident Report
Data Review

• Study Data to determine frequency of and details of:
  – Vehicles on Track
  – Broken gates
  – Unsafe Motorist Reports
  – On-track queuing
  – Accidents
  – Trespassing
  – Redundant Crossings nearby
  – Nearby Driveways
  – Adjacent Parking
• Any Time of Day Similarities?
• Any Time of Year Similarities?
Field Observations

Drive approaches:
- Drive each lane approach
- Look at visibility of RR devices, signing & striping, and pavement markings

Observe Motorist Behavior (from an inconspicuous place):
- Speed
- Queuing
- Driving around gates
- Change in motorist behavior at crossing (elevation change, crossing panel issue, etc.)
- Adjacent driveways or parking negatively impacting crossing operations
Field Observations

Walk approaches – look for:

– Car parts in RR ROW
– Tire tracks in RR ROW
– Gouges/scrapes in pavement surface
– Signs that RR equipment has been hit
– RR equipment protection
– Tire Marks on curbs
Traffic Engineering Basics

Section 3

Prepared For:
Traffic Engineering Basics

• Traffic Engineering Basics will help you:
  – Better understand highway authority improvements
  – Communicate more effectively with highway authorities
  – Suggest traffic control improvements more effectively
Regulatory Signs
Near Grade Crossings

Regulatory signs and Plaques for Grade Crossings

- MUTCD 8B.03 -
Regulatory Signs
Near Grade Crossings

Grade Crossing (Crossbuck) Sign (R15-1)

Use:
The Crossbuck (R15-1) sign requires road users to yield the right-of-way to rail traffic at a grade crossing. At least one Crossbuck sign shall be used on each highway approach.

- MUTCD 8B.03 -

Stop Sign (R1-1)

Use:
A YIELD or STOP sign may be installed in conjunction with a Crossbuck sign as part of the Crossbuck Assembly.

- MUTCD 8B.04 -

Yield Sign (R1-2)
Do Not Stop on Tracks Sign (R8-8)

**Use:**

A DO NOT STOP ON TRACKS (R8-8) sign *should* be installed where vehicles have significant potential to stop on the tracks at a grade crossing. The sign *should* be located on the right-hand side of the highway. Additional R8-8 signs *may* be installed such that they are on both sides of the highway and/or both sides of the crossing.

- MUTCD 8B.09 -
Warning Signs and Plaques for Grade Crossings

Warning Signs Near Grade Crossings

- MUTCD 8B.06 -

Note: The W10-11 sign is a W10-3 sign modified for geometrics. Other signs can be oriented or revised as needed to better portray the geometrics of the roadways and the tracks.
Warning Signs Near Grade Crossings

Highway-Rail Grade Crossing Advance Warning Sign
(W10-1)

Use:
A Highway-Rail Grade Crossing Advance Warning sign (W10-1) shall be used on each approach of every highway-rail grade crossing, except:

- On an approach to a grade crossing from a T-intersection less than 100 feet where W10-3 signs are used on both approaches of the parallel highway;
- On low-volume, low-speed highways crossing infrequently used tracks where an authorized person controls the crossing at all times a train is approaching;
- In business or commercial areas where active grade crossing traffic control devices are in use where physical conditions do not permit even a partially effective display of the sign; or
- When a W10-2, W10-3, or W10-4 sign shall be installed.

Grade Crossing & Intersection Advance Warning Signs
(W10-2, W10-3, W10-4)

Use:
If the distance between the tracks and a parallel highway is less than 100 feet, W10-2, W10-3, or W10-4 signs shall be installed on each approach.

-MUTCD 8B.06 -
Warning Signs Near Grade Crossings

**Low Ground Clearance Grade Crossing Sign & Plaque (W10-5, W10-5P)**

**W10-5**

**W10-5P** (Plaque required for at least 3 years after initial installation of W10-5 sign)

**Use:**

The Low Ground Clearance Grade Crossing (W10-5) sign **should** be installed in advance of grade crossings that can potentially scrape the bottom of crossing vehicles.

- MUTCD 8B.23 -
Pavement Markings and Striping Near Grade Crossings

- Two-Direction No-Passing Centerline
- White Edge Line Striping
- Stop Line

*Width may vary according to lane width

For narrow lanes only
Pavement Markings and Striping Near Grade Crossings

A - Edge line not on rumble strip
B - Edge line on rumble strip
C - Center line on rumble strip

Legend:
- Direction of travel
- Rumble strip

Note: Edge line may be located alongside the rumble strip (Option A) or on the rumble strip (Option B). Center line markings may also be located on a center line rumble strip (Option C).
Center Line Striping at Grade Crossings

Where center line markings are used, no-passing zone markings **shall** be used on approaches to grade.

- MUTCD 3B.02 -

No passing zone markings for roadway approaches to grade crossing

Painted Median

Two-Direction No-Passing Centerline
Edge Line Striping at Grade Crossings

4” White Edge Line Stripe

White Edge Line Striping
Stop Lines

Stop Lines

Stop lines **shall** consist of solid white lines extending across approach lanes to indicate the point at which the stop is intended or required to be made. Stop lines **should** be 12 to 24 inch wide solid white lines that extend across approach lanes.

- Stop lines **shall** be installed at active crossings. They should be placed **8’ in advance of RR gate** (if present), but no closer that 15’ in advance of nearest rail.
- Stop lines **should** be installed at passive crossings with a STOP sign and crossbucks.

- MUTCD 3B.16 -
Pedestrian Channelization

Tactile Warning Strips:

The detectable warning surface shall be located so that the edge nearest the rail crossing is 1.8 m (6 ft) minimum and 4.6 m (15 ft) maximum from the centerline of the nearest rail. The rows of truncated domes in a detectable warning surface shall be aligned to be parallel with the direction of wheelchair travel.
Pedestrian Channelization

- Unwalkable surface
- Tactile Strip just upstream of RR Warning Device
Pedestrian Channelization

Unwalkable surface

Counterweight does not extend to sidewalk limits

Tactile Strips prior to proceeding over tracks
Case Examples: Immediate and Longer Term Safety Enhancements

Section 4
Scenario #1: Vehicles on Track

Data:
- Vehicles turning onto track
- Night time occurrences
- Adjacent intersection is close to crossing

Field Observations:
- Crossing is dark at night
- Hard to see edge of pavement
- Motorist hesitation/driving slower than expected

What is a crossing enhancement you can suggest?
Applications Scenario #1

Scenario #1: Vehicles on Track – Possible Solutions

Add lighting to enhance vision

4” White Edge Line Striping
Applications Scenario #1

Scenario #1: Vehicles on Track – Solution Application

- 4” White Edge Line Striping
- Reflective Raised Pavement Markers (RPM)
Scenario #2: Vehicles Stopped on Crossing

Data:
- Vehicles stopped on crossing
- Accident history of vehicles getting hit by trains

Field Observations:
- Vehicles stopped on crossing
- Distance between crossing and downstream intersection does not accommodate a design vehicle

What is a crossing enhancement you can suggest?
Applications Scenario #2

Scenario #2: Vehicles Stopped on Crossing – Possible Solutions when crossing is Short Staged

Short Term:
- “DO NOT STOP ON TRACKS” signs
- Short Storage Signs
- “KEEP CLEAR” pavement markings

Long Term:
- Presignal

Short Storage Signs
Applications Scenario #3

Scenario #3: Unsafe Motorist Behavior

Data:
- Motorists not stopping when RR lights flash
- Vehicle - Train Incidents
- Broken gates

Field Observations:
- Obscured RR Flashers
- Motorists driving around lowering RR Gates
- Scrapes on RR gates/bent gates
- Large percentage of crossing users are from one nearby business

What is a crossing enhancement you can suggest?
Applications Scenario #3

Scenario #3: Unsafe Motorists – Possible Solutions

Short Term:
- Enforcement
- Improve flasher visibility
- Have highway authority move signs that might be blocking flashers or trim vegetation
- Stripe double yellow center line
- Refresh or paint RR stop line
- Education at nearby business
Successful Partnerships with Public Agencies

Section 5
Successful Diagnostic Meeting

• Make sure the right people are invited
• Conduct Safety Briefing
• Review existing crossing data
• Discuss any crossing concerns/observations
• Review highway authority proposed improvements
• Determine if the highway authority plans address all the existing concerns
• Ensure Meeting Minutes reflect all critical items discussed and are distributed in a timely manner
Early Engagement with Public Agencies
Benefits

• Railroad employees typically have more grade crossing experience.
• Immediate Enhancements can be realized
• Highway Authorities will likely engage the RR more often on items that impact both parties
• Agency can focus their resources on enhancements that will be acceptable to RRs
• If trust can be established early on in a project’s life, success is more readily accomplished.
• When Railroads and Highway Authorities cooperate and educate each other on their areas of expertise, mutually beneficial design elements will be implemented at grade crossings.
Long Term Public Agency Partnership Benefits

- Agency will reach out more often to RR
- Projects will take less time
- Projects will cost less
- Public will be better served
- Risk will be reduced for all
Questions

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