Improving Safety at Railway Level Crossings

21. Original American Railway Association poster in 1922 was 21 x 12¾ inc

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Level Crossing Protection Systems

"We can't solve problems by using the same kind of thinking we used when we created them"

A. Einstein

"The definition of insanity is doing the same thing over and over and expecting different results."

B. Franklin

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Improving Safety at Railway Level Crossings

The mass of a train, relative to a car is the same as the mass of a car relative to a soft drink can

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Improving Safety at Railway Level Crossings

- Recommendations
- How do Level Crossings Work?
- How are Level Crossings Built?
- Options for Level Crossings

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Recommendations

- Low Cost Systems Present the Optimal Approach to Improving Level Crossing Safety
- Evaluate and Install Low Cost Systems
- Build Test Track/Research Facility

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Recommendation 1: Test Track

- Dedicated Track + Revenue Track
- Diverse rolling stock
- High Speed
- Managed by VicTrack or DoI
- Available to Operators, Designers, Maintainers

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Recommendation 2: Low Cost System

- Reduced Cost = More Upgrades per $
- Reduced Time = More Upgrades per year
- More Upgraded Crossings = Improved safety

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How do Level Crossings Work?

Two Primary Components of a Level Crossing System

- Train Detection System
- Road Warning System

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Train Detection System

- Visual
- Track Circuits
- Predictors

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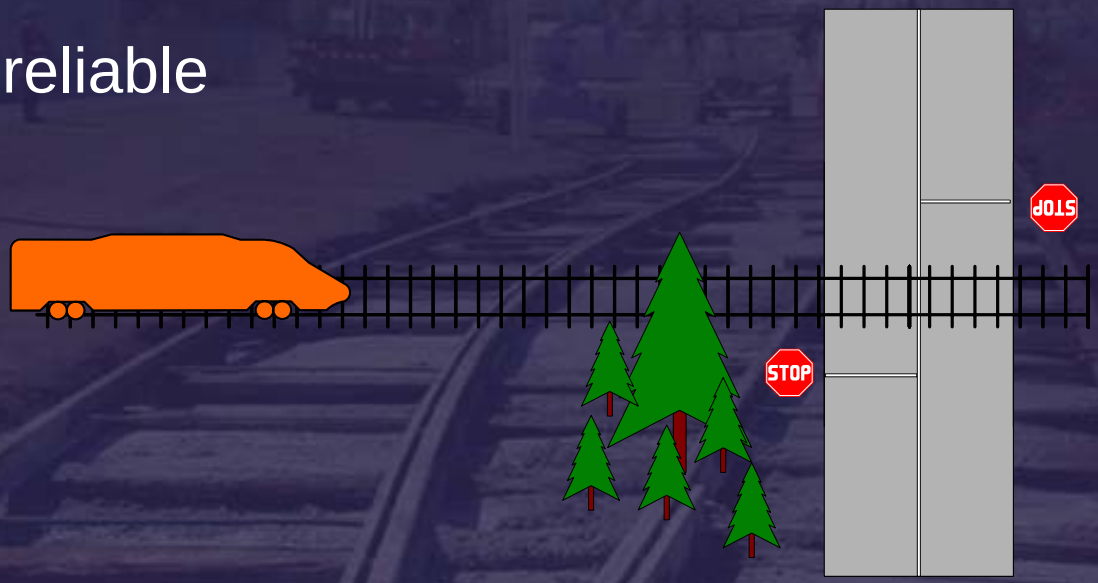
Visual Systems

Watch for Trains

Unreliable



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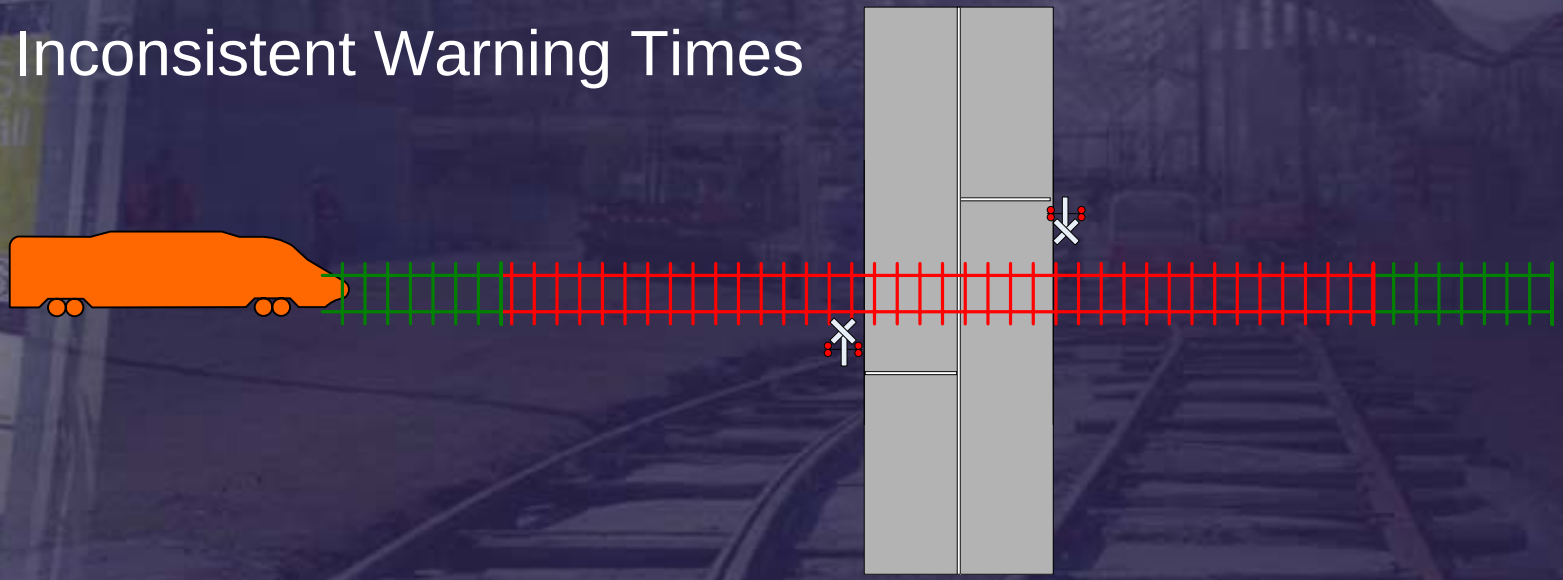
Track Circuits

Inconsistent Warning Times



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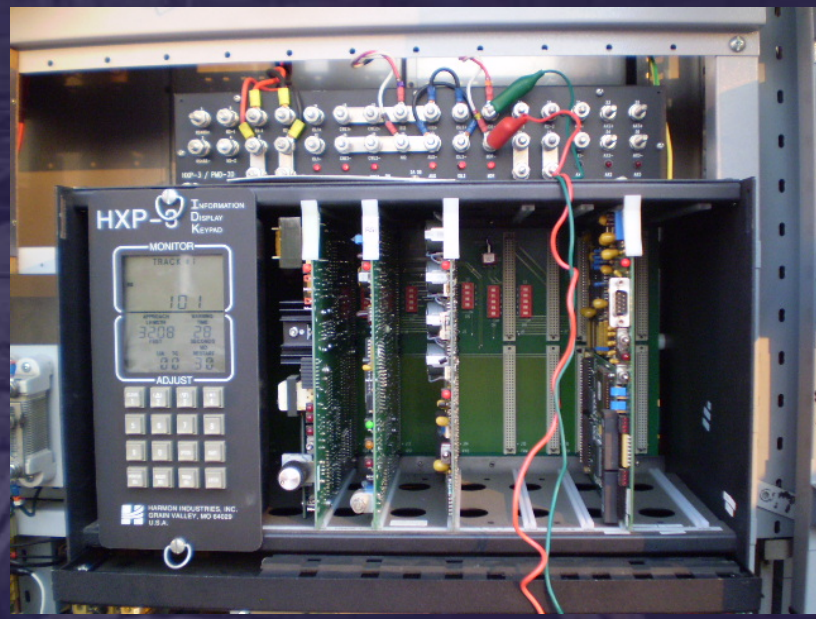
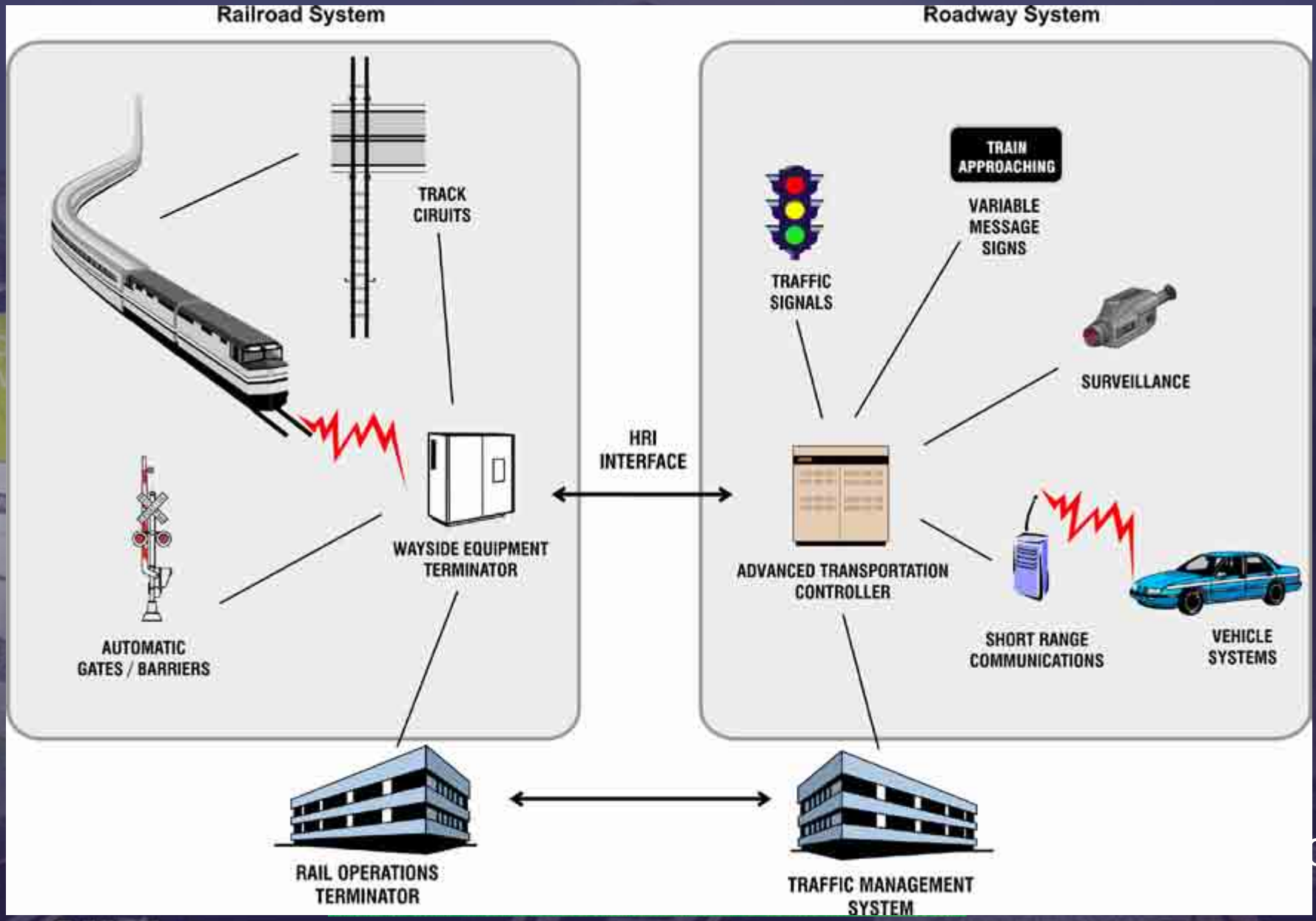
Predictors

- Calculate Time of Arrival
- Constant Warning Time




Railroad System
Roadway System
TRACK CIRUITS
TRAIN APPROACHING
VARIABLE MESSAGE SIGNS
TRAFFIC SIGNALS
SURVEILLANCE
HRI INTERFACE
WAYSIDE EQUIPMENT TERMINATOR
ADVANCED TRANSPORTATION CONTROLLER
AUTOMATIC GATES / BARRIERS
SHORT RANGE COMMUNICATIONS
VEHICLE SYSTEMS
RAIL OPERATIONS TERMINATOR
TRAFFIC MANAGEMENT SYSTEM

Road User Warning System

- Passive Signage
- Flashing Lights
- Boom Barriers
- Automatic Advance Warning Signs

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Building a Level Crossing

- Site Selection
- Design
- Construction
- Testing and Commissioning
- Maintenance

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Site Selection

- Site Visits
- Site Assessment

Preliminary Design

- Request for Tender
- Tender Evaluation/Award
- Preliminary Design
- Stakeholder Approval

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Detailed Design

- Request for Tender
- Tender Evaluation/Award
- Detailed Design
- Procurement

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Construction, Testing and Commissioning

- Site Access

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Maintenance

- Training for Maintainers
- Spares

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Impediments to Low Cost Solutions

- No commercial advantage
- Type Approvals
- Stakeholders

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Options for Warning Systems

Wayside Train Horn

Audio Spotlight

Retractable Barriers

Four Quadrant Gates

In-Pavement Lighting

Train Illumination

Adaptive Lighting

Flashing Light Options

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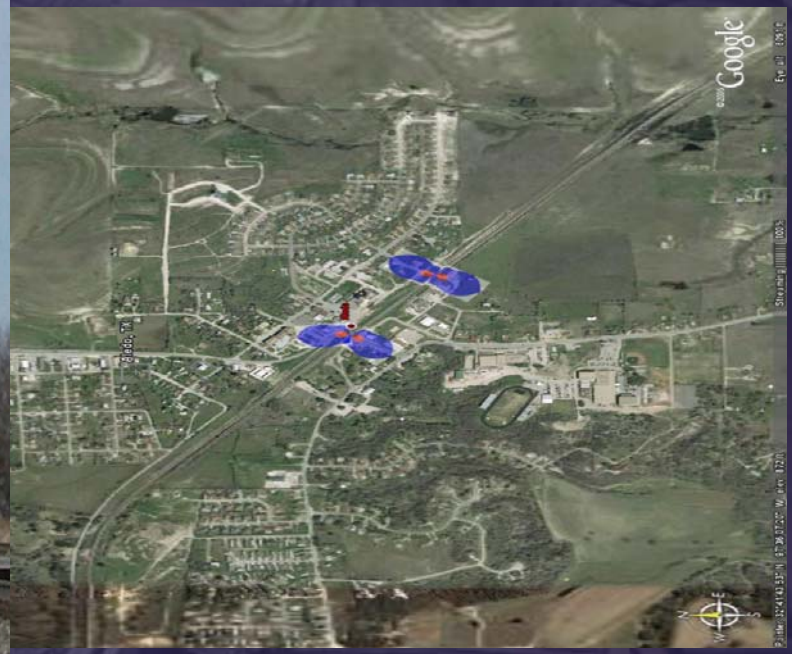
Wayside Train Horn



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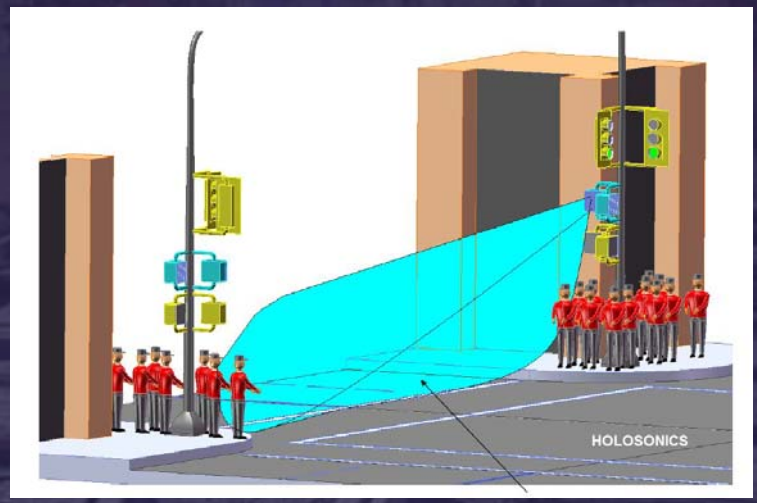
Audio Spotlight

Minimise Noise Pollution, Reduce Complaints

Incorporate with Train Horn

Targeted at User



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Retractible Barriers

Scissor Bollards

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4 Quadrant Gates

Prevent Trapping of Vehicles

Increased Maintenance

Supergates

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In Pavement Lighting

Crosswal

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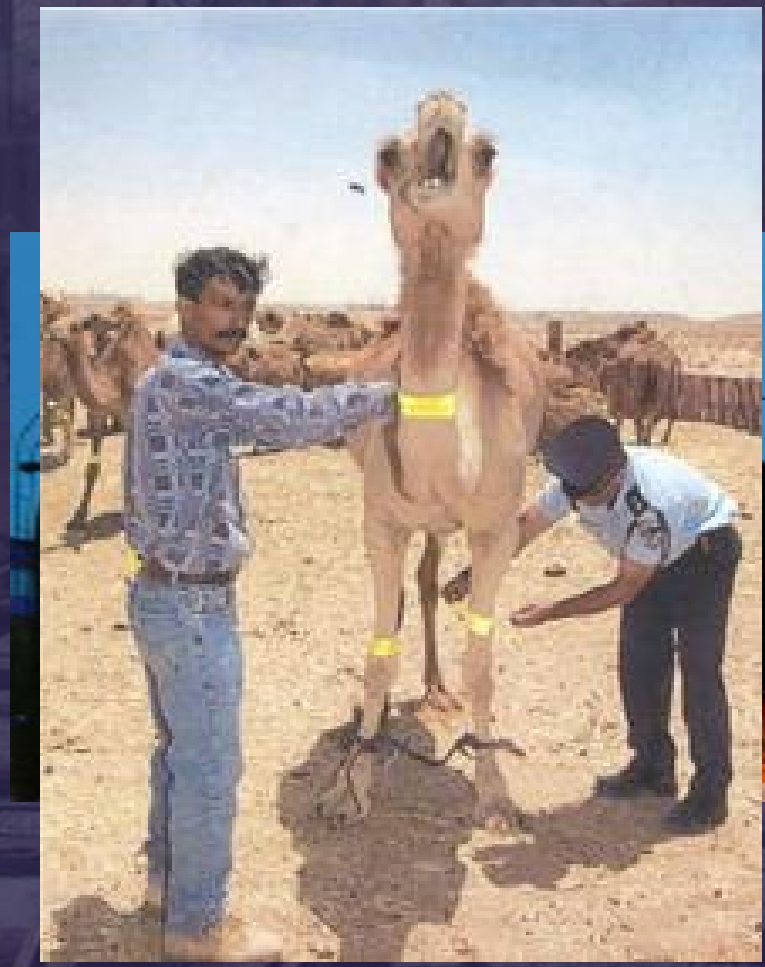
Train Conspicuity

Reflectors

LED Strobe

Livery



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Adaptive Lighting

Most Applicable to Pedestrian Crossings

Intensity Increases upon Train Approach

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Flashing Light Options

Advance Yellow

Double Beat Flash Rate

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Train Borne Video

Adopted by BNSF, GoTransit

Corroborates Driver Statements

Invaluable for Investigations

Corroborates Driver Statements

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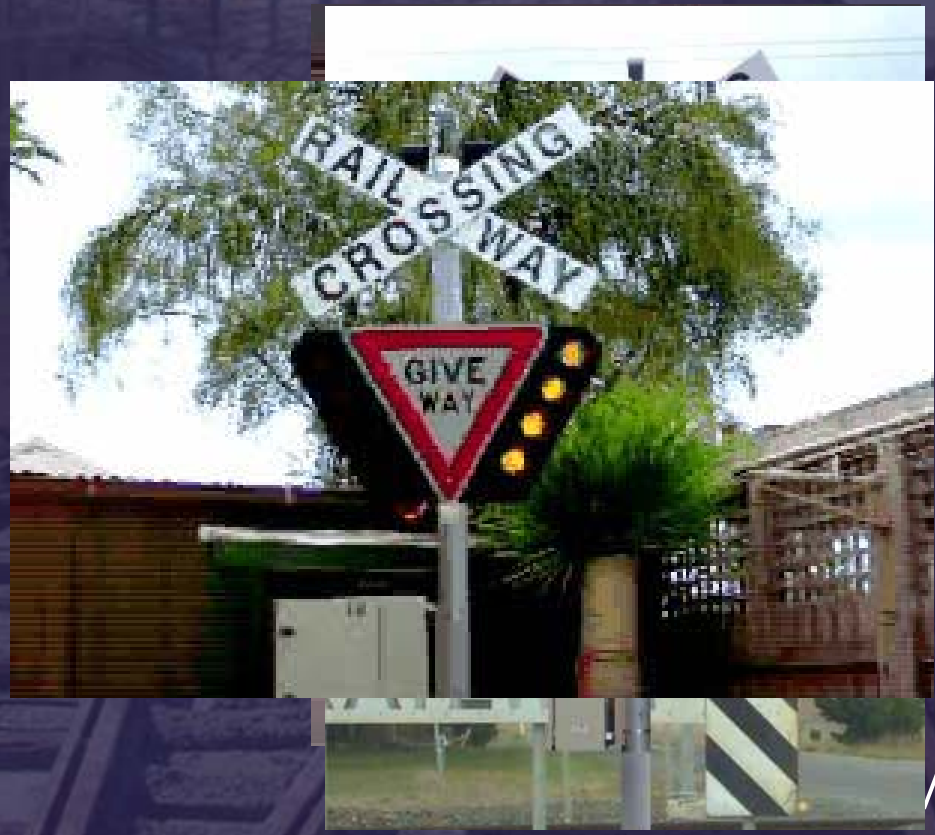
Active Stop/Give Way Signs

Flashes upon train approach

Fail Safe



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Radar Based Train Detection

$20,000 per unit

Local Manufacture possible

In use in USA, Norway, Venezuela

Independent of Railway Infrastructure