



Economic and Social Council

Distr.: General
26 January 2015

Original: English

Economic Commission for Europe

Inland Transport Committee

Working Party on Road Traffic Safety

Group of Experts on Improving Safety at Level Crossings

Fourth session

Geneva, 29-30 January 2015

Item 2 (g) of the provisional agenda

Enforcement

Submitted by France and the United Kingdom of Great Britain and Northern Ireland

This informal paper submitted by the subgroup comprised of Network Rail United Kingdom and SNCF (France) provides an update of analysis of the GE.1 survey and supplementary questionnaire regarding enforcement of regulations at level crossings.

I. Background

At the UNECE meeting of Level Crossing Experts on 20th January 2014 a programme of work was agreed covering a number of topics. One of the topics was improving user behaviour through enforcement at level crossings.

A combined questionnaire including elements of all 9 topics was issued to member states in July 2014. It was found that 18 countries out of 23 respondents carry out some enforcement at level crossings and 5 countries do not.

Table 1

<i>Countries which DO undertake enforcement at level crossings</i>	<i>Countries which DO NOT undertake enforcement at level crossings</i>
Republic of Moldova	Spain
India	Georgia
Hungary	Sweden
Germany	Estonia
Greece	Norway
Poland	
Republic of Ireland	
Romania	
Italy	
Belarus	
Belgium	
Portugal	
Bulgaria	
Turkey	
Switzerland	
France	
United Kingdom	
Russia	

The survey results were presented to the 3rd session of the UNECE Group of Level Crossing Experts. Discussion centred around the differences in enforcement for private level crossings in comparison to public road level crossings, and also enforcement around pedestrian use of level crossings in comparison to road vehicle use of level crossings.

Specific areas of discussion included:

- regulations in force, how they can be applied and suitable punitive measures to improve user behaviour;

- education and how it can be used to change user behaviour;
- In November/December a second, more detailed, questionnaire was drafted and issued to respondents. The aims of the second questionnaire were to find more detail about;
- what legislation is in place for pedestrian users of level crossings, and also legislation for both private and public level crossings;
- which agencies enforce the legislation;
- what processes are used to detect violations;
- technology and detection methods used, fixed/mobile, approvals & technical specifications, funding sources and reliability analysis;
- deployment of technology, site selection criteria etc;
- improving user behaviour and measuring success – including penalties/fines, education and analysis of effectiveness;
- sharing good practice and looking forward.

II. Findings from Survey

A. Legislation & Enforcement Agencies

The first group of questions were around legislation in place within member states because it is necessary to understand whether there is a consistent mechanism in place to underpin enforcement. This also allows the analysis to identify possible gaps in legislation and to identify the most effective legal provision in this area;

- Although the working group has not received all submissions from member states, indications are that generally, all countries do have laws in place around public behaviour at level crossings;
- Regulations covering road vehicle drivers at public road level crossings appear to exist for all countries;
- For many countries the regulations also cover pedestrian users of public road level crossings. However, this is not the case everywhere for example in the United Kingdom where the applicable regulations do not apply to pedestrians. This leaves a weakness in the UK around enforcing safe use of level crossings by pedestrians.

There is more inconsistency around private level crossings:

- For some countries the laws governing use at public level crossings also apply at private level crossings, for example in Sweden's Road Sign Act;
- For some other countries different laws apply at private level crossings compared to public level crossings, for example the UK;
- Note: in the UK and Ireland the majority of private level crossings do not have red/green lights so it is more difficult to demonstrate when an offence has taken place;
- For other countries an agreement or 'contract' exists between the railway company and the private users, for example France and Spain. This can allow the railway company to close the crossing if the user breaks the agreement by using the crossing

unsafely. Also, the user may be invoiced for train delay caused by not closing gates/barriers;

Respondents were then asked which agencies are in place with the authority to lead for enforcing safe use of level crossings:

- For public road crossings the majority of countries appear to use police for enforcement, including both pedestrian and road vehicle users. However, each country has different structure for their police forces and this can have an impact on which part of the police force has responsibility/jurisdiction;
- For private level crossings the majority of countries appear to use the railway infrastructure manager for enforcement, although some countries such as Portugal and the UK also use the police. Note: in the UK other government bodies can also prosecute private users for unsafe acts.

The first questionnaire, distributed in July 2014, asked respondents to identify which types of violations were enforced within their countries:

- *Red light violations* - the widest area of enforcement appears to be for red light violations for road vehicle users;
- *Road speed on approach* - a number of countries also enforce road traffic speed on the approach to level crossings;
- *Pedestrians* - most countries have the ability to prosecute pedestrians who violate signs/signals or audible warnings – however low fines or weak punishments can affect the willingness to enforce;
- *Barrier/train strikes* - some countries also use technology to identify road vehicles that have struck barriers or trains for the purposes of recovering costs (damage to trains, equipment and delay) – and this might not lead to prosecution;
- *Gate misuse at private crossings i.e. leaving gates open* – this is a common problem amongst member states. Some countries have the ability to invoice users for train delay caused by deliberate gate misuse;
- *Blocking back and queuing traffic.*

B. Technology

In the first questionnaire, member states were asked to identify the tools or means in which violations were detected. The results included:

- Police officers;
- Train Driver/Guard (staff) witness;
- Infrastructure manager (staff) witness;
- Camera equipment; on-train or infrastructure based;
- Obstacle detection;
- Third party reports e.g. members of the public.

In the second questionnaire, further information was requested about the processes used to detect violations of the laws/regulations to identify what technology and processes are in use within member states to identify violations:

- Cameras are the most widely used technology in terms of detecting red light violations, equipment/barrier/train strikes and speeding on the approach to level

crossings. Cameras are in use for level crossing enforcement within 12 countries. However, it appears that even in the countries where cameras are used, they are not deployed extensively at a high proportion of crossings. They are almost entirely deployed at public road level crossings rather than private level crossings or pedestrian footpath crossings;

- Pedestrian violations are almost exclusively identified by a witness – police officer or a railway member of staff;
- Gate misuse at private crossings (gates left open) is almost always identified either by train crew reports or other infrastructure staff reports. Although in some countries such as the UK, temporary CCTV cameras have been deployed to some problem sites to improve user behaviour and gather intelligence;
- Blocking back and queuing traffic is usually detected through Driver reports, Signallers and local knowledge. Note: the development of obstacle detection explores this issue.

Table 2

Red Light Cameras

<i>Country</i>	<i>Means of activating the camera when crossing sequence activates</i>	<i>Means of detecting a road vehicle is in the prohibited area</i>
France (1 x fixed system approved)	Interlocked with level crossing signalling	Induction loops within the road
UK (3 x fixed systems currently being approved)	Video analytics (x 3)	Video analytics using ANPR (x2) RADAR (x1)
(1 x mobile system approved – fleet of 15 vehicles)	Not applicable – CCTV footage on recording loop	Police officer witness

Table 3 –

Barrier/Equipment/Train Strikes

<i>Country</i>	<i>Means of detecting incident</i>
UK (2 x fixed systems)	Some CCTV operated crossings record footage which can be downloaded post incident Some crossings have CCTV specifically installed to monitor/record usage but NOT part of the normal operation of the crossing

Table 4

Speed Cameras

<i>Country</i>	<i>Means of detecting speeding</i>
France (1 x fixed system)	Video analytics

Table 5
Approval Processes

<i>Country</i>	<i>Approval Process Required</i>
France (both for speed cameras and red light cameras the same process exists)	Camera systems must be approved by the French Ministry. All images of violations are sent to the Ministry for approval and prosecution.
UK (for red light cameras)	Camera systems must be approved by the British government Home Office All images of violations are sent to an administering police force for approval and prosecution

Table 6
Technical Specification

<i>Country</i>	<i>Technical Specification</i>
France (both for speed cameras and red light cameras the same process exists)	<p>The system detects vehicle, a picture is taken of the detection area, the vehicle and its license plate with inlay of one or several chain(s) of alphanumeric data and in the archiving of pictures and data which accompany them</p> <p>The system must be provided with a door with secure opening (badge, physical code or electronic opening with remote control, etc.). The secure means of opening must be able to be invalidated in case of loss or of theft, to avoid any risks of intrusion and dishonest compromise; The system must be protected against any accidental or deliberate corruption which would pull a functioning of the device not meeting the requirements of the present order; Protection factor: envelopes protecting the logical units and / or the camera has to have a protection factor IP 45; Impact strength and vibrations: the system has to preserve its nominal performances following the tries of mechanical resistance; the class of severity of the tries corresponds to that applicable to instruments submitted to shocks or vibrations of not insignificant or high level; Electromagnetic compatibility: the system has to be in compliance with the current European directives and the marking THIS correspondent must be affixed on the equipment. Heat resistance and hygrometry: the system has to preserve, in functioning, its nominal performances in the conditions of temperature between -25 ° C and +55 ° C and in the conditions of humidity between 10 and 90 %</p>
UK (for red light cameras)	<ol style="list-style-type: none"> 1. Key compliance with the ACPO Red Light Handbook – HOTA <ol style="list-style-type: none"> a. Must provide two images that clearly show a vehicle progressing over the stop line whilst the road traffic lights are showing red. Image one: At or just over the line. Image

<i>Country</i>	<i>Technical Specification</i>
	<p>two: Clear progression over the line</p> <p>b. Image quality must be such that an operator can clearly see the vehicle type, model and registration mark in all lighting conditions.</p> <p>c. Must not, through thorough testing, produce evidence packages that indicate an offence when no offence has been committed.</p> <p>d. Must ensure data security between outstation and back office processing equipment through the use of government approved data encryption.</p> <p>e. Must be maintained in accordance with manufacturers and Type Approval minimum standards.</p> <p>2. Key Network Rail specification requirements:</p> <p>a. Must not introduce more than one additional item of street furniture (Columns) per side of crossing.</p> <p>b. Must be capable of operating at all times regardless of site illumination</p> <p>c. Must be able to detect all vehicles displaying a valid VRM (Vehicle Registration Mark)</p> <p>d. Must not directly connect to Railway signalling as a means of activation detection</p> <p>e. Must provide census data to authorised users showing crossing usage and offence detection levels (This element was largely de-scoped due to the encryption employed and the restrictions imposed by type approval).</p> <p>f. Must be Home Office Type Approved</p>

Table 7
Funding For Technology Deployment

<i>Country</i>	<i>Funding</i>
France	<p><i>Red light safety cameras:</i> French ministry pays for the cameras and their installation on the road. Rail infrastructure manager pays for any additional red light signals (as needed) and improvements to red lights so that the images will always prove red light illumination.</p> <p><i>Speed cameras:</i> French ministry pays for the cameras and their installation on the road.</p>

- In the UK the availability and reliability of the fleet of mobile safety cameras is analysed jointly by the British Transport Police who operate them, and Network Rail who fund them. Similarly, when fixed red light safety cameras become operational their reliability, availability, failure modes etc. will be analysed;
- In France reliability, time in service, fault modes and maintenance costs is not analysed by the Ministry. All fixed cameras have an alert system linked to the

Control Office in Rennes. Maintenance have the ability to use diagnostics to identify the fault and correct it remotely if possible, if not a site visit may be needed to rectify the fault.

C. Deployment and Logistics

Site selection:

- In France accident history (number of collisions with trains and barriers), traffic moment and railway structured expert judgement are used to decide which level crossings need to be examined to find ways to improve safety. At some of the crossings examined it is decided that cameras are the best measures to improve safety. The ultimate decision, however, is with the local authority;
- For fixed cameras in the UK - the initial programme has been targeted toward a selection of high risk automatic half barrier type level crossings. This is a risk based decision founded on modelled risk, accident history and foreseeability of future events. A longer term view, post commissioning of this new technology, will be taken to look at the success the equipment has had in improving user behaviour and the merits that a wider deployment programme/strategy will bring to the safe management of the level crossing estate;
- For the mobile safety vehicles short term deployment is based on incident/accident history trends recorded at a particular level crossing or crossing type, risk assessment modelled score: i.e. high risk locations or high risk crossing types such as automatic half barriers, stakeholder concerns from public bodies such as local authorities [LAs] or train operating companies [TOCs] or bad actor status – i.e. spikes in the number or type of known violations at a particular crossing. Targeting might also be influenced by local or national safety campaigns focussed on improving behaviour by user segment or crossing type.

Theft and vandalism of technology:

- Red light cameras are relatively new in France (since 2012), and very new to the UK (since 2014). No incidents of theft or vandalism have been reported yet in France however red light cameras are positioned between 2m and 3m high which makes them harder to access. No incidents of theft or vandalism have been reported in the UK but they are still undergoing testing and commissioning so it is a very early stage in their deployment;
- However, some vandalism and theft is to be expected. In France there are around 3,200 cameras of all types on the road network (120 at level crossings) and there are circa 10 – 12 completely destroyed per month with an average of 160 acts of vandalism per month;
- The location (urban or rural) is a significant influencing factor. The height of the cameras above street level is also a significant factor.
- It is recommended that any technology (cameras) deployed should have anti tamper measures.
 - In France an automatic technical alert is sent to the control room in Rennes if the camera is damaged, if the image is affected, if there is no signal etc. Where there is a high vandalism frequency of camera equipment, the police service will either provide an officer on site to safeguard equipment or they will deploy covert camera equipment to monitor/record theft and vandalism

offences. Where equipment has been vandalised, maintenance teams will visit site to repair and recalibrate equipment.

- In the UK, cameras are fitted with high security anti-tamper locks. In accordance with government home office type approvals, cameras are also fitted with electronic anti-tamper mechanisms. The cameras require a secure electronic connection to operate and enforce red light violations. Any breach of the outer case of the cameras will result in the destruction of the encryption key and any data that has not been electronically sent to the back office for prosecution. The destruction of the encryption key will trigger a loss of operational status alert which will be sent through to the back-office maintenance diagnostics team. Cameras are positioned at a height of between 4-5 metres by design.

D. Detection

Options available to the enforcing agencies when a detection has been achieved:

- For red light offences at public road crossings some countries can issue both fines and points against an offender's driving licence. For example, the UK and France do this;
- Some countries offer a set penalty for anybody who fails to obey the red light regardless of how close to a possible collision with a train. However, in the UK the punishment can be based on the severity of the offence. Legislation allows for a set fine and 3 points on the licence for a lesser offence through to a more significant fine, points or even prison sentence for serious offences such as; 'dangerous driving' or 'endangering life';
- Some countries allow for driver retraining. This is where drivers - who have committed an offence - are offered a training course. Opting for retraining can reduce or remove the fine or points, however drivers do have to pay to attend the courses. In some countries, such as France, the course is a general driver awareness course. In the UK however there is a specific red light safety course;
- In some countries, for speeding offences on the approach to level crossings, the level of the fine or points received depends upon how fast the offender was going above the speed limit. Other punishments available include; suspension of the driving licence, impound the vehicle, prison;
- In some countries, the regulations and punishments for offences on private roads are the same as for those on public roads, such as Portugal and Sweden;
- In some countries the regulations and punishments differ for public and private roads/level crossings. Fines may still be issued but it appears that points on driving licences are less likely in most countries
- In France and Spain users of private level crossings enter an agreement/contract with the railway infrastructure manager regarding the safe use of 'their' level crossings. If users repeatedly do not respect safe rules/protocols then the infrastructure manager has the ability to close the level crossing.

Analysing the effectiveness of the detection methods:

- In France the railway infrastructure manager analyses the evolution of number of infractions and compares with evolution of number of accidents (collisions and barriers broken). In France it has been possible to analyse the number of collisions with trains and also the number of collisions with barrier/equipment before [speed]

cameras were fitted compared with after installation. The analysis shows mixed results – with cameras being more successful in changing user behaviour in some locations than others. Similar analysis will be undertaken for red light cameras when there is sufficient data post deployment;

- In the UK the British Transport Police and the infrastructure manager analyses deployment of mobile safety vehicles, the number of detections and prosecutions. However, due to the mobile nature of this technology it is impossible to determine how successful the vehicles have been in changing user behaviour in the medium/long term;
- In the UK we are seeking to benchmark the overall effect on the number of offences before & after camera deployment however, initial attempts have been affected due to ongoing testing of the camera system itself prior to them becoming fully operational;
- It is recommended that more work is needed to analyse the effectiveness of enforcement on user behaviour taking into account offences/accidents before and after camera installation. This benchmarked analysis should include;
 - Low (red light running)/medium (barrier weaving)/high risk (near miss with train) offences and how the numbers change over time;
 - the number of barrier/equipment strikes;
 - the number of train collisions, etc;
 - the synergy effect from combining education and public awareness with installation of cameras – research/historical evidence;
 - understanding why cameras are more effective at some level crossings than others, what factors influence this and how that might inform site selection for future deployment.

E. Good practices

- Awareness days at level crossings [fitted with cameras] are an effective way to reduce the number of infractions. One is able to emphasize the overall level crossing safety message and also underline that further infractions will lead to punishment such as fines and points on driving licence;
- Awareness days at driving schools facilitates the education of new drivers and improves behaviour positively;
- Mobile safety vehicles are a very flexible means of enforcement. They have CCTV cameras to record violations and in the UK they are staffed by British Transport Police officers. Mobile safety vehicles allow for rapid deployment of enforcement to emerging problem level crossings. They are also very visible as a deterrent and can be used as part of an awareness campaign;
- Some countries the railway infrastructure manager has direct access to - and some tasking leverage over a dedicated railway police force – this helps target police/enforcement presence at the right locations;
- Specific driver training course dedicated to red light safety;
- Agreements/contracts between railway infrastructure managers and users of private level crossings detailing expected standards of safe behaviour and user's legal responsibilities.

F. Areas of enforcement that respondents would like to improve upon

- UK: Our main priority is enforcement of road vehicles at public road level crossings. Legislation around enforcing pedestrian safety at public level crossings. Beyond that we would like greater ability to enforce safe use of private crossings; better legislation within the UK and better means of detecting infractions at private crossings;
- France: More stringent punishment for pedestrians to deter unsafe behaviour and to incentivise police to enforce regulations. Also, we would like to see improvements in the way that police agencies are alerted and tasked to enforce safe use of level crossings. Also raising the profile and joint ownership of level crossing Safety within member states local authorities, police and other enforcement agencies.
- Sweden: Although not enforcement related, Swedish railway would like to see solutions to minimize user error & mistakes including;
 - Better visibility
 - Skirts on barriers to avoid people sneaking under the barrier
 - Lower the road speed from 90 to 70 km/hour
 - Improve the sighting of unprotected crossings

III. Next Steps/Recommendations

- (a) The working group will complete the analysis of all responses from the second - more detailed – questionnaire.
 - (b) The complete findings and conclusions shall form part of a final report to GE.1
 - (c) It is recommended that a time-bound plan is developed to carry out detailed analysis into the effectiveness of enforcement on user behaviour (see Section 2 (D)).
-