



Railway Accident
Investigation Unit
Ireland



INVESTIGATION REPORT

**Person entrapped in lowered CCTV level crossing,
Ashfield, Offaly, 24th May 2020**

RAIU Investigation Report No: 2021 – R003

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Report Description

Report publication

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Report structure

The report structure is taken from guidelines set out in “Commission Implementation Regulation (EU) 2020/572 of 24 April 2020 on the reporting structure to be followed for railway accident and incident investigation reports” having regard to “Directive (EU) 2016/798 of the European Parliament and of the Council of 11 May 2016 on railway safety”.

Reader guide

All dimensions and speeds in this report are given using the International System of Units (SI Units). Where the normal railway practice, in some railway organisations, is to use imperial dimensions; imperial dimensions are used, and the SI Unit is also given.

All abbreviations and technical terms (which appear in italics the first time they appear in the report) are explained in the glossary.

Descriptions and figures may be simplified in order to illustrate concepts to non-technical readers.

Preface

The RAIU is an independent investigation unit within the Department of Transport, which conducts investigations into accidents and incidents on the national railway network, the Dublin Area Rapid Transit (DART) network, the LUAS light rail system, heritage and industrial railways in Ireland. Investigations are carried out in accordance with the Railway Safety Directive 2004/49/EC enshrined in the European Union (Railway Safety) (Reporting and Investigation of Serious Accidents, Accidents and Incidents) Regulations 2020.

The RAIU investigate all serious accidents. A serious accident means any train collision or derailment of trains, resulting in the death of at least one person or serious injuries to five or more persons or extensive damage to rolling stock, the infrastructure or the environment, and any other similar accident with an obvious impact on railway or tramline safety regulation or the management of safety. During an investigation, if the RAIU make some early findings on safety issues that require immediate action, the RAIU will issue an Urgent Safety Advice Notice outlining the associated safety recommendation(s); other issues may require a Safety Advice Notice.

The RAIU may investigate and report on accidents and incidents which under slightly different conditions might have led to a serious accident.

The RAIU may also carry out trend investigations where the occurrence is part of a group of related occurrences that may or may not have warranted an investigation as individual occurrences, but the apparent trend warrants investigation.

The purpose of RAIU investigations is to make safety recommendations, based on the findings of investigations, in order to prevent accidents and incidents in the future and improve railway safety. It is not the purpose of an RAIU investigation to attribute blame or liability.

Summary

At approximately 12:13 hour (hrs) on the 24th May 2020, a Level Crossing Control Operative (LCCO), referred to as LCCO1 in this report, located at Athlone Local Control Centre (ALCC) cleared Closed-Circuit Television (CCTV) Level Crossing (LC) XA068, located in Ashfield, Offaly for the passage of the 11:00 hrs passenger service from Galway to Heuston (Train A703) while a member of the public (MOP) was inside the barriers of the level crossing.

The MOP had requested assistance from LCCO1 using the telephone provided at the level crossing. LCCO1 advised the MOP that they would raise the barriers and instructed the MOP to stand beside some level crossing equipment (clear of the tracks, but within the confines of the level crossing). LCCO1 did not raise the barriers and allowed Train A703 to pass through LC XA068. The MOP was uninjured as a result of this incident.

The RAIU identified the following *causal factors* (CaF) associated with the incident:

- CaF-01 – The MOP did not clear the confines of the level crossing when the warning lights and bell activated to indicated that the barriers were about to lower for an approaching train;
- CaF-02 – LCCO1 did not see the MOP prior to pressing the “Crossing Clear” buttons;
- CaF-03 – LCCO1 did not, when they became aware of the MOP trapped inside the barriers, immediately press the “Emergency Alert” button to the “On” position as set out in the Athlone & Mallow Level Crossing Control Centre Instructions.

A *contributing factor* (CoF) associated with the incident was identified as follows:

- CoF-01 – The functions of Mid-Section CCTV Crossing allow for LCCOs to take alternative actions, to those prescribed in the Athlone & Mallow Level Crossing Control Centre Instructions, in that they can operate the “Signal Controls” to cancel and request the level crossing’s protecting signals instead of pressing the “Emergency Alert” button.

No *systemic factors* (SF) were identified.

Additional observations (AO), specific to the incident at LC XA068 are:

- AO-01 – The functions of Mid-Section CCTV Crossing allow for LCCOs to take alternative actions, to those prescribed in the Athlone & Mallow Level Crossing Control Centre Instructions, in that they can operate the “Signal Controls” to cancel and request level crossing protecting signals, which could result in a train being involved in a *Signal Passed at Danger* incident.

- AO-02 – The functions of Mid-Section CCTV Crossing require the additional step of requesting the signals after the crossing has been cleared; where a LCCO may forget to do this, in error, there is potential for a Category A Signal Passed at Danger.

As a result, the RAIU made the following safety recommendations associated with the incident:

- Safety Recommendation 202103-01 – Iarnród Éireann – Infrastructure Manager (IÉ-IM) Signalling, Electrical and Telecommunications (SET) should, using a risk-based approach, consider the suitability of the “Signal Controls” functions for Mid-Section CCTV Crossings; should they be deemed to have an unacceptable level of risk, they should be removed from the LCCO’s console.
- Safety Recommendation 202103-02 – IÉ-IM SET should, consider introducing a time delay between the “Crossing Clear” buttons to prevent the LCCO pressing the second Crossing Clear button until the first Crossing Clear button times out. This time can be spent checking the confines of the level crossing for vehicles, pedestrians or other obstructions.

The RAIU also reviewed eleven similar occurrences of MOPs trapped in CCTV level crossings, and as a result made a number of additional observations, which resulted in the following additional safety recommendations:

- Safety Recommendation 202103-03 – IÉ-IM Chief Civil Engineer (CCE) should examine the feasibility of installing signage inside the barriers of CCTV level crossings warning MOPs what actions to take in the event of becoming trapped.
- Safety Recommendation 202103-04 – IÉ-IM should develop a means to make MOPs more visible should they become trapped inside level crossing barriers and position themselves adjacent to level crossing furniture or other infrastructure; where this cannot be achieved consideration should be given to examining possible initiatives or technologies that could be introduced to provide aid and assistance to LCCOs in identifying persons/obstacles that maybe trapped within the confines of a level crossing;
- Safety Recommendation 202103-05 – IÉ-IM should introduce measures to deter pedestrians from using unauthorised routes onto CCTV Level Crossings.
- Safety Recommendation 202103-06 – IÉ-IM should conduct a focussed review on the instances of MOP entrapment at Sydney Parade (LC XR004) and Serpentine Avenue (LC XR002) with a view of identifying any actions that can be taken to prevent the re-occurrence of MOP entrapments.

Contents

RAIU Investigation	1
RAIU decision to investigate	1
Scope & limits of investigation	2
Communications & evidence collection.....	2
Other stakeholder inputs	2
Other information relevant to the investigation process	2
RAIU report format	3
Summary of the incident & background information	4
Synopsis of the incident.....	4
External circumstances at the incident location	5
Weather	5
COVID-19	5
Fatalities, injuries & material damage	5
Fatalities & injuries	5
Material damage	5
Parties & roles associated with the incident.....	6
Parties involved in the incident.....	6
Roles involved in the incident.....	6
Parties & roles not directly involved in the incident.....	7
Infrastructure	8
Track.....	8
Level Crossing	8
Rolling Stock	8
Signalling and communications	9
Operations.....	9
Evidence	10
Level Crossing XA068	10

General description.....	10
Road signs, markings, signals & alarms.....	10
Level Crossing equipment at LC XA068.....	12
Athlone Local Control Centre & LC XA068 Workstation.....	14
LCCO Training & Competency Management.....	17
Standards	17
Training & Competency Management for LCCO1	18
Athlone and Mallow Level Crossing Control Centre Instructions.....	19
Introduction	19
Normal Operation for a Mid-Section CCTV Crossing	20
Crossing obstructed by vehicle or other obstruction when a train is approaching	22
Emergencies.....	22
Events before, during & after the incident.....	24
Events before the incident	24
Events during the incident	26
Events after the incident	32
Similar Occurrences.....	34
Introduction	34
Incidents where a train travelled through a level crossing after being cleared.....	35
Incident at LC XR004, Sydney Parade, on the 24/04/2017	35
Incident at LC XR004, Sydney Parade, on the 1 st February 2018	36
Incident at LC XR004, Sydney Parade, on the 3 rd December 2018	37
Incident at LC XR002, Serpentine Avenue, on the 11 th December 2018	38
Incident at LC XR001, Lansdowne Road, on the 12 th March 2019	39
Incident at LC XR002, Serpentine Avenue, on the 13 th June 2019.....	40
Incident at LC XM065, Knockcroghery, on the 21 st July 2020.....	41
Incidents where level crossings were cleared but actions taken by LCCO.....	42
Incident at LC XR001, Lansdowne Road, on the 31/10/17	42

Incident at LC XR004, Sydney Parade, on the 17 th February 2018	43
Incident at LC XR002, Serpentine Avenue, on the 30 th May 2018.....	44
Incident at LC XT151, Ahane No.2; on the 13 th August 2018	45
Analysis	47
Training & Competency Management for LCCOs & LCCO1.....	47
Level Crossing XA068	47
Operations of LC XA068 at ALCC	49
General description.....	49
Functions of the system	49
Actions of LCCO1 on the day of the incident.....	50
Additional observations from similar occurrences	52
Non-use of the “Emergency alert” button.....	52
LCCO monitor views of level crossings	52
Conclusion	55
Training & Competency Management for LCCO1.....	55
Level Crossing.....	55
Design & viewable area requirements.....	55
Functions of the system	55
Actions of the LCCOs on the day of the incident.....	56
Causal, contributing and systemic factors.....	56
Additional observations	57
Measures taken by IÉ-IM since the incident.....	58
National review of CCTV level crossings	58
IÉ-IM Internal Investigation Report	58
Warning signage at level crossings	60
Safety Recommendations	61
Introduction to safety recommendation	61
Absence of safety recommendations due to measures already taken	61

Safety recommendations as a result of this incident	62
Safety recommendations as a result of additional observations.....	63
Additional Information	65
List of abbreviations.....	65
Glossary of terms	66
References	69

RAIU Investigation

RAIU decision to investigate

- 1 In accordance with the Railway Safety Act 2005 and European Union (Railway Safety) (Reporting and investigation of Serious Accidents, Accidents and Incidents) Regulations 2020, the RAIU investigate all serious accidents; the RAIU may also investigate and report on accidents and incidents which under slightly different conditions might have led to a serious accident.
- 2 On the 29th May 2020, the RAIU received notification that on the 24th May 2020, at approximately 12:13 hrs, the 11:00 hrs passenger service from Galway to Heuston (Train ID A703) travelled through a CCTV Level Crossing (XA068), at Ashfield, County Offaly, with the level crossing barriers lowered and a MOP trapped within the barriers. LCCO1¹ had talked to the MOP over the level crossing telephone and told the MOP to take refuge behind a level crossing barrier machine and advised the MOP that they would raise the level crossing barriers. LCCO1 did not raise the level crossing barriers and Train A703 travelled through LC XA068 with the MOP inside the barriers. The MOP was uninjured; LCCO1 and her supervisors did not immediately report the incident, in full, resulting in the delayed reporting to the RAIU.
- 3 After the RAIU conducted a Preliminary Examination Report, the RAIU's Chief Investigator (CI) made the decision to conduct a full investigation into the incident, given its impact on railway safety (*Article 20 (2) (c)*), as under slightly different circumstances this incident may have led to serious accident with the potential for fatality or serious injuries to the member of public, had they been struck by the train.
- 4 In terms of categorisation, the EU Agency for Railways categorisation for this occurrence is a: Traffic Operations Management – Incident.
- 5 The RAIU's CI allocated RAIU Senior Investigators, trained in accident investigation, to conduct this investigation, as appropriate. In this instance, no external parties were required to assist with the investigation.

¹ It should be noted that some IÉ-IM documents refer to the Level Crossing Control Operator as the Crossing Controller or in the case of LCCOs based in Centralised Traffic Control (CTC), Connolly, the Suburban Level Crossing Control Operator. For the avoidance of any confusion, the document will refer to the position as LCCO.

Scope & limits of investigation

- 6 The RAIU have established the scope and limits of the investigation as follows:
- Establish the sequence of events leading up to the incident;
 - Identify any other precursors which led to the incident;
 - Establish, where applicable, the causal, contributing and systemic factors;
 - Examine the relevant elements of the Athlone & Mallow Level Crossing Control Centre Instructions (to be referred to as LCCC Instructions for the remainder of this report);
 - Examine the training and competency management documents for LCCOs;
 - Examine the technical management standards related to the design of CCTV level crossings;
 - Review the IÉ-IM training and documentation for LCCOs;
 - Examine any previous incidents of MOPs being inside the barriers at CCTV level crossings.

Communications & evidence collection

- 7 During this investigation, the RAIU collected evidence through the submission of Requests for Information (RFIs) and interviewing. Related to this investigation, the RAIU collated and logged the following evidence:
- Witness statements from available parties involved in the incident;
 - Competency records for the staff involved;
 - Copy of the voice communications surrounding the time of the incident;
 - All IÉ-IM documentation in relation to CCTV level crossings;
 - Training and competency management documentation for staff.
- 8 All relevant parties requested to co-operate, fully co-operated with the RAIU investigation.

Other stakeholder inputs

- 9 No judicial authorities or emergency service were involved in this incident.

Other information relevant to the investigation process

- 10 In relation to this RAIU investigation, there is no other information relevant to the investigation process.

RAIU report format

11 The RAIU report is divided into a number of key sections, namely:

- Summary of the incident & background information – Provides factual information surrounding the incident including:
 - Synopsis of the incident, which provides an abridged version of incident events;
 - External circumstances surrounding the incident or incident location;
 - Consequences of the incident, including fatalities, injuries or material damage;
 - Parties and roles associated with the incident;
 - Description of the relevant parts of infrastructure, rolling stock, signalling and communications, operations or other equipment associated with the incident.
- Evidence – Provides further factual details on the above descriptions, if necessary. It also provides details on relevant: SMS documentation; standards and procedures; risk assessments, etc;
- Events before, during and after the incident – Outlines a proximate chain of events:
 - Leading up to the occurrence including actions taken by persons involved; the functioning of rolling stock and technical installation and the operating system;
 - During the occurrence, by describing the occurrence;
 - After the occurrence including: consequences of the occurrence; measures taken to protect the site of the occurrence; and, the efforts of the rescue and emergency services.
- Similar occurrences – Outlines occurrences similar in nature to this incident.
- Analysis – Analyses the combined findings from the above established facts which resulted in the causation of the occurrence, such as: roles and duties; rolling stock and technical installations; human factors; control mechanisms; trends related to similar occurrences.
- Conclusion – Concluding information from the analysis of the factual findings; Measures taken since the occurrence; Additional observations.
- Safety Recommendations – where appropriate, safety recommendations will be made with the sole aim of preventing a similar occurrence in the future; safety recommendations may also be made as a result of additional observation with the aim of prevent another type of occurrence. The absence of safety recommendation shall be explained.

Summary of the incident & background information

Synopsis of the incident

- 12 At 12:13 hrs, a child entered the confines of LC XA068 while two adult MOPs are close by; one adult followed the child inside the confines of LC XA068. At 12:14 hrs, Train A703 initiates the closing sequence for LC XA068 located in Ashfield, Offaly (see Figure 1).



Figure 1 – Location of the incident

- 13 At ALCC, LCCO1 clears the crossing for the passage of Train A703 with one adult and child trapped inside the confines of LC XA068; the adult lifted the child over the barriers to the other adult. The trapped MOP, using the telephone at the level crossing, contacts LCCO1. LCCO1 advises the MOP that they would raise the barriers and instructs the MOP to stand beside some level crossing equipment (clear of the tracks, but within the confines of the level crossing). However, LCCO1 did not raise the barriers and allowed Train A703 to pass through LC XA068, see Figure 2.



Figure 2 – Train travelling through LC XA068

Image taken from IÉ-IM LC CCTV

External circumstances at the incident location

Weather

14 The weather at the time of the incident was clear and sunny with no rainfall.

15 Weather conditions were not contributory to the incident.

COVID-19

16 As a result of the COVID-19 pandemic, restrictions were in place meaning that there was a reduced number of trains operating, which in turn resulted in the LCCOs having less daily level crossing operations with level crossing operations being described as “very light” on the day of the incident.

Fatalities, injuries & material damage

Fatalities & injuries

17 There were no fatalities or injuries as a result of the incident.

Material damage

18 There was no material damage as a result of the incident.

Parties & roles associated with the incident

Parties involved in the incident

19 IÉ-IM is the infrastructure manager who owns and operates the railway infrastructure in Ireland and operates under a Safety Authorisation certificate issued by the Commission for Railway Regulation (CRR). The IM Safety Authorisation is issued in conformity with Commission Regulation (EU) 1169/2010; the authorisation was renewed on 24th March 2018 for a period of four years. The IÉ-IM department involved in this incident is the:

- IÉ-IM Operations – Responsible for the monitoring of Mid-Section CCTV level crossings, including the management of LCCOs.

20 IÉ is also the railway undertaking (RU) who owns and operates mainline and suburban railway services in Ireland and operates under a safety certificate issued by the CRR. The RU Safety Certificate is issued in conformity with European Directive 2004/49/EC and S.I. 249 of 2015; the Safety Certificate was renewed on 23rd March 2018 for a period of five years. The IÉ-RU department involved in the incident and relevant to this investigation is:

- IÉ-RU Operations – responsible for the operation of trains on the network. This includes the supervision of train drivers.

Roles involved in the incident

21 The roles involved in the incident, from IÉ-IM Department, were:

- LCCO1 – The LCCO who attended to LC XA068 on its initiation and was deemed competent at the time of the incident (further discussed in paragraphs 65 - 68);
- LCCO2 – Another LCCO deemed competent at the time of the incident, who contacted the Mainline Signalman in relation to the incident;
- ALCC Supervisor – Supervisor in ALCC, responsible for supervising rostered LCCOs at the time of the incident and providing relief signalling duties;
- Mainline Signalman – Signalman located at Centralised Traffic Control (CTC) at Connolly Station, Dublin.

22 The role involved in the incident, from IÉ-RU, is as follows:

- Driver A703 – The driver of Train A703. The Driver held a current driver's licence and was competent to drive the train on his route.

23 External roles associated with the incident:

- MOP1 – Member of public, who became trapped in the confines of LC XA068 and telephoned the ALCC for assistance;
- MOP2 – Member of public, in the vicinity of LC XA068 during the incident;
- Child – Child who entered the confines of LC XA069 after the level crossing closing sequence began.

Parties & roles not directly involved in the incident

24 The parties and roles not directly involved in this incident, but responsible in some aspects of the LCCOs role are as follows:

- IÉ-IM Signalling, Electrical and Telecommunications (SET) Department – Responsible for the design, installation and maintenance of signalling equipment, including CCTV cameras;
- Chief Traffic Executive (CTE) – Provides support to Operations Control Managers and Traffic Executives in the application of the standard, and competence files are in place and maintained for all the IM Operations (IMO) personnel. Conduct verification and compliance checks on the standard. Manage and carry out the assessment appeals process, where appropriate;
- District Traffic Executives (DTE)/ Acting Operations Controls Manager (Acting OCM) – As DTE assists in recruitment and is responsible for training and assessment of LCCOs; ensuring a competency management system is established and maintained for LCCOs; and, completion and maintenance of LCCOs records. As Acting OCM – Responsible for selection, recruitment, training, certification, monitoring and management of LCCOs; and provision of their safety equipment and information;
- OCM – Responsible for selection, recruitment, training, certification, monitoring and management of LCCOs; and provision of their safety equipment and information.

Infrastructure

Track

- 25 LC XA068 is located at 62 miles 1470 yards, between Clara and Tullamore, on the line of route from Portarlington (41 ¾ Milepost (MP²) to Athlone (81 MP) which is a single bi-directional line. The track is plain line with flat bottom *continuously welded rail* mounted on concrete sleepers in ballast. In this incident, a train travelling from Athlone towards Portarlington is travelling in the Up direction.
- 26 No factors in relation to the condition of the track were found to have contributed to the incident.

Level Crossing

- 27 The designation and physical features of LC XA068 are discussed in paragraphs 37 to 50 of this report.

Rolling Stock

- 28 The train involved in the incident was the 11:00 hrs passenger service from Galway (Ceannt) to Dublin (Heuston), Train ID A703. This service was operated by a three car 22000 Class InterCity Railcar (ICR); with the train consist being 22263 (leading unit), 22463 and 22363, see Figure 3. The total length of the train is approximately 70 m with a mass of 189 tonnes. The maximum permitted speed of this train is 100 mph (160 km/h).
- 29 No factors in relation to the performance of the train were found to have contributed to the incident.



Figure 3 – Illustration of ICR configuration on the day of the incident

² Mile Posts are measured from Heuston, Dublin (0 MP).

Signalling and communications

- 30 The line is signalled using two and three aspect colour light signals, controlled by the Mainline Signalman located in CTC. Track Circuit Block regulations apply to this route and train detection is achieved by a combination of track circuits and axle counters.
- 31 The means of communication between the train drivers and the Mainline Signalman on this route is through train radio and lineside telephones.
- 32 No factors in relation to the condition of the signalling and communications systems were found to have contributed to the incident.

Operations

- 33 In this incident, a train travelling from Athlone towards Portarlington is travelling in the Up direction.
- 34 The maximum permitted line speed from Portarlington to Athlone, as set out in the Working Timetable is 100 mph (160 kilometres per hour (km\h)) subject to any lower limit permanent and temporary speed restrictions.
- 35 LC XA068 is a *Mid-Section CCTV Crossing*, meaning that it is protected by signals which are controlled by the LCCO. LC XA068 is a CCTV level crossing operated by competent LCCOs who are permanently stationed at a control point remote from the crossing, with the use of CCTV, whenever the line is open to rail traffic. LCCOs must have a clear view of the level crossing. In the case, of LC XA068, the level crossing, is monitored from the LCCC Room, in ALCC. Mid-Section CCTV Level Crossings normally operate on the basis that trains, approaching the level crossings automatically trigger the initiation for the level crossings, resulting in warning signal lights and bells flashed and sounded, respectively, to warn any road traffic and pedestrians of the approaching train. LCCOs then check if the level crossing is clear from obstructions and clear and request signals, as appropriate.
- 36 The LCCO operations associated with LC XA068 are discussed in paragraphs 69 to 80.

Evidence

Level Crossing XA068

General description

- 37 LC XA068, is located on local road, L20094, which can be accessed through regional road R420 (Moate to Monasterevin, travelling through Clara, Tullamore and Portarlington). The road speed limit is 80 km/h. The road has a tar and chip surface.
- 38 There is an old railway house adjacent to the level crossing, now owned and occupied by private residents.

Road signs, markings, signals & alarms

- 39 In accordance with the Department of Transport's Traffic Signs Manual (published August 2019), CCTV level crossings should be fitted with approach signage, such as W120 (Level Crossing with Flashing Red Lights) and W122 (Countdown Markers) at three locations on the approach to a crossing. In addition, RTS 005 (Flashing Red Level Crossing Signals) should be located on each side of the Stop lines, see Figure 4.

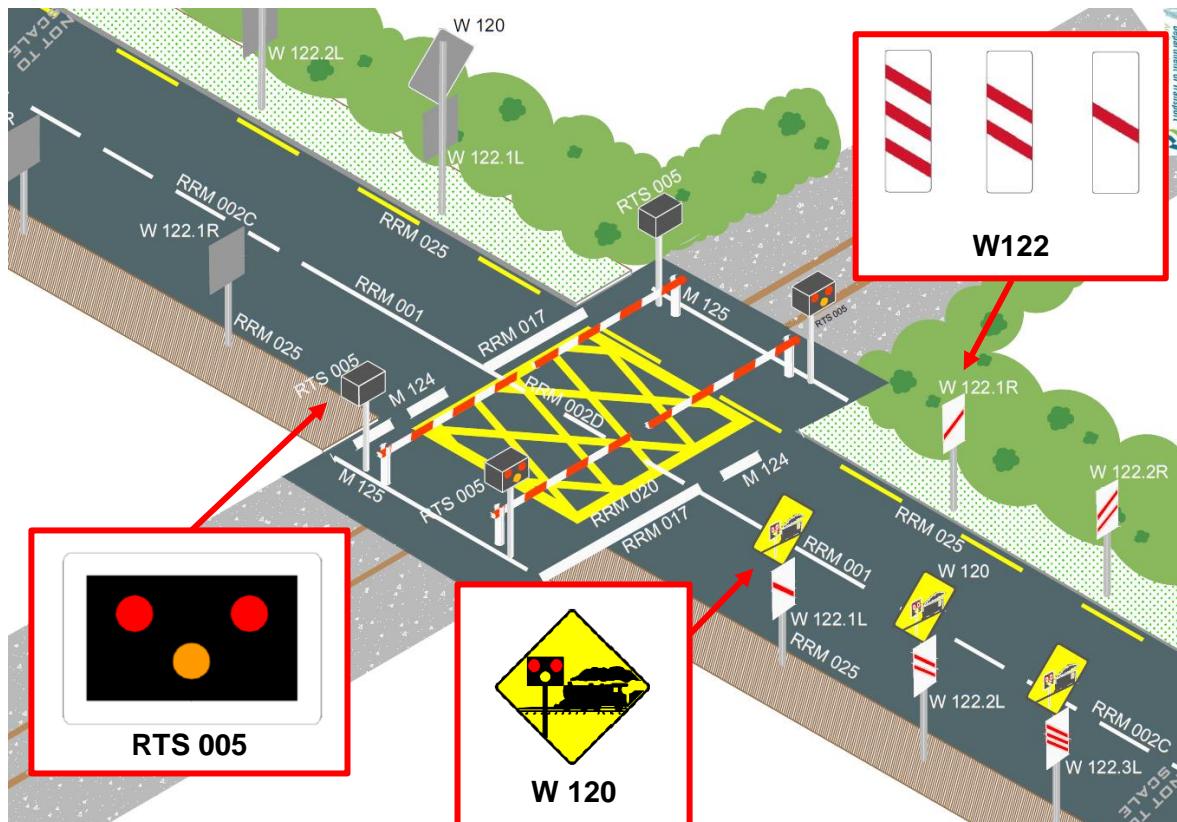


Figure 4 – Approach signage and lights at CCTV level crossings

- 40 LC XA068 has the correct approach signage, see Figure 5.



Figure 5 – Road signage on approach to LC XA068

- 41 In addition, LC XA068 has the correct road level crossing signals located on each side of the Stop lines, see Figure 6.



Figure 6 – Flashing Red Signals & Yellow Box Markings

- 42 At the level crossing, the road is covered in Yellow Box Markings (Chapter 7, Traffic Signals Manual); this is to avoid the blocking of road traffic on the level crossing (see Figure 6). These road markings are accompanied by caution signs stating "Caution: No parking within the Yellow Hatched Area). Adjacent to the Yellow Box Marking are marking, indicating where pedestrians should cross the level crossing.
- 43 There are two signs at XA068 states "Drivers of large or slow vehicles or herds of animals must phone before crossing".
- 44 There are no signs warning pedestrians not to enter the level crossing once the warning lights and bells for the level crossing flash and sound; there are also no signs inside the barriers of the level crossing, telling MOPs what actions to take in the event they become trapped.

Level Crossing equipment at LC XA068

- 45 There are four lifting barriers (two *entrance barriers* and two *exit barriers*), each fitted with two boom lamps and a skirt. The lifting barriers are attached to barrier machines (striped boxes in Figure 7) which house level crossing equipment.



Figure 7 – Barrier machine at LC XA068

- 46 Telephones are provided at LC XA068; two of these telephones are located on the railway side of the barriers and the other two are located on the public roadside of the barriers (see Figure 7 for the telephone used by the MOP on the day of the incident).
- 47 The SET Technical Management Standard, I-TEL-3516, Design Requirements for CCTV for Remotely Operated Four Barrier Level Crossings, Version 1.0, published on the 1st September 2019, sets out design requirements for the CCTV system for four barrier level crossings provided for the purpose of assisting a remote level crossing controller to determine if it is safe for a train to progress through the crossing. It also outlines the requirements for the physical location of the CCTV cameras at the level crossing, the camera and monitor requirements, and the video transmission medium between the level crossing and the remote Level Crossing Control location.
- 48 I-TEL-3516 illustrates, by way of example (Figure 8), the required viewable area for a typical level crossing (outlined in red in the document); I-TEL-3516 requires that this area should as a minimum extend to the extremities of the four barrier machines and barrier booms, and to a minimum height of 2 m above ground level.



Figure 8 – Required minimum viewable area of Level Crossing as set out in I-TEL-3516

- 49 I-TEL-3516 also sets out the requirements for the location of the CCTV at the level crossings, which provide the optimum views of the level crossing e.g. nominally perpendicular to road traffic, north-facing, etc.
- 50 The CCTV cameras for LC XA068 are mounted on standard steel poles located on the Athlone side of the level crossing. The orientation of the CCTV cameras is in a south east direction. Figure 9 shows the viewing area of LC XA068.



Figure 9 – Viewing area of LC XA068

Athlone Local Control Centre & LC XA068 Workstation

- 51 The Level Crossing Control Room (LCC Room) at ALCC is designated accommodation for the control of eighty-five³ CCTV level crossings on the Sligo, Portarlington to Athlone, Mayo, Galway, and Waterford lines. ALCC is located on the grounds of Athlone Railway Station. The CCTV live feed from each of the level crossings are divided into five areas (Area 1 – Area 5), see Figure 10 for Areas 1 to 3.

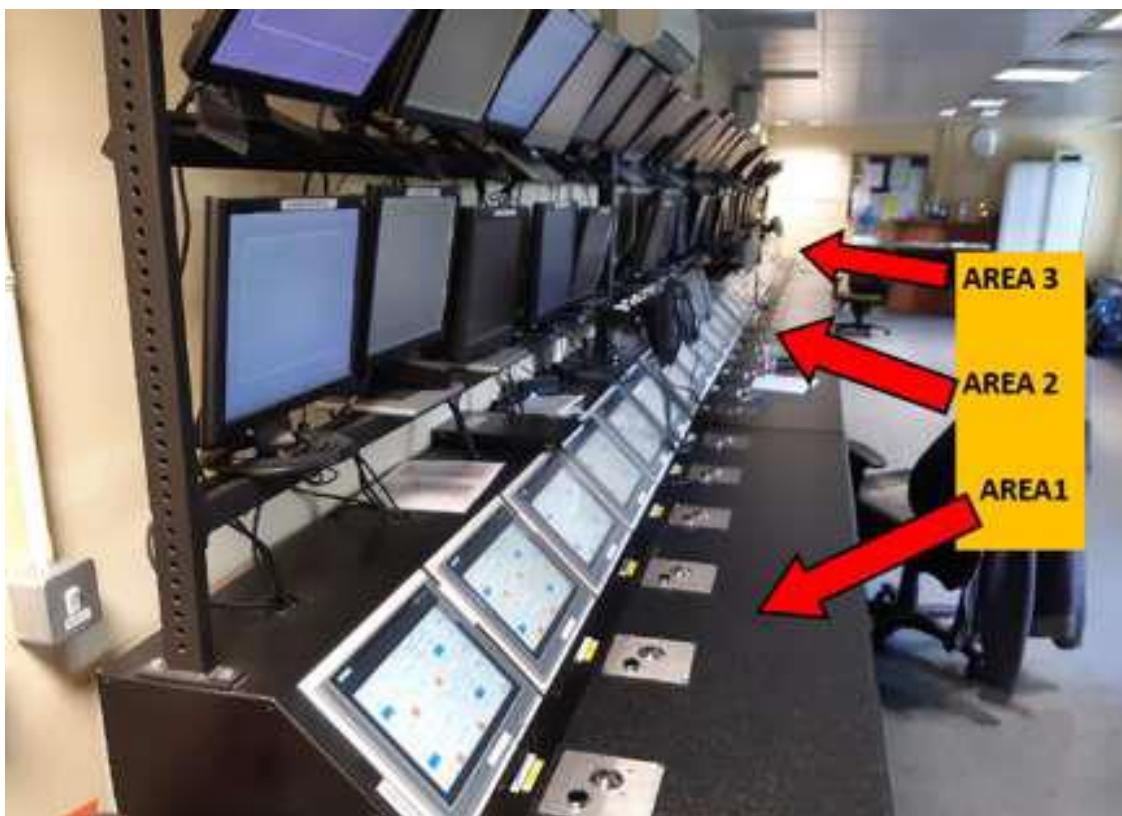


Figure 10 – Areas 1 – 3 in ALCC

Image taken from IÉ-IM report no. R0300-2021-17

- 52 LC XA068 is part of Area 1, which covers the operation of seventeen CCTV level crossings.
- 53 At the time of the occurrence, relevant to the operation of the CCTV level crossings, there were three LCCOs and one supervisor rostered.
- 54 The LCCOs manage between thirteen to seventeen level crossing monitors each. Each level crossing has a dedicated monitor situated on a fixed rack directly above the touchscreen panel controlling the level crossing.

³ ALCC is designed to accommodate ninety-six CCTV Level Crossings; there are currently eighty-five operated from ALCC.

55 During normal operations, LCCOs monitor approximately 160-200 level crossing operations daily; this involves checking they level crossings are clear from obstructions and clearing signals. The incident occurred during the COVID-19 pandemic, resulting in level crossing operations being described as “very light”.

56 Figure 11 shows the monitor and touchscreen associated with LC XA068 at ALCC.

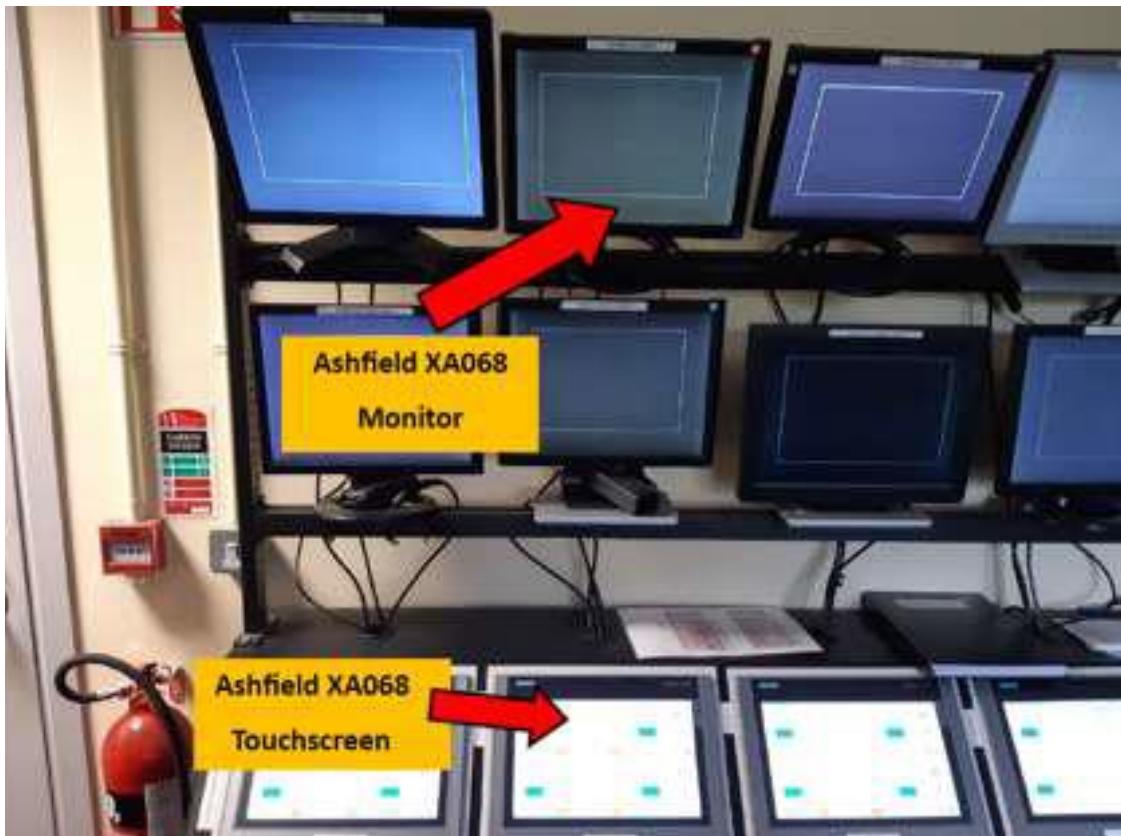


Figure 11 – XA068 monitor and touchscreen

Image taken from IÉ-IM report no. R0300-2021-17

57 Figure 12 shows an example of a Mid-Section CCTV Crossing touchscreen.

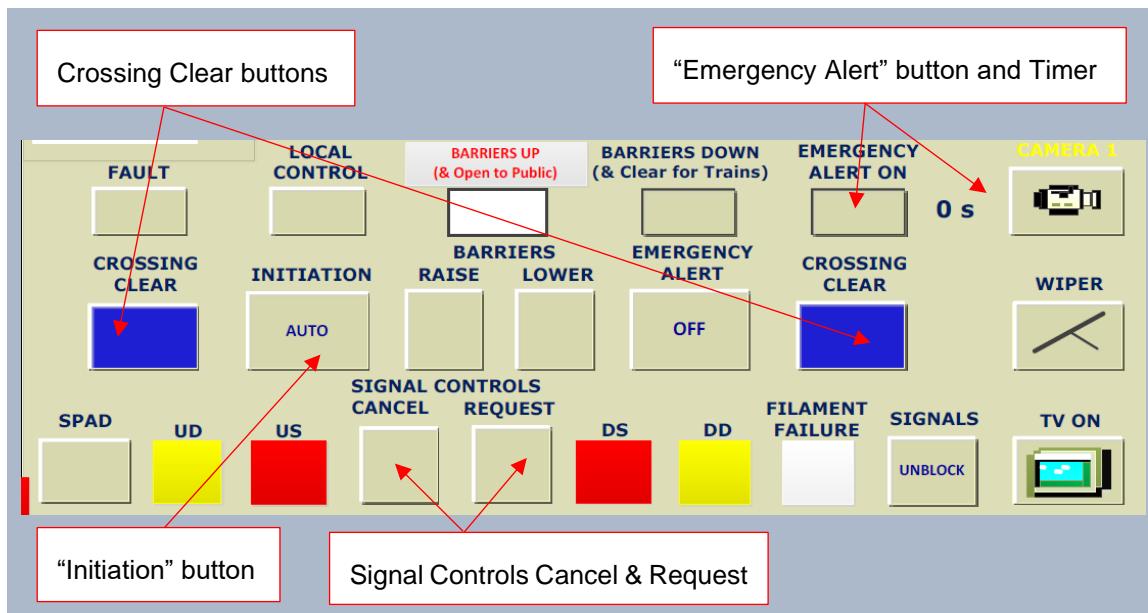


Figure 12 – Example of LCCO touchscreen

Image taken from IÉ-IM's Athlone & Mallow Level Crossing Control Centre Instructions

LCCO Training & Competency Management Standards

- 58 IÉ-IM standard, “Competence Management – Signallers, Level Crossing Controllers and Gatekeepers”, IMO-SMS-030, Version 1.0, published on the 24th October 2016 (to be referred to as IMO-SMS-030 for the remainder of this report), ensures that IÉ-IM manages the selection, training and competence management of personnel responsible for signalling trains and operating level crossings and gates.
- 59 Training comprises of two training modules, foundation training and workplace practical experience.
- 60 The initial assessment and certification requires the review of training and assessment records (including practical and theory).
- 61 Following the initial assessment, retention of competency is managed through the completion of minimum shift duties for a period of six months.
- 62 Ongoing assessment and monitoring are managed through monitoring and assessments, for staff with over one year experience (which applied to LCCO1) an assessment plan is carried out over a twenty-four month assessment cycle, comprising of: four workplace assessments, interim assessment and summary assessment (the purpose of the summary assessment is to update the candidate on any changes to rules and verify the candidate's competence over the assessment cycle). Assessments are formally documented.
- 63 It is noted that IMO-SMS0-030 states that “Particular attention must be paid to ensuring competence in the application of procedures for emergencies, degraded operations or other out-of-course situations which may occur infrequently. This must verify that the candidate has the competence to take charge of difficult situations. Simulation must be used where this is available and relevant to the task. An assessment of safety critical communications protocols must form part of every assessment – simulation may be used to meet this requirement”.
- 64 In terms of the issuance of publications IMO-SMS-030 requires that LCCOs are issued with all publications necessary for them to undertake their duties safely; and, publications are examined during summary assessments to ensure they are current.

Training & Competency Management for LCCO1

- 65 LCCO1 was trained and deemed competent during May 2007 and appointed to the grade in the same year; they were certified as competent at the time of the incident.
- 66 Monitoring and assessment records for LCCO1 were in order with the current standard.
- 67 LCCO1's last formal assessment prior to the occurrence was on the 11th December 2019. They were observed operating a number of crossings in ALCC during this assessment and complied with the current procedures and instructions. It was also recorded that they demonstrated self-checking skills and non-technical skills during the assessment process. There were no actions arising from this assessment. LCCO1's summary assessment was due in June 2020 (however LCCO1 has not returned to LCCO duties since the incident).
- 68 LCCO1 was involved in a previous safety related incident on the 24th May 2012. In this incident, when the 14:15 hrs Limerick to Galway passenger service train (Train A786) was ready to depart Athenry, a fault occurred at Level Crossing XG151, located in Athenry, resulting in the Galway Line Signalman being unable to clear a route from Athenry towards Galway. Working of a Single Line by Pilotman was set up was for the Athenry to Galway line section and the Galway Line Signalman, having satisfied all necessary criteria, authorised the Pilotman to instruct the driver of Train A786 (Driver A786) to pass Signal GL347 at danger. As the train commenced to move, Driver A786 saw road traffic passing over the Level Crossing XG151 and brought Train A786 to a stop. The LCCO (LCCO1) had not put the crossing into "Emergency Alert" and had subsequently inadvertently restored "auto-initiation" to the crossing. As there was no route set over the crossing this resulted in the barriers returning to the raised position.

Athlone and Mallow Level Crossing Control Centre Instructions

Introduction

69 The “Athlone and Mallow Level Crossing Control Centre Instructions” (to be referred to as the LCCC Instructions for the remainder of this report), Version 7.0, was published on the 21st April 2020 (approximately one month before this incident); the document had gone through six iterations in a three-year period. It is an eighty-nine-page document with the following headings:

- General information;
- Description of the equipment provided at a CCTV level crossing;
- Functions of the system;
- Normal operation of the crossing;
- Emergencies;
- Fault finding;
- Appointment of an emergency operator or attendant;
- Power;
- Appendices.

70 Of importance to this investigation are the “functions of the systems”, “normal operation of the crossing” and “emergencies” sections.

71 Pictograms are highlighted throughout the document as a means of illustrating to LCCOs the correct operation of the CCTV level crossings, examples are shown in Figure 13 to Figure 15.

Normal Operation for a Mid-Section CCTV Crossing

- 72 The “Initiation” button has two functions i.e. “Auto” and “Local”⁴. When the “Initiation” button is in the “Auto” position the barriers will lower and raise automatically; the LCCO will not be able to select the “Barriers – Raise” and “Barrier – Lower” buttons.
- 73 For normal trains running through a section of line, an automatic initiation will advise the LCCO of the approach of a train through an audible alarm. This automatic initiation is set in such a way so as to allow the crossing to be initiated, barriers to be lowered, “Crossing Clear” and “Signal Controls – Request” given by the LCCO; allowing the protecting signals to display proceed aspects for approaching trains.
- 74 Sections 4.5 sets out the steps for normal operation of the crossing when the “Initiation” button is in “Auto” (Figure 13, No. 1), as it was on the day of the incident, as follows:
- When the crossing has been initiated the monitor in the LCCC will display a picture of the level crossing;
 - The yellow road traffic lights (RTS 005 Signals, paragraph 39, Figure 4) will illuminate and the roadside audible alarms will sound;
 - After a short period the red road traffic lights (RTS 005 Signals, paragraph 39, Figure 4) will start to flash, all boom lamps will be illuminated followed shortly after by the entrance barriers descending;
 - Five seconds after the entrance barriers start lowering the exit barriers will also commence to lower;
 - When all four barriers are fully lowered the roadside alarms will stop and the Barriers Down (& Clear for Trains) Dark Blue label will change colour to Green which indicates that the barriers are fully lowered (Figure 13, No. 2);
 - The Barriers Up (& Open to Public) indication will continue to flash White (Figure 13, No. 3);
 - An audible alarm will also sound on the touchscreen to alert the LCCO that he / she must now satisfy himself / herself, by visual inspection of the picture being relayed from the level crossing, that the level crossing is clear of MOPs, vehicles and any other obstruction, which would prevent the safe passage of trains;

⁴ Placing “Initiation” button to “Local” should not be confused with *Local Control* of the crossing during which an Emergency Operator is in charge of the crossing, at the crossing.

- Having done so, the LCCO is then required to confirm this fact by operating the two “Crossing Clear” buttons (Figure 13, No. 4). The buttons may be pressed in any order, left-right or right-left, having the same effect, but both buttons must be operated within ten seconds of pressing the first Button to have any effect on the system;
- The rail signals are now free to exhibit a proceed aspect. In the case of Mid-Section CCTV Crossings (such as LC XA068) the LCCO must press the “Signal Controls – Request” button⁵ to clear the rail signals to proceed, after the “Crossing Clear” buttons have been pressed⁶.
- When the stop signals (notated as US (Up Direction Stop) and DS (Down Direction Stop) on the touchscreen) are displaying a proceed aspect, the normally Dark Blue coloured “Barriers” label will flash Red to indicate to the LCCO that the barriers cannot now be operated by him / her (No. 5, Figure 13);
- The picture on the monitor, if the “Initiation” button is left in “Auto”, will be extinguished. The picture on the monitor, if the “Initiation” button is at this point placed in “Local” will display;
- The Barriers Up (& Open to Public) Indication will change from flashing White to Grey and the Barriers Down (& Clear for Trains) Grey Indication will change colour to White and the audible alarms on the touchscreen will stop;
- The red road traffic lights will remain flashing, the boom lamps will remain illuminated.

⁵ This is unique to Mid-Section CCTV Crossings, the rail signals for Station CCTV Crossings are interlocked with the signalling system, with a ‘Crossing Clear’ indication required from the LCCO before the signals will display a proceed aspect.

⁶ To cancel a request to the protecting signals to display proceed aspects (through pressing the “Signal Controls – Request”), the “Signal Controls – Cancel” button can be pressed which will replace the protecting signals to the most restrictive aspects.

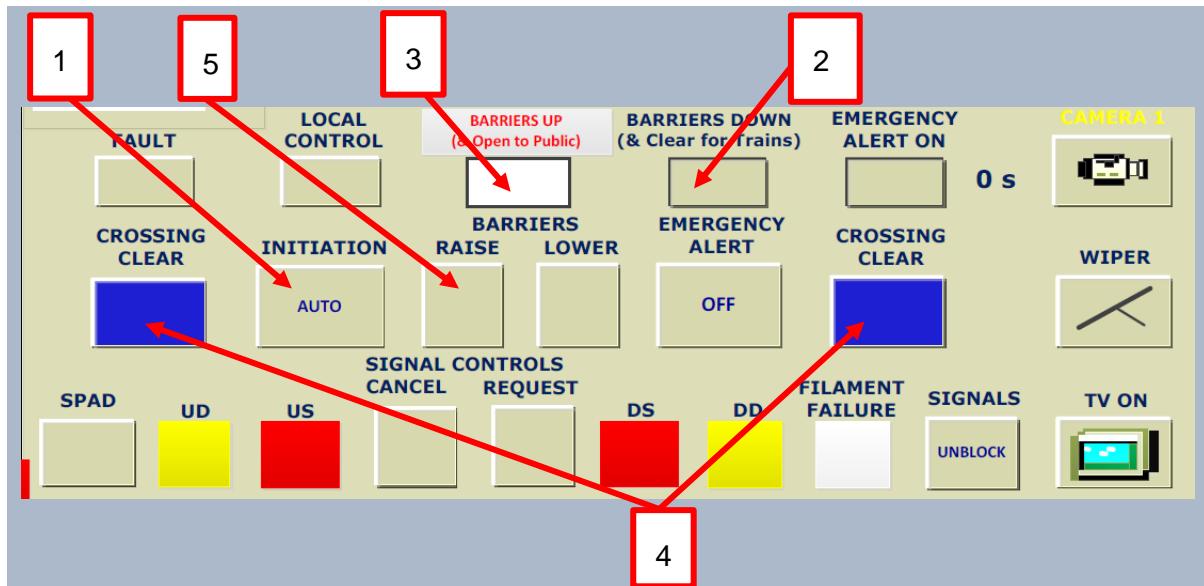


Figure 13 – Sequence when “Initiation” button is in “Auto”

Crossing obstructed by vehicle or other obstruction when a train is approaching

- 75 The LCCO has the capability to intervene and stop the lowering sequence if required by pressing “Initiation – Local”, and manually lower or raise the level crossing barriers where operations or regulations require (e.g. in the case of obstructions inside the barriers).
- 76 Section 4.6.1 of the LCCC Instructions sets out how the crossing close sequence (can be stopped on seeing an obstruction (this is for when the “Initiation” button is in “Auto”). It is as follows: on receipt of the audible alarm that a train is approaching and activation of the picture on the monitor, should the LCCO observe that a crossing is obstructed by vehicles or other obstruction he / she must immediately place the “Initiation” button from “Auto” to “Local” which will prevent the crossing close sequence from proceeding any further. The LCCO should then raise the barriers to release the trapped vehicle / obstruction.

Emergencies

- 77 The LCCO also has the capability to place a lowered and cleared crossing into emergency, a function that will replace the cleared protecting signals to danger and enable the LCCO to raise the barriers of the level crossing after the *approach locking* on the crossing has timed out after four minutes.
- 78 Section 3.10 and Section 5 of the LCCC Instructions indicate that the uses for the “Emergency Alert” button (see button circled yellow in Figure 14) can be used to cancel a “Crossing Clear” for trains and return the crossing protecting signals to danger. The indications for the “Emergency Alert” button are “On” or “Off”.

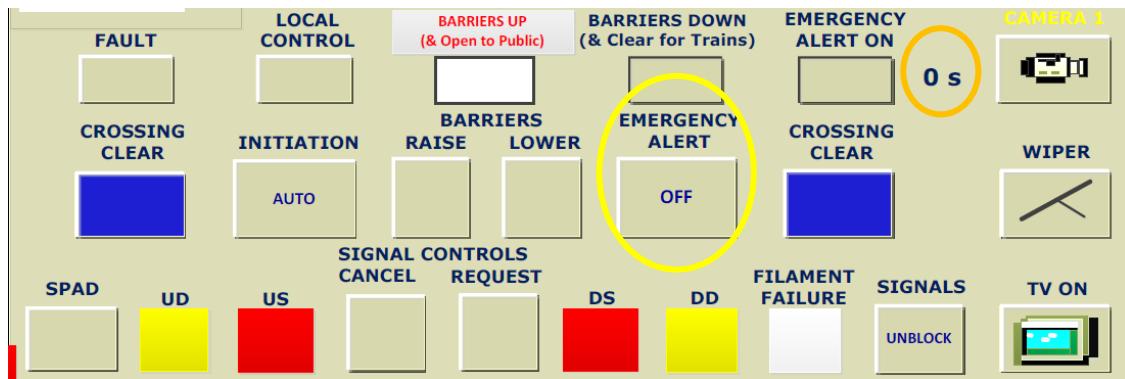


Figure 14 – Emergency Alert Button (circled yellow) & Timer (circled orange)

- 79 When the “Emergency Alert” Button is pressed to “On”, the “Emergency Alert On” Indication turns red (Figure 15). A timer is located to the immediate right of the “Emergency Alert On” button (Figure 15) to indicate (in seconds) the amount of time (generally 240 seconds) that must pass before it is safe to raise the barriers.

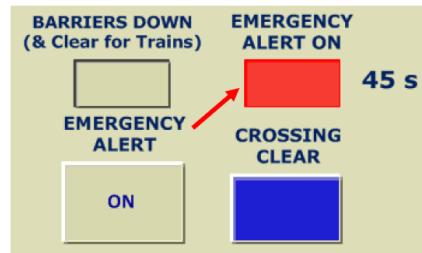


Figure 15 – Emergency Alert “On”

- 80 In addition when the “Emergency Alert” is in the “On” position:

- A picture will be displayed on the monitor;
- At the crossing, the rail signals protecting the crossing will be replaced to danger (*distant signals* to caution) and the request to clear the signals will be cancelled.
- The barriers will remain in the lowered position until the required time expires and it is safe for the LCCO to operate the barriers.

Events before, during & after the incident

Events before the incident

- 81 As a result of the COVID-19 restrictions, there was a reduced number of trains operating, which in turn resulted in the LCCOs having less daily level crossing operations.
- 82 On the morning of the 24th May 2020, LCCO1 and LCCO2 present at ALCC at 06:00 hrs, fit and well, for their rostered duties. IÉ-IM, using the Fatigue Risk Index, found that fatigue from roster and work pattern was not contributory in this incident.
- 83 LCCO1 was operating Area 1 (comprising of seventeen level crossings) which includes LC XA068. Operations were described as “very light” due to the COVID-19 pandemic.
- 84 At around 11:00 hrs the ALCC Supervisor who was on duty in the LCC room was required to leave the LCC Room to attend to unscheduled relief signalling duties at the Emergency Control Panel (ECP).
- 85 At approximately 12:00 hrs, LCCO1 cleared Bunnally Level Crossing (Athlone, Co. Westmeath) for Train A703; this was seven minutes prior to the initiation for LC XA068.
- 86 At 12:13:52 hrs MOPs (MOP1, MOP2 and Child) are at in the vicinity of LC XA068; the Child is playing with a bicycle in the confines of LC XA 068, see Figure 16 (the following CCTV still images are taken from the CCTV footage of LC XA068 from the LCCC Athlone).



Figure 16 – MOPs in the vicinity of LC XA068 (circled red)

- 87 At 12:14:00⁷ hrs, Train A703 auto-initiates the closing sequence for LC XA068. The warning lights and bells for the crossing flashed and sounded respectively to warn any road users and pedestrians of the approach of the train.

⁷ Times are taken from the Level Crossing Data Logger and CCTV footage.

- 88 At 12:14:13 hrs, the entrance barriers begin to lower; two MOPs (MOP1 and Child) remain within the confines of LC XA068, circled together in Figure 17.



Figure 17 – Two MOPs (circled red) within the confines of LC XA068

- 89 MOP1 clears a bicycle from the yellow boxed junction and goes to assist the Child.
- 90 The four gates are fully lowered at 12:14:25 hrs with MOP1 and Child within the barriers; at this stage, an audible alarm would sound in Area 1 to indicate to LCCO1 that the barriers had fully lowered.

Events during the incident

- 91 At 12:14:27 hrs, at ALCC, LCCO1 presses the “Crossing Clear” buttons (two seconds after the four barriers have been fully lowered); one second later, at 12:14:28 hrs, LCCO1 presses the “Signal Controls – Request”, to clear the rail signals to proceed, as set out in paragraph 74. LCCO1 stated that they did not see any MOPs in the confines of the level crossing. It should be noted that in the still image taken at the moment the crossing was cleared, shown in Figure 18, that the MOPs are in the shadows cast from the house and with the house painted a dark colour they are difficult to distinguish in the still; however, when the live CCTV footages is viewed the MOPs movements are clearly visible.



Figure 18 – Moment LC XA068 cleared within two MOPs inside the barriers

- 92 At 12:14:31 hrs the distant signals (Up Distant and Down Distant) and stop signals (Up Stop and Down Stop) are all displaying proceed aspects.
- 93 At 12:14:34 hrs, MOP1 lifts the Child over the barriers to MOP2 (see Figure 19) and moves the bicycle clear of the road and railway; MOP1 remains trapped within the barriers.



Figure 19 – MOP1 lifts child over the barriers to MOP2 (circled red)

- 94 At 12:14:54 hrs, MOP1 walks over the telephone, see Figure 20.



Figure 20 – MOP1 at telephone (circled red)

95 At 12:14:56 hrs, MOP1 contacts LCCO1 at ALCC; the conversation is transcribed as follows:

LCCO1: Operator, crossing control, Athlone.

MOP1: Hi, mmm, I'm caught inside the barrier at the Ashfield crossing.

LCCO1: [abrupt] Sorry?

MOP1: I'm caught inside the barrier at the Ashfield crossing...

LCCO1: [friendly tone] Oh, you're not, are you... (friendly tone)

MOP1: Yeah.

--- Four-second pause ---

LCCO1: Hang on now, just hang on one moment and I'll raise them and let you out.
Did you not see the lights and bells going?

MOP1: Well, there was a little boy inside with a bicycle and there was a bit of a panic...

LCCO1: [interrupts] Yeah, well did you not see the lights flashing for the barriers to be coming down?

MOP1: [terse] We were inside it at the time.

--- Nine second pause ---

LCCO1: I have to wait for the four-minute time-out for the reappear, I can't raise them straight away.

MOP1: Um?

LCCO1: [raise voice, almost shouting] There was a four-minute time-out on the crossing, so I can't raise them straight away.

MOP1: Okay, well...

LCCO1: Can you see there, can you see there just beside... I can see where you are standing...

MOP1: Yeah.

LCCO1: Do you see the barrier, do you see, can you just step in there please.

MOP1: Yeah... okay... [confused tone] I'm going to hang-up now.

LCCO1: Yeah.

96 During this conversation, LCCO1:

- Places the initiation switch to “Local” at 12:15:21 hrs. LCCO1 does not press the “Emergency Alert” button on the touchscreen as per paragraphs 80;
- Presses the “Barriers – Raise” button at 12:15:29 hrs; the barriers do not raise (the barriers would not raise in this situation as the level crossing signals had been cleared); and seventeen seconds later LCCO1 releases the “Barrier – Raise” button;
- Presses the “Signals – Cancel” button at 12:15:46 hrs. The distant signals (Up Distant and Down Distant) now display “Caution” aspects and the stop signals (Up Stop and Down Stop) now display “Danger” aspects.

97 At 12:16:14 hrs, after finishing the conversation with LCCO1 and hanging up the telephone, MOP1 walks away from the telephone and stands behind the barrier machine on the Up side of the track, see Figure 21 (circled red).



Figure 21 – MOP1 behind the housing for the level crossing

98 MOP1 is in this position at 12:16:20 hrs and remains here until Train A703 has passed through the level crossing and the barriers are ultimately raised, see Figure 22 for MOP1's position in relation to the track.



Figure 22 – View from MOP1's position behind the barrier machine taken by the RAIU

99 At 12:16:25 hrs, five seconds after MOP1 arrived at the position identified by LCCO1, LCCO1 presses the “Signals – Request” button; this action resulted in the Up Distant, Up Stop, Down Stop, Down Distant signals all displaying “Proceed” aspects again at 12:16:28 hrs.

100 However, one second later, at 12:16:29, LCCO1 presses the “Signals – Cancel” button, which in turn resulted in the distant signals (Up Distant and Down Distant) displaying “Caution” aspects and the stop signals (Up Stop and Down Stop) displaying “Danger” aspects at 12:16:31 hrs.

101 During this time, LCCO2 makes his way over to Area 1 and asks LCCO1 if they (LCCO1) want LCCO2 to contact the Mainline Signalman. LCCO1 gestures approval and at 12:17:13 hrs, LCCO2 contacts the Mainline Signalman, the following is transcribed:

Mainline Signalman: Mainline Signalman CTC [gives name].

LCCO2: Howya doing, this is the operator here at crossing control centre, Athlone. Ashfield Level Crossing, X-ray, Alpha, 0, 6, 8.

Mainline Signalman: Yeah?

LCCO2: We have all four barriers down and the signals requested, but then it came to our attention that there was someone inside the crossing.

Mainline Signalman: Yeah?

LCCO2: So we cancelled the signals and we got in contact with the pedestrian, and [incorrectly refers to as a male] he's moved over to the barrier box⁸. He's out of the way of the crossing. We have...

Mainline Signalman: [interrupts] Is he in the crossing?

LCCO2: He's out of the crossing.

Mainline Signalman: [repeats back] He's out of the crossing and the barrier are down? Yeah.

LCCO2: [low tone] He's next to the barrier box⁹. [raises voice] Okay?

Mainline Signalman: Okay, aaah, is the train gone through?

LCCO2: The train is on the approach now.

Mainline Signalman: Okay, do you need me to caution train, or is the...

LCCO2: Try and caution the driver, but, eh, just in case.

Mainline Signalman: Okay, but he has the signal and all for Ashfield, the train has the signal and there is no-one within the crossing.

⁸ LCCO1 is referring to the barrier machine.

⁹ LCCO2 is referring to the barrier machine.

LCCO2: That's correct.

Mainline Signalman: Okay, that's okay, so.

LCCO2: Alright, thanks for that.

102 LCCO2 assumed that LCCO1 would not have cleared the signals for a train with a MOP still inside the barriers.

103 However, at 12:18:12 hrs, LCCO1 again selects the "Signals Control – Request" button; this action results in the Up Stop, Down Stop, Down Distant signals all displaying proceed aspects again at 12:18:13 hrs. Up Distant remains at caution (paragraph 100) as Train A703 is likely to have travelled past this signal.

104 After the incident, when asked why the continuous used of the "Signal Controls" buttons, the LCCO1 could not explain while acknowledging that they understood what actions should have been taken.

105 At 12:18:50 hrs, Train A703 arrives at and passes over LC XA068 with MOP1 still within the confines of the level crossing behind the barrier machine, see Figure 23.



Figure 23 – MOP inside barriers as Train A703 passes through LC XA068

Events after the incident

106 After the Mainline Signalman terminated the call with LCCO2, the Mainline Signalman telephoned the driver of Train A703 (Driver A703). Train A703 had just travelled through LC XA068 at the time of the call. Driver A703 stated to the Mainline Signalman that he had seen the Up Distant signal downgrade from “Proceed” to “Caution”; the signal changed back to Proceed and as a result Driver A703 did not have to take any action.

107 At 12:19:10 hrs the barriers are free to be raised.

108 At 12:19:15 hrs the Initiation Switch is switched to “Auto”.

109 At 12:19:24 hrs all four barriers are raised and open to the public.

110 MOP1 waits for road traffic to pass and exits LC XA068 at 12:19:39 hrs.

111 In terms of reporting the incident:

- LCCO1 left the LCC Room at approximately 12:25 hrs and went to the ECP and reported to the ALCC Supervisor that after they had cleared Level Crossing XA068 and requested the signals they had become aware that a MOP had become trapped within the level crossing. LCCO1 did not disclose that they had subsequently re-called the signals and allowed the passage of Train A703 over the level crossing with the MOP still inside the level crossing barriers;
- The Acting OCM and LCCO1 then completed an Incident/Operation Occurrence Report Form and Formal Assessment Record Form. When this was finished both LCCO1 who was coming to end of their shift and the Acting OCM left ALCC;
- The ALCC Supervisor reviewed the CCTV footage from the level crossing and was of the opinion that the MOP was visible from the CCTV footage viewed before the crossing was cleared for the passage of Train A703 over the level crossing. The ALCC Supervisor did not review the entire CCTV footage of the incident because of time pressures as the ALCC Supervisor was required back to the ECP as there was a livestock incursion on the Ennis line. The ALCC Supervisor then relieved LCCO1 of their duties and reported the incident to the on call DTE/ Acting OCM;
- The DTE/Acting OCM went to the ALCC and arrived at approximately 13:15 hrs. The DTE/Acting OCM then checked the CCTV footage and listened to the voice recordings. At this stage, the DTE/Acting OCM became aware that LCCO1 allowed the passage of Train A703 over the level crossing with the MOP within the confines of the level crossing. The DTE/Acting OCM then contacted the OCM to report a level crossing incident; however, the DTE/Acting OCM did not come to a clear

understanding on the events and the OCM remained unaware that LCCO1 re-called the signals and allowed the passage of Train A703 over the level crossing with the MOP still inside confines of the level crossing. The DTE/Acting OCM also stated that it was understandable that the crossing was cleared in the first instance. As a result, Drugs & Alcohol (D&A) testing was not requested by the OCM given the circumstances of the reported incident and the COVID-19 restrictions in place;

- On the 28th May 2020, the DTE/Acting OCM contacted the OCM and stated that he had become aware that LCCO1 re-called the signals and allowed the passage of Train A703 over the level crossing with the MOP still inside the level crossing barriers;
- The next day (Friday 29th May 2020), the DTE/Acting OCM and the OCM reviewed the footage in its entirety, and it was clear that the MOP was inside the level crossing for the passage of the train. The OCM reported the findings to the Acting Train Control Manager (TCM) and in turn it was reported to the IÉ-IM Investigation Manager and an investigation was initiated;
- On the 9th August 2020, the DTE/Acting OCM contacted the Acting TCM and told them that he was fully aware, on the day of the incident, that the MOP was left inside the level crossing for the passage of the train.

Similar Occurrences

Introduction

112 Since 2017, there have been eleven occurrences of entrapments of MOPs in CCTV level crossing. In seven of these eleven instances, the LCCO did not see the MOPs and the train travelled through the level crossing and was subsequently reported by the driver of the train (except in one instance where the driver also did not see the MOP). Chronologically, the incidents are as follows (note the LCCC location is also included):

- 24/04/17 – XR004 Sydney Parade (CTC, Connolly);
- 01/02/18 – XR004 Sydney Parade (CTC, Connolly);
- 03/12/18 – XR004 Sydney Parade (CTC, Connolly);
- 11/12/18 – XR002 Serpentine Avenue (CTC, Connolly);
- 12/03/2019 – XR001 Lansdowne Road (CTC, Connolly);
- 13/06/2019 – XR0025 Serpentine Avenue (CTC, Connolly);
- 21/07/2020 – XM065 Knockcroghery – (Athlone LCCC).

113 Other incidents, where the LCCO saw the MOP after pressing the “Crossing Clear” buttons are as follows:

- 31/10/17 – XR001 Lansdowne Road (CTC, Connolly);
- 17/02/18 – XR004 Sydney Parade (CTC, Connolly);
- 30/05/18 – XR002 Serpentine Avenue (CTC, Connolly);
- 13/08/18 – XT151 Ahane No.2 (Mallow LCCC);

114 In relation to the incident at Ahane No. 2 on the 13th August 2018, it is noted that the LCCO did not press the “Emergency Alert” button and instead pressed the “Signal Controls – Cancel” button.

Incidents where a train travelled through a level crossing after being cleared

Incident at LC XR004, Sydney Parade, on the 24/04/2017

115 Sydney Parade Level Crossing, identified as XR004, is a four barrier CCTV Level Crossing monitored from the CTC Suburban Level Crossing Workstation at CTC, Connolly. XR004 is designated as a *Station CCTV Crossing* in that the protecting signals, are interlocked with the signalling system, with a “Crossing Clear” indication required from the Level Crossing Workstation before the signals will display a proceed aspect. Movement authority to pass these signals is the responsibility of the CTC Signalman.

116 At 22:07 hrs on Monday the 24th April 2017 the initiation for LC XR004 was triggered by the 21:30 hrs passenger service from Malahide to Greystones (Train E131). The warning lights and bells for the crossing flashed and sounded, respectively. At the same time, two MOPs entered LC XR004 (see Figure 24) with one MOP becoming trapped in the confines of the level crossing when the barriers were fully lowered.

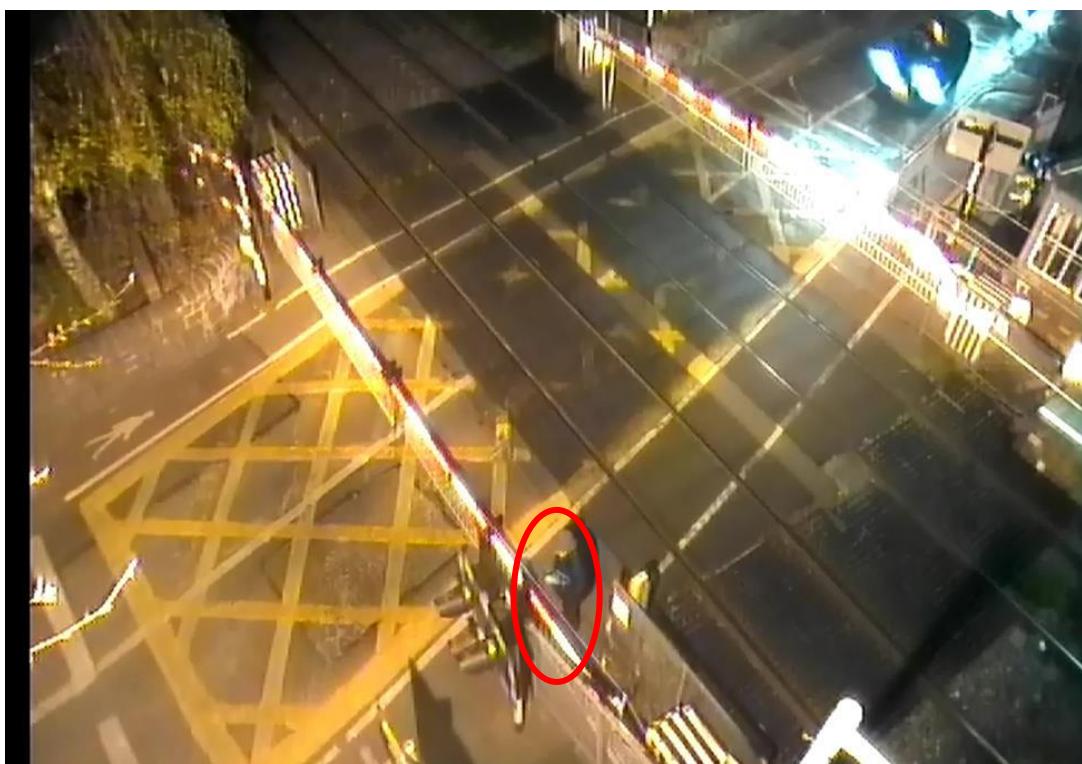


Figure 24 – MOP inside the barriers of LC XR004

117 At 22:08:18 hrs the LCCO pressed the “Crossing Clear” buttons for LC XR004, clearing the passage for Train E131 with one MOP inside the barriers.

118 At 22:08:56 hrs Train E131 entered LC XR004, and the driver noticed the pedestrian within the confines of the crossing as the train passed over and reported this to the Central Signalman CTC; correct post-incident procedures then followed.

Incident at LC XR004, Sydney Parade, on the 1st February 2018

119 At 12:50:32 hrs on the 1st February 2018 the initiation for LC XR004 (a description of LC XR004 is provided in paragraph 115) was triggered by the 12:15 hrs passenger service from Howth to Bray (Train E213).

120 The warning lights and bells for the crossing flashed and sounded, respectively. A MOP entered LC XR004, while the warnings were active, and had insufficient time to clear LC XR004. The MOP took refuge between the barrier boom and the protecting mesh fence between the boom and the Down line (Figure 25).

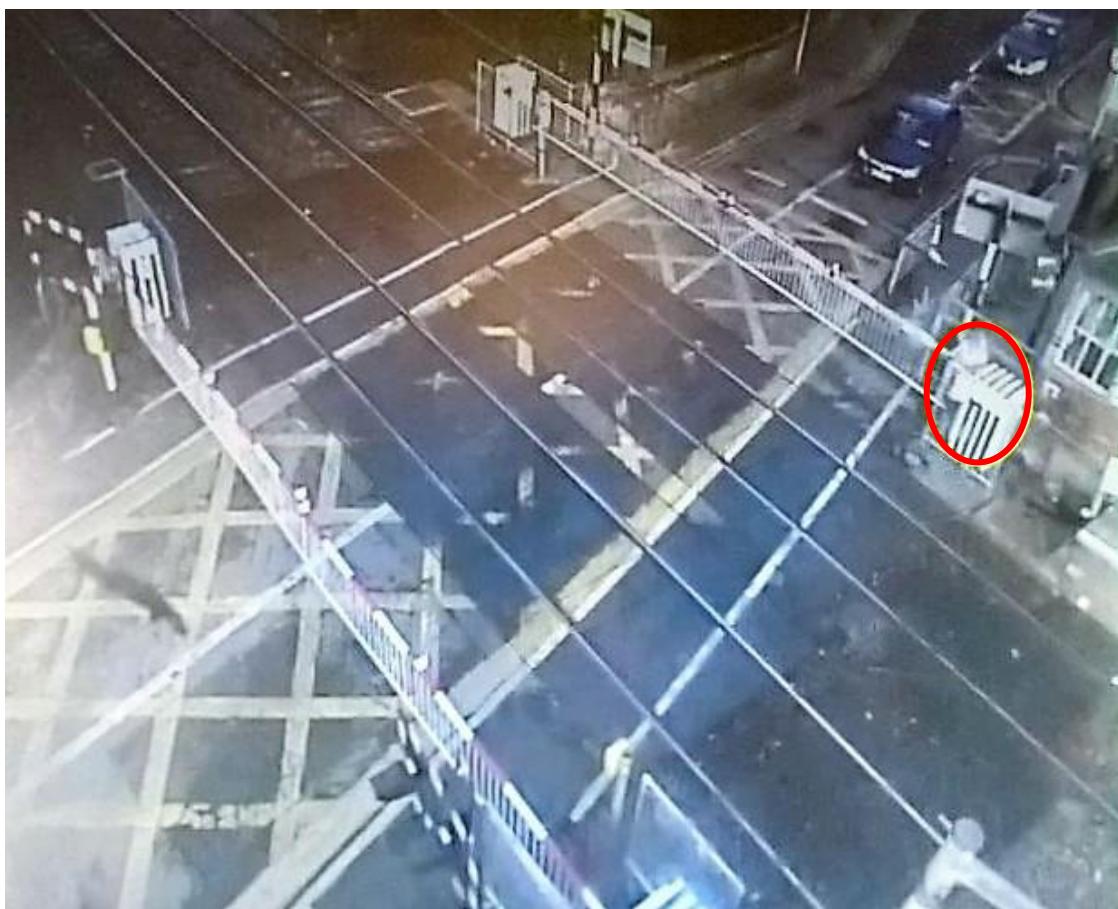


Figure 25 – MOP (circled red) inside the barriers of LC XR004

121 At 12:51:07 hrs the LCCO cleared LC XR004 for the movement. This also resulted in the 12:25 hrs passenger service from Bray to Howth (Train E915) being cleared to travel over LC XR004.

122 At 12:52 hrs, Train E213 travelled through LC XR004 and the driver saw a person within the barriers and reported it in the CTC Central Signalman, who in turn issues extreme caution to the driver of Train E915 (Driver E915) and correct post-incident procedures then followed.

Incident at LC XR004, Sydney Parade, on the 3rd December 2018

123 On Monday the 3rd December 2018, at 09:24 hrs, the initiation for LC XR004 (a description of LC XR004 is provided in paragraph 115) was triggered by the 08:41 hrs passenger service from Howth to Bray (Train E212).

124 The warning lights and bells for the crossing flashed and sounded, respectively. Approximately twelve seconds after the barrier lowering sequence had commenced a MOP entered the LC XR004 and was unable to exit as the barriers had lowered.

125 The LCCO pressed the “Crossing Clear” buttons at 09:24:18 hrs with the MOP inside the barriers, with Train E212 passing through LC XR004 at 09:25:19 hrs, see Figure 26.



Figure 26 – MOP (circled red) inside the barriers of LC XR004 with Train E212

126 The LCCO was unaware of the incident and the driver of Train E212 did not see the MOP when passing. The incident was discovered as a result of another MOP incident at LC XR004 two minutes later; whereby four MOPs disembarked from Train E212, ran from the platform onto LC XR004, the level crossing barriers were in the process of lowering again for another train, with the last MOP falling on the level crossing. In the instance, the LCCO stopped the lowering sequence enabling the MOP to exit LC XR004.

127 There was one recommendation as a result of this incident: The CCE should examine the feasibility of installing signage at CCTV Level Crossings warning pedestrians not to enter the crossing once the warning lights and bells for the crossing flash and sound.

Incident at LC XR002, Serpentine Avenue, on the 11th December 2018

128 Serpentine Level Crossing, identified as XR002, is a four barrier Station CCTV Crossing monitored from the CTC Suburban Level Crossing Workstation at CTC Connolly.

129 On Tuesday the 11th December 2018, the initiation for LC XR002 was triggered by the 07:24 hrs passenger service from Greystones to Howth (Train E906). The warning lights and bells for the crossing flashed and sounded, respectively. Approximately twelve seconds after the initiation sequence commenced a MOP entered XR002 and was unable to exit as the barriers had fully lowered. The MOP stood in front of a barrier machine, with a mesh fence separating the MOP from the running line, see Figure 27.



Figure 27 – MOP (circled red) inside the barriers of XR002

130 At 08:07:04 hrs the LCCO cleared XR002 and at 08:10:02 hrs Train E906 passed through the crossing with the MOP inside the barriers. The driver of Train E906 reported the incident to the CTC Central Signaller, who in turn applied the correct post-incident procedures.

131 There was one recommendation as a result of the incident, namely, the CCE should examine the feasibility of installing signage at CCTV Level Crossings warning pedestrians not to enter the crossing once the warning lights and bells for the crossing flash and sound.

Incident at LC XR001, Lansdowne Road, on the 12th March 2019

132 LC XR001 is a four barrier Station CCTV Crossing operated public road crossing, located on the Pearse to Rosslare Europort line between Grand Canal Dock and Lansdowne Road Stations.

133 On Tuesday, the 12th March 2019 at 15:09 hrs, the initiation for LC XR001 was triggered by the 14:35 hrs passenger service from Bray to Howth (Train E927). The warning lights and bells for the crossing flashed and sounded, respectively.

134 A MOP, with a dog, entered LC XR001 after the lowering sequence had commenced and had insufficient time to exit LC XR001 as the barriers had fully lowered. The MOP climbed under the barrier supporting frame and stood between the main barrier boom and the supporting frame, see Figure 28.



Figure 28 – MOP (circled red) inside the barriers of LC XR001

135 At 15:10:23 hrs, the LCCO pressed the “Crossing Clear” buttons, with the MOP inside the barriers.

136 When Train E927 was stopped at Lansdowne Road Station, the driver saw the MOP inside the barriers and contacted the Signaller, who in turn applied the correct post-incident procedures.

137 There was one recommendation as a result of this incident, namely that the CCE should examine the feasibility of installing signage at CCTV Level Crossings warning pedestrians not to enter the crossing once the warning lights and bells for the crossing flash and sound.

Incident at LC XR002, Serpentine Avenue, on the 13th June 2019

138 On Thursday the 13th of June 2019, LC XR002 (a description of LC XR002 is provided in paragraph 115) was initiated for both the 12:35 hrs passenger service from Bray to Howth (Train E921) and the 12:33 hrs passenger service from Malahide to Greystones (Train E114).

139 The warning lights and bells for the crossing flashed and sounded, respectively. A MOP entered LC XR002 after the warning sequence had begun and did not have sufficient time to exit the level crossing as the barriers had fully lowered.

140 At 13:06 hrs the LCCO cleared LC XR002 for the passage of trains with the MOP inside the barriers, Figure 29.



Figure 29 – MOP (circled red) inside the barriers of LC XR002

141 On passing through LC XR001, the driver of Train E921 noticed the MOP inside the barriers and immediately reported it to the Controlling Signaller, who in turn followed all post-incident procedures correctly.

142 There was one recommendation as a result of the incident, namely, that the CCE should examine the feasibility of installing signage at CCTV Level Crossings warning pedestrians not to enter the crossing once the warning lights and bells for the crossing flash and sound.

Incident at LC XM065, Knockcroghery, on the 21st July 2020

143 LC XM065 is a four barrier CCTV level crossing monitored from Area 2 in Athlone Local Control Centre. XM065 is designated as a Station CCTV Crossing.

144 On Tuesday the 21st July 2020, LC XM065 was initiated for the 18:15 hrs passenger service from Heuston to Westport (Train A808). The warning lights and bells for the crossing flashed and sounded, respectively.

145 After the warning sequence was initiated, a MOP, jogged onto the level crossing but was unable to clear as the barriers had fully lowered. The MOP then stood in front of the level crossing barrier, see Figure 30



Figure 30 – MOP (circled red) inside the barriers of LC XM065

146 The LCCO pressed the “Crossing Clear” button.

147 The driver of Train A808 saw the MOP as he travelled through LC XM065 and reported it to the Mayo Line Signalman; who in turn following the correct post-incident procedures.

148 An IM Operational Notice, IMO-ON20-02, was issued on Friday the 24th of July 2020 which included early points to consider, such as “If barriers have already lowered prior to you attending the touchscreen take extra care in clearing the crossing” and the use of Self-Checking Skills, e.g., “Use Risk Triggered Commentary” and “Check once, Check Twice do it right”.

149 One safety recommendation was made, namely that the CCE should examine the feasibility of installing signage at CCTV Level Crossings warning pedestrians not to enter the crossing once the warning lights and bells for the crossing flash and sound.

Incidents where level crossings were cleared but actions taken by LCCO

Incident at LC XR001, Lansdowne Road, on the 31/10/17

150 At 11:01 hrs on Tuesday 31st October 2017 the initiation for LC XR001 (paragraph 132) was triggered by the 10:30 hrs passenger service from Malahide to Greystones (Train E131).

151 The warning lights and bells for the crossing flashed and sounded, respectively. However, at 11:01:58 hrs a MOP pushing a buggy entered the confines of LC XR001 during the warning sequence and was trapped when the barriers fully lowered, Figure 31.



Figure 31 – MOP with buggy (circled in red) inside the barriers of LC XR001

152 At 11:03:00 hrs the LCCO pressed the "Crossing Clear" buttons. The LCCO then proceeded to attend to another crossing when a slight movement at LC XR001 caught his attention. The LCCO then noticed the buggy and placed LC XR001 into "Emergency Alert".

153 At 11:03:10 hrs another MOP walked down from Lansdowne Station platform ramp and assisted MOP with the buggy. The LCCO waited the required four-minute time out before the LCCO raised the barriers, freeing the MOP.

154 There was one recommendation made as a result of the incident: The CCE should examine the feasibility of installing signage at CCTV Level Crossings warning pedestrians not to enter the crossing once the warning lights and bells for the crossing flash and sound.

Incident at LC XR004, Sydney Parade, on the 17th February 2018

155 On the 17th February 2015, the initiation for LC XR004 was triggered by the 09:30 hrs passenger service from Greystones to Howth (Train E944).

156 The warning lights and bells for the crossing flashed and sounded, respectively. However, a MOP entered LC XR004 and had insufficient time to clear LC XR004. The MOP took refuge between the barrier boom and the protecting mesh fence between the boom and the Down line (Figure 32).



Figure 32 – MOP inside at the barriers (circled red) at LC XR004

157 The LCCO did not see the MOP and pressed the “Crossing Clear” buttons, two seconds later the LCCO saw movement at inside the barriers and initiated the “Emergency Alert” function and the relevant signals downgraded and Train E944 did not enter LC XR004.

158 When LC XR004 locking timed out, the LCCO raised the barriers and the person left. The LCCO then self-reported the incident to the CTC Traffic Executive and the appropriate post-incident procedures were carried out.

Incident at LC XR002, Serpentine Avenue, on the 30th May 2018

159 The following information is taken from IÉ-IM report “Operating Irregularity, Serpentine CCTV Level Crossing, 30/05/2018”, report number R1301-2018-34, published on the 14th December 2018.

160 Serpentine Level Crossing, identified as XR002, is a four barrier CCTV Level Crossing monitored from the CTC Suburban Level Crossing Workstation at CTC Connolly. Level Crossing XR002 is designated as a Station CCTV Crossing.

161 On the 30th May 2018, the initiation for LC XR002 was triggered by the 16:37 hrs Dun Laoghaire to Howth passenger service (Train E940). The warning lights and bells for the crossing flashed and sounded respectively to warn any road users and pedestrians of the approach of the train.

162 A MOP entered LC XR002 despite the visible and audible alarms and had insufficient time to clear LC XR002, and took refuge stand beside a mesh fence at the level crossing boom, see Figure 33.

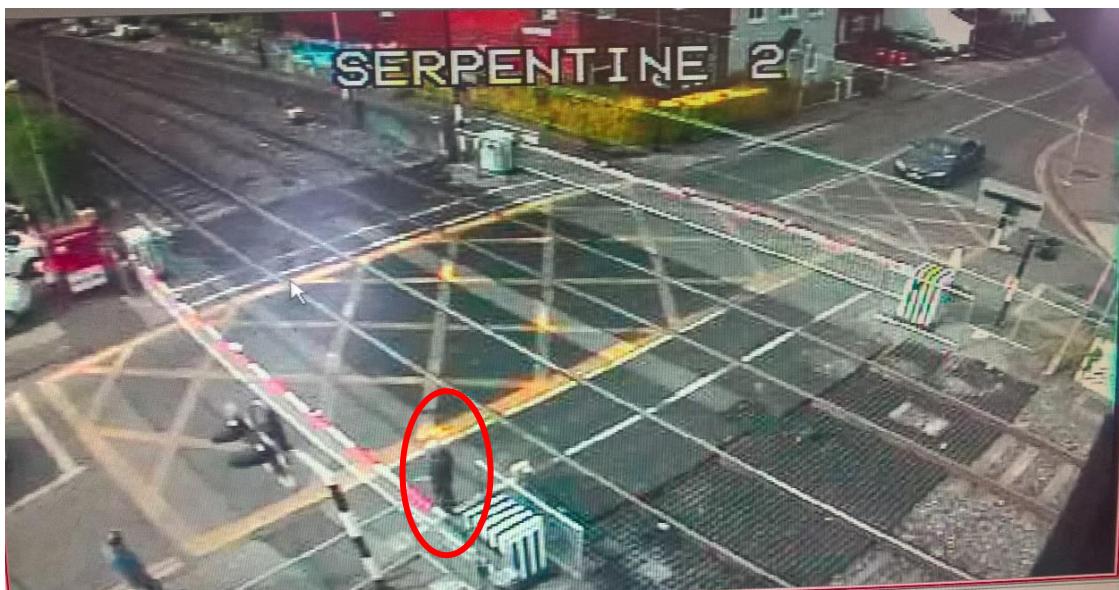


Figure 33 – MOP (circled red) inside the barriers of LC XR002

163 At 17:05 hrs pressed the “Crossing Clear” buttons to clear LC XR002; just as the LCCO pressed the buttons, he saw movement at LC XR002. The LCCO initiated the “Emergency Alert” function and the relevant signals downgraded and Train E940 did not enter LC XR002.

164 When LC XR002 locking timed out, the LCCO raised the barriers, and the MOP cleared the crossing. The LCCO then self-reported the incident to the CTC Traffic Executive and the appropriate post-incident procedures were carried out.

Incident at LC XT151, Ahane No.2; on the 13th August 2018

165 Ahane No. 2 Level Crossing, is identified as XT15, is a four barrier Mid-Section CCTV Crossing is located on the Mallow to Tralee line, between Farranfore and Tralee stations, County Kerry. It is monitored from Mallow Local Control Centre and signalling controlled by the Signalman at the Waterford /Tralee Line signal console in CTC, Connolly.

166 On the 13th August 2018, two MOP entered LC XT151 and sat under the exit barrier, see MOPs circled red in Figure 34.



Figure 34 – Two MOPs (circled red) inside the barriers of XT151

167 At 20:49:19 hrs the initiation for LC XT151 was triggered by the 17:05 hrs passenger service from Heuston to Tralee (Train A312). The warning lights and bells for the crossing flashed and sounded, respectively.

168 The two MOPs remained seated under the exit barrier as the lowering sequence of the barriers commenced for the passage of Train A312. They then stood next to the exit barrier housing within the confines of the Level Crossing once the lowering sequence of the barriers had completed.

169 The LCCO pressed the "Crossing Clear" buttons at 20:49:51 hrs and then proceeded to attend to another level crossing. Soon after, something caught the attention of the LCCO

and the LCCO switched back on the screen for LC XT151. The LCCO saw the MOPs and immediately cancelled the signals for LC XT151, resulting in the protecting distant signal (XT151DS) turning to danger.

170 As Train A312 was approaching, the driver (Driver A312) saw that Signal XT151DS had turned to danger and applied the brakes but was unable to stop in rear of the signal and resulted in a *Signal Passed at Danger* (SPAD) for Signal XT151DS. Train A312 stopped approximately thirty metres from LC XT151. It should be noted that the LCCO should have pressed the “Emergency Alert” button.

171 The LCCO acknowledged the SPAD alarm and advised the LCC Supervisor. The LCCO contacted the Controlling Signalman to advise Driver A312 of the presence of MOPs within the confines of the level crossing, however the LCCO did not advise the Controlling Signalman that he had received a SPAD alarm for XT151DS.

172 Driver A312 confirmed to the Controlling Signalman that he had brought his train to a complete stop but had passed Signal XT151DS at danger. Driver A312 advised that had seen the MOPs within the confines of LC XT151 and also confirmed that he had seen the MOPs departing the crossing over a fence.

173 There were three recommendations made as a result of this incident, namely:

- The CCE should examine the feasibility of installing signage at CCTV Level Crossings warning pedestrians not to enter or remain within the crossing once the warning lights and bells for the crossing flash and sound;
- A national safety awareness campaign should be considered by IÉ-IM Safety in conjunction with IE Corporate Communications targeting pedestrian and cyclist users of CCTV level crossings throughout the IE network;
- IÉ-IM Operations in conjunction with IM Safety should develop a professional handbook for the Local Control Centres in Athlone and Mallow to reflect all scenarios in dealing with operational incidents (this recommendation was closed through the re-issuing of an updated version of the Athlone and Mallow LCCC Instructions and a Professional LCCO Handbook).

Analysis

Training & Competency Management for LCCOs & LCCO1

174 The training and competency management is managed through IMO-SMS-030. LCCO1, met the requirements set out in IMO-SMS-030 with LCCO1's last formal assessment prior to the occurrence being carried out in December 2019 with no actions arising (paragraphs 65 - 67).

175 LCCO1 was involved in a previous safety related incident in May 2012 (paragraph 68).

176 LCCO1 knew that they were supposed to press the "Emergency Alert" button as set out in the LCCC Instructions, however, on the day LCCO1 deviated from the LCCC Instructions for reasons unknown to themselves (paragraph 104).

Level Crossing XA068

177 Present at LC XA068 are the required road signs, markings, signals and alarms as set out in Chapter 6 of the Department of Transport's Traffic Signs Manual (paragraphs 39 - 44).

178 Although, not required, there are no signs warning pedestrians not to enter the level crossing once the warning lights and bells for the level crossing flash and sound (paragraph 44). This signage has been proposed as a result of IÉ-IM recommendations into similar occurrences (paragraphs 127, 131, 137, 142, 149, 154, 173); and as of the time of this incident, the design of the proposed signs had not been completed or erected at any CCTV level crossings.

179 It is noted that there are no signs inside the barriers of the level crossing, telling MOPs what actions to take in the event they become trapped (paragraph 44).

180 The requirements set out in IÉ-IM's SET's I-TEL-3516, are also met; in particular in relation to the minimum viewable area at LC XA068, whereby all the required aspects are visible in ALCC (paragraphs 47 - 51). It is noted, that the MOPs are not clearly visible in the still image from the CCTV at the moment the crossing was cleared, shown in Figure 35, as the MOPs are in the shadows cast from the house and with the house painted a dark colour they are difficult to distinguish in the still; however, when the live CCTV footage is viewed the MOP movements are clearly visible.

Member of public trapped in the barriers of CCTV LC XA068, Ashfield, Offaly, 24th May 2020



Figure 35 – Moment LC XA068 cleared within two MOPs inside the barriers

Operations of LC XA068 at ALCC

General description

181 LC XA068 is one of seventeen CCTV level crossings associated with Area 1 in ALCC (paragraph 52).

182 Touchscreens associated with CCTV level crossings are clear (paragraph 57) and the instructions on their operation in the LCCC Instructions are concise, with many pictograms used as illustrations for LCCOs (paragraph 71).

Functions of the system

183 The LCCC Instructions set out clear guidelines in relation to Mid-Section CCTV Crossings, in terms of:

- Normal operations – Whereby when the lowering sequence has been initiated at a level crossing, and all four barriers are in the lowered position; and, the level crossing is seen to be clear of MOPs, vehicles and any other obstructions which would prevent the safe passage of the train. The LCCO can press the “Crossing Clear” buttons to clear the level crossing and then press the “Signal Controls – Request” to clear the rail signals (paragraph 74);
- When a crossing obstructed by vehicle or other obstruction when a train is approaching – Whereby the LCCO has the capability to intervene and stop the automatic lowering sequence by switching the “Initiation” button to “Local”, for example, where the LCCO sees an obstruction at the level crossing (paragraphs 75 - 76);
- Emergencies – The LCCO also has the capability to intervene when the barriers have been lowered, the crossing cleared and the signals requested by pressing the “Emergency Alert” function that will replace the cleared protecting signals to danger and enable the LCCO to raise the barriers of the level crossing after the approach locking on the crossing has timed out after four minutes (paragraphs 77 - 80).

Actions of LCCO1 on the day of the incident

184 On the day of the incident, operations at ALCC were described as “very light” as a result of the Covid-19 pandemic (paragraphs 55 and 83).

185 Thirteen minutes and forty-seven seconds prior to the initiation sounding for LC XA068 LCCO1 cleared Bunnally Level Crossing for Train A703 (paragraph 85); LCCO1 did not have to attend to any other level crossings prior to the initiation for LC XA068.

186 At 12:14:00 hrs, Train A703 then auto-initiations the closing sequence for LC XA068 (paragraph 87), there are two MOPs moving around the level crossing during the closing sequence; with one MOP remaining trapped in the level crossing when all the barriers had lowered (paragraphs 86, 88, 89, 90). The RAIU reviewed the CCTV footage of the incident, and the movements of the MOPs are clearly visible, especially as one MOP moves a bicycle, lifts a child over the barriers, and walks towards the telephone (paragraphs 90, 93, 94, respectively).

187 However, the LCCO1 did not see the MOPs within the confines of LC XA068 and pressed the “Crossing Clear” and “Signal Controls – Request” button to clear the crossing and the rail signals to proceed (paragraph 91). These actions contravene the requirements set out in the LCCC Instructions which require that, when an obstacle is detected, the LCCO should place the “Initiation Button” from “Auto” to “Local” which prevents the crossing close sequence from proceeding any further and allows the LCCO to raise the barriers (paragraphs 75, 76, 183). If LCCO1 did not see the MOPs, due to the shadows of the house, the MOP did use the telephone which would allow LCCO1 to take the appropriate steps below.

188 The LCCC Instructions do allow for emergency situations where the level crossing barriers are lowered, the crossing cleared and the signals requested. In this instance, the LCCO should have pressed the “Emergency Alert” button; and, switch the “Initiation” button to “Local” when the MOP made contact through the telephone. This would have resulted in the protecting signals being replaced to danger and the barriers would have remained down for 240 seconds when after this time delay elapsed LCCO1 would then have been able to raise the barriers for the MOP (paragraphs 79 - 80).

189 Instead LCCO1, while on the telephone to the MOP:

- Puts the “Initiation” to “Local” and attempted to raise the barriers, however, this failed (paragraph 96);
- Cancels the protecting signals by selecting “Signal Controls – Cancel”, which changed the distance signals to “Caution” and the stop signals to “Danger” (paragraph 96).

190 When LCCO1 terminates the call with the MOP after instructing her to stand behind the barrier machine (paragraphs 95 - 96); LCCO1 then:

- Requests the signals by pressing “Signal Controls – Request”, which changes the protecting signals to proceed (paragraph 98);
- Four seconds later LCCO1 re-cancels the protecting signals by pressing “Signal Controls – Cancel”, which returns the protecting signals to Caution/Danger (paragraph 100);
- One minute and forty-three seconds later LCCO1 re-requests which changes to protecting signals back to proceed (paragraph 103).

191 The above cycle of requesting and cancelling the signals only appears to stop when Train A703 passes through LC XA068 twenty seconds after the last “Signal Controls” request (paragraph 105); and LCCO1 puts the “Initiation” button back to “Auto” (paragraph 108) and the barriers automatically raise (paragraph 109) and the MOP exits LC XA068 (paragraph 110).

192 LCCO1 knew that they should have pressed the “Emergency Alert” Button instead of the “Signals Control – Cancel” Button; this “option” is unique to Mid-Section CCTV Crossings (other CCTV Level Crossings only have the “Emergency Alert” option). LCCO1 appears to have lost awareness of how the system would operate as LCCO1 tried to raise the barriers to no avail (paragraph 189) and then continued to cancel and request the signals until the passing of Train A703 (paragraph 104).

193 The continuous requesting and cancelling of signals, without a clear purpose, in the opinion of the RAIU may result in an unnecessary *Category B SPAD*, it was noted that Driver A703 stated to the Mainline Signaller that he had seen the Up Distant signal downgrade from “Proceed” to “Caution”, although this was a distant signal (paragraph 106). Also in terms of SPADs, the RAIU also consider that the extra step to press the “Signal Controls – Request” after the “Crossing Clear” buttons may result in a *Category A SPAD* in that the crossing is cleared but the rail signals are not; however, in this instance the driver should be obeying the signals.

Additional observations from similar occurrences

Non-use of the “Emergency alert” button

194 In relation to the incident at LC XT151, Ahane No. 2, on the 13th August 2018, which is a Mid-Section CCTV Crossing; after LCCO cleared and requested the signals for the level crossing, the LCCO saw MOPs inside the barriers and instead of pressing the “Emergency Alert” button, pressed the “Signal Control – Cancel” button, which resulted in a SPAD (paragraphs 165 - 173).

LCCO monitor views of level crossings

195 Of the eleven similar occurrences highlighted in this report, where MOPs were trapped inside the barriers, it was noted that in four of these incidents (paragraphs 113, 150 - 173) the LCCOs saw movement at the last moments and pressed the “Emergency Alert” function or cancelled the signals (in the case of Ahane No. 2, paragraph 194). The still CCTV images of these occurrences are presented in Figure 36.



LC XR001, Lansdowne Road, 31/10/17



LC XR004, Sydney Parade, 17/02/18



LC XR002, Serpentine Avenue, 30/05/18



LC XT151, Ahane No. 2, 13/08/18

Figure 36 – Stills from CCTV footage

196 In the seven other incidents of similar occurrences identified in this report (paragraphs 115 - 149) the LCCOs did not see the MOPs; and, the trains travelled through the level crossings and were subsequently reported by the train drivers (except in one instance where the driver also did not see the MOP). The images are presented in Figure 37.

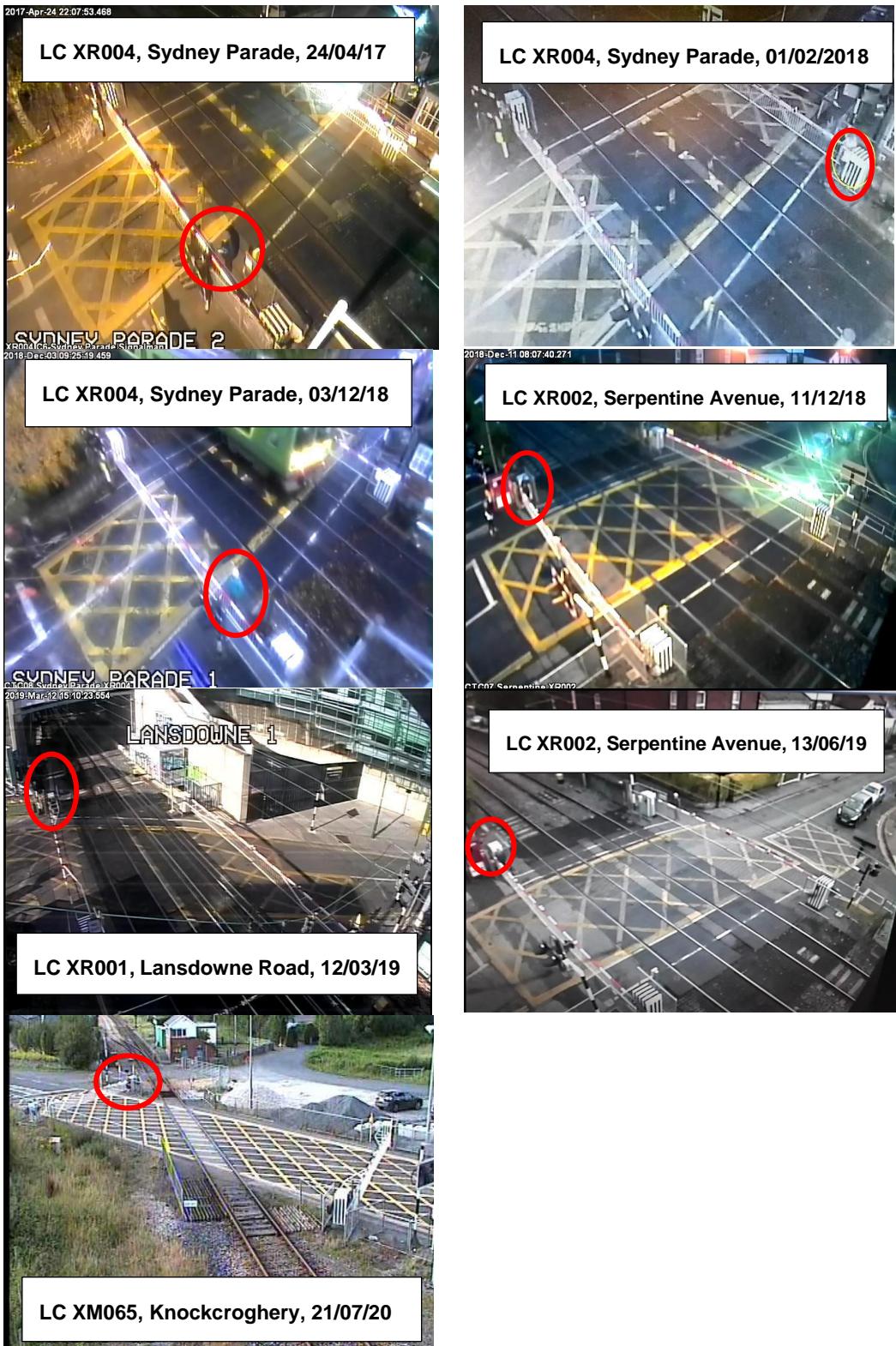


Figure 37 – Still CCTV footage of MOPs inside the barriers

197 Reviewing the eleven incidents collectively, there are some points to note:

- In seven of the instances, the MOPs have taken refuge close to one of the barrier machines; it is noted that the barrier machines are painted with stripes to act as a contrast in the instance that someone does stand beside the barrier machine;
- In four instances, the MOPs remain close to the barriers and away from the track;
- In two instances, MOPs walked directly from the station platform ramps onto the level crossings at Sydney Parade (paragraphs 123 - 127) and Lansdowne Road (paragraphs 150 - 154) in one instance the MOP was assisting another MOP that had become trapped; the authorised pedestrian routes were not used. In both these instances, the LCCOs did ultimately see the MOPs and raise the barriers;
- Seven of the eleven incidents occurred at either Sydney Parade (LC XR004) or Serpentine Avenue (LC XR002); this accounts for two-thirds of the incidents.

198 It is important to note that although, stills taken from the CCTV footage are still images and not the live feed that the LCCOs have available. With LCCOs monitoring approximately 160-200 level crossing operations daily; in some cases, LCCOs may be busy and when they do go to the monitor for the initiated level crossing; and by this stage the MOP may have already taken refuge and are standing still, making it more difficult for the LCCOs to detect the MOPs.

Conclusion

Training & Competency Management for LCCO1

199 LCCO1 was competent in the LCCO position since 2007 with all competency assessments up to date, with one previous safety related incident in 2012 (paragraph 68). It is clear that LCCO1 knew what actions they should have taken on the day, however, LCCO1 deviated from the LCCC Instructions for reasons unknown to themselves (paragraphs 174 - 176).

Level Crossing

Design & viewable area requirements

200 LC XA068 did meet the requirements for road signs, markings, signals and alarms as set out in Department of Transport's Traffic Signs Manual and it is noted that further signage in relation to warning pedestrians not to enter the level crossing once the warning lights and bells for the level crossing flash and sound were in development at the time of the incident (paragraph 177). It is noted that there are no signs inside the barriers of the level crossing, telling MOPs what actions to take in the event they become trapped (paragraph 177).

201 The requirements set out in IÉ-IM SET's I-TEL-3516 are also met in terms of the minimum viewable area (paragraph 180).

Functions of the system

202 The touchscreen monitors associated with CCTV level crossings are presented well and the instructions on their operation in the LCCC Instructions are concise (paragraph 182). The LCCC Instructions are clear that in the case of an emergency, such as an obstruction has been detected after the level crossing has been cleared and the signals requested, that the "Emergency Alert" button should be pressed to "On" (paragraph 188). This is the course of actions that should have been taken on the day of the incident.

203 However, a feature unique to Mid-Section CCTV Crossings allows a LCCO to defer from the correct practice set out in the LCCC Instructions and instead of pressing the "Emergency Alert" to the "On", the "Signal Controls" buttons can be used to cancel the signals (and they can be re-requested and re-cancelled), which is what the LCCO did on the day of the incident (paragraphs 74, 188 and 189). This flexibility in functionality, in the opinion of the RAIU may result in an unnecessary incident (such as a SPAD), (paragraph 192).

Actions of the LCCOs on the day of the incident

204 The previous two paragraphs establish what LCCO1 should have done, and did, on the day of the incident. The initial reason for not applying the requirements set out in the LCCC Instructions was likely to provide some thinking time to LCCO1, however, the situation worsened when the barriers did not lift as expected and then LCCO1 repeatedly cancelled and requested the signals, for reasons unknown to LCCO1 (paragraph 192).

Causal, contributing and systemic factors

205 At 12:18:50 hrs on the 24th May 2019, Train A703 travelled through LC XA068 with a MOP within the barriers of the level crossing.

206 Causal factors associated with the incident are as follows:

- CaF-01 – The MOPs did not clear the confines of the level crossing when the warning lights and bell activated to indicated that the barriers were about to lower for an approaching train;
- CaF-02 – LCCO1 did not see the MOP prior to pressing the “Crossing Clear” buttons;
- CaF-03 – LCCO1 did not, when they became aware of the MOP trapped inside the barriers, immediately press the “Emergency Alert” button to the “On” position as set out in the LCCC Instructions.

207 A contributing factor is as follows:

- CoF-01 – The functions of Mid-Section CCTV Crossing allow for LCCOs to take alternative actions, to those prescribed in the LCCC Instructions, in that they can operate the “Signal Controls” to cancel and request the level crossing’s protecting signals instead of pressing the “Emergency Alert” button.

208 No systemic factors were identified.

Additional observations

209 Additional observations, specific to the incident at LC XA068 are:

- AO-01 – The functions of Mid-Section CCTV Crossing allow for LCCOs to take alternative actions, to those prescribed in the LCCC Instructions, in that they can operate the “Signal Controls” to cancel and request level crossing protecting signals, could result in a train being involved in a SPAD incident;
- AO-02 – The functions of Mid-Section CCTV Crossing require the additional step of requesting the signals after the crossing has been cleared; where a LCCO may forget to do this, in error, there is potential for a Category A SPAD.

210 Although noted that in the incident at LC XA068, LCCO1, purposely did not adhere to the LCCC Instructions, the RAIU have made some findings in relation to other instances of MOPs being trapped inside the barriers. While making these findings, the RAIU do acknowledge that there is a potential issue with LCCOs looking for MOPs, is that in some instances, the MOP may have already taken refuge, in a position, not entirely visible to the LCCO; and when the LCCO does attend to the initiated level crossing the MOP are not clearly visible (paragraph 197-198), this should be coupled with the fact that LCCOs monitor between 160-200 level crossing initiations daily (paragraph 55). The findings are as follows (AO-03):

- There was one other incident where the LCCO did not immediately press the “Emergency Alert” button to the “On” positions, and instead cancelled the signals (paragraph 194);
- In four incidents, the LCCOs noticed the MOPs at the last moments, which may suggest that the LCCOs did not spend sufficient time checking the level crossings prior to pressing the “Crossing Clear” buttons (paragraphs 195 - 195);
- In seven incidents, the MOPs were not seen by the LCCOs;
- In two incidents, MOPs accessed the level crossings from the station platform and not through authorised pedestrian routes (paragraph 197);
- Seven of the eleven incidents occurred at either Sydney Parade (LC XR004) or Serpentine Avenue (LC XR002); this accounts for two-thirds of the incidents (paragraph 197).

Measures taken by IÉ-IM since the incident

National review of CCTV level crossings

211 Although, not carried out as a result of the incident, it is important to note that the IÉ-IM conducted a national review of CCTV level crossing in September 2019. Actions were identified in relation to individual level crossings, DART level crossings and all level crossings.

212 No individual actions were identified in relation to LC XA068.

213 In relation to DART level crossings, the issue of the “possibility of OHLE components, e.g. wires, insulators, cantilever arms, etc., impairing the view of the level crossing due to existing cameras being located above the OHLE structures” was identified. The associated action was that IÉ-IM should “investigate the feasibility of locating the CCTV cameras below the height of the OHLE or at such a position to minimise the impact of this fixed infrastructure”; the completion date for the action is Q2 in 2022.

214 In relation to all CCTV level crossing, it was identified that “advances in LED technology has provided the opportunity to improve the quality and uniformity of flood lighting at the level crossings and provide an improved quality of CCTV image during the hours of darkness. The use of LEDs also realises a significant reduction in energy consumption”. The associated action is that “a program for renewal of flood lighting at all CCTV Level Crossings with focused LED technology to be implemented”; the completion date for the action is Q1 in 2022.

IÉ-IM Internal Investigation Report

215 IÉ-IM completed a report of investigation into the incident, entitled “CCTV Level Crossing XA068 cleared while a member of the public was inside barriers on 24th of May 2020”, report number R0300-2021-17, published on the 4th May 2021. IÉ-IM made a number of findings; and based on these findings the following actions were taken or are in progress since the incident:

- LCCO1 is currently restricted from carrying out any safety critical roles and has not performed LCCO activity since the date of the incident;
- LCCO2 has been removed from carrying out the role of LCCO as a result of the communication with the Signaller;
- The DTE/Acting OCM has been removed from carrying out the DTE and OCM roles;

- The SET Department and the Infrastructure Manager Operations Department are to conduct a review into the possibility of removing the signal cancel function from the LCCO's consoles in the Athlone and Mallow Crossing Control Centres;
- An Operational Notice was issued by the IMO Department on the 4th of June 2020, regarding requirements for self-checking skills as well as the immediate reporting of incidents and accidents, in full, to your Supervisor or Line Managers;
- The OCM West has reviewed the incident with all ALCC Supervisors and DTE's under his control to prevent a re-occurrence. This action was closed on the 12th June 2020;
- The Infrastructure Manager Operations Department has initiated a review of the operation of ALCC regarding the recording, reporting and investigation of incidents to prevent a reoccurrence;
- As part of the current LCCO competence cycle an enhanced Safety Communications Module has been developed. This includes scenario-based learning, communications, and elements of Human Factors surrounding operational incidents.

216 IÉ-IM made the following internal safety recommendation: "The Infrastructure Manager Operations Department in conjunction with the SET Department should initiate a wide ranging review to examine possible initiatives or technologies that could be introduced to provide aid and assistance to LCCOs in identifying persons/obstacles that maybe within the confines of a Level Crossing before the Level Crossing is cleared prior to the passage of a train. This would be to mitigate against/prevent occurrences where Level Crossings are cleared for the passage of trains with persons/obstacles within the confines of a Level Crossing".

Warning signage at level crossings

217 One internal safety recommendation made by IE-IM in relation as a result of investigations into similar occurrences, was made/re-iterated seven times from 2017 to 2020 (paragraphs 127, 131, 137, 142, 149, 154, 173), is as follows: "the CCE should examine the feasibility of installing signage at CCTV Level Crossings warning pedestrians not to enter the crossing once the warning lights and bells for the crossing flash and sound"

218 As of the time of publication of this report, signage is being erected at CCTV level crossings, see Figure 38.



Figure 38 – Signage at CCTV level crossings

Safety Recommendations

Introduction to safety recommendation

219 In accordance with the Railway Safety Act 2005 (Government of Ireland, 2005a) and the European railway safety directive (European Union, 2020), recommendations are addressed to the national safety authority, the CRR. The recommendation is directed to the party identified in each recommendation.

Absence of safety recommendations due to measures already taken

220 In relation to the reporting of incidents, IÉ-IM issued an Operational Notice in relation to reporting incidents, in full, to supervisors/ lines managers (paragraph 215); as a result, the RAIU do not consider any further safety recommendation is warranted in relation to the internal reporting of incidents in IÉ-IM.

221 LCCO1 and LCCO2 have been restricted from carrying out the roles of LCCO (paragraph 215) and as such no further safety recommendations are warranted in relation to staffing at ALCC (CaF-02, Caf-03).

Safety recommendations as a result of this incident

222 The following two safety recommendations are related to the LCCO's touchscreen; one in terms of the "Signal Controls" buttons and one in relation to the "Crossing Clear" buttons.

223 In terms of the "Signal Control" buttons, unique to Mid-Section CCTV Crossing, which allows LCCOS to take alternative actions to those prescribed in the LCCC Instructions, in that they can operation the "Signal Controls" to cancel and request the level crossing protecting signals after the level crossing has been cleared, it was noted that there was one other instance of the LCCO not immediately pressing the "Emergency Alert" to the "On" position from the similar occurrence. The RAIU concur with the IÉ-IM action, namely that "The SET Department and the Infrastructure Manager Operations Department are to conduct a review into the possibility of removing the signal cancel function from the LCCO's consoles in the Athlone and Mallow Crossing Control Centres." (CoF-01, AO-01). However, the RAIU consider that further consideration should be given to the additional step of requesting the signals after the crossing has been cleared; where a LCCO may forget to do this, in error, there is potential for a Category A SPAD (AO-02). As a result, the RAIU make the following safety recommendation (CaF-03, CoF-01):

Safety Recommendation 202103-01

IÉ-IM SET should, using a risk-based approach, consider the suitability of the "Signal Controls" functions for Mid-Section CCTV Crossings; should they be deemed to have an unacceptable level of risk, they should be removed from the LCCO's console.

In terms of the “Crossing Clear” buttons, on the day of the incident, LCCO1 did not see the MOPs in the confines of the LC XA 068. The similar occurrences also show other examples of when LCCOs fail to see MOPs trapped in the level crossings. As a means of assisting LCCOs in establishing if the confines of the Level Crossing are clear of vehicles, pedestrians or other obstructions; a time delay should be considered for incorporation into the sequence to encourage LCCOs sufficient time to thoroughly examine the confined area of the level crossing. As a result, the RAIU make the following safety recommendation (CaF-02):

Safety Recommendation 202103-02

IÉ-IM SET should, consider introducing a time delay between the “Crossing Clear” buttons to prevent the LCCO pressing the second Crossing Clear button until the first Crossing Clear button times out. This time can be spent checking the confines of the level crossing for vehicles, pedestrians or other obstructions.

Safety recommendations as a result of additional observations

224 Although noted that in the incident at LC XA068, LCCO1, purposely did not adhere to the LCCC Instructions, the RAIU have made some findings in relation to other occurrences of MOPs being trapped inside the barriers.

225 In all the eleven incidents of similar occurrences, none of the MOPs contacted the LCCOs through the use of the telephones provided; and although IÉ-IM are in the process of introducing new signage warning MOPs not to enter the level crossings when the barriers are lowering (CaF-01), there is no signage inside the barriers, instructing MOPs on what actions to take if trapped inside the barriers, as a result, the RAIU make the following safety recommendation:

Safety Recommendation 202103-03

IÉ-IM CCE should examine the feasibility of installing signage inside the barriers of CCTV level crossings warning MOP what actions to take in the event of becoming trapped.

226 In seven incidents of similar occurrences, MOPs took refuge close to or adjacent to the barrier machines, making them difficult to decipher (especially in two incidents), as a result, the RAIU make the follow safety recommendation (AO-03):

Safety Recommendation 202103-04

IÉ-IM should develop a means to make MOPs more visible should they become trapped inside level crossing barriers and position themselves adjacent to level crossing furniture or other infrastructure; where this cannot be achieved consideration should be given to examining possible initiatives or technologies that could be introduced to provide aid and assistance to LCCOs in identifying persons/obstacles that maybe trapped within the confines of a level crossing.

227 In two of the similar occurrences, MOPs accessed the level crossings from the station platform and not through authorised pedestrian routes, as a result, the RAIU make the following safety recommendation (AO-03):

Safety Recommendation 202103-05

IÉ-IM should introduce measures to deter pedestrians from using unauthorised routes onto CCTV Level Crossings.

228 It is noted that two-thirds of the previous incidents of MOPs becoming trapped in the barriers of level crossings occurred at either Sydney Parade (LC XR004) or Serpentine Avenue (LC XR002), (paragraph 210), as a result the RAIU make the following safety recommendation (AO-03):

Safety Recommendation 202103-06

IÉ-IM should conduct a focussed review on the instances of MOP entrapment at Sydney Parade (LC XR004) and Serpentine Avenue (LC XR002) with a view of identifying any actions that can be taken to prevent the re-occurrence of MOP entrapments.

Additional Information

List of abbreviations

ALCC	Athlone Local Control Centre
CCE	Chief Civil Engineer
CRR	Commission for Railway Regulation
CTC	Centralised Traffic Control
DMU	Diesel Multiple Unit
hr	hour
ICR	Intercity Railcar
IÉ-IM	Iarnród Éireann Infrastructure Manager
IÉ-RU	Iarnród Éireann Railway Undertaking
km	kilometre
m	metre
MP	Milepost
mph	Miles per hour
OHLE	Overhead Line Equipment
RAIU	Railway Accident Investigation Unit
SET	Signalling, Electrical and Telecommunications

Glossary of terms

Accident	An unwanted or unintended sudden event or a specific chain of such events which have harmful consequences. For heavy rail, the EU Agency for Railways divides accidents into the following categories: collisions, derailments, level-crossing accidents, accidents to persons caused by rolling stock in motion, fires and others.
Approach locking	A feature of the signalling interlocking, in the context of a level crossing it should prevent the crossing opening to road traffic after protecting signals have been placed to danger if there is a risk of an approaching train not having received a complete warning sequence of signals.
Article 20 of Directive (EU) 2016/798, Obligation to investigation	<p>Article 20 (1) Member States shall ensure that an investigation is carried out by the investigating body referred to in Article 22 after any serious accident on the Union rail system. The objective of the investigation shall be to improve, where possible, railway safety and the prevention of accidents.</p> <p>Article 20 (2) The investigating body referred to in Article 22 may also investigate those accidents and incidents which under slightly different conditions might have led to serious accidents, including technical failures of the structural subsystems or of interoperability constituents of the Union rail system. The investigating body may decide whether or not an investigation of such an accident or incident is to be undertaken. In making its decision it shall take into account:</p> <ul style="list-style-type: none">(a) the seriousness of the accident or incident;(b) whether it forms part of a series of accidents or incidents relevant to the system as a whole;(c) its impact on railway safety; and(d) requests from infrastructure managers, railway undertakings, the national safety authority or the Member States.
Category A SPAD	Any SPAD when a stop signal and any associated preceding cautionary indications was displayed correctly, in sufficient time for the train to stop safely at the signal.

Category B SPAD	Any SPAD when a stop aspect was displayed because: signalling or level crossing equipment failed or malfunctioned; or it was returned to danger in error.
Causal Factor	Any action, omission, event or condition, or a combination thereof that if corrected, eliminated, or avoided would have prevented the occurrence, in all likelihood.
Continuous Welded Rail	Sections of rail that are welded together.
Contributing Factor	Any action, omission, event or condition that affects an occurrence by increasing its likelihood, accelerating the effect in time or increasing the severity of the consequences, but the elimination of which would not have prevented the occurrence.
Distant signal	A signal placed at a distance that will allow adequate advance warning to the driver of the aspect of the stop signal at which the train must stop.
Entrance Barriers	Entrance barriers are located on the left-hand side of the public road and control the entrance of road traffic onto the level crossing.
Exit Barriers	Exit barriers are located on the right-hand side of the public road and allow the exiting of road traffic from the level crossing.
Incident	Any occurrence, other than an accident or serious accident, associated with the operation of trains and affecting the safety of operation. For heavy rail, the EU Agency for Railways divides incidents into the following categories: infrastructure; energy; control-command & signalling; rolling stock; traffic operations & management and others.
Investigation	A process conducted for the purpose of accident and incident prevention which includes the gathering and analysis of information, the drawing of conclusions, including the determination of causes and, when appropriate, the making of safety recommendations
Lineside	Anything within the boundary of the railway but not within 3 m (10 feet) of any track.
Local Control	The crossing is being controlled from a control panel at the crossing by an Emergency Operator who is positioned 'locally' at the crossing.

Mid-section CCTV Crossing	Level crossings which have signals which are controlled by the Crossing Controller (or Emergency Operator at the crossing).
Milepost	Marks distances.
Risk	CCE-SMS-001 defines risk as “the chance that harm will result from a Hazard; the combination of the severity of the Hazard with the likelihood of its happening, the probable consequence of potential harm or damage resulting from an unmanaged Hazard”.
Risk Assessment	CCE-SMS-001 defines a risk assessment as “a structured assessment to identify the likelihood of a Risk event, the severity of the adverse consequences should the event come about, and the mitigating Risk control actions”.
Serious Accident	Any train collision or derailment of trains, resulting in the death of at least one person or serious injuries to five or more persons or extensive damage to rolling stock, the infrastructure or the environment, and any other similar accident with an obvious impact on railway safety regulation or the management of safety. For heavy rail, the EU Agency for Railways divides serious accidents into the following categories: collisions, derailments, level-crossing accidents, accidents to persons caused by rolling stock in motion, fires and others.
Signal Passed at Danger	Any occasion when any part of a train proceeds beyond its authorised movement and travels beyond the danger point.
Station CCTV Crossing	Level crossings which do not have signals controlled by the Crossing Controller (or Emergency Operator at the crossing) but do have signals controlled by a Signaller i.e. in that the protecting signals, are interlocked with the signalling system, with a “Crossing Clear” indication required from the Level Crossing Workstation before the signals will display a proceed aspect
Systemic Factor	Any causal or contributing factor of an organisational, managerial, societal or regulatory nature that is likely to affect similar and related occurrences in the future, including, in particular the regulatory framework conditions, the design and application of the safety management system, skills of the staff, procedures and maintenance.

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