

Oliver Stewart
Senior Executive, RAIB Relationship and
Recommendation Handling

8 June 2018



Mr Andrew Hall
Deputy Chief Inspector of Rail Accidents
Cullen House
Berkshire Copse Rd
Aldershot
Hampshire GU11 2HP

Dear Andrew,

RAIB Report: Fatal accident at Grimston Lane footpath crossing, Suffolk, 23 February 2016

I write to provide an update¹ on the action taken in respect of recommendation 1 addressed to ORR in the above report, published on 21 November 2016.

The annex to this letter provides details of the action taken regarding the recommendation, the status of which is now '**Implemented**'. We do not propose to take any further action in respect of the recommendation, unless we become aware that any of the information provided becomes inaccurate, in which case I will write to you again.

We will publish this response on the ORR website on 8 June 2018.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Oliver Stewart', written in a cursive style.

Oliver Stewart

¹ In accordance with Regulation 12(2)(b) of the Railways (Accident Investigation and Reporting) Regulations 2005

Recommendation 1

The intent of this recommendation is that the effect of skewed alignment on the safe use of passive crossings is fully understood and managed.

Network Rail should:

- i. identify the effects of skewed alignment at passive level crossings on user behaviour, including the sighting of approaching trains;
- ii. review its processes and guidance for level crossing risk management, including the 'all level crossings risk management' tool (ALCRM), to determine whether the impact of skewed alignment is sufficiently taken into account; and
- iii. make any necessary changes to its processes and the guidance and training given to its level crossing managers

ORR decision

1. Network Rail has carried out research into the effects of skewed alignment at passive level crossings, taking into account factors such as a user having impaired mobility, clothing that may affect their peripheral vision and the user's experience and risk perception.
2. Network Rail have considered the impact of skewed level crossing alignment on ALCRM calculations, such as right-angled crossing potentially encouraging misuse as the traverse time is shorter.
3. Network Rail have revised their guidance for level crossing managers based on their research and have also included examples of good practice.
4. After reviewing the information provided ORR has concluded that, in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005, Network Rail has:
 - taken the recommendation into consideration; and
 - has taken action to implement it.

Status: Implemented.

Previously reported to RAIB

5. On 22 November 2017 ORR reported that it was content with the Network Rail response and accept their rationale for using a qualitative approach to assess the risks arising from skew crossings, rather than making adjustments to ALCRM algorithms.

Update

6. On 9 January 2018 Network Rail provided a closure statement containing the following information:

Network Rail has taken account of all three elements of the recommendation within its action plan to close it.

The first stage of the plan addressed element two and sought to investigate if the current guidance and instructions given to Level Crossing Managers was sufficient. It was concluded that whilst skewed alignment would feature within training and mentorship plans and the risks were understood and assessed as common practice risk management activity, it was not absolutely documented.

With regard to the All Level Crossing Risk Model, it was concluded that the current risk engine adequately recognised the impact of extended traverse time and extended train exposure risk within its calculations. It was felt that any bespoke algorithm enhancements would be costly and afford a disproportionate benefit for the investment. In addition, it was apparent that any algorithm enhancements would not generate sufficient changes in calculated risk to highlight key risks to Level Crossing Managers.

The above is in addition to the recognition that a revised risk engine has already been developed as part of RSSBs T936 research paper for incorporation within future risk modelling enhancements.

The deliverable component of the action plan took shape from the output discussed above to conclude that enhanced guidance to promote greater awareness and advocate risk management good practice would best address the recommendation.

A new level crossing guidance document, LCG 19 Skewed crossings – Assessing the effects on pedestrian users has been developed which embraces elements one and three of the recommendation.

The guidance document features the following areas within its content:

- *Background to the incident at Grimston Lane*
- *The effect of skewed alignment on pedestrian safety including:*
 - *Extended warning time*
 - *Body positioning and compromised or unorthodox views of approaching trains*
 - *Trapping of small wheeled items such as scooters or trolleys on the flange-way*
 - *Dismounting of cyclists who fail to dismount*

- *Influential elements which affect behaviour*
 - *Cognitive ability, risk perception and experience*
 - *Mobility and impairments*
 - *Distractions*
 - *Clothing*
- *Assessing the effects*
 - *User demographic*
 - *Approaches*
 - *Topography and train visibility*
 - *Angle of the skew and impact on visibility*
- *Reducing the risks*
 - *Closure*
 - *Straighten at right angles whenever possible*
 - *Interim measures, temporary speed restrictions*
 - *Technology such as miniature stop lights*
 - *Ergonomic design and de-vegetation*
- *Photographs of practical examples of work undertaken to remove skewed alignment*

The level crossing guidance document has been cascaded to Route Level Crossing Managers for onward briefing. It resides within the suite of LCG (Level Crossing Guidance) Documentation which continues to bolster the risk management of level crossings.

Network Rail considers this recommendation is now closed.

7. As part of their closure submission, Network Rail also provided the guidance document 'skewed crossings – assessing the effects on pedestrian users'. The document showed in greater detail how Network Rail have addressed each of the points raised by the recommendation:

The effect of skewed alignment

Level crossings with skewed alignment may introduce additional risks and hazards for pedestrian users. Notably, a skewed level crossing surface:

- *will typically extend the traverse time for users and increase their exposure to trains;*
- *may compromise users sighting of approaching trains*
 - *the alignment of the crossing may direct user posture away from trains on the nearest running line*
 - *the degree of head turn needed to look up and down the line may be more exaggerated, forcing a more unorthodox twisted and contorted motion*
 - *peripheral vision and sensory loss may be exacerbated by the skew; and*
- *the angle of alignment may cause cyclists who fail to dismount to become unseated or small wheeled items such as scooters or trolleys to become trapped due to the increased chance that wheels could foul on the greater gap in the flange-way.*

These hazards may be present for all users, but their susceptibility will vary from individual and by the degree of skewed alignment. User behaviour may be influenced by elements such as:

- ***cognitive ability, risk perception and experience*** – *young, elderly or unfamiliar users are at greater risk of failing to take account of their surroundings and may be more focussed on the orientation of the footpath/crossing surface rather than looking for approaching trains*
- ***mobility impairments*** – *disabilities or injuries may impact on a person's ability to twist or turn to look for approaching trains; skewed crossings may exacerbate this motion and users may glance along the line rather than make a definite action to look*
- ***distraction*** – *other users on the far side of the crossing, other attractions or environmental characteristics may lessen peripheral senses by focusing user attention along the alignment of the crossing surface and away from approaching trains and so exacerbate the risks of the skew*
- ***dogs on leads*** – *dogs are likely to instinctively 'follow the path' and in so doing direct owners onto the crossing where their view of approaching trains may be compromised by the angle of approach/alignment of the crossing surface*
- ***clothing*** – *wearing hoods, sunglasses or using umbrellas may worsen peripheral vision at skewed crossings than at locations with right-angled crossing surfaces*
- ***encumbered*** – *negotiating a skewed crossing with a shopping trolley, mobility scooter or bicycle is more complex as wheels may foul on the extended flange-way gaps*

Assessing the effect of skewed alignment

When assessing the safety of level crossings with skewed alignment, it is important to reinforce the ‘think like a user’ approach to safety. For example, whilst sight lines may be compliant from a fixed decision point, cognisance needs to be taken of:

- *the user demographic and their physical and mobility impairments, including encumbered nature which may exacerbate the risks of the skew (as identified previously)*
- *the approach paths and whether the surroundings restrict visibility of approaching trains or provide good levels of visibility prior to reaching the railway boundary; i.e. the skewed alignment may impact less where good sighting exists before entering the railway environment*
- *the railway access; for example consider how the gates, stiles, stepped approaches, corral fencing and layout may influence the interaction a user has with the asset – specifically relating to the posture and sighting of approaching trains*
- *the angle of the skew and how this relates to approaching trains, particularly if it may cause users to have limited views and/or forces users to look away from trains on the nearest running line.*

Reducing the risk of skewed alignment

Where-ever practicable the best course of action is to remove the skewed surface and replace this with a right-angled crossing deck. This should be the target across the network where crossings cannot be closed.

Where existing public rights of access are retained, it may be necessary to install corral fencing within the Network Rail boundary to safely guide users along the entry/exit point to the crossing surface. Alternatively, and with local authority agreement, a new right of access may be possible and arranged through a diversion order.

If a skewed crossing surface cannot be realigned as an interim measure other options to reduce risk and manage safety may include:

- *Temporary closure of the level crossing*
- *Temporary or permanent speed restriction(s) to provide users with additional warning time and allow increased opportunity for recovery action*
 - *A sighting compliant passive crossing may be considered to have an insufficient traverse time due to the effect of the skewed crossing surface and the risks it imports*
 - *Evidence to support a reduction in train speed should be qualitative (observations of users) and/or quantitative (timing actual traverses)*

- *Any reduction in train speed would need to take account of any imported risks such as willingness to wait and extended warning times which could increase risk taking and offset any intended benefit*
- *Miniature stop light equipment provided*
- *Installation of yellow decking (and solar studs)*
- *Revised ergonomic layout – optimally positioned signage (including cyclist dismount signs), removal of unnecessary signs (clutter) and/or provision of corral fencing to control the posture of users so as to direct them toward approaching trains*
- *De-vegetation to maximise sighting lines*

ALCRM modelling

It is possible that ALCRM may calculate a risk increase as a result of replacing a skewed crossing surface with a right angled one. This typically occurs where sighting is already compliant with the skewed deck. ALCRM recognises that the reduced traverse time may incentivise risk taking behaviour and applies a deliberate misuse multiplier to the calculation.

Such an increased risk calculation should not be a barrier to providing a right angled crossing surface. The qualitative benefits of a right angled surface, as evidenced within this guidance note, are greater than the quantitative risk modelling calculations.

Where sighting is not compliant with the skewed crossing surface, but the right angled improvement generates sighting compliance, ALCRM will generate a risk reduction as part of the revised calculations.

Previously reported to RAIB

Recommendation 1

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- iii. make any necessary changes to its processes and the guidance and training given to its level crossing managers.

ORR decision

1. We are content with the Network Rail response and accept their rationale for using a qualitative approach to assess the risks arising from skew crossings, rather than making adjustments to ALCRM algorithms.
2. After reviewing the information provided ORR has concluded that, in accordance with the Railways (Accident Investigation and Reporting) Regulations 2005, Network Rail has:
 - taken the recommendation into consideration; and
 - is taking action to implement it by 31 December 2017

Status: *Implementation ongoing.* ORR will advise RAIB when actions to address this recommendation have been completed.

Information in support of ORR decision

3. On 2 October 2017 Network Rail provided the following initial response:

To address this recommendation, Network Rail will focus on the qualitative implications of skewed alignment vice complex quantitative risk modelling calculation changes. The central level crossing team will generate a special topic guidance paper for dissemination to the Level Crossing Manager community which considers the following areas:

 - *How a skewed crossing could influence the way in which a user interacts with the asset when determining if it is safe to cross*

- *How a skewed alignment may restrict user mobility in looking for approaching trains*
- *How the skew, in addition to increasing the exposure window, could direct users toward an approaching train; i.e. the angle of the crossing surface is such that a user is closer to moving trains on the 'far side' than at the start of their traverse*
- *If the skew cannot be corrected, or as an interim measure, what good practice controls can be implemented to reduce risk and improve safety*

In producing the guidance paper the central level crossing team will seek the advice and counsel of the Network Rail ergonomics team.

The approach to address the recommendation through improved risk management capability is preferred to risk model calculation changes. Risk model changes, which are likely to prove complex and costly to administer, will yield only minor changes in calculated risk which are unlikely to have the same effect in delivering real term practical improvements in process.

Improved qualitative assessment best meets the intent of the recommendation. It will help to cement greater understanding and also promote enhanced heightened awareness amongst assessors. This will improve risk assessment process and support risk control selection / safety based decision making