Infrastructure Projects Signalling Shared Learning

Issue 18/01: July 2017 – February 2018

Introduction

This Shared Learning document details key issues and incidents that have occurred on Signalling Projects between July 2017 and February 2018; and provides the key learning points associated with them.

It is intended for distribution within the Network Rail Signalling Community and the Supply Chain; in order to raise awareness of the learning points within, and enable best practice to be applied through all of our Signalling activities.

Derailment (Subject to Investigation)

Background

As a signalled train left the Station at low speed, it was directed towards the possession and struck the side of the Adjacent Line Open Protection train, which was positioned as part of the planned protection arrangements. Video evidence from the train shows that neither the left hand point switch, nor the right hand point switch, was fully closed and locked.

The ongoing investigation by RAIB identified that the points were misaligned and had directed the train away from the intended route.

Key Learning (to date)

- Ensure all points required to be Clipped & Padlocked (C&P) as detailed in the Test Plan and stage / scheme plan are C&P prior to the commencement of Testing & Commissioning (T&C) works. All operatives shall be demonstrably competent, and be aware of their accountabilities in the point securing process.
- Test desk connection and disconnection process must be followed.
- TICs to ensure that they have robust process to control issue, use and installation/removal of Test Straps.

ABCL Strike-In Points Incorrectly Positioned.

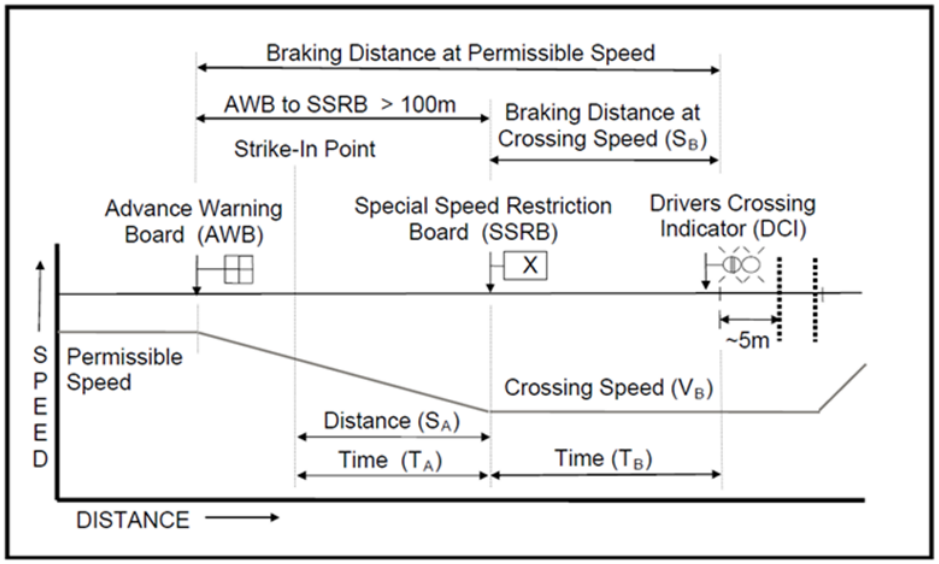
Background

A driver reported a ‘late’ change of aspect of the Drivers Crossing Indicator (DCI) on all routes, with the signal changing from Drivers Red Light to Drivers White Light when the train was ‘*closer to the crossing than expected.’*

The Strike-In Points (SIPs) were commissioned into use as designed and calculated. However the SIPs were incorrectly positioned in relation to the Special Speed Restriction Boards (SSRB) for all approaches due to an error in translating the requirements of NR/L2/SIG/11201/ModX11 Section 3.1.13 during the design process.

The same calculations had also been used at another crossing, to be commissioned shortly after the issue was identified. A modification was issued to move the Strike-In’s further out to prevent a similar occurrence.

ABCL Strike-In Points Incorrectly Positioned.



Key Learning

- Within the calculations; the minimum time between the SIP and SSRB of 14 seconds should take into account the requirements of NR/L2/SIG/11201/ModX11 Section 3.1.13 with respect to the 10s Minimum Road Open Time (MROT) required for two or more tracks over crossings. This should be reviewed during the independent check of the Scheme Plan and calculations.

- Key information with respect to time and distance could be detailed on the Scheme Plan; something that *may* have assisted in the error being identified.
- Post commissioning in-service checks, as prescribed by the ABCL Testing Specification, should be completed at the time of the commissioning.
- The competence of designers should be considered with respect to the particular type of crossings involved. Mentorship arrangements should be put in place where staff lack experience.
- Network Rail standards on Locally Monitored Level Crossings are being updated to clarify and resolve potential conflicts.

Signal Aspect Changes

Background
Following a major resignalling there were reports of multiple aspect changes as a result of momentary loss of lamp proving during normal changes of aspect.

The project had commissioned VMS Mk1 110V signals in a voltage proving configuration with a Westlock interlocking.

The above signal head is fully product accepted but there is no in-built delay in the internal lamp proving circuitry in this version of the head.

In order to complete the commissioning a ‘3 second slug’ was written into the interlocking data.

Key Learning
Although a product acceptance certificate confirms that a product **may** be used on the infrastructure it does not necessarily confirm all the applications / restrictions. It is still the designers responsibility, as system integrator, to ensure the design configuration meets the project requirements.

Signal Alignment

Background

Post commissioning reports of poor signal visibility or dim signals have been received on a number of projects, due to signal aspects not being aligned in accordance with the Signal Sighting Assessment Form (SSAF). The alignment is particularly critical on 3° narrow beam LED signals.

Key Learning

Staff should be able to identify the type of signal head and know how to set up / adjust the alignment, using the correct tools. It is imperative that the correct alignment tool is used for each type of signal head; they are not interchangeable.

It is also considered best practice for the Signal Sighting Chair to complete the final sighting check as part of the commissioning.

Information on this is available in NR/L2/SIG/10158 Appendix C; Signals – configuration, specification and construction guidance. Signalling Works Test Specification - NR/L2/SIG/30014/D120/TS7-91 Inspection to SSF and Signal Sighting, should also be referenced.

Track Circuit Failure

Background

A project had been drilling rail and installing bonds in preparation for resignalling works which would remove a large number of IBJs.

Despite the operatives collecting swarf with magnetic wands a small piece of swarf subsequently bridged the insulation of an IBJ causing the track circuit to fail.

Key Learning

Whilst it was evident that the team involved had collected a large proportion of the swarf, it was noted by the attending fault team that some remained. This was found to have blown from the immediate site of work to the adjacent track bed. Attention to detail and ensuring all swarf is collected whenever drilling works are undertaken is therefore of critical importance when planning and delivering such works.

Temporary Works: Interface Management

Background

A temporary platform extension, constructed from scaffold tubes and timber decks, to facilitate the turn back of trains during a blockade, caused a mechanical ground signal wire to snag.

A train turning back at the ground signal passed the signal, which appeared to be displaying a green aspect, and derailed on the points.

Temporary Works: Interface Management (Cont.)

Key Learning

Design out the conflict: Relocation of the signal wire run would have been a better solution, although it would have involved more extensive works.

Ensure sufficient timescales: It was deemed that project timescales (and budget) was prohibitive to move the wires.

Integrated Design: Location of signal wire run picked up during topographical survey and depicted on Civils General Arrangement (GA), however scaffold design 'referred' to the Civils GA and didn't show wire run. A 3D depiction of the scaffold tubes could have been produced.

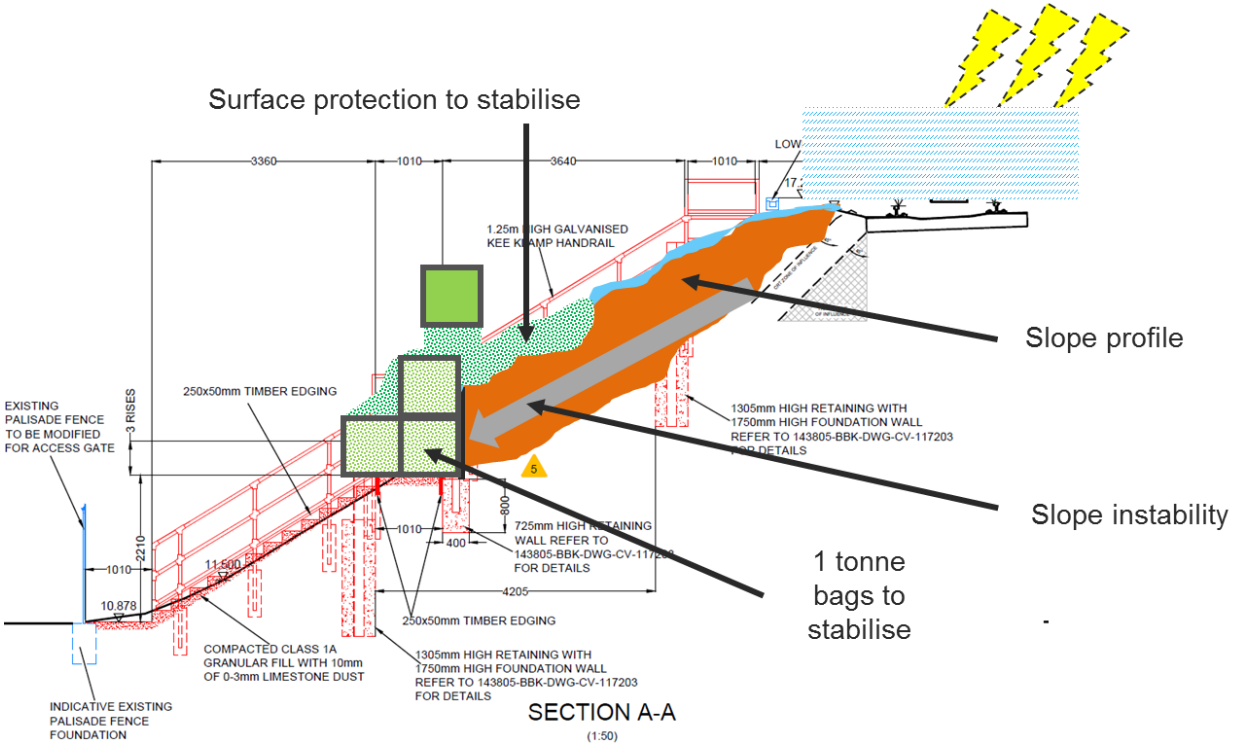
Signalling Interface: No Signalling Contractor was appointed, and Maintainer had prioritised maintaining access-to cable route.
A Signalling Project Engineer should be appointed in all cases.

Post installation inspection: Inspection of existing interfacing assets to ensure condition hasn't been compromised.

Access Steps – Embankment Failure

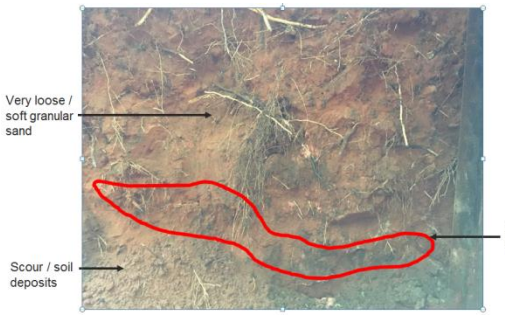
Background

During construction of access steps as part of a project, earth movement was noted on site and both adjacent running lines were blocked for safety reasons. Contributing factors included a period of prolonged heavy rain, on site changes to design and concerns around the verification of the topographical survey.



Key Learning

When Signalling projects involve significant work by other discipline engineers, be aware of these elements and utilise the expertise of our colleagues in other disciplines.



Other Incidents & Issues

Automatic Train Protection (ATP) System Issue

An ATP system was configured at 50mph for a junction with a maximum design speed of 40mph. The Track and Signalling Scheme Plan design had been amended to reflect the lower junction speed but the ATP updates were omitted from the change control. Lack of visibility of version control on ATP updates made the omission difficult to spot.

Surge Protection End Termination Units (SPETU)

Early in 2017 a programme of removing SPETUs from EBI Track 200 & 400 installations in DC traction areas and replacing with End Termination Units (ETUs) was implemented. A project part-way through installation at the time elected to progress with the SPETUs, with a view to replacing at a later date. On commissioning they suffered an exceptionally high level of failures of these units, which were known to cause reliability issues.

Loose Cable Termination

Heat damage was caused to a location case (see photo right) due to a loose cable termination.

Non-thermostatically Controlled Loc Heaters

Equipment failures were noted in location cases due to overheating as a result of the use of non-thermostatically controlled location heaters, continuing to heat the location during warm weather.

Other Incidents & Issues (Cont.)

Installation of AWS & TPWS in S&C

The positioning of AWS and TPWS equipment within S&C should be avoided where possible. Current standards permit some variation in positioning of equipment and this should be considered in the first instance. Where it is proposed to install AWS or TPWS within S&C, the following should be considered.

Automatic Warning System (AWS) – Installed Height.

NR/L2/TRK/2102 details maximum permitted height of AWS equipment, installation outside these parameters can result in false indication on the trainborne AWS equipment.

Automatic Warning System (AWS) – Effect on APC operation

AWS magnets in S&C may interfere with the operation of the on-train power control equipment. In AC traction areas the risk of erroneous activation of on board APC equipment should be assessed and consideration given to suitable mitigation.

Train Protection and Warning System (TPWS)

NR/SP/SIG/10138 details restrictions on positioning of TPWS relative to items of infrastructure and includes the restriction that the loops must be in excess of 300mm (transverse distance) from the switch rail.

Modular S&C

Modular S&C presents further restrictions in the mounting of AWS or TPWS equipment due to the shrouds used on split bearers. Even non-modular S&C sites may be converted to modular in future and positioning AWS & TPWS within the S&C should be avoided where possible.

Further Information

For any further details or information please contact:

Nicola Crocker: Programme Engineering Manager (Process & Capability)
Tel: 07733 127167
E-mail: Nicola.Crocker@networkrail.co.uk