

Shared Learning

The Thameslink Programme

Issue Date: 15th Dec 2015 - For further info contact simon.pears@networkrail.co.uk

Issue Number: TLP 047 Title: Earthing on Viaduct Structures

Overview of Event:

On the 25th October 2015, as part of Signalling & Track installation work, there was a requirement to fix mesh panels to the sides of a signal structure on the new Western Approach Viaduct. To gain access to one side of the signal the easiest method was to approach the task from the existing viaduct using an Road Rail Vehicle to lift the panel into position before fixing.

During the lift, the mesh panel came in contact with both the signal structure and the arm of the machine, this resulted in arcing between the two pieces of metal and part of the mesh panel caught fire for a few seconds.

Underlying Causes:

The investigation has identified that the Western Approach Viaduct system has been fitted with lightning protection and the Borough Market Viaduct (BMV) and Borough High Street Bridge have a class 1 architectural and functional street lighting. These provide a good earth path for the complete viaduct system incorporating:

- Borough Market Viaduct, Borough High Street Bridge
- Railway Approach Viaduct spans 1 & 2
- Western Approach 3, 4 & 5
- SAV-EX West 1 & 2, SAV-EX East 1. (Note SAV-EX structures are concrete however the acoustic barrier is metallic).

Convention for the South East has been to leave metallic bridge structures floating and not to provide any direct earth connections. This arrangement has associated hazards which are accepted as inherent in a DC electrified railway and does not guarantee that the structure is not earthed.

Recent data indicates that rail to earth voltages in the region vary between -10 and +40V. A recent measurement of the Up Charring Cross running rail to BMV potential was found to be in the range of 8 to 12V. These are not potentials that are hazardous to human health and are below the prescribed limits. However, coupled with an extra low resistance through earth could lead to currents that could damage infrastructure and cause other secondary hazards

Actions Taken As a Result of Investigation:

- Once the traction system is commissioned through the new viaduct system as part of stage HL07, concluding on the 4th January 2016, this hazard will be present. This is regardless of whether the traction supply is isolated, as a voltage potential remains in the running rails at the levels quoted above.
- The planning of works within the vicinity of the structures needs to account for the potential for this to occur if a conductive path is created between the running rails and the metallic parts of the structures or other metallic elements connected to the structures (e.g. signals, acoustic barrier).

General Key Messages:

- The risks associated with retaining the earthed arrangement and with removing the earth have been assessed and concluded that both arrangements are tolerable. However, the earthing should be removed to make the hazards associated with these structures comparable to other metallic bridge structures across the DC electrified network.
- Plans are being developed to remove the earth connections but until this has been verified and communicated as complete, it is important that staff undertaking the planning and implementation of works on the viaduct structures are aware of the difference in the risks.

Diagram/ Photo of event:

Signal structure on Western Approach where mesh panels were fitted

