A14 Huntingdon Railway Viaduct

Project Description:

The A14 Huntingdon Railway Viaduct is part of the Cambridge to Kettering section of the A14 dual carriageway. The structure has been the subject of a Special Inspection that indicated the presence of voids, water and chlorides in the tendon ducts, but no significant corrosion of the strands. A SoundPrint® acoustic monitoring system, designed by Pure Technologies Ltd of Canada was installed to monitor tendon wire break activity in one of the cantilevers.

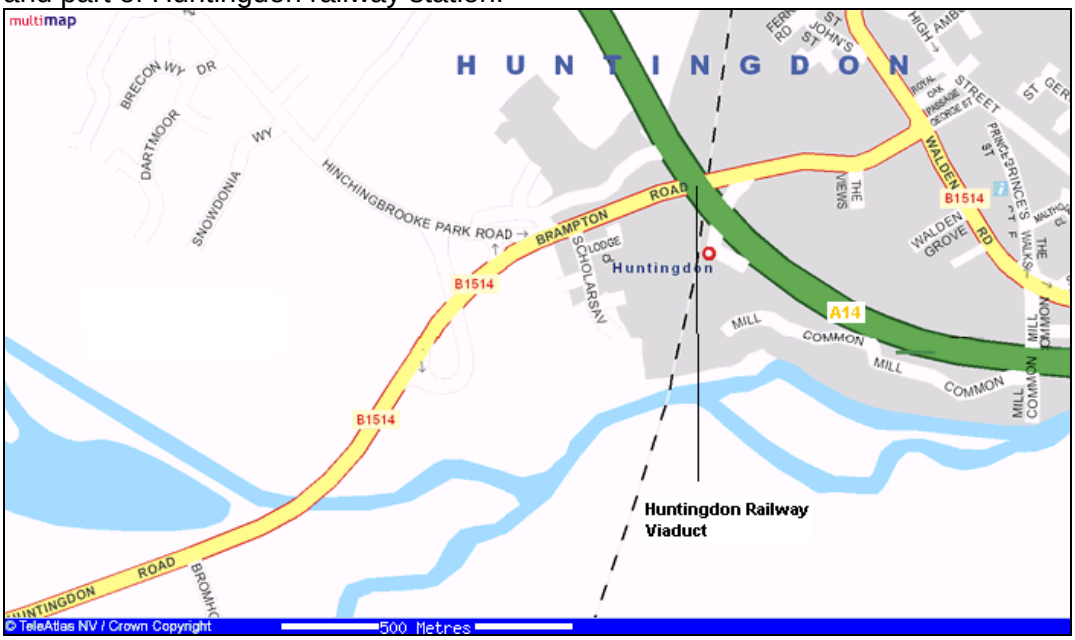
Huntingdon Railway Viaduct, England

Quick Facts:

- **Name and Location:** Huntingdon Railway Viaduct, Cambridgeshire, England
- **Owner:** Highways Agency, England
- **Structure category:** Medium span bridge
- **Spans:** 6 spans: 32.3/ 32.3 / 32.3/ 64.3/ 32.3/ 32.3m
- **Structural system:** Six span structure of which span 4 consist of two 16.15m cantilever sections and a 32.0m suspended span.
- **Start of SHM:** Mid 1998
- **Number of sensors installed:** 36
- **Instrumentation design by:** Pure Technologies Ltd, Calgary, Canada

Description of Structure:

The structure has six spans; the main span consists of a 32m long suspended span sat on half joints formed at the end of two 16m long cantilevers extending from the adjacent piers. The viaduct spans the B1514, the East Coast Main Line and part of Huntingdon railway station.



Location of Huntingdon Railway Viaduct

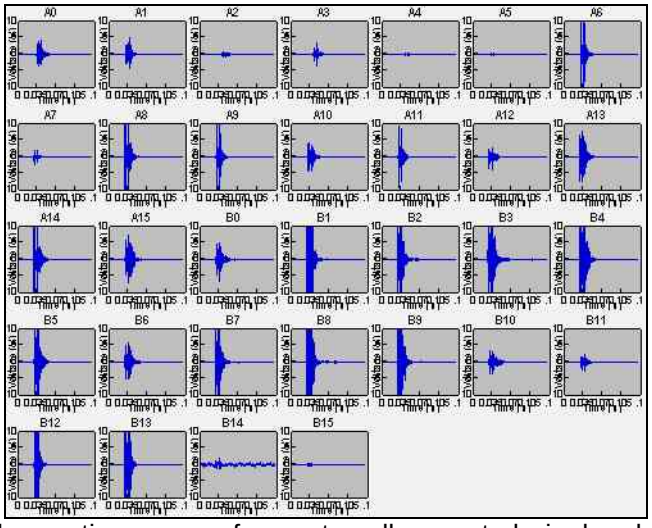
Purpose of Inspection:

Special Inspection indicated the presence of voids, water and chlorides in the tendon ducts. The SoundPrint® acoustic monitoring system has been installed to monitor tendon wire break activity in one of the cantilevers. The structure possessed further features that made it a good candidate for acoustic monitoring.

- Additional structural investigations were in progress. This would be enhanced by a clear indication of the presence or absence of actively fracturing wires.
- The structure contained features that lent themselves to monitoring, such as difficult to inspect half joints.
- The structure occupies a strategic position on the network and carried a high volume of HGV traffic.

Examples of Outcomes:

The probability of a tendon wire break occurring in the structure is very low so an external wire break device was installed on the structure to check the operation of the monitoring system.



Typical acoustic response from externally mounted wire break device

Benefits of using SHM technologies in the project:

The SoundPrint® acoustic monitoring system at Huntingdon has been in operation since mid 1998. It has provided an excellent opportunity for confronting challenges in detecting and locating post-tensioned wire breaks in noisy environments, and establishing the protocols needed to ensure the success of long-term, continuous, unattended monitoring. The viaduct has not experienced any naturally-occurring wire breaks during monitoring, although the conditions for corrosion are present. To test the monitoring system, external wire breaks have been artificially created and detected in blind trials.

References:

Cullington D W, MacNeil D, Paulson P and Elliot J (1999). Continuous acoustic monitoring of grouted post-tensioned concrete bridges. A paper presented at the 8th International Structural Faults and Repair Conference, London, 13th June 1999.

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