

Leica Geosystems Case Study

Owen Street Level Crossing, Tipton



In a world where there is no such thing as absolute stability, movement is an ever present phenomenon, how much something moves and when, has different importance to different people. One aspect of movement that we take for granted is the adequate, reliable and safe provision of transport infrastructure.

There are over 410,430 km of roads and rail track in Great Britain (Department for Transport), a figure that is constantly being extended year on year as population demands increase. This network is linked by over 7,600 level crossings on both public and private land. Each year 2,000 motorists and pedestrians are reported to have misused level crossings as we are reminded by in the news. Trains can reach speeds of 125mph and cannot stop quickly enough, making level crossings extremely hazardous and constantly exposed to risk.

The risks posed by level crossings can be eliminated by replacing them with over bridges or underpasses. One location where this is currently taking place is at the Owen Street Level Crossing where the B4517,

Alexandra Road, crosses the West Coast Mainline near Tipton Station in the West Midlands. The crossing is being replaced by 300 metres of road, which will pass under the railway line by means of a 55 metres by 9 metres box tunnel. The work is being carried out by the civil engineering contractor, BAM Nuttall Ltd. Formed in 1865, BAM Nuttall offers the full range of civil engineering services from road and rail construction, through to innovative, highly specialised construction solutions.

The £20 million 18 month project to replace the Owen Street Level Crossing is the first of four major physical regeneration schemes scheduled to take place in Tipton over the next three years. A newly constructed tunnel and high quality road layout aims to improve traffic flow and boost business in the town.

The construction work associated with the project involves jacking and piling activities that take place adjacent to the track. This heavy construction could have a big impact on the track, bearing in mind that the railway must continue to operate throughout the...

- when it has to be **right**

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...duration of the project. During the construction work, Network Rail must know whether the track is moving in relation to height, which can affect the twist and cant of the permanent way. In order to provide this information, it was imperative for BAM Nuttall to monitor the movement of the track throughout the duration of the project 24/7 day and night.



Pictured above: A piling rig works close to the busy West Coast mainline whilst the Leica equipment and GeoMoS software monitor the track for movement.

For agent Jamie Beech, it was vital that the development used the most cost effective and reliable monitoring solutions available on the market. For this he turned to Swiss measurement technology specialists Leica Geosystems Ltd. Leica Geosystems has been providing technology solutions since 1819 and its experience in this field was a major influence in the acquisition of the necessary items for this project.

The automated system, controlled by Leica Geosystems's GeoMoS (Geodetic Monitoring) software, enabled BAM Nuttall to make measurements of the track at predetermined intervals of time during the day and night, in order to understand and physical movement on the track.

The GeoMoS software can be tailored to report movement in just about any manner the user requires, from SMS text messages to claxon. The choice of how movement is reported is dependent on the users' requirements and can also be related to the amount of movement. GeoMoS also enables the user to monitor points at different frequencies depending on their relevance and importance. Such a system keeps cost down whilst maintaining the highest level of safety.

Pictured below: One of the two Leica TPS1200+ Total Stations measuring automatically to the mini prism at predetermined intervals, 24 hours a day.



The monitoring measurements were taken by two permanently mounted Leica TCA1201+ total stations measuring to 300 mini-prisms fixed to the rails. The GeoMoS software is capable of collecting data from virtually any sensor required for monitoring. In this case a Meteo Sensor was included to monitor temperature and pressure, which was used to 'correct' the observations so the weather would not influence the accuracy of the results. The reliability and repeatability of the assemblage exceeded the requirements of the project, for points to be recorded to better than <math><5\text{mm}</math>. The equipment has now been in place for many months and the repeatability of measurement is better than $\pm 2\text{mm}$.

Jamie Beech, Agent for BAM Nuttall comments: 'We were thoroughly impressed with the automated monitoring solution from Leica Geosystems. The off-the-shelf package not only provided us with the level of precision, detail and accuracy that was demanded of the project, but it also required no one to work unsociable hours, unless movement is detected and the alarm raised. The solution gave us 100% confidence in the project and allowed us to collect valuable information to analyse and submit to Network Rail, giving them the evidence their infrastructure remained unaffected, and the confidence in our continuing works.'



Pictured above: One of the 300 mini prisms fixed to the rails to monitor the track.

For more information about Leica Geosystems monitoring solutions contact us on +44(0)1908 256500, email uk.sales@leica-geosystems.com or visit www.leica-geosystems.co.uk ■