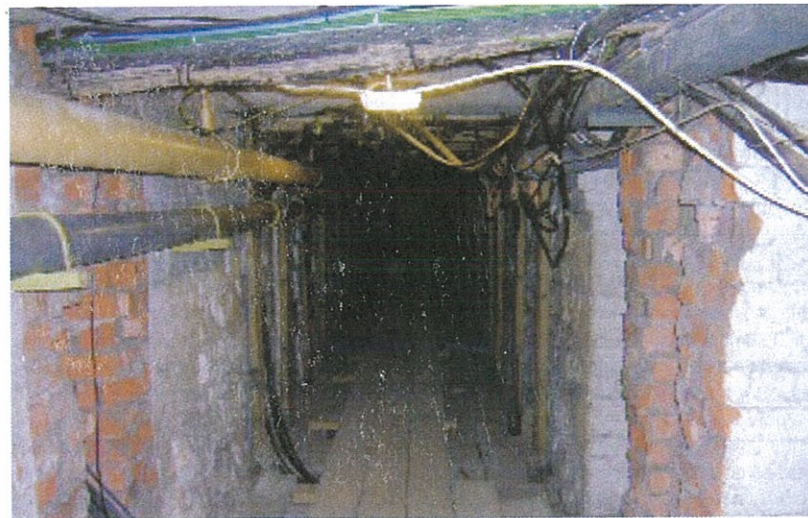


Platform revelations at Derby railway station

GPR (ground penetrating radar) and RVI (remote visual inspection) survey data from Fugro Aperio has played an integral role in the development of designs for platform 1 refurbishment at Derby railway station. Design consultant, Corus used the data to assist in the preparation of a Form A - Approval in Principle - Design for Works for canopy renewal on platform 1 for the client, Network Rail.

The refurbishment is currently at detailed design stage with site work scheduled to start in early 2008. Historical drawings showed that voids, in the form of a series of parallel service tunnels with intermittent walls, existed under platform 1 which is around 330 metres long.

Although some of the tunnels are accessible, many are bricked up or filled. As well as confirming their presence, detail was needed about their condition, dimensions and location in relation to above-ground structures to help designs for the platform refurbishment. A secondary objective was to determine the structure of foundations to the columns supporting the roof canopy.



View of accessible section of tunnel under Platform 1.

Conflicting

Martin Thackeray, a senior engineer at Corus, said: 'The station has undergone significant expansion over the years, and historical records often give conflicting

information about construction. Fugro Aperio's survey data confirmed much of the information we had on historical drawings, but also pinpointed some unrecorded voids.'

Completed in one night under a Tii protection, the GPR survey involved the collection of data along five transverse profiles spaced at 250 mm centres in 18 locations. Two longitudinal profiles were also collected along the entire length of the platform. Intrusive works, combining RVI and coring, were undertaken over two nights.

The GPR confirmed the presence of six tunnels: four running the full length of the platform north of the pedestrian subway, and two of indeterminate length running south of the subway. Only two were fully open; sections of backfilling were present in the remaining four. Martin Thackeray said: 'The data showed the spatial arrangement of the voids, the location of dividing walls and the extent of backfill so we could tie it in with above-ground data mapped out by our topographical survey.'

We were also interested in the construction of the top deck of the platform. We knew that it generally consists of stone slab and concrete, but construction varies a lot along the platform, as confirmed by the GPR. The GPR data, which was confirmed by coring in three locations, showed the anticipated

wide variations in platform construction. Construction detail ranged from 35 mm asphalt over 150 mm concrete, to 35 mm asphalt over 240 mm concrete and 100mm York Stone, with depth of reinforcement ranging from 40 mm to in excess of 300 mm.

Remote Visual Inspection

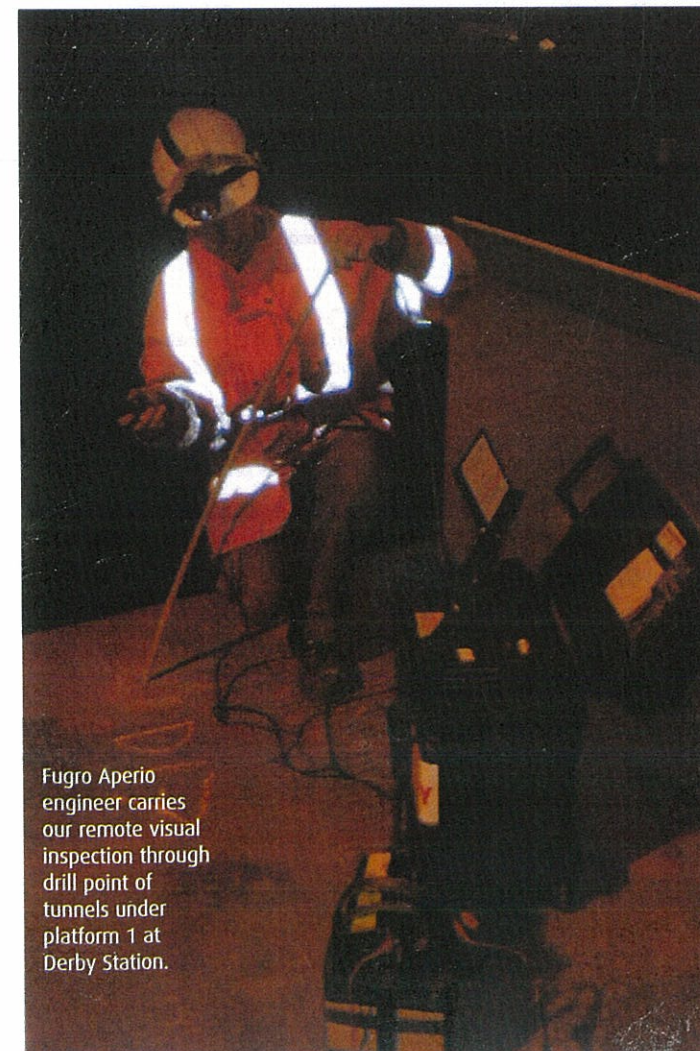
Fugro Aperio recommended the use of RVI to determine whether the original column foundations to the canopies, which pass down into the platform and underground voids, might be reused in constructing new ones. Using specialised endoscope equipment, they carried out the RVI survey via drill points in thirteen locations to confirm the foundation type of the columns.

GPR identified sections of tunnel, as well as areas of apparently solid ground. It found that one of the 455 mm square concrete encased columns was supported on a foundation block - 440 mm above the tunnel floor - while other columns pass straight down through the tunnel floor. The results provided sufficient information for

Corus to determine that it would be unviable to reuse the existing column foundations to support the new canopies.

Additionally survey data helped to determine solutions for resurfacing of the platform and the replacement of surface water and foul drainage. It highlighted areas where alignment and levelling of platform edges is needed, and new copings. This integrated investigation approach, combining rapid scanning ground radar with targeted remote visual inspection, is increasingly being used by engineers involved in platform work.

Network Rail is investing £18 million on the Derby Station work. Although not listed, Platform 1 dates back to 1840 when the station was first opened on completion of the North Midland line to Rotherham. ■



Fugro Aperio engineer carries our remote visual inspection through drill point of tunnels under platform 1 at Derby Station.

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