Geophysical Research Abstracts
Vol. 17, EGU2015-15509, 2015
EGU General Assembly 2015

Medway Tunnel Road Pavement Survey Using Different Frequency GPR Antenna Systems – A Case Study

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This presentation reports on an extensive survey carried out on a section (just outside the westbound end of the tunnel portal) of the Medway Tunnel in North Kent, UK. The Medway Tunnel provides a dual carriageway road crossing under the River Medway between Chatham and Strood. It is 725 metres long from portal to portal and consists of three sections. The appearance of repeated cracking of the road surface in this particular section of the tunnel suggested either a steady movement of the ground or possible undermining due to an underground watercourse. Ironically, the design and construction of the road had been realised to prevent any form of structural movement. It was deemed necessary to perform a Ground Penetrating Radar (GPR) survey in order to confirm underground construction details of the road in this section of the tunnel.

This presentation reports on the detailed survey and the challenges encountered during the operation, which utilised four different frequency GPR systems including 2GHz, 900MHz, 600MHz and 200MHz antennas. The presentation will also describe how decisions were made to carry out supplementary surveys based on results obtained on-site (via primary data processing) and observations made during the survey.

A summary of results will be presented individually for each antenna system used, as well as comparisons between each antenna system. Results will then be mapped against the design drawings available for confirmation of construction configurations.

In conclusion, the presentation will demonstrate that the tunnel road pavement is not constructed as per the information provided (design drawings). Results will clearly indicate that there is no second reinforced concrete layer present in this particular section of the road pavement (contrary to what was originally believed) and will present the actual road construction in comparison with the design drawings.

The results will confirm that there is no underground watercourse present in this particular section of the tunnel (at 2-3 m depth). However, it will confirm the presence of an unknown feature at a depth of 1.2m below road surface.

Acknowledgement

The authors would like to acknowledge the support of the COST Action TU1208 project, as well as Medway City Council's immense support in terms of expert workforce and road survey equipment in materialising this work.