Effects of tunnelling on existing tunnels
A half-day seminar to disseminate and discuss findings from the Imperial College Crossrail research project

Time and date: 13:00, Wednesday 25th April 2018
Venue: Room 164 (ground floor), Dept. Civil & Environmental Engineering, Skempton Building, Imperial College, London SW7 2BU

During the period from 2010 to 2014 and beyond Imperial College undertook an extensive research programme to investigate the effects of tunnelling on existing tunnels. The study was initiated from earlier fieldwork undertaken by the research group during the construction of the Jubilee Line Extension (JLE), written up by Standing and Selman (2001), and two case studies concerning new tunnels being constructed beneath existing ones: in one case the bolts of the existing tunnel were loosened (Kimmance et al., 1996) and in the other they were tightened (Moss and Bowers, 2006). The former approach mitigates the development of bending moments in the lining, but at the expense of uncontrolled displacements and the latter the converse.

The study was funded by EPSRC (EP/G063486/1), Crossrail and Morgan Sindall and was run in conjunction with the Crossrail project. There was a specific focus on grey cast iron (GCI) segmental linings, often used in the construction of the older more sensitive tunnels, some of which were affected by the construction of the new tunnels. The research was tackled through five inter-related primary paths: (i) structural testing of half-scale GCI segments (coupled and in rings); (ii) numerical analysis of the structural testing; (iii) field monitoring of the ground and the existing Central Line tunnels (at Hyde Park / Lancaster Gate); (iv) numerical modelling of the field conditions; and (v) advanced laboratory testing of high quality samples taken during installation of field instrumentation in Hyde Park (note that this final topic is not covered in this seminar).

Many of the findings have been disseminated in the form of papers, as listed overleaf. The intention of the seminar is: (i) to draw attention to the key findings of the work and implications for future design and analysis of tunnels; and (ii) to exchange views and contributions from those interested in tunnelling both from industry and academia. The presentations are to be given by some of those involved with the project.

13:00 – 13:20 – Registration
13:30 – 15:30 – Structural testing and analysis
   13:30 – 14:00 – Two-segment testing and analysis – Jessica Yu & Katerina Tsiampousi
   14:00 – 14:30 – Full-ring tests – elastic response at small displacements – Jessica Yu
   14:30 – 15:00 – Full-ring tests to failure – Sheida Afshan
   15:00 – 15:30 – Discussion on structural testing and analysis
15:30 – 16:00 – Tea break
16:00 – 18:00 – Field monitoring and numerical analysis of ground and tunnel response to tunnelling
   16:00 – 16:30 – Field monitoring in Hyde Park – Michael Wan
   16:30 – 17:00 – Monitoring within existing tunnels – Jamie Standing
   17:00 – 17:30 – Numerical modelling of field conditions/response – Vasilis Avgerinos
17:30 – 18:00 – Discussion on the geotechnical aspects and summing up

Please note that the event is free but if you plan to attend please email Sue Feller at least a week in advance so that we have an idea of numbers: s.feller@imperial.ac.uk
Structural testing and analysis


Field monitoring


Numerical analysis


Laboratory soil testing