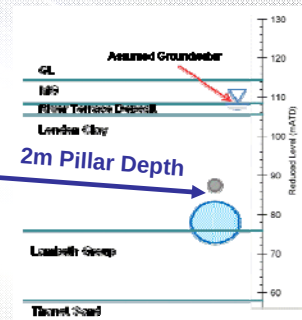
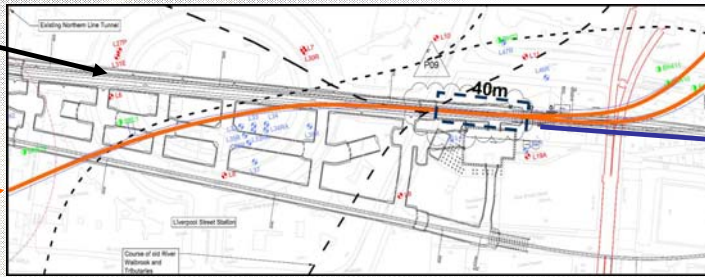


Problem Statement

What is the effect of tunnelling under an existing tunnel at close proximity?

New Crossrail
Platform Tunnel
at London Liv. St.
Station

Existing Post
Office Tunnel

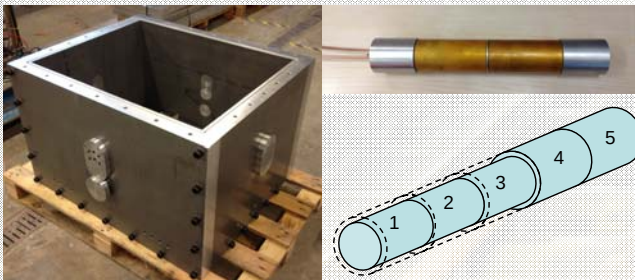


Methodology

Centrifuge Modelling

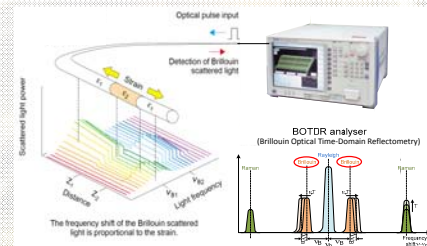


A **geotechnical centrifuge** allows a **scaled test** to have **similar stress-strain** as it would in a **full scale prototype** when it subjects the test package to an increased centripetal acceleration.



Quasi-3D tunnel construction will be simulated with a new **staged volume loss tunnel** model in flight.

Fibre Optics Monitoring

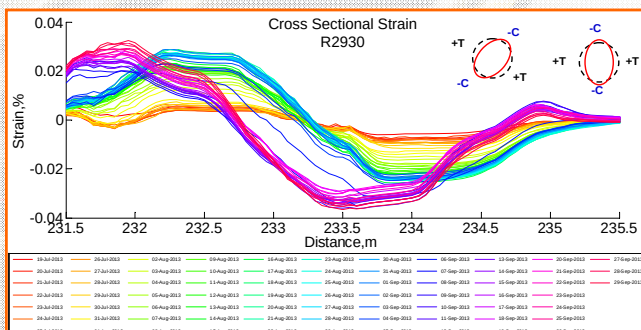


The **fibre optics strain sensing technology** enables a **continuous strain measurement** along the entire fibre optic cable by measuring the shift in Brillouin frequency of the backscattered light.



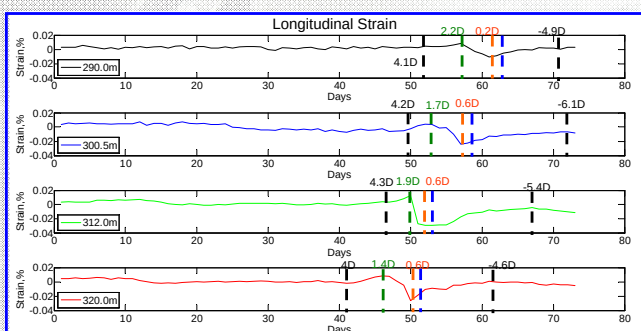
A total of **5 cross sections** and **1 longitudinal** section over a length of **40m** of the **Post Office Tunnel** is instrumented.

Results/ Progress to Date (Fibre Optics)



Cross Sectional Data: **Vertical Elongation** was observed.

-Diagram on the **Left** shows the **change in strains** from construction of **passenger addit** (**orange to blue**) to the ovalisation due to **pilot tunnel** (**purple to red**). +ve strain indicates **tensile strain**.



Longitudinal Strain Data: **Consistent Wave** was captured.

-Diagram on the **Bottom Left** shows the **change in strains** for a few **static points** on the longitudinal cable **to time**.

-A **deformation pattern** as shown **Above** is observed.

