



Installation of Monitoring Equipment on a Rail Tunnel Portal.

Case Study

As part of Network Rails' (NR) continuous assessment of its assets, DYWIDAG was contracted by the Murphy Group to install a monitoring system at the Primrose Hill site, located on the MD101 Line, Euston to Armitage Junction.

PRODUCTS

*Automated Track Monitoring
Infrastructure Intelligence*

LOCATION

United Kingdom

TIMELINE

01-2017 - 12-2021

SCOPE

*Installation
Supervision*

OWNER

Murphy & Sons

Context

Located in South Hampstead in the London Borough of Camden just north of Primrose Hill, Primrose Hill Tunnel is a 1064m railway tunnel located on the West Coast Main Line, roughly 3.3 km from Euston station. First opened to the public in 1842, it is the first railway tunnel in London.

The purpose of the monitoring equipment is to collate data from the tunnel portal and surrounding earthwork to ascertain causes of failure points observed within the tunnel structure, specifically, signs of strain and deformation resulting in cracking, separation of the brick arch and water ingress.



Prior to installation works, DYWIDAG carried out a thorough site walkover with Murphy group and NR, to determine the best method and techniques for installation. DYWIDAG's experience and in-house capability to provide Rope Access proved to be invaluable for this project. With Road Rail Vehicle (RRV) access being over 1m away from the job site, accessing height for any installation works with an RRV would reduce valuable actual working time. DYWIDAG's site staff hold Level 1-3 Roped Access qualifications, which was an enormous benefit, allowing DYWIDAG to plan and detail access plans directly from the portal, therein saving valuable hours within the possession.

Another challenge arose from the required complex data sets needed to provide the comprehensive understanding of how the asset was behaving. From a practical point of view the system needed to be fully independent and be able to sustain its own power and communications through a year-long installation. DYWIDAG's solution, to obtain data on tunnel convergence, parapet settlement, retaining wall rotation, earthwork settlement and earthwork slippage, saw them install an Automatic Total Station on an adjacent bridge. The location allowed line-of-sight to the entire front portal, wing walls, earthwork behind and 25m into the tunnel.

By installing prisms at all of these locations, a geospatial coordinate for each point could be gathered through 4-hourly cycles and converted into parameters such as rotation, settlement and convergence.

All data collected was transferred from site via the 3G cellular network directly to DYWIDAG cloud servers, where it was processed and converted into engineering units and displayed on a bespoke web portal for the client to view. DYWIDAG Infrastructure Intelligence data visualisation platform allows for multiple data sets and calculations to be viewed, plotted, tabulated, and compared on single pages.

Despite the location challenges, DYWIDAG were able to draw on its considerable skill set in design, build and NR access to meet the requirements of the project and provide a reliable robust monitoring system.

Long term, the data gained from the project will feed a large remediation design plan for the portal and enable a much more detailed rectification plan.