FRANKHAM

Stone Crossing Station

Stone Crossing Station is one of the maintenance and engineering projects managed by Network Rail, in accordance with the £4.8 billion Levelling Up Fund.

This Levelling Up Fund was launched by the UK government to invest in infrastructure that improves the everyday lives of communities across the UK, including the upgrade of local transport.

Frankham Consultancy Group as appointed by Octavius Infrastructure Limited to undertake the following services at Stone Crossing Station:

- **Stage 1:** carry out an inspection of one of four blockwork and concrete structures, supporting Driver Only Operation (DOO) monitors along Platform 1 (London-bound). A fault had been reported of gaps opening up between this structure and the back-of-platform wall.

- **Stage 2:** carry out the design of remedial works to support the existing DOO platform, which had exhibited displacements and was temporarily propped by scaffolding as an emergency measure.

The purpose of the commission, in Stage 1, was to assess the condition of the DOO monitor blockwork and mass concrete foundation. Stage 2 was to design permanent works to support the DOO platform by means of raking props and shallow strip foundation at the base of the embankment.

Client
Octavius Infrastructure Ltd

Sector
Rail

Duration
Jan - Oct 2023

Challenges Overcome

The identified challenges for Stage 1 were related to the lack of record drawings or previous inspection reports, quality of collected data, restricted access for the survey, and the unstable structural condition of the DOO platform.

During Stage 2, we overcame the following challenges:

- Lack of record drawings and quality of collected data – detailed and qualitative surveying of the existing assets to observe defects and understand what caused them. This was of importance to provide the right set of recommendations to maintain and, if possible, improve the structural performance of the existing blockwork and mass concrete foundation supporting the DOO Monitor.
- Restricted access for the survey – access to the outside face of the High Mileage wall was not possible due to the steepness of the embankment.
- Props – potential for deflection of the props and not properly tightened fixings which would cause further deterioration when loading the remedial works.
- Foundation deflection – potential for deflection and settlement of the shallow strip foundation, causing further displacement of the DOO platform.

Solutions

To collect the data required for the structural design, tactile and visual surveys were conducted by professionally qualified Frankham civil engineers. The engineer performing the inspection responded quickly to the identified defects and structural instability, providing technical discussion and remedial recommendations.

The visual survey was undertaken by a Frankham engineer, providing sufficient photographs and site notes to identify and record defects in inaccessible areas.

To mitigate the effects of deformation and settlement of the remedial works upon loading and maintain the stability of the DOO platform, the raking props were pre-loaded. Additionally, the foundation was sized in accordance with Serviceability Limit State design, ensuring controlled deflection and settlement using a base pressure derived from the ground investigation. This ensured minimum movement of the DOO platform following the installation. A CAT2 check was undertaken to validate and certify the quality of the original design in compliance with the design standards.

Outcome

The inspection revealed that the part of the DOO foundation closer to the platform had not sunk significantly, whilst the part further from the platform, and closer to the crest of the embankment, appeared to have sunk, leading to rotation of the entire block. This was most clearly observed where the side walls of the block have moved away from the platform back wall posts, which are monolithic with the platform trestles.

To overcome this structural instability and improve the structural integrity of the DOO platform, remedial works were designed, and installation method specified, to prevent further rotation of the DOO platform.

Sustainability

The survey and condition report informs an asset management plan at Stone Crossing Station, and utilisation of the existing assets aligns with the principles of the circular economy and supports sustainable working practices in several ways.

The condition report identifying defects and recommended repairs, followed by the design of proposed remedial works, helps maintain the structural and operational integrity of the blockwork and mass concrete foundation supporting DOO monitor.

Retrofitting/strengthening of the existing assets at Stone Crossing Station, which has exhibited structural instability, supports sustainability. Structural performance and durability is improved, leading to cost savings. This approach reduces the waste and conserves embodied energy, compared to the higher carbon footprint of the design and execution of a totally new enclosure and platform for the DOO monitor, including the reinstatement of the embankment slope.