

## CASE STUDY: King Sheet Piling (KSP®) Westbury Railway Embankment Slip Repair



### CONTRACT INFORMATION:

**Sector type:** Infrastructure – Rail

**Location:** NE Somerset

**Client:** Network Rail

**Principal Designer:** Bryne Looby & Partners

**Principal Contractor:** Balfour Beatty Rail

**Sheet Piling Contractor:** Ivor King (CEC)

**Contract Value:** 490k

### THE PROJECT:

The project consisted of the repair of a section of railway embankment which had suffered from long-term slope instability requiring regular maintenance of this section of track. More recently, following the pronounced wet period, the movement worsened and one track was closed to ensure safety. Network Rail instructed Balfour Beatty Rail, the Reactive Framework Contractor for the area, to develop remedial works. Following detailed study working with designer, Bryne Looby, a sheet piled wall was determined to be the optimum solution. Balfour Beatty Rail then proposed use of Balfour Beatty's innovative King Sheet Piling (KSP) system, previously used extensively in the highways sector.

The KSP walls were pitched and driven to depth (intermediates) or to refusal (kings) using a Movax side grip hydraulic vibrator. The kings were then driven to the design depth of the wall using a percussive hammer suspended from a crane. Sheet pile installation was completed on March 31<sup>st</sup>, 2014.

Mike Walsh, Project Manager commented: "During the scheme development, discussions with designer Byrne Looby & Partners and Network Rail were keen to trial the King Sheet Piling system that offered cost, programme and material efficiencies, the potential for enhanced safety during construction and reduced impact on local residents, businesses and train movements.

"Following the completion of the works on programme and in budget, Network Rail confirmed all of these goals were successfully achieved. In conjunction with Balfour Beatty Rail, Network Rail is now in the process of developing a presentation to all their development and delivery team so the success and lessons learnt by using the system can be used on future schemes".

### THE BENEFITS:

**The KSP system (Patent No. GB2463079; others granted or pending) was adopted in place of a standard sheet pile wall, saving 41% of the steel required, speeding installation, enhancing safety and more than halving percussive driving noise for nearby residents.**

An important benefit of KSP was that the short intermediates allowed equalisation of water pressures on each side of the wall.

All parties were impressed by the increased ease and speed of installation.

The lack of clutch friction meant the kings (48% of the wall) were much more easily driven to full depth, minimising noise to the public.

*The KSP system allowed easy safe access off a steel walkway/guide to clutch kings to the intermediates. This eliminated working at height to clutch piles together.*



### KEY LEARNING POINTS / BEST PRACTICE

KSP use at Westbury has demonstrated the benefits the system offers for remediating unstable railway earthworks. It has:

- Improved sustainability through installation of 41% less steel
- Saved circa 35% of the cost of a conventional sheet pile wall (after paying the licence fee).
- Enhanced safety.
- Speeded installation by a factor of about two.
- Reduced noise for nearby residents and the public by over 55%.

Where required, KSP walls can also be installed by silent pressing, including use of the Giken Wall Walker technique.