

Resin injection concrete slab relevelling Currys store



INDUSTRY

Commercial

STRUCTURE

Retail

PROBLEM

Subsidence

LOCATION

Newbury, UK

DURATION / YEAR

11 days, 2023

TECHNOLOGY

Teretek

BUSINESS UNIT

Mainmark UK

Mainmark, a ground engineering specialist with over 30 years' experience, used its innovative Teretek® geopolymer resin injection technology to treat a subsidence problem at a Currys-PC World store within Newbury Retail Park. The retail area was constructed in 2007 and built on top of an old rubbish tip. In 2019 the store's concrete floor slab began to show the effects of subsidence.

The sinking concrete floor slab issue at the Currys-PC World store had varying impacts on different areas of the building, with subsidence settlement ranging from 25mm to 100mm across the store. This resulted in the development of numerous cracks in the floor at different levels, which had a detrimental effect on the store's operations and furthermore created a tripping hazard for both staff and shoppers, posing risks and potential accidents within the premises.

Moreover, the uneven floors made it challenging to unload deliveries such that trolleys would roll back out of the warehouse if the brakes were not applied, and potentially causing accidents or damage to the merchandise.

The ongoing subsidence problem had further consequences, including detachment of a stud wall of the mezzanine floor from the ceiling. As the subsidence continued, the gap between the stud wall and the ceiling increased over time. Battens had been used to conceal the growing gap from the customers' view.

Overall, the subsidence-related problems mentioned above require prompt action to mitigate safety risks, improve operational efficiency, and provide a safe shopping environment for both employees and customers.

What were the challenges that the chosen slab-lifting solution had to overcome?

The challenges faced in trying to find the most suitable slab lifting solution to return the building to its original level were centred around the need to minimise business disruption and therefore reducing the subsequent costs. When the Currys-PC World reported the rather alarming floor movement, Columbia Threadneedle, the property asset managers, visited the site, saw the extent of the problem, and informed their insurers. This set off investigations by loss adjusters and consulting engineers, Waterman Group.

The concern was that alternative fixes (including digging out the existing slab to re-lay it) would require extensive excavation work, requiring a lengthy and disruptive store closure. This would then entail Currys-PC World having to temporarily relocate to an alternative site assuming a suitable one could be found at such short notice. This would lead to claims for loss of business revenue and recovery of all costs resulting from the enforced move.

The investigation works included a structural survey and showed that . This was laid over a 30mm membrane on top of 80mm of crushed aggregate with the ground below comprising grey sand with stone pieces. A drain survey also took place to check for possible water escape that could weaken the soil. Although no obvious cause of subsidence was found from the surveys, the finger of suspicion pointed at the root cause being related to the site being located on top of an old rubbish tip, where localised areas of poor soil compaction triggered the subsidence events.

Waterman Group conducted a thorough evaluation of the available information and decided that Mainmark's cutting edge Teretek® technique as the most appropriate method for treating the weakened underlying soil and lifting the slab back to level.

How did Mainmark's Teretek resin injection process meet the slab releveling challenges?

Mainmark's Teretek® state-of-the-art engineered resin solution was chosen due to its unique two-in-one

solution that delivers both ground improvement and slab lifting without the need for vacating the premises.

At the start of the project, Mainmark conducted dynamic cone penetrometer tests to determine the bearing capacity of the underlying soil and utilised laser monitoring systems to precisely measure the slab levels. This allowed the creation of a precise and detailed treatment plan for remediating the 800m² of slab affected by subsidence.

At each injection point, a 16mm diameter tube was inserted into a predrilled hole extending into the underlying soil below the slab. Then the exact amount of Teretek® was delivered which strengthened the underlying soil and lifted the slab back up to its original pre subsidence level.

David Knight, Regional Director of Waterman Group, Structures Division, Bristol stated: "We required the slab to be lifted up to 100 millimetres. We engaged with Mainmark, and they delivered the project requirements and exceeded our overall expectations."

Mainmark arranged for their engineers to work overnight after the store had closed and to be gone by the morning before it opened for business. This allowed the store to continue trading during the two weeks it took to complete the subsidence treatment. After the work was completed, the trolleys no longer rolled back out of the warehouse, the lift was operational and the wall on the mezzanine section was reunited with the roof and had no need to hide behind the wooden battens.

Mainmark engineers checked slab levels throughout the work and final level checking and penetrometer testing was carried out at the end of the project. This confirmed that the building was now back to the required level and sitting on a stable base once more. For added peace of mind, the project was backed by Mainmark's 20-year materials and workmanship warranty.

To ensure minimum disruption to Currys-PC World daily business, Mainmark only worked two weeks in nightshifts to complete project. A final precise level

monitoring check confirmed that the store's floors were at the pre-subsidence levels and furthermore, post treatment dynamic penetrometers test results confirmed marked improvement in the bearing capacity of the underlying soils. This was manifested by the fact that the trolleys no longer rolled back out of the warehouse and the stud wall of the mezzanine had been reunited with the ceiling above with the filler wooden battens removed.

Gerry Doogan, Director of Property Services at Columbia Threadneedle, had not heard of resin injection technology as a method of treating subsidence and was impressed by the cost-effectiveness of the solution and Mainmark's proactive approach stated: "It was a tremendous solution for everybody. Currys-PC World stayed in-situ and traded during the day, the work was done overnight, and the shoppers were none the wiser".

If faced with a subsidence problem in the future, we asked Gerry if he would use the resin injection slab lifting solution again, to which he replied "Mainmark would be our first port of call as the lack of disruption with their method was quite exceptional, it was an absolutely ideal solution."

If you suspect the floors in your property might be affected by subsidence movement, please visit our website for a wealth of information and guidance.

Mainmark's core expertise lies in its highly qualified engineering team, specialising in raising, re-levelling and re-supporting buildings affected by subsidence. Our skillset is applicable to a wide range of structures, including residential, commercial, industrial buildings, heritage buildings and infrastructure. If you need professional advice and guidance for your commercial building's requirements, don't hesitate to contact us today and consult with our experienced technical team.