Stabilised Pavem

Substantial cost and CO_2 savings on in-situ recycling repairs

Bath and North East Somerset Council has saved nearly £220,000 on the cost of repairing a 400m long section of the B3110 Midford Road at Odd Down, on the southern outskirts of Bath. This huge saving has been achieved by the Council's Design Group, in partnership with the Council's term maintenance contractor Atkins, choosing to recycle and strengthen in-situ existing tar-bound hazardous carriageway materials, instead of using conventional full-depth pavement reconstruction techniques with new bituminous materials. The existing layers throughout the depth of the road pavement were disintegrating and required strengthening.

In addition to the estimated £220,000 construction cost savings, the Design Group's first-time use of in-situ recycling has provided substantial environmental benefits. These include a vast reduction in carbon dioxide emissions and lower carbon footprint. Environmental savings were also generated from reduced transportation and production of materials, and far less use of virgin materials. Disruption to the Council's road network was also reduced.

Cost Savings

The bulk of the construction cost saving was achieved by not having to extract and dispose of the road's existing hazardous tar-bound material off site to a special licensed waste tip. Instead, the existing road materials were used as a 'linear quarry' for the primary source of aggregates, which were recycled and strengthened in-situ to reduce waste. In addition, an estimated 12-tonne saving in CO_2 emissions between in-situ recycling and conventional pavement reconstruction has been achieved for the site. Cold in-situ recycling contributes to considerably reducing CO_2 emissions, as the technique vastly reduces the need for extraction and transportation of existing in-situ materials to landfill sites, and the production and transportation to site of virgin materials extracted from natural sources.

'This stretch of Midford Road was in urgent need of strengthening and we found from site investigations and subsequent material testing that the road pavement contained a high proportion of tar material,' said BANES project manager and scheme designer Konrad Lansdown. 'In conjunction with the Council's term-maintenance contractor Atkins, we considered the road repair options available and concluded that in-situ recycling offered the most cost-effective and environmentally beneficial solution.

'There were approximately 1,800 tonnes of hazardous tar material in the road pavement, which would otherwise have been extracted and disposed of off site at a special licensed waste tip in Cheltenham, about 50 miles away. Tar material disposal costs alone would have been approximately £180,000 and some of this material was classed as special hazardous waste, which meant that it probably needed incineration costing around £1,000 per tonne.'

Stabilised Pavements director Gerry Howe: 'I believe in-situ recycling has to be the way forward for treating tar-bound roads in the UK'

Atkins project engineer Jesse Smith, who has had previous experience of in-situ recycling, said with the added complication of the tar, the process proved to be the best option to reconstruct this particular section of Midford Road. 'In-situ recycling has

By using in-situ recycling, Bath and North East Somerset Council has saved nearly £220,000 on the cost of repairing a 400m long section of the B3110 Midford Road on the southern outskirts of Bath

Stabilised Pavements are using their Wirtgen 2500 to rotovate and treat the tar-bound road to a depth of 180mm, while saving an estimated 12 tonnes of CO_2 emissions

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near Bath

shown to be less disruptive to local traffic than conventional reconstruction as we have saved about 180-200 movements of 20-tonne wagons and improved our carbon footprint,' he said. 'According to our specialist in-situ recycling contractor, Stabilised Pavements, we have saved an estimated 12 tonnes of CO_2 emissions.'

By adopting in-situ recycling for Midford Road, the Council has also made cost savings on the bituminous base and binder courses that would have been used in conventional pavement reconstruction. 'The construction work would have cost around £550,000 using conventional pavement reconstruction methods and would have taken longer and been more disruptive to road users and local residents,' said Mr Lansdown. 'The in-situ repair has proved to be operationally quicker on site and can be trafficked almost straight away as a temporary running surface prior to applying the surface course. This has been my first experience of using the in-situ repair technique and I would anticipate using it on similar road strengthening schemes in future.'

The in-situ recycling process, as practised by specialist road recycling and stabilization contractors Stabilised Pavements, based in Lutterworth, Leicestershire, involves rotovating and pulverizing damaged road pavements to depths of up to 320mm. This is performed using a special purpose-built 500kW machine, while simultaneously mixing in specific predetermined quantities of either lime, cement, pulverized fuel ash, bitumen emulsion or foamed bitumen and water, or combinations of these ingredients. The revitalized mixture is then rolled, re-profiled, re-rolled and overlaid with an appropriate final surfacing for a fast return to traffic. The process is performed in accordance with the Transport Research Laboratory TRL Report 386: Design guide and specification for structural maintenance of highway pavements by cold in-situ recycling.

For Midford Road, Stabilised Pavements used a blend of 70% cement and 30% pulverized fuel ash (PFA) applied in a powder blanket across the surface of the rotovated material at a ratio of 8% by volume of the in-situ material's dry density. The quantity of the strengthening agent was determined from pre-contract materials testing and mixed in a one-pass operation with Stabilised Pavement's Wirtgen WR2500 Recycler at the designated depth of 180mm. Water was added into the mix at the same time to achieve the required optimum moisture content. The cement and PFA complement each other as the cement provides an initial strength gain in the recycled road materials, while the PFA slows hydration and contributes to increasing the strength over time.

Stabilised Pavements had to recycle and strengthen in-situ 3,868m^2 of Midford Road to a 180mm depth of tar-bound hazardous material and provide a 20-year design life for 2.5 million standard axles. The approximately 10m wide carriageway was treated in two, separate halves. While one half of the carriageway was being recycled and strengthened, the other half remained open for one-way traffic during a short diversion route. Once the required levels and compaction were achieved the surface of the in-situ repaired carriageway was sprayed with a sealing tack coat and gritted as a temporary running surface for traffic. The process was then repeated for the other side of the carriageway using the adjacent recycled carriageway for one-way traffic.

The way forward

'I believe in-situ recycling has to be the way forward for treating tar-bound roads in the UK, which also provides the additional bonus of saving on CO_2 emissions,' commented Stabilised Pavements director Gerry Howe.

Although the in-situ recycled and stabilized basecourse bulked-up during processing, the Design Group adjusted the centre-line crown levels for the new road surface. The crown was raised by 80mm, and 10mm along the channels, increasing the cross falls to between 6 and 7%. Atkins's surfacing contractors Bardon Contracting followed on and overlaid Stabilised Pavement's rejuvenated full-width road base with a 50mm thick hot-rolled asphalt surface course for a fast return to full traffic.

For further information contact Gerry Howe at Stabilised Pavements Ltd on tel: (01858) 880499; fax: (01858) 881336; email: info@stabilisedpavements.co.uk; or visit: www.stabilisedpavements.co.uk

A blend of cement and pulverized fuel ash was spread as a blanket across the rotovated material to strengthen in-situ the tar-bound road

The cement and PFA blend, applied at 8% of the in-situ tar-bound material's dry density, is mixed in to full depth in one pass of the special rotovating machine