

SOIL STABILISATION

Road Recycling - A Sustainable Solution

Cambridgeshire Highways – the County Council’s highway service and its term maintenance service partner Atkins – have opted to in-situ recycle a 2km stretch of the B1040 at Ramsey St Marys.

In-situ recycling was seen as providing the better solution over traditional reconstruction – where the existing material is excavated and replaced by new materials – and over ex-situ or off-site recycling – where the existing material is removed to a mobile mixing plant for blending prior to being returned to site. The newly in-situ recycled section will have a design life of 20 years for 5M standard axles.

In-situ recycling offered particular benefits to the project. “In-situ recycling offered significant time and cost savings compared with other approaches”, said Stephen Douglas, Cambridgeshire Highways West Area maintenance engineer. “Furthermore, it lends itself to this site and allows residents to use the surface safely at the end of each day during all phases of the project. Ex-situ would have needed an area for the material processing plant. This was not possible with the site being so close to the River Nene”.

“The in-situ recycling technique is also far less disruptive to local traffic and produces a significantly lower carbon footprint”, added Schemes Manager Dan Crawshaw. “Normal full depth reconstruction taking out the damaged pavement and bringing in new materials would have called for some 440 20t lorry movements. Ex-situ would have required 600 lorry trips.” The in-situ method only required 30 lorry trips for the entire recycling operation. Its sustainability credentials are further underlined by the fact that in-situ offers a 14 – 20 reduction in the tonnage of carbon dioxide produced without even accounting for the CO2 emissions that would have resulted from the quarrying for new materials required for traditional reconstruction.

The in-situ deep and cold recycling process involves pulverising damaged or failed road pavements to depths of up to 320mm with a special rotovating machine and mixing in specific quantities of either lime, cement, pulverised fuel ash, bitumen emulsion or foamed bitumen. The revitalised mixture is then rolled, re-profiled, re-rolled and overlaid for a fast return to traffic.

The recycling was undertaken by Leicester-shire-based Stabilised Pavements Ltd (SPL) using a German Wirtgen WR2500 Recycler. “The Wirtgen 2500 can pulverise to full depth while simultaneously delivering accurately metered quantities of water, bitumen emulsion or foamed emulsion into the mixture to strengthen and rejuvenate damaged pavements”, explained SPL’s director Gerry Howe. “On this project rather than bitumen we used a blended Ordinary Portland Cement (OPC) and carried out a lot of sampling and testing to ensure the correct recipe for the repair”.

The road was planed off an initial 1000mm to accommodate the new wearing course. The Wirtgen 2500 then pulverised the road to the full 250mm treatment depth. The Wirtgen’s drum cutter was pushed into the worn-out pavement to full depth and the machine made a climbing cut leaving a 2.5m wide pulverised swath of material in its wake.

A motor grader followed on re-profiling the pulverised material which was then lightly compacted with a Hamm HD90 double drum vibratory roller. A blanket of OPC was then spread to a ratio of 6% by volume of the material’s dry density. The Wirtgen mixed the cement into the pulverised material to the full 250mm treatment depth. At the same time, water to the ratio of 4% by volume, was sucked from a bowsheer in front of the machine and injected directly



into the mix from nozzles in the crown of the Wirtgen’s rotovating drum chamber. All the ingredients were thoroughly mixed to reconstitute and strengthen the old base course.

Following laboratory testing, the strengthened mixture is then compacted, re-profiled and levelled by the grader prior to the Hamm roller compacting the newly strengthened road base to 95% of refusal density. The entire process was repeated to complete the sub-base in-situ repair. The strengthened road base is then sprayed with a sealing emulsion tack coat and covered with grit as a temporary running surface.

“The in-situ recycling has gone very well. Much smoother and faster than I anticipated”, said Douglas. “We had scheduled to work to take 8 weeks but the job, including the white lining, took only 6.”

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