

Aggregate Industries

How green is your blacktop?

Bardon Aggregates, an Aggregate Industries business, is investigating the environmental impact of road surfacing and high performance asphalts, so that its clients can make informed decisions on the basis of sustainability.

Environmental issues and sustainability are increasingly important drivers within the construction industry and its highways sector is no exception. Asphalt suppliers have made impressive progress, particularly in terms of materials recycling and reuse, cold mix technologies and the reduction in transportation of materials to and from site.

But, suggests Bardon Aggregates' Research Manager Bob Allen, there is still much more that could be done if both clients and suppliers were able to assess the true environmental impact of competing solutions. The highways sector, believes Allen, is in danger of falling into the trap of assuming certain materials and systems are

automatically good while others are necessarily bad – end of story.

"Such a simplistic approach to assessment does not provide all of the answers and

"Chapel Ash is a demonstration of sustainability in the development of special types of product and their performance in use." Dr Ben Vivian

therefore should not be used as justification to brush other environmental factors aside," Allen says. "A much more holistic and whole-life view is needed, that takes account of factors

such as energy use, emissions and importantly, product durability.

"To help quantify these issues, we have recently sponsored a PhD student at Newcastle University to provide an independent audit of the environmental impact of various highways projects. The aim is to start collecting data so that clients can make more educated judgements and decisions."

Of particular interest to Bardon Aggregates will be the performance of its Bardon Superflex product within this audit. Superflex is designed for flexibility, durability and resistance to deformation, which makes it particularly suited to highly trafficked urban situations and where there is a need to overlay jointed or cracked concrete pavements.

In Bardon Superflex's very early applications, such as the A236 in Croydon, its selection was based primarily upon performance characteristics, but increasingly clients are beginning to realise that a high performance product is often the most environmentally attractive too.

On a recent project at Chapel Ash in Wolverhampton, for example, Bardon Aggregates provided Superflex14 as both base/binder course and surface course layers to resurface one of the town's main arterial carriageways and associated surrounding side roads. This meant contractor Kennedy Asphalt could use a 100mm inlay compared to the 150mm originally specified, saving around 1200 tonnes of material and significantly reducing the energy requirements and emissions associated with executing the work.

Moreover, though not specifically a recycling

Bardon Superflex has been well received in Wolverhampton as a process that could have sustainable benefits



Research has shown that Bardon Superflex provides considerable advantages in both ease of laying and compaction

application, the 2400 tonnes of asphalt that was removed was recycled for another project. And when improved durability is factored in – Bardon Superflex should last longer than a conventional material – the environmental balance is clearly tipping in Superflex's direction.

Use of Bardon Superflex in Wolverhampton offered an initial cost saving and could well lead to further cost savings over time as requirements for maintenance reduce. Simon May of Wolverhampton City Council's Regeneration & Transportation Department says: "The council's elected members are keen to explore all avenues involving recycling and sustainability and Superflex was therefore

well received as another process that could be shown to have sustainable benefits."

Chapel Ash provides an interesting case study because it is typical of many local authority highway projects. The road's original construction, though not comparable with modern design standards, has nevertheless proved structurally serviceable, with surface cracking proving to be the mode of failure.

The road is underlain by an unbound granular foundation layer, which has become dense through consolidation over many years of heavy use. In fact, Wolverhampton City Council's original option, to take out and replace the top 150mm of the pavement, could have created long-term problems.

Key to Bardon Superflex is the use of polymer-modified binders combined with aggregate of the right size. This ideal mix was developed jointly by Bardon Aggregates and BP Bitumen.

Their research showed that smaller nominal-sized base and binder course mixtures of 20mm and 14mm, with grading structures designed around maximum particle packing, outperform traditional UK mixtures, providing considerable advantages in both ease of laying and compaction.

BP's input is in the bitumen polymer

modification. Traditional bitumen characteristics are essentially viscosity related and correlate directly to resistance to penetration and softening point, whereas modified binders can be engineered to be less likely to crack in cold weather and less susceptible to softening in hot weather.

The result is a proprietary asphalt that has been specially designed to optimise the three key performance properties of flexibility, fatigue life and resistance to permanent deformation. These are critical to the behaviour of asphalt when laid over cracked or damaged pavement layers.

Core samples identified that the upper layers were just 100mm thick in places. Therefore, removing 150mm of material would have eaten into the consolidated foundation layer, which contributes to the road's structural strength. Furthermore, exposing this unbound, consolidated layer could have accelerated its failure, particularly if there was heavy rainfall during the work.

A further advantage at Chapel Ash was the considerable reduction in the contract duration. And with the work being carried out during evenings, in what is a mixed shopping and residential area, disturbance to the community was minimised. The new surface is also much quieter than the one it replaced, which according to May, has been widely appreciated by local residents.

Dr Ben Vivian, Corporate Social Responsibility Advisor for Bardon Aggregates' parent company, Aggregate Industries, says: "Chapel Ash is a demonstration of sustainability in the development of special types of product and their performance in use. Construction changes the environment. As an industry with construction at its core, the roads sector constantly strives to provide products that are less intrusive on both the environment and people's everyday lives."

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