



Running smoothly at Kessock

Gussasphalt performs well in terms of skid resistance, with tests carried out soon after surfacing was laid at Kessock Bridge giving an average GRIP number of 0.79

The drive for more cost effective and durable road surfacings brings forward a stream of innovations, one of which could become a standard for long span bridges. Nick Barrett reports from Kessock Bridge.

Kessock Bridge, spanning the Beauty Firth on the A9 north of Inverness, is providing another proving ground for a long life, high quality surfacing material that is expected to protect the steel deck and provide a smoother than normal running surface for 30 years.

Gussasphalt has been used recently on the Avonmouth and Tamar bridges and is being looked at by long span bridge owners from across the UK; there was a visiting group from the Forth Road Bridge at Kessock when *Transportation Professional* was on site. Its track record includes use on the Storebaelt Bridge.

As well as lasting a hoped for 30 years, the dense mastic asphalt Gussasphalt should also extend the life of the slender 30 year old cable stayed Kessock bridge as the smooth running surface it provides significantly reduces bridge movement under load, which means less welding maintenance on its orthotropic steel deck.

There should be fewer traffic disrupting maintenance interventions over the coming years, and Gussasphalt also provides a quieter running surface, which is important to local residents as 30,000 vehicles – 11% of which are HGV's – use it daily.

Gussasphalt is a development of Swiss company Aeschlimann International and contains a high performance polymer modified binder from bitumen specialist Nynas. The material relies on the properties of the bitumen mixed with crushed stone and limestone fines to provide the stiffness and durability needed for a bridge running surface. The binder – Nynas Endura N5 – is a high performance material designed to ensure suitability for the Aeschlimann mixes.

The details of the mix design vary depending on the project, but includes a blend of sands, limestone filler and a number of additives including Trinidad Lake Asphalt granules. Surface texture

comes from a 6mm bitumen coated aggregate embedded in the hot surface by rollers.

Kessock Bridge is 1056m long, with two-lane dual carriageways and a pedestrian/cycle lane on each side. The main contract for the £13.25M of repairs and resurfacing has been let by Transport Scotland to Balfour Beatty, with BEAR Scotland supervising the works on their behalf. Stirling Lloyd has a sub contract from Balfour Beatty for the deck waterproofing and resurfacing.

The works are in two phases, from February to June this year and from February to June in 2014. Leiths Group supplies the surfacing material from its plant at Contin, some 30km north of Kessock, where it is made according to Aeschlimann's specification.

Asphalt production is very closely monitored by Leiths and Aeschlimann and is brought to site by special delivery trucks that can mix as well as heat the material >

> at temperatures up to 220°C. Leiths Group's technical director Neil Anderson said: "We supplied the surfacing material on a continuous basis over an extended shift of 16 hours to avoid making a transverse joint."

Aeschlimann also takes on the laying operations using its own workforce, with 12,250m² of material laid at Kessock in two layers of 25mm each, but up to 27mm in any dips. One key to the quality is the surface finishing machine that is laid on steel rails to give a high standard of regularity.

Stirling Lloyd project manager Darren Holmes said the previous hot rolled asphalt surface, which was laid when the bridge was built some 30 years ago and was the subject of various maintenance interventions over the years, had cracked in places. "Some areas of corrosion were found across the bridge deck," he said. "We prepared these areas by shotblasting to give us a clean and keyed surface for our primer. We lost quite a few days due to rain as the steel deck would almost instantly oxidise and we would have to blast it again."

Under the surfacing there is a single coat of primer, and two coats of Stirling Lloyd's Eliminator waterproofing, keyed to receive the Gussasphalt. "This is an extremely durable system that is being applied to the bridge, with our two layer Eliminator waterproofing system underneath the Gussasphalt," says Mr Holmes.

Engineer's representative Eric Coulshed of BEAR Scotland said the new surface gives the deck a tension that it hasn't enjoyed before, creating a composite



Surfacing going down on Kessock Bridge, which spans the Beaully Firth on the A9 north of Inverness

structure between the surfacing and the deck itself. Extensive tests were carried out to make sure the products were suitable for Kessock's needs, he said.

"The system is specifically designed for this type of structure and TAIT trials were detailed in the specification for the project," Mr Coulshed said. "Transport Scotland has a 10 year guarantee but we hope for a much longer life for the system."

Corrosion was found in a limited number of areas on the steel deck up to 4mm. The plate on lane one where HGVs run is 14mm thick, and on lane two it is 12mm and the worst of the corrosion appeared on the south approaches where

HGV's pull up the slope causing most wear to the surfacing.

Fatigue analysis by Transport Scotland's specialist consultants at Halcrow and Jacobs confirmed that the thick layer of surfacing bonded so tightly to the deck would reduce fatigue stresses, so it was possible to resurface without major repairs.

A key requirement for a road surfacing is that it provides adequate skid resistance and Gussasphalt performs well on this score, with a skid resistance test carried out soon after the surfacing was laid giving an average GRIP number of 0.79, well within the contract requirements.

Mitigation measures introduced to reduce delays for travellers

Traffic management has been a key and successful part of the Kessock Bridge project, involving consultations with all interested parties and public meetings.

Transport Scotland employed specialist traffic consultant SIAS to investigate traffic congestion, and devise mitigation measures to minimise traffic delays. There was a phase of pre main contract works to install traffic lights at roundabouts on the Inverness side of the bridge approaches as well as at a main junction, with traffic modelling to minimise the need for these works.

Wide loads were timed to minimise delays, with a lot of manufacturing related traffic to

the north of Kessock at Evanton, Invergordon and Nigg Bay.

Temporary dedicated bus and HGV lanes were introduced as part of the traffic management scheme.

Peak-time train services to and from Inverness from the North were doubled in capacity while the works were under way between February and June. Bus operator Stagecoach put on additional bus services to and from the Black Isle to the north of Inverness.

Additional car parking was provided at Dingwall and Beaully rail stations. Transport Scotland part funded the reopening of Conon

Bridge Railway Station, which was also constructed and operational prior to the start of the bridge resurfacing contract.

Additional VMS signs and CCTV cameras were installed to provide better information to road users. Delays have been less than feared so the careful preparation has paid off.

Transport Scotland's major bridges manager Douglas Laird said: "The mitigation measures represented an investment of around £2.5M, some of which will have significant long term benefits to the local community. It was extremely encouraging to see all stakeholders playing their part and making a big effort to ensure this major project ran smoothly."