BRITPAVE NEWS

ISSUE 40 - SPRING 2020

Slipforming success

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The British Cementitious Paving Association

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CHAIRMAN'S WELCOME

These are challenging and uncertain times and my best wishes go to all Britpave members.

Against this background, Britpave continues to forward the interests of its members by highlighting the wide ranging benefits of insitu cementitious infrastructure solutions. Recent publications include 'Motorway Barriers: The Concrete Benefits', which does exactly what the title says and underlines the superior vehicle containment levels, long-term performance life, reduced maintenance and minimum land take of concrete barriers. Another new report, 'An Introduction of Horizontal Slipform Paving', demonstrates the efficiency and productivity of using concrete slipform for a wide range of infrastructure projects including roads, busways, barriers and drainage channels.

The Association also continues to forward the benefits of concrete pavements. This issue of Britpave News explains how concrete road pavements will help the government deliver its decarbonising transport plans by reducing the fuel emissions of vehicles and providing a future infrastructure network that can readily charge electric vehicles as they pass over the road's surface. Meanwhile, new developments in groove and grind concrete pavement techniques have resulted in the 'Next Generation Concrete Surface' that offers the holy grail of road surfaces: long-lasting roads with a possible 75% reduction in traffic noise.

Also in this issue is coverage of member projects and products, Royal openings and industry initiatives.

I hope that this issue helps you to keep in touch with your industry sector. Stay safe. Stay well.

Joe Quirke
Britpave Chairman and Engineering Manager, VolkerFitzpatrick

Britpave, the British In-situ Cementitious Paving Association, promotes the better and greater use of concrete and insitu cementitious infrastructure solutions. Its members include major contractors, specialist equipment and material suppliers, consulting engineers and interested trade associations. Together, they provide a single voice for the insitu concrete paving industry.

Britpave News is published regularly by Britpave with the aim of keeping members up to date on Association matters, industry developments and member company news and views. Please help keep us in the picture on all of this by sending us any relevant information that you feel may be of interest to the membership.

COVID-19 AND THE NEW NORMAL FOR INFRASTRUCTURE”

The Institution of Civil Engineers is undertaking research into the impacts of Covid-19 on infrastructure and what role the sector can have in helping society recover from the pandemic.

Key questions to be examined by ICE's Infrastructure Client Group include “what will the 'new normal' look like for infrastructure and construction?”, “what will the ‘new normal’ be for society in the aftermath of COVID-19?” and “what role will infrastructure play in that landscape as well as its long-term recovery?”

Led by a steering group chaired by ICE President, Paul Sheffield, the project will amalgamate views and insights from across the membership, infrastructure professionals and policy experts as to how Covid-19 has *already impacted society and infrastructure* and what the implications of that will be if those impacts remain unaddressed over the coming months and years.

With various socio-economic issues previously raised in ICE’s National Needs Assessment of 2016, the research is also looking to demonstrate the critical role for infrastructure in building a more sustainable Britain in line with the *UN’s Sustainable Development Goals*, while providing government and industry decision-makers with a valuable knowledge resource for future planning.

"Everybody wants to know what the new normal looks like and with most of us now adept at video communication on a variety of platforms and attending virtual conferences and debates, that could act as a catalyst for a huge change in societal habits," said Sheffield.

"For instance, it could be a real benefit for those who are not comfortable with going into a traditional office place to be able to create the space for more home working whilst truly delivering great value to their business. Then, if everyone worked from home one day per week, that just might take 20% off the roads and rail links that we use for our commute - not to mention the 20% reduction in the desk space that we might need in the expensive offices that we occupy."

The programme’s first stage has been to gather insight from experts on what Covid-19 shows us we can, and must, do differently to address Britain’s entrenched social, economic and environmental challenges. Initial findings will be outlined in a Green Paper and a consultation period will be held over the coming weeks, with infrastructure professionals and other stakeholders invited to offer submissions that will inform the final White Paper.

The programme will provide a crucial information resource for government and industry stakeholders during a time when they may be unable to do so as they are rightly focused on reducing the spread of Covid-19, and mitigating the impact of measures put in place such as social distancing. The White Paper will also make a series of recommendations for future infrastructure requirements and how to deliver these based on the expertise fed in through the consultation process.

For further information visit:
https://ice.org.uk/news-and-insight

BALFOUR BEATTY WINS A19 CONTRACT

Britpave member Balfour Beatty has secured a Highways England £63 million contract to develop, design and deliver critical dual carriageway upgrades on 5km of the A19 between Norton and Wynyard in the North East of England.

The contract forms a key part of the Government's Road Investment Strategy and includes increasing capacity from two to three lanes whilst utilising noise-reducing concrete to diminish traffic noise-pollution.

Phil Clifton, Managing Director of Balfour Beatty's Highways business, said: "This vital project is critical to the Government's initiative for growth in the North East of England. We are delighted to be able to provide the road-user with a more sustainable road network which will ease congestion and improve journey times as well as working with the local community to give back to the areas in which we operate."

Highways England project manager Keith Bradley said: "Drivers who use this busy route have had to put up with congestion, particularly during rush hour, while the road surface has caused a noise issue for people living nearby."

Works are scheduled for completion in Spring 2022. At construction peak, Balfour Beatty will employ a workforce of 150 of which 10% will be from the local area as well as offering six apprenticeship positions.

UK LOSES 11% MORE LAND TO BUILDING OVER LAST TEN YEARS

The need to re-use brownfield sites has been underlined by new research from the Ordnance Survey that, for the first time, measured land use to the nearest square inch. The survey found that the amount of land in the UK occupied by buildings has grown by over 11% over the last ten years.

Some 8.3% of Britain's land mass of 90,500 square miles is now built on, compared with 7.7% in 2010. Buildings took an extra 129 square miles, roads expanded by 132 square miles and artificial surfaces such as carparks and hardstandings grew by 282 square miles.

The Government's pledges to increase housebuilding can only increase the pressures to build on greenfield and rural sites. Britpave believes that the redevelopment of brownfield land could significantly reduce these pressures.

"In the UK, according to the Campaign to Protect Rural England, there are 69,000 acres of brownfield land on which over 1.1 million new homes could be built," said Al McDermid, Chair of the Britpave Soil Stabilisation Task Group. "Much of this brownfield land could be sustainably and cost-effectively developed by using soil stabilisation techniques. This would address any issues resulting from the sites' previous use and provide a viable alternative to greenfield sites.

The new figures from Ordnance Survey underline the limited asset that is land. Soil stabilisation maximises the potential of brownfield land to be re-used and so reduce the need to build on greenfield sites."

NEW MD FOR COSTAIN

Sue Kershaw has joined Costain as managing director of its transportation division where she will be responsible for the highways, rail and aviation sectors.

Sue has a strong track record for driving complex, high profile transport and construction programmes to delivery. She is currently president of the Association for Project Management, a member of the Mayor of London's Infrastructure Advisory Panel and a Royal Academy of Engineering visiting professor at the Bartlett School of Construction and Project Management, University College London. Before joining Costain, Sue was managing director, Infrastructure Advisory Group at KPMG. Prior to that she was UK infrastructure head of programme management for KPMG Major Projects Advisory. Previous positions include director of rail, Europe at CH2M and deputy director of transport for the Olympic Delivery Authority. Sue is a civil engineer and started her career with Taylor Woodrow.

GOVERNMENT ISSUES HS2 'NOTICE TO PROCEED'

The Government has provided confirmation of the go-ahead for HS2 by issuing a 'Notice to Proceed'. The Notice is formal approval for main construction works to begin. It follows Government consideration of the independent Oakervee review that saw Prime Minister Boris Johnson confirm to Parliament last February that the project should go ahead to deliver vital improvements to rail capacity and connectivity across the Midlands and the North together with a reform package to improve HS2 governance to ensure that the project is delivered better and more efficiently. HS2 has now entered Stage 2 of the main works civils contracts.

Making the announcement at the height of the Covid 19 pandemic, HS2 Minister Andrew Stephenson said: "While the government's top priority is rightly to combat the spread of coronavirus, protect the NHS and save lives, we cannot delay work on our long-term plan to level up the country.

HS2 will be the spine of the country's transport network, boosting capacity and connectivity while also rebalancing opportunity fairly across our towns and cities.

Following the decision earlier this year to proceed with the project, this next step provides thousands of construction workers and businesses across the country with certainty at a time when they need it, and means that work can truly begin on delivering this transformational project.

The 4 work packages are for full detailed design and construction of Phase One of the HS2 railway. Through these contracts, small and medium businesses have the guarantee of a pipeline of activity for the future, helping to protect jobs and boost certainty for them in the current climate."

The joint ventures, originally awarded contracts by HS2 Ltd in July 2017, are:

- SCS Railways (Skanska Construction UK Ltd, Costain Ltd, STRABAG AG)
- Align JV (Bouygues Travaux Publics SAS, a subsidiary of Bouygues Construction, Sir Robert McAlpine and VolkerFitzpatrick, a subsidiary of VolkerWessels UK)
- EKBF JV (Eiffage Genie Civil SA, Kier Infrastructure and Overseas Ltd, BAM Nuttall, Ferrovial Agroman)
- BBV JV (Balfour Beatty Group Ltd, VINCI Construction Grands Projets, VINCI Construction UK Ltd, VINCI Construction Terrassement)

Together with the Notice to Proceed, the Government has published its 'Full business case High Speed 2 Phase One' that sets out the strategic and economic case for the project and outlining how it will deliver a positive return on investment, alongside boosting capacity and connectivity needed in towns and cities across the country, delivering on the government's levelling up agenda.

CONCRETE SOLUTION TO DECARBONISING TRANSPORT

Concrete infrastructure will help the government deliver its decarbonising transport plans by increasing the use of public transport, reducing the fuel emissions of vehicles and providing a future infrastructure network that can readily charge electric vehicles as they pass over the road's surface.

A preface report to the transport plans, due to be announced in the Autumn, has been published by the Department for Transport. The report, 'Decarbonising Transport: Setting the Challenge', underlines that transport is the largest contributor to greenhouse gas emissions in the UK contributing 28% of UK domestic CO_2 emissions and outlines six strategic priorities to enable the UK to reach net zero CO_2 emissions by 2050. These include increasing the use of public transport, decarbonising road vehicles and forwarding the UK as a hub for green transport technology.

The report highlights that 58% of car journeys taken in 2018 were for a distance of under five miles. Many of these could be done by the provision of more reliable and punctual public transport. For this, the government should encourage greater investment in busway networks. Busways typically consist of two 180mm high concrete kerbs set 2600mm apart on a concrete pavement. The kerbs act as both the guide for the bus and physical segregation from other traffic. This segregation removes the problems of traffic congestion, obstruction by parked vehicles and the use of bus lanes by unauthorised vehicles and so provides for a more reliable and faster bus journey.

The success of busways speak for themselves. Last year, the Leigh to Ellenbrook busway carried over three million passenger journeys. It is estimated that use of the busway has resulted in 580,000 fewer car journeys. The Cambridge to Huntingdon busway is annually carrying nearly 4 million passenger journeys. This is good news in terms of reducing car journeys and so reducing CO_2 emissions from road transport.

Transport CO_2 emissions can also be reduced thanks to the stiffer long-term performance of concrete road surfaces. Concrete roads have less 'play' when vehicles tyre roll over them. This means less rolling resistance resulting in more efficient fuel consumption. The increased fuel efficiency resulting from driving on concrete roads has been proven by several research studies. Research carried out the Canadian National Research Council's Centre for Surface Transportation Technology, the Swedish Road and Transport Research Institute and the Nippon Expressway Research Institute have all found that found that vehicles use less fuel when travelling on a concrete road compared to an asphalt pavement.

The government's decarbonising transport plans focus strongly on the widespread adoption of electric vehicles (EVs). However, the lack of a battery-charging infrastructure could severely hamper their uptake. According to the data company Emu Analytics there are only 16,500 charging points in the whole of the UK. It is estimated that with one million new EVs on UK roads within the next two years there needs to be a network of 100,000 charging points. Currently, only 3 per cent of

supermarkets have a charging point. Rapid chargers, which can fill 85 per cent of an EV's battery in half-an-hour are particularly scarce. The potential problem of a lack of charging points is compounded by the fact that whilst many EV drivers are likely to choose to charge their vehicles at home, or at their workplace, 20 to 30% of motorists do not have off-street parking. More than a third of households in England do not have access to off-street parking, and this proportion increases in most urban areas.

A new approach to charging points is required. The potential of concrete 'eRoads' that inductively charge EVs as they travel should be examined. Inductive charging is where the EV battery is charged without the need to plug the vehicle into a charging point. The process is wireless and can be done whilst the EV is on the move or stationary. If the vehicle is moving the process is referred to 'dynamic charging'.

A number of concrete eRoad options are being researched and developed where electric coils are installed within the road surface to create a magnetic field. The magnetic field creates an electric current in a secondary coil placed on the vehicle's undercarriage which feeds the charge to the vehicle's batteries.

What is being underlined by this research is the need for the road surface to have long-term durability and minimum maintenance. Both are inherent characteristics of concrete roads. A further benefit of concrete roads for the installation wireless modules is that in hot summer temperatures they, unlike asphalt, do not melt. Such melting could dislodge and compromise the positioned embedded wireless system.

Other exciting possibilities include making the actual concrete road itself conductive. Australian-based Talga Resources are mixing graphene into concrete to make it conductive and so charge an EV whilst it is driving. In Germany, Magment concrete is being developed. This consists of 87 per cent magnetisable aggregates which is waste product from the manufacture of ceramic ferrites and the recycling of electronic scrap. It allows energy to flow into a coil to inductivity charge vehicles as they pass. The proposal is to cast (either precast or insitu) concrete ready-to-connect coil modules that contain all the required wiring including optional sensors for integration into road construction.

Durability and minimum maintenance are key for future eRoads. This is especially so as the vehicles, particular heavy goods vehicles, will be travelling on the same path in order to charge. The road surface must, therefore, not prematurely deflect or rut. Concrete roads have a performance life of 50-60 years and are so fully able to provide the required long-term durability.

It is ironic that concrete, often seen as being an environmental problem, could, in fact, be the environmental solution to providing a transport infrastructure that can significantly forward the decarbonising transport agenda.

SLIPFORMING SUCCESS

Horizontal slipforming offers a fast way to achieve long-term, high performance, low carbon concrete infrastructure. The publication of new guide to horizontal slipforming could increase the take-up of modern efficient concrete infrastructure construction.

Horizontal slipforming is the on-site process of constructing continuous concrete elements such as highway and airfield pavements, tunnel inverts, railway slabtrack, guided busways, safety barriers, kerbs and drainage channels. It involves low slump concrete being placed into continuously moving concrete paving machines. Internal compaction by high frequency vibrators consolidates the mix into the shape of the mould.

As a construction method, slipforming can efficiently provide long-life structures which are 100% recyclable and, in the case of road pavements, still functioning well after 50 years despite carrying 50% more traffic than they were designed for. Furthermore, slipforming can realise the benefits of the low carbon agenda that the concrete industry is forwarding such as the development of low carbon cement mixes which have a lower carbon impact than asphalt. It can also demonstrate the whole life benefits of stronger, thinner modern concrete which are well known but for which take-up is low.

There are two distinct types of slipforming operations. The first is for barriers, channels, drains and kerbs. For these, the slipforming moulds are narrow and high. Typically concrete is conveyed from mixer trucks into the mould which is attached to the side of the paver. These can pave barriers/walls up to a height of around 2m and can achieve outputs of 300-400 linear metres per shift depending on the cross-sectional area of the structure.

Reinforcement can be provided in the form of continuous strand which is inserted through slots in the front of the mould. Reinforced cages can also be accommodated but the mould/vibrator arrangement is more complicated.

The most visible use of concrete barrier is the use of concrete barriers on the central reservations of motorway and trunk roads. There, they offer a vehicle restraint system that prevents cross-over accidents, saves lives, reduces congestion and is maintenance free .Even following severe vehicle impact, slipformed concrete barriers should not require repair or replacement given their high H2 containment level with a reduced ASI value of only 1.4 and impact severity level B. This provides the ability to contain errant vehicles up to 13.5 tonnes. Slipformed concrete safety barriers are fully compliant with the relevant European standard series EN 1317. There are a number of systems in the UK. Slipformed slot drains and V-channels are a practical and cost-effective drainage solutions particularly for motorway and trunk roads where they need minimal footprint space.

The second type is for pavements, tunnel inverts, rail slabtrack and busways. Here, the concrete is usually tipped from in front of the paver. High frequency vibrators are set across the slab usually at 0.3m centres and at half slab depth. The zone of influence from these vibrators overlap each other and provide continuous compaction across the width and depth of the slab.

These pavers can achieve outputs of 700-800 m^3 per shift and usually require an on-site batching plant to provide a

continuous supply. The width of the slabs can be up to 10m and 0.5m deep.

Reinforcement can be accommodated in these slabs. However, the concrete cannot normally be end-tipped. It will be necessary to use an additional machine to place the concrete over the reinforcement. Specialist placing plant is available for this, or excavators can be used as well.

The concrete mix must be designed with the right amount of fine/coarse aggregate and water to allow the concrete to stand unaided after the mould. Too much water and it collapses, too little and the finish is poor. It is necessary to use a low-slump concrete, 20-30mm, to enable the concrete to retain its shape as the slipform paving machine advances. Consequently, this provides improved compression and flexural strength. A concrete curing compound should be applied as soon as practically possible. Line and level are achieved by the slipforming machine following prefixed line and level guide wires. The result is a formwork free, cast-in-place concrete structure. Joints are normally saw cut into the structure when the concrete can withstand cutting without damaging the finish. However, this saw cut must be induced in time to avoid contraction cracking and this is typically 14-18 hours after laying.

There are several factors that need to be considered to determine if slipform is a practical construction solution including length of the proposed slipform project, site access and the availability and regularity of concrete supply.

In addition, there are the more specific considerations of understanding the required tolerances and aesthetics. Generally, the first type of slipforming will achieve tolerances of + 10mm for both line and level. The finish of these elements cannot usually be altered by brushing or trowelling.

The pavement slab type of slipforming will achieve a tolerance of + 6mm for level + 10 mm for line These rigorous tolerance levels can be achieved provided the concrete mix is consistent and that the line and level are provided by 3D modelling paver guidance systems. Pavement slabs can receive textures and finishes after the slab has been laid. The surface texture for slipformed pavements is applied by brushing during construction. The depth and pattern determines the surface friction, skid resistance and tyre-road noise of the finished pavement.

Exposed aggregate concrete surface (EACS) is achieved by applying a render to the fresh concrete surface. The surface mortar is later brushed away to expose the aggregates and provide negative texture. Another development in Europe and the US is the application of longitudinal diamond grooves as a surface treatment. The technique, known as 'Next Generation Concrete' surfacing, produces noise levels similar to asphalt.

For highways infrastructure, horizontal slipforming is a fast, cost efficient way to deliver high quality concrete elements. It offers an efficient mechanised process that has a high productivity rate with minimum waste and long-term durability plus the minimum maintenance expected with concrete construction.

Copies of *'An Introduction to Horizontal Slipform Paving'* may be downloaded from: **https://www.britpave.org.uk/Publications**

MOTORWAY BARRIERS: THE CONCRETE BENEFITS

Britpave has published a new guide to the benefits of concrete motorway barriers. These benefits include superior vehicle containment to reduce the risk of crossover accidents, a performance life of at least 50 years with minimum maintenance, minimal land take, the use of recycled aggregates and full end-of-life recyclability plus a wide range of available barrier types.

With such a range of benefits, it is little wonder the concrete central barriers are the default option for motorways and trunk roads where the average annual daily traffic level is 25,000 vehicles per day or more.

'Motorway barriers: the concrete benefits' is available as a free download from www.britpave.org.uk/publications

DUKE OF CAMBRIDGE OPENS NEW TARMAC TRAINING FACILITY

An industry-leading training facility for people working in the construction sector has been officially opened by His Royal Highness The Duke of Cambridge.

Leading construction materials business, Tarmac, has developed a National Skills and Safety Park located at an active quarry near Mansfield in Nottinghamshire, to ensure that it can provide first-class, practical training for emerging industry talent – including apprentices, graduates and those retraining from other sectors.

Marking the official opening of the innovative facility, His Royal Highness met with a number of Tarmac's young apprentices to learn more about their roles and career ambitions. The Duke got first-hand experience of Tarmac's 100 year-long expertise in road building at the helm of a cutting edge paving machine, as well as being introduced to apprentices in the training centre's maintenance workshop and trying his hand on one of the company's quarrying excavator simulators.

Martin Riley, Tarmac's senior vice president who started his own career in construction as an apprentice, commented: "It was an honour to welcome His Royal Highness to our new facility which is already helping people beginning a career in construction and those already established in the sector to develop new skills.

"Major infrastructure programmes are the foundations on which the construction industry and its supply chain are built, providing exciting and rewarding career opportunities for people from all walks of life across the UK who can help shape the built environment of the future.

"We're extremely proud to launch this new facility."

The opening of the new facility forms part of Tarmac's ongoing commitment to upskilling young people – with over 300 of the company's existing staff currently undertaking its apprenticeship programmes. The business is proud to be a member of the 5% Club, an organisation committed to ensuring that in the next five years 5% of its memberships UK workforce are young people on training schemes.

FREEPORTS CONSULTATION

Upon leaving the EU, the government has announced its aim to create 10 freeports across the UK. These would have differ different customs rules than the rest of the country, and would act as innovative hubs to boost global trade, attract inward investment and increase productivity.

The government has drawn on evidence from successful freeports around the world to develop a UK freeport model. The proposed model includes tariff flexibility, customs facilitations and tax measures. It is also considering planning reforms, additional targeted funding for infrastructure improvements and measures to incentivise innovation.

To support this work, the government has launched a formal consultation to obtain feedbacks on the UK's plans for freeports. The consultation finishes on 13th July 2020. For further information visit: **www.gov.uk/government/consultations/freeports-consultation**

CEMEX LAUNCHES CARBON NEUTRAL CONCRETE

Britpave member CEMEX has launched the Vertua low concrete range which includes, which includes the option to offset residual CO2 and provide a CarbonNeutral product, in accordance with The CarbonNeutral Protocol. The Vertua range is an important step to support the Company's recently announced climate strategy, which includes an ambition of delivering net zero concrete globally by 2050.

The range features a variety of bespoke concrete mix designs and includes the Vertua ultra zero option, which is a CarbonNeutral product. This product achieves a 70% reduction in embodied carbon emissions, with the remaining unavoidable emissions offset through working with Natural Capital Partners, a carbon offset and carbon neutrality specialist.

To contribute towards the 70% reduction, CEMEX is introducing a new innovative geopolymer cement solution, which was developed at its Global Research & Development Centre in Switzerland and can be used in certain applications. In addition to Vertua ultra zero, the range also features other low carbon concretes which can be used in a wide range of applications and include an option for customers to choose the added benefit of offsetting the residual CO2.

After engineering carbon reductions into the concrete mix design, CEMEX calculates the embodied carbon generated from extraction and processing of raw materials, product manufacturing and distribution. The residual carbon is then offset, making the concrete CarbonNeutral from cradle-to-customer.

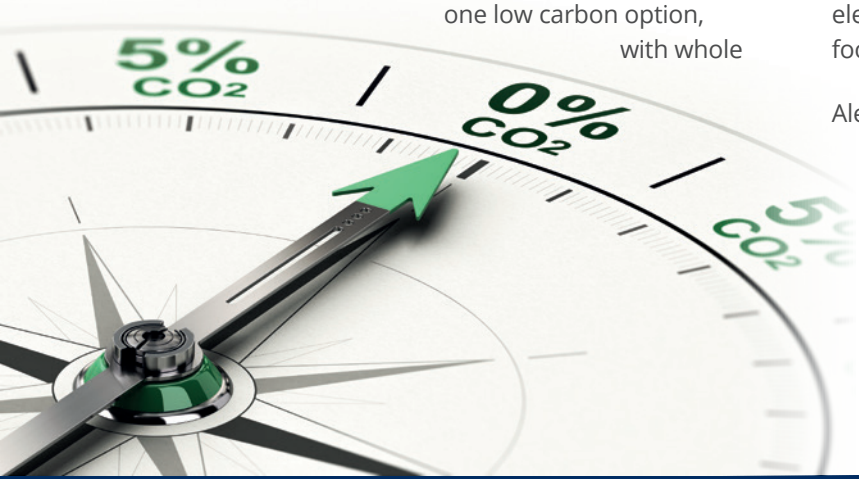
Carbon offsetting is the removal or reduction of emissions of carbon dioxide or other greenhouse gases from the atmosphere in order to compensate for emissions made elsewhere. CEMEX will facilitate this by investing in projects which physically remove CO2 where possible from the atmosphere, such as planting more trees or protecting against deforestation through an independently audited and verified project. A CarbonNeutral certificate is then issued to the client.

Andy Spencer, VP Corporate Affairs, Sustainability & ERM for CEMEX Europe, said: "We are really proud to introduce Vertua, the UK's first CarbonNeutral® ready mixed concrete product. By offering a range of low and 'zero' carbon concretes, including the ability to offset the current residual CO2, we aim to make it easy for clients to make the vital transition to more sustainable choices.

COSTAIN COMMITS TO DELIVER LOW CARBON WHOLE LIFE SOLUTIONS

Britpave member Costain has launched its detailed climate change action plan in which it commits to deliver low carbon solutions, including tackling 'Scope 3' emissions, to every client by 2023 and to be net zero by 2035. This will be via a whole life cycle approach, eliminating clients' and supply chain's emissions as well as its own.

Working collaboratively with government, clients, partners and its supply chain, Costain has revealed that by 2023, every solution delivered for clients will propose at least one low carbon option, with whole life cycle zero carbon emission solutions being delivered by 2035. The plan also outlined how the Group will play a leading role in the development and delivery of both carbon capture and clean and renewable energy generation to reduce carbon footprints across every sector.



Costain has published how it will reduce plant emissions, incorporate low or zero carbon materials, switch all of its energy connections to carbon neutral energy tariffs and overhaul its vehicle fleet to ultralow emission vehicles as elements of the commitment to reduce its total solution footprint to net zero by 2035.

Alex Vaughan, Costain CEO said: "Eliminating carbon emissions is fundamental to ensure we help shape UK infrastructure to mitigate and adapt to the global challenge of climate change. We are developing and offering our clients low carbon, whole life solutions to ensure that we make a positive difference over the next decade."

SHHHH!

A NEW GENERATION CONCRETE PAVEMENT PROMISES QUIETER ROADS

New developments in groove and grind concrete pavement techniques offer the holy grail of road surfaces: long-lasting roads with a possible 75% reduction in traffic noise.

The developments result from research carried out in 2005 that focused solely on traffic noise reduction has led to widespread adoption throughout the USA and Europe of a new groove and grind technique that provides a pavement that is described as being 'Next Generation Concrete Surface (NGCS)'. The UK fully has yet to fully examine the new groove and grind technique and its potential for significantly quieter roads that, importantly, can be used for both new and rehabilitated road surfaces.

The research was carried out by Purdue University, Indiana, USA. It studied 36 different concrete pavement groove and grind textures and their associated tyre noise generation and found that the geometric configuration of the blades and spacers used to construct the pavement texture was not the determining factor behind tyre noise generation. Rather, the resulting fin profile was the most important factor.

The optimum texture for noise reduction was found to be a combination of longitudinal grinding and diamond grooving. Diamond blades grind a negative texture in a longitudinal direction with a consistent profile of one deep groove and four shallow grooves. On a rehabilitated concrete road pavement, the use of NGCS can decrease tyre-pavement noise by 6 dBA which is the equivalent of a 75% traffic noise reduction compared to existing surface. Compared with an asphalt flexible pavement the noise reduction is 4 dBA or 50%. The textures provides the high level of skid resistance minimum maintenance and whole life cost benefits associated with concrete pavement solutions.

NGCS can be used for both the new construction roads and the rehabilitation of existing surfaces. Typical NGCS specs involve a first step of flush grinding concrete using 1/8-inch-wide blades with 0.035-inch spacers. The second step involves cutting longitudinal grooves ranging from 1/10 to 1/18 inches wide to a depth of 1/8 - 3/16 at 1/2- to 5/8-inch centres. The grinding process can be accomplished in single lane operations with short lane closures when necessary.

Following the research, a number of successful field trials resulted in American Concrete Pavement Association heralding the technique as being "the quietest texture yet developed for non-porous concrete pavements" and it being widely adopted for road projects by state highway authorities throughout the USA.

Trials in Europe have also underlined the potential of NGCS. In 2015, a trial was carried out on the N44 in Maldegem, Belgium. The trial comprised testing two different profiles on an existing jointed concrete road with an exposed aggregate surface. The thickness and diameter of the diamond blades was the same for both profile. The difference was the spacers which were considerably narrower for the first trialled profile. The close proximity (CPX) rolling noise measurements showed that the NGCS decreased traffic noise by 6 dBA compared to the existing concrete surface. The second rougher profile reduced the rolling noise by 2 dBA. A year later and the first profile is still providing significant noise reduction of 4 dBA while the second profile was the same.

NGCS is the first new concrete pavement texture introduced in the last 20 to 30 years and is the quietest texture yet developed for non-porous concrete pavements. The texture can be constructed on newly constructed pavements as well as existing pavements. It uses conventional diamond grinding equipment and blades but in a somewhat different configuration than traditionally used. The potential of NGCS for significantly reduced traffic noise on roads that are long-lasting and require minimum maintenance is being realised throughout the USA and increasingly in Europe. It is a potential that the UK should be actively examining.

NEW DESIGN MANUAL FOR ROADS AND BRIDGES LAUNCHED

Highways England has launched the new Design Manual for Roads and Bridges (DMRB) with its own new web location, www.standardsforhighways.co.uk/dmrb/ , making it easier and quicker to find information in what is known as 'the highways bible'. Several Britpave members provided input and feedback for the new document.

The publication marks a huge achievement for Highways England, which was challenged by the government in 2015 to review the usability, structure and content of the DMRB before April 2020. The new manual has been limited to a standards document.

Highways England believes that the new manual has significant benefits including:

- It is written to enable increased innovation and reduce the need for departures from standard by a projected 60% - which is equivalent to a saving of £10m per year
- It has been produced in a digital format that will enable innovation in design, construction and operation
- The new website enables easier access to DMRB documents, including archive documents, on a range of devices including mobiles and tablets
- The documents are written in a clearer, more concise style enabling a 50% reduction in word count and 60% reduction in the number of documents
- The standards have been authored, reviewed and housed in an easy-to-use enterprise system. The new digital approach has cut the time taken to author and review documents by around 70%.

Highways England's head of technical standards, Steve Davy, said: "To help the highways industry operate more efficiently, and to encourage more innovation, we have digitised and updated 300 standards used on a daily basis by anyone working on motorways and trunk roads in the UK and internationally

The new documents are in a format which make them far easier to read and apply. They reduce the need for departures from standard by 60% – which is equivalent to a saving to the industry of £10m a year.

'Anyone working on the design and maintenance of roads infrastructure will need to be aware of the changes."

PARIS-ORLY AIRPORT COLLABORATION

Britpave members Colas and Allied Infrastructure were part of a major collaborative effort to re-building the runway at France's second biggest airport.

The renovation and upgrading of runway 3 at Paris-Orly airport, built soon after the WWII and extended in 1959, had become essential. Colas Île-de-France Normandie secured the contract for the project, as part of a consortium with Colas Projects, Spie batignolles valérian, JDC Airports and Cegelec.

Between July and December 2019, teams pulled off a technical, logistical and environmental feat. With an average of 33 million passengers per year and 627 flights per day, deadlines were tight. At the height of operations, 700 people were working on site, alongside more than 150 machines and heavy trucks. As part of a circular economy approach, the concrete removed from the former runway was recycled in situ and either re-used for the new runway or sent out for use on other sites in the Paris area.

Allied Infrastructure, part of Colas Ltd in the UK, were called upon by the Colas Group to be part of the team completing the major renovation works on Runway 3 of Paris-Orly airport which re-opened in December of last year.

The intensive 18-week project was completed on schedule and encompassed three key phases, consisting supply of machinery and aggregates, closure of two runways to allow for the rehabilitation of main intersections and, finally, reconstruction of runway and taxiways. From an environmental standpoint, a recycling plant specially installed along the runway meant that 200,000 tonnes of existing materials could be re-used, thus negating 13,000 truck trips – 6,500 for evacuation to landfills and a further 6,500 for the transport of materials to the construction site.

The experienced team from the UK assisted the fast-paced scheme by carrying out over 8,200 linear metres of rock sawing through roller compacted concrete and heavily reinforced flint concrete and steel. Additionally, the Allied team collaborated with Colas to enable trenching before new ducting could be installed on the runway. With on-site machinery unable to cut through the reinforced materials, Allied's specially modified, 200mm wide rock saw successfully breached the concrete, resulting in additional rock sawing works being rewarded and timely delivery of the programme.

GILL CIVIL ENGINEERING WINS FOLLOW-ON MANCHESTER AIRPORT CONTRACT

Whilst undertaking the PP03 Package as part of the Manchester Airport Transformation Project, Britpave member Gill Civil Engineering have also been appointed by client Galliford Try and MAG to undertake the PPO4 contract for the installation of 1450m secondary ducting, 600m slot drainage plus the installation of 15,500m² of 430mm thick pavement quality concrete (PQC) and 125mm thick wet-lean concrete (WLC).

To ensure that the large volumes of PQC and WLC could be delivered efficiently Gill set-up on-site concrete batching plant.

All works in the PP04 Package are being carried out on a live airside environment during the night and the project is expected to be complete by December 2020.

EUPAVE CONCRETE PAVEMENT PRESENTATION WORKSHOP

Eupave is to hold a Eupave Workshop on Best Practices on Wednesday 14th October 2020. The theme of the workshop is 'concrete pavement preservation'.

Subjects to be discussed include concrete pavement preservation strategies and road condition a assessment plus an examination of different repair techniques for concrete slabs and CRCP. Finally some innovative developments in concrete preservation will be presented including the use of self-healing concrete and multi-crystalline technologies.

This workshop aimed at highway authorities, engineers and contractors. Participants will have the opportunity to exchange and discuss specific aspects and challenges. Registration is free. Contact: Elise Carabédian at email: **e.carabedian@eupave.eu**

NEW GUIDE FOR DESIGN OF JOINTED PLAIN CONCRETE PAVEMENTS

Jointed Plain Concrete Pavements (JPCP) are amongst the most common type of cast-in-place concrete pavements in the world. Specific to all concrete pavements, the phenomenon of cracking occurs when the concrete is exposed to several thermal and mechanical actions due to early-age shrinkage or expansion, temperature gradient, traffic stresses or possible soil movements. The transverse joints of which it is constituted are essential to prevent the pavement from cracking randomly. Namely, the principle of JPCP is to intentionally locate the cracks at these joints and, in this way, control their location and width. This method differs fundamentally from another type of concrete pavement called "Continuously Reinforced Concrete Pavement" (CRCP), which has no transverse joints, but a network of fine transverse cracks whose evolution is controlled by longitudinal reinforcement bars.

This new Eupave publication provides a general overview of the basic principles of JPCPs, as well as an assessment of the influence of the aforementioned factors. In addition to many useful recommendations for the design and construction, this document does not fail to deal with different aspects such as thermal movements, different types of joints and reinforcements. Finally, this publication also contains a guide for the design of joint layouts according to the rules of art.

To download a copy visit: **https://bit.ly/35Tfiyi**

MEMBERS' NEWS

DANLEY JOINS BRITPAVE

Britpave, is pleased to announce that Danley Ltd has joined as a new member. Danley manufactures and supplies engineered load transfer dowels for superior free-movement sawn joints that require minimal maintenance, in concrete ground supported slabs. They also offer concrete pavement designs that are more sustainable and better performing than conventional methods.

Joe Quirke, Britpave Chairman said: "We are pleased to welcome Danley as a new Britpave member and look forward to their involvement in helping us forward innovative concrete solutions."

Danley's key products are its Danley® Dowel and the PD3™ Tapered Plate Dowel System, which are used together to provide Strategic Reinforcement™ pavement designs. Danley's Strategic Reinforcement™ design is a value-engineered solution that combines the benefits of a ground supported concrete slab design, with the performance of its engineered tapered plate dowels. Danley's Strategic Reinforcement™ design provides many advantages to contractors, engineers, and asset owners. Such advantages include superior load transfer, minimised joint spalling and out of joint cracking, long service life and sustainability benefits through reduced slab thickness and steel content. For more information visit: **www.danley.co.uk**

ROADGRIP JOINS BRITPAVE

Britpave is pleased to welcome Roadgrip Ltd as a new member. Roadgrip have long worked within the concrete paving sector, predominantly in the field of concrete cutting and joint sealing, line marking, grooving and retexturing. Having invested heavily in specialist plant over the past few years, they are at the forefront of championing the process of longitudinal grooving and grinding concrete highways to improve texture, ride quality and noise reduction and thus promoting the ongoing use of concrete as a cost effective, environmentally friendly and long-term option for highway construction.

Based out of Leighton Buzzard, Roadgrip work nationally and internationally and are used to the challenges of mobilising at short notice across all parts of the UK and further afield.

Joe Quirke, Britpave chairman said: "Roadgrip have concrete paving expertise and experience that will compliment and add value to the work that Britpave does. We welcome their becoming a Britpave member."

For more information visit: **www.roadgrip.co.uk**

BRITPAVE MEMBERS

As the focal point for in situ concrete and cementitious infrastructure solutions, Britpave offers its members a recognised industry voice, market sector development and beneficial industry networking opportunities. Britpave members include clients, consultants and engineers, contractors, material and plant suppliers and academia.

AECOM Ltd - www.aecom.com

Aggregate Industries - www.aggregate.com

Allied Infrastructure Management Ltd - www.alliedinfrastructure.co.uk

Arup and Partners Ltd - www.arup.com

Atkins Ltd - www.atkinsglobal.com

Balfour Beatty Ltd - www.balfourbeatty.com

Ballast Phoenix Ltd - www.ballastphoenix.co.uk

BAM Contractors - www.bamcontractors.ie

Barton Plant Ltd - www.barton-plant.co.uk

British Lime Association - www.britishlime.org

Cambrian-UK – www.cambrian-uk.com

CEMEX UK - www.cemex.co.uk

CH2M - www.jacobs.com

Colas Ltd - www.colas.co.uk

Combined Soil Stabilisation Ltd - www.combinedssl.co.uk

Complete Design Partnership Ltd - www.cdpbroms.co.uk

Costain Ltd - www.costain.com

Danley Ltd – www.danley.co.uk

Dublin Airport Authority plc - www.dublinairport.com

Ecocem - www.ecocem.ie

Extrudakerb Ltd - www.extrudakerb.co.uk

Geofirma Soil Engineering Ltd - www.geofirma.co.uk

Gill Civil Engineering Ltd - www.gillgrouphouse.com

Gomaco International Ltd - www.gomaco.com

Hanson UK Ltd - www.hanson.biz

Lagan Aviation and Infrastructure - www.laganaviation.com

Morgan Sindall Construction and Infrastructure Ltd - www.morgansindall.com

Norder Design Associates Ltd - www.norder.co.uk

PJ Davidson (UK) Ltd - www.pjd.uk.net

RJT Excavations Ltd - www.rjtexcavations.co.uk

Roadgrip Ltd - www.roadgrip.co.uk

RPS Group plc - www.rpsgroup.com

SGE - www.sgeworks.co.uk

Smith Construction (Heckington) Ltd - www.smithsportscivils.co.uk

Tarmac Ltd - www.tarmac.com

Tata Steel Shapfell - www.tatasteeleurope.com

TKL Earthworks - www.thetklgroup.co.uk

TR Stabilisation - www.trstabilisation.co.uk

VolkerFitzpatrick Ltd - www.volkerfitzpatrick.co.uk