

Highways

A night-time photograph of highway maintenance workers. Two workers in high-visibility orange and yellow gear are in the foreground, one using a shovel. In the background, a large machine is paving asphalt, with bright lights and steam rising from the surface.

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Things fall together

Maintenance is a funny thing. On the face of it, it might seem like the easiest of tasks, to just keep things the way they are, but everyone in this industry knows it is anything but. In fact, it feels like we have to keep running faster and faster just to stay in the same place. Now add to this conundrum the fact that we still don't fully understand what we are maintaining. The predictability of asphalt deterioration is the subject of constant research and, despite oil being what most of the world runs on, we still haven't unravelled all the mysteries contained in a barrel of hydrocarbon compounds.

In this issue we put a special focus on this most essential of jobs – keeping the roads maintained. Key players in the industry give us their expert insight into where the engineering, technology, market and chemistry are going as far as road materials are concerned, while Highways England gives exclusive insights into road maintenance on the strategic network.

It is clear there is still a lot to learn. The use of recycled asphalt pavement still has a long way to go and barriers of perception are as important as the barriers of science, some say. Talk of engineered asphalt, where properties and elements can be put back into bitumen, appears to present exciting possibilities of a new age for materials, as does the so-called 'self-healing' roads concept that Highways England is working on. However, many would argue all this innovation is really just to get us back to the starting point of predictability. So it is worth asking, if you knew exactly when and how a road would fail what would that do to your business model, and to your procurement? Would you embrace the potential to change risk profiles and contracts as a result? Further to that, should we start working to that basis?

As a sector, we must consider whether we are having the conversations we need to have about this crucial area and if we are looking down the telescope from the right end. If we sat down together to work out the best way to incentivise predictability there is a good chance we could accelerate the journey towards it. So is it time we started selling and buying roads with an expiry date in mind? Should we switch, as they have in the United States, to more of a performance and outcome-related specification for asphalt rather than penetration and softening point rules? We certainly have gone a long way towards the knowledge and data needed to map lifecycles and test performances.

We are used to the idea of market disruption, but when it comes to keeping the road in place, we are trying to generate disruptive innovation in order to keep things the same. In short, maintenance is the science of engineering a predicted and desired future. Are we maintaining a market that helps us do this?



Dominic Browne
Editor
Highways Magazine

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Dedicated to highways maintenance and traffic management

Air quality plan illegal...again

A senior MP has described the Government's attempts to tackle illegal levels of air pollution as 'shambolic' after ministers were once again told by the courts to rewrite their plans.

Ruling on a challenge from environmental campaign group ClientEarth, Mr Justice Garnham found that the Government's latest national air quality plan, published in July last year, was 'unlawful'.

ClientEarth lawyer Anna Heslop said: 'For the third time in the space of three years, the courts have declared that the Government is failing in its obligation to clean up the air in our towns and cities.'

'The problem was supposed to be cleaned up over eight years ago, and yet successive governments have failed to do enough.'

Mary Creagh MP, chair of the Environmental Audit Committee, said: 'Millions of people in the UK live with illegally high levels of air pollution, which results in 40,000 early deaths every year. Ministers' shambolic attempts to tackle this means this is the third time the courts have ordered the Government to come up with a new plan.'

Highways approached environment department Defra for comment. —

Wales to use public-private partnership for A465

By Rhodri Clark

The Labour government in Wales has confirmed plans to establish a public-private partnership to dual the last remaining single carriageway section of the A465 Heads of the Valleys road.

After Carillion's demise last month, shadow chancellor John McDonnell said Labour would end the 'scandalous rip-off of outsourcing' and would not sign any new private finance initiative (PFI) deals when in government.

However, Ken Skates, Welsh transport secretary and Labour AM for Clwyd South, explained to the Welsh Assembly how a new public-private partnership would enable the Welsh Government to complete A465 dualling while capital budgets were under 'unprecedented pressure'.

The 11-mile dualling between Dowlais Top and Hirwaun is estimated to cost £428m in 2016 prices, excluding VAT and inflation. The Welsh Government is also committed to building a new section of motorway around Newport at an estimated cost of more than £1.3bn, excluding VAT and inflation.

It has developed its own form of public-private partnership called the Mutual Investment Model (MIM). Mr Skates said the MIM places risk with the party most able to deal with it.

'Therefore construction risk is passed to the private sector and we pay for a service, rather than directly for construction, so in the case of A465 the ability to use the road, which is maintained to an agreed standard,' he said.

'Welsh Government does not pay for this service until it is operational, incentivising the contractors to deliver to programme. Deductions will be made to the annual service payments if the operator doesn't meet stringent operational requirements, which we will actively manage.'

He also said the MIM addressed concerns about windfall gains by allowing the public sector to share in the private partner's profits. 'The MIM removes soft services from these contracts, which led to expensive, inflexible contracts and was a real bone of contention in the old PFI model.'

A public inquiry into the A465 scheme is planned for April. —

DfT opts for lane rental roll-out

By Dominic Browne

The Department for Transport (DfT) has announced plans to allow the roll-out of lane rental schemes across the country, giving local authorities the option to charge utility companies up to £2,500 a day for digging up the busiest roads at peak times.

The news follows successful trials by Transport for London and Kent County Council, and a consultation last year.

The DfT said the transport secretary will need to approve new lane rental schemes in line with existing primary legislation and on the basis of the following conditions:

- Authorities would need to have a 'well-run' permit scheme, where fees were proportionate, discounts were offered for joint works, it was compliant with permitting regulations and guidance and schemes fully supported the delivery of



'national infrastructure projects like HS2 and broadband/full fibre roll-out'

- Schemes would apply to a local authority's own works in the same way as in Kent and London

- Lane rental charges should be used to incentivise work outside of peak times; they are waived for joint works, caps are put in place for major works to install and to replace apparatus so that these works are not unfairly penalised and delayed

- Schemes are trialled for a period of time before 'going live' and reviewed annually to ensure that charges remain proportionate and are applied to the most

congested roads.

The DfT has suggested that lane rental should apply to around 5% of the network, as is the case in Kent.

Responding to the consultation, Jerry McConkey, joint chair of HAUC(UK) – which brings highways authorities, utility companies and government together – and CEO of JAG UK, representing authorities, told *Highways* that JAG's preferred option had been a 'super permit' system (or option three in the consultation), which would have combined aspects of the current permit scheme system with lane rental schemes.

This would give 'consistency and transparency,' he said.

However he added that the review of lane rental 'has demonstrated that this does bring benefits particularly to public users of the highway'.

Lane rental roll-out was a popular option in the consultation, with 66 votes of support out of 145 responses – almost double the level of any other option.

In response to the consultation, a stakeholder group representing utility companies estimated that implementation of lane rental across England and Wales could increase annual costs of street works by £327m and suggested it would deter over £2.2bn of investment in infrastructure.

The Government expects its lane rental roll-out plans to have a net £84.3m benefit to business. DfT officials said that 'about 2.5 million roadworks are carried out each year, costing the economy £4bn in increased costs to businesses through late employees or deliveries'.

It typically takes an authority around 12 months or so to develop, consult and implement a lane rental scheme. —

ON FRIDAYS
Highways

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Stonehenge plans go before the public

By Chris Ames

Highways England has launched a consultation on its plans for the A303 at Stonehenge, which include 'green bridges', grassed canopies at the portals and the conversion of the existing road into a route for walking, cycling and horse riding.

As well as a twin-bore tunnel at least 1.8 miles (2.9 kilometres) long past Stonehenge, Highways England's £1.6bn plans include changes to the road layout at either end.

It said its preferred option for the approach to the western entrance to the tunnel is an eight-metre deep cutting with the deepest two thirds formed with vertical retaining walls and the top third formed with rolling grassed slopes.



The western entrance itself would be at a depth of 17 metres with a fully grassed-over canopy. At the eastern entrance, a short length of canopy is proposed.

Highways England said the portals would be close to the existing road at locations that have been surveyed to show there are no significant buried archaeological features

that would be affected by their construction. With both portals located off the line of the existing A303, traffic would be able to keep using the existing road until the tunnel has been completed and the new road opened.

The consultation runs until Friday 6 April. Because of its size, the scheme is categorised as a Nationally Significant Infrastructure Project, which means that a Development Consent Order is required. Highways England said it plans to submit a development consent application in the autumn.

Scheme overview:

- a bypass to the north of Winterbourne Stoke with a viaduct over the River Till valley
- grassland habitat creation that would allow extension of the Parsonage Down National

Nature Reserve

- a new junction with the A360 to the west of and outside the World Heritage Site (WHS), with the A303 passing under the junction
- a section through the WHS with a twin-bore tunnel past Stonehenge at least 1.8 miles (2.9 kilometres) long
- a new junction with the A345 at the existing Countess roundabout to the north of Amesbury, with the A303 passing over the junction
- the conversion of the existing A303 through the WHS into a route for walking, cycling and horse riding
- new 'green bridges' to connect existing habitats and allow the movement of wildlife. ➔

• **Further analysis – pages 56-57**

Adding colour to enhance and highlight road safety features

Inner city highways can be dull and uninteresting places, but the addition of a pattern or colour highlights the intervention to the road user. This has certainly been the case in central London, where crossing points have been treated to bright, colourful and innovative designs.

These interventions were originally installed to promote the London Design Festival in 2016, but they have now become common place on the capital's streets. Similar designs have been installed in Brixton and Coventry, with several other projects being finalised in other major towns and cities.

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by Steve Menary

Sector steps in to fill Carillion breach

Contractors including Galliford Try, BAM Nuttall, Skanska and Tarmac have stepped in to keep work going on a swathe of road projects after the collapse of Carillion.

Only 10% of work on the £96m Lincoln Eastern bypass had been completed when Carillion collapsed and Galliford Try, which did not tender for the original deal, has taken charge on a temporary basis to prevent work grinding to a halt.

The council is also bringing in BAM Nuttall this month (March) for the ductwork, and trying to keep Carillion staff working on the project until permanent arrangements can be made.

Lincolnshire County Council leader Martin Hill OBE said: 'While Galliford Try will be keeping things moving in the immediate future, we'll be working to find a long-term replacement. We hope to have this new company take over in the summer.'

Skanska has stepped in to work on the final stage of a £20m relief road in Hampshire for the county council.

It is already Hampshire's road maintenance contractor and was signed up to keep work going on the 4.1-km Whitehill to Bordon relief road after the council officially terminated its contract with Carillion on 5 February.

Cllr Rob Humby, executive member for environment and transport, said: 'Our first priority is to ensure the completion of the southern section of the relief road from the A325/Firgrove Road roundabout to junction 2 to allow access to the first phase of new housing. We have made arrangements with



Tarmac is one of several firms to fill the gap created by Carillion's collapse

Skanska to complete this work.'

Tarmac was Carillion's joint venture partner on a £6.2m deal for the second and final phase of the Greater Yorkshire Link Road to Doncaster Sheffield Airport for Doncaster Council and is taking on the rest of the job.

Work began in May 2017 and is continuing after talks between administrators PwC, the council and Tarmac.

Peter Dale, director of regeneration and environment, said: 'Tarmac will now become the sole and main contractor for the scheme, which will complete the direct link to Doncaster Sheffield Airport from the motorway network at Junction 3 of the M18. As part of this agreement Tarmac will take on all contractor liability and responsibility for this council-sponsored scheme.'

Carillion was also working on the design element of a £57m bypass project on the A40 at Llanddewi in Pembrokeshire for the Welsh Assembly. Arup is lined up to take on this commission once the Assembly's contract with Carillion is officially terminated.

In Yorkshire, Balfour Beatty has been tipped to take on the £80m Leeds Ring Road project, which Carillion had been awarded just weeks before the firm collapsed.

Carillion was chosen as preferred bidder for a £7m job to build three roundabouts and for an £80m early contractor involvement deal to deliver 7.5km of dual carriageway.

Balfour Beatty also priced the deal but the council had not made any decision as *Highways* was going to press. ➔

News in brief



■ **Four shortlisted for A9 alignment work**
Morrison, RJ McLeod, Roadbridge and Wills Bros are chasing a £9m deal to build a stretch of single carriageway on

the A9 at Berriedale Braes in Strathclyde for Transport Scotland. The successful bidder will carry out improvements to the road alignment and the existing tight hairpin bend so vehicles do not need to slow down or stop to negotiate the bend.

■ **Amey wins £2m Staffs estate deal**
Amey has won a £2m deal to manage construction of a scheme to provide an access road for the Raleigh Hall Industrial Estate at Eccleshall in Staffordshire. The work also includes installation of a sustainable urban drainage system and is due to start on site in April. The project is expected to take eight months to complete.



■ **TfL award Croydon bridge refurb**
Morgan Sindall has a £2.5m contract to refurbish two bridges in Croydon for Transport for London. The deal has been let through TfL's civils project framework, and comprises replacing the

Heavyweights line up for £150m Gloucestershire deal

Balfour Beatty, Ringway, Skanska, Volker Highways and Tarmac's new acquisition Alun Griffiths have been shortlisted for a £150m deal for Gloucestershire County Council.

The council opted for a different approach last autumn after deciding to ditch existing term maintenance contractor Amey, which was heavily criticised by councillors due to a raft of problems.

The council's new approach will split the new five-year deal into three areas – term maintenance, highways structural maintenance including resurfacing, and professional services covering design and consultancy.



Skanska is on the shortlist for a £150m deal for Gloucestershire County Council

Cllr Vernon Smith, cabinet member for highways, said: 'We've been looking at how best to make the most of this council's five-year commitment of a £150m investment.'

'We agreed in November that a new approach to the way our highways contract works was needed to help us deliver quality roads and good value for money for taxpayers. It's great that we've had so many interested parties come forward, and I am

looking forward to seeing the proposals.' Bids are due in April and a decision is expected this autumn.

The council is expected to spend around £20m a year through the term maintenance deal, which will include pothole repairs, patching, winter gritting, grass cutting and gulley emptying. Amey will continue to work for the council until the new deal starts in April 2019. ➔

Eurovia takes to the West End stage

Eurovia has bagged a £14.4m contract to reconfigure highways around Tottenham Court Road in London's West End.

The scheme is part of Camden Council's £35m programme known as the West End Project (WEP) to prepare the area for the opening of the new Crossrail Station at Tottenham Court Road.

Cllr Adam Harrison, cabinet member for improving Camden's environment said: 'Camden has a clear track record of using bold

transport and infrastructure schemes to tackle traffic congestion and this project will help to address one of London's worst areas for pollution.'

Eurovia's work starts imminently and includes replacing the existing one-way system with two-way streets, upgrading signalised junctions, protecting cycle lanes and widening footpaths.

The entire WEP project must be completed by the end of 2019. ➔



decks on both Blackhorse Lane and Addiscombe Park bridges. The scheme also includes widening the carriageway on the Addiscombe Park bridge to create a new cycle path and has been designed by Pell Frischmann. Work is expected to start on site in May.

■ **Crackley Triangle starts to get drawn**
Galliford Try has begun work on a £1.5m access road project in Kenilworth in Warwickshire after beating a swathe of other contractors including Dawns to the contract for the county council. The road will provide access to a new Bloor Homes development known as Crackley Triangle and will take eight months to complete.



■ **Interserve secures £15m M6 haul**
Interserve has started on site with a £15m project to carry out a batch of improvements to Junction 5 of the M6 at Worcester for Highways England after edging out GRAHAM

and VolkerWessels for the job. Work comprises widening the slip road, as well as resurfacing and drainage improvements and must be completed by the end of this year.

■ **Barriers for noisy neighbour M40**
GRAHAM has landed a £3.5m job to install noise barriers along a 5km stretch of the M40. The scheme will reduce noise pollution between Loudwater near Junction 3 in Buckinghamshire and Wheatley near Junction 8 in South Oxfordshire. Highways England had initially intended to use photovoltaic enabled noise barriers on the scheme and but decided to switch to conventional noise barriers in 2016 due to cost. ➔

Shaping the future of England's strategic roads

Steve Gooding, former Department for Transport director and director of the RAC Foundation, discusses Highways England's current performance and future plans

And so the deadline arrives to submit comments on the Department for Transport's (DfT) consultation on shaping the future of England's strategic roads.

Or, more accurately, to pass judgement on Highways England's own *Initial Report* – a dense 103-page read (or just under 43 miles of network per page for those fond of a handy statistic) – since that is what the DfT's document effectively invites us to do.

The Highways England report sets out its stall on the story so far, just over halfway through RIS 1 and less than three years, we should remind ourselves, since Highways England emerged blinking into the light of day from the constraining chrysalis that was the Highways Agency.

The verdict? I'd say a solid grade B for progress to date (come on Jim, you weren't expecting me to be straight in with an A just yet, were you?). It's worth remembering that the feverish work that went into setting up the new arm's length company – the performance framework, the financial settlement and a whole bunch of other legal, financial and managerial changes – compressed the toil of a full-on regulatory review and a major company restructuring into an eye-wateringly short window.

So well done to the team that put in the spadework, not least to Alan Cook, who first recommended the restructuring in a report he wrote as the Highways Agency's first chairman.

The foundations are looking sound: high, stable and predictable funding; a clear statement – the first – of the Government's expectations of the network and the company running it; clearer accountability for delivery; a fresh emphasis on customer service; and a recognition that few if any journeys begin and end on the Highways England network – hence better joining up with neighbouring highway authorities really matters.

If only chancellor Philip Hammond would reward this successful start with a commitment to put the planned National Roads Fund onto a firm statutory footing, rather than leaving us with a naturally cautious supply chain to trust to a

politician's promises. We'll continue to argue that case.

The *Initial Report* also contains Highways England's proposals and recommendations for the network for Road Period 2 (2020-2025). Again, plenty of good stuff here. The first really clear explanation of a new hierarchy of road design, including the 'Expressway' concept that until now has been somewhat shrouded in mystery.

Anything that simplifies and makes more comprehensible what we should expect to encounter as road users gets the thumbs up from the RAC Foundation. We know that too many motorists are sticking to lane 2 or 3 of an all lane running section of motorway because they don't recognise the conversion of the hard shoulder to become lane 1.

“Anything that simplifies and makes more comprehensible what we should expect to encounter as road users gets the thumbs up from the RAC Foundation”

There are ongoing concerns about the spacing and signing of refuges – despite Highways England taking remedial action to address both matters – and the meaning of the red X and other warnings. So, the more the nature of the road can be standardised into a limited number of familiar and reasonably intuitive categories, the better.

That said, the acid test of the proposal will be moving beyond the diagrams on pages 58 and 59 to a programme that can move at pace and not leave us mired in a lengthy and messy transition. It will be as important to strip away the outdated technology as it will be to install the new kit swiftly and ensure it links to a back-office system that generates clear and consistent messaging from one variable message sign to the next. At present alternating variable message signs can carry inconsistent



messages, being sent through different systems.

Do we need a root and branch review of the performance metrics devised for RIS 1? It is understandable that Highways England would have us draw a distinction between the generality of data collected about issues such as traffic flow and asset condition; the metrics which, over time, tell us how the network is performing, and the specific performance targets on which the success of Highways England's management team is judged. Easier said than done, though. Much should rest on the sensible interpretation of results where the achievement of a target might have been boosted or confounded by measures outside Highways England's gift.

The strongest driver for some – we'd still say limited – change is whether the metrics identified as key performance indicators are both reflective of customers' needs and create the right focus for managers' attention.

We think more work is needed on network performance where we would like to see development of a three-part measure of 'delay', distinguishing between planned works (enhancement and maintenance), excess traffic demand over design capacity, and delay resulting from incidents (for example crashes) above a threshold. We think this goes to the heart of the network reliability users patently crave and goes hand-in-hand with our call for improved accident and incident investigation.

'The future is inherently uncertain' says the *Initial Report*. Hard to argue with that. But among all the uncertainties borne of driverless technology, alternative fuels and our changing lifestyles, there's another statement in Highways England's report that stands out: 'We connect the country' – true, and that's why it's so important that Highways England, the DfT and the Treasury get it right. ➡

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Let's talk SRM – strategic road maintenance and the modern client

The national roads operator gives *Highways* an exclusive briefing on the development of its road maintenance activities

Q Tell us about some of the innovations Highways England has made and overseen on maintenance since 2015?

Highways England has a well-established track record of delivering innovative ideas, from developing and building the world's first smart motorways to pioneering the use of more efficient and effective pavement materials.

For instance, our experts have worked with the University of Nottingham to develop 'self-healing' asphalt. Micro-capsules containing sunflower oil have been developed, which are added to asphalt mixtures. The capsules are durable enough to endure the construction process but will break over time as small cracks start to form in the pavement as a result of long-term traffic loading.

The oil fills the cracks and softens the surrounding material allowing it to self-heal. This is the critical point where conventional asphalt would begin to allow water to penetrate and lead to pothole formation in the road surface.

This is a finite process but it is expected that the technology could add a further three years of life to existing pavement durability, hence requiring fewer maintenance

interventions and less associated network disruption.

Product development and laboratory testing were successfully completed in January and off-network trials are planned for this year.

We are exploring innovations in many different areas linked to our themes:

- safety
- new and emerging technology
- data and information
- improving our infrastructure and
- support to sustainable operations.

If you have any ideas for an innovative trial on the network, email designatedfundscheme@highwaysengland.co.uk FAO the innovation programme manager.

To help us continue to drive innovation, we will shortly be launching our Innovation Hub – a place where we will publish our innovation challenges, run competitions and enable the sector to connect with us to attract and take advantage of new opportunities. More details to follow this spring.

Q. Highways England contractors achieved a lot of success with Lean techniques. Can you tell us



to what extent this is becoming standard practice and how it is being incorporated into any procurement processes?

Since the Lean Group demonstrated that it was possible to increase paver productivity during night closures to lay 1,000 tonnes per shift, this has been a clarion call for the surfacing industry. Projects now see this as a target to beat. Sometimes the figure of 1,000 tonnes is exceeded on a night shift, but if not, teams are getting very close to it.

Highways England (and previously the Highways Agency) has driven suppliers





to develop their Lean capability since 2009. Lean contractual requirements are continually being added and refined within Highways England contracts.

The clauses and annexes clearly identify what the key focus areas for successful Lean deployment are within any organisation. Lean is expected to contribute one fifth of Highways England's £1.2bn RIS 1 efficiency target, benefitting both the supplier as well as the client. Lean and structured innovation will help suppliers to apply creativity to their working practices and reach new heights.

'Embrace the contractual requirements,' says Neal Symmons, who is Lean lead for Highways England's maintenance supply chain. 'They will make you a better, more productive and more resilient business to meet the needs of the construction industry of the future.'

Q. Can you tell us about any work Highways England has done to analyse the way asphalt fails?

Highways England is currently engaged in a research programme with TRL called Spectrographic Analysis of Roads at Traffic Speed (SARTS) to measure the changes in chemical composition of binder in asphalt pavements over time. When the equipment has been manufactured and tested we will expect to start to collect network level data on the changes in chemical composition of binders as the pavement ages.

Q. What methods do you use to check the quality of the road surface and how often do you do it?

We undertake full road condition surveys across our entire network every year using traffic speed survey vehicles to measure road surface evenness, rutting, road texture, road surface ravelling (loss of surface stones), cracking and skid resistance in the wet. The results of these surveys together with site specific intrusive investigations help identify road pavement resurfacing and strengthening requirements. This includes localised minor repairs, replacement of the road surface and full reconstruction of the road pavement structure where justified. Road markings will also be renewed where essential.

Q. Do you have a preferred base layer for roads?

There is no preferred base layer for roads – permitted options include both flexible and hydraulically bound materials. All the permitted materials are performing satisfactorily without any significant failures, attributable to base material type, in the last 10 years.

Q. Is Highways England focused on extending the life of roads from construction or on improving road maintenance?

All new roads are constructed to achieve maximum service life, such that major

reconstruction would only be necessary after 40 years or more. This though excludes the need to resurface (top layer), which is typically replaced after 10 years on the basis that the surface exhibits safety or serviceability risks. The construction and maintenance plan considers the need for minimising whole-life costs.

Q. Will Highways England be making a commitment on how much of the SRN will be resurfaced in RIS 2?

This will be outlined in our Strategic Business Plan for the RIS2 period.

Q. What is the area of highways maintenance that Highways England feels it has made most progress on since 2015?

On 1 July 2016 the first of our new Asset Delivery (AD) contracts went live in the East Midlands (Area 7), followed by new AD contracts in the South West, North East and North West. This new delivery model brings direct ownership and key asset management investment decision making in-house, helping to ensure we maintain and manage the network in the most efficient and effective way, and fully aligned to our safety and customer service imperatives. Since its launch we have been developing the organisational capability we need to run this type of contract, while increasing staff numbers significantly to bring in the specialised skills we need to make the right asset management decisions. Although much remains still to be done, we have made significant progress and have come a long way in a relatively short period of time, enabling lessons learned from the initial roll-out to inform imminent and future AD contract roll-outs.

Q. What is the area of highways maintenance that needs most improvement?

We run one of the world's most advanced road networks and continually challenge ourselves to improve on the high standards we have set. A more recent area of work where we are seeking to raise the bar is modelling of assets and their behaviour so we are in a better position to predict future maintenance and funding requirements. We are now using decision-support tools to predict future volumes and costs of works, helping to inform our programme development.

This is still a relatively new area of work for us and we are making a number of improvements to the tools, processes and data we use to ensure that the outcomes from the modelling process can form an effective part in the network maintenance investment process to drive delivery of real efficiencies. ☹

Calm at the centre of innovation



FM Conway appointed David Smith (*pictured below*) as director of development in 2013 in order to strengthen its asphalt manufacturing capability, product range and client base. Five years later and having launched the new Gravesend bitumen terminal in Kent, the company says business is booming. Dominic Browne talks to Mr Smith about the intelligence and research behind the scenes that is keeping FM Conway at the vanguard of the sector

David Smith is something of a smooth operator. With a demeanour that is part Roger Moore and part your favourite teacher from school, he arrived at FM Conway with decades of experience in the highways sector and was charged with boosting sales and manufacturing capabilities. Sources at the infrastructure firm tell *Highways* this is mission accomplished although it is unlikely to rest on its laurels.

One of the areas where FM Conway likes to set itself apart is in pushing the boundaries of road materials, with the use of recycled asphalt pavement (RAP) a particular flagship offer. The firm has conducted trials with Transport for London (TfL) that set a 'new benchmark' of 50% recycled aggregate constituents.

Mr Smith says: 'We are trying to optimise the use of recycled material depending on the use of the road pavement. There are systems within the asphalt industry at the moment that use 100% recycled material. The Americans have a couple of machines now that use hot mix asphalt with 100% recycled material. It's not our ambition because we have quite high traffic densities in the UK and on certain parts of the strategic road network I think that might



be a step too far, because you can't control all the parameters in an engineered way to predict the behaviour of the pavement if you start putting 100% recycled in there.

'The current boundaries in people's minds are 10% of recycled material within the surface course and 50% within the lower layers and those are taken as gospel by a number of people who don't take advantage of the notes for guidance or variation order processes that can be used on the strategic road network. Those processes allow one to talk to the engineer and determine if you can put more recycled material in.

'We don't have any particular upper

target to put into these materials; we just think that an informed debate about how much recycled asphalt one should use in a particular circumstance is appropriate because there are all sorts of things that can be done to the asphalt to improve durability and performance.'

The use of polymer modified bitumen being one of them, he states, following the launch last year of FM Conway's new bitumen terminal in Gravesend, Kent, which produces the company's own.

One issue with recycling aspects of the roads surface is the cost-effectiveness of the process. Mr Smith points out that when you screen material such as recycled planings, the yield of a particular size aggregate, typically 10mm, is very low – 'usually around 17-18% certainly less than 20%.'

This means if you were to plane off high polished stone value (PSV) materials to get their valuable properties 'you are actually generating 80% of the material that you can't use under clause 942 [of the Specification for Highway Works]'

'What we did in conjunction with TfL, which is very open to sensible debates, is to produce an asphalted concrete, which used up a

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significant proportion of recycled materials across a range of sizes.

'We laid it 70mm thick in a single layer to show that we could produce a thickness of construction while at the same time providing a skid-resistant surface in a single operation. That went down several months ago and looked good. It was amenable to being laid around ironwork. We have offered that to the city of Westminster because it was looking to return to something like hot rolled asphalt.'

In trying to establish a more open debate about the boundaries of bitumen and asphalt, Mr Smith questions the very framework around how it is defined. His comments somewhat echo those made by Shell (see pages 18-19) on how the Americans may be more advanced in this area by working towards more performance-based specifications. It should be noted, FM Conway and Shell have a very strong working partnership. Shell provides FM Conway with vast amounts of bitumen every year

Mr Smith says: 'In the UK and in Europe the way bitumen is specified is based on two physical properties – penetration and softening point. These are just ways of defining bitumen within some physical parameters. They are not fundamental units. They come from standard tests that are used across the UK, US and Europe, but they don't tell you anything about things like ductility for example, which is very important to the long-term durability.

'There is a move afoot these days to move away from specifying solely by penetration and softening point towards issues such as ductility and resistance to fatigue.

'FM Conway has been part of some experiments done by New Hampshire and Nottingham universities looking at assessing some of the performance properties of bitumen so that the predicted laboratory derived property can be replicated in the road.'

He goes on to celebrate Shell's work in

'engineered bitumen' as he calls it. 'Shell has a refinery in the Netherlands that produces bitumen that Shell would add components back into – some of the aromatics and asphaltenes that have been removed would be added back in a controlled way to give you more performance properties. This is absolutely the way to go.'

Much of this exciting technology and chemical engineering however is an attempt to return to the fundamental principle of establishing more predictability in the life of asphalt, which is something the market could perhaps respond to with new business models, Mr Smith suggests.

'One debate we should have to promote innovation and to broaden the ability of contractors to take on a greater variety of materials, is whether there should be some sharing of risk with the supplier. FM Conway would welcome that. And if that had to be given in the form of extended guarantees then that would be something we would be happy to do under the right circumstances.'

Keeping a weather eye on the international scene, Mr Smith is also very aware of outside changes to the fundamental market for bitumen that could end up having as much of an impact on its production as research and

innovation from within the sector.

Bitumen varies depending on the crude oil that is refined to actually produce it. There are about 3,000 sources of crude oil in the world and only about 12% are suitable for making bitumen for a variety of reasons, Mr Smith says.

Coupled with this scarcity are two main market forces – both diesel and heavy fuel oil are in decline due to air quality issues. Diesel cars look like they are on the way out and the International Maritime Organisation has issued a set of regulations that says ships will no longer be allowed to burn heavy fuel oil from 2020 because it contains about 3.5% sulphur and so when it is burned it reduces air quality. Retrofitting refineries to not produce those heavier elements is a seriously costly business that can run to hundreds of millions of pounds.

'The end result is some people may not make bitumen anymore because the demand is in the light distillery functions. That is the biggest bulk area of the future demand. Refinery capacity in Europe has dropped by about two million barrels a day over the last five or six years and that's because a significant number of European refineries are of an age where it is not worth spending a billion dollars to retrofit them.'

With all the potential disruption washing around the sector, one question companies are often asked is whether they know their core value. Mr Smith doesn't appear to be easily ruffled and takes this question, like most other things, in his stride.

'Our core value is highways maintenance. There will always be vehicles and asphalt is an ideal material. The reason we use it is because of its ease of use. As far as the electrification of the highways sector is concerned we are pretty safe. We are already putting in digital receptors on behalf of our London boroughs. We have put in vehicle charging points in anticipation of electric vehicles. We have a very sound model especially as we can recycle the existing asset back into our materials.'



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Experience - the Difference

Dominic Browne talks to global product technology manager Dr Richard Taylor and technical manager Connor Campbell of Shell Bitumen to find out what lies just inside, and just beyond, the horizon



Speaking to Shell sometimes feels a bit like speaking to an engineering or chemistry oracle – one that deals with well-respected research, hard data and science of course. Nonetheless, visions of the future emerge but no-one can be sure how they will be interpreted.

As Dr Taylor points out Shell invented the synthetic rubber Styrene Butadiene Styrene (SBS) and subsequently SBS modified bitumen in the 1960s. However it took decades to become an established product and is now the 'most commonly used polymer modified bitumen (PMB) in the world' he says.

'The more recent adoption of warm mix [asphalt] by the industry was markedly quicker. As product life cycles shorten, the adoption rate of new solutions is getting quicker. This is an encouraging development that means more innovation for roads.'

Mr Campbell adds: 'There is certainly a greater adoption of warm mix asphalt. One of the benefits is that you reduce surface tension between the binder and the aggregate so the compatibility is improved. Depending on the plant, you can also considerably lower your mixing temperature, potentially up to 30 degrees. This means you are using less energy and the lower temperature means you can open the road sooner.'

When *Highways* spoke to Shell major issues arose for the future of the sector: Will roads remain part of the construction industry or are they an emerging services industry?

Dr Taylor says: 'There is an emerging question around the future of roads as a potential service provider. It raises interesting points around the purpose and functionality of roads that goes beyond the transportation of goods and people. As a result, the development of roads and wider infrastructure will be viewed through this lens and its value judged accordingly.'

This functionality includes electrification

Roads: The service industry?



– generating electricity and charging electric cars – active roads, which can take emissions out of the atmosphere, and coloured or glow in the dark roads that help with demarcation and communication of various hazards. All of which Shell has shown are possible for some years now.

“We are approaching these prospects with a holistic view and in doing so the reality of how a road becomes a service does not seem too distant in the future”

Dr Taylor says: 'The Shell group as a whole is gearing up for a new future. There are exciting developments taking place

across the business that are focused on developing new solutions for the energy transition. On electric vehicle charging, we recently purchased a Dutch company, NewMotion, that is a specialist in this field and we have also entered the wholesale electricity market.

'From a bitumen perspective, this opens up a lot of possibilities for greater innovation. We can explore ways to make it easier to install induction charging systems or investigate asphalts that are more efficient at transferring the induction charge. Once such technologies are installed, there are practical aspects to consider too such as demarcation of the charging lane by making it a different colour. We are approaching these prospects with a holistic view and in doing so the reality of how a road becomes a service does not seem too distant in the future.'

Back in the here and now, Dr Taylor says around 95% of Shell's research is 'still thinking about how countries can maintain



a safe, efficient, durable transport system'. However even this is subject to some major debates, not least the use of recycled asphalt pavement (RAP).

Dr Taylor says: 'The use of RAP appears to be on the rise. Methods also differ on how to soften the RAP, ranging from lighter potentially vegetable based oils to heavier products from the refinery. Asphalt today is markedly different to the 1970s. For example, where your traditional road would consist of aggregate, bitumen and some filler, today, there is a much greater variety of components in the asphalt mixture. For rejuvenators, my preference would be for the heavier end of the spectrum, something that is more alike to bitumen.'

There is some debate over how far RAP can or should go into the mixture. Again this is a debate Shell is leading with important research.

'It's certainly possible today to make an asphalt mixture that is 100% RAP but that does not necessarily mean it's always the

best option to pursue. Aside from availability, a chief issue is understanding what has happened to that bitumen over time,' Dr Taylor says.

'We have looked into this in great detail through a major study and found that asphaltene take on oxygen as they get older. In extreme cases, some of the RAP we measured was around 10 years old and had about 5% oxygen in the asphaltene. Since the asphaltene now have the oxygen molecule attached to it, it is possible that they arrange themselves more readily so that, as we have seen from our own studies, steric hardening occurs.

'The short-term effect is that the material stiffens and there could be a greater potential for cracking in future if the steric hardening we observe in the binder translates to the mixture performance. In the binder, you will get the intended penetration initially but over a few days it will become quite a bit harder than originally thought.

"In my conversations with customers, I sense a real appetite for innovation that hasn't always been there"

'If you have 80% of the bitumen coming from a new binder you can pretty much tolerate 20% of binder from the RAP without too many quality concerns. If you start moving on that to 100% rap mixes you are entirely relying on that old binder, plus whatever is added, acting like a new binder. This in itself raises another question – does a binder that's hard and has been softened to meet rheological specification behave like a new binder? Our initial conclusion is that it does not.'

According to Dr Taylor, on the lecture circuit two schools of thought are being debated on how best to tackle the issue of RAP – one a lot more complicated than the other.

'On the one side, there are advocates for the bio component rejuvenator, RAP and standard bitumen, and on the other there is the emphasis for PMB solutions. I personally see the future for PMB as being healthy since, even with RAP, it ensures that a road has high performance. Generally speaking, adding polymer will improve the rutting and the cracking issues.'

The move towards RAP may mean we have to look at specifications and testing in a new light and Dr Taylor suggests that parts of America are taking a different and perhaps more practical approach.

'For us it is still very much a volumetric design with one or two indicative performance tests. In the US there is an emerging thinking that they don't need a restriction on RAP but a balanced mix design. It's a very rational approach and in doing so they are balancing rutting, cracking and ageing. The ageing step is important. We still live in a world where things are designed against fresh bitumen but in reality, a certain amount of severity goes through the plant and paver. They are therefore designing for what ends up in the pavement rather than the lab situation.'

Another issue that has caused some heated debate behind the scenes is the use of recycled plastic in roads. One company in particular has become synonymous with the process. While the process has been celebrated by some for trying to tackle a recycling issue, others have made the point that we cannot know at this stage what impact it will have on the durability of the asphalt mix.

Dr Taylor says: 'Although it's an attractive development and I approve of the innovative thinking that is being applied, there is little evidence to support durability improvement in asphalt pavements using polyethylene. This is a story worth watching closely as long-term service evidence arises which sheds light on improving durability of pavements using this particular route.'

All this adds up to make a picture of a sector willing to take on innovation and willing, dare we say it, to try and fail a little bit more.

Mr Campbell says: 'In my conversations with customers, I sense a real appetite for innovation that hasn't always been there. Recent solutions such as the warm mix have helped spur this in my opinion. The benefits it brought to customers and their bottom lines has meant everyone is now hungry for more.'

'What I find most exciting is the new-found passion to test and learn – we are getting a pull from the industry asking 'what do you have?' and 'let's test and prove this together before we take it to market'. That mentality has the potential to produce some really exciting results.'

Dr Taylor concludes: 'As an industry, we are at an important crossroads. For decades we have been iteratively improving our technologies and solutions for application on roads, the purpose of which hasn't changed since Roman times.'

'Now we look towards a future that has the potential to fundamentally alter the purpose of our end-product and the solutions required from us as an industry to make it possible. At Shell we are planning for that eventuality today, from the group level down to bitumen specifically, and the green shoots are already visible.' ➡

Engineering that bridges divides

Throughout 2018, the Government's Year of Engineering, *Highways* will feature a series of articles celebrating the diversity of UK infrastructure, the careers on offer and those who work in them. First up we have Jenny Roberts, senior project manager at Gaist Solutions, who gives her unique insight into the power of engineering solutions



How did you get into highways and engineering?

I'm relatively new to the highways industry, but not so new to engineering. My love of engineering began as a child. I was always designing and making things and enjoyed anything that involved being creative. At that point I didn't realise it was called engineering though. That came much later when one of my design technology teachers at school suggested that I look into it as something to study at university. That was a bit of a 'eureka' moment when I realised there was a subject that embodied everything that I enjoyed. From that point on I didn't look back and very early on in my degree I decided I wanted to use my engineering skills to benefit others wherever possible.

What has been the best experience you have had in the sector?

Designing a self-opening birthday present box for a little boy who had never been able to open any presents on his own before due to his disability. This was a project I carried out as a volunteer with Remap, a charity that custom-makes equipment to help disabled people live more independent lives. The design consisted of a box with a sprung rotating section that was released by a pull chord trigger, unveiling the presents inside. It is probably one of the simplest designs I've come up with, but it gave so much joy to the end user. Seeing something that you've engineered come to fruition and make a difference in someone else's life is the best feeling in my opinion.

What has been the worst experience?

I struggle to pick out one as I've been fortunate enough to enjoy my career a great deal to date. However, going through the process of making design mistakes early on in my career and then rapidly learning the resulting impact to the project, or future processes, was certainly not the most enjoyable experience, but a valuable lesson learned nevertheless. It has made me a better engineer as a result, with a greater appreciation for the impact of early design decisions and the importance of understanding both the intended function of the product and also how it is to be used and by whom.

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What exciting projects have you been working on/do you have coming up?

I am currently working on BridgeCat (see *Highways Jan/Feb 2018*) - a project funded by the Department for Transport (DfT), with ourselves (Gaist) and Cumbria CC. It is a mobile bridge inspection system designed to identify scour and bridge degradation in a safer manner than traditional inspection methods. Having taken the system from a concept on paper through to an operational prototype, I'm at the stage of early field testing and have seen some exciting results so far, but it's important we thoroughly test these and any assumptions. The project is a prototype and it would be easy to get carried away. This is why I'm rigorously ensuring results can be validated with bridge managers at Cumbria CC, the DfT and other experts.

How would you rate the current state of UK engineering and how do you think it could be improved for the good of the country?

I believe we have a great deal of engineering talent in the UK and are world leaders in many engineering fields. However, UK engineering is no doubt under pressure from competition overseas. Despite this we have the advantage of an engineering legacy from our predecessors, who have

been responsible for some of the most innovative and successful engineering projects in the world. I believe that UK engineering should focus on sustaining this legacy, investing in new technology and pushing the boundaries of design, manufacturing and production. UK engineering should be renowned for being pioneering and exceptional.

What advice would you give to young people coming into the sector?

Be excited about making a difference. Engineering is entwined in every aspect of our lives from the technology we use to communicate, to producing the packaging that covers our food. It enables us to travel, play sport, work, relax, but also it enables other professions to carry out their jobs effectively. Engineers design medical equipment, disability aids and implants to allow medical professionals to make our lives better. Engineers design bulletproof vests and fire retardant suits and helmets to keep our emergency services safe while doing their job. Engineers design school buildings, class room furniture and learning tools, to enable teachers to harness our children's imaginations.

Have you ever encountered any barriers throughout your career? How did you tackle and overcome them?

I have been very fortunate in my career not

to have come up against many barriers, but if I was really pushed for one I would probably say juggling a family as well as a career. While my employers have always been extremely supportive when it comes to maternity leave and flexible working, I find some professional institutions rarely think about the impact of their membership rules on women (or men) who may need to bring up a young family.

I was keen to continue pursuing my career as a passionate engineer but it did feel I was restricted from doing this so had to stop my membership for a time sadly before I found a more embracing professional institution.

I am guilty of wanting it all though and I believe this is one of the biggest struggles I've faced in my career. I have felt left behind at times, but this has also given me the drive to aim high and determination to get there.

What is your favourite piece of engineering?

I have a strong interest in how the development of biomedical engineering can transform people's lives with greater advancements in prosthesis development. To enable someone to regain the use of their limb, and in some cases regain sensation, never ceases to amaze me. The partnership between engineers and medical professionals here is a prime example of where engineers enable advances in other fields and make a real difference to people's lives. ☺

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Making a mark: RSMA's hot topics

The Road Safety Markings Association Members' Interest Group meetings cover the key industry issues of the day. Policy and membership officer Liam Sheanon reports from the latest meeting, which took place at the Principal Hotel in York



Welcoming more than 50 delegates from across the UK to the Road Safety Markings Association (RSMA) Members' Interest Group meeting in January,

Scott Yuill, vice chair of the RSMA, said: 'Engagement with our members is crucial. Feedback highlights the need to discuss a range of topics, to share best practice, and to ensure that that we listen to and act on our members' current interests and concerns.'

'As a trade association, our primary purposes are to be representative of our members within the road marking industry, promote the industry for what it is – a key component of any safe and effective highways network – and support our members in what is a hazardous and highly regulated profession. The introduction of these Members' Interest Groups, or MIGs, has allowed our members to be briefed on hot topics, share their views and air concerns about issues on the horizon – all of this feeding into the representational work we undertake on behalf of them.'

ROAD WORTHINESS TESTING AND AN END TO EXEMPTIONS

Following a consultation in 2016, the Department for Transport (DfT) has said it supports the principle of introducing mandatory roadworthiness testing for specialised heavy vehicles, which can weigh up to 44 tonnes, where this is practicable and proportionate. Annual roadworthiness testing for HGVs is covered by the Goods Vehicles (Plating and Testing) Regulations 1988. The regulations contain a number of exemptions for certain vehicle types.

The road marking industry, as with other sectors within the wider highways industry, has utilised the exemption to roadworthiness testing in the past but this will be coming to an end in the near future. John Stephenson, policy manager for the Driver and Vehicle Standards Agency (DVSA) led this session, ensuring that RSMA members were getting accurate and timely information, and answering questions.

Mr Stephenson gave a timeline for the introduction of the roadworthiness testing, confirming that changes to exemptions for road construction vehicles will start from



May 2018, but will be delayed after this date until the tax is due on the vehicle. This will allow for a phased approach for road construction vehicles.



IS THE CLOCK TICKING FOR ONE OF A KIND TITANIUM DIOXIDE?

Titanium dioxide (TiO₂) is by far the highest volume and most versatile globally-used white pigment. No other pigment comes close to matching its exceptionally high opacity (a result of TiO₂ having the highest refractive index among all known white pigments), bright whiteness and UV-absorbing protective properties.

The French authorities proposed the classification of TiO₂ as a Carcinogen Category 1B substance in May 2016. While the European Chemicals Agency's (ECHA's) Risk Assessment Committee has concluded that a Carcinogen Category 1B classification cannot be scientifically justified, it has also asserted that TiO₂ meets the criteria to be classified as suspected of causing cancer (Carcinogen Category 2) specifically through the inhalation route. Although a Carcinogen

Category 2 harmonised classification is less severe than that proposed by the French authorities, this classification would still have severe consequences.

The conference heard from Morris Cole, a representative of the Titanium Dioxide Manufacturers Association on where the issues surrounding TiO₂ currently stand and where they are likely to move in the future.

There is no exact alternative to the use of TiO₂ in road markings. No product is produced to the same quantity or allows for the exceptionally high opacity and reflectivity, key features of high performing road markings. However RSMA members learned that there will be no changes, if any, in EU regulations regarding the use of TiO₂ before mid-2020 at the earliest. This is good news for the road marking industry, for now at least, as it ensures the quality of the product will not suffer, nor will road safety, but it is certainly an issue the RSMA will have to watch.

HIGHWAYS ENGLAND'S PASSPORT TO SAFETY

With an ambition to set a common safety standard for more than 50,000 workers across its whole supply chain,'

Highways England's Mark Bridges shared





news of its new Health and Safety Passport scheme.

Highways England hopes all its suppliers will be using the system by the end of 2018.

A Highways England working group identified that the passport scheme project has two main deliverables. The scheme requires everyone who works on the strategic road network to a) undertake a Highways England health and safety induction that imparts relevant knowledge of the principle hazards and risks, legislation and best practice and b) record their induction onto an electronic competence and contract management system, which allows authorised users to access and confirm induction records as well as other training and briefing details. Access to the system will be via a Highways England branded photo ID smart card, which must be presented to access Highways England sites.

The RSMA will continue to monitor and liaise with members about how the passport will impact the road marking industry. There are concerns that the passport will be seen as just another card for the operative to obtain and members who have a large number of operatives will incur significant costs in setting this up. The benefits of the passport are undeniable, but its feasibility in practice remains to be seen.



Tolulope Oke



INCLUSIVITY

The importance of being an inclusive industry cannot be underestimated. This is not simply because it is the right thing to do, but because it opens the industry to a wider, diverse workforce and takes action to engage, retain and develop employees. Put simply, it makes business sense.

This was the key message delivered in a lively presentation by Tolulope Oke, Fairness, Inclusion and Respect (FIR) training and project manager, from the Supply Chain Sustainability School (SCSS). The SCSS is an award-winning industry wide collaboration, with a vision to be a 'world class collaboration to enable a sustainable built environment'.

Ms Oke pointed out some challenging statistics. According to the 2015 Construction Industry Training Board's

Blueprint for Construction, to meet growth forecasts the industry needs around 44,600 new recruits each year between 2015 and 2019. The latest government data suggests that in the construction industry just 8,360 people completed apprenticeships and 8% of the labour force are aged under 24. Meanwhile, women account for almost 47% of the overall workforce in the UK but in the construction industry make up just 13% of the workforce – and are primarily in administrative and office-based roles.

Historically, the UK construction industry has relied on new immigrants to the UK to provide the skills needed. In the year to March 2017, net immigration to the UK was 246,000 people. The Government's target is 100,000 people per annum. This leaves a huge potential shortfall.

Ms Oke encourages all innovators and leaders in the construction industry to start having conversations on fairness, inclusion and respect and take advantage of free workshops delivered by the FIR Programme to introduce the ideas to their business. Having understood the importance of FIR, Ms Oke encourages all to become FIR ambassadors and to make use of the FIR toolkit. The toolkit is a free industry resource developed in conjunction with Highways England, Network Rail, BAM, HS2, GRAHAM, Osborne, Skanska, Balfour Beatty, Vinci, Civil Engineering

Contractors Association and the SCSS.

The RSMA is keen to move towards becoming an ambassador with the aim of supporting and bridging the skills gap. It is currently working with training groups and a number of colleges to raise awareness of the industry but concedes it can get much better in targeting these efforts – becoming a FIR ambassador will aid this. The RSMA works in an industry that is heavily male-dominated and across the highways industry there is an ageing workforce. Becoming an inclusive industry and attracting new talent is beneficial for the road marking industry and the wider highways sector.

Access the free FIR toolkit for construction here: www.supplychainschool.co.uk/FIR.

FATIGUE

Highway maintenance, shift work and fatigue go together. The work undertaken in the road marking industry is demanding – the hours can be long and the work dangerous. There is also pressing demand from the clients to get the job done and re-open roads, which in turn can mean the operative is feeling the strain and pressures of the work.

The symptoms of fatigue in the highways industry are potentially catastrophic, so it is important for the industry to come together to define best practice and develop a risk profile for the industry.

Current fatigue management documents are limited to two interim advice notices, 189/16 – *Policy on Managing Fatigue in the Workplace*, and 190/16 *Guidance on Processes for Managing Fatigue in the Workplace* where Highways England stipulated that shifts had to have an HSE Fatigue Risk Index score below 45 for fatigue, and below 1.6 for risk. These fatigue documents fail to recognise the differences and breadth of specialisms across the highways industry. There is not a one-size-fits-all approach to managing fatigue across the industry.

A new fatigue study was established by Highways England with input from the RSMA along with other industry bodies. The report came about as a result of the Health and Safety Laboratory (HSL) being invited by key figures in the highways industry to develop a fatigue risk profile of the sector, including how it compares with good practice and specialist advice on how risk can be minimised. Working groups consisted of companies and associations across the highways spectrum including traffic management, road marking, surfacing, trade associations, tier 1 contractors, Highways England and local authorities, to facilitate the work of the HSL.



Four focus groups – across traffic management, road marking, surfacing, and winter maintenance and cyclical maintenance – were held, and a small number of operatives and foremen were asked for their perceptions of fatigue, working hours, shift duration, rest periods and workloads in order to establish a fatigue risk profile and produce a gap-analysis against good practice.

The report is still confidential and has not been publicly shared as it is still in its developmental stage, but it is an important issue that could affect working practices and the industry needs to be prepared for it. The RSMA expects to hear more on fatigue in the near future.

ORAS V:2

The Operative Refresher Assessment Scheme (ORAS) was introduced in May 2014 as part of the National Highways Sector Scheme 7 (NHSS7), the road marking quality assurance document. Operatives who have held their NVQ Level 2 Road Marking or Road Studding qualification

for four years or more prior to May 2014 are required to complete ORAS and all operatives are subsequently required to complete ORAS prior to the fourth anniversary of achieving their NVQ Level 2.

ORAS is a mandatory requirement under NHSS7. It was created to mitigate potential skills-fade from operatives and ensures they are working to current legislation and best practice. The proposed changes to ORAS come as a result of feedback from those who have already completed it, and will help ensure the industry has a strong and safe future.

RSMA members are optimistic about ORAS and see it as important to having a skilled and competent workforce. The industry is ensuring that road marking contractors who are NHSS7 accredited complete work to the highest standards in a safe manner, abiding by current legislation and best practice. This method of cyclical retraining to ensure operatives remain compliant with regulations is likely to be rolled out to further areas within the wider highways industry. ☹

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GDPR: New adventures in data protection

Adam Bernstein looks at the new General Data Protection Regulation coming into force this spring and gets some legal advice on what the roads sector needs to know

Data protection law is nothing new. However from 25 May 2018, and despite the UK's move towards Brexit, the General Data Protection Regulation (GDPR) will come into force, bringing in new data protection legislation from Europe.

The landscape is about to radically change and few will have thought about how the GDPR is going to apply to the UK's transport network.

Liz Fitzsimons, a partner at law firm Eversheds Sutherland who specialises in privacy and information laws, says: 'The GDPR builds on and upgrades current data protection laws, imposes more prescriptive and additional obligations on those it captures. The GDPR is now the standard to aim for.'

A draft document from the Institution of Engineering and Technology (IET), titled *Local Authority Guide to Emerging Transport Technology*, notes that 'authorities are faced with finding new ways of increasing levels of utilisation of the transport networks they already have'. This, and the need to commercialise data held, means that the GDPR needs serious consideration by the world of transport.

Data collection

The issue that organisations need to grapple with is that as technology develops, and datasets are combined, it is making it easier to identify individuals.

Ms Fitzsimons says that court decisions have confirmed that postcodes, vehicle number plates and internet protocol addresses are considered personal data.

'The GDPR is explicit,' says Ms Fitzsimons, 'personal data includes information relating to an identifiable person where they can be identified, even indirectly, such as by an identification number, location data, or online identifier.'

While the GDPR is all about protecting individuals it offers no succour to businesses says Dai Davis, solicitor and engineer at DaiDavis.com.

'The legislation only applies to data held on individuals – this limited company or that district council is not caught by the legislation.'

Any use of personal data is subject to the GDPR. This includes automated use, collection, recording, storing, disclosing by transmission and structuring the data through its life cycle. In the context of smart highways and connected and autonomous vehicle operation this will no doubt involve multiple players working together to process huge amounts of personal data about individuals, vehicles and road use.

As for highways, Mr Davis says that local authorities and vehicle manufacturers already collect information.

'Cars are associated by manufacturers to owners who in turn will be known by the DVLA. Local authorities will know about cars and drivers from other sources – parking permits, parking fines, and internet connected devices.'

It's clearly not going to be hard to tie owners to vehicles via a multitude of databases and big data.

New obligations

The GDPR has a requirement to engineer in privacy and compliance by design and default. Particular concerns will be data minimisation, encryption and data security, minimal data access and early anonymisation. Indeed, Mr Davis says that for a local authority (or anyone else for that matter) to be compliant with the GDPR, the work load will rise as data subjects will gain many new rights.

Take the right to be forgotten. How will an authority handle this? Under the Data Protection Act, data has to be used 'fairly'. Mr Davis says that presently organisations have to register with the Information Commissioner's Office (ICO), which is rarely checked by data subjects, and then follow eight principles of data processing – with minimal penalties for breaches. Under the GDPR, data must be used 'fairly and transparently'.

'Going beyond just registration,' says Mr Davis, 'authorities will have to frequently remind data subjects that data is held about them and tell them about their rights.'

And the penalties for breaches are stiffer – up to 4% of global turnover or €20m – whichever is the greater.

The GDPR expects personal data to be anonymised as quickly as possible. Ms

Continued on page 32



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Continued from page 30

Fitzsimons says that it is hard to achieve this successfully (and lawfully) but if done properly, details will no longer be personal and can be used outside the confines of GDPR. [She adds a note of caution: The proposed Data Protection Bill plans a new criminal offence if de-identified data is used to re-identify individuals.]

Mr Davis says that when legislators don't understand an issue they create new worlds.

'So we have pseudonymisation – a halfway house where only some data is redacted.' Even so, both he and Ms Fitzsimons think that if data can be anonymised it should be.

And what of the new concept of consent, which data subjects can withdraw to be 'forgotten'? Mr Davis thinks it an impractical concept. 'So I borrow a friend's car, drive to a county I've never been to before and am billed – how am I to withdraw consent? I've not given the local authority consent to collect my data so in reality I cannot stop it.'

So how will Transport for London, for instance, monitor drivers while offering them the right to object to automated processes?

'Most people won't exercise their rights and it only matters if you drive close to the congestion zone or if you enter after the charging stops. A driver concerned that they've been charged incorrectly can ask to see the data that leads to charging. Under the DPA there is a £10 charge but under the GDPR this becomes free,' Mr Davis says.

There's also the interesting point of third party access to data. Can a car owner withdraw consent to the DVLA passing vehicle details to a car parking company? Mr Davis says not. He points to three reasons to process data – consent, contract or legitimate interest.

'Car parks are required to have contract terms posted prominently for drivers to see. Therefore, when parking drivers agree to the contractual right under the GDPR Article 6, which allows parking firms to have an arrangement with DVLA.' Drivers, he says, are deemed to have read the contract, which is binding in law.

Data ownership

So who owns the data collected? It's important to understand this because alongside personal data there will be, as Ms Fitzsimons says, confidential, proprietary and commercial information.

'Clearly personal data belongs to the individual who is the subject of the data and it can be used by businesses and organisations subject to meeting GDPR and related requirements. But it cannot be owned exclusively by a business or local authority.'

She adds that while personal data use between businesses and organisations can be controlled by contract, 'contractual terms

must fit with the GDPR's requirements, which cannot be overridden'.

In relation to non-personal data, there can be 'ownership' and exclusivity issues but determining the benefits can be complex. As Ms Fitzsimons comments: 'The law does not prevent commercialisation; it imposes checks and balances to ensure the rights of others are properly respected – compliance will be key.'

Mr Davis suggests that where a local authority tracks cars along a road, the data owner will be the authority. But what happens if the authority sells the data to others who then process it further?

He thinks they will be owners too and he gives an illustration: 'If Ford Motor Co has a deal with a local authority to track drivers then the authority will be the owner and user of data. But if the authority uses a third party to just process data, ownership will not transfer to the processor.'

He worries that local authorities tracking owners will say that they own the data but notes that there will be multiple owners of data – the car owner, the local authority and the manufacturer.

But what of the data generating device? Mr Davis says: 'From March 2018 all new cars that are sold in the European Union will be obliged to have emergency dialling SIMs fitted and so will be internet connected. The question is – who owns the device? The manufacturer could say that it's not the car owner, but as a lawyer, I'd say the owner of the car is the owner of the device.'

Out of date

After all that the GDPR is actually out of date before it's even come into force. Looking back at its timeline it's easy to see why. It was originally drafted in 2007, when cloud computing didn't exist, but is now taking effect in May 2018. Mr Davis says: 'The EU commission didn't know any better and so in terms of internet connected cars and transport infrastructure the concept of protecting data is almost impossible to apply.' The draft IET document proves the point. Under the section on Security and Privacy of Data, s4.3 on open data provision, it notes that systems should 'prevent unauthorised access both from the client (user) end and the system administrator function'. But, as Mr Davis points out, it's the individual that owns the car – why should they be limited?

The bottom line

Bodies worried about the impact of the GDPR should act as a business would. They should analyse what there is to be worried about, ignore the rest and assign resources properly. The right to be forgotten is a good example – it's not really enforceable. The ICO's resources are limited and so will naturally focus on gross infractions rather than things that are harder to track. But as Ms Fitzsimons warns, 'there can be joint and several liabilities between an organisation or business and its supplier'. Security breaches will become mandatory to report to the ICO and, as major players in transport could soon find out, hiding a breach will prove very expensive. ➡





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Procurement that won't stifle innovation

Andrew Rhodes, head of marketing at Clearview Intelligence, gives his insights into the world of innovative highways procurement from the use of frameworks to the NEC3 contracts

For small and medium-sized enterprises (SMEs) working in the UK highways industry, gaining new work through the procurement process may, at times, seem like a dark art. This is especially the case when you are working in an area that is heavily regulated, dominated by multi-million pound contracts and a large group of powerful Tier 1 contractors, and has the added interest of the Government and civil service departments. At best procurement can seem like a necessary evil; at worst it can stop the participation of the SME, reducing sales and limiting technical innovation.

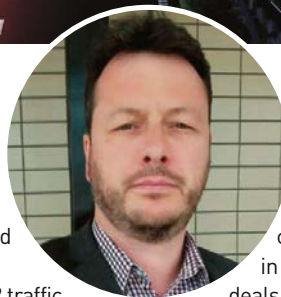
However, there are benefits to be gained if you are willing to stick out the qualification process and gain that all important approved status.

Clearview Intelligence has seen quantifiable benefits after its first year as part of the Crown Commercial Services (CSS) Traffic Management Technology 2 (TMT2) framework. The purpose of the CSS is to support the public sector to achieve maximum commercial value when procuring common goods and services. As this is a framework with 15 different types of lots within it, SMEs such as Clearview can feature in relevant lots that suit their core competencies rather than have to team up in partnerships or joint ventures just because the requirements don't allow more specific supply agreements.

Using framework agreements such as the TMT2 provides local authorities and other government departments with an easier way to buy goods and services. It essentially removes the need for qualification checks and multiple tendering. Similarly, SMEs save time and resource with fewer documents and fewer tenders to respond to.

Security to invest

Being part of the TMT2 framework has allowed Clearview to invest in developing its product range. Much of the Highways England strategic road network has legacy traffic monitoring units (TMU) in operation feeding the National Traffic Information Service (NTIS). This equipment, while still working, needs upgrades to ensure continued delivery of accurate data. Secure in the knowledge that procurement across the UK could be made through a single point of contact, thus focusing and speeding up the



process, Clearview was able to invest in designing a new unit with the latest technology. The result was quicker time to market product development and existing TMU and TAME kits can now be replaced with new TMU2 traffic monitoring units.

The new units are fully supported and provide improved system and data availability with reliable performance. Orders for the new TMU2 units were quickly placed by Highways England and can now be called off by regional areas from Highways England stores as part of the routine maintenance stocks.

For commercial companies using NEC3 and the new NEC4 contracts, these provide a standard and consistent approach using common language. The fact that they can be split into type of service is useful as this allows a similar engagement on the most appropriate NEC model based on the scope of work.

When used wisely they save both supplier and purchaser time and therefore money. If the highways industry continues to use the CSS, NEC or other industry standard contracts or frameworks, we must ensure that we are not just paying lip service to the concept. Companies should be encouraged to limit the use of NEC contracts that use Z clauses - additional conditions of a contract which have the same status as core and optional clauses - which run the risk of negating the benefits by effectively turning

them to traditional contracts. Are frameworks and NEC contracts the future of all procurement? They will certainly continue to play a central role in enabling larger procurement deals to be put in place quickly and efficiently. But we should be careful not to inhibit the ability to embrace new technology and new thinking.

With Highways England publishing its recent Strategic Road Network (SRN) Initial Report looking at operating the UK's roads through 2020 to 2025, there is no respite in the need to invest in new technology while maintaining the road network as safe and fit for use.

Framework agreements run the risk of limiting what is permissible on our roads and perhaps more consideration should be given on how to allow the service contracts to operate in a broader way. Providing the required service levels is always necessary but allowing operators flexibility to manage the contracts as new technology develops is an interesting challenge that the industry is facing.

With the benefits of operating under framework agreements or NEC contracts continuing to be positively perceived by both large and small organisations it's hard to see them disappearing anytime soon, but perhaps it's right to keep them under scrutiny to ensure they remain relevant and workable in changing times. ☹



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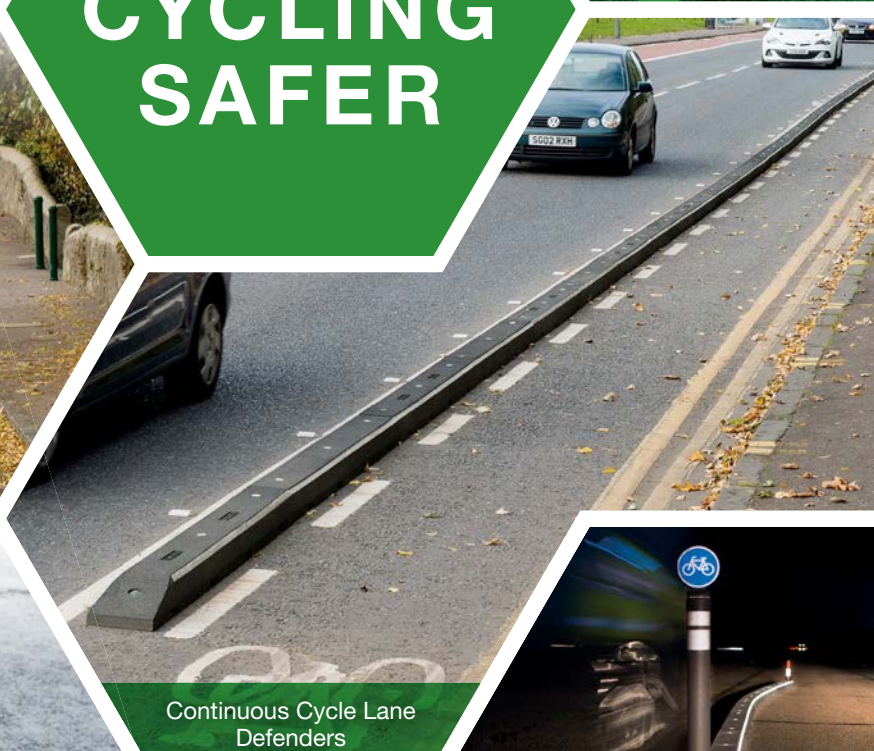
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Smarter tunnels

One of the most complicated parts of a highway authority's portfolio of responsibilities, proper tunnel maintenance and design standards can be a matter of life and death. While new tunnels can be built to the highest standards, retrofitting old tunnels can actually be more of a challenge, especially given tight budgets. David Adams, associate director, tunnelling and underground structures at AECOM, digs into the expensive and complex issue of tunnel maintenance



Major transport infrastructure in the form of tunnels, bridges and underpasses is often built to alleviate congestion or used at constrictions where

the natural or built environment poses challenges that restrict the movement of people and freight. For this reason, these structures are vital components of a busy transport network. However, like all engineered structures, assets deteriorate with age and require maintenance or remedial works.

The importance of keeping on top of these works was cruelly highlighted by the infamous Mont Blanc Tunnel fire in 1999, which killed more than 30 people and, quite rightly, put a huge spotlight on the safety of transportation tunnels. So how far have we come over the past two decades?

A new EU Directive on the minimum safety standard for road tunnels was released in 2004 in response to the catastrophe at Mont Blanc and updated in 2007. The same year, the *Road Tunnel Safety Regulations* (RTSR) was published in the UK, which deferred more or less entirely to the EU Directive for design. Ensuring that existing road tunnels were brought up to the standards required by the RTSR was a major

task for the years that followed.

The 658-metre Penmaenbach Westbound Tunnel on the A55 is a prime example of a tunnel being brought up to the necessary standards. AECOM demonstrated that the ventilation system provided the equivalent protection for tunnel evacuees to an unventilated tunnel 500 metres long, which is the specified requirement in the RTSR.

AECOM's analysis saved the client – the Welsh Government – several millions of pounds by removing the need to build a cross passageway. In addition, AECOM worked with contractor Amey to refurbish the A38 tunnels through the centre of Birmingham, including renewing ventilation systems and pumping stations and installing new security and communication systems. This work enabled the tunnels to meet current safety standards and included technology that will assist in their future management.

As well as projects to meet RTSR standards, AECOM has also carried out projects such as the high profile refurbishment of the Mersey Queensway tunnel beneath the River Mersey from Liverpool to Birkenhead. AECOM led the project, which included provision of a new cladding system to improve the environment within the 3.25km tunnel for road users.

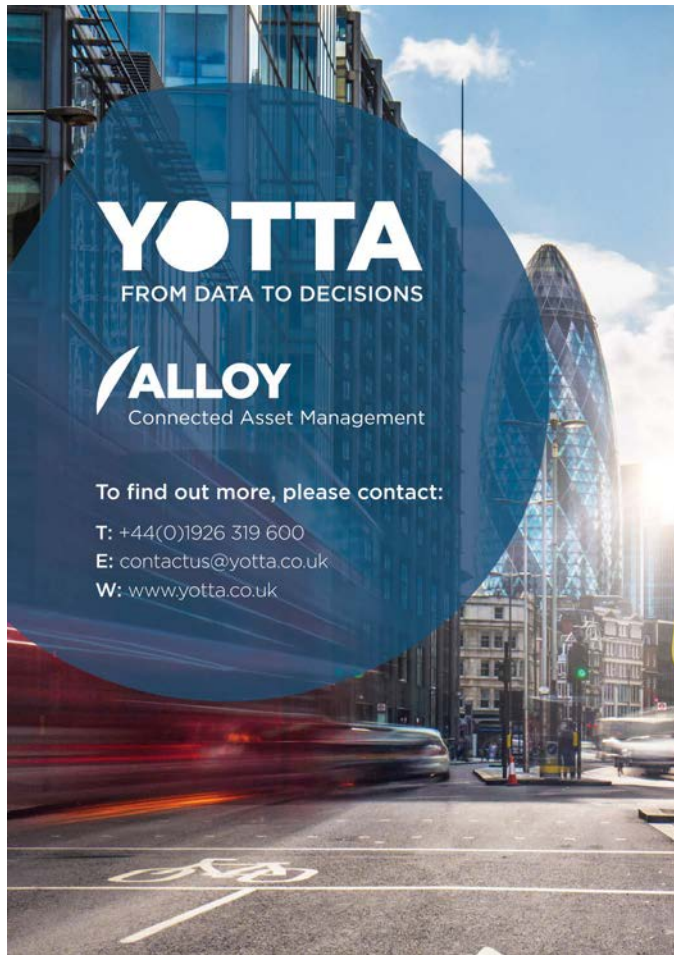
Having delivered a variety of tunnel

maintenance and remediation schemes, there have been a number of key lessons learned when adopting the RTSR. A major challenge is that in terms of minimum safety design standards, the EU Directive that the RTSR refers to is very much focused on new tunnels and not existing ones. Adaptations to legacy tunnels, such as putting in cross passageways, are not always possible, so alternative methods may need to be found.

Another challenge is that authorities with responsibilities for road tunnels are rarely given extra funding for tunnel upkeep compared to an open road environment, unless tolls can be applied, but these are unpopular.

Road tunnels are operationally much more expensive to operate than an open road however, when factors such as ventilation, lighting and personnel roles are taken into account. Consequently, revenue/opex costs and whole-life costs are far more important to consider as part of the design rather than reducing capital costs.

The sector has certainly come a long way since the tragic Mont Blanc Tunnel fire and the vision for smarter tunnels of the future and their role in driving smarter infrastructure will only continue to evolve. ➡



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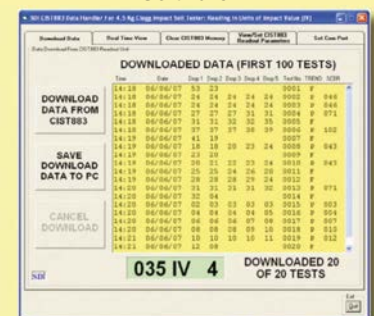
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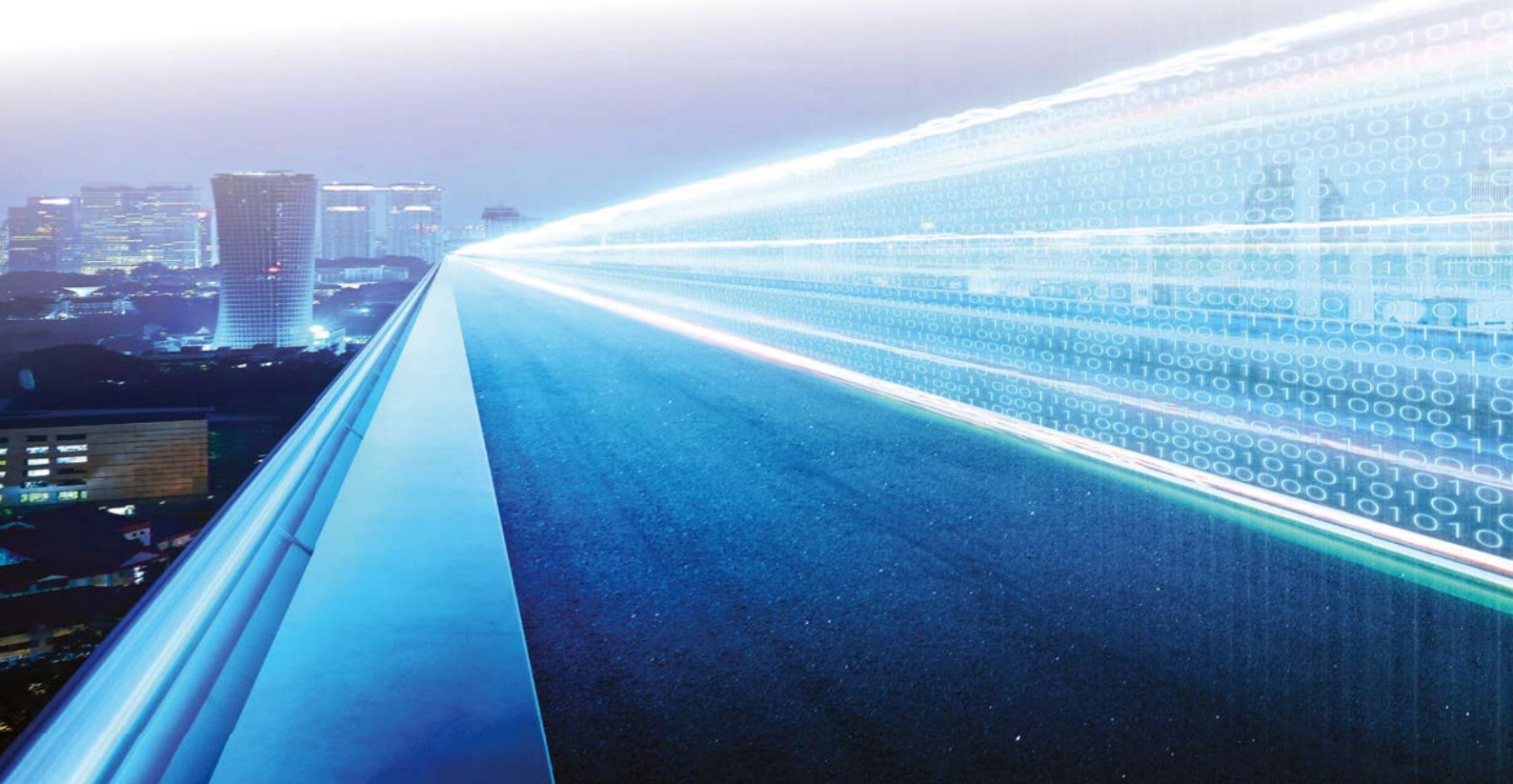
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Digital design and hybrid practitioners – a highway to the future?

Simon Benfield, director at Ramboll, argues civil engineering needs to branch out to embrace other disciplines and professions

The UK is facing a significant productivity issue. When compared with the rest of the G7 advanced economies in 2015, output per hour worked was 15.9% below the average. When comparing the UK to Germany, productivity lagged behind by almost 30%.

Three of the key challenges facing a construction industry that is performing particularly poorly are the skills shortage, technically challenging programmes and budgetary constraints. This is combined with out of date approaches that ensure almost every construction is a one-off. Digital design and automation are the way forward to meet these challenges. The ever-expanding growth in computer power, sophistication and complexity is opening many doors for those willing (and ready) to step through.

The simplistic label of 'civil engineering' can be restrictive, and it is important to embrace other professions within day-to-day work. This has notably been highlighted on Highways England's smart



motorway programme (SMP), for which Ramboll provided gantry structures as a series of products with standardised components and sub-assemblies rather than individual designs.

The SMP presented just the right balance of quantity and variability to marry up decades of productisation – presenting a service or solution as a product – and process engineering with the programme requirements and a need to automate, particularly given the near-impossibility of completing the work to a comparable quality with traditional methods. Automation was a key enabler on the schemes and the work was undertaken by combining the roles of civil engineers, product designers and software programmers.

Skills shortage

The requirement for civil engineers is ever increasing, alongside the growing demands of the population and infrastructure, and the growing need for digital design affecting all sectors. The ability to fill the

void with engaged young people is becoming increasingly challenging – looking to solve these problems within one discipline is not viable.

The use of digital design and automation is a powerful tool in addressing the skill shortages within the industry, releasing existing staff from carrying out low-skill tasks and giving them time to take on more complex and challenging work, which is required to deliver modern schemes. As design and modelling tasks become more accessible it is possible to use newer staff, giving them valuable experience, involvement and ownership of the design process in an easy to use system.

These new systems also widen the resource pool by allowing a wider breadth of talent and experience to be involved in production, design and manufacture.

Budgetary constraints

The new systems offer considerable budgetary benefits. There are obvious savings in worker hour costs because fewer staff are required and, of those, lower-cost team members take on a much higher proportion of the work. There are also a number of other more subtle advantages.



It is possible to identify where the time and cost-critical aspects occur in the projects, so that focus can be brought to bear to reduce these. For example, by developing an in-depth understanding of the manufacturing process we have been able to modify construction details so that the most costly element (usually the labour) is reduced, even if it means increasing the material costs – smallest and lightest are not always the most cost effective.

There is also a significant cost saving to be gained from the possible reductions around scope and requirement change; leaving the gantry design to the end of the overall design process, facilitated by the greatly reduced programme time required, significantly reduces the 'change' generated by the evolution of the other design disciplines that influence gantries. On some schemes change can amount to over 50% of the total outturn cost of gantry design.

Timing

As noted above, these systems provide a significant reduction in the time required to deliver finished designs and models. For direct comparison, the time taken to create a 3D 'Level of Detail 4' (detailed design stage) gantry model was reduced from days to a matter of seconds. From a project point of view, this major step change provides many benefits including reducing the time required to produce the design and drawings and so compressing that element of the project programme.

Moreover, because of the reduction in delivery time there is greater flexibility over when the gantry design can be undertaken

in relation to the wider scheme design. It can be left until much later in the overall design programme, allowing other disciplines, such as signs, signals and alignment to reach further certainty. This drastically reduces the need for change and therefore the time required to re-work deliverables.

Looking Forward

Can these approaches be adopted in a wider civil engineering environment? What benefits could they bring to the industry in terms of design and construction? Can they address some of the challenges facing the industry in this period of unprecedented change?

The answer to all of these is a cautious yes. Digital design and automation can only succeed where there is a strong underlying process in place, which is understood by those involved, and where the scale of the process is appropriate for the tools available. Ten thousand lines of computer code won't bridge the Firth of Forth, or safely replace a 150-year-old rail viaduct, which is why the combination of design experience and programming capabilities are critical to success, before we get on to the development of automated systems and the off-site, factory-based products that will give savings in time and resources.

In addition to programming and civil engineering, we ought to also embrace other professions such as product and industrial design. We can capitalise on the benefits of cross-industry collaboration and add angles and viewpoints to enhance outputs while simultaneously streamlining processes. With digital design in all its forms becoming

more critical to the needs of society, we need to recognise disruptive technologies as the tools to revolutionise our industry rather than a negative disturbance to the natural order of things. It is critical that the industry identifies and develops a career path for new hybrid practitioners. Embracing the role of a multi-focused engineer is paramount. So while there is no question that a skill shortage in engineering is a hurdle, are we casting the net wide enough to capture the skills that will revolutionise the industry, to respond to the challenges we face as a society?

Addressing these skills will be vital to creating an industry fit for the future. As we face an uncertain economic outlook, the impetus for innovation needs to accelerate. Digital design tools have already delivered numerous benefits. They have delivered time compression to get projects further faster, de-risked the design process by bringing downstream execution knowledge to early-stage decision-making, and supported this with clear visualisations of quantitative design data.

Investment will continue as the industry shifts toward automation, driven by the wider challenges it faces. It is widely accepted that the construction industry has lagged behind others in terms of innovation, but to accelerate our development we must reward bright ideas and encourage investment. We must hope that the Government's pledge to tackle low productivity with investment in housing, transport and innovation provides some of the stimulus needed to encourage innovation in the industry to flourish. ●

While council directors' body the Association of Directors of Environment, Economy, Planning and Transport (ADEPT) is well-known for helping build successful communities, another key aspect of its work is saving lives. Paul Copeland, chair of ADEPT's Traffic and Safety Working Group, gives his view on traffic safety and making the best use of funding, data and collaboration

ADEPT members have had to work creatively to find alternative sources to fund traffic safety. Collaboration and Local Pinch Point funding means we work with our highways engineering teams and developers to guarantee that road safety

There are five pillars of action used as guidance: safe road use, safe vehicles, safe speeds, safe roads and roadsides, and post-crash response.

Our members comprise four neighbouring local authorities, East Riding of Yorkshire Council, Hull City Council, North East Lincolnshire Council and North Lincolnshire Council. Humberside police and Humberside Fire and Rescue Service are also members, alongside Highways

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Continued from page 40

England, and the Defence School of Transport in Leconfield.

Effective collaboration and evidence-based management are both key to handling a wide remit that includes setting speed limits and speed management policies, improving driver behaviour, and feeding into major engineering schemes and transport developments.

The data challenge

Making use of data is fundamental to providing a more efficient service. While big data enables us to understand long-term national trends, it is local data that supports critical decision-making at an operational level, making implementation more cost-effective.

Local data on collisions and incidents is used to determine priorities and solutions that can range from temporary signs and local publicity to longer-term work, engineering schemes, planning and safety messages.

Social and demographic data provides general information on road users and, when analysed alongside traffic incident statistics, allows us to determine where incidents are happening and

who is involved, enabling us to target key groups.

Safer Roads Humber operates in a predominantly rural area where we have had some issues with motorcycle casualties. Demographic data has allowed us to understand that many of these accidents have involved tourists unfamiliar with the local roads. We have used the MOSAIC consumer classification tool to assist us – a new method for some, but it works – enabling us to provide focused messaging to reach a specific group.

Education, collaboration, review

Education is an ongoing long-term commitment. The school students of today become the young drivers of tomorrow so getting into schools is vital, particularly as large-scale road safety TV campaigns are a thing of the past.

Safety messages need to reach young people before they get behind the wheel, but with stretched timetables, getting into schools isn't automatic.

Working in a partnership makes this far easier and more cost-effective to manage. The fire service is already working closely with secondary schools and colleges and

is able to deliver our messages as well as their own, reducing the workload for the local authorities and pressure on timetabling for schools.

The impact of campaigns like these can only be assessed accurately over the long-term, as driver behaviour is scrutinised over time. The partnership undertakes ongoing monitoring and evaluation, but this long-term approach, aiming for high quality roads with well-educated drivers, requires long-term funding certainty.

Nationally, the Road Safety Management Capacity Review is expected to report to the Department for Transport before the summer. Consultation is being undertaken with a comprehensive group of stakeholders, interest groups, professional organisations and academia, NGOs, local authorities, road user groups and emergency services.

Its remit is to provide analysis and guidance on best practice and future approaches to road safety. ADEPT has been contributing to the work of the review and looks forward with interest to its findings. We hope it will prove to be a catalyst for innovation, taking us on the road to a safer future. —





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The fight against the workload

David Kinsey – head of highways, grounds maintenance and a lot more at Derby City Council – takes us through the long list of what constitutes ‘all in a day’s work’ at this time of year



his time of year it always feels as though we are spinning more plates than usual – getting ready for the end of the financial year as well as dealing with the coldest

months of winter, hence the pothole season.

These issues come on top of:

- The Incentive Fund questionnaire submission
- Continuation of preparation to implement *Well-managed Highway Infrastructure*
- Finalising the 2018/19 capital programme with value management and scheme prioritisation processes applied, to allow us to finalise our three-year costed work programme
- Completing the Institute of Highway Engineers' Professional Diploma in Asset Management course and associated assignments
- A senior management restructure with a view to implementing a new operating model for our Streetpride services (street cleansing, refuse, grounds maintenance, highway maintenance and fleet management).

So since our last update back in November (*inset*), there has been plenty of activity within the highway maintenance team.

Incentive Fund submission

The self-assessment questionnaire was submitted with Derby City Council proposing a Band 3 score. This followed workshops with all major asset owners going through each question in turn and collating evidence to support continuous improvement. We recognise there are areas that need development, including lifecycle planning of all assets beyond carriageways. Our approach to risk will also be developed following the council's review of its risk management policy and procedures, including updated strategic, tactical and operational risk registers. This will help develop the new risk-based approach under the new code of practice across all assets and not just safety inspections.

We await a potential Department for



Transport (DfT) consultation about reviewing the funding formula. It certainly needs us to have all our asset management ducks in a row to obtain maximum funding without having to bid for it.

Winter

So far Derby seems to have avoided any significant snowfall. That said, we have had some particularly cold spells with ice and frost, which have occasionally been prolonged.

This led to a few issues with driver cover and having to insist on rest days, the result of which means reactive highway maintenance and income-generating work suffer – just at the time when reports of potholes increase!

Speaking with other authorities, the lack of drivers is an issue that is felt nationally. In an attempt to mitigate this, we now have trained gritter drivers in our street cleansing, grounds maintenance and fleet management departments, with more planned from our colleagues in waste management.

On a more positive note for winter, the season has gone well so far in terms of keeping up with the weather. In addition, we had a very successful media afternoon. It was a Friday when there was snow forecast for the weekend. The local newspaper did a Facebook Live broadcast from the depot and then went out with one of the drivers, which attracted a record number of views for them. This was followed up by local TV and radio interviews. Most notably, there were more positive than negative comments on the Facebook video.

IHE professional diploma in asset management

It was back to the classroom for four days in

November and December. My colleague Kully Boden and I went along with others from Luton, Doncaster, Oxfordshire, Halton and Sandwell.

The four days in the classroom were quite intensive but enjoyable. As well as (hopefully) gaining us the qualification, the learning highlighted a few areas that we need to revisit in our existing policies and procedures. Then followed 12 assignments of between 1,000 and 1,500 words – not exactly easy to fit in around the day job, plus Christmas as well.

Having said that, I would recommend the course to anyone with responsibility for asset management. It certainly has built our competency in key functions, including lifecycle planning and performance management. In my opinion the industry has needed a bespoke course such as this for some time now.

Future operating model

The senior management restructure has been carried out with a view to determining a future operating model for our Streetpride services. One of the main objectives is to develop a model that allows greater flexibility in terms of generating income and becoming more 'commercial'.

With this in mind, I attended my first meeting as a member of the Future Highways Research Club – which provides exclusive articles for *Highways* – at Cranfield University. I came away with a clearer view of where Derby needs to start in terms of identifying potential markets and services that can generate income.

So yet again it looks like being another very busy year and we haven't even mentioned the bid we are working on for the DfT's Connected Vehicle Innovation Fund. This is a really exciting piece of research and if successful, we look forward to writing about it in a future issue. ☺



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Promising signs

Dan Robinson, managing director of Traffic Management Products Ltd and chairman of the Association for Road Traffic Safety and Management (ARTSM), talks to *Highways* about how his organisation plays a vital role in the sector

How significant do you believe ARTSM is to the highways industry?

The association has never been stronger and has grown significantly in the last 10 years. We now total some 50 members, with a significant growth in members from the variable message signs (VMS) sector.

We participate in the Department for Transport's (DfT) working group on signs and lines, have a presence on Highways England's Sector Scheme 9a working group, sit on several BSi committees and have been a significant force in the development and operation of TOPAS (Traffic Open Products and Standards), with its current and previous director chosen from the ARTSM executive committee.

How do you account for this growth in membership?

As signage technology has improved so have road users' demands to be kept informed. We can see the evidence on all road improvement sites, which now provide, as standard, additional information through signs to explain the reasons for road



works, how long they will be in place, the expected time delay and other information.

This signage is often provided by smaller companies, which are faced with significant legislation to ensure that the signage they provide is appropriate. Our surveys of new members show the reason they choose to join ARTSM is to have guidance on compliance with regulations.

What do you think have been the major changes to signage in the past 10 years?

There have been so many. Most static signs are now manufactured from long lasting prismatic films with the signage digitally printed, bringing an end to lichen moss sitting on the top of vinyl letters. Aluminium substrates have been replaced by more carbon neutral composite materials. Self-righting bollards are now seen as standard, reducing electricity consumption, minimising maintenance and offering greater durability. VMS are at the heart of smart motorways, allowing the hard shoulder to be used as a running carriageway. Signals on both permanent and temporary sites operate on more sophisticated electronic management that minimises traffic delays and disruption. Of course a lot of signs now sit on passively safe posts, reducing the need for additional protection barriers.

What all recent sign developments have in common is that they are designed to minimise

their environmental impact, lower whole-life cost and at the same time maximise efficiency. Lean working is a constant theme in our members' businesses.

We must not forget that the changes to sign requirement made in the *Traffic Signs Regulations and General Directions 2016* and the subsequent revisions will also impact on how the road network will look in the near future. There is now greater flexibility in sign design, more local authority approval replacing DfT approvals and a continued drive to de-clutter the network, looking at how traffic signs and lines will work together to minimise clutter and of course cost.

What do you see as the future direction of ARTSM?

We have already come a long way from the association's humble beginnings in 1934. What is clear to us as an organisation is that:

- 1) Our industry has become increasingly reliant upon the experience of a small group of professionals who are approaching and in some cases past the retirement age
- 2) We can no longer rely on either central or local government to provide the resource facilities that were made available in previous years
- 3) When Brexit happens, we will have the opportunity and task of managing our own future legislation
- 4) Legislation will become more intense in future years, regardless of where the legislation is formed
- 5) The advent of driverless vehicles will impact significantly on traffic signage.

Our strategy in 2018 and going forward will be to address all of the above points. Our first duty will be to continue to provide a value added service to our members. A significant part of that will be to provide a more focused internal training facility for members to help them prepare for the changes that will undoubtedly occur.

It is clear that budget constraints on government departments are set to continue and the trend for industry to step up to fill the void has already been established. ARTSM will play its part in establishing the future direction for the sector by increasing its participation in a range of external organisations and cooperation with other trade associations.

We have already begun to introduce some of these changes and have recently created the new post of strategy and development officer to help the organisation realise its full potential. The next 10 years will be an era of even greater change and we expect ARTSM to help drive that change for the benefit of all stakeholders. ☺





The Intertraffic conference and exhibition, held on 20-23 March in Amsterdam, is a four-day juggernaut of an event, taking in some 30,000 visitors, covering 13 halls and giving the world a comprehensive view of just how dynamic the traffic and transport sector is.

Exhibition manager Joyce de Winter says that despite its size: 'Intertraffic Amsterdam is a hands-on place where you can not only see and learn about the latest developments in mobility but also experience them first hand through demonstrations in exhibition halls, outside the RAI Centre and through driving experiences on the roads of Amsterdam.'

A good place to start in this somewhat overwhelming landscape of new products and ideas is the Intertraffic Amsterdam Innovation Award. More than 60 high quality entries were narrowed down to the final 15, leaving three nominees in each of the five categories – infrastructure, traffic management, safety, parking and smart mobility. From the category

winners, one entrant will ultimately be crowned this year's overall winner, with the results announced at the opening ceremony of Intertraffic Amsterdam on Tuesday 20 March.

Among the big names up for an award is Dynniq for its CrossCycle product in the smart mobility category – one that is likely to impress the home crowd.

Dynniq says: 'The CrossCycle app identifies cyclists sooner when they approach an intersection and gives them the green light more quickly. In addition to extending the green light for individual cyclists, the app also makes it possible to give priority to groups of cyclists. The app promotes the use of bicycles by making cycling fun again.'

Dynniq, with its business units WPS Parking and Energy, will also be hosting a seminar on parking and energy solutions on 22 March where it will analyse the issues around the potential future of off-street parking facilities with extensive, fast-charging systems.

AppyParking is shortlisted in the traffic management category with its Signs to Lines TRO Mapping solution. The company

says: 'Signs to Lines Mapping is the latest patent pending technology that creates the world's most accurate map of all the paint on the street related to traffic and parking management.'

In the infrastructure category, Czech-based company CROSS Zlín is in with a chance with its OptiWIM sensor, which the company claims features 'several world firsts', most notably perhaps the 'world's only technology suitable for free-flow-toll-per-tonne'.

ParkHere GmbH is in the parking category with its self-powered parking sensor, which not only registers whether a car is parked in the spot but 'is the first parking sensor that doesn't need any kind of external supply'.

The company says: 'It uses energy-harvesting to produce the energy it needs to send a signal to the base station which forwards the data to a cloud server. The sensor is expected to operate for more than 25 years without the need of any source of energy or maintenance.'

Portuguese company Sernis is up for awards in both parking and safety. In the safety arena it is hoping to win the day with its SR-90 product, described as an intelligent system for physical speed reduction of vehicles for controlled speed zones. The product involves a hardwired road stud, which can signal drivers using lights and elevation from the soil.

'The control will be the result of an intelligent algorithm: the level of elevation and the LEDs colour will change accordingly to the speed that the car approaches the control area,' the company says.

Outside of the product exhibition, the Intertraffic conference has a wide range of discussions and presentations designed to push the boundaries. One notable presentation category is 'public private cooperation', which includes a discussion on integrating smart mobility into traffic and transport models.

Rijkswaterstaat - the Dutch infrastructure authority - and Connecting Mobility are hosting the talk and arguing that 'in order to support future decision-making in traffic and transport, it is essential that models include the changes smart mobility is expected to have on travel behaviour'.

'Forecasts for future demands with regard to infrastructure, public transport, etc. are only useful if the effects of all new ways of travelling are included. In this session, we will present different views on how to integrate smart mobility in models, and all challenges ahead.'

Another interesting presentation is on the concept of the 'car as a sensor'. The National Data Warehouse for Traffic Information in the Netherlands (NDW) is coordinating research on the use of mobile phone apps and other sources of floating data on behalf of the road authorities. The presentation will give an update on the latest developments in the field. ●



Shining a light on BIM

Will Baron, co-founder and director at Keysoft Solutions, discusses how Building Information Modelling can help whole-life costing and maintenance in street lighting

Building Information Modelling (BIM) originated within the building construction industry and has been proven to deliver whole-life cost savings. *The Government Construction Strategy*, published by the Cabinet Office in 2011, announced the Government's intention that all centrally procured contracts should be compliant with BIM Level 2 by 2016. The key objective of this approach is to reduce the capital cost and the carbon burden from the construction and operation of the built environment by a fifth.

Building design, for example, has transitioned over the last 30 years from one largely undertaken on a drawing board to a highly digital, information-rich software-based activity. It is now possible for computers to greatly speed up and assist the designer. Design standards, regulations and other rules can be 'built-in' to the digital model. For instance, if two windows are too close in a design, the computer can provide a warning that building standards will be breached.

All too often however, at the end of

the design process, the output is simply a printed sheet or perhaps a PDF file that lacks any of the 'intelligence' of the model, and much of the associated information such as manufacturers' part numbers, and subsequent value is lost. This value can reduce the costs of construction, and more significantly whole-life maintenance costs.

BIM has often been said to be 20% technology, 80% process and the primary focus for industry is to develop joined-up thinking throughout the whole life of infrastructure. BIM is not software; it is more about planning and a way of integrating all the tasks and related information with all stakeholders. It is important to identify the project deliverables and this may need to be developed in discussions with clients.

Underpinning and defining what BIM means for each project will be a 'BIM Execution Plan' (BEP). The BEP is a document that will be agreed at the outset. It should be regularly reviewed and may evolve as design teams, suppliers and manufacturers, and perhaps even technology change throughout the project.

What is BIM for lighting engineers?

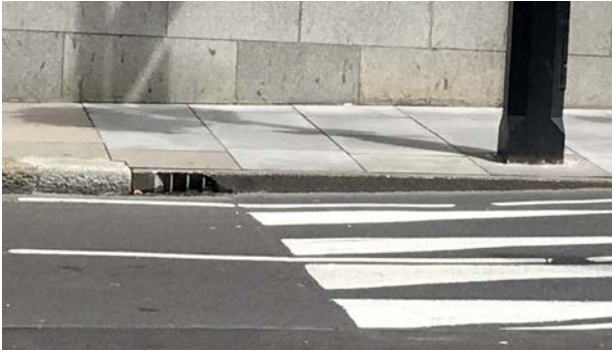
While the lighting industry looks somewhat different from building construction, there are nevertheless many advantages to building a digital street lighting information model. Traditionally, scheme implementation and contract drawings have provided little value after installation. However, lighting design is highly data driven. Lighting assets are also already usually maintained by means of a Geographic Information System (GIS) so BIM can provide clear benefits by linking information defined at design time such as photometric data (see figure 1 on next page) and data captured during the scheme implementation with the maintenance phase.

While most lighting designers will determine the appropriate selection of luminaires against the backdrop of real, to scale mapping, this context can provide the opportunity for all aspects of a lighting scheme to be calculated. For example, map-based design can assist with power, cabling and ducting design as voltage drops

Continued on page 50

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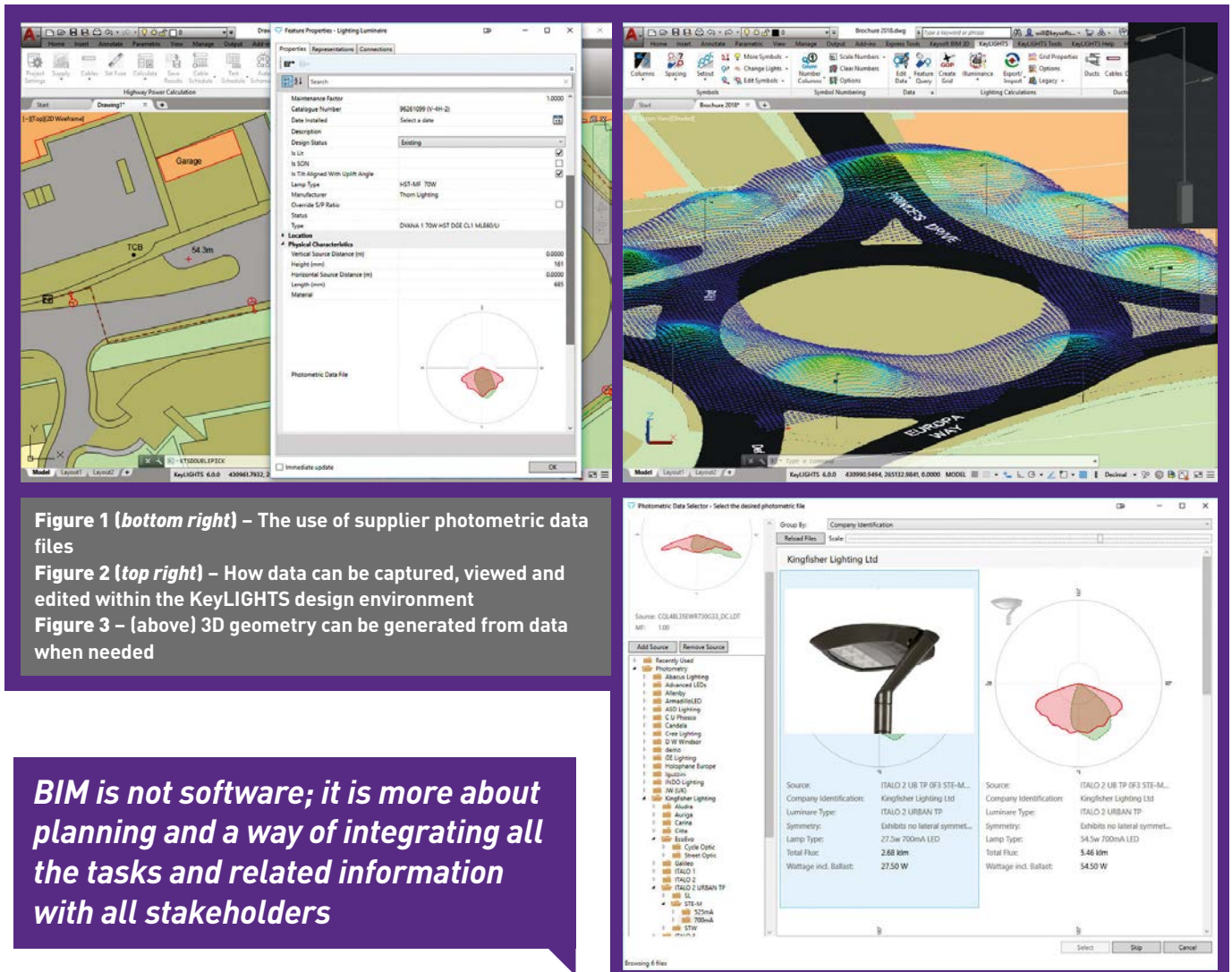
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Session five: Technology – What are the challenges for implementation

Session six: Communication – How to attract new recruits



BIM is not software; it is more about planning and a way of integrating all the tasks and related information with all stakeholders

Continued from page 48

are based on actual physical distances read directly from the map. Cable lengths and other design parameters can then be taken forward along with other aspects of the scheme design to assist with testing and commissioning of lighting schemes.

3D vs data

Much is made about BIM and what it means. BIM is defined as a graduated process, Level 0 being simple CAD (or paper!) based systems that 'allows for the exchange of information between all parties'. Levels 1 and 2 encourage collaboration through the implementation of standards and protocols and the use of 3D. Level 3, currently seen as the holy grail, represents a fully integrated and collaborative process that will utilise construction sequencing [4D].

Many have been seduced by the attractiveness of 3D, particularly when this provides photorealistic visualisations. While visualisation is important to communicate design intent before a scheme is built, the real value of BIM is to the whole-life asset management. To support this the focus

needs to be on data, whether that be meta-data attached to the digital design, such as part numbers, or 3D information embedded in 2D objects, such as column planting depths and foundation dimensions.

Figure 2 (above) shows how data can be captured, viewed and edited within the KeyLIGHTS design environment. This data needs to 'travel' with the as-built digital representation of objects for the whole life of the digital model.

The transfer of as-built data from system to system provides the greatest value by means of efficient data transfer and standardised data formats, and often 3D representations can be effectively created when needed from the embedded data (see Figure 3 above).

Capturing 'as-built'

It is crucial to BIM that the 'as built' situation is captured. Decisions based on the digital model can only be made with confidence if the model reflects the real world accurately. A common situation with poor data – for example below ground assets where location has not been accurately captured – can often mean that costs are increased due to the

need for hand digging, hasty design revisions or repair to accidentally damaged drains, electrical or fibre optic cables.

The process of BIM is not just one-way, however. The process can be described as maintaining value from design through the life and ultimately to the disposal of assets. But the value in the digital model can also be used to inform the design of future schemes and reduce installation costs.

Conclusion

Lighting design data has value beyond the construction phase of the project, often however, this information can be lost. The process of BIM enables this value to be available for the whole life of the assets. When the data is collated in systems, designed to unify different types of data, such as services and utilities, a more complete and valuable information model can be built.

Comprehensive and rich digital lighting models enable sophisticated and cost effective maintenance and operational decisions to be made and will enable savings to be made in the capital cost and the carbon burden from the construction and operation of the built environment. ➔

Another step towards safer crossings

Thames Hydroblasting's (THB) latest innovation is Safe Steps for Schools, a visual road safety programme that comprises road crossings and walkways to improve children's road safety near schools. The company tells *Highways* how it came about

In 2017 THB installed the UK's first bespoke preformed road crossings in Brixton as part of The Brixton Design Trail. The feedback on these has been consistently positive following the launch, with comments suggesting the crossings have transformed the area aesthetically and improved road safety.

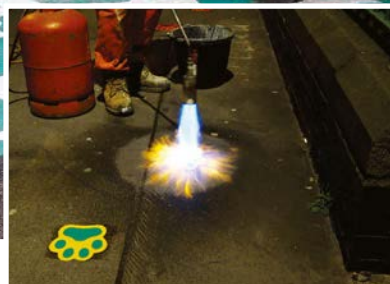
Later that year, a THB staff member mentioned in a meeting the poor behaviour he had witnessed that morning when dropping his children at school, including parents leading their children in between parked cars and stationary traffic.

With this in mind, THB explored the possibility of combining the preformed marking products we had recently used in Brixton. The team knew that bespoke designs and features would incentivise children and parents to use the road-crossing provided, as well as drawing drivers' attention to the approaching crossing, thus improving road safety in the vicinity of primary schools.

THB could not find any visual road crossings in the UK designed purely to encourage child safety prior to this project.

The vision was further justified by research on the subject of child road safety conducted by speaking with local councils and schools, which expressed similar concerns around this issue to those raised by the THB staff member. This in turn was supplemented by figures from the Department for Transport highlighting an increase in child casualties on the road.

The Safe Steps for Schools programme was born, featuring a strikingly designed preformed road-crossing with 'footsteps and paw prints' leading children to and from their



school and the crossing. THB was excited to partner with Croydon Council and completed a successful launch on 1 February this year at Crescent Primary School in Croydon. The use of 'footprints' on the pavement was chosen by the school's children, enabling them to familiarise themselves with the design before it was even installed.

The materials THB uses comprise long-lasting, environmentally friendly thermoplastics. Using preformed thermoplastic materials, the application process involves administering a specialised primer and then laying preformed thermoplastic pieces together (like a jigsaw) on top of the prepared surface. The preformed material is then bonded to the surface through heat application. The materials provide premium high UV resistant colours with a lifespan up to 10 times longer than traditional paints and is complemented by an anti-slip coating.

The materials are specialised for this project as the components are non-toxic, containing no lead or chromates to ensure the safety of children. The use of preformed thermoplastic enables intricate, complex designs to be created and the material is much easier to lay, compared to other materials that require hand application.

Typically, an average sized Safe Steps for School road crossing can be installed in just a single shift. A starting point for the cost would be around £100 per square metre. A lot of the work THB carries out is in partnership with schools, unitary authorities and charities and there is a major discount to the works to benefit these institutions.

THB has worked closely with famous design house Eley Kishimoto for some time now and first partnered with it over the 'Flash' crossings installed in Brixton. The design work Eley Kishimoto produces is perfect for this type of project and it chose to donate the 'Ivy leaf with eyes' design free of charge for the opening Safe Steps for Schools installation. THB looks forward to working alongside Eley Kishimoto again for future designs.

Since the launch, the reaction has been very positive and the orders have been piling in. THB is at enquiry stages with a number of primary schools across Greater London and the UK, with numerous local councils showing a keen interest in the crossings as well. Widespread national and local press coverage surrounding the launch, including ITV News and London Live, has helped massively in spreading the message. Schools are keen to explore how this programme can help improve road safety in their vicinity. ➡

Networks on a knife edge

With limited time and resources, local authorities are constantly looking for new and emerging technologies and systems to help provide them with solutions to everyday challenges including managing traffic flows and keeping the network open. Adrian Tatum reports from the latest *Highways* round table debate in partnership with Siemens

SIEMENS

As the fight for road space intensifies, traffic managers and their teams are searching

for new ways to effectively manage congestion and keep the roads open as much as possible in the event of vehicle incidents or technical problems. The latest *Highways* round table debate, sponsored by Siemens, discussed the issues around this central challenge and how technology, collaboration and improved protocols can help.

The debate was held under Chatham House rules to help aid an open and honest discussion and included officers from a wide range of local authorities from different parts of the UK.

One comment from an attendee made clear the scale of the challenge some local authorities face: 'The network is probably beyond breaking point at any one time and it only takes one incident for everything to start going wrong and you are always catching up after that. These days with the volume of traffic and use of road space, all the resilience has been taken out of the network.'

It was immediately agreed

that there were clear benefits to an open discussion between councils and private sector companies such as Siemens to help shape the market and the solutions it offers for the good of the sector.

One attendee spoke about the challenges of a modern on-street traffic management department: 'It isn't just about the traffic signals. We have to think about managing an Urban Traffic Management Control (UTMC) system, CCTV, car park management systems and major infrastructure like tunnels and bridges. But the main challenge for us and every local authority I think, is around coordinating who is working on the network.'

Another attendee had different challenges due to their authority's geographical location: 'With only a couple of routes in and out of the city, during the summer when there are lots of people on holiday if we do have an incident the whole area can gridlock very quickly,' they said.

'There is always more to think about, plan and implement than you might realise. We have to make sure we have things like scaffold and skip licences in place, implement the process of closing footways and manage what effect that might have on the network,' they added.

'Often there are cases where

we have no control of what is going to happen such as gas leaks, for example. But it is also about encouraging awareness. Often people working on these schemes aren't aware or interested in the knock-on effect that the work they are doing is having on the network. To help with managing that process we are moving over to the Strategy Manager cloud-based tool, which is part of Stratos.'

Stratos, a Siemens system, has been developed using cloud-based technology, delivering scalable real-time traffic management, information and control, ranging from basic control to strategic control of complex urban traffic environments. Being a hosted solution, Stratos doesn't need dedicated servers or machines, therefore there is no capital or on-going maintenance costs.

But it isn't just about managing and coordinating works. The safety of works is also vital.

'For safety reasons we ideally don't want the network live when there is an incident but we realise the longer it isn't live the more problems that might occur including congestion,' said one participant.

As part of its research, Siemens has been working on ways to improve safety and

improve on maintenance hours. It has been investigating ways in which the amount of on-street work around traffic signals and other traffic management can be reduced.

One of the major solutions is the Plus+ product, a new third-generation traffic management system. It uses distributed intelligence to increase intersection uptime and reduce on-street installation and maintenance time.

The system from Siemens no longer uses many individual connections between signal heads and controllers; instead it uses simple four core cables and intelligent communications to reduce the installation effort





and save valuable resources as well as improve resilience.

Plus+ uses dedicated failsafe controllers, signal heads, and pedestrian indicators as well as new smartloop modules, ensuring that the overall system can tolerate an individual component failure and cable damage, resulting in higher intersection availability and reduced disruption to the travelling public.

The debate moved on to what is apparently a common theme among local authorities.

'The police are very difficult to engage with and coordinate when it comes to incidents on the network – they can often be the cause of congestion and create a

much bigger incident,' said one attendee.

Another participant said: 'Managing major events can be a challenge. How can we put traffic management and extra variable message signs in place, for example, if we haven't been told about it?'

'The level of engagement with the police very much depends on whether we get a roads police unit or a neighbourhood team attend an incident. Often the roads teams are more savvy and will work with us especially when it is a serious incident but it does depend on the individual officers. Quite often we even sit next to the police teams in our traffic control centres but still getting

them engaged and interested in coordination is difficult.'

Another attendee says: 'This means that we are often hearing about incidents second hand – often on the radio. We receive a police email an hour after an incident has happened. By that time, there could already be a major incident on the network.'

'I think it illustrates the point, whether the police are involved or not, the road network is on a real knife-edge at any time of the day and we have to be prepared for that.'

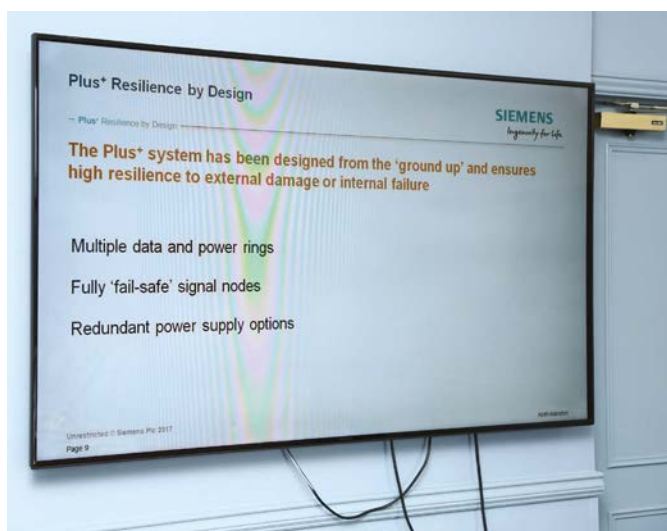
Attendees debated the issue of increased volumes of traffic and how that could be effectively managed. 'Traffic flows are increasing annually but road

space is not. But if you increase road space, even if you could afford it, which many authorities can't, it just increases traffic demand so that isn't a solution anyway.'

'We need a completely new approach to managing our network. Instead of trying to increase capacity through SCOOT (Split Cycle and Offset Optimisation Technique) systems or other small junctions schemes, we need an approach that holds traffic back from the city centre so the central area can function, especially during peak times.'

Another attendee said encouraging more modal shift was key, which 'in an Intelligent





Transport Systems (ITS) context, involves using microsimulation modelling to develop network management strategies'.

'In a wider context it needs a major rethink around issues such as car park charges, workplace parking, Local Enterprise Zones, ring roads, park and rides, bus services, cycle schemes,' they added.

'A severe lack of funding means it is very difficult to justify investment in advanced modelling and other new technologies and solutions, but ironically we need solutions that help drive costs down. For now it is all about getting the best out of the equipment we do have,' said another.

'We don't have enough staff to deal with the amount of work at the moment. With investment you can start to automate the traffic management process so you can start to look 15-20 minutes ahead on the network. That would bring real advantages but you cannot automate the human element of it,' said one attendee.

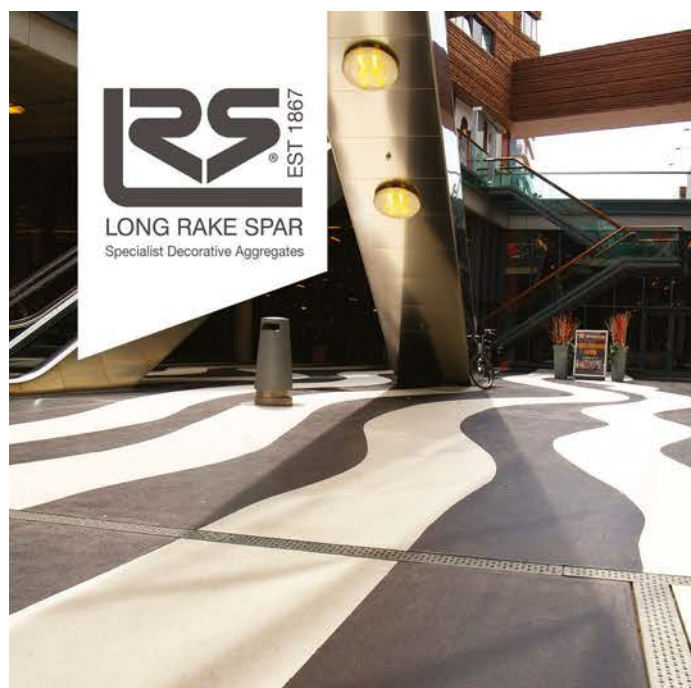
Another said: 'There is a massive skills shortage across the entire industry. I have recruited four trainees and have spent the last two years teaching them UTC/ SCOOT and ITS. I intend to spend another year on this before they become fully competent. This is a very time consuming and when an experienced SCOOT engineer or signals design engineer has been needed, we have had extreme difficulty in finding anyone we can use.'

The debate closed with the room agreeing that there was also concern over a lack of industry standards. 'This makes it very hard for us to work out what to invest in but also how we manage and govern other partners that might be working on signal design schemes or other traffic management projects,' said one participant. 'Should there be one set of standards, one guidance document for outside suppliers/contractors working on schemes?'

'One solution,' said another attendee, 'is to build more equipment off-site so minimum work is needed during the installation process and therefore disruption is kept to a minimum.' ➡

SIEMENS SIEMENS/HIGHWAYS ROUND TABLE ATTENDEES

Jackie Davies	Bristol City Council
Tony Sharp	South Gloucestershire Council
Gafoor Din	Warwickshire CC
Samuel Mintah	Medway DC
Michelle Fillingham	Bournemouth Council
Ruth Anderson	Oxfordshire CC
Gary Bray	Siemens
Keith Manston	Siemens
Dominic Browne	Chair; Editor, Highways



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Keeping it real-time

Key to keeping drivers happy is providing them with the right information on delays. Matt Felce from MVIS Ltd speaks to Dominic Browne about real-time traffic management on the strategic road network to ensure drivers are kept in the loop

The data needed to provide MVIS's variable message signs (VMS) with real-time journey information on the strategic road network (SRN) comes from an array of

sources, including automatic number plate recognition cameras (ANPR), loop systems in the road and floating data from vehicles.

This is sent to INRIX, which verifies all the data by checking it against historical records and internal algorithms. Once this process has been completed, the data is sent to the National Traffic Operations Centre (NTOC) and they publish it on the DATEX II system.

MVIS then takes this information, processes it through its own server and then pushes it out to the signs on the relevant routes. While this may seem complicated the information on its VMS is updated every five minutes.

MVIS believes it is the first company to use this system on portable sign equipment following four months of preparations to develop its server and the algorithms operating in the background. MVIS launched the system in August last year on the M62 Manchester smart motorway scheme.

In testing the product, the company picked a route on the M60 and had a sign back at the depot displaying journey times. This was then reviewed and compared with other sources of information to make sure it was fully operational.

Matt Felce from MVIS tells *Highways*: 'We can use any of our signs at any location on the SRN. All our signs have 3G connectivity so this can work on any of our signs without any extra work on the signs themselves. Over the years using 3G, we have started using a roaming SIM in the sign itself so it will work on any provider and can latch on to the strongest signal.'

'Because the system goes through our



server it is a secure connection between our sign and server. So no one can hack in or connect to the sign. They would have to hack into the server. You could not put another SIM into the sign either because the system is locked to the specific SIM we use.

'At the moment the system is being used on all major schemes and tells drivers the distance and time for instance: "To junction 19 - 20 miles, 30 minutes".'

This information, Mr Felce says, is driven by a Highways England directive for major schemes, which outlines how many signs are needed over certain distances, what information they have to put across and how often it has to be updated.

He adds: 'From the people we talk to about journey time information. It seems to be the case that even if there are delays on the network as long as you pre-warn people



about the delay and say how long it is going to be, it diffuses a lot of the situation anyway. People don't like sitting in queues not knowing how long they are going to be there.'

Mr Felce points out that the next potential growth area for the real-time system could be local authorities 'feeding more information to people as they approach the SRN so they can make decisions before they actually join the motorways'.

He adds that Highways England tends to prefer to keep people on the SRN, as the national roads operator does not want to put any undue stress on the local network.

Elsewhere, in terms of new markets, Mr Felce says 'connected vehicles is the way forward, getting information direct to the user' but he adds that MVIS is keeping a watching brief at the moment and 'seeing which way the market goes'.

Highways asks about the importance of standards and who should drive them as the sector makes this leap towards a more connected and autonomous future.

'Standards are at the core of our business and the way our signs work it is essential that they follow through to any other means of getting the information across. So it definitely is standards driven.'

'It's a difficult one. I would say there definitely needs to be guidelines from government on what information needs to be going out to individuals because we have to avoid information overload. If you start putting too much out it can start getting ignored. It has to be kept to relevant information.'

'The main thing is you have to make sure the information you are putting across is valid and quantifiable.' ☹



Highways England seems confident that its planned tunnel at Stonehenge will not have too great an impact on local groundwater flows and the historical treasures that depend on them but its optimism will need to be tested before the scheme gets the formal go-ahead. Chris Ames reports

In February, Highways England launched a new consultation on its plans for the A303 between Amesbury and Berwick Down, including a tunnel passing close to Stonehenge that will be at least 1.8 miles (2.9 kilometres) long at depths of up to 50 metres.

The decision to build a tunnel, which is intended to remove the site and sound of traffic from the vicinity of Stonehenge, remains controversial, not least because both portals will be inside the Stonehenge World Heritage Site.

Much attention has focused on the impact on the local water table, including the unique site of Blick Mead, where human habitation can be traced back to around 8,000BC, which has been preserved in damp peat and silt. Last November, *Highways* looked at the potential impact on the site of dewatering during the tunnel's construction but the structure itself could well disrupt groundwater flows.

Andy Rhind-Tutt, chairman of Amesbury Museum and Heritage Trust and a former mayor of Amesbury, is concerned about the huge impact of such a large tunnel on both Blick Mead and the historic cathedral at Salisbury.

He explains: 'Stonehenge is on a chalkland aquifer, so basically the rain that lands north of it travels south and eventually ends up in the River Avon. It heads primarily towards West Amesbury but also to Blick Mead. Underground fissures send water towards the River Avon.'

All options on the (water)



(clockwise from top left) Existing fields adjacent to Parsonage Down National Nature Reserve; visualisation of western approach to new Longbarrow junction; driver's view of canopy with ventilation outlets exiting; existing Countess roundabout; eastern tunnel entrance; view of the inside of the tunnel; view of WHS from Winterbourne Stoke Barrow Group after construction

Images courtesy of Highways England



Mr Rhind-Tutt says a 3km concrete tunnel, which will be between 16m and 50m deep, would impact this groundwater flow, especially at the long portal entrance and flyover nearest Amesbury, adding that when the current A303 was constructed in the 1960s the water table at Blick Mead changed significantly.

He also points out that the magnificent 800-year old cathedral is potentially vulnerable to changes in the water levels in the ground on which it is built, so much so that there are regular dip tests to establish this.

Because of its size, the tunnel scheme is categorised as a Nationally Significant Infrastructure Project, which means that a Development Consent Order (DCO) is required. This will require an Environmental Statement (ES), setting out the results

of an Environmental Impact Assessment (EIA).

In the meantime, the raft of documents published alongside the main consultation booklet includes a Preliminary Environmental Information Report (PEIR), which gives Highways England's current assessment of a range of issues including air quality, cultural heritage, biodiversity, and 'road drainage and the water environment'.

On the last point the PEIR concludes that with the help of a Construction Environmental Management Plan there would be no likely significant temporary or permanent adverse effects during construction activities or the operational phase.

However, the detail of the document suggests that it is not that simple and Highways England does not – yet – have all the answers.

The PEIR identifies a number of issues that the design of the proposed scheme should address, including no 'unacceptable' detrimental impacts 'on the hydrology and water quality of the River Avon or River Till nor on the designated habitats and species for the Special Area of Conservation (SAC) and Sites of Special Scientific Interest (SSSI) associated with those rivers', or 'that could affect the integrity (hydrology) of the Blick Mead spring'.

Asked by *Highways* whether these represent red lines for the project and who will make the judgement, a Highways England spokesperson said: 'The issues set out here are a combination of statutory requirements and issues raised by the Environment Agency as the relevant statutory stakeholder. The determination of significance and acceptability

table



of effects will be made by the competent experts undertaking the assessment in consultation with the Environment Agency.'

The conclusion on the issue of road drainage and the water environment states explicitly that 'the integrity of the River Avon SAC (incorporating the River Till SAC) would not be adversely affected by the proposed scheme' but makes no explicit statement in relation to Blick Mead. Highways England said that this statement encompasses the immediately adjacent Blick Mead area, adding: 'Our assessments to date indicate that there would not be any significant effects on the Blick Mead area.'

In addition the PEIR states that a Water Framework Directive (WFD) Assessment will be undertaken and a WFD compliance assessment report produced alongside the ES.

It adds: 'This report will consider the extent to which the proposed scheme could impact on the current and future target WFD status of the water bodies (the River Avon, the River Till and the Upper Hampshire Avon groundwater body). Where potential adverse effects are identified, an assessment of these will inform what mitigation measures need to be incorporated into the design and construction methods of the proposed scheme to remove or minimise the effect. The results will be presented in the ES.'

This suggests that Highways England is confident that an assessment that it has yet to complete will not identify impacts that cannot be mitigated. It told *Highways*: 'The scheme will ensure it is WFD compliant.'

With regard to Blick Mead, the PEIR notes: 'This is situated along a dry valley to the east of the West Amesbury dry valley, on the northern bank of the River Avon north of the Abbey. This may also be an area of groundwater discharge and will be confirmed within the ES.'

Potential permanent impacts arising from the construction of the proposed scheme identified in the PEIR include 'impacts caused by lengths of the tunnel below the groundwater level in the chalk interfering with groundwater flow'. It notes: 'There are a number of springs in the area down hydraulic gradient of the tunnel including the spring system around Amesbury Abbey, which could be affected.'

However, the document's list of potential mitigation measures does not appear to contain any specific measure relevant to such an impact. Highways England told *Highways*: 'In this particular case, our assessment to date indicates that there will be not be any adverse impact that requires any mitigation above that provided by the design of the proposed scheme.'

It is clear that a degree of uncertainty remains. Highways England said it plans to submit a development consent application in the autumn, by which time many of its current assumptions will need to have been thoroughly tested. ☹

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Duties of care

Chief executive of the Institute of Highway Engineers, Richard Hayes, considers the legal responsibilities for local highway authorities and how advice and guidance is available to support them in undertaking their statutory duties



Throughout the United Kingdom, there is a qualified duty to undertake winter maintenance. The duty arises from different legislation depending on which area of the UK you are in.

Highway authorities in England and Wales have a duty to ensure, so far as is reasonably practicable, 'that safe passage along a highway is not endangered by snow or ice' (Highways Act 1980, Section A1 (TA) as modified by Section 111 of the Railways and Transport Act 2003).

In addition, Section 150 of the Highways Act 1980 imposes a duty upon authorities to remove an obstruction resulting from the accumulation of snow.

In Scotland, statutory responsibilities are defined by Section 34 of the Roads (Scotland) Act 1984, which requires that 'a road authority shall take such steps as it considers reasonable to prevent snow and ice endangering the safe passage of pedestrians and vehicles over public roads'.

In Northern Ireland the Roads (NI) Order 1993 SI 1993/3160 (NISI) provides, in Article 10, a duty for the Department of Regional Development to 'remove snow, soil etc. which has fallen on a road', or in

fact obstructions from 'any other cause'.

Section 9 of the order also enables the authority to 'take such action as it considers reasonable to prevent snow or ice interfering with the safe passage of persons and vehicles using the road'.

Given this duty, the industry has developed a best practice guide that is accepted by the courts as the standard to be adopted or any variations qualified by the authorities themselves.

The code of practice (COP) for highway maintenance management, *Well-managed Highway Infrastructure (WMHI)*, and other guidance issued by the Roads Liaison Group of the UK Roads Board gives the lead for winter service policy and operations.

The COP reflects many years of operational practice as well as current issues and is regarded as a benchmark by which authorities will be assessed by both the general public and the courts should disputes occur.

The COP was revised in October 2016 with an expectation that all authorities would seek to comply with its recommendations by October 2018. There is however a significant change introduced by *WMHI* to previous guidance in that the new document has removed all

prescriptive advice and seeks to move all authorities to a risk-based approach to the delivery of highway services.

In particular, Section B7 of the *WMHI* relates to winter services and how authorities should undertake their legal duties, winter policies and procedures within the context of a risk-based approach.

WMHI, in moving towards this new approach, is recognising that given the scale (or lack thereof) of financial and other resources available to local highway authorities involved in delivering the winter service, it is not reasonable to provide the service on all parts of the network. This has been accepted in the past.

Many authorities have a primary treatment network of 50% or less of the total road length. That treated network includes those areas where the outcomes of not carrying out the treatments would create the highest impact. Therefore in developing a risk-based approach to winter services authorities may not see significant changes to the existing arrangements but they will need to establish a robust risk assessment of each location, or type of location and its

Continued on page 60

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Continued from page 58

priorities against a reasonable level of resource or appropriate response.

Risk is considered in terms of likelihood or probability and impact or severity. The likelihood has been considered in terms of the chances of having an injury on part of the untreated network as opposed to the treated network. This consideration also makes extensive use of collision analysis as well as other factors.

Impact has been considered in terms of financial impact, largely based on insurance claim data, (which recognises that more serious injuries would have a greater financial impact), reputation, and stakeholder and customer impacts.

Authorities undertaking a risk-based approach are more able to justify their standards and arrangements, which will be heavily tested during a period of sustained severe weather. These principles are also transferable to other severe weather situations and assist the civil contingency role for each organisation.

There are given levels of response, which

should form part of the local policy and plan:

- 1. Primary salting network** – this is the highest level of winter service and this network will be treated whenever snow, frost or ice is forecast, even for short periods overnight, to mitigate the effects of this hazard. However even at this level the highway can never be guaranteed to be free from a winter hazard
- 2. Secondary salting network** – this network extends the primary salting network in conditions where prolonged periods of ice and snow are expected, generally a minimum of 24 hours. The treatment will be in advance of the freezing wherever possible
- 3. Snow plan** – this will be implemented in part or all the county when snow or ice is expected to cause widespread disruption to travel and seeks to restore a highway network on a priority basis starting with the primary and secondary networks but then extending into

other parts based on need

- 4. Resilience network** – this will be treated as a minimal network when resources are scarce, for example salt, fuel or personnel
- 5. Self-help** – this is a network of local locations where individuals or groups wish to treat parts of the highway in more extreme conditions to aid local mobility, at locations which are locally important.

In addition to these levels there are other responses undertaken by the authority. In severe winter weather situations the authority will use care helplines to try and provide an appropriate response, particularly to the vulnerable, to ensure that basic needs can be met. This includes the requirements for medication and other essential concerns and will be in the form of a response that does not require a remote highway to be treated, for example engaging transport volunteers with 4X4s. Local communities are also encouraged to develop plans to ensure the elderly and vulnerable are adequately cared for in emergency situations. ➊



The green, green grass of parking



Highways talks to Grass Concrete about the benefits of going green in parking

Not all car parks are equal. Some provide flooding prevention and attenuation, as well as help improve air quality and, well, to be blunt they look a little nicer. That is certainly the argument and selling point of Grass Concrete, a firm that has been around for more than 45 years and has developed an international reputation providing grass reinforcement systems.

Despite boasting an annual turnover in the UK of £4m a year, the firm has just eight office staff and 12 contracting staff in the country. It also has 32 licensees for its product, which still retains a patent, around the world in countries including Hong Kong, New Zealand and the USA.

With flooding and air quality issues rising up the news and political agenda, Bob Howden OBE, managing director and owner of Grass Concrete, tells *Highways* that sales are growing all the time.

'We work in flood prevention and attenuation and so can protect an area from both sides – source control cuts the chances of flooding while better natural drainage helps mitigate the risk. We have developers now telling us they can't have big housing developments without some form of sustainable urban drainage system (SuDS) solution. But it is not just about flooding for us. Removing vegetation can have adverse effects on air quality and CO2 emissions.'

It is probably the flooding angle that is central to the company's success however. Its Grasscrete product has become almost a generic reference for permeable grass paving. Using a cast on-site concrete system, Grasscrete has strong ground reinforcement qualities and can take traffic weight loads of up to 40 tonnes. It also has deep soil pockets to provide sufficient water attenuation to



Grasscrete has become a highly popular Grass Concrete product

reduce peak demand on the main sewer infrastructure and has a flow rate of 8m per second.

While it is good news that developers are realising it is important to take account of drainage, the country has a flooding issue that is not going away and, as Mr Howden points out, continued development is only adding to the issue. On the issue of SuDS and whether the nation has gone far enough on making it mandatory, Mr Howden says: 'I think there is a certain amount of heads in the sand. It's a case of "we would like to do this but how far can we push it". We wrote about this issue decades ago, before the term SuDS was even in use and ever since we have been banging the drum about continued development creating water run-off.'

Elsewhere, the issue of standards in the market has raised concerns at Grass Concrete. The company tells *Highways*: 'It's a growing concern that many clients contact Grass Concrete following failed areas of grassed cellular plastic pavers.'

'In most instances failure stems from either an inability to accept load or an issue

of waterlogging, and in some cases both problems are evident. As part of Grass Concrete's commitment to "fit for purpose" they do not recommend the use of their plastic pavers Grassroad system in regularly trafficked applications. A relatively thin layer plastic paver/grass matrix cannot be expected to provide the same sustainable load bearing capability as a reinforced concrete surface.

'Also worrying is the trend towards specification of plastic pavers with gravel infill for traffic use. With no grass to provide tensile anchorage, vibration across the surface will naturally cause a sieving effect that can lead to loss of gravel through into the base below. Under traffic use the gravel can also rotate with an abrasive effect on the side walls of the plastic grids, in each case the likely outcome is a breakup of the structure.'

Mr Howden points out: 'There is no defined British standard on grass paving. We always try to benchmark the system wherever we can. If we could achieve a test that we think will benchmark the market then we would work closely to make that happen.' ➔

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NEWS

Unforgettable in heart or mind:

Bernard Butler, former Institution of Works and Highways Management (IWHM) president and treasurer, passed away on 10 January and was laid to rest at Frensham's St Mary's Church



Living to be perhaps the to be the oldest treasurer of a UK charity, Bernard was born into a large family in Doncaster in February 1911. He left home at the age of 16 and travelled to London for work. He tried various activities until gaining employment in the local government sector, where he remained until his retirement as a senior officer at 65.

For over 50 years Mr Butler was a prominent member of the former IWHM and a leading light in the promotion of education and training. The IWHM supported and part-funded the concept and development

of distance learning in relation to highways design and maintenance – now known as Highways Open Tech (HOT) – and incorporated it into the City of Bath College distance learning programme.

He served as president of the IWHM and remained as a serving senior member until 1984, when he was recalled to the frontline to act as treasurer as the Institution's funds had dwindled to £10,000. His shrewd investment and financial controls soon had the books looking very healthy and by the early 90s the assets were over £270,000 and increasing rapidly.

The IWHM Bernard Butler Trust Fund was

BRIEFS



Round table was the business

Business secretary Greg Clark attended a breakfast round table event attended by IHE chief executive Richard Hayes at the Royal Academy of Engineering in January, where he discussed the Government's Industrial Strategy and the role of professional institutions like the IHE in developing better routes for people to enter the profession.

Full details of the strategy can be viewed online on the business department's website.

E4E talks new T levels

Richard Hayes attended a meeting of the Royal Academy for Engineering's E4E group, where a progress report was given on the development of the new T level qualification, a proposed replacement for all current post-16 qualifications such as NVQs and HNCs in England over the next

few years. Information on T levels, which were officially announced last October, can be found at <http://bit.ly/2yfnV7l>

A third party accident damage guide

The IHE has received several requests for best practice guidance to be issued to assist local highway authorities in recovering costs from third parties who have damaged the highway or any of its apparatus. The IHE believes that many authorities fail to recover the full cost of repairing damage and this leads to a resulting charge against their revenue budgets, which are under extreme pressure from other demands.

If any members or others have any advice they would be willing to share or know anyone who would like to be involved in preparing a best practice guide, please contact Richard Hayes via email Richard.hayes@theihe.org.

IHE industry standard has eyes on a prize

The IHE's professional certificate in Temporary Traffic Management design is becoming the industry standard for such works and has been shortlisted for a prize at Highways England's Health, Safety and Wellbeing Awards event in early March. The certificate, prepared jointly by the IHE with Virtus Ltd and the University of Aston, has seen over 75 candidates successfully complete the training course and assessment.



Road safety engineering diploma

The IHE will shortly launch a new professional certificate and diploma in road safety engineering. The first course will be run as a pilot training course and will be held in Birmingham later this year. Anyone interested in attending the course should contact Richard Hayes.

Street works inspections

The Highway Inspectors Board, managed by the IHE, is seeking to prepare a further competence standard for inspectors working on behalf of highway authorities who are responsible for supervising the

WS

Bernard Butler 1911-2018

“I enjoyed a busy and satisfying career in municipal engineering and know that the services it provides are essential to modern life”

set up in July 1997 from the IWHM funds (the IWHM was originally established in 1939) when its members voted to merge their IWHM 'Learned Society' activities and day-to-day membership with the Institution of Civil Engineers.

The new trust was set up by the 86-years-young Mr Butler, by then a retired municipal

engineer, the then president, David Comber, and general secretary Geoff Porter as they wanted to widen opportunities for young people to contribute to the development of engineering and technical services.

The fund incorporated Mr Butler's name in the title in recognition of his many years of service to the IWHM, including two terms as treasurer and one term as president in 1954-55.

Mr Butler said at the time: 'I enjoyed a busy and satisfying career in municipal engineering and know that the services it provides are essential to modern life. Now I am concerned about the future and worried that not enough young people are entering the engineering profession. So we agreed, when the IWHM decided on a merger, to use its assets to do something to help.'



activities of utilities and others working within the road. The board would like to hear the views of practitioners on what should be included within the standard and anyone with information or suggestions should contact Richard Hayes.

Design principles

IHE senior vice president Jonathan Pearson attended the launch of Highways England's Good Design Vision and Principles seminar - an opportunity to communicate the Government's vision and commitment to progressive and sustainable design and to make an early

endorsement of the Government's Year of Engineering in 2018.

SOUTHERN BRANCH

The Southern Branch of the IHE has two events coming up - a visit to the 3M facilities in Bracknell and an all-day workshop with Keith Smith of Virtus on the traffic signs manual updates.

The latter is a follow on from his very well-received presentation at the seminar in October 2017.

UPCOMING EVENTS

6-7 Mar	Highways Maintenance Part 2	Birmingham
6-7 Mar	Traffic Signal Control Part 2	Worcester
7-9 Mar	Winter Services Training Part 2	Birmingham
8 Mar	ITS	Worcester NAL
13 Mar	TTME F11	Edinburgh
13-14 Mar	Road Safety Engineering Part 1	Birmingham
14 Mar	Bridges	Ricoh Coventry
14 Mar	EngTech Workshops Part 2	Birmingham
15 Mar	Highway Law	Birmingham
19 Mar	Cycling Infrastructure	London
9 Apr	Traffic Sign Design	Birmingham
10-11 Apr	Traffic Signing and Road Markings Part 1	Birmingham
17-18 Apr	Road Safety Engineering Part 2	Birmingham
19 Apr	M&Q Executive Board	Birmingham
24-25 Apr	Cycling Infrastructure Part 2	London
1-2 May	Asset Management Part 1	Birmingham

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'Mini' Highways Directory

The Highways Directory 2017/18 – a useful reference for companies and suppliers looking for new partners – is available online at www.highwaysdirectory.com and in digital book format at www.highwaysmagazine.co.uk

For your convenience, we are also producing a 'mini' Highways Directory here, that lists our featured suppliers under useful category headings. To find the full contact details for each company, please select the required company name below and you will automatically be taken to their page in the online Highways Directory.

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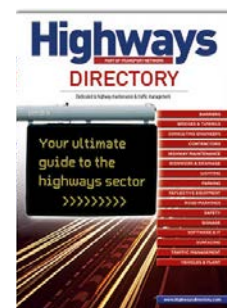
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Racing towards an electric future?

In light of the second reading of the Automated and Electric Vehicles Bill by the House of Lords in February, Jon Hart, Catherine Lai and Hannah Collins from law firm Pinsent Masons take a closer look at the implications for our impending smart vehicle charging future



The Automated and Electric Vehicles Bill is on its way to becoming law. This is a central part of the Government's attempt to lead the charge in

promoting electric vehicles (EVs) and associated infrastructure. At the heart of this is an attempt to introduce a degree of compulsion into providing EV charging points and improving the, presently sketchy, charging networks. However, the Bill also highlights some significant gaps in current thinking.

Although EVs still are seen as a transport of the future, in reality they have been around a lot longer than you might think. The first-ever EV dates back to the late 1890's and by 1900, 28% of cars were electrically powered. Early 20th century EV technology lost out to improvements in the internal combustion engine, and with some exceptions (e.g. milk floats) remained, on the whole, outside widespread commercial use and the parameters of government thinking.

The bigger picture has taken time to change. New Labour's commitment to increasing the use of diesel cars as an alternative to petrol due to the lower levels of carbon dioxide produced has given way to a realisation that diesel vehicles produce high levels of toxic nitrogen dioxide and with this the introduction in November 2017 of the 'Toxin Tax' on diesel cars. EVs now represent a different prospect for manufacturers, drivers and the Department for Transport (DfT).

Hybrid buses are currently travelling through our towns and cities, and in December 2017 the first electric black cabs rolled out onto the London streets. Car manufacturers are leading the way in EV research and are constantly producing new designs and concepts,



Jon Hart



Hannah Collins



Catherine Lai

racing to stake their claim to this new untapped market. Tesla has recently released plans for an electrically powered heavy-duty lorry, already scoring orders from freight operators. Other companies committed to EVs include Volvo which has announced that all new models introduced in 2019 would either be hybrid or fully electric.

Despite these positive noises from manufacturers and recent

converts, a dominant reason as to why there are so few EVs on the road is one of a practical nature – what users call 'range

anxiety'. This is where drivers fear their EV will run out of charge before reaching a charging station. According to a recent RAC Foundation report, there are approximately 125,000 electric cars with only 14,000 chargers to support them – only 2,620 of which are fast chargers, which can charge 80% of an EV in 30 minutes. The Bill attempts to alleviate the concerns that our current infrastructure is incompatible with today's or the future's electric-driven world.

As currently drafted, the Bill gives the secretary of state power to make regulations that will make it compulsory for certain operators of motorway services and large petrol retailers to install electric charging points, as well as ensure that the public has access to live data on the location and availability of these charging points. So at least EV drivers will have a better idea of what they are dealing with. The Bill



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further provides for all installed chargers to have 'smart' functionality. The agenda of the Bill is also helped by the allocation of £400m in the Budget for infrastructure charging in relation to EVs.

However, although the Bill represents a step in the right direction, there have been criticisms that it is not going far enough. There remain a range of legal and practical implications to be addressed arising from the installation of charging points.

One major issue not addressed by the Bill is the potential stress to the National Grid that may come from increased EV uptake: if everyone comes home from work at 6pm and decides to pop their EVs for a charge, does that mean the lights will go out?

Some forward-thinking solutions to guarantee a smooth EV adoption into grid management have since been offered. The first of these relies on greater sophistication when it comes to local capacity management. The use of smart chargers, which would connect via the internet to systems that will analyse network capacity at a local level, would allow the right levels to be used during times of increased electricity demand. If full capacity is being utilised in an area, smart chargers can automatically delay the charge or charge at a lower power until the demand for electricity declines.

The second area is the development of a dynamic tariff system for electricity charges. This would allow EV users to take advantage of the cheaper off-peak tariff as opposed to the hefty rates at peak hours - therefore allowing the charging infrastructure to zap electricity at a tolerable level for the grid, and potentially accommodate an estimated 15 million EVs. The transparency of information in the new tariff between suppliers and end users would presumably have to mirror the respective provisions in our current energy legislation. An alternative would be to allow the buyback of the energy from the car users to energy companies. Newcastle University, Dutch firm Encel and Nissan have designed charging points that enable EVs to put unused energy back into the electrical transmission grid. The EV can then release an electrical charge, or even sell it back into the grid during peak hours of usage.

These approaches are nonetheless going to require further legislative thinking, setting

up the physical infrastructure is only part of the story.

The Bill also does not address uncertainties regarding the payment in the charge points. For this electric infrastructure to be sustainable, the system must become profitable. Currently the UK system is unnecessarily complex as different chargers take different forms of payment and often registration to a membership with the operating company will be required before payment. Moreover, the potential of sharing private chargers has yet been realised.

One recommendation is to look at

One major issue not addressed by the Bill is the potential stress to the National Grid that may come from increased EV uptake

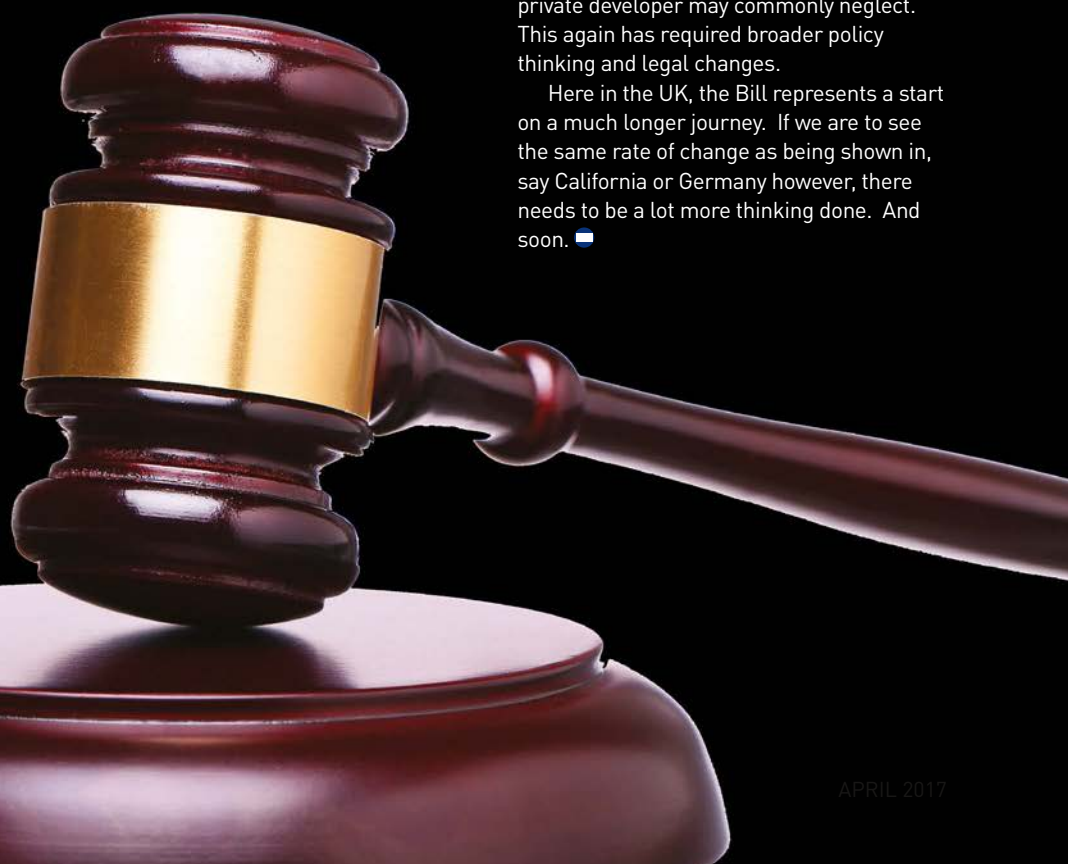
the German model. By using Ethereum blockchain-powered technology, EV users in Germany have been able to utilise private EV stations for their own profit thanks to the EMotorWerks application, which uses the Share&Change platform developed by MotionWerk, an innovation affiliate of the German energy company, Innogy SE. The peer-to-peer nature of these systems allows individual EV users to set their own price, track other users and securely exchange payment between parties. To put this in context,

imagine you wanted to charge your EV while grabbing a quick coffee, however all the public chargers are completely taken. All you have to do is to login to this application and locate the closest available private charger. The owner of the charger can then set out the rate and you make payment via the application. Although digital log-file technology such as blockchain is seen to go hand in hand with EVs by some due to the nature of infrastructure for EVs, thought needs to be given to cybersecurity and criminal law given its vulnerability to crypto-hacking - more legal considerations to be addressed.

The distributional impact of the EVs is another area that has not been addressed by the Bill. Although there are enhanced capital allowances that act as tax reliefs for companies to support the development and installation of charging equipment for EVs, there remains a general perception that EVs equate to Teslas and that only the wealthy have made the switch. Opponents have since made the argument that the Government's investment in these charging points only benefits a marginal group of people but remains a huge cost on the majority of taxpayers. Therefore, 'fairness' must be introduced in EV programmes in order for EVs to be extensively accepted and scaled up by the population.

The Californian model has been to encourage electric utility companies to finance the EV infrastructure investments, but with the state using its own resources to invest in adequate provision for charging points for multifamily properties and low-income neighbourhoods, areas which a private developer may commonly neglect. This again has required broader policy thinking and legal changes.

Here in the UK, the Bill represents a start on a much longer journey. If we are to see the same rate of change as being shown in, say California or Germany however, there needs to be a lot more thinking done. And soon. ■



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TSC takes Wylde's side

The Transport Systems Catapult (TSC) has appointed Helen Wylde as chief engagement officer.

Ms Wylde will be responsible for the business and relationship development team at the TSC, leading on the forging of collaborations and partnerships with industry, academia and government in the transport sector.

She joins the TSC from her position as managing director UK and Ireland for Benelux company BringMe. Before this, she was sales and marketing director for Parcelforce Worldwide and she has also worked in a number of senior commercial positions at Lloyds TSB, ADT Tyco, O2 and Vodafone.

She said: 'I am delighted to join TSC, as I firmly believe that the role played by the catapults, and in particular transport systems, is vital and timely in bringing together the very best of UK thinking to harness the many new and innovative technologies currently emerging.'

'The TSC is a great opportunity to contribute to the UK in helping to create high quality jobs for UK people and to ensure that the UK takes the global lead in transport systems technical innovation.'

The Transport Systems Catapult is a not-for-profit technology and innovation centre,



established and overseen by the UK's innovation agency, Innovate UK. It focuses on intelligent mobility – harnessing emerging technologies to improve the movement of people and goods around the world.

Yale gets ivy league post at Econ

Econ has appointed Kevin Yale to a key sales role, giving him responsibility for clients in the West of England and Wales.

Mr Yale was a top seller with DAF dealerships in the West Midlands and has more than 25 years' experience in the fleet and specialised vehicles sector.

Andrew Lupton, sales director at Econ, said: 'In appointing Kevin we are confident his outstanding customer relations track record in both the public and private sectors will be a real asset to the team.'

Mr Lupton also revealed that this year will see further developments and improvements at Econ with 'significant new product launches'.

He added: 'The service team will be further boosted, guaranteeing that our team of dedicated, highly trained engineers are on hand at all times to ensure that our clients can expect maximum up-time from their Econ vehicles.'



Mumford on song for Highways England

Highways England has appointed Peter Mumford as executive director of major projects and capital portfolio management.

Mr Mumford has held the post on an interim basis since August last year and has UK and international project and programme

experience across the rail, road, airports and utilities sectors.

Highways England chief executive Jim O'Sullivan said: 'I congratulate Peter on his appointment and am pleased he will continue with Highways England and the executive team as we deliver the Government's £15bn road investment programme.'

Mr Mumford said: 'With so much achieved in recent years, I look forward to working with our leadership and teams across the business as we continue to focus on safety, customer and delivery towards the aim of safer, smoother and more sustainable roads.'

The appointment took effect from 1 February.

While those in the political arena fight over the morality of austerity, *Highways* is just keen to see the infrastructure sector allowed to get on with its job with the most long-term sense of security, strategy and efficiency. However, occasionally a story comes a long that pulls at the heart strings to such an extent that even hardnosed hacks or seasoned engineers cannot turn a blind eye and must speak out.

When austerity bites hard and food stocks are low

We are thinking of course of the Driver and Vehicle Standards Agency's (DVSA) hospitality bill.

In answering a written parliamentary question, transport minister Nusrat Ghani revealed some of the effects of austerity on the Department for Transport's (DfT) largess, while reminding us all that: 'Hospitality is appropriate only exceptionally where there are external visitors.'

Despite this, the DfT and its executive agencies managed to rack up £164,187 in 2016/17 on hospitality, down from £216,707 in 2010/11.

However, *Highways* noted with dismay that the DVSA only managed to spend £15 of this total. Surely this is going too far. Even the Vehicle Certification Agency managed to spend over £7,000 rolling out the

welcome mat last year.

The DVSA now has so few 'external visitors' (should we read that as 'friends'?) that it can barely manage to splash enough cash to cover sandwiches and crisps for more than three people.

How well the DVSA must remember the heady days of 2010-11, when £663 was blown in what must have been some night out (by DVSA standards),

and who knows what happened during its year of living dangerously, 2013-14, when £6,132 was spent despite austerity being at its most fierce.

All *Highways* can say is if you are driving past the DVSA's headquarters in Bristol, why not spare a thought for its poor standards writers and pop in to say hello. You will no doubt be greeted with the words: 'We don't get many visitors around here.'

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Highway Asset Management Engineer
£28,485 - £30,153 per annum SO2

For an informal discussion, please contact: Gareth.pegg@telford.gov.uk

For further information on the role and to apply please visit:

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Job Title: Highway Asset Management Engineer

Location: Telford & Wrekin Council

Salary: £28,485 - £30,153

Telford & Wrekin Council is ambitious, always looking to develop, improve and attract investment. The Council has recently delivered a number of exciting projects including the new £250m Southwater Development, £12m Box Road Transport Scheme, £17m Growth Point Package and £12m Telford Town Centre Connectivity Package. Over the next three years the Council is embarking on a significant investment programme in the highways and transport network including £26m investment into our highways network.

Job Title: Engineer - Highways Capital Projects (S106)

Location: Liverpool City Council

Salary: £31,601 - £36,379

The successful candidate will ensure the effective delivery of improvement works that mitigate the effect of development through agreed Section 106. They will ensure projects are delivered by creating and securing partnerships, working with external companies and the respective developments, as part of the Major Schemes Project and contractual arrangements of the Section 106 agreements.

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Location: Rugby Borough Council

Salary: £23,398 - £27,668

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The Ranty Highwayman

The Ranty Highwayman is a chartered engineer who works in a local highways department. In this article he discusses funding issues in the often unglamorous world of highway maintenance

Maintenance is by definition a perennial subject, but highway maintenance (or more to the point the lack of it) is never far from the news over the winter months. The favourite proxy for politicians and press alike is the humble pothole but, as we very well know, there's more to it than that. So how can we capture the imagination of the public who, as with any public utility, only seem to notice when things go wrong?

A report from the RAC Foundation caught my eye recently. After an extensive Freedom of Information trawl, its report ^[1] revealed that the number of substandard bridges maintained by local authorities in Great Britain had reached 3,500 (substandard being failing to be meet 44 tonnes capacity). While this number only represents one in 22 structures, the financial liability of nearly a billion pounds to bring these to capacity and the £5bn total bridge maintenance backlog is no small figure.

Take this with the wider carriageway maintenance backlog of £12bn ^[2] in England and Wales, the £1.2bn backlog on Scotland's national roads ^[3] and perhaps another £1bn on Northern Ireland's roads ^[4], the UK is gathering up some serious liabilities. There is also the backlog of street lighting, drainage, footways, road markings and other assets, which as far as I can work out haven't been quantified as yet. We are easily looking at a repair bill of more than £20bn to just get us up to date from a capital investment point of view.

This is a big number and is perhaps too abstract to explain simply, especially when much of the value of our highways is literally buried in the ground. However, we need to find a way to engage with the public to explain the importance of maintenance, the funding issues around it and the implications of carrying on as we are. The problem is, there is no real national system of collating condition data and so we end up with industry surveys or Freedom of Information requests and I am not sure the public at large are particularly interested in the results. In any case, I am not even sure if we communicate the results of these surveys outside of our little bubble.

Any local authority maintenance engineer in the country will be familiar with requests from their residents asking for carriageways to be resurfaced or for works to crumbling footways. They'll also



be familiar with trying to explain that the money isn't there or perhaps (a little cheekily) telling their correspondent that it will probably be about 200 years before their side street is resurfaced. I won't be thanked by highways departments run on skeleton crews, but perhaps we need a national reporting system of some basic, people-friendly metrics. We already have the Government telling us how many potholes some one-off bits of funding will fill ^[5], but it's not sophisticated and we are never told the proportion of potholes it would clear.

Perhaps we need to look at key headings such as roads by class (A, B and so on); and whether urban or rural, with sub-headings for the condition of various assets – carriageways, footways, bridges, lighting and so on. Each highway authority could then provide data on the residual life for each asset, an estimate of the replacement cycle, an estimate of replacement value, as well as providing investment data. We could then test the extent of our backlog against different investment scenarios, whether one-off (as a measure of where we are) or the number of years to reach a steady state.

The approach would require a politics-free national data-collection standard and the resources to collect it, which I accept

would be a financial burden. However, unless you measure the problem, you don't know how large it is and you can't measure improvement, let alone explain the extent of the problem and how it can be tackled.

Highway maintenance is often thankless and it is rarely glamorous. We are very good at funding and building new roads to a fanfare, but we consistently decide to under-invest in what we already have. With the way that funding has changed in recent times, the new stuff tends to get funded from national budgets and the local maintenance from local budgets. It's a shift that the public have not seen and it is simply not sustainable to carry on the way we are. Especially so if the public are in the dark. ➔

Follow me on Twitter
@RantyHighwayman

[1] <https://www.racfoundation.org/media-centre/number-of-substandard-bridges-rises>

[2] <http://www.asphaltuk.org/wp-content/uploads/Key-Findings.pdf>

[3] <https://www.transport.gov.scot/media/41505/sag-response-to-audit-scotland-jan-2017.pdf>

[4] <https://www.theyworkforyou.com/ni/?id=2016-09-20.6.1>

[5] <https://www.gov.uk/government/news/cash-for-councils-to-fill-almost-1-million-potholes>

The Ranty Highwayman is not writing on behalf of any organisation. The views expressed in this article are his own and not those of his employer or any organisations that he is a member of or affiliated to. All views expressed in this article are those of the author and do not necessarily represent the views of, and should not be attributed to, Highways Magazine.



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