



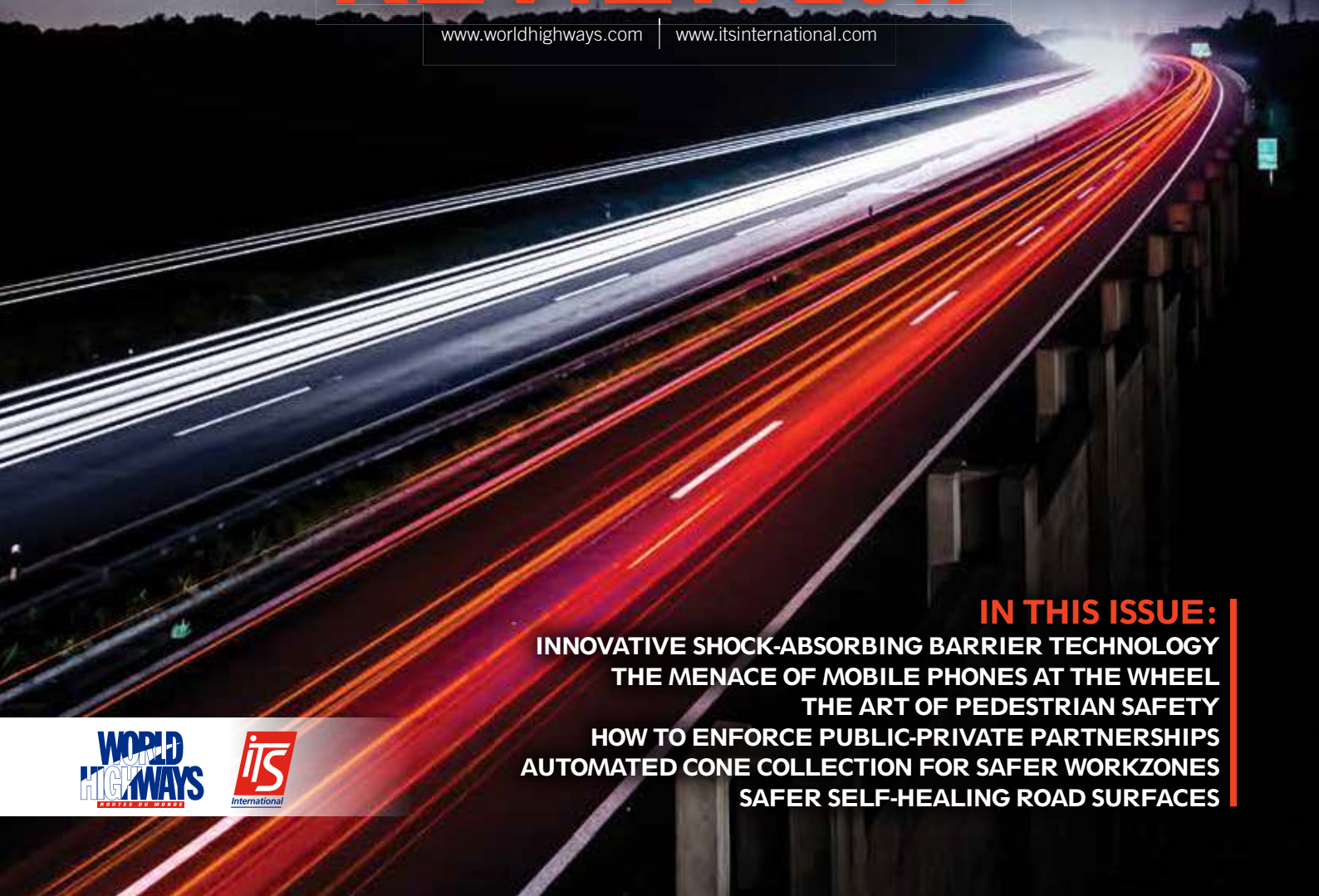
THE GLOBAL ROAD

SAFETY

REVIEW 2017

www.worldhighways.com

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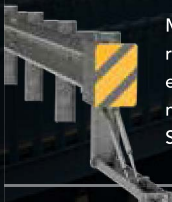
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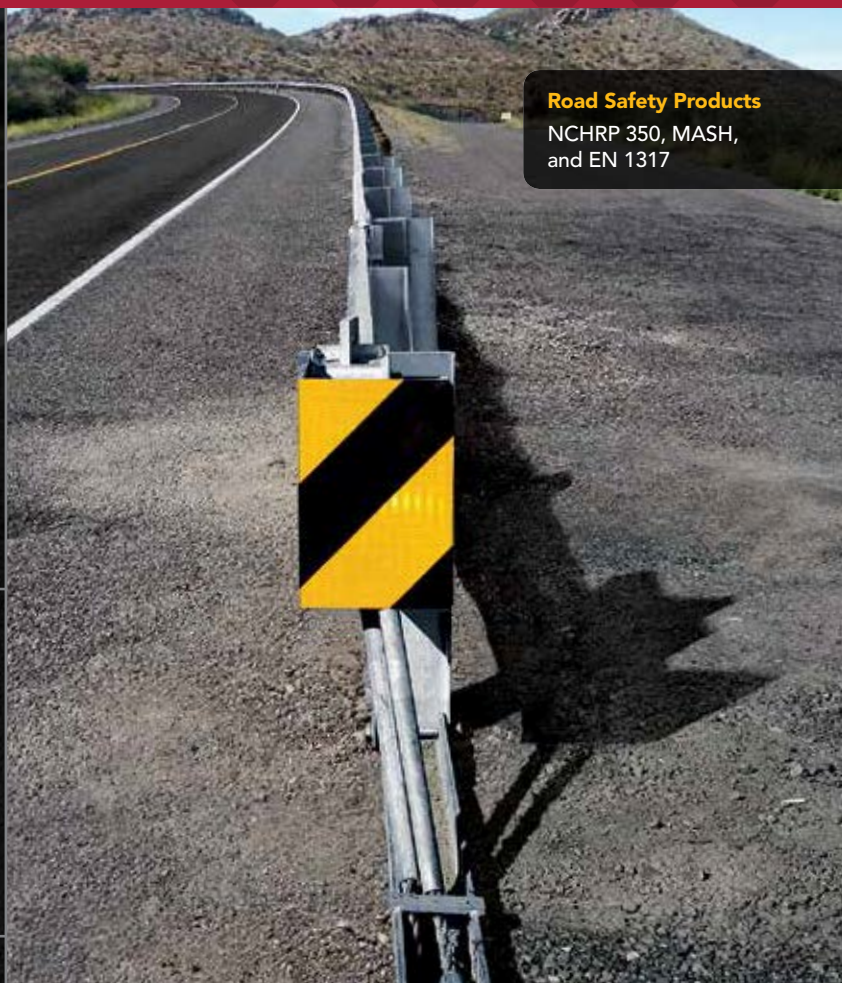


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EDITORS:

David Arminas, Colin Sowman,
Mike Woof

EDITORIAL CONTRIBUTORS:

David Crawford, Mary Sands,
Jon Masters

CHIEF SUB EDITOR:

Kevin O'Shea

DESIGNERS:

Simon Ward, Andy Taylder,
David Morley

PRODUCTION MANAGER:

Nick Bond

OFFICE MANAGER:

Kelly Thompson

CIRCULATION & DATABASE**MANAGER:**

Preeti Lalli

INTERNET, IT AND DATA SERVICES**DIRECTOR:**

James Howard

MANAGING DIRECTOR:

Andrew Barriball

CHAIRMAN:

Roger Adshead

PUBLISHING DIRECTOR:

Geoff Hadwick

ADVERTISEMENT SALES**Head of Construction Sales:**

Graeme McQueen

Tel: +44 1322 612069

Email: gmcqueen@ropl.com

Sales Director:

Dan Emmerson

Tel: +44 1322 612068

Email: demmerson@ropl.com

UK / Classified, North America:

Yvonne Tindall

Tel: +44 1622 844027

Email: ytindall@ropl.com

Italy:

Fulvio Bonfiglietti

Tel: +39 339 1010833

Email: bonfiglietti@tiscali.it

Asia / Australasia:

Roger Adshead

Tel: +44 7768 178163

Email: radshead@ropl.com

ADDRESS:

Route One Publishing Limited

Waterbridge Court

50 Spital Street

Dartford, Kent DA1 2DT, UK

Tel: +44 1322 612055

Fax: +44 1322 788063

Email: [initialsurname]@ropl.com

(eg: radshead@ropl.com)

GLOBAL ROAD SAFETY REVIEW

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WELCOME

With 2020 coming ever closer, the UN's target of halving global road deaths in the 10 years from 2010 still looks far away. Considerable progress has been made in Australia, Europe, Japan and South Korea on cutting fatalities by half from the figure for 2010. But even in these developed countries, the 50% drop in road deaths by 2020 still seems an ambitious target. Improvements to road safety in the US meanwhile first stalled and then worsened. And in the developing world, most countries have seen their road fatalities increase, particularly in Africa and Asia where vehicle numbers continue to grow at a fast pace. There have been safety gains in some developing nations however, with Vietnam

in particular making moves in the right direction through straightforward enforcement measures to tackle drunken driving and speeding and requiring all motorcycle users to wear helmets.

Whether the UN's target of halving global road deaths by 2020 compared to the 2010 fatality rate can be achieved remains to be seen. At present, however, it seems unlikely. The tools are there and in Europe, France and Portugal have pointed the way, while Vietnam's progress has shown other South East Asian nations that basic measures can deliver major benefits. More work is needed though as neither the developed nor the developing world can afford the economic as well as human toll that road crashes cause. □



© Davor Dopar | Dreamstime

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Tanzania's road network is becoming safer according to the latest official figures. Information from Tanzania's Police Traffic Department shows that the number of crashes from July to September 2017 was 48% lower than for the same period in 2016. There were just 1,264 crashes in this time in 2017 compared with 2,639 in 2016. With fewer crashes it follows that deaths and injuries have also seen a reduction of 32% and 40% respectively.

SIGNPOST UNVEILS OPTIMAST

SignPost Solutions, part of the Swarco Group, has launched Optimast 400, the latest addition to its range of passively safe sign masts.

The company says that Optimast, which has a distinctive shape, has been designed with strength and versatility in mind.



The Optimast 400 adds to the range of four established masts – 127mm, 168mm, 219 mm, 244mm. “Adding to the other masts in the range, the Optimast 400 can accommodate signs right up to the very largest of motorway and Advance Direction Signs,” said Tim Daly, national sales manager at SignPost Solutions.

It has also been successfully crash tested to BS-EN 12767 and achieved an energy rating of 100NE2.

www.swarco.com/stl

UK's 'most dangerous' roads safety awards



Two of the UK's 'most dangerous' roads have received Prince Michael International Road Safety Awards for their casualty reductions.

The 'rear facing' average speed installation on the A537 allows motorcycles (which only have a rear plate) to be monitored and the latest figures show a 77% reduction in killed or seriously injured (KSI) casualties. Another average speed enforcement system, covering 220km of both single and dual carriageway sections of the A9 in Scotland is currently showing a 62% reduction in KSIs.

Jenoptik's cameras are being used on both projects.

www.jenoptik.com

Hitex International introduces HiFlex

Hitex International, a provider of road safety markings, surfacing, road repair solutions and decorative surfacing, has been showcasing several new solutions, including three new products.

They include the Puma range of quick and easy to apply modified MMA - Methyl Methacrylate - road safety marking and coloured textured surfacing materials and PumaGrip, a BBA/HAPAS certified type 1 high friction surfacing.

Hitex said that the Puma range enhances road safety and delivers a long service life. It can be installed rapidly to maximise productivity for contractors by reducing time and resource on site, with less inconvenience to road users caused through road and lane closures.

Hitex will also introduce its new HiFlex range of preformed thermoplastic markings. HiFlex has full BASt certification

at the highest P7 level of 4 million wheel-overs. It is also compliant with stringent sustainable road building, constructional durability and quality requirements. Quick to apply without requiring specialist application equipment, the range includes precision-cut preformed lines, symbols, numbers, letters and logos with outstanding adhesion, flow and colour stability properties.

Also being launched is TexBand Solo and TexPatch, new BBA/HAPAS approved road repair products. TexBand Solo is a single pass over-band and fill and over-band system which permanently repairs open joints and cracks in the road surface as part of proactive road maintenance programmes. TexPatch has been developed using the same technology to quickly repair larger defects such as potholes.

www.hitexinternational.com



UK council adds LEDs to sweepers

In the UK, South Gloucestershire Council is looking to increase road safety by installing the latest, high visibility LED traffic control lights to its Scarab sweeper fleet.

Supplied and installed by Somerford Equipment, part of the Hitex Group and a provider of road marking vehicles and equipment, the units will enable the council to ensure the highest level of protection for road maintenance crews.

Retrofitting was completed faster than planned, enabling the sweepers to be put back into service in less time.

Somerford Equipment's LED Traffic Control Arrow unit features 13 amber LED lamps, each producing 2400 cd, providing the highest level of visibility in typical road conditions at more than 500m. The lamps have an estimated lifespan of 10 years, providing a low cost of ownership in terms of replacement and maintenance costs.

With simple in-cab operation, the unit displays Chapter 8 compliant warnings including flashing 'keep left/keep right' arrows or alternately flashing four corner lamps. The lamps



Somerford's LED Traffic Control Arrow make a clean sweep of it.

automatically dim in ambient conditions to extend their operational life and reduce glare for drivers.

The Somerford LED traffic control lights are manufactured using powder coated aluminium for high rust resistance and are both lightweight and durable enabling them to deliver reliable service in the harshest environments whilst providing

long term fuel efficiencies across the fleet.

The new LED lights provide greater visibility, particularly in low light conditions, compared with the blue direction signs that were previously used. They also enhance the safe use of these vehicles by eliminating the need for drivers to leave their cabs to manually operate the signs.

www.somerfordequipment.co.uk

PHONE DISTRACTION WARNING AT RAIL CROSSINGS

The UK's rail track owner, Network Rail, is using the latest technology to reduce the number of near misses as pedestrians cross the railway lines. Statistics revealed that 70% of near misses at crossings are due to distraction, with the top three being: friends (40%), headphones (20%) and mobile phones (12%). Almost a third (29%) of young adults admit to using their mobile phone while crossing the railway and near misses rise from an average of 15/month in December and January to peak at 50 in September.

In response, Network Rail and British Transport Police are geo-targeting more than 100 crossings where phone distraction has been flagged as high-risk. It will use technology that causes an advert to flash up in whatever app is being used, to display a safety message warning users to pay attention while crossing the railway.

The effectiveness of the approach will be evaluated towards the end of the year. www.networkrail.co.uk

BIG JUMP IN UK DRUG-DRIVING CONVICTIONS

In the first full year since new legislation was enacted, 8,500 drivers were convicted of drug driving in 2016 compared with 879 in 2014.

New legislation in 2015 banned drivers from driving with illegal drugs in their body or any of the listed prescription drugs if they impair driving. The use of roadside testing equipment was also introduced. Roads Minister Andrew Jones told the National Roads Policing Conference that £1m of government funding has been used to train 1,000 officers from police forces across England and Wales in 'gathering evidence of impairment caused by drugs'.

Those caught drug-driving face a minimum 12-month driving ban, up to six months in prison, an unlimited fine and a criminal record.

Swarco helps reduce bridge strikes at London hotspot

Six Swarco full colour, full matrix electronic warning signs are helping Network Rail and Transport for London (TfL) reduce the number of lorries hitting a railway bridge at Thurlow Park in South London by more than a third. The signs are installed either side of the bridge, and when an over-height vehicle is detected it triggers the warning signs.

In the six-month period prior to installing the signs there were 11 bridge strikes, and in the six months following their



installation there have only been seven incidents - and only one in the last four months.

Energy-efficient LEDs enhance visual impact and

the signs are integrated with TfL's traffic control centre and can be used to provide traffic information to road users.

www.swarco.com/stl

TARGETED SAFETY TO TACKLE YOUNG DEATHS

Additional hazard perception training and graduated forms of licensing will help tackle the risks faced by young drivers and motorcycle riders in Europe, according to the Young Europeans Acting for Road Safety (YEARS) report.

More than 3,800 young people (aged 18-24) are killed each year on EU roads and young two-wheeled riders are particularly at risk, with deaths for moped riders peaking between the ages of 15 and 17 and 18 and 24 for motorcyclists.

A lack of experience means young people are poor at anticipating and reacting to hazards and less aware of how to drive and ride in particular road conditions and situations. They tend to drive smaller, older and often less crashworthy vehicles which lack the latest safety technologies and their use of seat belts and protective clothing is also poor.

The report makes a number of key recommendations including better enforcement of speed and drink-driving limits, mobile phone use and seat belt wearing and the lowering of the alcohol limit for young drivers.

MELBOURNE TRIALS LIGHT-CHANGING FOOTPATHS

The city of Melbourne, Australia, is trialling new technology in a bid to improve pedestrian safety at intersections where people cross the road and disobey pedestrian crossing signals.

Lights have been installed in footpaths along the edge of the road at the intersection of Little Collins Street and Swanston Street and change colour between red and green in time with the pedestrian crossing signals. The lights will be switched on around the clock, helping people walking at night or letting those looking down at their phones know where the footpath ends.

www.vic.gov.au

Siemens Plus+ is a bonus

The latest controller and signals system from Siemens, the ST950 Plus+, uses fewer cables and a smaller controller cabinet than other systems.

The aim of the Plus+ solution is to offer significant reductions in on-street installation and maintenance time, improved safety and reduced deployment costs compared to conventional methods.

In short, it's easier and faster to install and later maintain, explained Keith Manston, head of product management for Siemens.

Signals can be pre-assembled and the system uses low-level access poles, meaning installation engineers spend less time working



on-street and so reduce risk to themselves and public disruption.

The new ST950 Plus+ system 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. Plus+ uses dedicated fail-safe

controllers, signal heads and pedestrian indicators. It also incorporates new smart-loop modules ensuring the system is tolerant of individual component and cable damage. The result is higher intersection availability and reduced disruption to the travelling public.

www.siemens.com/uk



Rapid access with ProTec-Tor 120

Mobile road restraint systems at roadworks, such as the narrow, high-containment ProTec family of crash barriers, prevent users from leaving the carriageway and heading into oncoming traffic and make it essentially safer to work on site.

To keep vehicles moving at roadworks, it may be necessary to take the traffic through a lane onto the oncoming carriageway because the actual directional carriageway is being resurfaced. To separate the contraflow traffic, the individual crash barrier elements are connected by force-fit transitions and, depending on the requirements and extent of the roadworks, they will often stretch over several kilometres.

But in an emergency, it is frequently necessary to provide rapid access to the scene of an accident for the fire brigade, emergency services and police particularly in such special traffic flow areas. This is to provide effective help and assistance even in the confined roadworks situation.

The ProTec-Tor 120 allows for the mobile crash barrier to be opened quickly and easily without needing any tools.

Striking visual signs and a different pattern for the side reflectors make the ProTec-Tor clearly visible for the emergency services. The rapid access point can also be marked with a number or mileage indication.

Brief instructions on the element explain how to loosen the force-fit transition by hand in five easy steps so that the mobile crash barrier opens up easily like two large wing gates, with crank support.

The wing gates run on extendable rollers with a hinged opening of up to 180° in either direction. The hinge system even permits space-saving positioning of the opened ProTec-Tor elements parallel to the line of crash barriers.

In just a few seconds, this creates a large rapid access point for emergency services in the mobile crash barrier, without needing any tools.

www.berghaus-verkehrstechnik.de

Duck alert in English village

Wadding ducks are a common sight along the narrow streets in the small English village of Addingham in West Yorkshire. Protecting them from road hazards has been a priority for years.

The village has often used removable paint to decorate roads with yellow duck and duckling designs to alert motorists. But the village decided to seek a more permanent – and colourful – road safety solution to protect its feathered pedestrians.

Jointline, a provider of road markings, airfield markings and high friction coloured surfacing solutions, was called in to solve the problem with a solution from Hitex.

Jointline installed three large duck road markings just in time for the Tour de Yorkshire professional bicycle race, stage 3 of which passed through the



village in April.

It took a team of five around six hours to assemble and install the ducks, explained Mark Garrad, commercial manager at Jointline. Each duck was manufactured as a jigsaw using HiFlex preformed thermoplastic road markings from Hitex Traffic Safety, a global provider of road safety and surfacing materials.

HiFlex provides a colourfast, highly durable road marking solution and is available in a range of patterns including numbers, letters, logos, symbols and colours. It can also be specified as a road lining tape and can be tailored to meet specific requirements.

www.jointline-group.co.uk
www.hitexinternational.com

■ SINGAPORE TRIALS LIGHT-UP PAVEMENTS TO IMPROVE PEDESTRIAN SAFETY

Singapore's Land Transport Agency has commenced a six-month trial to study whether LED light strips encourage pedestrians to focus on the traffic signals at pedestrian crossings and if they are suitable for Singapore's environment and climate.

The red and green light strips are embedded in pavements near the edge of two pedestrian crossings and will operate in conjunction with the pedestrian traffic lights, switching between steady green, flashing green and steady red as the traffic signals change. Both test sites experience a high volume of pedestrians across different demographics, such as young people and elderly pedestrians, and public perception surveys will be carried out during the trial period as will site observations and analysis, to determine the light strips' effectiveness.

■ JAMAICA ROAD SAFETY

Jamaica is seeing an improvement in road safety, with a reduction in casualty levels. So far in 2017, overall road deaths have been 49 fewer than in the same period during 2016. The road death toll at the end of 2017 is hoped to be significantly lower than in 2016, itself an improvement over the previous year. During 2016 there were 379 road deaths in Jamaica, compared with 382 in 2015.

One key strategy in reducing road deaths is to encourage motorcyclists to wear helmets. Motorcyclists now account for over 30% of all road deaths in Jamaica, an increase from the 15% of 2010. And 90% of those motorcycle riders killed were not wearing helmets at the time of the crash. Road safety groups as well as the Jamaican police are pushing the message to riders that helmets can cut fatality rates. Meanwhile the Jamaican police force is also now trying to tackle speeding, another key factor in crash severity and risk.

TransCalm is full of air

TransCalm is a stand-alone bolt-down speed hump designed to persuade drivers to comply with the limit in 32kph zones and is described as a 'responsive

speed control' by its manufacturer Mallatite.

The TransCalm is constructed from a rubber compound containing a pneumatic cylinder, fitted

with a patented valve that operates at a preset safe speed. The valve is open for drivers under normal safe use, allowing the cylinder to deflate to around 45mm, reducing the firmness of the unit. If the safe speed is exceeded, the valve closes, retaining air in the cylinder, creating a 70mm hump so that the vehicle occupants experience progressive discomfort in proportion to the speed of the vehicle passing over the unit.

TransCalm comes in 3.3m strips to cover a full lane width and weighs around 130kg. With a total width of 900mm, the TransCalm hump is also said to generate less noise when a vehicle rolls over it than other traditional asphalt or rubber bolt-down equivalents.

Markings are reflective to suit traffic direction.
www.mallatite.co.uk



GOOD VIBRATIONS FOR BORUM

Borum reports that it has seen increased acceptance of rumble strips globally, especially in the US, Australia and Denmark. The company, based in Denmark, notes that international studies demonstrate the effectiveness of centreline rumble strips for reducing road traffic accidents, especially in rural areas. While some studies show a reduction in head-on collision accidents of around 20%, other international studies suggest that they can reduce accidents by up to 55%.

The profiled application of Borum's rumble strips can be applied as extruded profiles in thermoplastic material or as a two-component profile application.

Two-lane rural roads experience a significant number of single vehicle run-of-the-road crashes and crashes from cars going across the centreline and colliding with oncoming vehicles. This has inspired different stakeholders to experiment with centreline rumble strips to prevent head-on collisions. Centreline rumble strips are placed between opposing lanes of traffic to alert drivers that they have crossed over into the path of oncoming traffic.

When the tyres pass over the rumble strips, the raised or grooved patterns suddenly produce an uncomfortable vibration, and the noise heard inside the vehicle alerts the driver to change direction.

www.borum.as

CAMBODIA CRASH CONCERN

Cambodia's crashes continue to be a cause for concern. The country's National Committee for Road Traffic Safety says that road deaths increased by 11% during the first nine months of 2017 compared with the same period in 2016. The areas identified as having the highest rates of road deaths were Kandal, Kampong Thom and Phnom Penh. On a more positive note though, serious injuries from crashes slightly decreased compared to the previous nine month period.

The Blade cuts it with A-one+

UK contractor A-one+ maintenance operatives in England's southern counties of Kent, Sussex and Surrey are now protected by a new vehicle-fitted crash cushion.

The Blade - manufactured by Dutch company Verdegro Blade - is designed to absorb impacts including those by large heavy vehicles that have increased bumper heights.

A-one+ said that the Blade is the only crash cushion that has been tested to US MASH crash testing standards, the most demanding in the world.

The cushion, when deployed on a vehicle, extends 6m.

"Cars and lorries have got bigger and we need tougher protection for our staff working in front of our impact protection vehicles repairing the roads, litter picking or clearing up after accidents," said Gavin Crittenden, A-one+ transport manager for the region.

"When the cushion is deployed behind an impact protection vehicle, if anything hits it the IPV's brakes lock and the cushion absorbs all the impact to stop the truck being pushed forward and threatening our operatives, even under braking," said Crittenden.

The Blade unit measures 6m long by 2.4m wide and its

strength comes from a composite aluminium welded profile. The unit has 12 internal "blades". During an impact four blades cut through the aluminium composite H-beams, with another eight cutting through welded tubes, absorbing the impact. The remaining weak aluminium parts bend away safely.

Alongside the Blade, A-one+ is using a new RedX arrow board on its new protection vehicles. RedX, also manufactured by Verdegro, is designed to match the latest traffic management signage used to signal lane closures on smart motorways.

www.aone.uk.com



Reducing intersection deaths in Toronto

The city of Toronto, Canada, has seen an average drop of 40% in the number of collisions causing a death or serious injury at intersections equipped with red light cameras, according to the Toronto Star. At some locations, there have been no deaths or serious injuries caused by collisions since the cameras were installed.

The city has almost doubled its red light cameras as part of a plan it says is aimed at eliminating traffic deaths and serious injuries. To date, 65 new cameras have been placed at intersections this year and are now operational, with another 10 to come that are still under construction or review.

In an e-mailed statement to the newspaper, Myles Currie, director of the city's Traffic Management Centre said the

city would traditionally remove cameras and relocate them to other locations. However, it was advised to retain the cameras from the previous phase. "They continue to maintain their effectiveness at those locations and moreover, anecdotally we are seeing a halo effect of the cameras likewise serving to reduce fatal and serious injury collisions at adjacent intersections as well," he concluded.

Signage is key to making sure the cameras are effective, according to Brian Patterson, president and CEO of the Ontario Safety League. He said that unlike common tactics like speed bumps, increasing the number of red light cameras is one of the traffic calming and behaviour modification projects that really does work.



THE GLOBAL MARCH TOWARDS LED STREET LIGHTING

LED street lighting is coming to a town near you - faster than you think, according to recent research.* *David Arminas reports*

They are energy efficient. They cast a different light than what we are used to and they are getting less expensive to buy. Welcome to the future of street lighting, the light-emitting diode - LED.

There are an estimated 315 million street lights of all kinds in the world and this will reach 359 million by 2026. Last year there were more than 1,000 LED street light projects in over 90 countries, according to a new report by the US-based Northeast Group, a 'smart' infrastructure research organisation. Cities and utilities will hook up nearly 139 million LED street lights over the next decade.

There is a lot at stake for manufacturers – between 2016-2026 global investment in LED street lighting is expected to be \$57 billion. On top of that, another US\$12.6 billion will be spent on smart networked street light systems, notes the report that analyses and forecasts the global market for LED and smart street lighting up to 2026.

It's not just western countries that are embracing this latest road luminaire technology. India is a standout market, not least because the government two years ago committed the country to LED street lights, ensuring a huge - and eager - market for their products (see separate story).

Driving the adoption will be a lowering of cost, the report suggests. "Once upfront costs reach parity with legacy lighting, nearly all new street lights will be LED and several legacy ones will be converted, leading to 89% LED penetration by 2026." Also, "by 2017, the energy and O&M [operating and maintenance]

savings from smart street lights will outweigh their upfront costs and by 2026, 42% of all street lights will be networked."

The report says that countries with higher electricity prices and labour costs stand to save considerably more. "On average, countries in East Asia will save \$863 per street light over 10 years, while countries in Africa will save just \$357 per street light. The highest growth rates for street lights are in emerging markets, where cities are struggling to maintain infrastructure for growing populations. By the 2020s, Africa and South Asia will be driving LED street light sales."

A number of players are fighting for position in the smart street light value chain, including chipmakers, component manufacturers, luminaire vendors, and networking companies. The leading smart street light vendor is Telensa with 18% market share, followed by Silver Spring Networks, but dozens of vendors have carried out major smart street lighting projects. □

**Global LED and Smart Street Lighting: Market Forecast (2016-2026), available from Northeast Group, in Washington, DC.*

www.northeast-group.com

LED STREET LIGHTS – WHAT'S AT STAKE

- Across 125 countries, just over 280 million LED street lights will be added over the next 10 years, reaching a penetration rate of 89% by 2026.
 - The largest market segment will be for the "cobrahead" and "shoebox" LED street lights, which will be worth \$38.3 billion over the next 10 years.
 - Decorative LED street lights will have a value of \$15.1 billion and high wattage LED street lights will have a value of \$3.5 billion over the forecast period.
 - Cities and utilities will network almost 139 million streetlights
- within the decade, reaching a 42% penetration rate.
- As of 2016, there are more than 1,000 LED street light projects in over 90 countries.
 - In the near term, the largest markets will be North America, Europe and eastern Asia, particularly for networked street lights, as cities look to reduce high energy and labour costs.
 - By the 2020s, LED street lights will be the majority of the installed base in all regions and smart street lights will be well developed globally.

Source: Northeast Group



BELOW: The use of regular signs reminds drivers to adhere to the posted limit.

AVERAGE SPEED ENFORCEMENT SHOWS OUTSTANDING RESULTS

As the benefits of section speed enforcement are becoming clearer, the technology is gaining converts worldwide. *Colin Sowman* reports.

America’s National Transportation Safety Board (NTSB) is calling for urgent action from both road authorities and the federal government to combat speeding which has been identified as one of the most common factors in motor vehicle crashes in the United States. This new call follows the publication of a safety study which found that between 2005 through 2014, 31% of all traffic fatalities (112,580) were the result of crashes in which law enforcement officers indicated a vehicle’s speed was a factor. More than three quarters of crashes and fatalities involved passenger vehicles. While the relationship between speed and injury severity is consistent and direct, that between speed and crash involvement is complex and affected by factors such as road type, driver age, alcohol impairment, and roadway characteristics (curvature, grade, width and adjacent land use).

The NTSB report starts with the basics and questions the suitability of using 85th percentile speed of free-flowing traffic as the way of determining speed limits. It states ‘there is not strong evidence that the 85th percentile

speed within a given traffic flow equates to the speed with the lowest crash involvement rate for all road types.’ Indeed it says raising limits to match the 85th percentile speed may lead to higher operating speeds, and thus a higher 85th percentile speed – effectively a vicious circle. It also highlights the availability of alternative approaches and expert systems that incorporate factors including crash history and the presence of vulnerable road users.

Significantly, it states that: ‘Speed limits must be enforced to be effective, and data-driven, high-visibility enforcement is an efficient way to use law enforcement resources.’ Furthermore, it adds that: ‘Automated

speed enforcement (ASE) is also widely acknowledged as an effective countermeasure to reduce speeding-related crashes, fatalities, and injuries. However, only 14 states and the District of Columbia use it. Many states have laws that prohibit or place operational restrictions on ASE, and federal guidelines for ASE are outdated and not well known among ASE program administrators. Point-to-point enforcement, which is based on the average speed of a vehicle between two points, can be used on roadway segments many miles long. This type of ASE has had recent success in other countries, but it is not currently used in the United States.’

One of those other countries is the UK where the authorities are very keen on section or average speed enforcement and the use of this technology is increasing as the price of the equipment and communications continues to fall (see ITS International Nov/Dec 2016). Initially the systems were predominantly temporary deployments in work zones but having proved their effectiveness, the number of permanent installations is increasing rapidly. One supplier, Jenoptik (Vysionics)

DUBLIN DEBUT

The first average speed enforcement cameras in the Republic of Ireland, have recently been deployed to deter speeding in the Dublin Port Tunnel.

has delivered equipment for more than 100 section speed installations covering in excess of 1,000km, and has orders for a further 20 systems.

According to Jenoptik's Geoff Collins, section-long compliance is a major advantage of the average speed approach. He points to 'before and after' speed measurements in Scotland where 112 cameras provide section speed coverage along 220km (137 miles) of the A9 trunk road (Europe's longest average speed enforcement zone). He says: "I show this graphic and ask, 'when do you think the cameras were turned on?'"

Most installations use paired sets of cameras with ANPR to time vehicles over a measured distance but non-linear areas and even small towns can be covered. "It is simply a case of speed and distance. If you measure the distance between two cameras, then you can set up an enforcement system," says Collins, adding the qualification that they must be contained within a single speed limit.

Siemens has recently installed 120 of its Sicore ANPR cameras for speed enforcement duties as part of Transport for London's (TfL's) SafeZone roll-out. The cameras are permanently deployed in 80 sites on some of London's busiest arterial routes. TfL's head of strategy and outcome planning, Lilli Matson, said: "Ensuring speed compliance along a more extensive length of road, rather than just where a camera is located, can make a big difference in cutting the number of tragic, unacceptable collisions, saving more lives and improving air quality."

Deterring, rather than catching, speeding drivers is a major attraction because average speed enforcement brings about a change in driver behaviour that extends well beyond the measured sections. Collins says that even after taking into account known statistical anomalies such as regression to the mean, average speed systems typically result in a 36% reduction in speeding motorists and often this behavioural change can benefit the surrounding areas outside the measured section.

Data from many sites shows that there is a 70% reduction in the number and severity of people injured in the targeted sections and the average 85th percentile speed of vehicles is just below the posted limit. According to Collins, "typically only one in 10,000 journeys will result in a ticket being issued" and he added that this level of income would just about cover ongoing maintenance.

"The big savings come from the reduction in crashes, crash severity and casualties and when



In 2013 we reviewed the use of ten years of section control in Austria

ABOVE: Asfinag has found section control to be most effective.

those savings are taken into consideration, these systems can pay for themselves in six months," he says. With the UK's Department for Transport putting the savings for preventing a serious road casualty at almost £220,000 and around £2million for a fatality, it is evident that the benefits can rapidly repay the cost.

Regular warning signs, of which Collins recommends four for each camera, remind drivers they are in an average speed zone, help increase compliance and counter any suggestion that the cameras have been placed 'to catch out drivers.'

AUSTRIAN EXPERIENCE

Asfinag, Austria's state-owned motorway operator, currently has five stationary section control systems and 14 mobile systems (per traffic direction) near building sites. It has been using section speed control systems in high-risk roads (such as tunnels and work zones) for more than 13 years and has declared itself very satisfied with their effectiveness.

"Section controls help definitely to increase discipline inside certain sections. Their success speaks for itself - road users are much more disciplined in section control areas," says Christian Ebner, head of traffic management at Asfinag.

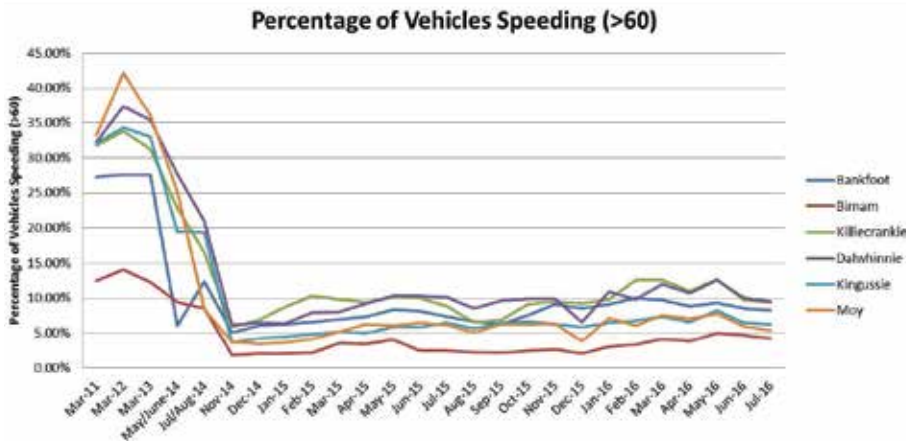
"In 2013 we reviewed the use of ten years of section control in Austria. In all cases where we used section control systems, the number of incidents with damage to persons went down. This means that numbers of crashes in controlled sections have decreased by 50%."

This is 'decisively true' for the system in use in the Bindermichl tunnel system because although there are still roughly 100 accidents per year, these are rear-end collisions with vehicles travelling between 40 and 50km/h and result in few, if any, fatalities. "There are no more accidents caused by excessive speeds - and therefore no casualties or hard crash consequences in the aftermath of high-velocity crashes," Ebner says.

As an example of how section control systems can save lives, he highlights the Kaisermühlen Tunnel on the A 22 Donauufer motorway. Since the system was first commissioned in 2003, there have been no fatalities and crashes have halved. The effect in another tunnel at Niedernhart, near the German border, is even more impressive as the crash rate has dropped by two thirds.

With such proven effectiveness in





→ combating speeding America’s NTSB is urging the implementation of average speed technology. It is calling on the USDOT to complete the actions called for in the 2014

Speed Management Program Plan and for the National Highway Traffic Safety Administration to identify speeding-related performance measures to be used by local

law enforcement agencies. These, it says, should include, ‘the numbers and locations of speeding-related crashes of different injury severity levels, speeding citations, and warnings, and establish a consistent method for evaluating data-driven, high-visibility enforcement programs to reduce speeding. The performance measures and evaluation methods should then be disseminated to the local law enforcement agencies.’

Some of its strongest recommendations are to the 35 states that prohibit, or do not have laws regarding automated speed enforcement. To them the message is simple: amend your laws. □

- www.nts.gov/safety/safety-studies/Documents/SS1701.pdf
- www.jenoptik.com
- www.siemens.com
- www.tfl.gov.uk
- www.asfinag.at

Vacuworx offers the HL Series

Highway construction projects can be particularly challenging when space is limited, roads are crowded and time is short. To meet these challenges, the US company Vacuworx has developed the HL Series Hydraulic Barrier Lifters.

Vacuworx describes the lifters as “a smarter way to handle concrete barriers”. The traditional method of moving concrete road barriers with slings and chains is slow and lacks control, not to mention increasing the dangers of accidents for employees.

Designed for use with a variety of equipment, including excavators and backhoes, the HL Series lifters connect easily and work with the host’s hydraulic system. Elastomer grips provide superior performance with full surface contact without damaging materials.

It is equipped with a hydraulic lock for safety to prevent loss of load if hydraulic pressure is lost. With 360° rotation, the HL Series is perfect for manoeuvring in confined spaces during road, bridge and highway applications.

Precision handling capabilities and wireless remote operation from the cab of the host machine makes loading, unloading and installation

fast and easy and without the need to have someone continually guiding the barrier on the ground.

From an environmental perspective, Vacuworx hydraulic lifting systems produce near zero noise and air pollution, ideal for construction sites within city limits or with strict emission guidelines.

The HL B1 is designed to lift concrete road barriers up to 2,720kg and nearly 3.7m long while the HL B2 can handle barriers up to 35,275kg and nearly 9.2m long.

Quick-couplers are available for virtually all host machines for the ultimate in attachment versatility and even greater productivity on the job.

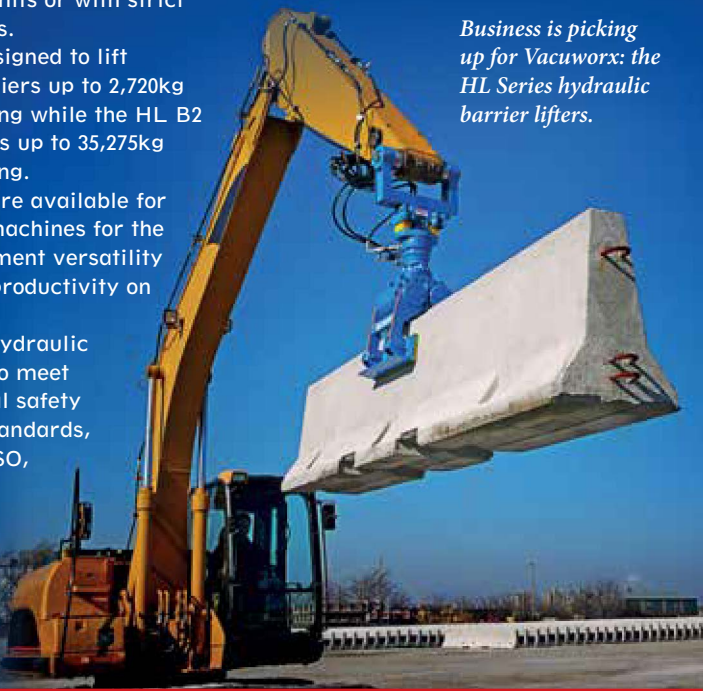
The HL Series Hydraulic Barrier Lifters also meet or exceed all global safety and engineering standards, including OSHA, ISO, ASME and CE.

Vacuworx lifters can be attached to hydraulic excavators and backhoes (with or without a coupler

system), wheel or track type loaders, cranes, pipe layers, skid steers, forklifts and knuckle booms and can also be mounted for a variety of in-plant applications.

www.vacuworx.com

Business is picking up for Vacuworx: the HL Series hydraulic barrier lifters.



Road-tough RWS-20 weather sensor

British meteorological instrument manufacturer Biral has launched what it says is "a very competitively priced" transportation road weather sensor (RWS-20).



RIGHT: Biral's RWS-20 weather sensor is made specifically for harsh road conditions

The sensor monitors visibility and obstruction to vision for road transport applications.

It has been manufactured to allow easy integration with any road weather information system but it has been developed specifically for the harsh roadside environment.

The RWS-20 is based upon Biral's SWS range of visibility sensors, sharing many of its advanced technical features. It uses the compact forward scatter measurement principle and remains accurate in all weather conditions, ensuring local light sources, headlights or flashing signs do not impact its operation or reliability.

The RWS-20 has a measurement range of 10m to 7.5km for use in road applications where fog, rain, spray and snow can create dangerous driving conditions. The optical windows and sensor hoods contain heating for use in harsh weather conditions throughout the year. Both optical windows have systems for lens contamination monitoring, ensuring the visibility

output is constantly compensated to maintain accuracy whilst reducing routine maintenance duties.

The unit also has self-test capabilities, along with automatic alerts for cleaning the optical windows. The product has a serial data output of RS232, RS422 or RS485, while providing analogue voltage visibility outputs (0-10V) or the extinction coefficient (EXCO).

The RWS-20 features optional relays which directly connect to roadside signage and other control systems, allowing intelligent communication and operation of local warning signs.

Biral is based in Bristol, UK. Its products range from sensors - measuring wind, temperature, precipitation, visibility, solar radiation and other standard parameters - to complete weather stations. Biral is also a specialist in the design, manufacture and supply of particle analysis and climate research instruments for science, industry and the environment. □

www.biral.com

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- ASEAN countries
- India
- Iran
- South Africa

The way to look good and last

French firm Tertu is a well-established pioneer of steel-backed timber guardrails for use in highway applications. The wood is treated so that its service life matches that of the steel reinforcement. The company first designed, tested and marketed these types of crash barriers in France more than 25 years ago and has continued to develop the range to meet EU regulations. Tertu is market leader in France and now exports across the EU to countries such as Austria, Belgium, Cyprus, Denmark, Germany, Italy, the Netherlands, Norway, Spain, Switzerland and the UK. The company also has partners or licensing arrangements in Chile, Brazil, New Zealand and South Korea as well as a subsidiary operation in Shanghai. Exports now account for more than 50% of Tertu's turnover. All Tertu barriers are crash tested to the European EN1317 standards and are CE marked. The current range offers 12 different models from containment level N1 to H2 covering 5 different working widths from W3 to W7. All Tertu barrier units are designed to be highly reliable and easy to install. The company continues to innovate and new safety products are being tested now.



REAL-WORLD CONDITIONS WILL LIMIT AV SAFETY GAINS

Alan Thomas of CAVT looks at the reality behind the safety claims fuelling the drive towards autonomous vehicles.

The case for autonomous vehicles (AVs) is usually made by saying 90% of crashes are caused by driver error, so remove the driver and you avoid 90% of crashes. However, this simplistic approach ignores the real-world causes of collisions and fails to acknowledge the challenges facing the developers of smart systems.

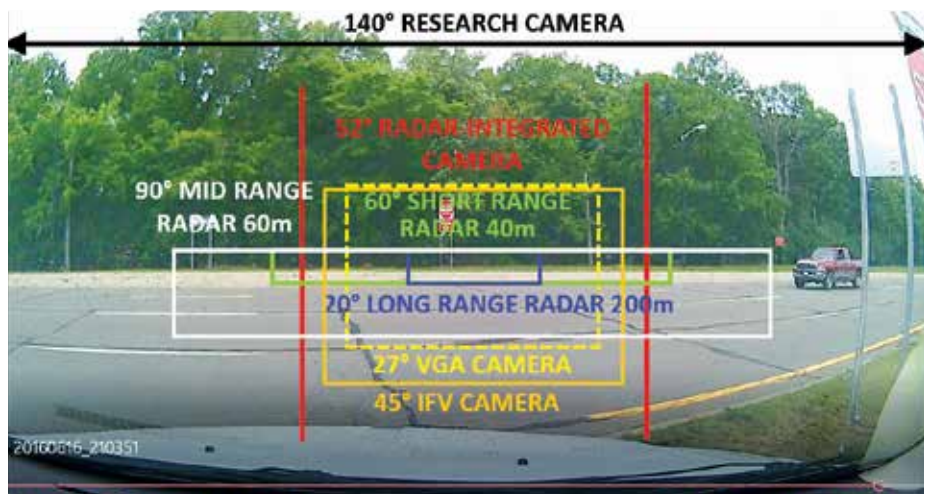
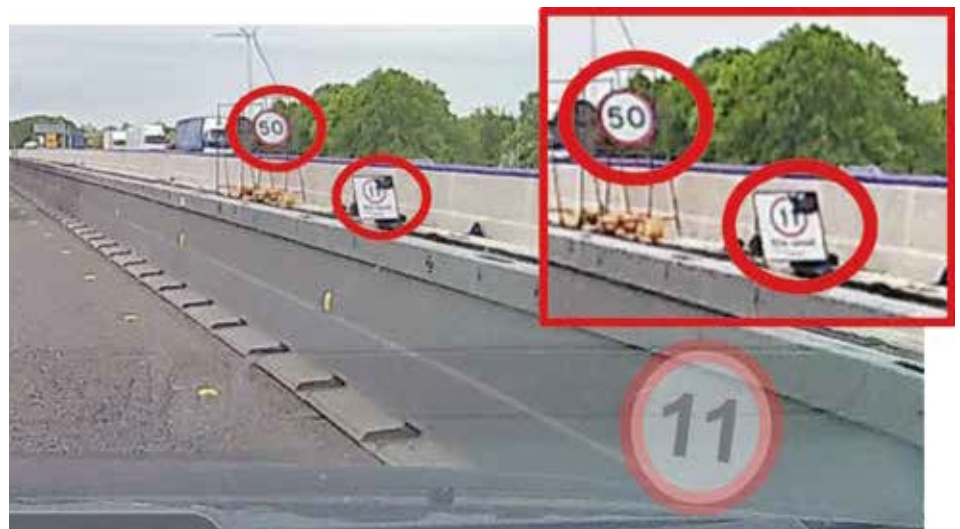
Work being undertaken by CAVT includes researching how a range of road and traffic scenarios can produce atypical conditions in which drivers, and particularly autonomous and advanced driver assistance systems (ADAS) are faced with instantaneous choices. The outcomes of these choices range from inconsequential to a fatal collision, and the research supports the development of ADAS which take account of the real world - not the world we would like it to be.

AVs and ADAS can avert collision scenarios coded into their algorithms, plus others generated through the vehicle's deep learning capability or 'taught' by transfer from an as-yet non-existent external body of accumulating AI wisdom. Human drivers are also good within their training and experience and, in addition, have the capacity to learn and intuitively interpret novel and ambiguous situations. This ability is vitally important as infrastructure and traffic do not conform to standards and are subject to huge variations locally, nationally and internationally.

One example is Europe's pictograms which have no US equivalent. And where pictograms do not suffice, text is used and may be bilingual. In the absence of 100% connected vehicle coverage, delivering a clear message in a few easily-readable words is a challenge and any automated traffic sign recognition system will require complex linguistic abilities. This problem is amplified with variable message

TOP: The TSR system has detected the (lower) construction zone speed limit so intelligent speed adaption would limit the vehicle speed accordingly.

ABOVE: Radar and camera fields of view.



signs where the wording can vary and the strobe effects may render it unreadable to a digital camera.

IN FIGURES

Despite recent moderations, the mantra persists that 'AVs are expected to eliminate most of the 93% of collisions that currently involve human error'. This comes from a summary by the US DoT focusing on the

'Critical Reasons for Crashes Investigated in the National Motor Vehicle Collision Causation Survey' (NMVCCS) which attributes 94% (±2.2%) of critical reasons to the driver. However, it defines the critical reason as 'the immediate reason for critical pre-crash event - often the last failure in the causal chain'.

NMVCCS defines the critical pre-crash event as the 'circumstance that led to this vehicle's first impact in the crash sequence and

made the crash imminent' - in other words, given a situation in which a collision is almost inevitable, the driver failed to avoid the impact.

INEVITABLE CRASH

This raises questions about what led up to the situation when the impact was inevitable. The full NMVCCS Report to Congress, and contributory crash-associated factors highlight that there are almost always multiple factors: 30.4% of those contributing factors were attributed to road and weather, 16.4% to the vehicle with 0.7% unknown. This means the driver is solely responsible for 43.4% crashes - less than half the often stated rate.

Looking at details of the drivers' critical reasons for the critical pre-crash events, the largest factor was errors of recognition (40.6%) followed by the wrong or no decision (34.1%), performance (10.3%), non-performance (7.1%), and other/unknown (7.9%). Again, more than one error may be involved.

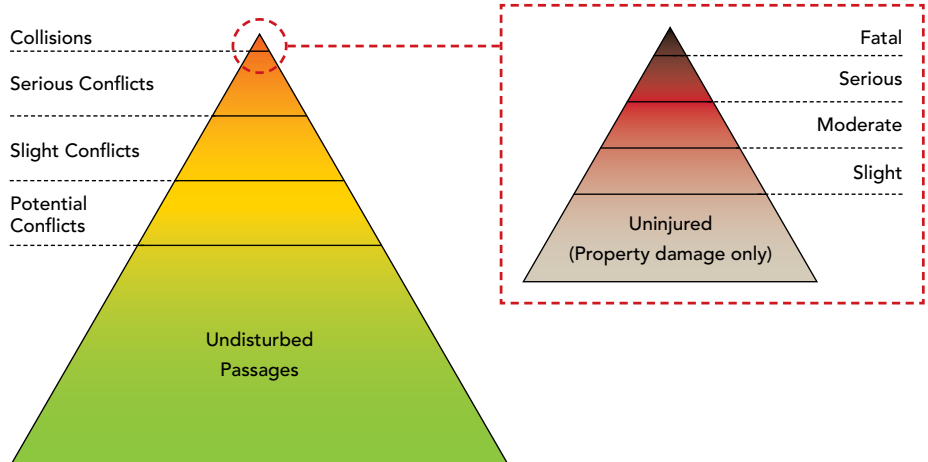
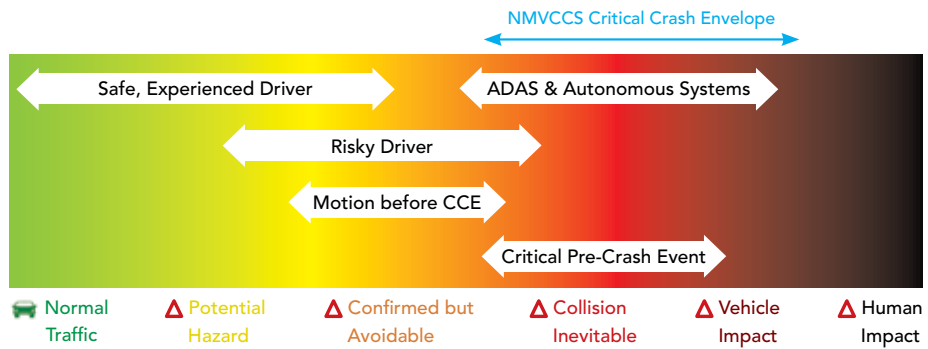
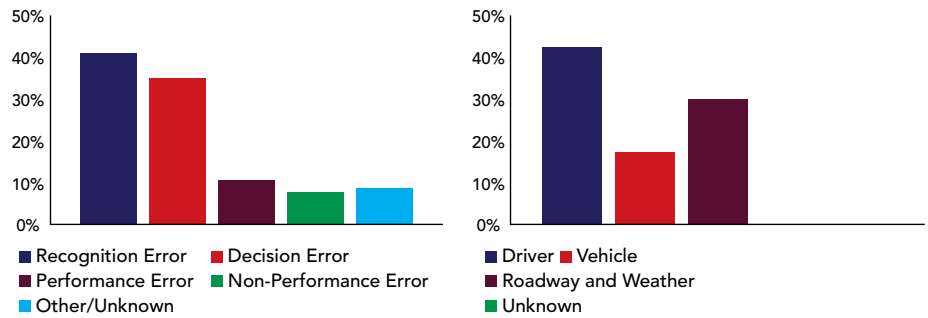
Similar analyses of French and UK data classify driver functional failures differently, but show a similar pattern.

FIELDS OF VIEW

In an attempt to clarify some of this confusion and determine if automated systems could really counter these problems, CAVT undertook some testing to understand what was happening in these circumstances. A test vehicle was fitted with a road-scene video camera using a 1920x1080 HD sensor running 30 fps in full colour with a wide dynamic range. Its f/1.9 lens maximises light transmission and provides a 140° field of view with a horizontal angular resolution of 0.073°/pixel (compared with 0.051°/pixel of a typical ADAS VGA camera which has a 38° field of view - comparative information about cameras used in AVs is not readily available). The extra wide angle is important because many hazards arise from the sides. LIDAR, it should be noted, covers about 170°.

These tests suggest that a VGA camera in a vehicle travelling at 80km/h (50mph) cannot reliably detect an oncoming cyclist moving at 30km/h (20mph) until he/she is 50m away - or 1.60 seconds before a collision - sufficient under ideal conditions, but scary.

The recording road and traffic scenarios (excluding dangerous driving manoeuvres), reveal a vast array of circumstances which cause human confusion and would be hard to program into or train an autonomous vehicle to handle, many relating to infrastructure and in particular traffic sign recognition. These could be rectified given time and money, but there is little sign of that beginning.



TOP LEFT: Driver critical reasons for critical pre-crash event. **TOP RIGHT:** Crash-associated factors. **CENTRE:** Collision timeline. **ABOVE:** Ekman's traffic conflict pyramid, with a collision pyramid.

Other examples are not as 'easy' to counter and include examples of sensors being compromised by flooded motorways, wet tramlines at night and low sun.

CONFLICTING SIGNS

In England this is compounded by a confusing system of road sign regulation which has been loosened to give local authorities more discretion. While this causes consternation to drivers' organisations and highway engineers (who remain legally liable for compliance), it presents an even greater challenge for machine recognition and interpretation.

X2V communications would help but are not infallible. In a long-term construction zone the traffic sign recognition (TSR) system picked up the site limit, while the satnav

display showed the default 70mph (112km/h) limit - a potentially dangerous error for intelligent speed adaptation. Away from the construction zone, the sat-nav correctly displayed 70mph but the TSR showed an illegal 90mph (145km/h) - and inspection of the video footage could not explain the error.

COMPLEX SITUATION

There are also many examples of signage displaying access or stopping restrictions that vary by vehicle type, time or day of the week. Rarely does a map database contain this data meaning the sign's text must be optically recognised, converted, read (and possibly translated), understood and cross-referenced with the vehicle, its occupants/cargo and the time and date.

→ There are also examples where AI could learn incorrectly. An 8km (5mile) stretch of the A447 has three sets of temporary warning signs but no lights, whereas a few miles further on there were active lights. The AI could have learned to ignore these signs – as did a human driver who overtook our test vehicle and was surprised by the lights and consequently caused our driver to brake abruptly. Many such evasive actions (both resolved and failed) can be viewed on the internet and it is often apparent that the well-known collision timeline is under way.



TOP: Complex restrictions - UK, USA, Cataluña. **ABOVE:** How can an algorithm be written to deal with this situation?

respond to a conflict that is already into the orange/red critical pre-crash event domain, is a recipe for failure.

INFRASTRUCTURE MAINTENANCE

Assuming (rashly) that full integrity and reliability can be achieved, it is in principle possible to provide good enough physical infrastructure and I2V to mitigate some of the risks of ADAS and AV systems - but given today's budgets and the inability of authorities to maintain existing standards, this is impossible. Interestingly, many of those measures, particularly the lower-cost ones, would also remove or minimise the hazards for human drivers.

While a 43% safety gain would be more than welcomed, the '93%' claim must be viewed in context and with regard to the ability of advanced technology. The 50%+ aim of crash-associated factors that are not down to the driver will keep everyone busy for some time.

□ <http://cavt.co.uk>



Following a career in vehicle manufacture, safety, regulations and driver performance R&D, Alan Thomas is now director of research and consultancy at CAVT.

TRAFFIC CONFLICT

The stages of the collision timeline blend, and the time-scale can be variable but, in relation to Ekman's traffic conflict pyramid, NMVCCS generally defines 'crash associated factors' in the 'normal traffic' (green) zone as: overloaded, snow/sleet, dark but lit, not physically divided, view obstructions, non-driving activities, fatigue, tyre, wheel, or brake deficiencies. The potential and slight conflict zones (yellow-to-orange) cover 'motions before the critical crash envelope' including changing lane and avoidance manoeuvres (due to a previous critical event).

The red (serious conflict) zone houses 'critical reasons for the critical pre-crash event' often including continuation of factors initiating the hazard. These include distraction, inattention, too fast for conditions, illegal manoeuvre, misjudgement of gap, overcompensation, panic and sleep as well as tyres, brake or other system failure and signage, road layout, obstructed view, fog and glare.

NEAR-MISS ANALYSIS

Analysis of near-miss events (often called the traffic conflict technique) is now widely used because more can be understood by observing the frequency and number of conflicts (where one road user changes trajectory due to another user's action) than by waiting for a collision to occur. This technique can also distinguish the small marginal changes between the different levels of event, by which a slight conflict can become a serious conflict or a crash, through almost random minor differences in circumstance.

In order to remove human errors, ADAS and AV systems would need to be immune to all contributory factors – a nirvana that may be impossible to achieve. Furthermore, the introduction of new contributory factors (due to system hardware and software shortcomings and failures – even with ISO 26262) is almost inevitable because of the number of unknowns.

HUMAN PARALLELS

More fundamentally, there are parallels to consider between ADAS/AV and human failures including perception (inadequate range, field of view, resolution or contrast), or degradation by ghosting, reflections, artefacts and sensor obscuration by snow, rain or litter. The evaluation and interpretation of anything the sensors detect is also fraught with difficulties including conflicting inputs and false positives. Then the system has to decide what to do (which could be to hand over to the human) and action that decision. Every stage can be subject to error.

Accepting that sensor fusion will help overcome some of these problems and that LIDAR can play a major role in providing a ground-truth reference for other sensors, the system performance should be total, regardless of vehicle price point.

Due to many of the limitations in perception, and particularly when the driver is treated as a fall-back in Level 3 and 4 vehicles, the system must always behave as well as an experienced driver in the green/yellow zone. To delay intervention or response until the situation is yellow/amber would be uncomfortable or alarming for occupants. To delay further until the driver has failed to



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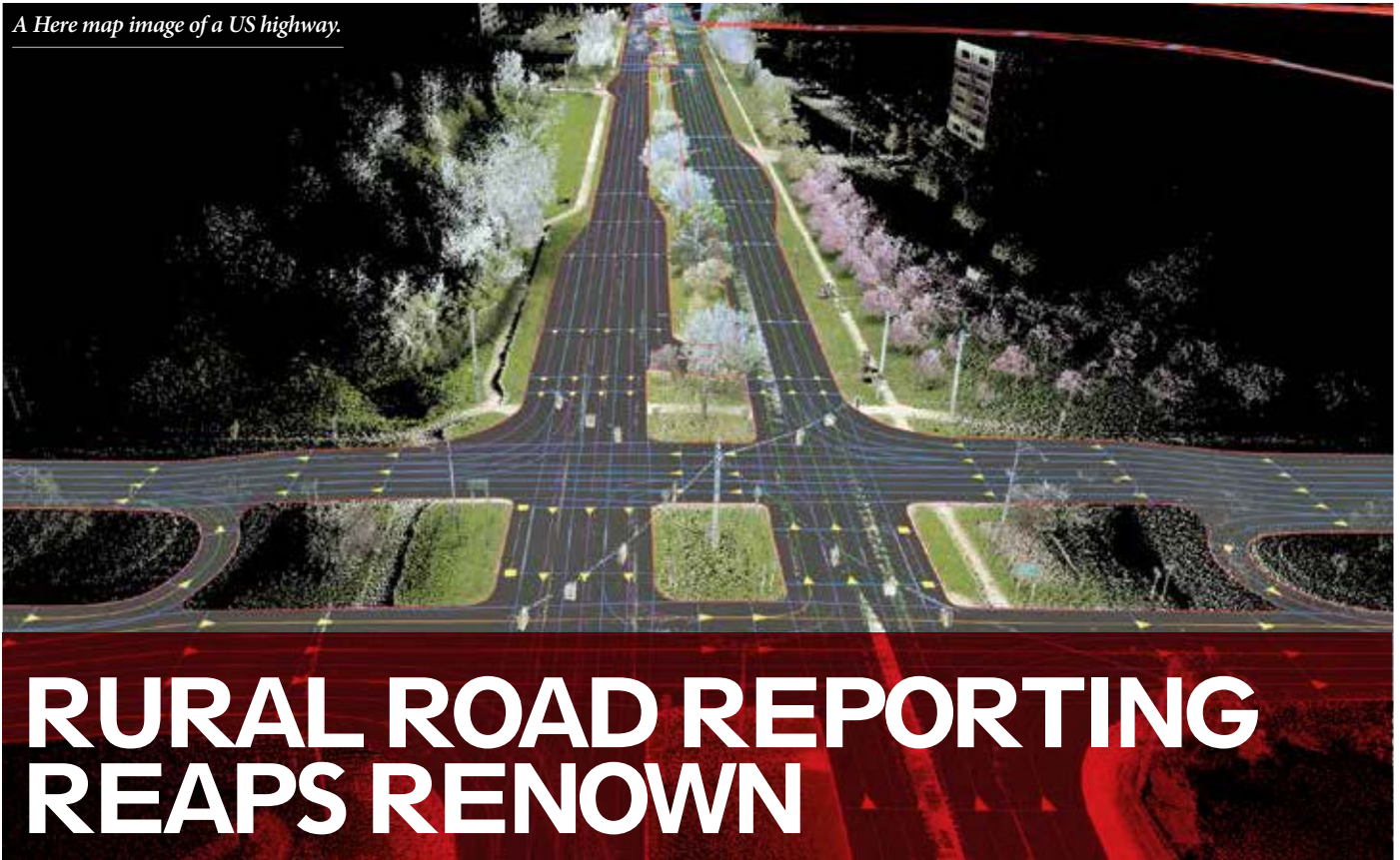
Gregory's TTMA-100 is designed for use in mobile and stationary work zones. The versatile truck-mounted attenuator is hitch-mounted, NCHRP 350 TL-3 approved, and can be used with almost any vehicle in your fleet from 4,536 kg to unlimited GVW.

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A Here map image of a US highway.



RURAL ROAD REPORTING REAPS RENOWN

David Crawford sees how Missouri is using commercially available information to rapidly improve monitoring and driver information on rural highways.

Missouri is a predominantly rural state with the second largest number of farms in the country and agriculture the main occupation in 97 of its 114 counties. US statistics starkly reveal how road accidents in rural areas tend to be more serious than in urban regions and of the 32,000 US motorists killed each year, 54% die on roads in rural areas even though only 19% of the population lives in these.

And these incidents are not confined to small backroads. Although rural interstates see fewer crashes than urban ones, they experience higher numbers of fatal accidents. Congestion on rural interstates is a growing concern for many US states, including Missouri, with rising traffic volumes impacting on intercity travel times. Furthermore, rural workzones cause particular issues because of the lack of adequate parallel alternative routes and long-distance drivers unlikely to be familiar with local conditions in the corridor hinterlands.

But change is possible as Missouri's Department of Transportation (MoDOT) has shown – and collected a string of accolades for its traffic information initiatives - one of which extends the live traffic data-based driver warning systems developed for the main urban centres, to its rural interstates. Another has brought the department's field staff and highway patrols up to the same level of traffic

situation preparedness as their office-based colleagues.

Operational since January 2016, the new Rural Queue and Delay Warning System (RQDWS) has gained a Best Project Award from ITS America's Heartland Chapter which

covers the states of Iowa, Kansas, Missouri, Nebraska and Oklahoma.

Historically, MoDOT had enjoyed access to live traffic data only in its two major metro areas, St Louis, its major city, and from across the state border, Kansas City - both of which have a dedicated traffic management centre (TMC) (named Gateway Guide and KS Scout respectively). This partnership between the Missouri and Kansas DoTs formed as the population of Kansas City is split almost evenly between the two states.

In these two urban centres, MoDOT collects speed and traffic count information data from roadside sensors and keeps drivers informed of upcoming delays and congestion by setting advice on dynamic message signs (DMS). Its long-term ambition is to install comparable capability on its two main interstate corridors: the I-70 which links the two conurbations and the I-44 which runs south-westwards from St Louis to the border with Oklahoma.

MoDOT traffic management and operations engineer Jon Nelson told ITS International: "Previously, for the rural areas of the state, the only way we had to know how traffic was moving was to be on scene, have cameras operating in the area, or receive a phone call from a member of the public. These methods can be very subjective, and we rarely had real traffic data available to point back to."

ZIPPER

Zipper is the name given to alternate vehicle merging and is currently the subject of driver information campaigns in several US states. This follows research showing that, in dense or slow moving traffic, resisting the temptation to change lanes at the first indication of an upcoming workzone can reduce the traffic backup by up to 50%.

Motorists are being told that using two full lanes of traffic until they see a specific instruction to merge will reduce the difference in speed between the lanes. When both of these continue to move slowly, all drivers are equally delayed and there is less risk of road rage.

As a starting point, in 2014 MoDOT contracted to gain access to GPS-based live traffic probe data as the basis for a rural system. In January 2016 KC Scout launched RQDWS along I-70 and Gateway Guide followed suit along I-44 in September 2016. The new system builds on MoDOT's experience while taking advantage of the fact that less dense probe data remains relevant owing to the wider spacing of interchanges in rural areas. Mapping specialist Here collects and processes data from sources including mobile devices in cars, connected vehicles and fleets, and converts the results into speed and travel time data for each roadway segment.

It makes the outputs available as a XML-based web service, with a standard configuration file detailing the road segments. MoDOT polls the XML feed every minute, and integrates the results into its advanced traffic management system, which uses Transcore's TransSuite software.

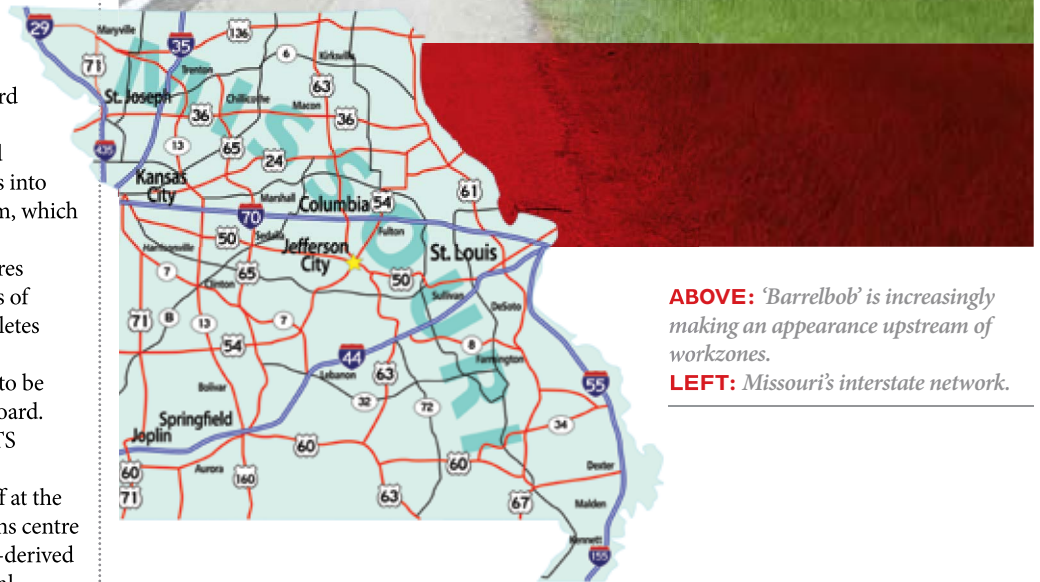
This reads the Here data and compares it with preset thresholds for indications of slowed or stopped traffic. It then completes the processing necessary to determine when a queue warning message needs to be automatically posted to a rural DMS board.

Here's James Etheridge stressed to ITS International that no new hardware is needed, saying: "it's simply a feed." Staff at the company's US national traffic operations centre in Chicago can complement the probe-derived data from other sources including social media to build a better overall picture of traffic situations.

The system builds on MoDOT's practice of delivering on-road traffic condition messages which have proved effective in reducing numbers of rear-end crashes resulting from fast-moving trucks suddenly encountering a stopped vehicle. The rural DMS are strategically located in pairs along I-70 and I-44.

Once TransSuite detects a speed threshold being crossed, it automatically formats and posts, on the first sign, a message giving motorists information about the possibility of encountering slow or stopped traffic ahead; if they do so, where they should expect it (referencing exit number) and what kind of delay to expect.

The system is based solely on Here's probe data and works automatically regardless of the cause of the delay (an accident, a workzone, adverse weather conditions...). The ability to react to the last has enhanced MoDOT's role in dealing with, for example, 'snow fights' between snowplough crews and the weather - "one of our most visible and closely watched



ABOVE: 'Barrelbob' is increasingly making an appearance upstream of workzones.

LEFT: Missouri's interstate network.

services," said Nelson.

"Knowing where and when to send out snowploughs has historically been the responsibility of crews out on the road, which can be a very manual and labour intensive process. Here's traffic information has allowed us to make our efforts more efficient and targeted."

Once a slow-down is detected, a TMC operator can initiate a response plan - posting additional guidance on the follow-up DMS and, if appropriate, dispatch a field team to the scene to deal with the problem.

Another driver alert system supports the management of self-contained smart workzones at major road construction scenes. It uses smaller, portable changeable message signs (CMS - as MoDOT terms them) to warn of stopped traffic when congestion builds upstream of a site. These can carry shorter 'slow traffic ahead' or 'zipper merge' warnings (see box).

MoDOT's workzone ITS is solar-powered and automated to enable the calculation and generation of realistic travel times for transiting the construction activity, 24 hours a

day. The department says CMS has become "a major tool" in helping to reduce crashes.

It is now monitoring drivers' satisfaction with the system via an online questionnaire, asking:

Did you have enough warning before entering this workzone?

Did the signs provide clear instructions?

Did you make it through the work zone in a timely manner?

Were you able to travel safely in the work zone?

Respondents giving negative answers to the last two questions are invited to provide additional detail.

In both general traffic and workzone scenarios, state emergency response and traffic incident management staff work closely along the two interstates with local jurisdictions, all of which can sign up to receive routinely generated incident alerts.

MoDOT also has plans to expand the new driver information approach to its other interstates - I-29, I-35, and I-55. Since traffic volumes on these are substantially lower, the workzone system is likely to be prioritised

While the number of rural road crashes is lower than in urban areas, the severity is often greater



→ in advance of the next tranche of major road reconstruction being scheduled.

Here is currently also supplying traffic information to 11 other state DoTs. Etheridge told ITS International: “governments are interested in seeing how others have deployed the technology and Missouri definitely has some innovative approaches for them to leverage.”

FIELD ALERTS

When MoDOT began acquiring Here’s real-time traffic data, it initially fed the results into an online traveller information map, to keep staff and drivers updated on actual road conditions. While useful, in practice the map

proved to be of most benefit to office-based employees with computer access. It soon became clear that staff working in the field needed a more proactive and convenient way to access the information. In response, MoDOT’s Traffic and Highway Safety division joined forces with the Information Systems division to develop an internal alert programme for sending out critical warnings.

The resulting Field Alert Traffic System (FATS), launched in April 2015, is closely integrated with the RQDWS. It allows MoDOT employees (and contractors) to sign up for coverage of specific road segments (for example, within a workzone) on which they want to be kept notified by text or email to

their mobile phones, if speeds fall below a pre-defined threshold.

Registered users can opt to be updated on as many road segments as they wish, and control the criteria for receiving alerts (for example, by time of day, day of week or speed threshold). Once alerted, they can then investigate and decide on an appropriate response. MoDOT reports finding this system of great value in managing workzones and incidents.

FATS currently has some 200 users taking advantage of it in their day-to-day operations - Missouri state highway patrols as well as staff working for all three of MoDOT’s TMCs. The third TMC is at Springfield and gives local daytime support to Gateway Guide in the Ozarks region along the south-western section of I-44.

Nelson says: “Many times, these alerts have been the first notification an employee has had of adverse traffic conditions in their area of interest, and they can then respond more promptly. The cost of setting up the system was nothing for materials and 80 hours of labour.” □

www.modot.org
<https://here.com>
www.transcore.com

OTHER AWARDS

The RQDWS (and underlying existing systems) also won the 2016 Missouri State Governor’s Award for Quality and Productivity for the MoDOT’S technical group in recognition of their ‘ingenuity and customer-focused commitment’.

FATS, in turn, has won the 2016 Francis B Francois Award for Innovation presented by the American Association of State Highway and Transportation Officials (AASHTO) which has enabled MoDOT to fund a USD10,000 graduate fellowship at a state university.

The department has also won a further 2016 AASHTO President’s

Award for Research for the Road to Tomorrow team’s work in identifying potential sources of funding for the creation of an ITS testbed along the state’s tranche of I-70. Launched in 2015, the long-term project plans to invite commercial companies, entrepreneurs and innovators to come and stage trials of technologies that could include automated vehicles and solar roadways.

MoDOT hopes it will produce solutions that other US states will be able to benefit from. (See *ITS International*, November/ December 2015).



David Crawford has spent 20 years writing about and researching ITS and is a Contributing Editor to ITS International.

RetroSign GRX pass-fail option

Delta's new RetroSign GRX retroreflectometer is a portable instrument for measuring retroreflection of road traffic signs as well as high-vis clothing and number plates.

Delta says that its RetroSign GRX offers many features and supports a preset measurement program, making it easy to measure and evaluate results on the spot. In addition, the RetroSign GRX software and App/tablet solution feature asset management capabilities for data processing and storage, including data search capability.

The GRX has a built-in

function for setting minimum retroreflection levels. A minimum level can be set for both the sign background colour, the sign legend colour and/or colour contrast between the two. It allows the user to instantly know if a sign passes or fails minimum requirements.

From a practical point of view, the setting for minimum reflection allows maintenance crews to immediately change road traffic signs which do not meet the requirements. This avoids a time-consuming and therefore costly second visit to the site to make essential changes to the sign.



RetroSign GRX has a pre-set measurement programme.

For the US market, Delta has expanded the pass-fail function to facilitate the sign library MUTCD - Manual on Uniform Traffic Control Devices. This optional feature hosts the complete MUTCD library in the instrument and tablet, comparing measurement results against the minimum requirements stated in the library. Again, this feature will inform the user instantly of the sign's conditions.

In addition, RetroSign GRX can take a picture of the measured sign and compare it to the references in the MUTCD library in order to confirm whether the sign meets the requirement or not.

The tablet option supports marking the defect in the photo image and linking it to a note, if there are conditions related to the performance of the sign requiring this. □

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KEEPING AN 'EYE' ON UNDERTAKING CYCLISTS

Fusion Processing's *Jim Hutchinson* looks at a two-year trial of the company's cyclist detection system.

Is cycling in a city dangerous? Well, that depends where you are and how you view statistics. Malmö is far more bike-friendly than Mumbai and the risk can either be perceived as small - one death per 29 million miles cycled in the UK in 2013 - or large - that equated to 109 deaths in the same year.

Whatever your personal take on the data, the effect of these accidents can be felt indirectly too. News of cyclist deaths, especially from large vehicles, has repeatedly hit the headlines in recent months and eroded the confidence in cycling, pushing many nervous road users back into their cars.

A 2014 survey by the British newspaper, the Guardian, cited dangerous driving as the largest deterrent to cycling, followed by poorly-suited road design, lack of infrastructure and fear of an accident. That this is a global problem is evident from similar conclusions reported by Australia's SMH newspaper, which highlighted that 'cyclists now comprise 30% of road-crash hospitalisations in the Sydney metropolitan area'.

In order to reduce congestion, traffic pollution and pollution-related illnesses, authorities know they need to get more people commuting by bike, and they can play a key role in making cycling safer and combatting fear.

Part of this comes through educational measures like the Metropolitan Police's 'Exchanging Places' initiative, which gives cyclists the opportunity to experience how difficult it can be for truck drivers to see them, and encourages truck drivers to experience cycling in the city. The West Midlands Police has a scheme to raise awareness by targeting close-pass drivers, using plain-clothes officers on bikes to monitor for this. In a four-day test, 80 drivers were pulled over and given education programmes.

But while these initiatives undoubtedly help, more is needed to tackle the underlying problem. In 2015 large vehicles (in this case HGV lorries) accounted for nearly 90% of all cyclist fatalities in London. The Construction Industry Cycling Commission points out that while HGVs account for only 3.5% of traffic across London, they are involved in 57% of crashes. Three quarters (76%) of those cycling collisions and 62% of fatalities occurred at junctions where the cyclist is 'invisible' to drivers in truck cabs. This is where technology can play a role.

BRISTOL'S APPROACH

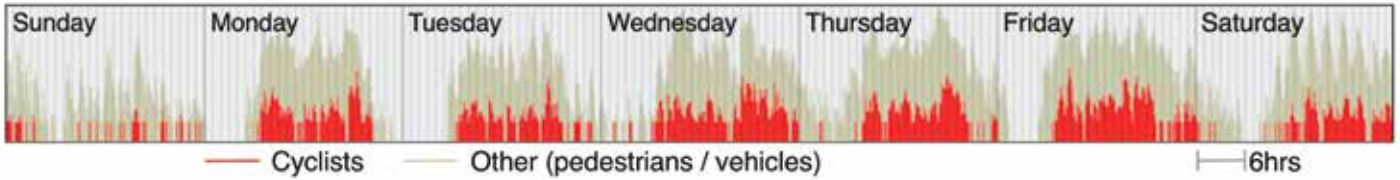
For the past two years, First Group has been running the CycleEye cyclist detection system on buses in Bristol, with the system fitted to vehicles running on high-density cycling routes.

Bristol is designated as the 'UK's first cycling city', and Bristol City Council and First wanted to both prevent accidents and to counter the perceived threat to cyclists. This initiative was widely reported in national, local and cycling press.

Initially, four CycleEye units were deployed



RIGHT: First buses in Bristol has been trialing a cyclist detection and alert system which uses radar and vision technologies.



in the Bristol trial. This was subsequently increased, allowing the movement of the units between buses and routes, to better understand where potential incidents may occur. The city's busiest cycling routes were chosen, as they represent the most challenging environments in which to evaluate the devices, and also to gather a more detailed understanding of the volume of cyclists and 'undertakes' on these routes.

The drivers were also surveyed to understand how they view the technology. The feedback has been widely positive, and First has chosen to continue using the units on key cycling routes - for example between the station and university (see map).

Bristol City Council, is keen to see this rolled out more widely to improve safety.

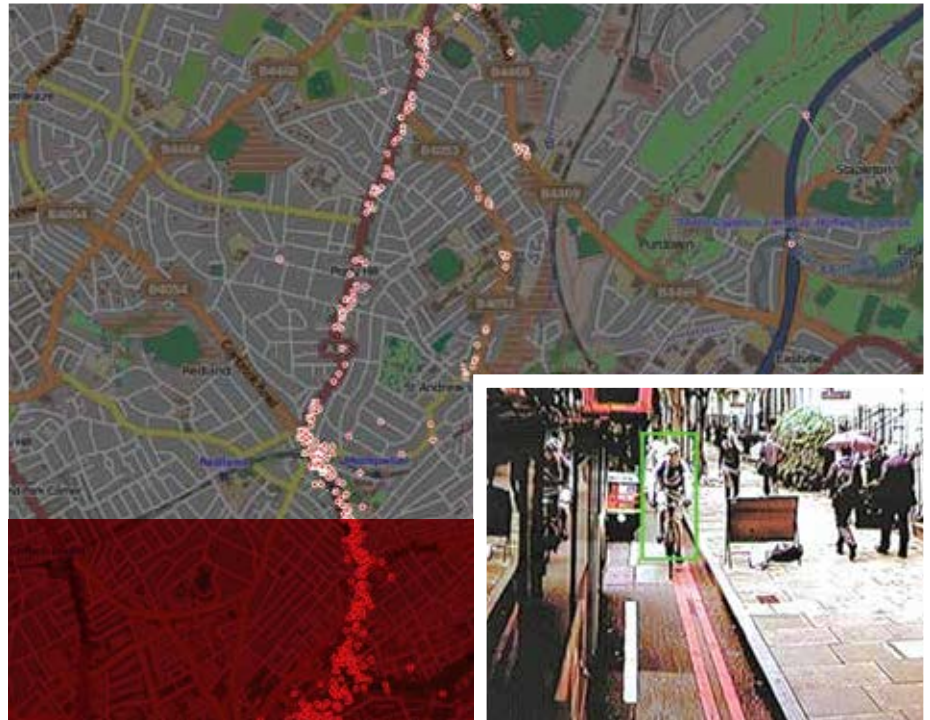
THE SYSTEM

The system is not just about blind-spot checking. Even the best-trained drivers can suffer from cognitive overload in what is an exceptionally information-dense landscape. So a system needs to not only show what's there but also identify and assess the threat, and alert the driver in as concise a way as possible.

The system simultaneously uses radar and vision sensors to detect a cyclist on a vehicle's nearside and alerts the driver if a bike 'undertakes' the vehicle.

All sensors represent a trade-off. For example camera-only systems will degrade significantly in the dark and in poor weather conditions. However, by combining the input of two sensor technologies into the single unit, in this case radar and camera, and using Fusion's proprietary algorithms, it achieved an accuracy of 98% over the trial periods.

When a cyclist is detected, the system sends a spoken, concise, alert to the driver. Still images are recorded (for later analysis) and tagged with a GPS reading and time stamp. In the event of an accident, a 10 second loop of video is also recorded - while short, this is enough to capture the lead up to an accident. The system allows fleet owners and transport



TOP: Chart showing driver alerts on one bus over a week can be used to pre-warn drivers about key periods.

ABOVE: Data from the system identifies the areas of greatest risk.

INSET: The onboard technology identifies cyclists and scooter riders, prompting a driver alert.



planners to identify issues that may require greater driver awareness, individual driver training or infrastructure adaptations.

DATA FROM BRISTOL

Looking on a day-by-day and week-by-week basis provides useful information to alert the drivers - for example (and perhaps unsurprisingly) there are more incidents in July than December, but other spikes occur that correlate with key events in the year, allowing drivers to be forewarned.

But looking at shorter periods of time can also be informative (see chart). Plotting alerts over these short time periods, enables drivers to be more alert to cyclists at given times of day,

or in various weather conditions. For example, it is possible to see that in addition to the pre-9am and post-5pm spikes, there is an earlier spike (3pm) on the Friday afternoon. We can also see a spike after 11pm on Wednesday, Thursday, Friday and Saturday - which could indicate that a significant number of people are cycling home after an evening out.

One of the key issues with using accidents to inform spending decisions is that they are very rare, meaning that one or two accidents in bizarre locations would significantly skew the data. By plotting alerts, even over a short period of time, it is easy to see where cyclists and buses are more frequently coming into close proximity. The map is a plot from a



→ CycleEye unit during February 2017. It takes place on route 70 / 71 between the centre (bottom) and the University of the West of England in the north of the city. Clusters around traffic lights can be seen clearly, but also larger clusters around potentially problematic junctions - such as that between Redland and Montpellier.

SYSTEM EVOLUTION

The following are some of the key findings from driver surveys and collected data, from trials in Bristol and London.

It is important to get the alert frequency right

Drivers need to know when there is a genuine risk, but too many alerts can lead to them being ignored, which is more dangerous in the long-term. The system is tuned to alert to cyclists ‘undertaking’ the bus, but does not alert to cyclists following the bus, or those that are being overtaken to ensure alerts only occur when necessary.

The type of alert the driver receives is critical

Drivers need concise, unambiguous alerts. However, too much information acts as

a distraction. One very early-phase trial requested confirmation images for the driver alongside the audio. These images were found to be distracting to the drivers, so were abandoned.

Another important factor, is that the alert needs to be ‘human’. Drivers find beeps frustrating, easily ignored and it is not clear what information is being conveyed. After consultation with experts, the best option was found to be a spoken alert: “Cyclist left”. This gives the required clarity and brevity.

Database proved vital

An alert database was initially compiled as a test facility to help evolve the system. However, it quickly became clear that this information was also of great value to city planners. The data enables a better understanding of cyclist and pedestrian behaviours along the bus routes, including traffic flows and movements throughout the day.

Ultimately, this data allows fleet-owners to better prepare their drivers; and for planners to consider infrastructure changes.

FUTURE DEVELOPMENTS

Both Bristol City Council and First Group

have been encouraged by results, and are considering expanding the use of the CycleEye system. Other cities have also undertaken trials – including two Transport for London bus trials. In Europe, vehicle manufacturers, including Volvo, are working on projects using the technology and it is already being tested in Australia. The first units are set to be shipped across the Atlantic for trials in Canada within the next month.

On a national level, the Welsh government is running trials based on an expanded version of CycleEye with new settings to identify motorcyclists. The unit is mounted on posts beside roads, and having detected a motorcycle, active signs will alert drivers on side roads to the motorcycle approaching on the main road. It is anticipated this will result in fewer collisions. □

www.fusionproc.com



Jim Hutchinson is CEO Fusion Processing.

Advances in barrier restraint

Safety restraints have come a long way in the past 20 years. But perfection has its drawbacks, notes *Thomas Edl*, head of barrier manufacturer Delta Bloc.



In Europe, establishing regulations for construction and testing of road restraints has been complex. But the journey has been worthwhile in terms of lives saved, says Thomas Edl, managing director of Delta Bloc International, based in Vienna.

The European Commission looked at this and decided that there should be regulations to make it an even playing field for manufacturers across Europe. Hence, the adoption of CE certification EN1317, part 5, says Edl.

“It was a wake-up call for manufacturers and clients,” says Edl, who joined Delta Bloc in 2005 and has been managing director

BELOW: Focus is shifting to the transition points where one system joins another.



since 2007. He also holds a PhD in construction engineering material, specifically glass and timber, from Holzforschung Austria – the Austrian Forest Products Research Society. By his own admission, he’s a “technical person who has moved from glass and timber into concrete”.

Manufacturers such as Delta Bloc rose to the challenge created by the adoption of CE certification for in situ concrete barriers (so-called passive safety systems), several years ago. “From our point of view it was a positive move for the market. It forced manufacturers to invest in new technology. If the European Commission had not clarified this, the technology would have stayed the same for the next decade. Now there is an incentive for manufacturers to improve their product. That means only safe-proven in situ concrete barriers are used on roads. It pushes the industry to develop new systems.”

Delta Bloc is now manufacturing around 200km of CE certified concrete barriers a year and this will increase, he says. “Suddenly manufacturers were coming out with different shapes and heights and the market quickly moved on. For example, we have slipform in situ concrete barriers where the

internal reinforced steel cable is corrosion resistant and the barriers themselves have a 50-year lifespan.”

Many European local authorities and highways agencies are now looking at regulations regarding transitional barriers and how they connect to other types of barrier. What is the joint or connect like and is it a safety weak point in today’s continuous safety barrier?

Manufacturers are putting a lot of work into the physical design of connections, including simulation and real-life crash testing, and not only from a single direction, that of the anticipated vehicle impact. Germany and France have the toughest regulations for transition sections and their connections. But there is as yet no pan-European harmonisation of this process and connection. “One country requires a crash test and another country requires a simulation. It’s still a tricky situation,” says Edl.

For the past 20 years, the standard across most of Europe has been an H2 containment level for concrete central reservation crash barrier performance. This means a barrier should stop a 13tonne bus. In the first decade of those 20 years, barriers performed

better and better, many times reaching beyond H2 and sometimes nearly H3 – the ability to stop a 16tonne truck. Once that peak was achieved, manufacturers started to optimise the product by making it less expensive to make, and so to purchase.

On the one hand, that is good. But by optimising for a very specific safety requirement, in reality there was a downgrading of performance, explains Edl. Barriers still achieve H2 level, but often gone is that added margin of safety, or reserve safety, whereby in some situations the barrier might also perform better than its regulation level of H2.

“Everybody is optimising. But some local authorities believe that perfecting the H2 barrier has led to less safety on the roads.”

Edl believes that the next driver for innovation is the search

by local authorities for higher containment levels as standard along long stretches of highway. In some markets, the normal safety level might be raised from H2 to even H4b – the maximum level, a 38tonne truck - to regain that lost reserve safety. “The trend is that H4b will replace H2 as the standard barrier in the central reservation along long stretches of highway. So this is another wake-up call for manufacturers, to make H4b barriers as efficiently as we’ve been making H2 barriers.”

Delta Bloc is in the forefront, he says, and has brought down manufacturing costs for H4b barriers, allowing them to be sold in high volumes to suit clients. “We have developed new H4b barriers that will soon be on the market.” □

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CALLING TIME ON DRIVERS USING MOBILE PHONES

With the UK set to increase the penalties for using mobile phones while driving, the RAC Foundation's *Steve Gooding* considers what else can be done to combat this deadly distraction.

The first mobile phone call was made in 1973, by an engineer working for Motorola. Today 4.7 billion people across the globe subscribe to a mobile service. In the UK alone, at least two-thirds of the population now have a smartphone. The first car was, arguably, made by Carl Benz in the 1880s. Now there are well over a billion on the planet. Individually they have both contributed greatly to global connectivity, accessibility and opportunity. However, together – and it was inevitable that the twain should meet – there are complications.

Mobile phone technology potentially offers drivers great advantages: from providing directions, to giving traffic information, to facilitating the payment of tolls and parking charges. And yet the use of mobiles in vehicles also offers up the possibility of disaster. Hence the explicitness of the law: It's illegal to use a hand-held phone or similar device while driving, or riding a motorcycle. The rules are the same if you're stopped at traffic lights or queuing in traffic.

It couldn't be much clearer, and yet some people are still tempted to take their hands off the wheel to use their phone, sometimes with tragic consequences. In Great Britain (which has the fourth safest roads in the world according to the World Health Organisation (WHO)), in 2015 a driver using a mobile phone was a contributory factor in 22 fatal accidents – and that was probably an underestimate. While there might be records to prove a driver was making a call at the time of an accident, it is much harder to demonstrate whether they were scrolling through messages, looking at Facebook, checking e-mail, or composing a lengthy text at the time of a catastrophic collision. And a driver is unlikely to admit to such an action.

In most countries around the world it is illegal to use a hand-held mobile at the wheel - in the UK it became an offence in December 2003. Since then, and in response to continuing



ABOVE: A truck driver looking at his phone caused this crash which killed a mother and three children (see also www.itsinternational.com/phonecrash).

evidence of non-compliance, the penalties for doing so have increased three times, including this year, with punishment now standing at a £200 fixed penalty and six points on a licence (12 points usually results in the driver having their licence withdrawn for a period).

Naturally all those involved hope that the new penalties will make more people stop and think, but will it be enough, particularly given the low likelihood of actually being caught?

So the next question we asked was whether technology could help drivers do the right thing. We are all familiar with flight mode on our mobile phones, so why not drive-safe mode, installed as standard? Or possibly, and this is debatable, could the technology take over and deliver compliance automatically?

Ministers in the UK are keen to explore

all avenues and are reportedly meeting with representatives of the telecoms industry to discuss the options. This is a meeting and approach the RAC Foundation warmly endorses. In fact, it is a route we ourselves followed last year when we commissioned TRL (formerly the Transport Research Laboratory) to speak to telecoms companies, vehicle manufacturers and phone makers to find out what they were doing to limit the use of potentially distracting technology.

The results were not universally encouraging. The responses revealed that, in general terms, while a great deal of thought goes into the design of built-in equipment and dashboard layout, when it comes to products not specifically designed for in-car use:

- 1) 'distraction in vehicle' was not consistently considered to be a priority during the design phase;
- 2) it was largely thought to be up to the driver to make sure their use of technology in the car complied with the law;
- 3) in the absence of any legal obligation, few

companies would incorporate limitations on the use of their equipment because they felt that would put them at a commercial disadvantage; however,

4) demands for technologies such as drive-safe mode could come from fleet and safety managers, because they are more directly aware of the legal and moral duty to protect their employees and the public.

So the demand could be there. How hard would it be?

We know that the data generated by a smartphone can be used to identify whether it is travelling in a car or a train, and deduce how fast it has been travelling. It doesn't look to be beyond the grasp of clever designers to create an automatic app.

Indeed, it appears that as far back as 2008 a US patent application assigned to Apple was filed (and eventually granted) for a so-called lock-out mechanism which could – in one incarnation – curb functionality because the device is in a car. It would use motion sensors to detect if the device was travelling at above a preset speed and then use scenery analysers to determine if the 'hand-held computing device is located within a safe operating area of a vehicle based on at least one of picture data and video data.'

As far as I am aware this technology has not been applied commercially. What's more, the existence of a patent is likely to limit the ability of another company to develop and bring to market a similar product.

It might be that Apple relents and follows the example of Volvo from decades earlier. The Swedish company patented the now-ubiquitous three-point safety belt but recognising the social benefits made the design available to others without demanding a fee.

But there are two more design challenges to be tackled. The first, obviously, is that the phone might be carried by a passenger in the vehicle – a business executive taking an important call wouldn't thank their phone for cutting out mid-deal. So maybe automated cut-out isn't feasible. What about a car-safe mode that needs to be activated? The challenge then is to ensure that the right functions are disabled whilst leaving others 'live', such as satnavs. It sounds doable to me.

The first thing that should go is surely the ability to read and send texts. Previous work by the RAC Foundation showed that texting whilst driving impaired a driver more than if they were at the legal drink-drive limit. This is not entirely surprising, given that at 96km/h (60mph) even a second-long glance down at a screen will mean almost 30m (98ft)



TOP: While phones are the primary focus, the RAC Foundation also questions the widespread use of dashboard touchscreens.

ABOVE: Jaguar Land Rover has been called 'irresponsible' after an article described drivers using in-built technology to check their calendars and use other apps while on the road.

covered without attention to the road. Perhaps when the mobile phone issue first came to the lawmakers' attention they had in mind the vision of a motorist with a phone clamped to their ear chattering away. How much worse the sight of someone focused on the phone screen rather than looking ahead through the windscreen?

This leads to our second concern. While the focus on the hand-held mobile is perfectly logical, we can't help but question the wisdom of the increasingly widespread installation of dashboard touchscreens. Of course auto designers are keen to give motorists the best at-a-glance information, as well as state-of-

the-art audio systems. But touchscreens aren't tactile – drivers have to look at what the screen is displaying. Centrally mounted screens necessarily mean eyes off the road. And some require multiple 'touches' to scroll through screens, all of which takes time and attention.

So there's still work to be done to ensure our in-car systems are designed to help drivers focus on the road and not be distracted by the dashboard. Unless and until, of course, the autonomous car literally makes the whole issue of driver distraction a thing of the past. □

www.racfoundation.org



Steve Gooding is director of the Royal Automobile Club Foundation for Motoring, an independent charitable transport policy and research organisation which explores the economic, mobility, safety and environmental issues relating to roads.

GREGORY ROLLS OUT THE SAFETY ROLLER BARRIER

Gregory Industries, based in the US state of Ohio, is now the exclusive North American distributor for the Safety Roller Barrier system.



Gregory has opted to market the innovative South Korean roller barrier technology in North America, offering a novel solution for road safety. The SRB is a MASH TL-4 longitudinal barrier that works by absorbing and converting shock energy into rotational energy. Prime locations for installations are areas where vehicles are exposed to frequent accidents.

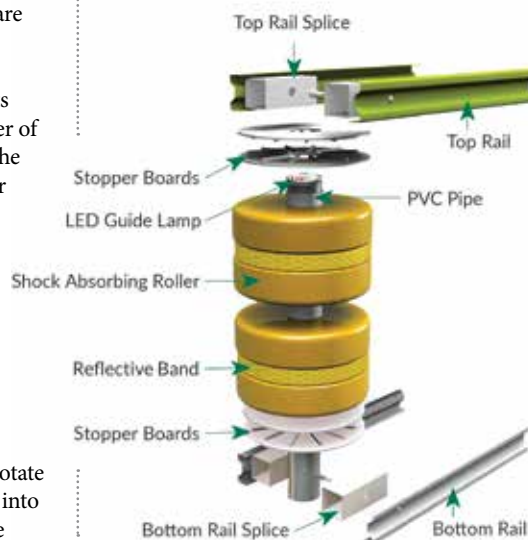
SRB is highly visible with a noticeable colour and self-luminescence which alerts drivers – especially at night - to the danger of that particular curve or stretch of road. The system can be used as a median barrier or roadside barrier.

The SRB, manufactured by the South Korean company Evolution in Traffic Innovation, consists of rotating barrels made of ethylene-vinyl acetate that are aligned within a continuous metal frame. Ethylene-vinyl acetate has better shock absorption characteristics than rubber or urethane.

Upon impact by a vehicle, the barrels rotate to convert shock energy from the vehicle into rotational energy. This propels the vehicle

forward and back onto the road instead of crashing through the barrier or becoming entangled in a destroyed barrier system.

Importantly, with upper and lower frame sections, the guardrail can handle impacts



ABOVE: Self-luminescence which alerts drivers – especially at night - to dangers.

BELOW: Rolling along; vehicle directional energy is transferred into rotational energy.

from large and small vehicles.

Gregory launched the SRB into the North American market at the 2017 ATSSA Traffic Expo in Phoenix, Arizona, in February. The company said that it is working with several states to develop pilot projects and complete installations.

Gregory Industries is the exclusive North American distributor also for the Guardian 5 (G5) – MASH TL-5 longitudinal barrier system.

The strong and flexible MASH TL-5 longitudinal barrier is designed to safely capture and redirect a fully loaded 36,290kg vehicle. The company said that the G5 is a cost-effective and safer alternative to concrete barriers and is intended for use in areas of high congestion and median cross-over accidents. □

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Ringwood is Readi

Readi for use on a site in the English county of Hertfordshire.

UK maintenance company Ringway says that it has invested in Readi Barriers to help improve the management of road closures and reduce the number of incidents with the travelling public.

Several automatic Readi Barrier systems have been trialled as an alternative way of enforcing road closures at sites in the English counties of North Yorkshire, Hertfordshire,

Cheshire West, the East Midlands and Cambridgeshire.

Ringway said that the implementation follows an incident where a member of the public drove straight through a road closure.

A system takes just two people to manoeuvre the component parts and assemble the barrier at the site entrance. The barriers can be operated remotely up to 20m away. However, a gateman

is still required on some sites to facilitate access to certain areas of the site.

Ringway said that it has found Readi Barriers far more effective than signs and cones when it comes to deterring the public. Most people approach, see the barriers and do not stop to enquire, instead they turn around and go on their way, said Richard Whitaker, Ringway's hub and programme manager.

“The feedback from our people on the North Yorkshire scheme has been very positive. Our frontline staff are well trained to deal with motorists who object to access controls, but this solution removes that flash point,” said Whitaker.

Ringway is part of Eurovia UK, a wholly owned subsidiary of Eurovia which in turn is part of VINCI.

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AUTOMATING SAFE PRACTICE

In some countries, public-private partnerships for road traffic law enforcement are helping to greatly reduce traffic fatalities. But careful implementation is essential, according to a new white paper*.

Big brother is watching you. Speed cameras are just a cash cow for local authorities. Police use them to keep their speeding ticket statistics high. The list of suspicions goes on. But there is nothing suspicious about road deaths, says Philip Wijers, chairman of the sub-committee on enforcement at the US-based International Road Federation. Speed kills and is continuing to kill at an alarming rate, despite the goodwill being shown by governments that signed up to the UN's Decade of Action for Road Safety 2011–2020 (see box on next page).

“Public-private partnerships for road traffic law enforcement systems are first and foremost about saving lives,” says Wijers, who is also director of government affairs for Sensys Gatso, a leading global supplier of automated law enforcement systems including cameras. Even if such contracts save lives, Wijers and the IRF also understand the public's concern when they see their local government and police agency partner with a private company to provide the service.

Issues of fairness and confidence in the system - as well as who gets how much traffic violation money - are paramount. This is why

the IRF recently published what it believes is the first set of best practice guidelines anywhere for implementing what is called an automated traffic enforcement public-private partnership (PPP or P3).

In most countries traffic enforcement cameras and other road safety equipment

are purchased, owned and operated by government organisations. However, the past two decades have seen a wave of private companies contracted to not only install the systems, but also run them as back-office functions for local authorities and police.

Gaining public support for this is vital.



Technology helps improve road safety.

“In particular,” says Wijers, “a crucial element is that the violation funds collected are invested back into road safety. The concept that violators are paying for road safety is, I believe, a good model. This is a most important pillar of the system.”

While the white paper sets out best practice for implementing PPPs, it does not suggest that there is a one-size-fits-all solution to reduce traffic deaths, explains Brendan Halleman, director of international programmes and advocacy at the IRF. It simply flags up issues that have been noted as very important by the many people whom the IRF consulted in putting the paper together.

Automated enforcement uses cameras to determine road speed, be it at a particular point on a road or an average speed camera calculated over a set distance between two cameras. It also covers imagery at intersections and other road junctions where drivers jumping red or amber lights cause safety issues.

It also covers speed cameras that are in vehicles travelling around, a kind of roving speed camera. Ireland is one country that is using the roving camera in marked and unmarked vehicles, either with or without a law enforcement officer inside, says Halleman. In the US, too, camera use is increasing at a rapid rate.

Many police authorities and local governments are having to make cuts and use their time more efficiently. “They are looking to cutting back on the size of their police forces and are taking a hard look at some of the process that can be outsourced,” says Halleman. “Some activities such as checking seatbelts and random checks for drugs and driving will remain under manual control. But speed management technology is now relatively mature and lends itself

well to automation.”

In many western countries, there is a more developed regard for the integrity of the police when it comes to issuing traffic violation tickets. But in other countries, this may not be the case. That is why the IRF’s white paper comes at the right moment, says Wijers.

More and more interest in automated law enforcement is being shown by countries in Latin America and Africa. Governments in these areas are possibly cash-strapped so large investment in camera systems and operating them is a concern. But there is also an issue – a big issue - about the integrity of the police. Enforcement of traffic violations has not always been done in an ethical manor, he explains. An automated system, if implemented properly, could boost public confidence in enforcement in how the police carry out traffic violation duties.

“A PPP is not an effort to do away with the police,” says Wijers. “A private party cannot issue a violation. It operates only when there is an official who has the legal right to approve a violation. The private party can only process evidence so it can be seen by the police.”

“Only after confirmation by an enforcement officer is the violation validated and then a notice of penalty sent out to the violator. It makes police forces more efficient. This automation allows the police to focus on road safety issues that cannot be automated,” says Wijers. □

**The International Road Federation is a global not-for-profit organisation based in Washington, DC, and supported by regional offices throughout the world. The White Paper “Public Private Partnerships in Traffic Safety Enforcement” is available free for download at <http://knowledge.irf.global/>*

www.sensysgatso.com
www.roadssafetysupport.co.uk

A NEW EUROPEAN ROAD SAFETY TARGET HAS BEEN SET FOR 2030

A new road safety target has been set for 2030. The European Union transport ministers have agreed to aim at halving the number of serious injuries on roads in the EU by 2030 from their 2020 level.

Ministers have endorsed the Valletta declaration aimed at improving road safety. The ministers also called on the European Commission to come forward with a new road safety strategy for the decade 2020-2030.

Antonio Avenoso, executive director of the European Transport Safety Commission (ETSC) said, “We warmly welcome today’s commitment to a long-term target to tackle

deaths and, for the first time, serious injuries on EU roads. But if the EU is serious about meeting this goal, meaningful measures are needed now. EU vehicle safety standards have not been updated since 2009 despite rapid advances in technology that can help drivers keep within speed limits and avoid collisions. Every day of delay will lead to more unnecessary deaths and serious injuries on our roads.”

During 2016, 25,500 people died on EU roads, a figure virtually unchanged in three years. In addition, the European Commission estimates that more than 135,000 suffer serious injuries/year.

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Richard Cuerden considers how many of the technologies developed as part of a move toward autonomous vehicles are already being deployed as ADAS improve road safety.

The drive to create autonomous vehicles has caused a re-evaluation of what is needed to safely navigate today's roads and the development of systems that can replace the driver in many scenarios. However, many manufacturers are not waiting for 'tomorrow' and are already incorporating these systems in their new cars as Advanced Driver Assistance Systems (ADAS) to improve road safety today.

ADAS features that aid drivers in the driving process are becoming more prevalent on the roads of Europe and elsewhere, especially as part of the drive towards creating smarter, connected, more efficient and safer transport networks. Current vehicle ADAS features are designed to help the driver with longitudinal and lateral guidance and can intervene in certain emergency scenarios to prevent collisions or to mitigate their consequences.

However, today's technologies only offer partial automated functionality and require permanent driver supervision. As more ADAS features are incorporated into cars on the

road we will learn how they react in certain scenarios, and this evidence will be part of the development process for the next generation of connected and automated vehicles. Looking towards highly automated vehicles that can drive themselves under certain conditions, there are still gaps in our knowledge and challenges, such as how an automated vehicle can safely hand control back to the driver? Will they be ready to resume control and how long will this process take? Research by many organisations, including TRL, is helping to understand these challenges and beginning to identify what standards and requirements may be necessary.

AEB – TIME TO STOP?

One system that is already becoming commonplace on Europe's roads is autonomous emergency braking (AEB), which is designed to improve safety in three ways. Firstly, AEB helps to avoid accidents by identifying critical situations early and warning the driver. Secondly, it can reduce the severity of unavoidable crashes by applying the

brakes to lower the impact speed and, in some cases, by preparing the vehicle and restraint systems for impact.

AEB systems use either sensors or cameras or a combination of these devices to identify a potential collision. The vehicle's electronics then process this information, (taking into account the knowledge of the vehicle's speed, trajectory and time to impact) to determine the best course of action: either alert the driver to act; or apply the brakes autonomously.

Current AEB technologies are not capable of identifying and reacting to all potential collision scenarios. First generation systems were primarily effective at preventing shunt impacts between vehicles while the new generation is capable of detecting stationary and moving vehicles, pedestrians and other objects. Vehicle manufacturers are increasingly

ABOVE: Volvo is one of several car companies incorporating Autonomous Emergency Braking for Pedestrians (AEB Pedestrian) in its vehicles.

incorporating the more effective AEB as ADAS, without waiting for a driverless solution.

In Europe AEB is currently only mandated for larger vehicles, such as trucks. However, the underlying technology and software are equally applicable to all sizes and types of vehicle and we hope they will become standard rather than optional on all new production vehicles within the next few years. AEB, especially pedestrian and cyclist-capable AEB, will significantly reduce the number of fatal and serious injury collisions that take place. TRL is investigating the potential costs and benefits associated with regulating this technology for passenger cars on behalf of the European Commission.

DESIGN OPPORTUNITY

Progressing towards higher levels of both autonomy and electrification presents challenges but it also offers up opportunities, particularly from a design point of view.

For example, future vehicles will feature a wide variety of new gadgets and technology

much more must be done to improve vehicle safety design for vulnerable road users, both preventing collisions and reducing the risk of injury when they do occur.

If safety is given a sufficiently high priority early enough in the design stage, then we could see large changes in safety system performance. This also raises the potential to enable radical exterior design changes, which would ensure more forgiving structures in the event of impacts with pedestrians and cyclists, without compromising vehicle user safety.

DRIVER MONITORING

It's not just the systems monitoring activity outside the vehicle that are going to prove vital, but also those looking at what the vehicle's occupants are doing, mainly the driver. For example, seat belt reminders are an essential feature on any vehicle. It may sound a little bit 'Big Brother', but the statistics show that about 30% of people who die on the road are not wearing a seat belt – and half of these people would survive if they wore seat belts on every journey. With this in mind, a simple reminder

becomes important.

Although some of these reminders could be implemented straightaway, there is arguably a need for a more sophisticated system of driver monitoring. As vehicles evolve and begin to drive themselves, at least on some journeys, there needs to be considerable work done on the process in which the vehicle passes control back to the driver.

For example, current autonomous systems in vehicles require the driver to leave their hands on the steering wheel so they are always in control of the vehicle if needed. But what systems do the vehicles need to have when we reach a level of autonomy where the driver can do other tasks, such as checking email or watching a TV show?

There needs to be a very carefully thought-out process that the vehicle goes through when preparing to hand control back to the driver: is it able to determine if the driver is fit to take back control? Have they fallen asleep? And what is the course of action if they have?

The only way to answer these questions is through extensive testing and companies are starting to take up the mantle, for example with Volvo running its Drive Me research project, along with the research we



BELOW: Driver drowsiness detection is now a standard feature in Volkswagen's Passat Alltrack.



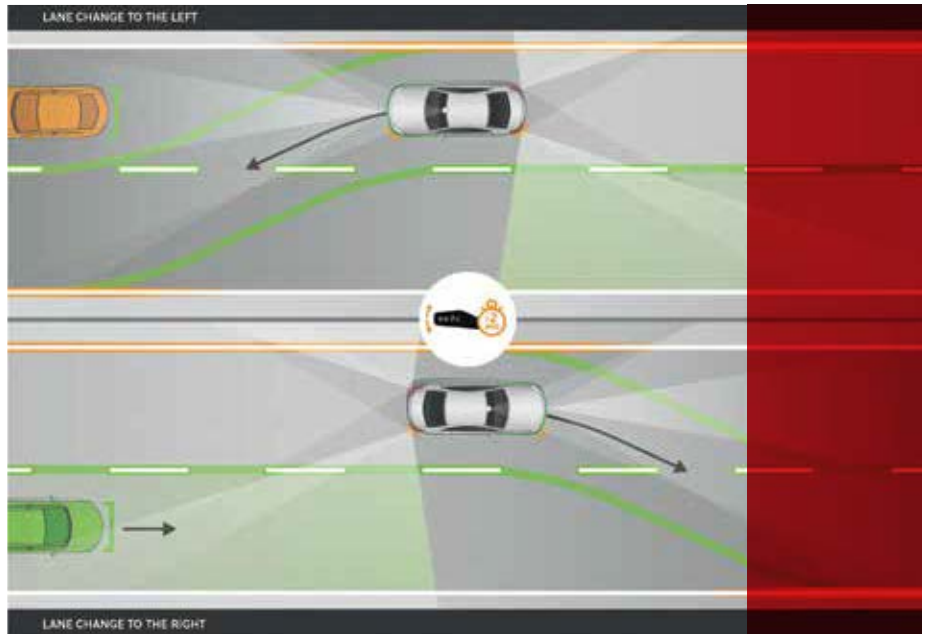
for which safety engineers will need to account. This means that screens should be manufactured to be 'impact-friendly', through utilising new technologies such as spray-on liquid crystals. Alternatively, the whole cabin will be designed to protect people from potential collision injuries. The sensors and cameras used for ADAS and connected vehicles (and to navigate autonomous vehicles) will provide collision warnings and this data can help inform and actively adapt the performance of seat belts and airbags.

The ultimate aim is to optimise vehicles in terms of impact characteristics and the specific needs of people both inside and outside of the vehicle. Other technologies, such as pre-crash, fold-away mechanisms and advanced airbag designs will be able to physically remove potential hazards, for example, dashboard-mounted screens, milliseconds before an impact.

The additional pre-collision alert data is one of many things that would improve safety for those outside of the vehicle as well as within it. Therefore, to reduce road casualties further,



RIGHT: Mercedes-Benz' radar- and camera-based Active Lane Change Assist supports the driver in changing lanes – for instance when overtaking on multi-lane roads.



→ are conducting at TRL. This work includes simulator trials and on-road programmes, including GATEway and MOVE_UK (funded by the Innovate UK initiative) and utilising TRL's Smart Mobility Living Lab (UKSMML) based in Greenwich, south-east London, to test the next generation of automated vehicle technology in real-world environments.

However, one car manufacturer, Ford, has already decided to avoid this conundrum and will not be offering Level 3 vehicles; instead it is concentrating on fully autonomous Level 4 and 5 vehicles.

INTELLIGENT SPEED ASSISTANCE

Intelligent Speed Assistance (ISA) is another piece of key technology that is gaining popularity. In essence ISA helps drivers to remain at or below the speed limit. Today's technologies use satellite navigation systems with integrated speed road map data and road sign recognition systems, where cameras 'read' road signs. This technology means that vehicles can adapt to variable speed limits as on Smart

motorways.

ISA describes a range of technologies, of which the three main forms are:

- Advisory – alert the driver to when their speed is greater than the speed limit;
- Voluntary – the driver chooses whether the system can restrict their vehicle speed and/or the speed it is restricted to; and
- Mandatory – the driver's speed selection is physically limited by the ISA system.

On behalf of the European Commission, TRL is investigating the potential costs and benefits associated with regulating each of these forms of ISA for all vehicle types. Further work in 2017 will provide policy-makers with the evidence regarding whether

regulation is a proportional and appropriate response to this life-saving technology.

Ultimately, there are many emerging opportunities within new technologies to make roads safer, and the industry, the European Commission and the UN are starting to take steps in the right direction. □

www.trl.co.uk



Richard Cuerden is the chief scientist at TRL, the independent, UK-based surface transport and mobility organisation which has worked with authorities in 145 countries.

Cameras to target dangerous drivers at level crossing

Following some excessively dangerous driving, the UK's Network Rail is installing safety cameras at Yapton level crossing in West Sussex. The cameras will be equipped with number plate recognition technology, allowing British

Transport Police to identify and prosecute motorists misusing the crossing. Yapton level crossing has seen almost daily occurrences of drivers jumping red lights, vehicles striking and weaving around barriers and

queuing over the crossing as the barriers descend. In one recent incident (pictured), a motorist drove onto the track causing 21 train cancellations and severe service disruption which cost the rail industry US\$200,000 (£160,000).

These types of cameras were first introduced on Britain's rail network in 2015 and, according to Network Rail, driver non-compliance has been reduced by as much as 90% at some crossings. www.networkrail.co.uk



VIRTUAL SAFETY APP FROM 3D REPO

3D Repo is working with contractors Balfour Beatty and Vinci and the UK roads agency Highways England to deploy a virtual reality simulation program for safety training.



Seeing is believing, and staying healthy: 3D Repo's construction site simulation

3D Repo, a spin-off from University College London, develops open-source software for building information modelling in the cloud. More than 40 different 3D file formats are decomposed and federated in the company's big data repository.

The simulated program - part of the UK's

Smart Motorway programme - is a fully immersive simulation to prevent on-site accidents by making highways construction and maintenance projects safer through improved training. It features real-world scenarios while the virtual experience gives users different perspectives of the same

potentially dangerous situation in order to develop an understanding of safe working zones.

"In order to demonstrate our understanding of our customers' needs and facilitate the collaboration between our customers and their clients, we wanted to digitally transform our approach," commented Neil Thompson.

The head of digital research at Balfour Beatty said that using a standard visual reality headset, the 3D Repo simulation provides multiple views of different scenarios. The user is immersed in a position relative to an activity, for example bank excavation, so they can examine both the worker's as well as the plant driver's visibility. The user can then position themselves where they think they are safe and switch to the plant operator's position to understand what they would see.

All this is done within the safety of an office or training room and without the need for lengthy manuals, training sessions or specialist personnel. As the scenarios are hosted online, the system can be set up easily from any location and can be deployed across numerous sites at the same time.

"Upon login, users can access all their projects remotely on the fly and without the need to create custom executables each time," said Jozef Dobos, chief executive of 3D Repo. "We also utilise existing site-specific 3D models and building information modelling (BIM) data so that custom scenarios can be created and uploaded as and when needed." □

<http://3drepo.org>

MESSAGEMAKER OFFERS GUIDE TO VEHICLE ACTIVATED SPEED (VAS) SIGNS

Vehicle activated speed signs - commonly referred to as VAS signs - are increasingly popular on roads.

They are considered as a more motorist-friendly advisory alternative to speed cameras because they reward good behaviour with positive messages.

They are low-cost, easy to install and require little

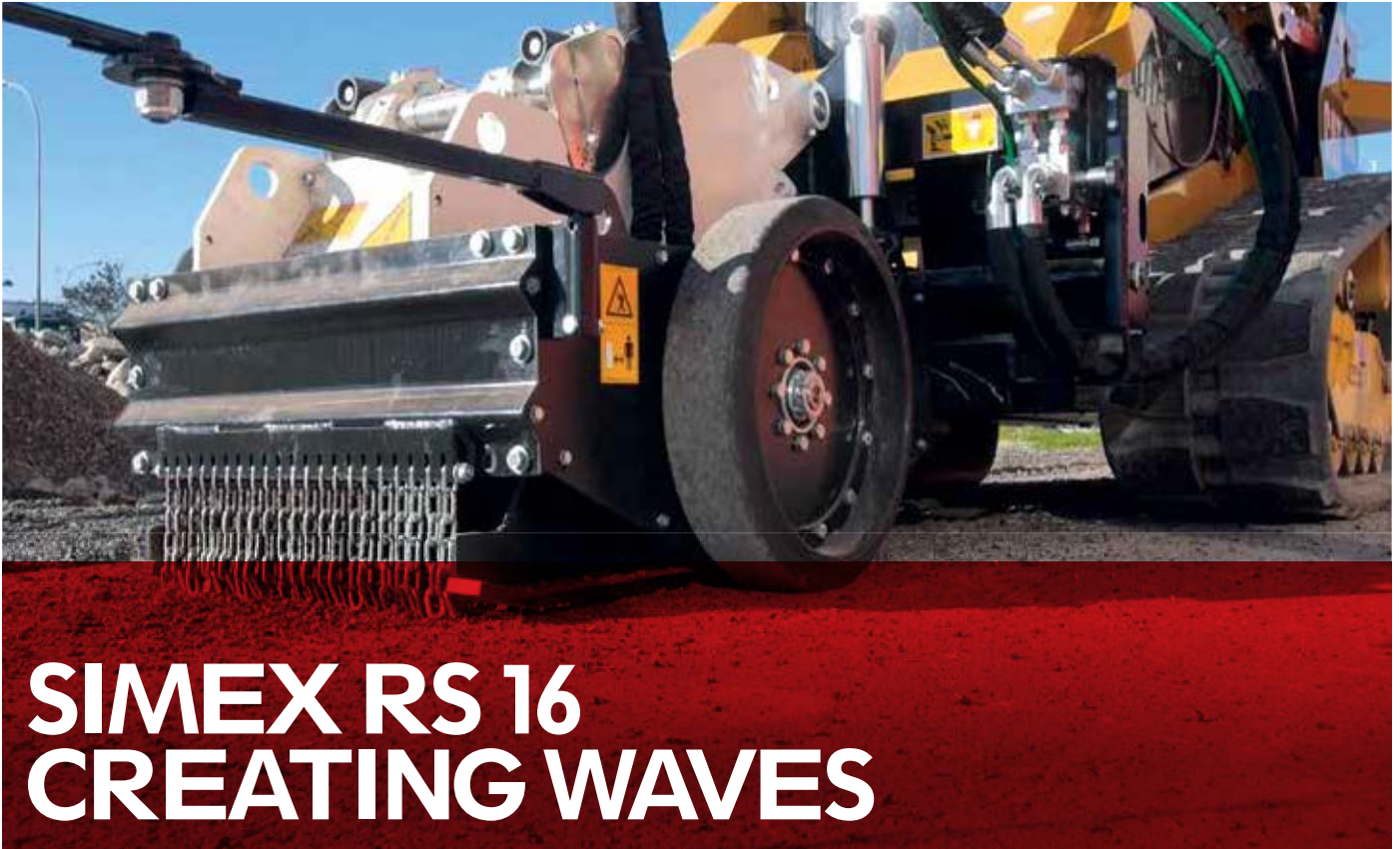
or no maintenance. The company Messagemaker notes that VAS signs are proven to reduce vehicle speeds by up to 15% and accidents on the road by up to 30%. VAS signs can also be an effective replacement for speed bumps, which may be unsuitable in certain circumstances, for example, along bus and emergency

access routes.

But VAS signs come in a bewildering array of sizes and types, making it difficult to decide which size best fits the needs of a highway and its owner.

To assist specifiers, Messagemaker has put together a downloadable guide which offers definitive information about VAS

signs, their uses and their benefits, all in one easy to understand infographic. Whether it's learning about the different types, the recommended sizes, or what power supply options they use, the infographic answers questions and offers informed choices. www.messagemaker.co.uk/traffic-signs



SIMEX RS 16 CREATING WAVES

Simex says that its new RS 16 planer for creating rumble strips is an efficient alternative to costly, specially designed machines or small manual equipment.

Rumble strips created by intermittent milling of the wearing course offer the advantage of lower production costs and a higher durability than those made using elastoplastic adhesives - laminates. Compared to adhesives, rumble strips created by surface milling also have the important advantage of being indented and not raised, a characteristic that avoids accidental removal or damage by snowplows.

The idea for the new Simex RS 16 triple-use planer for rumble strips came after studying the market in North America where rumble strips are most common.

Equidistant indentations are made by self-propelled machines or specific machinery, but for contractors this can involve a substantial outlay of resources versus the amount of use to be had from the equipment. In some cases, these costly and often large machines can be used only to create rumble strips and not to perform regular milling or removal of surface markings. For that, a

contractor often must buy three pieces of equipment.

In search of a solution, Simex united three applications in one triple-use attachment which can be mounted on compact loaders or small front end loaders, either articulated or rigid. The full attachment consists of a planer fitted with a special enclosed support at front.

The system, by maintaining constant contact with the ground, allows the distance between the milled strips to be consistent, regardless of the advancement speed of the prime mover.

When intermittent milling is no longer necessary and the planer has to work in continuous mode, the front support is simply removed. By adjusting the width of the drum and modifying the mechanism that sets the

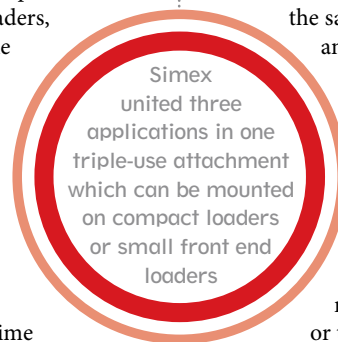
distance between the strips, rumble strips can be milled to a depth and with variable spacing according to regulations in the countries where the equipment is to be used.

When used as a planer, the RS 16 has the same features as the PL 40.15, and as a result permits milling widths of up to 400mm and depths up to 150mm.

Similar to all SPL range planers, when fitted with appropriate teeth, the RS 16 can mill either asphalt or concrete pavement. It can also be quickly adapted to remove road surface markings or to level out roughness of the pavement.

With simple procedures, the drum can be replaced - the same drum being used in the previous two functions - with a multi-tooth drum for added versatility. □

www.simex.it/en-gb/home-en





GETTING TO GRIPS WITH TRIBAL ROAD CRASHES

David Crawford looks at a new initiative to deal with high crash and fatality rates on America's tribal roads.

According to the US Centers for Disease Control and Prevention, on average two members of the country's indigenous communities - American Indians or Alaskan Natives (AI/AN) - die every day in motor vehicle crashes. This represents a far higher percentage than that of the country's general population. Historically, the US states with the worst records are Wyoming, South Dakota, Montana, North Dakota and Arizona.

Over the three decades to 2014, numbers of fatal crashes on Native Indian reservations rose sharply compared with national trends. Both US federal agencies and tribal transportation leaders agreed that the issue had become critical, but were hampered by the paucity of research findings to support strategic policymaking and justify the necessary investments.

Among those that have responded to the need is a long-running partnership between mapping and spatial analytics specialist Esri, the Geographic Information Systems (GIS) Laboratory at Claremont Graduate University in California and the University of Minnesota's Roadway Safety Institute (RSI). These three are focusing on using GIS and mapping technologies to deliver much-needed improvements in the collection and use of traffic injury data in and around tribal areas.

Another initiative is the Tribal Road Safety Project at the University of Berkeley, California's Safe Transportation Research and Education Center (SafeTREC). Work to date has identified the need for the closer examination of the causes of road-departure collisions, one of the most frequent crash types occurring on and around tribal lands.

Claremont's Professor Tom Horan told ITS International: "The annual number of tribal

road deaths is fairly low, so it can be hard to ascertain consistent patterns. However, broadening the scope to include severe crashes as well allows for more robust analyses.

"We have used GIS to help quantitatively in analysing 'hot' and 'cold' accident spots; and qualitatively in telling the safety narrative through 'story maps'. Our interest is in extending GIS capability to improve the efficiency and effectiveness of data analysis throughout the tribal safety planning and implementation process.

"Smaller tribal regions have limited staff capacity to spend time in learning about, and using, GIS for increasing traffic safety. Part of our work has therefore involved creating templates that they can use to manage their own data more easily."

Many tribes, he continued, are deploying GIS not just for transportation, but also for wider management functions, such as land use. "Multiple use is important."

Speaking at the RSI in November 2016, SafeTREC co-director Professor David Ragland highlighted current work, in conjunction with the US National Indian Justice Center, on a new tribal road safety tool. This will enable the area-specific analysis of data derived from sources such as California's statewide integrated traffic records system as the basis for clearly identifying traffic collisions in tribal locations.

It will also establish the scope for incorporating data from other sources. These could include tribal areas' own law enforcement agencies (out of California's 110 tribes, 33 have police departments), first responders and emergency management services.

One issue has proved to be jurisdictional as

the integrated traffic records system lacks the necessary codings for locating events on roads owned by tribes, unlike the roads owned by other public agencies. In response, SafeTREC has developed an approach to identifying collisions on tribal areas by first geocoding them and then overlaying each with a tribal area shapefile (an Esri-developed geospatial vector data format for geographic information system software).

Another factor to emerge is that it can take twice as long for the emergency services to deliver the victims of crashes in tribal areas to their nearest trauma centres, which has highlighted the need for better communications and despatch systems.

Looking further ahead, Ragland is considering the feasibility of developing a dedicated version of a strategic highway safety plan for use on tribal road networks. Under the US' Federal Highway Safety Improvement Program, a strategic highway safety plan is a required state instrument which aims to secure substantial reductions in traffic deaths and serious injuries on public roads through implementing infrastructure-based upgrades. □

www.esri.com

www.roadwaysafety.umn.edu

<http://safetrec.berkeley.edu>

<http://iswitrs.chp.ca.gov>



David Crawford has spent 20 years writing about and researching ITS and is a Contributing Editor to ITS International.



BELOW: A model of the Stockholm Bypass tunnel interior.

TACKLING TUNNEL TRAUMA

David Crawford reviews the latest safety systems installed in European tunnels.

Blueprints for the safer road tunnels of the future are emerging fast as European operators invest in technologies to enhance travellers' prospects of surviving an accident. Central to modern emergency planning is the principle that, following an incident, drivers should be enabled to rescue themselves and their passengers with the aid of prompt and correct identification and communication of the hazard.

Roles for cooperative ITS (C-ITS) are highlighted in a set of detailed recommendations from Swedish research institute Rise, which was co-financed by Trafikverket (the Swedish Road Administration) and the EU's Trans-European Transport Network (TEN-T) programme. Rise sees its work as a prime contributor to the safety planning for the new 21km, north-south Stockholm Bypass route, some 17km of which will run below ground. After years of planning, construction is now under way at the southern end of the alignment.

Due for completion in 2024, the €2.54bn (US\$2.84bn) link will be one of the world's longest road tunnels, carrying up to 140,000 vehicles a day around the west of the fast-growing Swedish capital. The result has been growing pressure on the city's existing eastern bypass route, which is now carrying twice the volume of traffic for which it was designed.

The Swedish capital is built on 14 islands, which are connected by 57 bridges and have historically made north-south travel arduous.

The new link will pass at three points under Lake Mälaren, the country's third largest freshwater expanse.

Having analysed the project, Rise has identified ways of better communicating critical data both from and to road users, who – it stresses – may differ substantially in their informational needs and reactions. Multisensory alerts, for example, will be needed to keep the hard of hearing fully informed.

Stressing the importance of accurate incident location for both operators and users, Rise envisages remedying the lack of available GPS signals with the results of 'promising developments' in wireless and future cellular networks.

It sees much of the overall communications development needed centring on the scope of the 802.11p approved amendment to the US IEEE's 802.11 standard, added to cover V2I and V2V wireless access and data exchange in traffic environments and to support ITS applications. The amendment is also the basis of the European ETSI ITS-G5 standard. Rise assumes that smartphones and similar devices will, as their adherents grow in numbers, be among the 'natural choices' for the human/machine interfaces for conveying emergency information in wired-up tunnels by 2024.

As an additional resource in emergencies, it calls for the investigation of potential roles for professional drivers – of trucks, buses and taxis – in supporting rescue teams and helping less skilled or vulnerable road users, with appropriate modules being built into

training. In an emergency, these professionals would receive instructions via in-vehicle or nomadic devices – for example, to block other traffic or direct people to the nearest emergency exit. In turn, trapped road users would be alerted to their presence.

For the benefit of bus drivers and their passengers, who tend to feel uneasy when travelling through long tunnels, Rise recommends installing dynamic bus lanes. It notes the 'innovative approach' of the intermittent lane, divided into sections where the status can be changed in response to demand in order to minimise the impact on general traffic.

In one version, private vehicles already travelling in a section when it was switched, would be able to continue. In another, trialled in a recent Portuguese research project, private vehicles have to exit the lane as soon as its status is changed – necessitating reliable vehicle identification and V2I links, including those needed to ensure correct information on, for example, variable message signs. The system could also accommodate trucks carrying hazardous loads.

Trafikverket project manager Leif Eklöf told ITS International that tendering documentation for the procurement of the technical installations currently being specified is due for issue this year.

AUSTRIAN ACOUSTICS

Austrian motorway operator Asfinag, is the first in Europe to begin equipping its tunnels with a new acoustic situation-monitoring

service, called Akut. Developed by Graz-HQ'd technology innovator Joanneum Research, Akut is designed to overcome normal background acoustic conditions, which are characterised by a continuous mix of noise from engines, the rolling of tyres on pavements and the airflows created by traffic.

The machine-learning core of the system models these as the baseline for detecting deviations – vehicles colliding with each other or with the tunnel structure, tyres squealing and bursting, horns, doors banging or stressed voices – as picked up by microphones. These are installed at 100m-150m intervals, on tunnel walls or the connection boxes supplying power to co-located video cameras.

The boxes are also equipped to amplify the abnormal sounds and convert them into digital audio signals, for transmission via optical fibre or copper cable to a control centre. An analysis computer then classifies them into pre-determined categories - taking advantage of the fact that each serious incident typically generates its own characteristic auditory footprint - and triggers an alarm in less than a second.

Audio alerts are normally accompanied by the display of real-time video images captured by the activation of the nearest camera to the incident. The system integrates the outputs to enable a decision on the most effective response in terms of aid to victims and warnings to approaching motorists.

If, however, visibility at the accident site is poor - perhaps because of smoke - control centre staff can still gain useful information on what is happening, Akut developer Dr Franz Graf told ITS International: "They can use the output from the nearest microphone. They can hear if there are people still at the site, and if rescue teams are already present. If there is a fire, they can trace its progress by the sounds of vehicle tyres bursting."

They can also hold conversations with stranded travellers, talking to them via public address systems (most major tunnels have now installed versions designed for greater intelligibility) or vehicle radios, which operators typically advise drivers to tune into during tunnel transits. Staff can pick up people's questions via the microphones and broadcast answers that will guide and reassure them.

The system will also automatically activate tunnel stop lights and warn several minutes-worth of oncoming traffic from entering. The analysis computer is connected to a ring buffer, which stores the data from all the microphones for a defined period for future

examination.

The microphones are manufactured for resistance to dirt, corrosion and the effects of tunnel jet washing. Asfinag expects to have equipped 56 tunnels across its 2183km network by 2022.

Outside Austria, Joanneum Research is working with Highways England in the UK, which has already identified its first tunnel for upgrading, and is in discussions with operators in China, Denmark and Norway.

MONT BLANC

Logos is the new €4 million (US\$4.8 million) centralised technical management system for security equipment installed in the 11.6km single-bore, two-lane Mont Blanc Tunnel. Built to hold 36 times more information than its predecessor, Logos went live in January 2017 and enables high-speed, automatic analysis of up to 36,000 outputs of continuously generated data. This information comes from an array of 11,000 detectors (including cameras and sensors) whose output it integrates to organise incident response and speed evacuations.

Designed to enable a team of 22 operators,

working in shifts around the clock, to react more effectively to incidents, Logos also supports the automated functioning of lighting, ventilation, entrance barrier control and surveillance equipment. It stores operational and maintenance records for post-incident analysis. In its deployed version, Logos encapsulates the outcome of over a million tests, including full-scale trials held under realistic conditions during 25 night-time closures. Its installation represents the latest in a series of security upgrades following Mont Blanc's disastrous fire in March 1999 which gutted the tunnel and led to its closure for three years.

This fire, and subsequent incidents, laid the foundations of the 2004 EU directive on road tunnel safety, under which all EU member states are required to have met minimum standards for subterranean sections of the TEN-T by April 2019. The European Tunnel Assessment Programme (EuroTAP) evaluates compliance, with ITS applications accounting for over half the points in its scoring method. □

www.traffikverket.se

www.ri.se

www.joanneum.at



David Crawford has spent 20 years writing about and researching ITS and is a Contributing Editor to ITS International.

LEFT: Stockholm's new tunnel has to burrow under water as well as land. **BELOW:** An Akut installation, showing the microphone, connection box and video camera.





MARIETTA GETS CONNECTED WITH SMARTPHONE APP

Must the benefits of connected vehicle technology wait for a generation of new or retrofitted vehicles? The US city of Marietta is about to find out.

Can connected vehicle functionality be delivered via a smartphone? Well, in Marietta, Georgia, they are about to answer that question. The city is testing a smartphone app which warns motorists of nearby cyclists and pedestrians, approaching first responders, wrong-way driving, entering active school zones and much more.

Based on Applied Information's Glance TravelSafely smartphone application and deployed by ITS installation specialist Temple, the app connects all the city's 120 traffic signals, first responders' vehicles, school beacons and anonymous smartphones into a network to improve both safety and traffic flow. Essentially, the TravelSafely app is designed to make drivers, cyclists and pedestrians more visible to each other, improve traffic flow by optimising traffic signal timing and clear the path ahead of emergency vehicles in order to reduce response times.

Anyone driving, cycling or walking in

the city can download the free app, which automatically works in the city's 60km² (23 square mile) area. Once on the users' phone, the app runs in the background and automatically detects if the person is a

ABOVE: Pedestrians, cyclists and drivers are warned of approaching emergency vehicles.

BELOW: Speed to green information does not rely on knowing the vehicle's route.



motorist, cyclist or pedestrian based on their movement. TravelSafely will also provide alerts even if any other app is being used (such as social media or for navigation). It is possible to set the app to display visual alerts and countdown timers on the screen.

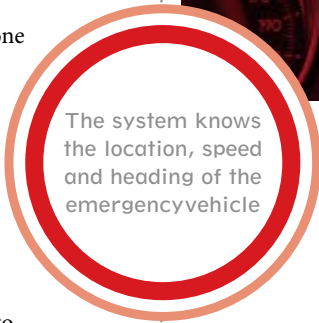
The app can also interface directly with a vehicle's onboard unit (OBU) using Bluetooth to provide the alerts via the smartphone display. External communication can use both Dedicated Short Range Communication (DSRC) equipment (where fitted) or the cellular network and means deployment of the technology does not have to wait for DSRC to be deployed in all vehicles. It is triggered by whichever message arrives first.

When in use, each smartphone sends out a basic, or personal, safety message that is received by the phones of all vehicles, pedestrians and cyclists in the vicinity. In addition, the app also receives and sends information from and to the infrastructure including traffic signal controllers (time to green and red light running), school beacons (speeding in an active school zone), work zones (speeding in work zones) and pedestrian crossings (active pedestrian crossing ahead). Other warnings cover emergency vehicles (including direction of approach), poor weather (icy road conditions), wrong-way driving and impending rear-end collision.

To include traffic lights in the system, the roadside controllers are fitted with a remote subscriber unit which receives the signal phase and timing (SpaT) messages from the controller via an Ethernet connection. This message is then processed and sent out in the J2735 standard over the cellular network and/or DSRC radios to provide time to green information. Drivers will also be warned if they are about to run a red light, notified when they are in a school zone, when the beacons are active, and be given a warning if they exceed the school zone speed limit.

Furthermore, 'virtual loop' detection information about the vehicle's position is sent via the Ethernet interface to the traffic controllers (or via an input/output card in the cabinet used to connect sensors). This information can feed into an adaptive or actuated traffic control system to help provide users with a higher proportion of green lights.

This last feature is extended in the use of



ABOVE: Communications between the cyclist's and driver's phones determine if they are on a collision course and sound an alert.

an emergency vehicle prioritisation system which utilises the same remote subscriber unit and uses 'over-the-air' software updates to enable existing pre-emption and traffic signal monitoring installations to perform the additional functions. So, in Marietta, first responders' vehicles will automatically be given green lights at intersections to provide a safer route and shorten response times. Other TravelSafely users, be they drivers, cyclists or pedestrians ahead of the first responder's vehicle, are warned of its approach and direction of travel.

To receive incoming signal from OBU equipped vehicles, a DSRC unit must be connected to the remote subscriber unit in the cabinet. While DSRC has a theoretical range of around 300m (1,000ft), in practice this is normally shorter due to line of sight issues. As the system simultaneously transmits over the cellular/4G network, users out of DSRC range will still receive all relevant safety messages. All messages transmitted over the cellular/4G network are effectively geofenced (as happens with the routing system for telephone calls) and are only transmitted to phones located in the immediate area of interest.

"You only get messages for the lights

immediately in front of you," explains Applied Information's president Bryan Mulligan. He adds that current experience is that the 4G/cellular communication is working with end-to-end latency of about 300ms which is not noticeable on time to green style services.

Warnings are delivered to drivers, cyclists and pedestrians via their cell phones 10 seconds in advance of the predicted collision, which allows them time to take precautions and, if necessary, avoiding action. In the case of impending tail-end crashes, the signals from both drivers' phones are received by the other driver's device and if an impact is likely the driver at the back will receive a 10-second warning but (currently) not the one in front. "We know what the driver at the back needs to do to avoid a crash but what is the one at the front supposed to do? So we don't give them a warning," he reasons.

Similar methodology is used to warn drivers of the imminent approach of an emergency vehicle and from which direction. "The system knows the location, speed and heading of the emergency vehicle, so it can determine where that vehicle will be in 10 seconds and can transmit an alert to users in that area," says Mulligan. He then adds

that in using the '10 second' method, it is not necessary for the system to be informed of the route the emergency vehicle will be taking.

The application will also detect if a user's vehicle is on-course to hit other TravelSafely connected road users such as a cyclist or pedestrian and, if so, provides an alert to both parties (as both can take avoiding action). By using 'impact imminent' triggering, drivers will not be inundated with unnecessary warning messages caused by cyclists in a dedicated lane running alongside the road. Warning messages are also graded so if a likely collision is detected where there is a relatively high closing speed, a loud audible alert will be sounded whereas at low speed the warning is less dramatic.

An anticipated application of connected vehicle technology is to improve work zones safety and TravelSafely achieves this using

GPS-enabled solar powered mobile beacons at the start and end of the construction site. This provides coverage and connectivity in the area between the two beacons. Once the speed limit is programmed into the beacons, drivers entering the work zone will see the speed limit displayed on their mobile phone and receive a warning if they exceed that limit by more than 5mph (8km/h).

Curve ahead warnings can be achieved with a single beacon using the same technology. Currently Marietta is geo-fenced, so once the mobile device is outside that area the app automatically turns off and will 'wake-up' again on re-entering the city. As connected vehicle technology becomes more widespread, Mulligan expects standards will be introduced to enable interoperability and allow the use of such devices across the country and over-the-air updates mean existing users benefit from new and updated

functions as they are introduced.

Running the app in the background does use additional battery power which can be a problem for cyclists and pedestrians (as the phone is not connected to the vehicle's power supply). However, Mulligan points out that illuminating the phone's screen is usually the biggest drain on the battery and this can be turned off while allowing the app to continue functioning. Individuals can also choose to turn off the warnings while leaving the system actively transmitting.

"There are hundreds of millions of smartphones out there and we can do something about road safety today without waiting for a new generation of connected vehicles," Mulligan concludes.

The people of Marietta will be among the first to know if he is right. □

www.appinfoinc.com

www.temple-inc.com

Philips Lighting for London upgrade

UK engineering firm McCann has won a €7.5 million contract to replace and maintain street lighting in London's second largest borough, Hillingdon.

McCann is upgrading around 23,000 lanterns to LED and will maintain 25,000 assets over five years. The firm, based in the city of Nottingham, said it recruited 10 people and invested nearly €575,000 in equipment in order to deliver the contract.

McCann recently completed a similar project on budget and ahead of schedule for North East Lincolnshire Council in eastern England.

"We couldn't have wished for a better start to our 50th year in business," said McCann contract manager, Steve Ellis.

Street lighting is rapidly being brought into the Internet of Things (IoT). New systems promise considerable savings of up to 60% because of LED and up to 80% with systems in place. Out-of-order street lights are repaired faster than previously – or even replaced before they fail with preventative maintenance.

Philips Lighting has

been operating at the interface of lighting and IoT for several years, with more than 700 projects in 36 countries, according to the Dutch firm. Its CityTouch product is a web-based end-to-end street lighting management system. It enables remote and workflow management of individual or group of lights.

CityTouch connects each individual street light via the existing cellular network,

allowing the street lighting department to manage the lights remotely. During installation, the CityTouch Ready luminaire automatically connects to the system once installed like any other conventional luminaire. That commissioning process takes a few minutes and the operator can easily be connected to the luminaire and can start operating.



Philips Lighting sheds light on London.

*Simply better lighting for Schallberg
on Switzerland's Simplon Pass.*

TRIDONIC LIGHTS UP THE SCHALLBERG TUNNEL

From Europe to the US, improvements continue for lighting and air quality in tunnels.

The Schallberg tunnel on Switzerland's Simplon Pass is now a much brighter place thanks to LED components from Tridonic.

The 45km Simplon Pass between Brig and Iselle is one of the most important transit routes in the Swiss Alps. On average, around 2,500 vehicles a day use this Swiss national highway which is open all year round. The route features numerous tunnels, galleries and bridges, most of which have been in operation since the 1960s.

The Swiss Federal Roads Office, ASTRA, invests around €28 million euros each year on maintenance and optimisation measures at Simplon Pass, especially in the area of safety, and has completed numerous projects on this route in the past few years. One such project is a two-and-a-half-year extensive renovation of the 500m Schallberg Tunnel that transformed the old dark 1970s structure into a modern tunnel packed with state-of-the-art technology.

Renovation of the Schallberg tunnel, at the start of the pass and close to Brig, could not be delayed any longer in view of its advanced age. "This was a complete renovation job, involving all the tunnel elements," said Mark Siegenthaler from ASTRA.

"Among other things, we repaired the two galleries, built a new escape tunnel, lowered the road in some places to provide adequate clearance for trucks and put down a new road surface". Also renewed were the operational and safety equipment, the ventilation system, the power supply, the control system and the lighting.

The Schallberg tunnel now has 100 transition-zone luminaires and 150 interior-zone luminaires from Swiss tunnel lighting

specialist, Rigamonti. In combination with the white reflective tunnel walls a pleasant atmosphere is produced. The inner workings of the luminaires come from Tridoni, which also supplies emergency lights on the walls, escape route lights and indicators and escape exit signs which are all equipped with LED components from Tridonic.

The transition zone luminaires in the entrance and exit zones feature new LED modules based on the high-efficiency RLE series and developed specifically for tunnel lighting in accordance with specifications supplied by Rigamonti. Entrances to and exits from tunnels are high-risk areas for accidents because the lighting conditions change so abruptly. The risk can be reduced, however, with the right artificial lighting.

Each of the transition zone luminaires contains two LED modules. They are supplied with an operating current of 350mA, draw 112W of power and generate a luminous flux of 18,350lm. Only the last three luminaires in the transition zone are equipped with only one LED module, providing a gentle transition to the interior zone. A striking feature of the luminaire housing is its low-profile design, made possible by LED technology. The luminaires are 1,550mm long and 170mm wide but only 40mm deep.

For lighting in the interior zone new customised LED modules were developed on the basis of LLE modules, with five being accommodated in each luminaire. At an operating current of 300mA, the interior-zone luminaires need 38.25W and provide 6,365lm. With an emission angle of 120° and a light colour of 6,500K, they and the transition zone luminaires together generate the recommended

average carriageway luminances of 45cd/m² in the entrance zone and 3cd/m² in the interior of the tunnel.

Drivers from the Premium series ensure optimum operating conditions for the LEDs. The 1-100% dimmable constant-current LED drivers feature adjustable output currents and have integrated over-temperature, short-circuit and overload protection.

The one4all interface provides superior dimming performance via DALI, DSI, switchDIM and corridorFUNCTION and also has the ready2mains digital interface. While the transition zone luminaires have one driver per LED board, the tunnel interior luminaires need only one driver per luminaire.

The new LED solution from Rigamonti for the Schallberg tunnel is a high-performance lighting system that offers a high level of visual comfort and has a positive effect on the sense of safety among vehicle drivers. The system ensures compliance with the current standards of the Swiss Engineers and Architects Association (SIA) and will lead to a noticeable reduction in energy consumption and maintenance costs, according to Tridonic.

For example, the LED inserts can be replaced without the need for any tools. Long life is another benefit, according to Tridonic which specifies a life of up to 100,000 hours for the components. This translates into more than 11 years of continuous operation for the interior zone luminaires.

Tridonic is the technology company within the Zumtobel Group and has its headquarters in Dornbirn, Austria. The company operates in more than 50 countries and in 2015/16 had sales of €410.4 million. □

www.tridonic.com



PICKING UP ON SAFETY

A cone collection system to further isolate workers from traffic and improved worksite lighting are among the latest safety and demarcation products.

X-Cone is a new traffic cone management system offering a higher level of safety for workers and maximum efficiency for contractors.

Austrian-made X-Cone is a truck-mounted system that can manage the setting out and collection of cones from the flatbed of any 3.5tonne vehicle. It does not matter if the cones are straight or laying on the road, the X-cone can still manage the work quickly, safely and reliably, according to the manufacturer.

For setting out standard cones, the driver can decide the distance between cones by using a simple screen on the LCD display of a wireless remote control. The X-Cone has a long life expectancy. It's stainless steel and aluminium lightweight construction make it extremely durable with minimum maintenance requirements.

Once installed on the flatbed of the service vehicle this multifunctional system is fully automatic and works unaffected by weather or temperature conditions. The design makes it fully flexible for use on the right or left side of the road and in either traffic flow direction.

The X-Cone is extremely versatile and is able to set out or collect cones ranging from 600-800mm in height. Because it collects or deposits cones quickly – without putting workers' safety at risk – the unit is suitable for longer work zones.

The X-Cone has been designed for a



one-man operation. After set-up a single worker can operate the system at a speed of about 6kph. X-Cone systems are working in the Austrian city of Graz and in the Czech Republic capital Prague, as well as Ljubljana in Slovenia and Munich in Germany. Machines have also recently been shipped to Tokyo and Bangkok. Machines are sold through distributors to local highway administration and highway maintenance companies.

The company is also working on projects in Singapore, Denmark and Netherlands. It says that it always sends engineers for product installation of the first machine as well as product training to customers.

LIGHTING UP

The hazards faced by workers in any country are many when operating in demanding situations such as on busy motorways, anywhere at night-time and in poor weather. To this end, Woodway Engineering, an emergency services provider, and Acklea, a traffic management vehicle specialist, have developed an illumination system to help

ABOVE: Business is picking up for Austrian traffic safety firm Franz Janschitz. **LEFT:** The Acklea mast can be extended to 2.5m above the fixed base.



LEFT: Going mobile - Acklea's portable lighting system on the road.
BELOW: The CPLB2 covers around 3,000m² with a diameter of 61m.

protect vulnerable roadside workers.

The mast and lighting system – that has the approval of Highways England in the UK - is designed to illuminate the operator's entire working area.

The mast can be extended to a height of 2.5m above the fixed base and is equipped with efficient LED flood and spot lights giving up to 32,000 lumens of light output.

The operator can also pan and tilt the lighthoods in any direction with a handset operated from either inside or outside the cab. In addition, a handbrake release system has been designed to prevent the vehicle accidentally being driven away with the mast fully extended.

This mast solution has already been fitted to 14 vehicles and more installations will follow, said Andy Dougan, sales and marketing manager for Acklea.

Acklea, founded in 2003, designs and builds traffic management vehicle equipment with an emphasis on operator safety, high performance and ease of use. Last November, specialist vehicle hire and management company SHB Hire acquired Acklea, based in the southern English county of Wiltshire.

Acklea and SHB were at this year's Traffex exhibition in Birmingham, UK, where they showcased their 18tonne traffic management trucks which feature the Scorpion Crash Cushion, tested at 112kph. The truck, designed and built by SHB's and Acklea's fabrication teams, will be alongside Acklea's 72tonne Iveco Daily traffic management trucks that has been designed with a plastic body for lightness.

Woodway Engineering supplies automotive emergency warning systems and vehicular



mounted mast systems for many markets, including those of the police, fire and ambulance services. Products include LED lighthoods, lightbars, beacons and scene lighting.

CHICAGO LIGHTS

Chicago Pneumatic has introduced its new series of electrically-powered light towers that are available in both metal and LED versions.

The CPLB2 light towers come with a choice

of high-quality bulbs to enhance visibility, with wheels for ease of movement and a robust canopy. The mobile on-site tower lights plug into any power source, such as a standard outlet and a generator.

The CPLB2 LED joins three other models in the Chicago Pneumatic portfolio: the CPLT V15 LED, CPLB6 LED and CPLT H6 LED. The company says that all the lights are suitable for construction and mining sites as well as outdoor events.

They feature heavy-duty build up and high protection index (IP 67). Its four high-efficiency fLED lamps give an average coverage of 3,000m² with a diameter of 61m - allowing 10luxes. The 7m-long mast requires height to achieve maximum light coverage and the tower's manual lifting system is ideal for this, according to the manufacturer.

Easy service and transportability have also been factored into the design of the new light tower. Its compact frame allows up to 32 units to be transported on a single truck and offers simple access points for maintenance work.

Up to four CPLB2 LED light towers can be connected together and powered by one of Chicago Pneumatic's newly launched single portable inverters.

HELP IS AT HAND

Recent trials by a UK contractor of onsite emergency alerts has resulted in an order for 450 units of the Skyguard lone-worker device.

UK contractor Ringwood said it has been investigating ways to protect and aid their lone onsite workers, particularly in the case of a medical emergency. The company decided to purchase several hundred and has rolled

them out across its highways service business. Workers in other sectors may also get them.

The Skyguard device is connected to a worker through the Skyguard portal which holds information about the user, including any medical conditions.

There are two functions on the device to raise an alarm, one being the SOS button which connects to the Skyguard internal call centre within 30 seconds. The other is the man-down function which raises an automatic alarm to the Skyguard call centre if the device suffers a sudden impact.

If the alarm is activated the call centre will attempt to make verbal communication with the user through the device to check if they require the emergency services. No call will be closed until the call centre ensures the user is OK. If no contact can be made with the user Skyguard will mobilise a response using their in-house security team to attend the location.

The device includes a tracker which would allow any response team to locate a distressed or potentially distressed worker.

Ringwood says that Skyguard has more than proven its worth on a number of occasions, even during trials. The device had to be used



Founded in 2000, Skyguard offers a range of personal safety devices linked to its own UK-based, 24/7 Incident Management Centre

Help is at hand with the press of a button on the Skyguard personal device.

for medical assistance, alerting the emergency services who attended the injured party within seven minutes of activating the unit.

Another incident occurred when a winter

maintenance spreader vehicle hit a patch of black ice causing it to leave the carriageway, falling onto its side.

Although the driver wasn't seriously injured, he was wearing his Skyguard device and pressed the SOS button. He could speak to the Skyguard team through the device while waiting for the ambulance which was onsite 10 minutes after the incident occurred.

Founded in 2000, Skyguard offers a range of personal safety devices linked to its own UK-based, 24/7 Incident Management Centre certified to the UK's highest lone working industry standards - BS 8484:2016, BS 5979 Category 2 and Secured by Design. The Skyguard lone worker alarms incorporate GSM 2-way audio as well as GPS technology so that the wearer's precise location is known. □

- www.acklea.com
- www.woodwayengineering.co.uk
- www.cp.com
- www.skyguard.co.uk
- www.janschitz-gmbh.at
- www.traffic-safety-services.com

Amey trials biometric safety devices

UK contractor Amey said it has successfully conducted trials of wearable biometric and location device safety technology that could reduce risks to drivers and lone workers.

The technology was provided by Fujitsu. It includes a collar drowsiness detector and ear clip measuring changes in blood flow which are indicators of attention loss and an initial sign of fatigue. The small units detect when the body is under stress and help workers raise instant alarms at the touch of a button.

A rugged band worn around the wrist monitors vital signs and environmental factors. This alerts employees to signs of heat stress. It also provides other valuable information, such as a sudden change in posture indicating a trip or fall, and the wearer's exertion level.

Finally, a location badge can be activated by the wearer to send an alert allowing help to be dispatched far more quickly and accurately in the

event of a threat or injury.

Amey - part of the Ferrovial Group - is looking to evaluate other safety devices and suppliers of similar products, said Mike Kehoe, Amey's principal engineer for intelligent transport systems.

"Our eight-week trial on Highways England's North East Regional Technology Maintenance Contract really put the technology through its paces. Every member of staff on that contract drives a vehicle and can be out at any time of the day or night, in all weathers or in locations like embankments and next to live traffic.

"We found that the tech is transferable to other situations and could potentially provide a wealth of data about the wellbeing of our people which will help us improve general safety," said Kehoe. "We have more work to do to evaluate the market and look at ways to make the tech useable every day for our people."

- www.amey.co.uk
- www.fujitsu.com



The road safety division of 3M will provide the US state of Michigan with lane markings and retroreflective signs for a connected vehicle technologies trial along the I-75 highway.

Around 5km of the Interstate 75 work zone in Oakland County will be transformed over the next four months to improve safety for drivers and test advanced vehicle-to-infrastructure technologies.

In addition to rebuilding the interstate, the department of transportation will realign interchanges and upgrade geometrics to improve safety and travel time reliability. Installation of permanent roadside units are included to further support connected and automated vehicles.

3M's role will be to provide advanced all-weather lane markings, retroreflective signs with smart sign technology and dedicated short-range communication (DSRC) devices for vehicle to infrastructure (V2I) communications. Additionally, 3M will provide work crews ANSI-compliant apparel with 3M Scotchlite Reflective Material to aid worker safety throughout the project.

The company said that the I-75 modernisation project will position Michigan among the first states to test connected vehicle infrastructure at this scale. Signs, pavement markings, temporary traffic controls and vehicle identification systems need to be designed and implemented to pave the way for the data-driven environment of the cars and roadways of tomorrow.

"Michigan is globally recognised as the leader in automated vehicle research and technology and through our Planet M initiative, we have solidified ourselves as the hub for mobility innovation," said department of transportation director Kirk Steudle.

Under Planet M, launched last summer,

HIGH-TECH IN HIGH PLACES



The US state of Michigan sets up a high-tech test road while New Zealand's transport officials buy in some high-tech weather forecasting.

nearly 200km of roadway - including the rebuilt portion of I-275 near Livonia, I-96, I-696, US-23 and I-94 - will become a technology-enabled "smart corridor".

The city of Ann Arbor will be home to the

only two permanent autonomous vehicle testing sites in the US by 2017, the state governor said during the launch. MCity at the University of Michigan opened in 2015, while the American Center for Mobility, on a 135hectare site on a former military base, Willow Run, was announced in early 2016.

LONDON LIGHTING

Safety has been improved on some UK roads after UK civil and electrical engineering firm McCann completed 19km of LED lighting upgrades between J22-25 of the M62 motorway in England.

The project, coordinated by Highways England's term contractor A-one+, was completed by Nottingham-based McCann in March after nine weeks of work. More than 1,220 high-pressure sodium lanterns were replaced with Ampera Maxi LED lighting units. Also, 12 street lighting feeder pillars were replaced.

Work included installation of a central



McCann's handywork - before and after on the UK's M62.

→ management system with remote manipulation of operational burn hours, control over the timing of dimmed lighting when there is minimal traffic and fault monitoring and energy consumption tracking systems.

The reporting and control mechanisms can also be operated on a light-by-light basis or across the entire network. One of the major benefits of the newly-installed LED lights is that they require no routine maintenance.

The company estimates that the upgrades will generate a 53% energy saving - reducing annual energy consumption from around 2,204kW/hrs to about 1,042kW/hrs.

“The benefits of our work on the M62 will be seen far into the future, offering a more sustainable approach to lighting,” said John McCann, managing director at McCann. In monetary value, the saving equates to €148,000 annually and over the 25-year lifespan of the LED lights, savings could top nearly €3.71 million. A total of 612 tonnes of carbon emissions will be saved every year.

THE HIGH ROAD

Better weather forecasting should lead to safer roads in New Zealand after the Milford Road Alliance began receiving enhanced services from the national MetService. These include severe weather threat matrices covering snow, strong winds and heavy rain with Free Air Freezing Level (FAFL).

Milford Road Alliance is a partnership between the NZ Transport Agency and Downer NZ to ensure the safe and efficient management of activities on State Highway 94, a mountain highway between Te Anau and Milford Sound.

Downer NZ provides engineering and infrastructure management services to the public and private transport, infrastructure and resources sectors across Australia, New Zealand and the Asia-Pacific region.

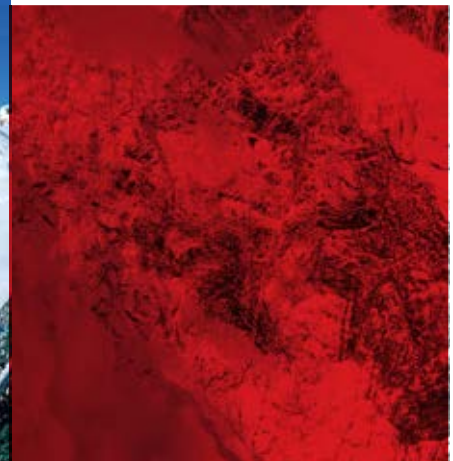
The Alliance operates specialised weather and environmental data acquisition devices at both road and mountain levels. Information from these systems is supplied to the MetService so the service can make forecasts and relay them back to the Alliance.

The MetService is also now providing animating rainfall, snow and cloud ceiling forecast maps. Site-specific rainfall and temperature probability forecasts complete the picture in terms of value-added forecast services. On top of this, significant improvements to the distribution and communication of data and forecasts have been made.

The new services complement those already provided by MetService to the Alliance, said



ABOVE: High up high-tech for a safer State Highway 94. **RIGHT:** Bird's eye view of New Zealand's State Highway 94.



Kevin Thompson, Milford Road Alliance manager. The avalanche hazard forecast is compiled from information that includes existing avalanche start zone snow-pack conditions - snow pit studies.

Also included are weather observations from automated road and mountain weather stations that transmit data to MetService forecasters, the weather forecast and local knowledge of avalanche activity.

MetService - Meteorological Service of New Zealand - was established as a state-owned business in 1992 but had existed in many variations since before 1900. Self-proclaimed as the “coolest little weather company”, it employs about 250 people and is based in Wellington, the capital of New Zealand.

Last month, New Zealand's Transport Agency started a five-year road-weather data and data visualisation service with the MetService. Under the arrangement, MetService has contracted Finnish road-

weather supplier Foreca to provide high-resolution road-weather forecasts which are based on MetService's own forecasting services and a host of additional weather and road information.

MetService has secured data services from Foreca following a comparative performance evaluation conducted during winter/spring 2016 and a live systems trial held last November during the Desert Road Design Sprint. The Sprint was a multidisciplinary design programme to create solutions to reduce the number of accidents on the Desert Road where ice was a contributing factor.

The services fuse MetService observations

from its network of automated roadside weather stations and expanding mobile measurement platforms with 360° photographs, high-resolution topography, road metadata and road modelling.

The Lewis and Porters Passes will be the first to see this level of forecasting with more areas to follow.

Forecasts at reduced resolution will be provided for the remainder of the state highway network and these will be delivered several times per day, every day of the year, said Malcolm Flattery, senior project manager with the NZ Transport Agency's Highways and Network Operations Group. The information will allow more comprehensive guidance from MetService to Transport Agency operational staff and contractors responsible for road management and maintenance.

SURFACING IN MALAYSIA

Also in the Asia-Pacific region, road safety and surfacing solutions provider Hitex International has agreed a partnership with Protasco Trading.

Protasco, part of Protasco Berhad, a Malaysian engineering and infrastructure firm, now has exclusive access to Hitex International's full range of anti-skid surfacing and road repair materials. Protasco will utilise them on many sections of Malaysia's 10,000km of federal and state roads for which it has responsibility, said Dato' Ronnie Yap, executive director at Protasco Berhad.

Hitex is supplying Protasco with materials, equipment, training and necessary support to ensure that installations are completed quickly and efficiently.

Materials include Hitex Type 1 anti-skid surfacing materials which are fully accredited by the British Board of Agreement (BBA) certification scheme, the highest classification attainable. Hitex said that it is formulated for Malaysia's sub-tropical conditions and provides a sustainable and durable solution for use on highly-trafficked, high-stress areas including off-ramps from busy toll roads and busy trunk



roads. Traffic disruption and traffic management costs are kept to a minimum because it is quick and easy to install, noted Hitex.

To speed up the road maintenance process, Protasco is also using Hitex TexBand, a BBA-certified single-pass over-band and fill and over-band system which permanently repairs open joints and cracks in road surfaces.

Finn Goff, group commercial director at Hitex International Group, said that the agreement extends Hitex's reach across Asia. "We have already received significant interest from surrounding countries including Singapore and Thailand," he said. □

- www.3M.com/TSS
- www.mccann-ltd.co.uk
- www.aone.uk.com
- www.urbis-schreder.com
- www.downergroup.com
- www.metservice.com
- www.foreca.com
- www.hitexinternational.com

Instarmac has it covered

UK-based Instarmac has broken into the North American market with the first use of its Manhole Installation System in Canada.

Instarmac said the installation was carried out in conjunction with the Region of Peel council, near the city of Toronto. It was done quickly with minimal disruption to motorists and in temperatures above 35°C.

The Manhole Installation System has been independently tested and approved by the UK's Highways Authority Product Approval Scheme, said Instarmac, a manufacturer and distributor of cement- and bitumen-based products globally.

The Region of Peel confirmed that it will be working with Instarmac's Canadian partner Da-Lee, using the Envirobed HA104 high-performance bedding mortar on a number of other

problematic manhole covers throughout the area.

Instarmac's Manhole Installation System is made up of Envirobed HA104 high-performance bedding mortar, M60 rapid-strength bedding mortar, PY4 polyester resin

system, QC10 F rapid-set flowable concrete, Instant Road Repair cold-lay asphalt, SCJ seal and tack coat spray and Instaband ECO thermoplastic overbanding tape.

The company said that

manhole cover ironwork reinstated with Instarmac's system can be opened to traffic in as little as one hour after completion. It has a service life of more than five years.

www.instarmacinternational.com



LINDSAY SYSTEM EARNs MASH APPROVAL

Lindsay Transportation Solutions has announced that its QuickChange Moveable Barrier Concrete Reactive Tension System (QMB-CRTS) has earned MASH approval.

The system meets crash test and evaluation criteria contained in the American Association of State Highway and Transportation Officials' Manual for Assessing Safety Hardware (MASH).

MASH is the new standard for the crash-testing of safety devices for use on the National Highway System. It updates and replaces NCHRP Report 350.

"We are pleased to inform our existing customers that the NCHRP350 TL4 barrier they installed in recent years now has passed MASH TL3," said Chris Sanders, senior vice president of Lindsay Transportation Solutions. "All CRTS barriers connect seamlessly,

providing fully compatible systems and spare parts."

The QMB-CRTS is a non-anchored, portable or temporary concrete barrier used in managed lanes and construction applications. The company said that it is the first and only MASH compliant moveable barrier system that uses a machine to create real-time roadway reconfiguration while maintaining positive barrier protections between lanes. The system completed two MASH Level 3 (TL3) crash tests conducted by an independent testing facility, which were submitted to the Federal Highway Administration for approval in December.

If installed under the range

of tested conditions, QMB-CRTS is now eligible for reimbursement under the federal-aid highway programme.

Last October, Lindsay's Road Zipper median barrier system won an award of merit from the San Francisco Metropolitan Transportation Commission for its performance on the Golden Gate Bridge. The moveable median barrier, completed in January 2015, has reduced head-on collisions on the 2.7km-long bridge that handles around 2.5 million vehicles per month.

The barrier is a mechanical "zipper" that changes the configuration of the bridge's six lanes twice daily to keep traffic flowing smoothly. □

www.lindsaytransportationsolutions.com

Lindsay has already won an award for its moveable barrier



COLLISION AVOIDANCE SYSTEM FOR SHELL BITUMEN

Shell Bitumen is now using an innovative collision avoidance technology in its HGV fleet in the UK, which is intended to improve transport safety.

The package has been installed with the support of DHL, its long-term transport and logistics partner. “The team decided to look into available aftermarket technology, which is becoming widely available for the car market.

Although these systems had not been used on HGVs, we were determined to find a solution that would provide the alert functions to help improve driver reaction times and attentiveness,” said John Doyle, distribution manager at Shell Bitumen.

The firm has retrofitted HGV tractors within the fleet with Mobileye, a technology that will visually and audibly warn Shell Bitumen drivers in time to make necessary corrections to avoid potential collisions or lessen the damage.

Shell Bitumen had run two pilot initiatives with DHL, which operates its fleet - first on a Scania tractor, followed by a Volvo tractor, over eight weeks. These were carried out by instructors on its driver training trucks to put the technology through its paces.

The installation took place across all older tractors, which do not feature the latest generation automatic electronic braking systems (AEBS). All new tractors coming into the fleet have AEBS as standard, which negates the need for the collision avoidance technology.

In November 2016, the first of the 36 tractors was retrofitted with this collision avoidance technology. In June 2017, the final Shell Bitumen tractor units were fitted with the technology.

“All through the programme and installation across the fleet we have had very positive feedback from our drivers, which has helped us to fine tune the system. And while technology can never be a complete solution nor a substitute for AEBS, it is providing a major step forward in our continuous journey in road transport safety.”

Phil Roe, managing director, Transport,



TOP: The Shell Bitumen tractor units are equipped with detection technology to ensure greater safety around other road users.

Engineering & Manufacturing, Energy & Chemicals, DHL Supply Chain added, “The Shell / DHL fleet covers in excess of 6 million kilometres per year and, with UK roads becoming increasingly congested, there are more and more potential distractions. We are always looking for innovative ways to make every journey as safe as possible for our drivers,

other vehicles and vulnerable road users. Mobileye is another step in the right direction on our joint safety journey.”

Shell Bitumen operates a large fleet of tractors through DHL to distribute bitumen throughout the UK. At any one time, Shell Bitumen has a flexible fleet of up to 75 HGVs on the UK road network. □

www.shell.com



COLOURFUL CROSSWALKS

Safety remains paramount but crosswalks can also be colourful and fun.

The increasing popularity of colourful crosswalks is exercising the creativity of municipalities around Europe. An example is the use of DecoMark preformed thermoplastic markings in Rotterdam, Netherlands. The art collective Opperclaes, working with urbanism agency Street Makers, designed an artwork-style crosswalk on the Westblaak area of Rotterdam. The Westblaak is a busy street in the city centre and connects Churchill Square with the Eendrachtsplein. The street has a wide pedestrian middle area that includes a skate park and which is used as a meeting place. Because it is a people-place, good crosswalks are essential for public safety.

For the project, Schreuders Infra, a road marking and street furniture specialist, applied the preformed thermoplastic markings. The company has extensive experience in applying all kinds of paint and surfaces, including cold plastic as well as making asphalt repairs and lining for roads, parking garages, parking lots and electric charging points.

The attraction for such innovative and creative pedestrian crossings is not just the fun aspect for children. These interesting

crosswalks get their attention, meaning they are more alert to the fact that the pedestrian area is where they should cross the Westblaak's busy road. Images abound on the crosswalk, as well as words such as, "Stand straight and walk proud".

Public response to the crosswalks has been very positive and the Rotterdam city officials are conducting research on their use with an eye to creating similar pedestrian crossings in other traffic intensive parts of the city.

Creative and decorative crosswalks have also been made with preformed thermoplastic in the Bankside area of central London. In Zaandam in the Netherlands, authorities used PlastiRoute cold plastic from Geveko Markings to create rainbow-crosswalks to set a statement for the lesbian, gay, bisexual and transgender (LGBT) community.

SAFETY AWARDS

In London, Evonik announced the Columbian city of Medellin as the winner of its global Road Safety Award for 2017. The award ceremony is due to take place at a global or regional road safety event at the

ABOVE: Schreuders Infra handiwork with DecoMark in Rotterdam.

end of this year.

Applications for this, the second year of the Evonik Road Safety Award, closed at the end of May. The award acknowledges and rewards the contributions to road safety of public authorities worldwide.

The prize is €10,000 in the form of a sponsored road marking application, a donation of traffic safety related items, or a donation to a non-profit organisation. It is bestowed by Evonik upon identification of the winner by an independent jury of internationally recognised experts in the field of road safety, transport and city design.

The Evonik Road Safety Award is designed to support sustainable road safety initiatives. Key criteria for the winning project/initiative are its contribution to road safety (60%), sustainability (20%), innovation (10%) and replicability (10%).

A project candidate can be any completed infrastructure initiative which includes some form of road marking with at least a

one-year track record. Qualified applicants are public authorities from a city, state, national or regional level, responsible for such an initiative.

The jury consists of Adnan Rahman and Susanna Zammataro at the International Road Federation. Rahmann is general director and senior transportation consultant at the IRF, while Zammataro is executive director and environment expert.

The two academic jurists are Markus Oeser and Paul Carlson. Oeser is the Chair-Professor for Pavement Engineering & Director of the Institute for Pavement Engineering at the RWTH Aachen University, Germany. Carlson is senior research engineer and division head at Texas A&M Transportation Institute in the US.

Last year's winner was Thailand's Department of Rural Roads for a comprehensive safety initiative around schools, especially in rural areas. A pilot project was set up at Nonthaburi province in 2013. It identified speed reduction and visual communication as two key ways to create awareness.

Thai authorities installed edge lines, coloured anti-skid rumble stripes and pedestrian crossings based on MMA cold plastic road markings. Since being installed, they have recorded zero accidents and the MMA cold plastic-based road markings remain durable and functional, even after three years, with no maintenance required.

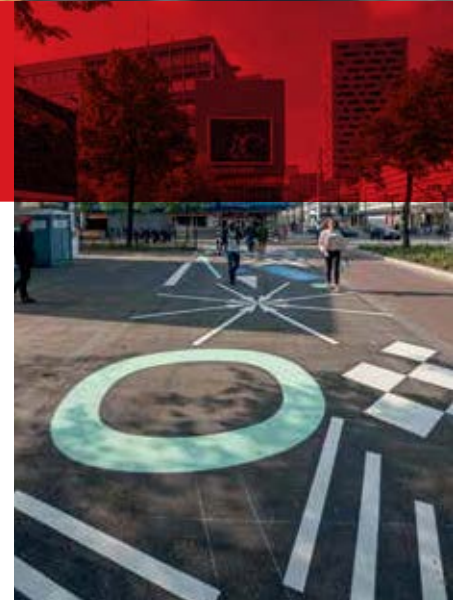
Second place was for Chongqing



ABOVE: *Evonik's 2016 winner - a well-marked crossing saving the lives of school children in Thailand. RIGHT: Geveko Markings paints a pretty picture on the Westblaak.*

Municipal Government Traffic Department's School Zone Caring Colour Zebra crossing project. The Chinese city launched the project in late 2012. The four crossings are red and white anti-slip crossings covering a 400m² area in front of schools in Chongqing city. The crossings not only provide visual awareness to drivers, but also guide students. Observation statistics showed that the rate of road accidents is reduced by more than 50% after using a coloured zebra crossing. □

www.geveko-markings.com



Minnich's wall drill slides along

Minnich Manufacturing, a maker of concrete dowel pin drills, concrete paving vibrators and vibrator monitoring systems, has developed a concrete barrier wall drill.

The tool drills vertical holes for the pins used to secure temporary concrete traffic barriers. Minnich, based in Mansfield, Ohio, said the air-driven and self-propelled drill straddles and rides along the top of the temporary wall. A tethered controller enables the operator to simultaneously drill three

accurate, consistent pin holes — through pre-molded holes in the wall, through the road, into the sub-base — while positioned on the non-traffic side of the barrier.

The introduction of Minnich's concrete barrier wall drill comes just as US states move towards requiring temporary barriers to be pinned, according to Todd Jurjevic, director of sales at Minnich Manufacturing. "The new drill saves contractors significant time and cost and promotes safety by

eliminating the need to hand-drill pin holes on the traffic side of the barrier."

Additionally, the tethered controller removes the operator from excess debris and dust. Minnich claims that on one Illinois highway construction project, the contractor realised 35% time savings, nearly 20% labour and equipment cost savings and around 30% bit cost savings compared to a three-person crew using high-powered rotary hand drills. The contractor also reported that the accuracy and consistency of the

holes drilled by the Minnich drill made pin removal significantly easier. Hand drilling can result in inconsistent holes with varying angles, making pin removal a challenge.

Minnich can customise the drill to fit F-shape barriers, Jersey barriers or any other barrier wall profile. Drill spacing and hole-depth of the drill are fully adjustable. The unit can be easily moved with a forklift and loaded onto the wall with a backhoe or service crane.

www.minnich-mfg.com

SOSEC barriers can operate up to 900 times a day

SOSEC, a mobile solar-powered barrier system for work sites, made its UK debut on the M23 motorway.

The SOSEC gate – solar and security – is made by Green Gate Access Systems, a subsidiary of Solar Gates UK, which provides and installs solar and mains-powered gates, barriers and access control systems. The system on the M23 provided contractors with a power-free method to slow and control access to the work zone, track who is on site and prevent accidental entry from the public.

Highways Care, a contractor responsible for installing overnight 1.5km of temporary crash barrier on the live lane, used the SOSEC system to secure the entire route. A 4G intercom allows visiting contractors or emergency services to contact the central control office with known contractors using managed swipe cards or entry codes – all powered by the sun.

SOSEC combines a 5m automatic traffic barrier with optional full-length drop skirt and LED lights to control



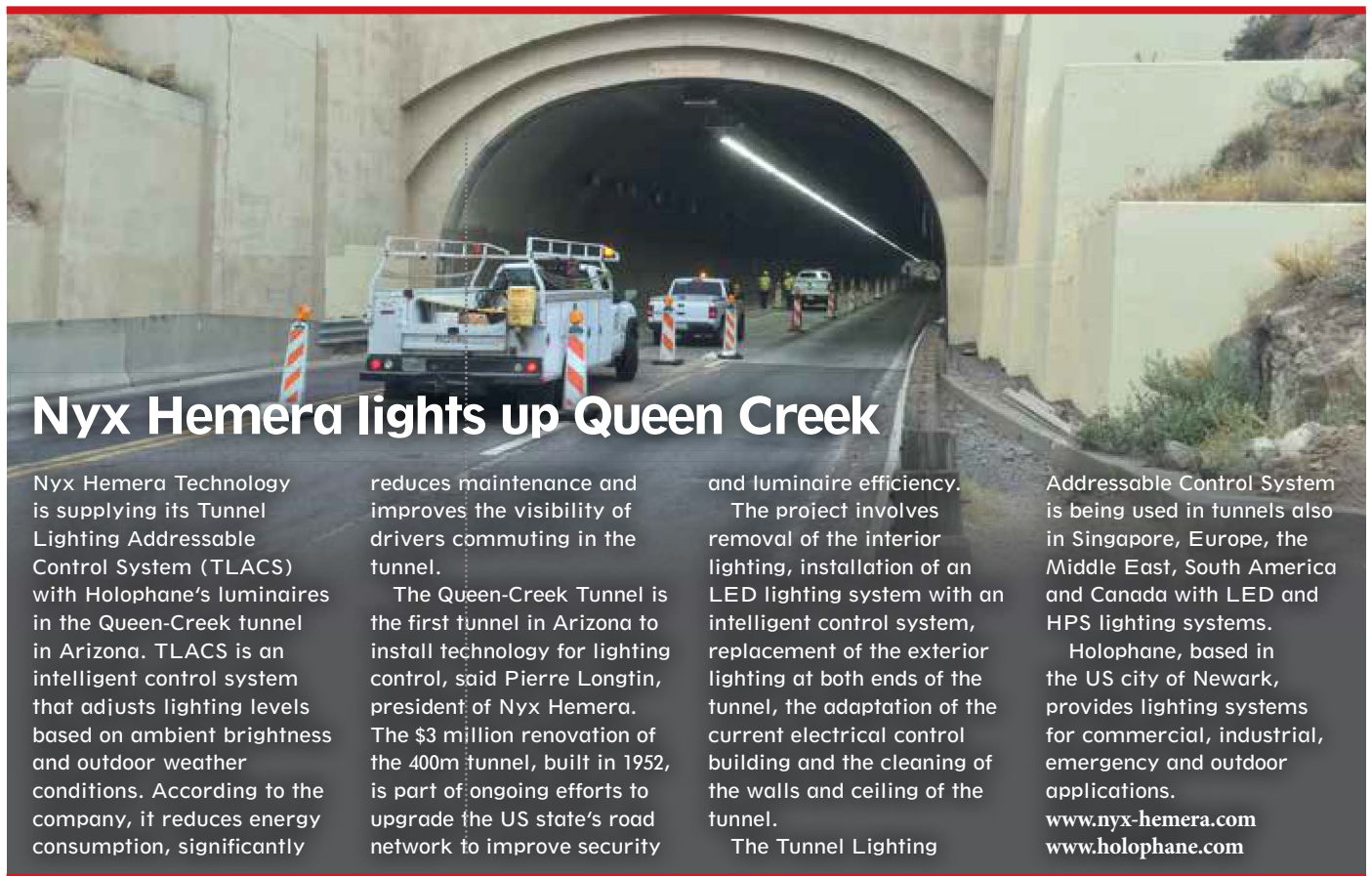
ABOVE: SOSEC barriers can operate up to 900 times a day.

vehicles with a rugged, locked and self-closing gate for pedestrians. It is designed around a rugged, galvanised, 8mm steel platform with a compact footprint allowing it to be positioned with a forklift or telehandler.

A high-capacity solar panel operates the barrier up to 900 times per day, even during an average British winter. For short-term sites, SOSEC comes with a battery store for use up to one month.

The combined barrier and gate allows access control to be customised

to site needs. Supplied with simple key code and radio remotes as standard, additional options include 700m remotes, mobile phone opener, swipe cards, key codes, open/close timer or simple entry/exit on approach. Each unit arrives fully tested to BS EN13241-1, force tested to BS EN 12445 and complies with the gate safety standards as defined in DHF TS011. www.greengateaccess.co.uk www.sosec.co.uk



Nyx Hemera lights up Queen Creek

Nyx Hemera Technology is supplying its Tunnel Lighting Addressable Control System (TLACS) with Holophane's luminaires in the Queen-Creek tunnel in Arizona. TLACS is an intelligent control system that adjusts lighting levels based on ambient brightness and outdoor weather conditions. According to the company, it reduces energy consumption, significantly

reduces maintenance and improves the visibility of drivers commuting in the tunnel.

The Queen-Creek Tunnel is the first tunnel in Arizona to install technology for lighting control, said Pierre Longtin, president of Nyx Hemera. The \$3 million renovation of the 400m tunnel, built in 1952, is part of ongoing efforts to upgrade the US state's road network to improve security

and luminaire efficiency.

The project involves removal of the interior lighting, installation of an LED lighting system with an intelligent control system, replacement of the exterior lighting at both ends of the tunnel, the adaptation of the current electrical control building and the cleaning of the walls and ceiling of the tunnel.

The Tunnel Lighting

Addressable Control System is being used in tunnels also in Singapore, Europe, the Middle East, South America and Canada with LED and HPS lighting systems.

Holophane, based in the US city of Newark, provides lighting systems for commercial, industrial, emergency and outdoor applications. www.nyx-hemera.com www.holophane.com



ROADS WITH A DIFFERENCE

Bitumen technology developments now offer self-healing roads, slippery roads and slimmer roads. Meanwhile, one UK contractor has started manufacturing its own polymer modified bitumen - *Kristina Smith* reports.

Professor Erik Schlangen, who heads up experimental micromechanics at the Delft University of Technology is receiving calls from all round the world these days. And it is hardly surprising because he and his team have invented a great new technology: asphalt that heals itself.

The idea is simple. Tiny lengths of steel fibre are mixed in with the asphalt of a road's wearing course; every few years, an induction machine is driven over the road, creating eddy currents in the wires which then heat up; the heat from the wires melts the bitumen around them which then runs in to fill up any tiny cracks that have formed.

The Dutch government believes the savings could be massive. It has calculated that if this material was laid on every highway in the Netherlands, the savings over the whole life of the roads would equate to €90 million/year. The fibres – which are like wire wool, 25 microns in diameter and 8 to 10mm long – add only 25% to the capital cost of the

wearing course.

Schlangen's team began working on the idea back in 2007, with the first trial section on the Netherlands' A58 laid in 2010. That section was treated with the induction machine in 2014 and tests prove that it is still in good condition. The next pass is planned for 2018.

"You have to treat it when there are only micro-cracks, before you see cracks or potholes and before the stones are driven out of the surface," explained Schlangen. "We did testing in the laboratory to age samples in different conditions and from that research we found out that four years was the optimum time interval. We may have to increase that frequency in the future as the bitumen is still ageing so it may be damaged faster in the future."

Porous asphalt is used in the Netherlands because it takes water away from the road surface and also because it absorbs sound. However, the open structure means that it

is more vulnerable to damage with porous asphalt wearing courses having a standard life of around eight or nine years.

The self-healing asphalt has been laid on 11 other roads by contractor Heijmans, including areas of high impact such as roundabouts, traffic lights and on industrial estates. Dense asphalt containing fibres has also been laid on bridge decks and the effect has been shown to work equally well as for porous asphalt. "The contractor is very confident about the technology," said Schlangen.

There were some practical issues to solve in manufacturing the mix. The fibres, though small, were all wrapped in a big ball when they were delivered so a means of separating them had to be devised; Schlangen does not want to reveal this technical detail.

In a few years' time, the first trial section →

TOP: A trial of the new material is being carried out.

→ will provide proof that the self-healing wearing courses do last longer than their standard counterparts since most have to be renewed after eight or nine years. Meanwhile, interested parties from Europe, North and South America and Asia have all been on the phone.

Taking the idea further, one of Schlangen's PhD students has been testing an alternative self-heal technology on a trial section in China, which sees tiny capsules containing rejuvenator mixed into the road. A variety of capsule materials are under trial, containing a light oil such as waste cooking oil.

One of the challenges is that the oil tends to migrate very slowly through the hardened bitumen, a process that is speeded up with heat. So perhaps the best solution could be a combination of both the capsules and the induction-heated fibres, said Schlangen.

PR INDUSTRIE

While most surfacing materials aim to provide adhesion, PR Industrie created its PR SLIDE product to do the opposite: create a slippery surface to use for driver training.

The specialist additive manufacturer invented PR SLIDE, a two-part epoxy resin system, for the APTH training centre in Le Creusot, France, and commercialised it 15 years ago. Since that time, the surfacing material has been re-laid many times on the centre's four tracks, with contractor Colas carrying out the most recent works in August last year. PR Industrie has also supplied it to other tracks in Austria and Germany.

Set up initially over 20 years ago by the hydrocarbon transport accident prevention association (APTH), the centre in Le Creusot now offers training to a broader range of drivers including those who drive HGVs, LGVs and cars. In addition to 4km of tracks, the facility offers driving workshops, practice loading stations, a firefighting workshop and meeting rooms.

The slipperiness of the track allows accident situations to be created at around half the speed that they would normally occur, providing the driver with the sensation of losing control without the danger of doing it at high speed. The tracks are equipped with water obstacles that squirt out water in front of the driver, simulating an event such as a pedestrian stepping in front of the vehicle or a car stopping.

The idea of the training sessions is to discourage drivers from driving too fast. "The aim is to show drivers what can happen if they drive at the limit," explained PR Industrie's business development

manager Michael Lecomte. "According to the centre manager, a visit to the track leads to an accident rate that is halved because people realise how dangerous it can be."

ITERCHIMICA

A total rethink of the design of a 9km-long section of the A53 in Italy has led to a more durable pavement structure, while requiring significantly fewer materials and slashing the number of days spent laying pavements layers by 130 days.

The scope of works on the A53 between



"We believe we are the only asphalt manufacturer in the UK that has its own bitumen import terminal"

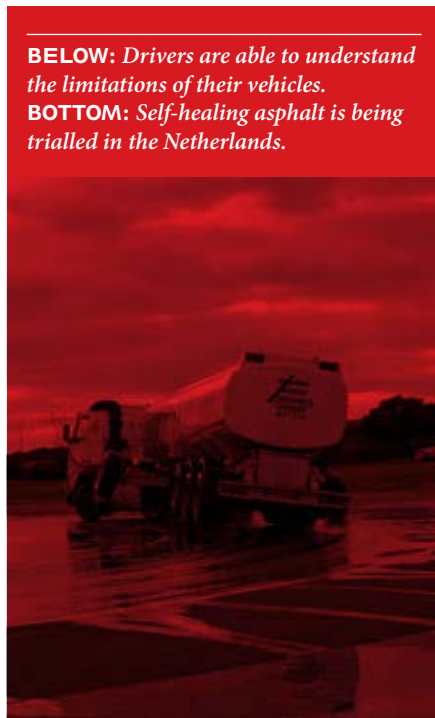
Pavia and Berguado encompassed several things: upgrades to guard rails to meet current safety standards; the widening of the road to accommodate the new barriers at either side and centrally; new lighting; a new wastewater system; and a new tollgate at Berguado.

Concession-holder Milano Serravalle-Milabo Tangenziali worked with Professor Maurizio Crispino of Politecnico di Milano and specialist additive supplier Iterchimica to challenge and update the design of the pavement. The result is a road construction that is 90mm less deep than the original design, has reused and rejuvenated material taken from the original road, and that exhibits better performance characteristics.

"We like to get involved at an early stage because it means we can understand our customer's needs better and propose a range of solutions," said Iterchimica's chief executive Federica Giannattasio. "Our customer gets a more efficient approach and can leverage our extensive knowledge and consultancy value."

The original design comprised a 200mm of stabilised layer, a 200mm cement-bound layer, a 150mm HMA base layer, 60mm of HMA binder and a 50mm wearing course. The new solution comprises 300mm of super-compacted subgrade; a 300mm cement-bound layer mixed in situ with Iterchimica's ITER PPS 1000CS, polypropylene fibres and polymetric compound, 30% of RAP and anti-stripping agent ITERLENE ACF1000S/115; an 80mm high-modulus base binder layer, also with 30% RAP and the Iterchimica additives; and finally a 90mm high-modulus

BELOW: Drivers are able to understand the limitations of their vehicles. **BOTTOM:** Self-healing asphalt is being trialled in the Netherlands.



RIGHT: According to fatigue tests, the new material performs significantly better than conventional types. **BELOW:** The innovative self-healing technology offers major benefits in reducing road maintenance costs. **BOTTOM:** FM Conway has invested in a new bitumen terminal at Gravesend.



semi-draining bituminous wearing course with 20% RAP and the additives.

Fatigue tests showed that the new mix performed better than the original one which should mean that the road lasts longer. In terms of environmental benefits, the new design meant that contractor Itinera-Caffù JV saved 4,000 lorry journeys equating to 72,000 litres of diesel. Around 18,000m³ of bituminous materials were saved together with 40,000m³ of stabilised and cement-bound mix.

FM CONWAY

In an unusual move, UK contractor FM Conway started producing its own polymer modified bitumen (PMB) in May this year. The contractor has already laid the PMB on some minor highways and is planning to carry out extensive testing on the material

using in-house and external resources.

“One of the things we are very keen on is collecting lots of data,” said FM Conway’s director of development David Smith. “We are investing around £1 million to provide a new laboratory at our Gravesend facility where we can do our own sophisticated testing.”

FM Conway is using SBS polymers from Kraton to create its PMB. “We’ve had technical input from Kraton and we have also been working with the supplier of the PMB plant, Benninghoven,” said Smith.

There is a growing awareness among clients such as national roads authority Highways England and Transport for London that PMB can increase the life of roads. “When you get to some of the other local authorities, the impact of budget

reductions means that they don’t have any in-house materials engineer expertise. That means you end up with a client who is inexperienced and de facto becomes risk-averse.”

Currently PMBs are used mostly in the surfacing layers of roads in the UK. However, FM Conway is keen to investigate its use in lower layers and is working on a research project with Nottingham University and the University of New Hampshire in the US to investigate the impact of PMBs on the durability of roads.

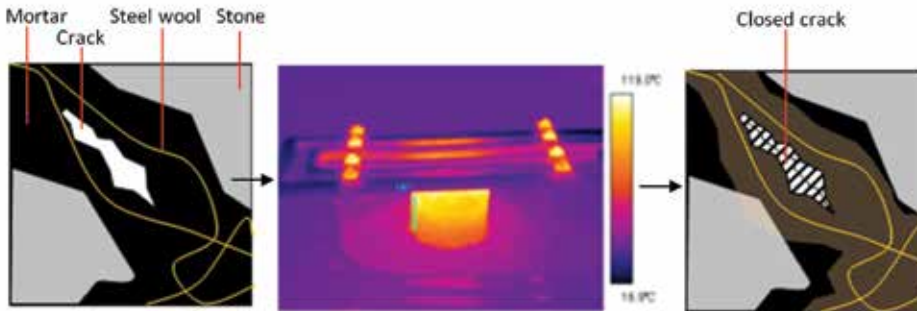
FM Conway has an ethos of self-delivery. Starting out as a contractor, the firm now has a design business, five asphalt plants including two with parallel heating drums for recycled asphalt and a plant fleet which includes two bitumen tankers with a third under order. In 2014, it started up its own bitumen storage terminal at Gravesend, South East England, with a capacity of 7,500 tonnes.

“We believe we are the only asphalt manufacturer in the UK that has its own bitumen import terminal,” said Smith. “The reason we did it was because we wanted independence, and long-term security of supply. There’s a decline in European refineries and that will continue.

Refineries are being upgraded to produce higher-value products than bitumen and older refineries that would cost too much to upgrade are being shut down. Because FM Conway works only in London and the South East, this one terminal can service all its asphalt plants.

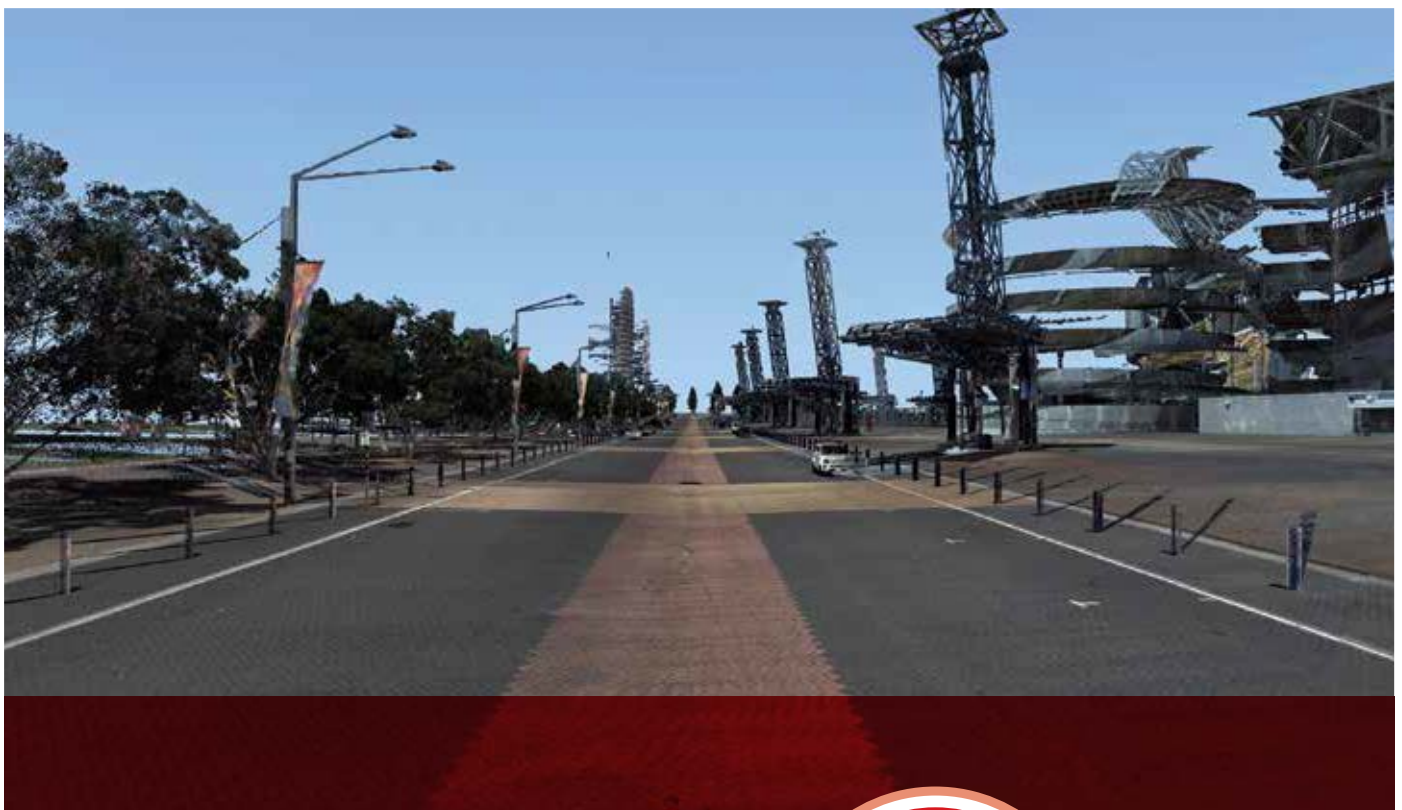
FM Conway currently has a long-term supply contract with Shell Bitumen. “We still like to have our bitumen coming from Europe where possible because the short sea journey makes it easier to control our stocks,” said Smith. FM Conway also supplies bitumen to Nynas which services its customers in the south from the Gravesend terminal. □

www.tudelft.nl/citg/
www.fmconway.co.uk
www.iterchimica.it
www.pr-industrie.com



LIDAR SURVEYS BOOST ASSET MANAGEMENT

In the coming age of the autonomous vehicle, fast and accurate LiDAR surveying will be increasingly important, explains *Valdis Vanags**.



The game-changing introduction of autonomous vehicles relies not only on intelligent traffic systems but well-maintained roads to help computer-guided systems navigate using road markings. Laser scanning technology, too, is a game changer when it comes to planning and executing many civil engineering projects, including transport network upgrades and smart city initiatives.

Creation of a virtual 3D model of a city grid makes it possible to analyse road conditions as well as plan engineering works with least disruption for highway users.

Many top surveying companies and local authorities around the world are using either LiDAR - light detection and ranging systems - to gather enhanced intelligence

of local infrastructure or are commissioning surveys to study complex transportation systems in the form of a three-dimensional map.

Over the past year, the company 3D Laser Mapping has provided either LiDAR surveying services or products to surveying companies or government organisations in some of the world's most populated cities.

LiDAR can collect around a million measurements per second by emitting light from a laser shot towards an object and calculating the amount of time it takes to for the light to return to the laser. When combined with an Inertial



Measurement Unit (IMU) and GNSS positioning system, a point cloud with accuracies of under 7mm is created allowing surveyors to pinpoint problems or focal areas.

This is particularly useful when planning construction or maintenance works down to the millimetre, without having the need to return to site.

Most infrastructure surveys are now carried out using some type of mobile mapping systems for several reasons, not least to save surveying time. Scans from a moving vehicle can be carried out around 80% faster than by using more traditional methods, such as total stations or terrestrial scans.

Thanks to the improved accuracy of systems such as ROBIN, whole city grids can be covered in minutes from the safety of a vehicle or remotely from a UAV - unmanned aerial vehicle. Mobile laser scanning is, therefore, not just faster but safer than other methods of data capture.

The latest point cloud software can also automatically classify objects such as street furniture, lamp posts and traffic signals, as well as identify and even extract vegetation and road markings.

The same set of data can be used for traffic planning, urban modeling, power line surveys and the mapping of assets, as well as in the event of a disaster. During the devastating flooding in New Orleans following Hurricane Katrina in 2005, maps generated by LiDAR helped emergency services navigate rubble-strewn streets to identify areas in which survivors were trapped.

In France, a recent mobile laser survey was carried out over an entire city – around 40km² - that captured over 3 terabytes of data, showing houses, utilities and

transportation infrastructure in millimetre-perfect detail. The project forms part of a national French initiative to combine the data with photographs to create a detailed topographic map for long-term future planning, including the use of autonomous vehicles.

In Japan, one company is using the ROBIN system from 3D Laser Mapping mounted onto a drone for road surveys. By mapping bridge clearances and vegetation encroachment, they provide clients with detailed topographical information without any disruption to traffic.

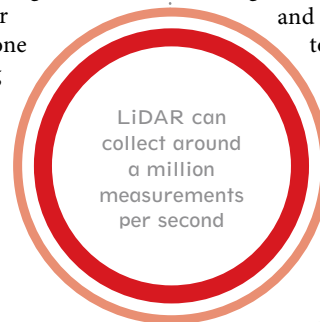
In 2015, mobile mapping surveyed New York's 10ha public Battery Park on the tip of Manhattan Island. The point cloud data showing buildings, pavements and road markings enables city officials to plan construction and preventative maintenance.

A recent survey in Melbourne, Australia,

classified and catalogued assets along a specific route. Software for processing point clouds and images, such as that from Terrasolid, enabled 3D Laser Mapping operators to identify not only road markings and utilities, but locate their coordinates and condition. Scanning a

large block took under half an hour and the data is still being used to manage and monitor maintenance. Regular scanning of roads, slopes and vegetation means the assets can be monitored for changes that could be dangerous. □

www.3dlasermapping.com
www.terrasolid.com



**Valdis Vanags holds an MSc in geodesy from Riga Technical University in Latvia. He has more than 20 years in LiDAR, remote sensing, geomatics and photogrammetry. In 2013 he joined 3D Laser Mapping, a global geospatial technology developer and supplier based in the UK.*



Standing tall: ProLight shines in tests

ProLight tower passes the test

The ProLight lighting tower has been used in the UK on the A14 and Hinkley Point power generation site, the M1 Smart Motorway and for Scottish Southern Electric power supplier. ProLight comprises a specially-developed trailer-mounted unit with heavy-duty deep-cycle batteries, an array of four 330W solar panels, a 7.5m telescopic mast with a minimum Lux level of 20 and a 10,000-40,000 lumens output.

Every ProLight is fitted with a micro-controller and GPS tracking, so it can be monitored to ensure continued operation, enable on/off times, be adjusted remotely, as well as to record key data such as power generation and consumption.

"We calculate that every ProLight represents an annual saving of around 6tonnes of carbon when

compared to the popular VB9 diesel generator," said Prolectric managing director Chris Williams.

"We were able to develop a trailer light with a solar array three times the power of any other solar light previously available," said Williams. "We also built in 'smart' technology so the unit's on- and off-times could be controlled automatically and data on power usage and carbon savings is monitored remotely."

Prolectric is a manufacturer and provider of solar lighting and wind power technologies, based in the UK county of Somerset. The company said that it was the first business to introduce permanent solar-only street lights to the UK market in 2011. There are now more than 3,000 units installed nationally. www.prolectric.co.uk

Constant distance from driver-operated lead vehicle



AUTONOMOUS ROAD SAFETY VEHICLE LAUNCHED

What the developers claim is the world's first "Autonomous Impact Protection Vehicle" (AIPV) has been used live onsite in the US state of Colorado.

The introduction of autonomous technology to an impact protection vehicle removes the driver from a potentially dangerous situation should the impact be sufficient to cause injuries or death. The vehicle is a joint US-UK project. It was developed in the US by Micro Systems Incorporated – a division of Kratos Defense & Security Solutions – and Royal Truck and Equipment in conjunction with the Colorado Department of Transportation. The autonomous vehicle uses drone technology developed for the US military.

The group approached Colas in the UK to carry out testing of the vehicle on closed roads. Operating data obtained by Colas was added to that of Colorado DoT and in August the first live road demonstration took place in Fort Collins. The vehicle followed a line painting truck.

The autonomous vehicle is fitted with Micro System's electro-mechanical Multi-Platform Appliqué Kit (M-Pak), a fully integrated sensor suite. It includes a roof-mounted navigation module, a quick-install steering actuator, actuators for acceleration and braking, transmission controller and an active safety system. M-PAK is a scalable system so it can be used as a stand-alone vehicle mobility kit, or sensors can be added to offer various levels of autonomy.

The lead vehicle – in this case a line-painting truck - with its driver has a roof-mounted NAV that contains a GPS receiver, system computer, digital compass and a transceiver. It transmits GPS position

data called eCrumbs back to the follower vehicle, which then uses the data to track along the exact path and speed of the lead vehicle at each point along the route. The NAV Module can be easily unstrapped and removed from one vehicle and installed on another if a different lead vehicle is required.

Royal Truck and Equipment, founded in 1982, is a large manufacturer of truck-mounted attenuators and other safety vehicles based in Coopersburg, Pennsylvania.

Micro Systems, wholly owned by Kratos,

is based in Fort Walton Beach, Florida. MSI develops unmanned vehicle technology, command-and-control systems and other vehicle management systems for all types of military use. □

www.codot.gov

www.royaltruckandequipment.com

www.colas.co.uk

www.kratos-msi.com

BELOW: *The business end of the driverless vehicle.*



Who goes there?

Urban design technologists Umbrellium said that it has created the Smart Crossing, a pedestrian crossing that adjusts its lines and colours according to the situation.

The crossing, a prototype, was developed for UK insurance company Direct Line in response to research which highlighted the dangers for people, cyclists and vehicle drivers at pedestrian crossings. Research by Road Safety Analysis, a designer of highway safety programmes and services, noted that there were more than 29,000 casualties on or near a pedestrian crossing in the UK from 2011-2015.

The Smart Crossing covers an area of 7.5m x 22m road surface. The prototype is waterproof, is not damaged by the weight of vehicles and recognises the difference between pedestrians, vehicles and cyclists.

According to the manufacturers, it

uses computer vision technology to "see" exactly what's happening around it. It comprises an LED road surface that automatically changes its markings according to activity on the surface and nearby the crossing.

It can pre-empt pedestrian movement and where their eyeline is most likely to be, which help to ensure it grabs attention to limit danger. The area can widen to accommodate large groups, a feature that the manufacturer says could help reduce the number of crowd-related incidents outside schools or sporting events.

It will adapt to protect pedestrians in emergency situations, such as a child chasing a ball into the path of oncoming traffic. It can also provide warning signals for pedestrians walking across the road to ensure they're not hidden by high-sided vehicles which can cause a blind spot for other road users.

The crossing pattern will change

to grab the attention of so-called 'smombies' (smartphone zombies) - pedestrians engrossed in their mobile phones while walking. The crossing will urge them to look up and focus on crossing the road safely.

"The Smarter Crossing responds in real time, using technology which has been designed with colours that we know and understand and practical designs that help those on the crossing feel comfortable, confident and safe," explained Usman Haque, founding partner of Umbrellium. "Pedestrian crossings as we know them were made for a different age, when the human relationship with the city was completely different."

The technology has received backing from road safety charity Brake and the UK government's Parliamentary Advisory Council for Transport Safety. www.umbrellium.co.uk www.roadsafetyanalysis.org

Green light for orange areas

The first of a new-style smart motorway emergency stop area is being trialled on the M3 motorway in England.

The redesigned emergency area has a highly visible orange road surface and better signs to improve its visibility, according to Highways England, the wholly government-owned company responsible for modernising, maintaining and operating England's motorways and major A roads. Work on the officially-

titled Emergency Refuge Areas is being done by WJ UK in collaboration with maintenance contractors Balfour Beatty and Colas.

Smart motorways relieve congestion and improve journey times by making the hard shoulder available for use at busy periods. On some schemes, it is permanently converted into a traffic lane, known as All Lane Running.

Spaced emergency refuge areas - ERA - are provided roughly every 2.5km and are clearly marked with blue

signs featuring an orange SOS telephone symbol.

This safety upgrade, using QMS Type 1 HyperGrip system, has been delivered on the 21.5km smart motorway scheme, which covers the M3 from junctions 2-4a in the counties of Hampshire and Surrey. Two emergency refuge areas were completed as a trial and now all ERAs on the scheme will be afforded the same enhancement.

It is planned now to apply this coloured system on all

ERAs throughout the scheme with other smart motorway contracts expressing interest.

The change is part of an ongoing review into the design and spacing of emergency areas on smart motorways, said Jim O'Sullivan, Highways England chief executive. www.qmarkings.co.uk www.wj.uk www.balfourbeatty.com www.colas.co.uk www.gov.uk/government/organisations/highways-england

BERGHAUS OFFERS TOOL-FREE BARRIER ACCESS

Berghaus' ProTec-Tor 50 and ProTec-Tor 120 mobile crash barriers are tool-free solutions to open a quick access point for emergency services.



Berghaus' Protec-Tor 50: Tool-free.

They are part of the German manufacturer's ongoing commitment to the development of mobile crash barriers. In an emergency, it takes only a couple of fast actions to release the force-fit connection of the ProTec-Tor 50 and ProTec-Tor 120 mobile crash barriers and open the ProTec-Tor elements. Fire brigades, emergency services and police then have easy access through the otherwise closed, mobile crash barrier. In special cases, it is also possible to divert traffic away through the emergency opening.

Back in the 1990s, Berghaus initially focused on developing mobile crash barriers made of steel. This was soon followed by a combination of steel and concrete, resulting in the first ProTec crash barrier tested to European standard DIN EN 1317-2.

The ProTec family has evolved into six

types of mobile crash barriers.

Firstly, there was the ProTec 50, made of steel which achieves an ASI value A with containment level T1 and effective range W2. Because of its narrow width and minimum space requirements, it can be transported in high volumes.

The second pure steel system was the ProTec 50 City with a containment level T1, effective range W2 and ASI value A. It is tested at an impact speed of 80kph and is suitable for urban roadworks.

With its low weight of just 23.5kg/m and element length of only 2m, ProTec 50 City can be installed quickly and easily without needing additional equipment.

The mobile crash barrier ProTec 100 is the first system in the product family to offer a combination of steel and concrete. With a narrow structural width, element length of

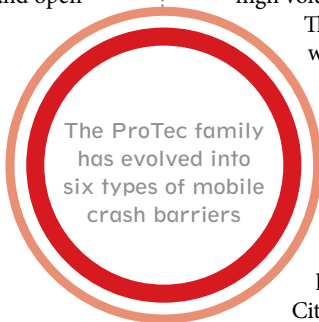
6m for economic transport and rubber-based stands that protect the road surface, this crash barrier achieves containment levels T1 and T3 with effective range classes W1/W2 together with the ideal ASI value A.

ProTec 120 is Berghaus' all-rounder. It fulfils the effective range classes T1/W1, T3/W2 with the outstanding impact force class A and is also H1/W5-tested. It has an element length of 10m, narrow structural width of 30cm and low element weight that allows for a high transport volume. It is popular in not just Germany but internationally.

The ProTec 121 offers ideal protection particularly for constricted roadworks situations. In corresponding impact tests, ProTec successfully achieved the containment levels T1/W3 and H1/W5. It also reached the best effective range class W1 in containment level T3.

The ProTec portfolio is rounded off by the ProTec 160 which has containment level H1 and effective range W4. □

www.mobile-schutzwaende.de



NYX BRIGHTENS QUEENS MIDTOWN TUNNEL

The Tunnel Lighting Addressable Control System (TLACS) from Nyx Technologies will be installed, along with Schröder's luminaires, in the Queens Midtown Tunnel in New York City.

New systems will be installed after completion of repairs made necessary by Hurricane Sandy (see box), said Pierre Longtin, president of Nyx Hemera Technologies. Work on the 2km tunnel connecting Queens to Manhattan is being fast-tracked. The TLACS solution will facilitate the installation of the new tunnel lighting system thanks to the power line communication technology used to control the luminaires that does not require the installation of control wiring. Nyx Hemera said the use of this technology will help to save hundreds of thousands of dollars in wires, conduits and connectors because the communication to control the luminaires will be on the existing electrical wires that supply electricity.

The TLACS' Local Product Controller (LPC), installed in both Schröder's OMNIstar and LEDNova luminaires, will turn on/off and dim up and down the luminaires at the tunnel entrance to reduce the black hole effect. It will also control the lighting in the tunnel to achieve a safe and comfortable lumens output for drivers, according to the company.

Nyx also said that the TLACS will help the operator save even more energy, thanks



not only to the LED luminaires but also the dynamic control of the luminaires as per the real needs, which are based on the variable luminosity at the tunnel portal.

Nyx Hemera Technologies will also provide dedicated Supervisory Control and Data Acquisition (SCADA) for the lighting system. This will help the Metropolitan Transportation Authority – Bridges and Tunnels (MTABT) in their day-to-day operations as they will be able to remotely and individually monitor the electrical parameters of all the 2,000 or more luminaires and maintain a better control over the entire lighting system.

“The TLACS will improve the lighting system's lifecycle by monitoring and controlling the internal luminaire

ABOVE: *The latest lighting from Nyx Hemera Technologies and Schröder.*

temperature,” said Longtin. “Overall, the MTABT will benefit from additional energy savings and also eliminate unnecessary equipment and operations, which in turn will reduce the tunnel's carbon footprint.”

Nyx Hemera said that its Tunnel Lighting Addressable Control System is used in more than 30 tunnel projects around the world, including Singapore, Spain, Middle-East, Peru, US and Canada. Schröder Group operates in more than 45 countries worldwide. □

www.nyx-hemera.com
www.schroeder.com

ALL CHANGE FOR QUEENS MIDTOWN

The 4-lane twin-tube tunnel which now accommodates around 88,000 vehicles per day was opened in 1940 by the New York City Tunnel Authority to relieve traffic congestion on the city's East River bridges. It was also one of the largest public works projects of the US government's New Deal era where investment in infrastructure was essential to keeping Americans in work after the Great Depression of the late 1930s.

But in October 2012, floodwaters from Superstorm Sandy damaged the tunnel's architectural, mechanical and electrical components. Money from FEMA – the Federal Emergency Management Agency – is helping repair the

tunnel and to protect it against a 500-year flood event.

The Queens Midtown Tunnel also made the switch to cashless tolling at the start of the year, according to its owner, MTA Bridges and Tunnels. MTA is an affiliate agency of the Metropolitan Transportation Authority that operates seven intrastate toll bridges and two tunnels in New York City. The agency is likely to have removed toll booths from all its New York City bridges and tunnels by the end of the year. The project began with the Hugh L Carey Tunnel going cashless and continues with the Rockaway, RFK, Verrazano-Narrows, Throgs Neck and Bronx-Whitestone bridges.



PEXCO LAYS DOWN A MARKER

Pexco says it has raised the bar for high-performance channeliser posts with the introduction of its City Post model, GD Glue Down.

City Post GD - the latest addition to the City Post family - features the same sleek profile, polyurethane construction and quick, sharp, impact rebound. The pinwheel design of the base enhances post retention, says Pexco. The City Post GD Glue Down's exceptional performance was recently proven by the Texas A&M Transportation Institute in a test sponsored by the Florida Department of Transportation.

The testing institute's independent testing sought to establish new minimum standards for managed lane applications. Pexco said that this state-level DOT-sponsored event was the first head-to-head testing ever at an accredited

third party test facility to determine the highest performing posts on the market.

Of the seven products tested from four different manufacturers, Pexco's City Posts emerged as the top performers, with the new City Post GD testing 222% higher than the minimum impact standard recommended by researchers. All posts survived well over 100 impacts at 112kph. The one-piece construction posts need no drilling and thanks to their self-adhesive quality they can be glued down on both concrete and asphalt. One-piece construction means no assembly is required and there are also no springs to fail.

Pexco's Davidson Traffic Product Division manufactures the City Post GD in the US.

It also makes other systems, including kerb system lane separators, Type I, II and III barricades, reflectors for barrier walls, snow poles and many more, some of which are self-adhering.

Pexco is based near Atlanta in the state of Georgia. Last October it opened a facility called the Extrusion and Engineering Center of Excellence at its Philadelphia facility.

The centre offers engineering consultation and design services for companies that require custom-extruded products or components. The facility focuses on the industrial market, including the lighting, filtration and traffic safety sectors. □

www.pexco.com

Zephyr for traffic sign control

Swarco said that Zephyr allows authorities full flexibility over their assets, including variable message signs and trailer VMS, car parking signs, vehicle-activated signs and school warning signs. A web-based interface enables users to edit message and pictogram displays at the touch of a button, as well as upload new text and graphics as required, explained Andrew Walker, business development manager of Swarco Traffic. The interface

also comes with a TSRGD - Traffic Signs Regulations and General Directions 2016 - rule checker to ensure that messages comply with industry regulations.

The software features drag and drop windows and the ability to dock certain assets so that they remain in view if required.

Key features of the interface include pan/zoom maps, enabling each of the assets to be easily located and their status monitored. Key features also include:

the current messages displayed, schedules for any changes that are due and red flags for any faults or errors that could impact the signs' operation. The software also enables the segmentation of data to include traffic count or car park occupancy that can be detailed in a separate report.

"Users can even set 'mass messages' to display across a region, which is ideal to alert the public of upcoming events or diversions," said Walker. To access the interface,

all that is needed is a web browser such as Chrome, Edge or Firefox. Individual password-protected staff accounts can be created so that each user can set their own preferences. This also means that security can't be compromised by allocating the same details to a group of users.

Signs can be connected to Zephyr using a variety of communications such as GPRS, 3G, 4G and other wireless networks. www.swarco.com/stl

SPEED DETECTION ACCORDING TO VEHICLE TYPE

The A75 Gretna Green-to-Stranraer road, the main route through Scotland to the ferry port servicing Northern Ireland, introduces speed solutions.

With over 1.5m vehicles, including over 200,000 heavy goods vehicles, using the road each year, Transport Scotland commissioned Clearview Intelligence to conduct speed surveys at 12 locations between Gretna and Stranraer.

Speed limits differ according to vehicle type, such as passenger cars, vans and heavy goods vehicles. The surveys highlighted a recurring problem with the 85th percentile speed being unacceptably high, most notably with HGVs.

Clearview, working with the road operator, Scotland TranServ, developed a solution that identifies speeding per vehicle type and provides an alert to the driver.

Six locations were selected for maximum impact. However, problems with speeding vehicles are not confined to built-up areas, so the solution needed to be solar powered to cater for rural locations where it is impractical or impossible to connect to a mains supply.

Clearview installed solar powered vehicle "detection count and classify" equipment to record a combination of vehicle classification with identification of vehicles travelling above

the speed limit. Each of the six sites features two vehicle-activated signs (VAS) facing each direction of travel. The vehicle detection units communicate with the VAS to trigger a display showing the appropriate speed limit warning according to vehicle type.

Clearview said that this kind of vehicle-activated, dynamic speed warning system serves as a highly visible and immediate

reminder to drivers to monitor and manage their speeds appropriate to the legal limit of their vehicle's classification. □

www.clearview-intelligence.com

BELOW: Clearview installed its speed awareness solution in six locations on Scotland's A75.



Crane-and-bucket for Mobile Barrier MBT-1

The crane-and-bucket combination is positioned on its own 3m removeable wall section and provides a 9.15m reach and a capacity of 3900kg at base and 680kg at 9.15m. The unit can be operated from the ground or bucket via wireless controls. The bucket can be rotated out of the way or removed when not in use. Physical stop points ensure that the crane and bucket do not encroach on live lanes.

It also allows for safe

access in live traffic because of an insulated bucket for maintenance activities such as under bridge inspections, ITS/lighting and jet fan inspections in road tunnels, light poles inspection/lamp replacement, ITS signage and tolling gantrys.

The crane enables work crews to conduct activities such as guard rail and crash cushion replacement efficiently in a safe environment. This reduces the need for additional safety

assets, cuts down operational times onsite and minimises lane closures.

The barrier can also be rapidly deployed as an incident management device. The high walls of the MBT-1 minimise the 'rubbernecking' that occurs when motorists drive past incident scenes, often creating secondary incidents.

An MBT-1m version has been designed for security and defence applications. With around 455kg of strength

and up to nearly three metres high, the MBT-1m can stop a car, pickup truck or larger vehicle in a direct 90° impact of at least 70kph, according to the manufacturer based in the US state of Colorado. It's capable of stopping or deflecting even more, particularly when angled to the approach. The MBT-1m will also withstand small arms fire and can provide high levels of blast protection.

www.mobilebarriers.com

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