UK CONSTRUCTION TRANSPORT

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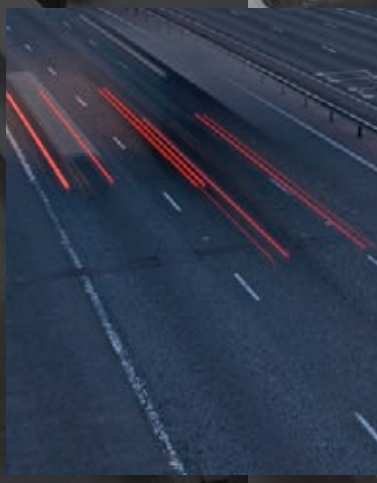

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NETWORKS FOR THE NEXT GENERATION

THE UK'S RAIL INDUSTRY IS UNDERGOING A SERIES OF CRUCIAL SIGNALLING AND TELECOMS UPGRADES WHICH PROVIDE FUTURE SUBSTANTIAL OPPORTUNITIES FOR THE UK'S CONSTRUCTION SECTOR. MIKE HEWITT, HEAD OF NEXT GENERATION NETWORKS AT ADCOMMS, EXPLAINS

Our railways are undergoing an almost unprecedented period of technological growth and change thanks to a series of vital signalling and telecoms upgrades. This investment will deliver a robust and cost effective network infrastructure, and further cement the UK's standing as a world-class hub for rail innovation and development. The opportunities these projects create for the rail industry and indeed the construction sector as a supporting body are of a scale not seen for decades. A number of key upgrades underpin these improvements.

FTNX – NETWORK OF THE FUTURE

Network Rail, which owns and operates the UK's rail infrastructure, will soon go live with an IP (internet protocol) upgrade known as FTNx (Fixed Telecom Network). This carrier class IP/MPLS (multiprotocol label switching) network will deliver a transport layer for all network services, regardless of type. This must deliver a secure resilient structure that will support the transformation of the UK's signalling network.

FTNx is essential to progressing the operational capability of our railways. Network Rail's multi-million build commitment also includes a signalling infrastructure upgrade to European Train Control System (ETCS) and the European Rail Traffic Management System (ERTMS).

The upgrade could yield a number of important safety benefits for the rail and construction workers involved. The ability to link to consumer devices could lead workers to sport wearable technology so they can be alerted to the arrival of an oncoming train, Network Rail has already proposed. Workers will also be able to operate more smartly and safely through the use of internet enabled devices. Data delivery used to analyse conditions, predict events and generate information remotely could also save having engineers out trackside in a dangerous environment.

The challenge is balancing this implementation of new technologies, while continuing to support our railways' existing services and safety systems. This will enable the monitoring of millions of sensors and devices, both connected and wireless, across our railways and bring benefits from data acquisition and analytics to improve the reliability of the network through predictive preventative maintenance. FTNx is far more than a mere network upgrade - it is the catalyst for an evolution in network technologies. With this project, Network Rail is rising to the challenge of bringing our Victorian infrastructure into the 21st century.

Improved connectivity for passengers is guaranteed, as is greater flexibility as to when and where we travel as capacity increases. The role that technology focused organisations will play in this transformation is key to the successful delivery of modern infrastructure, as integration of advanced technologies is critical.

At ADComms, we have demonstrated how successful a collaborative approach can be across a series of vital telecoms and signalling upgrades. For example, we were recently tasked by Network Rail to design and install a new 'leaky feeder' solution to support the installation of crucial GSM-R technology as part of a Merseyrail signalling and telecoms upgrade. This replaced Network Rail's existing wireless communication system within the tunnel structure beneath Liverpool.

We are now working on a new project to install GSM-R coverage across Heathrow Airport's rail tunnel infrastructure. This will see us working to install the latest phase one of the UK's ETCS compliant systems. The introduction of Crossrail services through to Heathrow Airport will rely on this upgrade to meet rising demand to provide ten trains every hour on the stretched Great Western Main Line. As an enabler for Crossrail, the project will contribute towards massively

increasing consumer choice, making Heathrow a more commutable option for many travellers. This is a very important project which, by enabling Crossrail trains to run, will deliver an improved experience for passengers. Commuters will have more choice as to their preferred route in and out of the city of London, with the option to use Heathrow Connect, Heathrow Express or Crossrail.

THE FUTURE'S BRIGHT FOR RAIL

The future holds greater connectivity and more travel flexibility for tomorrow's rail users as capacity increases on the network and operators start to tackle the issue of increasing WiFi provision. The construction industry will play a vital role in the delivery of these vital upgrades, and in return, will reward workers with a substantial increase in track side safety. These will make our railways a safer and more secure environment for its workforce to navigate – welcome developments the industry deserves.

Mike Hewitt

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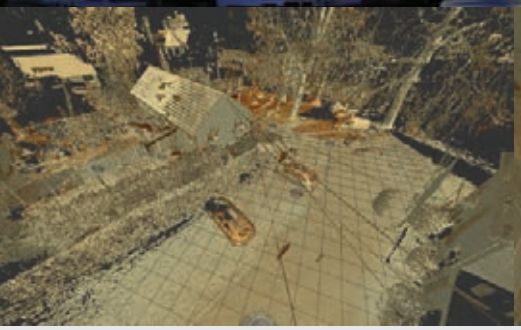

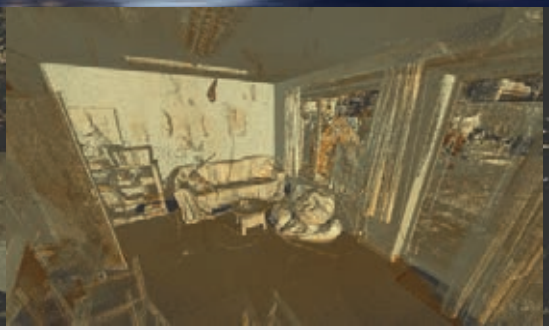

The highest in professional surveying standards

Subvision Surveys take pride in offering an extensive range of professional surveying services, with a highly experienced team of surveyors and CAD technicians at hand. Whether a 3D 'topographical', a 'Ground Penetrating Radar' (GPR), a 'Utility Mapping', or a 'CCTV' drainage survey, Subvision Surveys strive to meet the individual requirements of all clients.

The Company, which employs some of the most knowledgeable electromagnetic and GPR surveyors in the UK today, adheres to strict in-house and external training guidelines in the use of RD8000 & CAT4 electromagnetic tracing equipment and IDS Detector Duo GPR equipment.

With more than 18 years of industry experience, alongside the widest range of equipment and specialist techniques available, Subvision provide surveys of unrivalled quality at competitive rates to ensure client satisfaction to the highest standards possible.

Subvision Surveys is a firm believer in the fundamental importance of experience. The Company's skilled team of surveyors is trained in the use of electromagnetic equipment over a period of years rather than months.

Similarly, Subvision Surveys' in-house CCTV teams have considerable experience in undertaking surveys, producing reports and classifying defects, and are fully WTI trained in assessing both pipe and brick sewer surveys. Such experience is crucial to ensuring concise and accurate CCTV reports that are easily digestible by the client.

All on-site surveying teams hold valid CSCS and PTS Track Safety cards, and have been CRB/DBS checked and approved, while the Company's survey managers are IOSH qualified in managing safety.

With more than 16 years' experience in the industry, together with the widest range of equipment and specialist techniques at our disposal.

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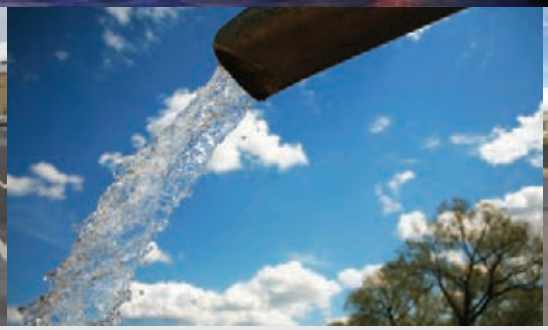

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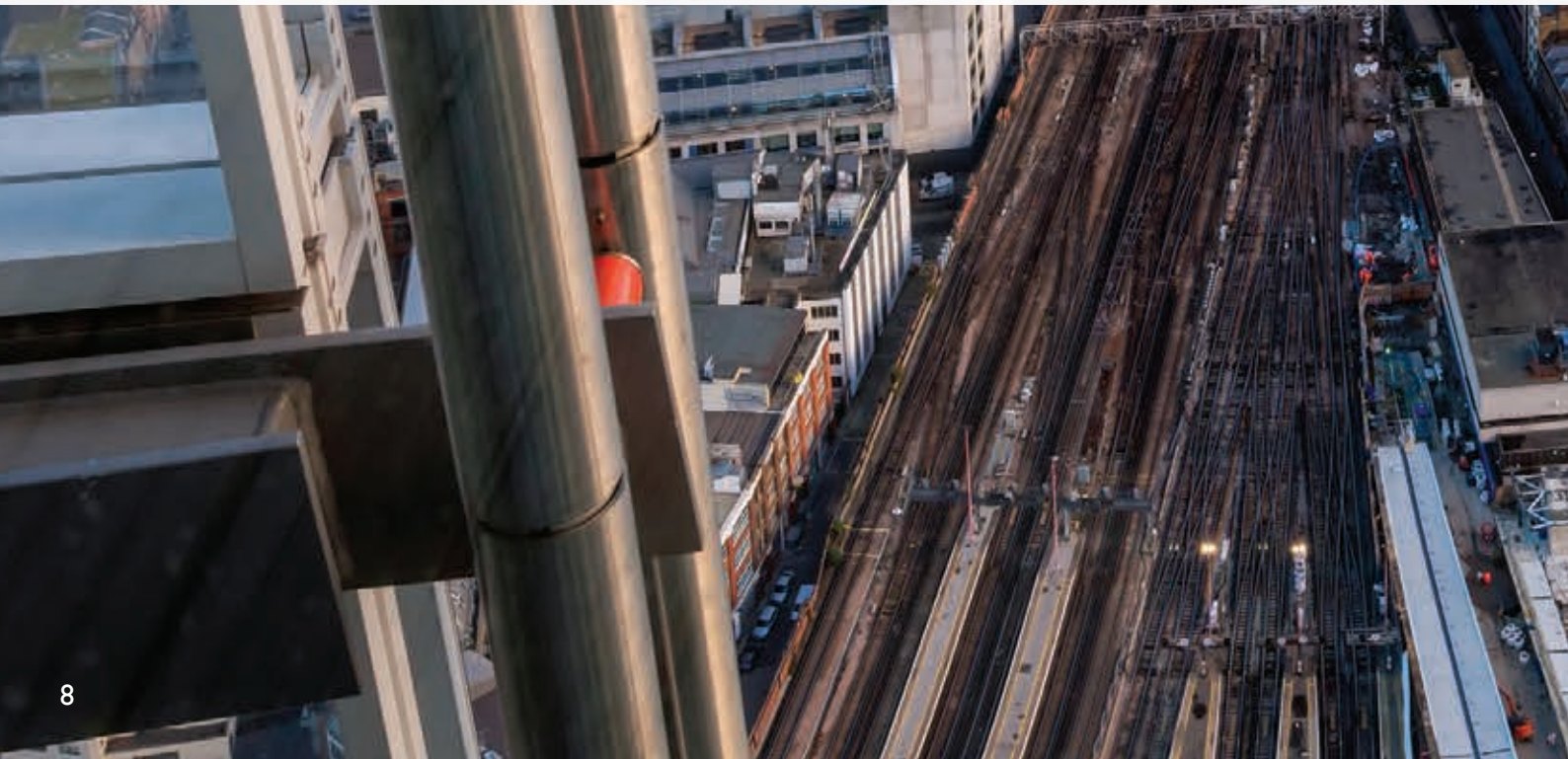
UNLOCKING REGIONAL ECONOMIC GROWTH THROUGH INFRASTRUCTURE INVESTMENT

SUE KERSHAW, DIRECTOR OF RAIL FOR EUROPE, CH2M

The UK is home to one of the world's most economically and culturally advanced cities in the world yet many of its urban areas outside of London are failing to achieve their growth potential. Global growth is increasingly driven by cities, with a study conducted by the McKinsey Global Institute highlighting that just 600 urban centres generate around 60% of global GDP. In the UK, however, relatively few northern cities are at the forefront of economic growth. London contributed over half of the net jobs created in cities from 2004 to 2013, and almost 85% of the net increase in private sector jobs in cities in the same period.

A key driver for unlocking regional economic growth is investment in infrastructure. Although we have seen increased political commitment in recent years for investing in transport infrastructure, northern cities in the UK are still lagging behind London and the South East when it comes to this, particularly in rail services. A recent report by think-tank IPPR North found that the Government had invested just £263 per head in rail infrastructure in the North East in 2014-15, compared with £3,100 in London.

It is the role of major programmes such as HS2 and the wider Northern Powerhouse agenda to create this shift and help bridge the North-South divide when it comes to transport connectivity. The HS2 'engine for growth' tagline is therefore not just a bold statement, but also a confident prediction of what high speed rail investment can do for the UK, and particularly the North. Phase I of the programme will build much needed capacity into our rail network, providing a major boost to Birmingham in the process, whilst Phase II will act as the real 'engine for growth' to our northern towns and cities. By creating high-speed rail links between the West Midlands and both Manchester and Leeds, HS2 will act as the spine of a wider northern transport network enabling better connectivity between the region's core economic hubs. Better connectivity and quicker journeys between the North's many mid-sized cities will create a metropolitan area comparable in size to the capital and open up the area to much greater investment opportunities. The Northern Hub rail programme in itself is expected to allow 700 more trains to run each day in the North of England by 2019 which will bring over £4Bn of wider economic benefits to the region.



Although rail investment contributes a major part of infrastructure spend one should not forget about the significance of other modes of transport in the wider debate. Following the Budget announcement in July this year to triple highways investment between now and 2020-21, it is clear to see the role that the Chancellor feels road connectivity has in creating better inter-city links and developing northern economies. There is also the case for improved regional airport investment as the discussions over south east aviation capacity continue in the wake of the Davies Commission report published in July. Although more capacity is required in the South of England there is still scope for better use of international airports such as Manchester, Liverpool and Birmingham - just 70 minutes from London - which have available capacity and scope to bring more travellers into and out of the UK.

Today infrastructure is seen as a way of not only connecting communities but also unlocking regional growth. However, it is not enough to simply replicate the investment in world-class infrastructure that has provided the platform for London's unparalleled growth. We must also capture the experience and examples of best practice learned from major London projects such as the Olympics and Crossrail, perhaps the most important of which is empowering metropolitan authorities to work in collaboration to achieve their wider goals.

As we watch the regional devolution agenda unfold and more city regions gaining control over their transport spending we will begin to see how major projects pave the way for improved multi-modal transport networks to unlock economic growth. It is only by combining measures like these with the efficient development and delivery of transformational infrastructure projects like HS2 or the Northern Hub that we can help the North grow and begin rebalancing the UK.

SITE EYE IS THE UK'S LEADING TIME-LAPSE FILMING COMPANY

Established in 2000, Site Eye have gone on to work on some of the UK's most prestigious construction and infrastructure projects and have this year been appointed as the sole time-lapse provider for Cross Rail, The Mayor of London's Office and Transport for London.

BACKGROUND

Founded by two brothers, Site Eye now employs 15 full time members of staff across the UK, managing over 200 active projects. From individual house builds to some of the largest construction projects in Europe, the use of Site Eye cameras has expanded significantly as marketing teams and project managers find the benefits of the technology and support.

Due to Site Eye's reputation as a service led organisation, their growth has been through referrals and recommendations from previous happy clients with little or no advertising over the last 15 years. The company has grown on the simple ethos that client satisfaction is the key to a successful project.

SERVICES

Site Eye was the first company in the UK to develop remote access, high quality, time-lapse cameras and they have gone on to continually research leading-edge technologies for the industry.

They have a selection of camera systems available including:

8K Time-Lapse, Live Streaming, Pan Tilt Zoom, 3D, 4K, Solar and 360 degree Time-Lapse as well as Real-Time Filming.

As they have employed their own in-house software and hardware developers, they can create bespoke systems to suit any specific project or request.

Their new Project Management system allows you to remotely log in and view every image taken and film produced by the cameras via your computer or hand-held device.

This is a particularly useful tool for management teams as it allows them to pinpoint activities on site throughout the duration of the project from anywhere in the world.

Marketing teams can make use of the monthly progress films produced as well as the live links to the cameras to help engage with their stakeholders and the wider public.

Site Eye engineers hold all of the relevant qualifications and training, allowing them to work independently on construction sites meaning any camera installation or maintenance is achieved with minimal impact on the day-to-day activities on site.

If you have any projects you think might benefit from Site Eye's services contact their head office on 01422 884477 or email info@site-eye.co.uk

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BRITAIN'S RAILWAYS NOW SAFEST IN EUROPE, BUT REGULATOR HIGHLIGHTS PRIORITIES FOR IMPROVEMENT

The Office of Rail and Road's (ORR) annual safety report has welcomed the rail industry's strong track record on improving safety and highlighted the need for it to meet the challenges of growth and change. ORR is supporting the rail industry to take a more proactive approach to managing safety, predicting and preventing problems before they pose a safety risk.

ORR's latest health and safety report combines the findings of its inspectors, who spend the majority of their time out on the rail network a detailed analysis of statistical trends and industry capability. The report highlights that the trend in harm to passengers is down by a third in the past ten years and Britain's railways are now regarded as the safest in Europe.

Following a decade of sustained focus on safety management and improvement, 2014 was the eighth consecutive year without any train accident-related passenger fatalities. It was also the second consecutive year with no passenger train derailments. The rail industry, informed and supported by ORR, has successfully collaborated to reduce the risk of passengers coming to harm when getting on or off a train. However, despite these successes, the latest safety data and evidence from ORR's inspections show that there is still room for improvement in terms of working more proactively. The industry needs to predict and prevent problems, focus on worker health and integrate safety by design.

ORR's Director of Railway Safety, Ian Prosser, said: ***"Great Britain's railways have a strong track record on improving safety, and after a decade of investment and growth, are now statistically the safest in Europe. While this improvement is to be commended, statistics only tell part of the story, the industry cannot become complacent. ORR's inspectors have identified that there is still room for improvement.***

"ORR's evidence highlights the challenges facing the rail industry, in particular, the need to manage growth safely. Our safety inspectors report a mixed picture, with improvements at level crossings, on platform safety and asset management. However, inspectors are also seeing

scope for improvement in safety risk assessments and worker health and safety.

"The regulator is working with the rail industry to help it take a more proactive approach, recognising and managing safety issues before passengers or rail workers come to harm."

IN ORDER TO IMPROVE ITS HEALTH AND SAFETY MANAGEMENT, THE REGULATOR WANTS TO SEE THE RAIL INDUSTRY:

- Be more proactive, predicting and preventing problems. ORR's independent safety assessments have highlighted inconsistencies in safety management across the rail industry. ORR has found evidence of excellence and best practice in places, with improvements in safety at level crossings, and the industry collaborating to reduce harm to passengers when getting on-or-off the train. However, ORR inspectors have also had to step in where serious issues have been found, such as insufficient safety risk assessment, lack of planning for maintenance activities, poor management of electrical working, lifting operations and working at height. Network Rail's slow start undertaking maintenance and renewals work against its plans, if not prioritised and managed carefully, has the potential to increase infrastructure safety risks. ORR has challenged Network Rail to identify and take steps to address this and will monitor and take enforcement as necessary.
- Integrate safety by design. The industry must take advantage of opportunities provided by its current multi-billion pound investment programme, to 'design out' or reduce safety risks when renewing or building new infrastructure, rolling stock and equipment.
- Ensure worker health is considered as important as worker safety. ORR's report and analysis shows that there has been a significant improvement in the rail industry's management of worker health, however there is still more to do. ORR is pushing the rail industry to improve its management of worker health risks, to make better use of data to drive change and take action on key health risks, such as hand arm vibration, musculoskeletal disorders, mental health and exposure to asbestos, silica and diesel fumes.

THAMESLINK PASSENGERS CATCH GLIMPSE OF HIGH-TECH COMMUTING FUTURE AS NEW SIEMENS-BUILT TRAIN ARRIVES

The UK is now home to the first brand new Siemens-built Class 700 Desiro City train, which is set to transform passenger experience on the Thameslink rail routes when it rolls into action next year.

Designed to provide much-needed extra capacity on the South-East's busy commuter routes, the train arrived at the newly constructed Three Bridges traincare facility near Crawley, West Sussex in the early hours of 31 July 2015.

Train manufacturer Siemens and operator Govia Thameslink Railway (GTR) will now be undertaking an exhaustive testing programme. Passenger services will begin in spring 2016 on the Thameslink network between Bedford and Brighton and later on routes to and from Cambridge and Peterborough, as well as to other destinations in Kent and Sussex.

The trains feature intelligent air conditioning, wide doors and open through-carriages which contribute to a more accessible and comfortable passenger experience. They will also bring the following benefits to commuters in 2018 in the morning three-hour peak:

- Over double the number of carriages, providing 80% more peak seats across central London (between Blackfriars and St Pancras).
- 60% increase in carriages and over 50% more seats from St Albans to London.
- Additional trains from Gatwick Airport with over 50% more running across central London between Blackfriars and St Pancras, with four trains an hour continuing to Peterborough and Cambridge.
- 1,000 extra seats from Brighton.
- 15% more seats from stations along the line from Peterborough and Cambridge.

The delivery of this first train is part of the Government-sponsored Thameslink Programme of infrastructure improvements and new rolling stock that will transform north-south travel through London, reduce crowding, increase capacity and improve reliability on one of the busiest routes in the UK. Thousands of jobs are being created as a result of the Thameslink Programme, including up to 2,000 across the UK supply chain in component manufacturing, assembly, construction of new depots and subsequent maintenance. A considerable number of components for the new train are being manufactured by suppliers throughout the UK, further emphasising the UK rail industry's ability to compete on a global scale.

Rail Minister Claire Perry said: *"We are investing record amounts building a world-class railway that provides more capacity, more services and better journeys. The Class 700 trains will transform rail travel for customers and provide a massive jobs boost for Britain and a significant boost to our economy.*

"The arrival of this first train is a huge step forward for the Government-sponsored Thameslink Programme, which is creating thousands of jobs across the country and is a vital part of our long-term economic plan. I am looking forward to these spacious new trains being introduced across London and the South East on schedule from spring next year providing quicker, more reliable and more comfortable journeys for millions of customers."

Commenting on the arrival of the first Class 700 train, Iain Smith, Programme Director of the Thameslink Rolling Stock Project at Siemens, said: *"The arrival of the first train into Three Bridges is a real milestone for Thameslink and is a hugely exciting moment for us at Siemens. It signifies major progress towards the transformation of the Thameslink services, a step change in the passenger experience and a real sense of the future. We will now be focused on testing and commissioning the train, while GTR trains drivers and maintenance staff to ensure that everything is ready for the start of service next year."*

In welcoming the new trains, GTR's Programme Director Keith Wallace, added: *"The new Class 700 trains will bring many changes and benefits to our passengers - from more frequent services on longer trains, to greater capacity, easier access, better on-board information, and an altogether better train environment. We're looking forward to our passengers seeing them in service next spring."*

Andy Pitt, Executive Chairman of train owners Cross London Trains (XLT), also added: *"I am delighted to see the first Class 700 train arriving in the UK in what is another significant project milestone. The next few months will see a series of tests completed before the train takes its first outing in passenger service on the UK rail network – another step forward in ensuring the train is completely ready for passengers."*

UKRAIL

RAIL ELECTRIFICATION, ISOLATION PLANNING & DELIVERY AND CONSTRUCTION

Professional, Cost Effective and Prompt Service

Our UK Rail electrification team has extensive experience in working on some of the largest redevelopment projects of the UK Rail network.

The teams expertise and experience means that we have a proven ability of managing the time and program pressures involved in delivering rail electrification schemes and also the pressures placed on delivering isolation and worksite services safely and on time.

We are adept at working collaboratively and choosing the right partners to deliver comprehensive programs of work as well as smaller one off works. We place immense value on creating and developing open and honest relationships with our customers to which our drivers are making all works safe for everyone, on time, without disruption and the lowest life cycle cost.

Isolation Planning and Delivery

We are experienced in possession and isolation management and by using this experience it helps us to eliminate the potential of possession/Isolation overruns.

From inception from the initial planning stages through to delivering and the implementation of the isolation and worksite services, we ensure that all risks are identified and managed to mitigate all risks. Safety is always our number one driver on all UK Rail managed projects, we provide a 24/7 "on Call" services which is fully facilitated by our senior management team as standard.

Our delivery teams are highly motivated and multi-skilled allowing them to be integrated in to the works team after worksite services have been performed, this "can do" attitude and training significantly reduces the onsite costs without compromising delivery or safety.

Our core resources within this sector are:

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- Isolation Planners
- Possession Planners
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- Engineering Supervisors
- Engineering Supervisors-Level A
- Authorised Persons-AC/DC
- Controllers Of Site Safety
- Protection Controllers
- Machine/Crane Controllers
- Points Operators
- Barrier Attendants
- Possession Support Staff
- PTS-Labourers
- Safe Work Leaders
- Safe Work Planners

Construction Services

With UK Rail's construction team's experience of delivering various size construction projects across a number of regions our core competencies are:

- Main Steel Erection
- Traction Return Bonding
- Installation of Small Part Steel
- Running New Conductors
- Erection of Line side switches and cross feeds
- Installation of troughing routes
- Survey and Analysis

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REVAMP OF PADDINGTON STATION WILL MEAN BETTER FACILITIES FOR PASSENGERS

Over the next 18 months Network Rail will be making significant changes to Paddington station to provide passengers with new and improved facilities and ultimately a better travelling experience.

The Grade 1 listed structure is currently benefitting from a renovation of its roof and an upgrade to its lighting system above the platforms, but now Network Rail is starting a major programme of work to significantly improve the appearance of the station as a whole and provide growing numbers of passengers – 61 million forecast for this year - with a wider range of places to eat, drink and shop.

DETAILS OF THIS WORK ARE AS FOLLOWS:

- The area known as 'The Lawn' which houses the retail outlets at the back of the main station building is to be renovated to provide passengers with better retail choices and more food and drink outlets.
- Better waiting facilities, including more seating areas, will be installed.
- The glazing on the roof of the station will be replaced with new, clear windows to let in more natural daylight.
- The roof will be cleaned and the pillars, roof and steelwork repainted to improve the station's appearance.

In addition, First Great Western will be carrying out work to their ticket office to provide 12 ticket counters, install new state-of the-art ticket machines and transform its appearance using a Brunel inspired design.

Natalie Holden, Network Rail's Senior Commercial Scheme Sponsor for the project, said: *"Paddington is one of Britain's busiest stations and getting busier each year, so it's only right that passengers have the facilities to make their travelling experience better.*

"We're working closely with English Heritage to preserve the heritage of this iconic building, making sure the changes we make are sensitive to the original structure and take account of its Grade 1 listed status."

During the 18-month duration of the project, train services will not be affected by the work but passengers will notice changes to the layout of the station and to some of the retail outlets.

Natalie continued: *"Paddington will remain open for business while we work, trains services will continue to run and there will still be places where you can buy food and drink.*

"We'd like to thank passengers in advance for bearing with us while we make their station a more pleasant place and provide them with a greater range of facilities."

While these improvements are carried out, Network Rail will also be continuing its work on the Crossrail programme, to better connect the South East with London and reduce journey times across the capital. In addition, work will be continuing as part of the Company's £7.5Bn modernisation programme to electrify the Great Western Main Line in preparation for the arrival of a new fleet of longer, faster, quieter and greener electric trains and to re-signal the route to provide greater reliability and punctuality for passengers.

First Great Western's Flagship Station Manager at Paddington, Ian Monks, said: *"Paddington is an icon of engineering and we welcome this work, which is being conducted as part of the most significant programme of investment on the Great Western network in a generation.*

"As well as improvements to many station facilities to better passengers' experience, the electrification of the Great Western Main Line will also see us provide our passengers with reduced journey times, more frequent trains and more seats - all the things we know that they want to see."

All the heat you need!

THERMOBILE®

Established in 1993 , Thermobile UK Limited is a leading provider of heating and cooling products for a wide range of market sectors; incorporating the motor trade, agriculture, horticulture, poultry, plant hire, construction, rail and the events industry.

What's more , with a highly trained team of personnel and extensive resources – the company is part of Thermobile Industries BV , a major European manufacturer of warm air heating products based in the Netherlands, which has been established for over 50 years - it offers not only great products, but genuine, practical and cost effective solutions.

With a central warehouse in Nuneaton, Warwickshire, Thermobile is renowned for providing professional advice, distribution and after sales service.

Its products are produced with great care and they are extensively tested. A permanent quality control system, accredited to ISO 9001, is part of the production process.

Thermobile has a vast range of products available, from direct oil fired heaters, natural gas/ propane fired and infra-red radiant oil fired heaters, waste oil heaters and dual voltage heaters plus dehumidifiers and mobile cooling units.

The company has a highly skilled and talented team and prides itself on the professionalism of its team and its commitment to superior workmanship and longevity.

This goes a long way to explaining why Thermobile is still thriving in such challenging economic times.

Thermobile is present at a number of leading shows too; ideal places to get to know the company and its products. In the latter half of 2015, it will be exhibiting at two major events, starting with the **Four Oaks Trade Show, Lower Withington, Cheshire on the 8th to 9th September followed by the Showman's Show at the Newbury Showground, 21st & 22nd October.**

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HOW ADVANCED VIDEO ANALYTICS WILL POWER THE SMART HIGHWAYS OF THE FUTURE

GADI LENZ, CHIEF SCIENTIST AT AGT INTERNATIONAL

Prototypes for connected vehicles continue to gain media headlines as technology advances. But it isn't just the vehicles that could benefit from smart Internet of Things technologies, it is also the road itself and how it is managed. Sensors such as CCTV and speed cameras are already deployed on our highway infrastructure, and as these become smarter, the volumes of data that can be collected increases and becomes more valuable to governments and councils looking to make their transport systems more efficient.

However, we need to start looking at where data can be harnessed from existing resources in order to deliver next-generation traffic management. To illustrate in more detail, ask a child to tell you what he sees on a road. He might say he sees a red car driving fast and an old lady about to cross the road further down at the traffic light. The boy would understand that an old lady with a walking stick would need much longer to cross than, say, a teenager on rollerblades. The same task – to not just take in information, but to analyse it instantly – has always been beyond computer technology, as facilitating automatic insights and associated decisions require intelligent thought. What we need is a system that operates in a way similar to the human brain, with video cameras able to analyse the information it gains in real-time.

Traditionally, anomaly detection by video cameras is made possible by inputting a set of rules into the camera's operating system. The camera is primed to recognise something strange on the road, as it is programmed to look out for anything "abnormal". This is great – as long as you know what the camera should be looking out for. Ultimately, this method depends on the programmer knowing in advance what "anomalies" are likely to be on the road. This requires a great deal of forecasting, and even then the system is not flexible and cannot adapt to the many different, and often new, scenarios that occur on our roads each day. During initial installation of these systems, the programming of the rules and designation of the areas in the camera's field of view to which these rules apply is a time consuming and labour intensive exercise that is therefore very costly as well.

A system that takes in data from thousands of sensors needs to operate on a more instantaneous basis to reflect the changing highway. With that in mind, machine learning approaches are starting to appear in some commercial applications of video. Basically, the machine is trained on what represents normal traffic flow and once the learning phase is over, the machine can autonomously indicate that something abnormal has happened. This is a more efficient method of detection because it is easier to spot something abnormal once you have learnt what is normal – after all, this is the way the human brain works. As the term "machine" here means the computer that ingests the video stream and runs the anomaly detection algorithm, this, in principle, could be run in the camera itself or very near to it. As you deploy smarter sensors to watch over traffic, it makes sense to do the analytics in the devices themselves rather than sending the data back for central analysis in a system which can be inefficient and risks bottlenecking. A system like this will make smart city management as responsive as it needs to be in the rapid environment of the highway, where a split-second decision could cause or prevent a crash.

SO WHAT SORT OF SMART TRAFFIC MANAGEMENT APPLICATIONS COULD BE BUILT ON ADVANCED VIDEO ANALYTICS?

In the vehicular traffic area, anomalous behaviours such as a stopped vehicle in a road lane, or someone driving on the hard shoulder, can be detected autonomously. Video cameras can also observe a pedestrian crossing and intelligently predict how quickly an individual can get

across as the system's video analytics has learnt to identify if that person is elderly or handicapped. This can be connected to the traffic lights themselves, with crossing time automatically extended to allow for a safe crossing. Eventually, this type of autonomous system will enable real time responses to the changing flows of different types of pedestrians crossing busy streets.

Advanced video analytics could also make roads much safer for cyclists. Cameras, quietly observing a junction or roundabout, will use advanced analytics to track and predict potential accidents between the projected paths of bicycles and cars turning across the bike lane. A warning signal is transferred through connected vehicles own systems or to digital roadside displays to alert drivers to a potential problem and help prevent a serious accident. These kinds of alerts could be particularly helpful for drivers of heavy goods vehicles, who often have poor visibility. Signs alerting drivers to cyclists are relatively common-place but currently very vague; using IoT analytics from video sensors, the signs may be able to alert all road users to the number of cyclists and their actions (are they moving towards the tunnel, for example). The ability to autonomously predict a collision could mean a sharp reduction in these fatal incidents when applied with other measures. This isn't just a super smart highway, but potentially a super safe smart highway.

The opportunities of vehicle to vehicle (V2V) communications will become apparent as more connected cars and trucks run on our roads. One possibility is more instances of related vehicle to infrastructure (V2I) where vehicles also communicate with each other but also with equipment on the roadway using standardized communication protocols. For example, roadside equipment measuring the height of trucks before height-limited tunnels or bridges can talk directly to an appropriate radio in the truck alerting the driver to take an alternative route in advance. So, in the future all these technologies V2V, V2I and video analytics will interplay to make our roads safer.

The implementation of these kinds of analytics from the data generated from connected vehicles and infrastructure could save governments a lot of money, but more importantly, these smart traffic systems also function without violating people's privacy as the systems aren't tracking vehicles based on their number plates but instead monitor activity for anomalous events. This should reassure anyone who finds the idea of AI "taking over" leaving their data vulnerable rather alarming - on the contrary: technology has never been so helpful or safe. While our highways already are "smart" in a lot of ways, we can look forward to a future where analytics ensure our roads are intelligent in a way that is really useful to normal people.

Gadi Lenz

TLS

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OVER £1.5BN OF INVESTMENT AWARDED TO UPGRADE MOTORWAYS IN ENGLAND

Highways England has appointed six joint-venture companies to Design and Build ten 'smart motorways' across England as part of a £1.5Bn investment.

Three of these projects will start in autumn this year: two in the Midlands - M1 junction 19 to junction 16 in Northamptonshire and the M5 junction 4a to Junction 6 in Worcestershire, and one in the North West - M6 junction 16 to junction 19 near Stoke-on-Trent.

The smart motorway schemes, part of the £15Bn government investment Highways England is delivering between now and 2021, will see 292 extra lane miles added to motorways. The hard shoulder will be converted to a traffic lane and signing and technology will tell drivers what speed to drive at, if lanes are blocked or closed and about incidents up ahead.

Construction contractors appointed are Balfour Beatty and VINCI joint venture, Costain and Galliford Try joint venture, and Carillion and Kier joint venture. With designers being CH2M and Hyder joint venture, Amey and Arup joint venture, and Jacobs and Atkins joint venture.

Valued at up to £1.55Bn in total, this is the second major procurement to be awarded under the company's Collaborative Delivery Framework (CDF). The first was the appointment of designers and contractors for the A14 Cambridge to Huntingdon improvement which was announced last month (June).

Roads Minister, Andrew Jones, said: *"As part of our long-term economic plan, we are investing more than £1.5 billion over the next five years in upgrading congested sections of motorway. This means better journeys for millions of people across the country, easier access to jobs, and stronger links between towns and cities. This is good for the economy and good for Britain."*

Highways England Smart Motorway Programme Director, Andy Watson, said: *"We have awarded these contracts to the companies who demonstrated to us they will work together, across all the projects, not just the ones they have been awarded. They proved they are driven to get the best results on price, quality and on reducing impact on road users: keeping the motorways flowing while they construct these vital improvements."*

The Balfour Beatty and VINCI joint venture have won a construction package including delivery of the M5 junction 4a to junction 6 smart motorway in Worcestershire, starting this autumn at a value of £45.4M.

They have also been appointed to construct two future schemes: the M6 junction 2 to junction 4 in the Midlands, expected to start work in 2017/2018, and the M4 junction 3 to junction 12 in London and Berkshire due to start work in 2016/2017, at an estimated combined value of up to £562M. CH2M and Hyder joint venture have been appointed as the designers for these two future schemes, valued between £25M to £30M.

The Costain and Galliford Try joint venture have won a construction package including delivery of the M1 junction 19 to junction 16 smart motorway in Northamptonshire, starting this autumn at a value of £65.39M.

They have also been appointed to construct two future schemes: the M1 junction 24 to junction 25 in the East Midlands, and the M1 junction 13 to junction 16 in Bedfordshire and Northamptonshire, both expected to start work in 2016/2017, at an estimated combined value of up to £302.3M. Amey and Arup joint venture have been appointed as the designers for these two future schemes, valued between £20M to £25M.

The Carillion and Kier joint venture have won a construction package including delivery of the M6 junction 16 to junction 19 smart motorway in Staffordshire and Cheshire, starting this autumn at a value of £129.5M.

They have also been appointed to construct three future schemes: the M6 junction 13 to junction 15 in Staffordshire, the M20 junction 3 to junction 5 in Kent, and the M23 junction 8 to junction 10 in Surrey and West Sussex, all expected to start work 2017/2018, at an estimated combined value of up to £345M. Jacobs and Atkins joint venture have appointed as the designers of these three future schemes, valued between £20M to £25M.

Minos lights the way

Innovative, Birmingham-based business, Minos Systems, has been involved in a number of projects with big names such as Highways England, Welsh Assembly, Amey and many local authorities over the years. The company has the support of Italian sister company UMPI, with its roots firmly established in the electrical engineering sector and is well-known, through another sister company Remco, for its remote monitoring expertise. Minos has built on this and provides intelligent solutions using the existing streetlight infrastructure, winning awards for green technology and high growth potential from the ITC for the company's far-sighted thinking and business approach. Both Minos Systems and Remco are part of Smart Inclusion Group, owned and managed by MD Phil Bailey.

The Minos lighting control system is one of the first to be Morlics approved by Highways England. In the strategic plan launched by HE earlier this year, it outlines environmental impact as one of its 5 main aims. Having been heavily involved in a number of 'Midnight Switch Off' projects, Minos has more than proved its worth in terms of reducing carbon emissions.

Phil Bailey, MD, Minos Systems UK

"We are committed to maintaining our focus on reducing Highways England's carbon footprint, and working closely with our suppliers to reduce emissions from network related activity, and to move from carbon measurement to the challenge of carbon management."

Highways England

Minos Systems UK worked with Amey on Highways England's MAC area 9 'Midnight Switch-off' (MNSO) project where it has provided a remote monitoring and controlled CMS solution for motorway lighting. Area 9 has the largest quantity of motorway MNSO equipment in the UK and therefore the largest savings in carbon emissions. The MNSO Area 9 Project alone affected 4400 motorway lights across 64 motorway sites.

"UMPI MINOS CMS has already been proven with 62 miles of part night switch off. The Agency now intends to prove it as a flow based dimming and switch off system i.e. as a Motorway Road Lighting Control System compliant CMS that uses MIDAS data".

Jason Burrows, Highways England

Award-winning Minos Systems UK

Minos has created a niche for itself in the way it uses the existing streetlight infrastructure. The beauty of its execution lies in maximising existing investment in streetlights, regardless of their age or type. This means there is no need to dig up roads or increase street furniture – making the streetlight a multi-purpose carrier for different requirements without compromising its primary function of lighting our roads and highways.

More broadly, the company applies state of the art technology to the streetlight infrastructure to reduce carbon emissions, lower costs and provide a range of vital services: streetlight control, electric vehicle charge, Broadband for remote parts of the UK and intelligent CCTV.

In-house manufacturing, Minos Systems UK

CASE STUDY

THE PROJECT:

Equipping motorway lights with Minos' advanced streetlight control and management system - based on powerline communication to control the light according to time scheduling, weather conditions and traffic.

Electrical Panels: 112

Lighting Points: 5509 (2214 Syra controlled) HPS Lamps (150W - 1000W)

Motorways: M1, M2, M4, M5, M6, M27, M54 & M62

NEEDS:

Most flexible light management, facility to handle virtual lamp groups for management of specific areas or highway sections

Automatic fault detection with statistics report for any kind of fault

Facility to restore the light of a specific junction remotely

Minos Systems integration with MORLICS system

Dynamic dimming system connected to the MIDAS traffic management system

Visit the Minos website for more information: www.minos-systems.co.uk

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