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MINIMISING IMPACT
WHILE MAXIMISING BENEFITS

PAUL SHEFFIELD
ICE PRESIDENT

As an institution with more than 200 years of history we have been through some turbulent times. The coronavirus pandemic is certainly one of those times and is creating uncertainty and disruption around the world. The Institution knows, through experience, that it is these times that require us to be pragmatic, flexing and bending with the wind without breaking.

We also know that there is a security to be found in the familiar and the reliable while all else around us seems to be changing at a frenetic pace. You can also be absolutely assured that your Institution is doing everything it can to develop high quality knowledge, policy and membership products that address the current crisis and whatever may come after.

Part of that process is why I am writing this column for you. We know that members truly value the insight, information, news and expertise that the pages of your member magazine offer and how important it is to maintain this no matter what is happening around us. However, we also recognise that putting strain on already stretched resources by distributing the hard copy of *NCE* may not be appropriate under the current circumstances, which is why this and the next edition will be digital.

Across the ICE we have seen tremendous change in the past months and have been able to achieve some startling things in an incredibly short space of time. We, of course, remain committed to delivering activities in line with our charter and minimising the impact of the pandemic on the services we offer to you as part of your membership.

We have already moved our entire knowledge offering online. Members can continue their professional development online through our member-only Learning Hub and we have been adding vital programmes to this to support you as we all learn to work remotely. But, in addition we have developed a whole programme of strategy sessions and prestige lectures that will keep you firmly abreast of the big issues facing civil engineers. The first of these lectures in April attracted over 1,000 people online.

Coming up this month are strategy sessions addressing systems thinking and digital technologies and lectures exploring the future of flood defence and unpicking the recent Toddbrook reservoir review.

The Institution has also begun to develop longer term thinking for the future. We know that Covid-19 will drive fundamental strategic changes to the future of infrastructure.

The pandemic has shone a light on the extreme ends of the spectrum between economic growth and carbon reductions, between having job security and staying safe and between access to products that are cheap versus guaranteed access to strategic goods. How we build a better new normal will be important and with our new Covid-19 programme, working with the Infrastructure Client Group, the ICE will seek to inform and guide the debate at all levels.

With all the changes and significant interventions the ICE is undertaking and has planned it is hugely important to us that we can reliably remain in contact with you all, so we ask that you make sure your contact details are up to date on the MyICE section of the ICE website. That way you will be guaranteed to receive the latest updates and information from the Institution.

As I mentioned at the beginning, these are unprecedented times that require pragmatism, while continuing to provide secure and reliable touch points. This may be a temporary change to the distribution method of *NCE*, but I hope you agree that we are continuing to offer an invaluable service in what are difficult times for everyone.

*Paul Sheffield is ICE President*
The coronavirus pandemic has thrust airport expansion plans under the microscope as engineers reassess the role of air travel and look at ways airports could be reconfigured in a post-Covid world.

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How will the coronavirus pandemic change our infrastructure use?

During April, UK road traffic dipped to as low as 73% of pre-coronavirus levels; while national rail and London Tube travel both fell below 80%

The ICE is progressing work to build an understanding of what the longer-term lifecycle implications might be if changes to infrastructure use patterns were to become permanent.

There are two parts to this. The first is to build an understanding of attitudes towards life under lockdown. This will be done through public opinion polls and focus groups.

The second is to work with the government and the UK’s infrastructure providers to identify the policy interventions that would be required if public opinion has moved to a position that is now at odds with traditional norms around working and socialising.

The results of this work, and other coronavirus-related projects that the ICE is progressing, will be published throughout the course of 2020.

If you would like to find out more please contact policy@ice.org.uk

Airport capacity in the UK was a national talking point heading into the coronavirus pandemic, with expansion at Heathrow ruled out on environmental grounds by the Court of Appeal.

That decision by no means spells the end of plans for a third runway at the UK’s largest airport and we can expect a resumption of that debate in due course.

In fact, when that happens it is likely that the environmental challenge to Heathrow’s expansion will have strengthened. During April, departures from the largest UK airports fell by around 90% as a result of national and international lockdown restrictions.

On any measure, this has been positive from an air quality and emissions reduction point of view.

Of course this scenario has been dictated and not chosen. There are no guarantees that consumers and businesses will fly less when they have free choice again.

In any case, can a global economy thrive without moving people and goods physically via air travel? This too is fundamental to the airport expansion debate.

Beyond airports, there have also been significant changes to the demand profiles of other infrastructure networks as lockdown measures have confined all but essential activities to the home.

During April, UK road traffic dipped to as low as 73% of pre-coronavirus levels, while national rail and London Tube travel both fell below 80%; equating to millions of every day journeys having not been undertaken.

For those job roles where it is suitable, this has led to wide-scale remote working, which in itself has placed new demands on other infrastructure networks, such as telecommunications and broadband connectivity.

If these arrangements were to become permanent after the economy emerges from the other side of the coronavirus pandemic, this could mean both a reduction in fixed costs for businesses and in travel costs for those employees who commute long distances for work.

As part of its response to the coronavirus pandemic, the ICE is progressing work to build an understanding of what the longer-term lifecycle implications might be if changes to infrastructure use patterns were to become permanent.

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High Speed 2 stations and trains could be redesigned for post-coronavirus world

**HIGH SPEED 2**

High Speed 2 Ltd chief executive Mark Thurston has admitted that the mega-project’s stations and trains may have to be redesigned to factor in travel habits in a “post-coronavirus world”. Thurston revealed that a team has been set up within HS2 Ltd to observe the changing travel habits of the population over the next 18 months, while speaking during a Railway Industry Association webinar on the impact of the coronavirus. He said that the initial station and train designs “from a pre-coronavirus time” may have to be changed during detailed design to factor in things like social distancing. “We’ve clearly got designs thus far that are based on pre-coronavirus norms. How we adjust those over time, in fact if we need to adjust them, only time will tell,” Thurston said. “The likelihood is that the world will never be the same again and we have to figure out what we want to leave behind.” He added: “From a design point of view we need to look at what that means in terms of density of people as well, both on trains and in stations. I think that is a real challenge for us and we will not know the absolute answer until we observe people’s travel habits for the next six, 12 or 18 months, and then we adjust our designs to those habits. “I think it is a great time and opportunity for High Speed 2 and the supply chain to come together and innovate.” Thurston added that it is important to set the ball rolling on this thinking early as there may come a time when legislation forces the industry to implement new design standards.

**AIRPORTS**

HEATHROW ‘UNLIKELY’ TO RESTART EXPANSION PLAN SOON

The Civil Aviation Authority (CAA) has said that it is “unlikely” that Heathrow’s expansion plan including construction of its third runway will be restarted in the “short term”. It said that it is adjusting its plans and is now setting new price controls for Heathrow as a “two runway” airport for the period starting January 2022. Heathrow Airport Ltd (HAL) paused its expansion programme in March, following a Court of Appeal ruling. That decision coupled with impact of the Covid-19 pandemic has led to the CAA’s belief that HAL is unlikely to resume its expansion programme in the near future. It adds: “It is unclear whether capacity expansion will proceed and at the very least there will be significant implications for the timeline of the capacity expansion programme.”

**ROADS**

£27BN ROAD SPENDING PROGRAMME FACES LEGAL CHALLENGE

Sustainable transport activists at the Transport Action Network are appealing to the High Court to order a judicial review of the government’s roads programme. They claim the Department for Transport (DfT) ignored environmental legislation when it approved the five year plan in March. It includes £14.7bn worth of road upgrades between 2020 and 2025. The Lower Thames Crossing and the controversial Stonehenge Tunnel are also among the major projects in the plan. The Transport Action Network is launching the appeal following a court ruling which outlawed the government’s National Airports Policy Statement which backs Heathrow Airport’s expansion plans. The Court of Appeal ruled that the statement failed to consider the government’s commitments to cut carbon emissions under the 2016 Paris Agreement.
JUNE 2020   |   NEW CIVIL ENGINEER

STRUCTURES

POLCEVERA NEARS FINISH

The final span of the new Polcevera Viaduct in Genoa, Italy was lifted into place 19 months after the collapse of the old structure which killed 43 people. This marks the end of the main construction phase, and the bridge is scheduled to open to traffic in July – on schedule despite coronavirus restrictions on site. A joint venture between contractors Salini Impregilo and Fincantieri has led construction with Rina Consulting working as project managers.

ROADS

HIGHWAYS ENGLAND AWARDS SMART MOTORWAYS ALLIANCE CONTRACT

Highways England has announced the winners of its Smart Motorways Alliance contract, worth £4.5bn. Winners include Fluor, WSP, Jacobs Engineering, Costain, Balfour Beatty, and Bam Nuttall/Morgan Sindall Joint Venture. The alliance partners will design and deliver Highways England’s smart motorway programme for 10 years. The value of the framework is expected to be £4.5bn, but could rise to £7bn. A Highways England spokesperson said: “Today’s announcement marks the start of a pioneering new approach to how Highways England does business. The 10 year framework will see us join forces with six partners to safely deliver a key element of the government’s second Road Investment Strategy.” The smart motorway programme will include measures set out in the recent Department for Transport stocktake of smart motorway safety concerns.

RAIL

MANCHESTER ‘SUPER HUB’ TO UNDERPIN HIGH SPEED NORTH PROJECT

A Manchester Piccadilly “super hub” has been proposed as part of the High Speed North rail project. The Revisiting High Speed North report by rail research company Greengauge21 proposes incremental rail improvements to help kick-start the economy in the North. It suggests a new tunnel from the western suburb of Ordsall to Manchester Piccadilly, could connect to High Speed 2 (HS2) and Northern Powerhouse Rail. Fast trains from Chester, North Wales, Liverpool, Blackpool, Barrow and Glasgow could travel through the super hub with services heading east across the Pennines to Leeds/Bradford, Sheffield, Hull, York and Newcastle. The report adds that the super hub would meet the desire of Manchester authorities for an underground “through” station at Manchester Piccadilly along an east-west alignment.

KEY STATS

£1.7bn
Value of A303 upgrade between Amesbury and Berwick Down

ROADS

STONEHENGE TUNNEL AND A303 UPGRADE DECISIONS DELAYED

Transport secretary Grant Shapps has announced that the planning decisions for two upgrades on the A303 will be delayed until 17 July to allow for further work to be undertaken. Planning approval of the A303 Amesbury to Berwick Down section, which includes the Stonehenge Tunnel, was expected in April after funding was approved in the March Budget. The Development Consent Order application for the £1.7bn scheme, which includes a 3km tunnel and 13km of dual carriageway construction, was made on 2 January following recommendations by the Planning Inspectorate. Shapps’ announcement also delays the decision about the £179M A303 Sparkford to Ilchester dualling scheme to upgrade 5km of trunk road to dual carriageway. A decision on this was initially expected in December last year.
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Robert McAlpine and Kier were originally awarded the main civils packages in July 2017, but were unable to start work until the notice to proceed was handed down. This was originally earmarked for November 2018, with construction due to start in “early 2019”. Decisions on the go-ahead were delayed several times, with contractors told to “go away and sharpen their pencils” to reduce costs.

An HS2 Ltd spokesperson confirmed that talks with contractors about costs were still ongoing as recently as February this year. At the time, HS2 Ltd said that re-tendering the contracts would be a decision for the government, if HS2 Ltd was unable to agree costs with its contractors. There now appears to have been an acceptance by HS2 Ltd and the government that the main civils packages are going to cost more than the original £5.8bn that was budgeted.

The cost of all main civils works is now expected to come in at £12bn, more than double the initial £5.8bn target price.

A source at one contractor said: “What we were being asked to get down to last year, or the year before was unreasonable. It was never going to happen and it would have been irresponsible for any of the JVs to price the job low just to get the go-ahead. I believe the figures being talked about now are far more realistic.”

Opponents of the scheme have questioned the timing of the decision, with anti-HS2 lobby group Stop HS2 labelling the go-ahead announcement during the coronavirus lockdown as “shamelessly opportunistic”, while councillors in Buckinghamshire said they were “dismayed” at the timing of the notice to proceed.

Lowery – who is also Eiffage UK executive director – explained that notice to proceed unlocks a huge amount of value, allowing contractors to sign deals with sub-contractors and suppliers.

“There’s still a lot of preparatory work and detailed design to go before work on the ground begins,” Lowery said.

“What notice to proceed does is it allows us to sign contracts with our strategic delivery partners for the next stage. It also allows us to get on board tier two, three and even tier four suppliers and sign contracts with them.”

He added: “There has been a huge amount of work put in to get to notice to proceed. We have 10 strategic partners which got us this far and now we are in the process of renegotiating with them to discuss how we can take that on to the next stage of detailed design and then construction.

“Regardless of whether or not we were in lockdown we would not be looking at starting work until later this summer or early autumn. That said, we are looking at construction schedules and what work can be brought forward in the case of lockdown as we are determined to stick to the overall schedule and end date.”

The EKFB JV will deliver lots C2 and C3 of HS2 phase one between London and Birmingham. The lots cover an 80km section between the Chilterns and Warwickshire and include 15 viaducts, 5km of tunnels, 22km of road diversions.
67 overbridges and 30M m³ of excavation. The total value of the section, including the design and development work already completed is now £2.3bn – up from the original £1.3bn target price.

The EKFB JV originally comprised Eiffage, Kier and Carillion. When Carillion collapsed in January 2018, Eiffage and Kier continued alone. Now that notice to proceed has been given, Ferrovial and Bam Nuttall have come on board.

“Having Bam Nuttall and Ferrovial on board expands our capacity and capability to carry out the next phase of work and ensures we have the capacity for when it comes to construction,” Lowery added. “It also means we have experienced partners from all over the Continent, who have a wealth of experience on high speed rail projects.”

The story is much the same for the other three main civils JVs working on the project, with full scale construction not really starting in earnest until next year. The first tunnel boring machine (TBM), for example, is not scheduled to be launched until 2021, and major earthworks are unlikely to begin until the turn of the year.

That said, some big temporary bridges are scheduled to go in over a motorway near Birmingham, huge construction compounds will be set up at the Chilterns tunnel south portal near the M25, and there is still an enormous amount of archaeology work to finish.

At Old Oak Common station in West London, piling work is expected to start at the end of the year. HS2 Ltd is also expected to appoint contractors for its Birmingham stations and rail systems. Although construction is still some way off, SCS JV managing director James Richardson said that notice to proceed gives the industry “confidence […] in these changing times”.

“We’re delighted to have been granted notice to proceed to commence full detailed design and construction of Phase 1 of the HS2 railway in the southern section of the overall project, which includes Euston tunnels and Northolt tunnels,” he said.

“HS2 will support the UK economy for years to come and will form the backbone of our rail network connecting around 30M people. It will also enable us, in these changing times, to give confidence to our businesses, supply chain and the communities that we are working with, by creating thousands of jobs and apprenticeships and strengthening the industry for the future.”

**ROADS**

**Mixed Covid messages**

Road workers complain of unsafe working conditions

**BY ROB HORGAN**

The mixed approach to highways work during the Covid-19 pandemic is leading to confusion and anger among road surfacing and maintenance crews. Highways maintenance workers have told *NCE* that they feel “unsafe” carrying out work which they say is impossible to do while adhering to social distancing guidelines.

They claim that the situation is made worse by the different approaches adopted by local authorities across the country, which is causing resentment among workers still on site. While some councils have stripped back work to “essential repairs” only, others are sticking to their maintenance schedules and some are even ramping up the amount of work to take advantage of the lower levels of traffic on the roads during lockdown.

*NCE* has been alerted to a row about coronavirus safety which occurred at one local authority highways department in the north of England in late March. It is understood that senior local authority managers were determined to push ahead with carriageway works while traffic levels were low despite the misgivings of maintenance crews.

“Covid-19 was really taking off and it was felt that carrying out the necessary activities was not compatible with social distancing,” said a technician, speaking on the condition of anonymity. “Initially, middle management was instructed to progress the works regardless of the concerns of operatives,” the technician said. “Eventually good sense prevailed and the bosses backed off.”

Similar stand offs are occurring across the country, with workers forced to choose between their health and their pay packets. Another worker in the south of England – who works for a tier one contractor – said that “there is no way” social distancing can be adhered to for road maintenance crews.

“It is impossible to keep 2m apart while carrying out most jobs,” the worker said. “There are some jobs where you can do it on your own, but a lot of work requires at least two people working in close proximity.” He added: “We raised it with our bosses and they were sympathetic but said as long as no-one was showing any symptoms [of Covid-19] then we had to keep on turning up or it would be marked as an unauthorised absence.”

Trade Union Unite has urged local authorities and Highways England to do more to protect highways worker safety. In response, a spokesperson for Highways England said that “all [Highways England] sites have strict safeguarding measures in line with PHE [Public Health England] guidance, to prevent the spread of Covid-19”. The spokesperson added work is essential “to ensure life-saving medicine, equipment, supplies and healthcare staff can travel to where they are needed most”.

One council that has managed to achieve harmony with its highways maintenance workforce is Oxford City Council. Between the last week in March and the end of April Oxford Direct Services (ODS), a local authority trading company wholly-owned by Oxford City Council, completed 381 road maintenance inspections and repaired 1,191 defects. This is a marked increased on the same period last year when ODS completed work on 708 defects. ODS is also bringing forward its programme of planned resurfacing works for Oxford city centre,
The advantages of technology in engineering are being brought to the fore by the Covid-19 lockdown. Across the country, construction firms have been forced to adapt to the Covid-19 crisis and subsequent lockdown forcing the industry to think on its feet.

In the past, construction and engineering firms have implemented technology for the office-based side of construction, often neglecting construction sites themselves.

The pandemic has the potential to change this – and fast – as the industry discovers that with technology, remote site management is feasible.

Remote site monitoring software company Sensat chief executive James Dean believes the growth of his company is proof that the construction and engineering sectors have been on the brink of a technology revolution for some time. He believes that solutions brought about during lockdown will now accelerate that revolution.

“It’s a forcing function on this industry, which didn’t really need to change before,” said Dean. “Suddenly things have had to change overnight. What are going to be the long term implications of that?

“If companies use these new technologies for 90 days and they become habits, it’s unlikely they’ll go back to the old way of working. So we could actually see a productivity boost of double digits in the course of the next year.”

Sensat’s value has risen from £0 to £47M in its three year lifespan, a growth that looks set to increase as the construction industry turns to technology during the coronavirus pandemic.

The company has made its remote working platform Mapp free for six months. Using Mapp, project teams can take snapshots of sites at the point of closure and monitor them remotely throughout lockdown. On the Barking Riverside Overground Extension project being carried out by a Morgan Sindall Volker Fitzpatrick JV this has already been done.

The use of artificial intelligence (AI) has also increased since lockdown. Vivacity Labs has been using its AI sensor network – which provides continuous streams of data on urban transport – to monitor the impact of Covid-19 on highways. It showed that by 25 March, following lockdown, there had been a 60% reduction in traffic across the country.

In Oxfordshire, data from the sensor network has also been processed to calculate whether social distancing rules are being followed by pedestrians – it has found that peak daily pedestrian interactions have fallen by 70%. This type of tracking technology is now being trialled as a means of keeping workers distanced and safe on site.

Construction management software firm Procore has identified a similar shift towards technology uptake during lockdown, according to its director of UK and Ireland Brandon Oliveri-O’Connor.

“We were all waiting for a catalyst in this industry – the momentum was building,” he said. “There is going to be a time post-Covid – if it’s not happening already – where executives are looking each other in the eyes and saying, ‘How could we have better prepared for this? How can we ensure that we’re prepared for this in the future?’”

Procore offers a platform that connects business applications and stores the information in one place, allowing companies to easily view important data and standardise operations. Using iPhones, Android devices or tablets, field communication – such as site diaries – can be logged and connected back to offices in a single platform.

Oliveri-O’Connor added the firms that have already used technology like this have found remote working relatively straightforward. He believes this makes the case for more remote working once lockdown restrictions are relaxed and the “new normal” is established.

Digital tools for public engagement are also proving their worth during the pandemic, with many councils and the Planning Inspectorate now in the process of setting up digital public consultations.

Aecom has launched its own virtual public consultation tool to digitally showcase consultation materials, including videos, maps and plans. “Much has happened in the past month – and those at the forefront of construction technology appreciate the gravity of the pandemic but also feel it could make the industry better,” said Aecom global lead for digital transformation Kevin Carlson.
Inside Track

Latest Italian bridge collapse highlights continued maintenance failings

Cracks in deck grew over nine years before catastrophic failure

BY ROB HORGAN

Severe cracks had propagated in the Albiano Magra bridge in Italy several years before it collapsed in April, according to images discovered by NCE.

The 260m long bridge near the town of Aulla, midway between Genoa and Florence, collapsed in April.

Due to lockdown the usually busy trunk road was almost empty and only two motorists were injured.

Images of the collapse released by the Italian fire and rescue service show that five approximately 50m spans of the bridge on the SS330 road collapsed. An investigation into the cause has been launched, and 17 people are currently under investigation. Initial reports suggest poor maintenance could be to blame.

According to Italian newspaper La Repubblica, a crack had appeared in the bridge last November, but inspecting engineers decided that it posed no danger to the structure. Images obtained by NCE via Google Maps show visible cracks across the deck at each abutment, up to nine years before the collapse. The images – taken in 2011, 2018 and 2019 – reveal that the cracks worsened over the years, getting considerably worse between 2018 and 2019.

Analysing the images of the cracking, independent bridge consultant Simon Bourne said that they should have been recognised as an “early indication that something was moving” above at least one of the bridge’s piers.

“The crack looks like fairly typical movement around the expansion joint at the end of the bridge, in other words it is not a structural fault,” Bourne told NCE.

“Over the piers, you would expect to see some cracking in the road surfacing, as the bridge spans expand and contract with temperature, leading to surfacing cracks that open and close horizontally, in line with the bridge. But there should not be any vertical movements.

“At the abutments, you would expect the same horizontal movements too, but it is also common for there to be some vertical movements behind the abutment, where the ground settles, but the bridge structure does not. This is common in many bridges, with an ongoing maintenance regime required to restore the road surfacing levels over the abutment, to keep them level with the structure of the bridge itself.

“This may be all that we are seeing. However, if there were vertical movements over the piers or vertical movements of the bridge itself in front of the abutment, then something is very wrong. Equally, excessively large horizontal movements (ie more than due to normal temperature variations) would also indicate that the bridge structure was in trouble.”

He added: “Looking at the failure pictures again, it does seem that something odd has happened around Pier 1 and Span 1 [the pier and the first span over the river], as the collapsed deck/arch is very different at that location to the other areas of collapsed deck and arch.

“This suggests that the failure did start around Pier 1/Span 1. Once that occurred, bringing down Span 1, the progressive collapse mechanism begins, pushing over the other piers and bringing the others arches down.”

It is the third incident involving a road bridge in Italy in recent years. The most catastrophic was the failure of the Polcevera Viaduct in Genoa, which collapsed in 2018, killing 43 people and injuring 13. The rebuild project is on track to be completed later this year (see The Edit, page 8).

A motorway bridge on the A6 in Liguria also collapsed following a landslide in November last year. A 20m section of the viaduct collapsed after it was hit by a landslide caused by torrential rain. No injuries were reported from the Liguria collapse.

Following the collapse of the Polcevera Viaduct, a leading Italian research body demanded the implementation of a “Marshall plan” costing “tens of billions of Euros” to bring the tens of thousands of bridges across Italy that have exceeded their design life up to standard.

Images of cracking within the deck can be viewed here: www.bit.ly/AlbianoCollapse
GROUN D H E A VE SOLUT I O N S

PRODUCTS FOR THE PROTECTION OF BUILDINGS FROM THE EFFECTS OF EXPANSIVE SOIL
In reality, the modern way of looking at running any organisation or charity – with ever increasing financial regulation – is to reduce the number of trustees so that you can effectively create an executive board. These need to be people who are used to running a business and dealing with profit and loss and managing the legal issues too. That is really difficult to do with a big cohort of people, so the recommendation at the time was to change the structure of the ICE to introduce a much smaller Trustee Board with 12 people.”

Council agreed with the changes and put it out to ballot in June 2018. “There was a feeling from some members that this change was rushed through and not properly consulted or explained,” says Sheffield. “There were also some who did not feel that the changes were necessary at all.”

As a result of these concerns, a Special General Meeting (SGM) was called following that initial ballot to check that due process had been followed. “There were three votes put to the SGM that questioned the validity of the process and direction of travel of the move to a smaller Trustee Board,” says Sheffield.

“It was concluded that the ballot had been done legally and the membership had voted in favour of the changes.”

“The Council then tried to work with the membership to see what changes could be instigated to improve both governance and transparency of the Institution going forward without overturning the changes that were brought in by the ballot.”

“It was a look at a more collaborative approach.”

This collaborative aim led to the Presidential Commission, which is
ICE members will be voting on the composition of the Trustee Board, the nominations committee and about the way Special General Meetings are held.

KEY POINTS FOR THE 2020 BALLOT

The ballot will cover three points that the Presidential Commission identified as requiring changes to ICE bylaws in order to implement. ICE President Paul Sheffield explains the significance of these issues.

TRUSTEE BOARD
“The Trustee Board is a new body that was brought about two years ago, but the Orr Commission has looked at the constitution of the board,” explains Sheffield. “The original 2018 concept for the balance of the board was skewed slightly in favour of the presidential cohort.”

Currently the Trustee Board is formed of 12 people – the President acts as chair with seven vice presidents, three Council members and one nominated member. The proposals being put to ballot would see the President remain as chair with three vice presidents, three Council members and one nominated member joined by four ordinary members that are elected by the ICE membership.

“If you think about what the Trustee Board is, it’s actually the board of directors of a £35M a year organisation,” explains Sheffield. “It has wide-ranging responsibility and strategic leadership responsibilities.”

According to Sheffield, being a technically accomplished civil engineer does not necessarily mean you have the right skills for the Trustee Board. He says that the Council members have a key role to play by being at the forefront of knowledge leadership and this was underlined by the Orr Commission.

The formation of the Council remains unchanged from the 2018 revision that reduced the number of members from 44 to 38 when trustee responsibility was removed, and the body given a more advisory remit. The headcount reduction was a result of moving from having seven vice presidents on the Council to just the senior vice president. Sheffield says that the formation of the Trustee Board creates focus on governance and business issues to allow Council to focus on lifelong learning.

NOMINATIONS COMMITTEE
“The Nominations Committee has a responsibility to ensure that people who are put forward for vote by members are both competent for the role and do reflect diversity,” explains Sheffield. “It is not a new committee, as it has always existed as part of the Institution’s succession planning and exists to put in place the chairs of the disciplinary panel, audit committee and so on.

“What is being encouraged through the Orr Commission is that the operation of the committee is far more transparent. Now it will act as a gatekeeper for election to the Trustee Board but its members will not nominate, recommend or suggest people themselves. They exist to check that the people applying are competent for the task.”

Under the proposed changes, the Nominations Committee is being expanded from between six and 10 members to between nine and 12. Under the 2018 changes the committee was formed by a past president as chair, the President, the senior vice president and at least three Council members appointed by the Trustee Board. Under the new proposal, the group will be led by a past president with the President and senior vice president, plus members drawn from the graduate or student membership, ICE members and Council members. There will be more fluidity about how many should come from each of those groups.

SPECIAL GENERAL MEETINGS
“The final three findings from the Orr Commission centre around Special General Meetings (SGM) and it was agreed that there is no need to change the number of requisitions needed to call an SGM,” says Sheffield. “But we want to make it absolutely clear that non-members can attend and speak at an SGM. They are just not allowed to vote. It is more a clarification than a change.”

Where there is a change is the move to make it possible to vote in an SGM electronically. “The rules were laid out at a time when more people were based in London but we need to modernise and make the process more inclusive,” explains Sheffield.
also sometimes referred to as the Orr Commission.

Sheffield describes its work as “very thorough” and “extensive” with many hundreds of members consulted.

The draft findings were extensively shared with the membership with regional committees invited to respond ahead of the final report.

The Commission published its final report late last year with 20 key findings, which covered a wide range of issues.

The findings relate to the top level governance structure; composition and balance of the Trustee Board; methods for electing that board; how the Nominations Committee is formed; how the Trustee Board and Council will be chaired and what their roles are, as well as what the roles of the President and vice president are. The findings also covered transparency and engagement issues, in addition to how future Special General Meetings will be called and how they will be voted on.

Council recommended to the Trustee Board that all 20 of the findings are accepted in full, however, some require changes to the ICE’s existing bylaws and it is those changes that members are now being asked to vote on.

According to Sheffield, members are being asked to consider three fundamental issues.

“The first is the balance of the Trustee Board – how the board is made up,” he says. “The second, how do you appoint – and dismiss – members of the Trustee Board.

The third is to agree whether or not we need to change the rules for attendance and voting for Special General Meetings.”

The vote will be a straightforward yes or no.

Once the votes have been counted, the changes will go before the Privy Council and the Engineering Council – both of whom have already agreed the changes in principle.

“We want to have the changes in place when the next Council period starts in November but it is an evolving process and there will be a transitional period,” says Sheffield.

“Traditionally we get around 9% of our eligible members voting on such issues, which is a lamentably low number but is very similar to that reported by other organisations,” he says. “It would be fantastic to get half of the eligible members to vote on this to ensure the results are representative.”

The ballot was launched in May and ICE members will have six weeks to respond.

For more details on ICE governance and to read the Presidential Commission report in full, go to: www.ice.org.uk/about-ice/governance

It would be fantastic to get half of the eligible members to vote on this to ensure the results are representative
I wonder if someone who, not so long ago, chaired BSI’s policy panel for the Construction Products Regulation (CPR) and its predecessor, the Construction Products Directive (CPD), might contribute to the debate that the Inside Track article (NCE, March 2020) has started?

I wouldn’t want to disagree with the points Donald Lamont makes (NCE, April 2020) about codes of practice, but I am concerned that some important fundamentals are being missed by all concerned as regards standards for construction products. For example, assuming BSI is to continue its membership of the European standardisation bodies.

Although the CEN/Cenelec internal regulations require the withdrawal of any national standard that conflicts with a European one, the term “conflicting standards” can, in practice, only mean “conflicting as regards trade with the European Union (EU)/European Economic Area (EEA)”. For example, the UK is entitled to maintain, and indeed does maintain, ISO standards in areas covered by harmonised euronorms (hENs), and these can be used for trade outside the EU/EEA wherever the ISO would be acceptable.

On the basis of my first point, post-Brexit BSI is free to publish national standards that do conflict with ENs, for use in the UK and elsewhere outside the EU/EEA. However, in doing so it may cause less confusion in the marketplace if, wherever practicable, BSI added normative national annexes to ENs (the European Commission may have banned these annexes from hENs, but it has no control on BSI post-Brexit).

Current hENs are written uniquely to support the CPR for trade within the EU/EEA (as I recall, a majority are still written with former CPD provisions). Whether this helps manufacturers with regulatory compliance in the EU/EEA is not relevant to this debate, but they certainly are not written for compliance with UK regulatory requirements.

Thus, it may actually be necessary for the UK to take a different approach from the EU for construction product standards, assuming the UK declines to follow the same retrograde line that the Commission seems to have in mind. The UK will not be able (nor, perhaps, willing) to use EU technical regulations as such, but will obviously retain the need for construction product standards, even if these are technically identical. Equally, the UK will not be able to accept standards that provide only for essential characteristics and CE marking.

It will be interesting to see how BSI reacts to this.

Haydn White (M), haydn.whiteobe@outlook.com

BRIDGES HUNTINGDON GROUTING INSIGHT

I am writing to correct an erroneous impression given by the Huntingdon Bridge article (NCE, May 2020).

In that article there is a reference to water ingress and damage to reinforcement and a statement that “it’s a common problem for 1970s post-tensioned bridges, that they didn’t grout up the post tensioning”. As an engineer operating in the 1970s, I am surprised at the suggestion that post-tensioning was not grouted up during that era and I can attest to the fact that the post-tensioning ducts of the Huntingdon Bridge were grouted.

In fact, at the time of the construction of the Huntingdon Bridge, there was much consideration among the supervisory team about the long term reliability of profiled post-tensioning ducts due to concerns that grout “bleeding” could lead to water tracking within the ducts which could expose tendons to voids within the ducting and thus a loss of alkali protection.

The supervising engineers for the Huntingdon Bridge were sufficiently concerned by the risks associated with bleeding that they monitored the amount of bleed water that drained from the ducts during and after the grouting process. The volume of water collected was within what was then understood to be acceptable levels but the supervisors remained concerned about the risk of localised voiding within the grout ducts.

As the bridge had been the subject of a contractor’s alternative design, the supervisors’ concerns were not considered to outweigh the accepted grouting practice of the period as had been adopted by the contractor’s designers.

The lesson that I take away from the Huntingdon experience is that contractor’s design alternatives, should be aggressively assessed before being accepted by clients, even if the short term cost savings may be very attractive at the time.

It is clear to me that designs carried out under intense programme pressures may often involve significant compromises which may not ultimately be in the client’s best long term interests.

Tony Collings (M), tony.h.collings@outlook.com

Huntingdon Bridge: Grout concerns
**Main Point**

**Toddbrook Report Raises More Issues**

David Balmforth’s report on the Toddbrook Spillway failure (*NCE*, May 2020) confirms the indications of the early reports and pictures, that the spillway was formed of jointed slabs overlying the erodible downstream face of the dam.

The basic question is how did such a design come about, disregarding the fundamentals of engineering hydraulic structures?

Any misalignment of adjacent slabs through imperfect construction or subsequent settlement creates a step which is vulnerable under high-speed flows down the spillway.

An upward step forces water through the joint and below the slab, creating a lift force and eroding the sub-layer.

A downward step creates a negative pressure which may leach out sub-layer material through the joint and destabilise the slab.

Once one slab goes, the sub-layer erodes and the whole spillway (and dam) is at risk. This appears to be what happened at Toddbrook.

This event raises the wider questions: are there any more earth dam spillways like this? Have they ever come into operation and with what results? Should they all be condemned and replaced?

Mike Thorn (M), mlcthorn@supanet.com

As an erstwhile supervising engineer under the Reservoir Acts, I hope that the Toddbrook failure will act as a strong pressure to correct the situation where owners of dams can ignore the advice of inspecting and supervising engineers with regard to maintenance and remedial works which are necessary.

Although the official report on the incident suggests every confidence in inspecting engineers, I wonder whether their position in bringing about necessary works is sufficiently powerful. I believe the dam owner can appoint any competent inspecting engineer and therefore the inspecting engineer is dependent on the owner for his position. In these circumstances there must be a tendency to not wish to upset the owner and lose a remunerative appointment by being too aggressive about what needs to be done.

The list of failings in maintenance at Toddbrook is appalling and gives the impression that the owner either did not appreciate the importance of such works or was cavalier in lack of response to them.

Perhaps inspecting engineers should be appointed rather than chosen by dam owners and supervising engineers should be made responsible to the inspecting engineer rather than the owner.

Basil Tinkler (M), basil.tinkler@btinternet.com

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**High Speed 2**

**Call to Put High Speed 2 on Hold Until Covid-19 Has Gone**

It was with disbelief that I read that the government has given Notice to Proceed for High Speed 2 (HS2). Much worse is the inevitable supportive comment from ICE Members employed in the big construction firms.

History is repeating itself, just like High Speed 1. Political projects are taking precedence over common sense. Billions being spent on a project for which the traffic forecasts are flawed and everything is being done to justify the project, which had the usual scrutiny of business case and design been applied in the beginning, its flawed foundation would have killed it off long ago.

Members are running out of time to change their ways – climate change is here, economic catastrophe is here – thanks to Covid-19 – and yet some are rejoicing in unnecessarily adding to the debt which our grandchildren and their children will be paying for throughout their lives?

Even if one believes the present revised forecasts for traffic, costs and returns, one thing is certain these are now wildly optimistic. HS2 should now, at the very least, be put on hold.

If after Covid-19, capacity is found to be required on the rail routes to the Midlands and the North, then using the old Great Central route, modernising the Midland mainline and electrification of the line Southampton to Birmingham will be a much more practical way of ensuring that the whole country has the best chance of survival.

It is no longer a case of harnessing “the great sources of the powers of nature” for the benefit of mankind, but of ensuring the survival of mankind.

Peter Stebbings (M), peter@familystebbings.org.uk
Climate change and the coronavirus pandemic have thrust airport expansion plans under the microscope as engineers reassess the role of air travel and look at ways airports could be reconfigured in a post-Covid world.

**Future of Airports**

How Covid and Climate Change Will Affect Airports / Page 22
Singapore’s Changi Airport Starts to Expand / Page 26
Heathrow’s Competing Expansion Plans / Page 30
Before the Covid-19 pandemic, discussions about airports ranged from environmental concerns to strategic planning considerations and the challenges of ownership. These are issues which will surface again post-pandemic – but what that will look like and whether the impact of the virus will accelerate change in these areas remains to be seen.

“Pre-Covid issues are going to be ones that need urgent resolution as part of the resumption of normal service,” says architect Pascall & Watson director Matthew Butters. In this pause, an opportunity exists for the industry to consider how it will come back better commercially and environmentally.

Once airports get back to around a 20% base level of business – the critical mass to get operations back in place – Butters suggests that their operators might then be able to start addressing these challenges.

“There’s a blank sheet of paper to allow the industry to draw out a way of working that might actually give a bit of a shift in the mindset of how we operate,” he adds.

Future of Airports

The impact of the coronavirus pandemic has made the aviation sector’s efforts to develop its assets, while driving sustainability and innovation, more complex. Catherine Kennedy reports.

Pre-Covid issues are going to be ones that need urgent resolution as part of the resumption of normal service.

POST-COVID AVIATION

It is possible that the pandemic could accelerate change – for example, a move to more point to point flights where long distance passengers go direct to a destination rather than passing through a hub as they have done up until now.

Butters explains: “A lot of airlines now are using this as an opportunity to park inefficient planes, to re-look at their networks and say: ‘maybe we don’t need to be tied to a traditional hub. We can fly more where passengers want to fly to directly’. This means cheaper flights and less infrastructure to maintain.”

But Martin Moe a senior architect at Norwegian architecture firm Nordic – Office of Architecture believes the pandemic could lead to less investment in new infrastructure and technologies, with airports squeezing their assets instead.

“One thing that worries me is that the recession which is likely to follow the lockdown may lead to a slowdown in necessary investments in greener technology,” he says.

“This goes for the building-related part of the industry but more importantly in what sort of aircraft we will have in the near future. If we don’t solve that issue, the entire industry will come under stronger political pressure.”

There is also a concern that those airlines that are currently surviving are mainly government-sponsored, so recovery will take longer for more commercial forms of travel or airports in locations on the fringes of economic viability.

“There’s a strong argument for saying a traditional hub like [Amsterdam] Schiphol or [Paris] Charles de Gaulle will survive because that’s where the population density is and it’s where the government centres are,” says Butters.

70%
Decrease in global scheduled flights as of 4 May compared to the same period last year

26.6M
Number of airline seats available globally per week as of 4 May, compared to 109M in the same period last year

KEY FACTS

| Number of flights into and out of the UK in 2018 | 2.2M |
| Number of passengers handled by UK airports in 2018 | 292M |
JOINED-UP THINKING

Expedition Engineering director Alistair Lenczner sees investing in these larger airports as an approach for the future. Aircraft serving fewer, stronger, international airports will be larger and carry more people, so carbon emissions per passenger could decrease.

According to Lenczner, a strong international airport at Manchester for example – well-connected by train when High Speed 2 (HS2) is complete – would allow Leeds-Bradford and Liverpool airports to either close or be used for private or freight flights. Meanwhile, where Cardiff, Bristol and Exeter currently compete in the South West, one airport would be needed to serve the south Wales/south west England region.

“That airport will be able to deliver flights to a wider range of destinations and on a more frequent basis than any of the individual airports and therefore becomes a stronger airport,” Lenczner explains.

HS4: Greater effort to link high speed rail with airports will be needed after the coronavirus crisis ends

“But you need to find a way for the owners of those airports to come together for a bigger purpose.”

As such, Lenczner emphasises the importance of joined-up thinking throughout the transportation sector, viewing aviation, high speed rail and regional rail as “a complete system”.

Expedition Engineering’s HS4 Air proposal suggests connecting Heathrow and Gatwick to HS2 and HS1, providing access to airports from most metropolitan areas across England, Wales and potentially Scotland.

It suggests that providing these rail links to ensure 90% of the population is within 90 minutes of an airport would allow the UK to reduce its airports to five or six international ones from more than 40 commercial airports, since flight slots currently allocated to domestic flights could be freed up for international use.

In France, for example, the journey from Paris to Lyon takes two hours by train and is now a more popular option than flying. Once HS2 is complete, Lenczner argues there should be no need for London to Manchester flights.

Other European airports such as Frankfurt in Germany and Amsterdam Schiphol also have integrated high speed railway stations, providing direct, cross country rail services.

“Evidence shows that once you can get journey times end to end to two to three hours or less then the market share which uses rail over plane increases,” says Lenczner.

But according to Butters the difficulties of building railways are often underestimated.

“You only have to look at Crossrail and HS2 to begin to understand the cost and the challenges,” he says.

“It’s so much easier to build airports but they have to be good airports. It depends on your view about the degree to which aviation can continue to improve its environmental performance. From a regional connectivity point of view, there are a lot of people who would argue for electric aviation as a counterpoint to rail.”

And, of course, this all comes with the caveat that no one quite knows what aviation demand will be, post-Covid. Attitudes towards leisure travel may shift – but Lenczner says the pandemic reinforces the proposal to rationalise airports and link them using high speed rail.

“It’s a chance for us to take a real step back to find out what we really need moving forward,” he says.

“If demand goes down for a few years, then obviously that makes the case even stronger for having fewer airports and stronger airports which are best placed to serve the country and its regions.”

Moe adds that airports that attract investments in high speed rail links or other means of ground transport will be in a much better position after the crisis.

“Much of this is dictated – and obstructed – by ownership, with most UK airports privately owned. When it comes to high speed and regional rail connections it is necessary to
There will be a change in the extent to which people will want to maintain physical separation

look 30 years ahead, but most private investors often want a return within a decade.

“That means that the investment decisions tend to be based on shorter term,” Lenczner says. “It’s not in the best interests of the nation, which is why I think regional governments should have a major influence in how regional airports are planned and developed.”

EXPANSIONS
As well as the business side, there are other challenges to airport expansion.

Pascall & Watson places an emphasis on passengers’ quality of journey – a focus that is also likely to increase post-Covid, especially from a health perspective.

“I think there will be a change in the extent to which people will want to maintain physical separation, and we’re going to have to try and understand that and facilitate that and make it really safe,” says Butters.

Through static and dynamic passenger modelling, the firm looks at the efficiency of the spaces that already exist to see if they can be optimised – but sometimes the geometry of buildings is fundamentally wrong. Small airports may have started using a third of their interfaces, with the rest developed over time, but not in the most efficient way.

“You have to work quite hard with operators to understand the value of the different bits of space that they have and look at how they can reconfigure their buildings so they’re making best use of that interface,” explains Butters.

And then there are the increasing environmental challenges.

“In the recent competition we did for Terminal 3 in Guangzhou, China we discovered that our strategy of replacing all the steel members in the main roof with a timber construction counted for a carbon footprint reduction equivalent to some 35 round trips from London to China with a widebody aircraft,” Moe explains.

“This is pretty discouraging when you realise the entire airport complex will have five runways, each with 30 to 40 aircraft movements per hour.”

But he acknowledges the fact that large terminal buildings are test grounds for the building industry – citing Nordic’s recently opened terminal two at Oslo Airport as a good example.

It is the first Breeam excellent-rated airport building in the world, with its shape taking advantage of passive solar energy and sunlight. It also uses low carbon technologies like district heating and natural thermal energy.

”
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STRENGTH IN DEPTH

Space to expand Singapore’s Changi Airport is being developed at pace and had reached the halfway stage before Covid-19 forced work to halt. Claire Smith reports.

There is a sweet spot for airport locations that is the same the world over but it is not one that is easy to find, especially when it comes to expansion. They must be close enough to the urban area they serve for connections to be swift and seamless, but far enough away that there is enough room for the necessary sprawl of airfield, terminals and other infrastructure.

Singapore’s Changi Airport has a solution to the challenges relating to space – reclaim more land. Field improvement work to do just that had reached the halfway stage in early April when a government mandated lockdown to reduce the spread of the Covid-19 pandemic brought work on site to standstill.

The pandemic has triggered a slowdown in global flights, which some believe may permanently alter travel patterns, but Changi anticipates reclaiming its position as an international transit hub when the threat of the virus does recede.

Last year the airport handled 66M passengers, and current work will create room to increase capacity to 135M passengers per year by building a fifth terminal which is due to open in 2025.

To make way for this, major ground improvement work is being carried out to the east of the existing airport boundary. The land that is the current focus of geotechnical activity was reclaimed between 1990 and 1996 in anticipation of future airport expansion. It remained largely unconsolidated until the current phase of work started in 2018.

Much of the sand imported for the reclamation is undergoing vibro compaction with deep soil mixing (DSM) being used to improve ground conditions close to the site boundary and existing structures.

Ground improvement work so far has been split into two contracts and there is more to come next year. The first contract was completed in 2018 and contract two is now underway after work started in June 2019. Completion was scheduled for December but the current shutdown on site as a result of the coronavirus restrictions might delay that slightly as there is still another eight months of work to do on site.

For contract one, 20M.m³ of ground was treated and the first three of the five phases into which contract two is split will result in around a further 30M.m³

At full water pressure the oscillating vibrator penetrates to the design depth and is surged up and down as necessary to agitate the sand, remove fines and form an annular gap around the vibrator. At full depth the water flow is reduced or stopped.

**KEY FACT**

4.2M.m² Area of reclaimed land to be consolidated
After PVD installation, the ground is usually surcharged with up to 8m of material for three to nine months before being treated with a combination of vibro compaction undertaken by Keller or DSM by Dong Ah.

The ground vibrations induced by vibro compaction while DSM is being undertaken to between 25m and 30m to create 1.2m diameter columns where the ground improvement is needed. A 15m exclusion zone has been put in place around existing structures and infrastructure.

Keller is treating the ground at Changi to depths of up to 20m, but the technique can be used to depths of up to 60m. The sand for the reclamation came from Malaysia and Indonesia and has a natural relative density of 40% to 50%.

Cone penetration tests (CPTs) for the natural material gave CPT resistance (Qc) values of just 4 to 6MPa, showing how loose it is.

“There are two ways that vibro compaction is normally specified in Singapore — it is either by settlement or the Qc value of the treated ground,” explains Keller Asean business development director Kam Weng Leong. For the Changi development, the specification is by the latter and has resulted in a high specification which is graded by depth with 9MPa specified at 2m depth, 13MPa at 2m to 7m, 17MPa at 7m to 9m and 19MPa below 9m.

The high specification is to deal with dynamic loading that will be placed on the ground by moving aircraft.

Keller has two sizes of vibrator on site to ensure the work meets this specification. The S700 vibrator is the largest size Keller owns and imparts a centrifugal force of 70t. This is supplemented by the S300 vibrator that delivers 30t of centrifugal force.

“Essentially the vibro compaction technique works through a combination of high pressure water jets and the vibration inducing sand collapse,” says Leong. “At full water pressure from the...
It is the sheer size of the site and volume of ground to be treated that is the challenge here. The bottom jet, the oscillating vibrator penetrates to the design depth and is surged up and down as necessary to agitate the sand, remove fines and form an annular gap around the vibrator. At full depth the water flow is reduced or stopped.

“The compaction is carried out in steps from the maximum depth of penetration upwards. It encompasses a cylindrical soil body and the increase in density is indicated by the vibrator’s increased power consumption. “Around the vibrator a crater develops which is backfilled with additional sand. Up to 10% of the treated soil volume is needed for backfilling.”

Water for the work is being extracted by Keller from within the sand itself. The work calls for around 20,000 litres of water per day.

“The technique is similar to vibro stone columns, but that technique helps to transfer loads to a more competent layer at depth, whereas vibro compaction creates a zone of densification,” says Leong.

The vibro compaction is being undertaken to a grid pattern that varies from location to location from a 2.5m spacing between centres up to 4.8m. The compaction areas have been broken down into 90m by 90m squares to allow the work to be planned and sequenced more easily.

The rigs used are electrically powered and the rig operator carefully monitors the electrical current used by the rig to understand the rate of compaction as the vibrator is pulled towards ground level.

More sand is added to the column as the vibrator is pulled up to compensate for densification of the existing sand and ensure ground level is maintained.

As the site is located away from residential development, Keller is able to operate 24 hours a day with two 12 hour shifts. It takes around 20 minutes to create a 12m column.

No curing time is needed between columns with the rig moving swiftly onto each adjacent location which is surveyed into position and marked with a flag.

Work quality is tracked by undertaking CPTs before and after vibro compaction.

According to Balguri, the results so far have shown that the compaction has exceeded the specification.

During the first contract, Keller had 18 rigs operating on the Changi site at the peak of work and the current phase – contract 2 – of the project had matched that until work on site was suspended. According to the Keller team, contract two could break that record when work on site restarts in order to get as close to the original schedule as possible.

Work on site started with a fleet of 15 vibrators operating but Keller always planned to bring more to the project as the work ramped up.

“We were operating six construction sites before work halted,” says Leong. Balguri said that the experience on the first contract at the site helped with productivity in getting the work underway, although the techniques being used have not changed.

“It is the sheer size of the site and volume of ground to be treated that is the challenge here,” he says.

At the moment, Leong estimates that the work on site had reached the midway point when the government tightened social distancing restrictions and forced work to stop. Leong added that the remaining work is expected to take around eight months.

In total, Keller will undertake 400,000 vibro compaction points in this current contract and Leong and his team was hoping to be able to get back on site to complete the second half of this work as this issue of NCE went to press.

While the scale of the work may seem huge, it is not the end of the project. According to Leong, there will be another phase of ground improvement covering a similar tranche of land next year.
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The battle over Heathrow Airport’s third runway is as protracted as it is political. Proposals for expanding the West London hub have been repeatedly knocked back since the early noughties. But in 2018 when the then transport secretary Chris Grayling convinced his fellow MPs to vote in favour of expansion, it looked like the third runway proposal could finally get off the ground.

Since then a string of legal disputes, political flip-flopping – led by our current prime minister – and environmental challenges have continually threatened to ground the proposal once and for all.

The latest hurdle to overcome is perhaps the greatest of them all. In February, Lord Justice Lindblom ruled that the government’s Airports National Policy Statement – which backed the third runway – failed to consider Britain’s commitment to cut carbon emissions under the 2016 Paris Agreement. Consequently, the Court of Appeal ruled that the third runway proposal cannot proceed because the policy statement is unlawful as it breaks net zero carbon emission laws implemented by prime minister Theresa May’s government before last year’s General Election.

The coronavirus lockdown has only strengthened opponents’ arguments against expansion. The estimated fall in global carbon emissions is estimated to have been between 5% and 25% since most of the world’s flights were grounded, drawing attention to the amount of pollution generated by airports like Heathrow.

Airport operator Heathrow Airport Ltd (HAL) says it will challenge the ruling in the Supreme Court, but for the time being its plans are in limbo.

And if that was not enough, there is also a battle about how to best carry out the expansion programme. For the first time ever, the Planning Inspectorate is considering two plans focused on redevelopment in one location, adding new capacity between Terminal 5 and the M25.

The coronavirus lockdown has only strengthened opponents’ arguments against expansion

Heathrow Airport Ltd and Heathrow West will go toe-to-toe in their quest to build Heathrow’s third runway. But first, both must overcome legal hurdles blocking the airport’s expansion. Rob Horgan reports.
HAL’s proposal for Heathrow’s third runway includes widening the M25 (lowered between 4 and 4.5m) to pass below the new runway.

- Improved M25 solution, with upgrades to Junction 14/14a
- M25 widened (M25 to be moved west of M25 in one location, adding new capacity)
- Divert local rivers

But before the two contestants can go toe-to-toe, they are united in their aim to overturn the Court of Appeal decision to block expansion. Both have appealed to the Supreme Court, and both are confident that the decision will once again be overturned. However, final development consent order applications from both parties have been suspended and look unlikely to be submitted later this year as originally planned.

Although united on overturning the court’s decision, the two parties are divided about how to expand the airport. HAL’s proposal includes detailed plans to lower the M25 by between 4m and 5m, taking it beneath the proposed third runway. It also wants to divert rivers and enhance surface access infrastructure.

In its new alignment, the M25 will pass below the new runway and taxiways. The HAL masterplan also proposes that the M25 be widened with upgrades to junctions 14 and 14a to accommodate future traffic requirements.

In addition, HAL has put forward plans for the A4 along the north side of the airport to be moved further north, to avoid the new runway. And the A3044 east of the M25 would be moved to the west of the motorway.

The masterplan also sets out HAL’s intention to divert local rivers around the new western boundary of the expanded airport. This includes creating a river corridor that passes beneath the new runway.

To improve surface access, two car parks have been proposed to the north and south of the airport to accommodate much of the airport’s future parking capacity. It is planned that both parkways be constructed and brought into operation in a phased manner as the airport is expanded over time.

The proposed northern car park would be capable of accommodating up to 24,000 cars, have access from the M4 and be connected directly to the airport’s central terminal area by a shuttle system.
Future of Airports
Heathrow Expansion

HAL will be fined if its expansion costs rise above what has been agreed

terminal, HAL is doing the runway, terminal and supporting infrastructure. Our plans focus purely on the terminal side,” Brown explained.

“Whereas HAL has gone for an option of expanding the terminals in three areas, we have gone for a much more focused design, working with the airlines, and we’ve centred our terminal expansion in the west, adjacent to Terminal 5.

“By having a really efficient design and having all the extra passengers in one location, you can create a central hub which is great for the passengers arriving, as you have less transfers.

“In a nutshell, we have an efficient design in one location compared to HAL’s proposal which is spread out over three locations.”

Under Heathrow West’s plans all the current infrastructure used for Terminal 5 would also be reused for its proposed Terminal 6 which it claims would provide sufficient capacity to cater for a third runway.

HAL’s plans require development to the north of the airport site and in the centre. But Heathrow West claims that the northern site is “simply not needed” and the central terminal expansion is “very costly”.

Brown adds that by building new terminal capacity in just one location, Heathrow West’s plans are more aligned with the government’s environmental requirements, as they will have a shorter construction period and a smaller carbon footprint.

Heathrow West’s parent company Arora has previously raised concerns about HAL’s “monopoly position in relation to the provision of airport operation services and related services at Heathrow Airport” and about the “undesirability of Heathrow expansion exacerbating the anti-competitive effects of that monopoly and leading to increased costs to both airlines and consumers”.

In a boost for Heathrow West, NCE revealed in December that airports regulator the Civil Aviation Authority (CAA) had hired an independent assessor to determine whether Heathrow’s terminals could be operated by different companies.

The regulator has already tightened the screw on HAL’s proposal. The CAA revealed last December that HAL will be fined if its expansion costs rise above what has been agreed.

This comes after it emerged that pre-construction costs in relation to HAL’s planning application rose to £2.9bn in July last year.

HAL has also announced that it has pushed back the scheduled completion of the third runway from 2026 to “early 2028 or late 2029”, after the CAA ruled that Heathrow’s timeline should be adjusted to allow for the Planning Inspectorate to rule on its development consent order application.

HAL also submitted two possible delivery schedules to the CAA to demonstrate that it was willing to work on its costs. One focuses on cost savings and the other prioritises services, such as surface access and retail units, and would require additional investment. The first plan would allow Heathrow’s third runway to open in 2028. The second would bring the runway into service in 2029.

HAL claims the first delivery schedule can still be completed within the original £14bn budget announced in 2014.

The second, more expensive, schedule involves spending an additional £3bn over the first 15 years including investing £750M each in western and southern rail links and an additional £500M every five years on passenger service, such as upgraded passenger lounges and faster delivery of digital services such as 5G upgrades.

Under this proposal a western rail link would be completed in the mid-2020s before the third runway opens, with a southern link scheduled for completion in the mid-2030s.

To date, Heathrow West’s plans have come under little scrutiny from the CAA, however NCE understands that will change in the coming months. N
Efficient use of energy, earthmoving equipment and resources are examined this month, as London Underground shares heat from the Tube with Islington residents; High Speed 2 gears up and app manufacturers aid remote working.

**HARNESSING HEAT FROM THE TUBE / PAGE 34**

**HIGH SPEED 2’S MEGA-MUCKSHIFT / PAGE 36**

**APP WORK AROUNDS FOR CORONAVIRUS RESTRICTIONS / PAGE 40**
It is estimated that London’s wasted heat could meet 38% of the city’s heating demand, so a new project harnessing London Underground’s waste heat could be a game changer. Nadine Buddoo reports.

estled between towering high-rise blocks, a new energy centre in the London Borough of Islington is a shining example of how energy from waste can decarbonise urban areas.

The £16.3M Bunhill 2 Energy Centre enables the extraction of waste heat from London Underground’s Northern line to help power a district-wide heating network.

Working closely with Colloide Engineering, consultant Ramboll led the design and delivery of the project, which is helping to provide heating and hot water for 1,350 homes, a school and two leisure centres.

Commissioned by Islington Council, the scheme is an extension of the existing Bunhill 1 network, which was launched in 2012 and which is powered by a combined heat and power (CHP) engine. Gas-fired CHP is the common source of heat for district energy schemes, making Bunhill 2’s use of waste heat resources particularly distinctive.

The new energy centre is located on the site of a disused London Underground station, between Old Street and Angel. Formerly City Road Station, the site has been converted to house a new heat pump system.

While Ramboll was not involved with the preceding phase of work to deliver Bunhill 1, the engineering consultant was appointed to undertake a feasibility study for Bunhill 2. The study confirmed that waste heat from the London Underground ventilation shaft could be utilised by heat pumps. Ramboll also found that the system could capture the waste heat and heat it to approximately 80°C.

Gas-fired CHP is the common source of heat for district energy schemes, making Bunhill 2’s use of waste heat resources particularly distinctive.

The client was keen to push for the most efficient and sustainable solution possible, so the heat pump design temperature was lowered further to 70°C.

Ramboll investigated the impact of lower temperatures for the connected buildings’ heating and domestic hot water loads to ensure demand could be met and the end user would be unaffected.

“Our feasibility study made it clear that the concept was viable,” says Ramboll’s department manager for UK district energy Paul Steen. “Following the study, we continued our involvement to support Islington Council to take the project through the procurement and design process. We then acted as the owner’s engineer to take the project through construction and now into commissioning the system.”

HOW DOES IT WORK?
The system uses a 2m diameter fan installed in an existing six-storey, mid-tunnel ventilation shaft. The
Underground network generates 18°C to 28°C air, which is extracted through the Northern line ventilation system by the fan.

The heat pump captures heat from the warm exhaust air, via a closed loop water circuit in the ventilation shaft. This is used to heat ammonia – the refrigerant gas used in the heat pump – which is then pushed through a compressor, converting it into a hot liquid that heats the pipes surrounding it. These hot pipes are used to heat water that runs through a new 1.5km network of insulated underground pipes. The water is then pumped to nearby council housing estates using heat exchangers.

The Bunhill 2 heating system also incorporates two smaller gas-fired CHP engines which provide heat and supply electricity to the heat pump when electricity from the power grid is most expensive.

But as well as delivering additional heating capacity, the Bunhill 2 system provides an innovative cooling solution. The fan in the ventilation shaft has the potential to be reversed to help cool the London Underground network during the summer, Steen explains.

“Like a number of London Underground (LU) ventilation shafts, it incorporates a bi-directional fan so they can change the direction of air flow either into the tunnel or reject air from the tunnel,” he says. “It has been agreed with LU that in the winter when the ambient temperature of the air outside is low, we will extract warm air from the Underground.

“In the summer, because ambient air outside is typically going to be anything from 16°C to 30°C, the fan will reverse and suck air from outside. This air is cooled as it passes over the coil in the heat pump, then this cooler air is pushed into the tunnel.”

Steen believes the project could represent a step-change in the way cities and local authorities approach energy schemes.

SUSTAINABLE SOLUTION

While Northern line passengers enjoy cooler tunnels, local residents benefit from more efficient, sustainable energy and the wider London community benefits from reduced carbon emissions and improved air quality as gas combustion from traditional gas powered district heating systems is displaced.

The Bunhill Heat and Power district heating network is helping to reduce CO₂ emissions by around 500t each year. Heating bills for council tenants connected to the network are expected to be cut by 10% compared to other district heating systems.

The project aligns with Islington Council’s target to hit zero carbon by 2030.

“The project shows there are these waste resources that we should absolutely be tapping into and that work,” says Rowena Champion, Islington Council’s executive member for environment and transport. “The scheme is helping us tackle fuel poverty, but is also making Islington a cleaner and greener place.”

Steen agrees that the success of Bunhill 2 could provide a blueprint for future energy schemes.

“The principle used for this project is no different to many other places on the Tube network,” he says. “I also think there are some further innovation opportunities for them [LU] to undertake.” Steen points to the potential for novel approaches to energy storage, which could allow heat to be stored seasonally to increase the system’s capacity and efficiency.

“There are some very clever things that can be done. The potential for these systems is really interesting,” he adds.
DATA FOR DIGGING

Delivering 30M.m$^3$ of earthworks for High Speed 2’s central section efficiently and safely takes logistical and engineering challenges to a new level. Claire Smith looks at the technology being deployed.

Notice to proceed with High Speed 2 (HS2) was widely welcomed by the construction industry when it was issued in April and work is already getting underway. For the contracting joint venture working on the central section, it was the green light to put developments into action which it believes will deliver an industry-wide step change in the use of digital technology.

EKFB – formed by Eiffage Genie Civil, Kier Infrastructure, Ferrovial Agroman and Bam Nuttall – is delivering the £2.3bn central section which covers 80km of the route between the Chiltern Tunnels and Long Itchington Wood. Unlike the other sections that include major tunnelling work, the central contract is focused on earthworks – 30M.m$^3$ to be precise – and this required a new approach.

Realising the scale of the challenge at the tender stage, the team worked with construction equipment manufacturer Caterpillar and its UK distributor Finning to develop the Digital Graphical Earthworks Reporting system, known as Digger for short. The simplicity of the name belies the years of work that have gone into creating the system and the benefits it is expected to deliver.

“HS2 is the single biggest infrastructure project in Europe and presents some challenges which are the biggest in living memory,” says EKFB project director David Lowery. “From an infrastructure and a construction industry perspective, we had to look at this differently. “We needed to look at driving innovation and embracing digital technology. We set our sights high about leading in this space, not just for the benefit of the HS2 programme but also driving the industry forward.”

EKFB earthworks director Mark Harrington says the scale of the project is unprecedented.

“The amount of material we need to excavate is huge,” he says. “At Hinkley Point C, which is a massive excavation undertaken with mining type machines, the quantity excavated there was 5M.m$^3$. “The excavation for the central

KEY FACT

30M.m$^3$
Volume of earthworks on HS2’s central section

Innovative Thinking

High Speed 2

We needed to look at driving innovation and embracing digital technology

HS2 contract is spread over an 80km stretch of a very narrow trace plus all 30M.m$^3$ is to be reused on site in embankments and screening mounds.”

The work must avoid transporting
2020
british construction
industry awards
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geobear

28 October 2020
Grosvenor House Hotel, London

KEY DATES

5 JUNE
ENTRIES CLOSE

JUNE
JUDGING 1st STAGE

JULY
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SEPTEMBER
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Innovative Thinking  High Speed 2

We’re going to be data rich so getting the right data to the right people at the right time is key

material on public roads, as well as recording what was excavated where and when in addition to the material type.

Harrington says that at peak, work will require a fleet of almost 800 machines – excavators, dozers and dump trucks.

“For us to operate a fleet of equipment of that size and to operate it efficiently we need to know what it is doing, where it is doing it in real time,” he explains.

“That is why we looked to find a digital solution to map the work against the plan.”

Digger draws together data gathered from a variety of sources – such as drones and the construction equipment itself – from across the site and integrates it to create tools the project team can use in real time.

Lowery says: “We’re going to be data rich so getting the right data to the right people at the right time is key.”

EKFB head of IT Gurpreet Sohal says: “A large part of it is automating the key performance indicator reporting. Keeping sight of a large project like this without having an army of people to monitor progress on the ground is difficult.

“The platform will leverage and harness the data to drive leadership and cross site management.”

Developing the system was not straightforward, as Harrington says no complete off the shelf solution was available.

“Parts of the system existed,” he says. “For example, machine telematics to get information from the equipment has been available for years but has not been collected and used in real time.

“We engaged with a number of equipment manufacturers, but Caterpillar and Finning really recognised what we were looking for and picked it up and ran with it.”

Sohal adds that the challenge was in bringing the different sources of data together.

“Working with Finning, there was a more than a year of working out what we were trying to model from the data,” he says. “Finning leveraged a number of cloud-based solutions to do what we needed by but essentially we are using the Microsoft Azure platform to bring all of the data into the central Digger platform.

The heart of the Digger platform is a series of online dashboards and visual displays.

“We can see the location of plant, how efficiently the plant is being operated and how efficient ground compaction activities are, for example,” adds Sohal.

According to Harrington, the type of data that can be collected has evolved during the development period. He points to driver fatigue information as an example and says that the team is looking at how to integrate this into the system too.

“We are looking at the people as well as the equipment and trying to make the operation safer through the use of the technology,” he says.

Sohal adds that it is also possible to use the system to minimise the risk of interaction between people and plant. The aim is to improve safety by using proximity and geospatial data to be more proactive about identifying risks.

The system had already been put through its paces last year when the joint venture undertook a trial site at Boddington in Northamptonshire, where HS2 will run in a cutting.

The ground conditions comprise shale – which is quite soft – overlain by clay. There was a risk of ground heave due to scale of unloading as a result of the earthworks excavation and this can be hard to predict, so the reason for doing the trial cutting in that location was to understand the risk in more detail.

A 13m deep cutting involving 250,000m³ of excavation was created and, as well as looking at the heave risk, the trial allowed the team to put Digger into action.

According to Harrington, it proved that the system worked even though it was not fully complete at that stage.

“It was a valuable period,” he says.

With notice to proceed secured, bulk earthworks on site will start later this year but this is more preparatory work and the main earthworks phase is planned to start in spring 2021. The work is expected to be completed over three earthworks seasons [spring and summer] to finish in 2024.

Lowery says that despite the unprecedented scale of the work, productivity targets are key and he believes that Digger positions the team well to deliver on that.
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Tune in to hear the latest episode
As the coronavirus pandemic rages on, businesses are facing the challenge of engaging and communicating with stakeholders. Digital interactives can help, reports Max Thompson.

Against a foreboding background of lockdowns and the dawning realisation that other pandemics could follow, the impetus to change the way engineers work and communicate has never been greater.

And at the heart of that change is digital transformation and the use of interactive experiences and tools.

Participants in a recent NCE webinar on technology and innovation, said that while there is a will to embrace the challenge of digital transformation, the collective know-how about how to take the first step is lacking.

Damjan Haylor, managing director of Bristol-based communications agency Popcomms, believes that firms like his will play an increasingly essential role in helping the sector take those first steps.

Having already built interactive tools for the likes of Jacobs, Wienerberger, GCPAT, Tensar, Roche, GSK and Arm, Haylor believes change is afoot, and if there is one good thing about the coronavirus it is the fact it is making people think outside the box.

Aecom’s recently launched public consultation tool is a case in point says Haylor: “Why make people come to your offices when you can broaden your reach by making your most valuable and important assets available virtually and globally?”

“When applied intelligently they can save significant time and resources and improve new business conversions, in a time when meeting face to face is impossible, they help businesses to continue to have important conversations that would otherwise not take place.”

Interactives enable people to walk through processes simply

SEEING IS BELIEVING

Large engineering and infrastructure projects will always be complex, and trying to explain or visualise how these projects and processes work can be tricky.

Interactives help businesses to create models which enable audiences to walk through processes simply, while allowing them to drill into more detail if they need to. Visualising projects in this way makes it far easier for people to understand and remember complex processes. “The human brain processes visual information 400 times faster than the spoken or written word,” says Haylor. “So, we’re more likely to take that information in, and more importantly, to remember it.”

Tensar marketing and communications manager Marianna Bryce agrees: “I think interactives engage our senses more, which can lead to better initial understanding and increased retention of information.”

But Bryce warns that getting engineers to embrace the technology is a delicate business. “Engineers tend to be risk adverse, especially when something seems too good to be true.”

KEY FACT

400
Number of times faster the human brain processes images compared with written or spoken words

Interactives engage our senses more, which can lead to better initial understanding and increased retention of information
or salesy,” she says. “The interactive deck Popcomms built for Tensar was a way for us to showcase the many facets of what our company offers without overwhelming them.”

Bryce adds: “The piece has also proven to be effective at smaller local shows on tablets, as well as brown bag [informal lunchtime] presentations – making it a truly versatile piece for our company and sales team.”

Whether it is a virtual public consultation tool accessed remotely, or – coronavirus-permitting – one you physically interact with, the beauty of these digital tools is that they can hold all the content that a business might need when communicating with customers, partners, stakeholders or the public.

Popcomms’ involvement with the Ebbsfleet Garden City development (NCE last month) really exemplifies the opportunities interactives offer. The agency’s brief for the project was all about stakeholder engagement. Out went A3 mood boards, drawings and sketches and in came a state-of-the-art interactive marketing suite.

“There really is no limit to the level or breadth of personalisation that can be built into an interactive,” says Haylor.

But as Haylor goes on to explain, an interactive tool can also supply the client with valuable information. “Customers can tag content that they are interested in and download it directly from the experience for later consumption. The same interactive can also be shared by the customer with colleagues, and analytics that run in the background will track everything that is being looked at – the business can see exactly what people are interested in and downloading, which is valuable information.”

Interactive tools and experiences come in many forms but they are all created to distill complex information to allow personalised conversations, with the content being accessed and explored in any number of ways depending on the audiences’ requirements.

“For example, if you are talking with an architect the interactive will automatically only show content that is relevant to an architect,” says Haylor. “This can be further subdivided, so if the architect is interested in sports stadiums, the content will further filter down to that unique piece of information that is relevant to architects and sports stadiums, creating a personalised experience.”

**OUT WITH THE OLD, IN WITH THE NEW**

Lying behind the best interactive experiences and tools is progressive web app (PWA) technology. Platforms like Pinterest, Spotify, Uber and Instagram are all PWAs. They deliver high performance regardless of device or network condition.

PWAs are still relatively new, but businesses are starting to replace their websites and custom-built native apps. If required, such tools can be woven onto clients’ existing websites, and Haylor thinks it is the start of a change in how information is disseminated.

“PWAs are the next natural step in the evolution of web and app technology,” he explains. “We build our interactives as PWAs because they combine the very best attributes of responsive websites and native apps. “One of the simplest, but most valued examples of this is that like a native app, our tools work offline. It’s another potential niggle ironed out before that all-important meeting,” says Haylor.

With the availability of cutting edge PWA technology and the looming threat of future lockdowns, there really is no time like the present to get interactive, if the engineering sector is serious about embracing digital transformation.

“This pandemic has just put some elements of digital transformation trends on hyperdrive; telecommuting [working from home], for example,” says Bryce. “There is a very good chance that virtual experiences will gain more merit and consideration... and not just for marketing.

“I believe exciting times are ahead in so many ways.”

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**Progressive Web App advantages**

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Opportunities to utilise emerging technologies across the industry are varied and complex. So how can engineering firms identify the right solutions? Nadine Buddoo reports.

Identifying new technologies and exploring ways they can improve efficiencies and reduce costs is a complex task for the civil engineering sector. Perceived costs and risk aversion are often barriers to the adoption of emerging technologies.

But software provider Deltek is determined to help firms navigate these challenges.

The annual “Deltek Clarity Architecture & Engineering Industry Report” includes the results of a survey which identifies the key challenges facing engineering and architecture firms, highlights opportunities and forecasts future trends.

The survey also seeks to understand how technology is already helping firms drive competitive advantage and efficiency.

“The report is really focused on providing architects and engineers with a view of what’s happening in the industry,” says Deltek regional vice president for EMEA and APAC Neil Davidson.

“What are the market conditions? What are the industry trends? What are the benchmarks of other companies?

“But it is also intended to provoke some of these companies to think bigger than they are currently; to get out of just the everyday, and really challenge them to continue to improve the way that they run their businesses.”

The biggest proportion of the survey respondents – 29% – was UK-based, and of this 60% were from the engineering sector and 40% from architecture.

Davidson explains that the report provides an opportunity for engineering firms to gain some insight from the wider industry that can then be fed back into their businesses.

“[The report] gives them a platform to have conversations within their own companies and with their teams, to start to figure out ways that they can work towards a higher level of performance,” he adds.

The survey, which was conducted online and gathered 600 individual responses from engineering and architecture firms, highlights several emerging technologies expected to have a significant impact on both sectors.

Artificial intelligence (AI), the Internet of Things (IoT), Big Data and geolocation continue to be the main areas where Deltek is seeing the most traction and interest across businesses.

“There’s also a lot of conversation about IoT pairing with digital twins and the new dynamic there,” says Davidson. “I think it will be really interesting to see how some of these technologies start to come together.”

While there is parity among engineering and architecture firms in the top technology trends, approaches to AI vary. The report found that a resounding 72% of engineers view AI as important for their business, while just 44% of architecture firms said the technology was important.

Davidson believes this disparity is because engineers are involved with the design, construction and maintenance...
Emerging technologies like artificial intelligence and Big Data are having a growing influence on construction teams. Designers are starting to look at how AI could help to reduce errors and tackle design challenges,” he says.

Davidson points to firms such as engineering consultancy Sweco which is using machine learning to boost construction productivity, and Ramboll which is using AI and 3D scanners to deliver a major road project in Sweden.

Davidson also underlines the potential for AI to help improve collaboration between designer and client over the course of a project.

“I think there’s a huge opportunity for better project outcomes, because having that intel up front can really help the client and designer better understand what the ultimate goal is and monitor it throughout,” he says.

“You can make sure that everything is on track so that you’re not waiting until the end of the project and faced with the surprise that this isn’t really what the client wanted or it isn’t delivered the way they expected.

“The technology allows clearer checkpoints along the way to better facilitate that end goal.”

But what are some of the barriers facing engineering firms as they look to adopt these new technologies?

Davidson is confident most engineering firms are in a good position to drive the uptake of AI and other emerging technologies, but admits there is more work to be done.

“There is a good understanding of the benefits of these technologies, but there needs to be more understanding of how they can be applied in the real world,” he explains.

“It’s about making that connection between these emerging technology trends and what they actually mean for your business.”

The starting point for firms looking to embrace new technology, insists Davidson, should be creating a comprehensive strategic plan.

“Businesses often know what they want to do, but it’s about carving away the time from project deliverables, which is the lifeblood of what they do every single day, and giving them the opportunity to really focus on [creating a strategic plan],” he says.

This clear strategy should outline how a company will prioritise technology trends and empower employees to explore new approaches.

“This isn’t just driven from leadership. Employees have to be confident that they’re working in an environment that won’t stifle these opportunities,” says Davidson.

“You have to give your people the ability and authority to drive this forward.

“One of the biggest barriers is ensuring they have freedom to take ownership of this.”

Deltek is continuously looking at ways to support its clients’ efforts to tackle these issues and identify the right solutions for their businesses.

“When we look at the solutions we provide, we look at them through the lens of what we call ‘purposeful innovation’,” Davidson explains.

“We’re not just looking at specific requests from our customers, we’re taking a holistic view of how we can use technology to provide solutions and make their processes more efficient.

“It’s not just about focusing on new technology because it’s the latest trend. We focus on what makes sense for our customers.”

A resounding 72% of engineers view AI as important for their business
Before the coronavirus demanded public attention and grabbed headlines across the world, climate change was the pressing issue that looked set to dominate 2020.

While global focus is firmly on combating the pandemic, United Nations experts have warned that the world must “show the same determination and unity” in the face of climate change as it has with the coronavirus.

BuroHappold engineer James Forsey believes engineers’ role in helping to reduce carbon emissions and promote sustainability has never been more critical.

Last year, dozens of engineering firms, led by BuroHappold, joined forces to declare a climate emergency and work towards minimising the industry’s environmental impact.

“As an engineer designing a 60-storey building, the consumption of resources during the process of building that structure is huge,” says Forsey. “The onus isn’t just on engineers, but we have the technical knowledge to help bring about real change.”

Forsey believes engineers can spearhead this change and suggests circular economy principles could help. The circular economy, in contrast to the traditional linear economy, aims to reduce waste through more sustainable resource management.

Resources traditionally follow a take, make, dispose process, often discarded to landfill sites at the end of service life.

Circular economy thinking helps to close the loop in this process, with resources reprocessed, refined and reused as many times as possible.

“Construction is a huge industry and, obviously, with that comes exceptionally large quantities of resources and fuels to support them,” he says. “If we can adopt the principles of the circular economy and apply them to the construction industry, we can have a massive impact.”

Forsey who is 25 hopes to lead by example in his role as one of four UK delegates to this year’s G7 youth summit.

Each year, delegates debate four policy tracks, including education and jobs; global connectivity and trade; peace and security; and energy, which Forsey is leading. The event was initially to be held in Washington DC in June, but will instead be held via video conference as a result of Covid-19 restrictions.

Forsey is tasked with engaging the UK’s youth to get their feedback on the G7’s policy tracks.

He is keen to see more engineers taking this proactive approach, whether through leadership roles in the industry or by reaching out to young people to promote engineering.

“Engineering is a great career. It’s not just about being an engineer but being able to really enact change and use your technical skillset to improve the world around you,” he says.
Innovation News

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TRANSPORT
FRENCH TO CUT COSTS ON COVENTRY LIGHT RAIL SCHEME

French engineering consultant Ingerop Conseil et Ingénierie has been brought in to drive down the cost of Coventry's very light rail scheme. A contract notice on the Official Journal of the European Union reveals that the consultant beat three other bidders to the job that involves designing new track for Coventry's light rail scheme. In September last year, Coventry City Council revealed a target cost of £10M/km of track, much less than that of traditional light rail systems which cost between £35M/km and £60M/km. A Transport & Works Act order is due to be submitted in spring 2021 with confirmation and full business case approval set for 2023.

C O R O N A V I R U S
TRACKING TECHNOLOGY COULD HELP REOPEN SITES

Tracking technology will enable project teams to view workers’ site interactions if operatives test positive for Covid-19. The CrewStrong technology – a collaboration between American data firms Foresight Intelligence and OEM Data Delivery – uses Bluetooth devices to track workers while on site. Teams can access reports listing individuals’ interactions within a given radius during any time period selected. The firms behind the technology, claim it will allow a safer return to job sites.

D R O N E S
FIRST OUT OF SIGHT DRONE INSPECTION TRIAL A SUCCESS

AmeyVTOL has successfully trialled the first drone inspection of UK infrastructure to go beyond visual line of sight. During the trial – undertaken by an Amey and VTOL Technologies joint venture – the drone surveyed an area 2km out of the sight of its pilot. Previous drone inspections have been limited to flight within visual line of sight and so could go no further than 500m from their pilot. The VTOL Flying Wing drone can fly up to 100km on a single charge using a hybrid design and optimised energy system.

S T R U C T U R E S
STAINLESS STEEL BRIDGE TO BE LIFTED INTO PLACE AFTER COVID-19 PAUSE

The main structure of the UK’s first stainless steel road bridge is to be lifted into position in the coming weeks. Cumbria County Council announced that the £5M road bridge at Pooley Bridge will hit the key milestone in the coming weeks. Contractor Eric Wright Civil Engineering resumed work on the bridge at the end of April following a brief suspension due to coronavirus restrictions. The original three-span 18th century stone arch bridge collapsed after Storm Desmond hit Cumbria in December 2015.
ICE

Five new members for Trustee Board

ICE Council also confirms Ed McCann and Anusha Shah as succeeding vice presidents while two Council members step down.

Five new members have been appointed to the ICE Trustee Board for the 2020/21 presidential session. The ICE Council has confirmed that Anusha Shah, Sabih Khisaf and Jim Hall will become Trustee Board members from November 2020. Andy Alder and Gary Cutts will also join the Trustee Board, as Council Appointee Members. They join existing Board members Ed McCann, Keith Howells, Emer Murnaghan, Richard Threlfall, John Beck and Liz Waugh, and will work with incoming President Rachel Skinner.

Council has also confirmed the presidential succession. Anusha Shah has been confirmed as a succeeding vice president from November 2020. She will go on to become President in November 2023, subject to interim annual election by Council. Ed McCann has been confirmed as succeeding Vice President. ICE Council voted that, based on seniority, he should be considered as a candidate for the Presidency in November 2021, subject to formal election by Council in December 2020. CK Mak and Jane Smallman will stand down as vice presidents in November, at the end of their three year terms.

ICE

Stay in touch with the ICE during lockdown by updating details

The ICE has asked members to ensure their details are accurate so they can make the most of online resources during the Covid-19 pandemic. Members can update e-newsletter preferences, so they can keep up with developments from across the ICE’s Membership, Policy and Knowledge divisions. The ICE Learning Hub also allows members to continue their development programmes online.

Details and communication preferences can be updated via the MyICE section of www.ice.org.uk

STRUCTURES

Experts assess Grenfell and Polcevera failures at ICE strategy session

Issues which emerged during recent major infrastructure disasters were discussed at a recent ICE strategy session. Dame Hackitt, the government’s independent advisor on tall building safety, said many in the industry saw risk and safety issues as “somebody else’s problem”. Transport Scotland chief bridge engineer Hazel McDonald and ICE Council member Julie Bregulla also shared their views.

PROJECT 13

Project 13 wins support from the World Economic Forum

Project 13 – the industry-led change programme developed by the ICE and the Infrastructure Client Group – is to be supported by the World Economic Forum as part of a new strategic partnership. Launched in 2018, Project 13 is a flagship initiative designed to make infrastructure delivery more society-focused. As part of the new partnership, it will benefit from the reach and knowledge of the World Economic Forum’s Platform for Shaping the Future of Cities, Infrastructure and Urban Services.

BENEVOLENT FUND

Benevolent Fund launches online Covid-19 support

ICE members needing advice about how to cope with the impact of Covid-19 on their lives can access a range of new resources provided by the ICE Benevolent Fund. Alongside the existing benefits and support packages, members can now access a range of webinars. An online therapist-led support group is also available to help combat concerns about reduced income, redundancy, anxiety and illnese.
KEEPING MANCHESTER METROLINK MOVING

The only thing certain in life is change and this is something I have embraced throughout my 15 year career in the rail industry.

Now, more than ever, embracing change is vital.

On 22 March this year, the new Trafford Park Metrolink line opened to the public to provide vital service to key workers in the area, seven months ahead of schedule. The very next day the UK was placed under lockdown to protect the nation from the Covid-19 virus.

Utilising technology quickly and increasingly became invaluable to ensuring Greater Manchester’s key workers could rely on our network to get them to their jobs, tackling the virus on the front line.

Our focus on continuous improvement by upgrading technologies such as the Agility Asset Management system and deploying mobile devices across the organisation has become paramount in enabling our multi-disciplinary teams to work collaboratively and for our own front line teams to remain safe.

A key change as part of the Metrolink joint venture is moving towards a proactive and preventative approach to asset maintenance. Being able to predict potential issues also means we are better prepared for those challenges as they unfold.

As part of this, I believe that the more we can use the latest technology to automate certain tasks, the more we can keep people safe while reaping other efficiency benefits.

By investing not only in innovation, but in creating the right culture within our organisation, we are implementing a reliability-centred maintenance regime on the Metrolink network, which is now the largest light rail network in the UK.

Integral to achieving this is leveraging expertise and experience from Amey and Keolis.

Utilisation and data analytics play a huge part in this – that is, how we access and analyse high quality data so that we can make better decisions. For example, our tram-mounted remote condition monitoring project will provide us with data about overhead line heights and staggers and contact wire thickness as well as rail profile measurements and ride and track quality. Just one tram trip can provide a much more holistic picture of the overall asset condition.

I am immensely proud of how our colleagues have adapted and embraced improvement as many of our processes have been streamlined. Discussion also focused on the impact of Covid-19 on public transport habits.

ICE graduate member Jen McKinney is currently working towards her chartership. She is head of infrastructure, KeolisAmey Metrolink – Greater Manchester Metrolink Operator Maintainer

SUSTAINABILITY

ICE strategy sessions continue with sustainability focus

The role of sustainable, public-focused infrastructure in achieving the United Nations (UN) Sustainable Development Goals was the focus of a recent ICE Strategy Session. UN Office for Project Services head of strategic initiatives Steven Crosskey highlighted to attendees that significant global investment is needed to meet the $97 trillion (£76.81 trillion) infrastructure funding challenge and ensure the targets are reached. Discussion also focused on the impact of Covid-19 on public transport habits.
Fresh content designed to keep civil engineers in-the-know and engaged about the latest industry discussions, will be delivered to members by email.

As the industry adjusts to the lack of face to face learning events amid the Covid-19 pandemic, the Institution is helping members to remain informed and engaged.

Members will receive a specially curated e-newsletter every two weeks. It will include a range of content to keep them informed with latest news and which will enable them to continue professional development. Each issue will be themed.

ICE director of engineering knowledge Mark Hansford said: “Whatever else Covid-19 is doing, it is reinforcing the need for civil engineers to be able to access reliable and trusted knowledge. The ICE is here to provide that, so please keep reading our newsletter and checking the ICE website for all our latest outputs.”

Sign-up for the knowledge e-newsletter by emailing knowledge@ice.org.uk

Industry professionals are being asked for their views and expertise as part of the ICE’s latest research project, which looks at the social impact of Covid-19 and how infrastructure systems can help society recover.

A steering group chaired by ICE President Paul Sheffield is leading the research which is being carried out on behalf of the Infrastructure Client Group.

The first phase of Covid-19 and the New Normal for Infrastructure Systems research is now underway.

A consultation paper is live and the Institution is asking industry professionals, ICE members and other stakeholders to respond.

Within the consultation is an assessment of what the “new normal” could be for society following Covid-19.

It will also examine infrastructure’s role in its long-term recovery and whether the pandemic will impact the UK’s ability to achieve the United Nations Sustainable Development Goals.

Following the consultation, the ICE will publish a White Paper outlining key learnings and recommendations about the role of infrastructure systems in tackling Britain’s social, economic and environmental challenges over the next 18 to 24 months.

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

“For instance, it could be a real benefit for those who are not comfortable with going into a traditional office place to be able to create the space for more home working while truly delivering great value to their businesses.

“Then, if everyone worked from home one day per week, that just might take 20% off the roads and rail links that we use for our commute – not to mention the 20% reduction in the desk space that we might need in the expensive offices that we occupy.”

Details of the consultation and updates on the project can be found at ice.org.uk
When times are tough you get a chance to see clearly what really matters in life. The March 2020 Loo Roll Crisis points in one direction, massive community support for NHS workers in another.

In times of great uncertainty, it is comforting to know that what you do is important; not just that your job will be secure, but also that you are playing a meaningful role in helping society survive and thrive.

Civil engineers should take comfort in the fact that, on the whole, what we do really does matter.

Through the current crisis the lights have stayed on, water still comes out of the tap, toilets still flush, trains still run. This speaks volumes to over 200 years of civil engineering effort that continues today and provides the physical infrastructure underpinning modern life.

The capability of the civil engineering community to adapt has been great to see. Clients and their consultants moved out of their workplaces into their homes in just a few days and many are already as productive as when they were in offices.

Contractors, facing greater challenges, re-designed and implemented new working practices to comply with social distancing guidelines and got back to work within weeks. The infrastructure operators just kept going, making sure that the nation’s infrastructure kept on going too.

The story of the Nightingale Hospitals will be told for years to come and was a perfect example of what can be achieved when we work together with purpose and imagination.

None of this was a big surprise to me; our community of civil engineers is above all a group of inventive and determined problem solvers.

Of course, Covid-19 is just the latest in a lengthening list of threats that we face, including the ongoing climate emergency, global wealth inequality, and the growth in national populism.

Tough times indeed.

The lesson for me in all of this is that if we want to succeed: as individuals, as businesses and as a society; then we need to identify what really matters and change accordingly.

Our industry evolved through the 19th and 20th centuries to provide the infrastructure that society needed then.

We are evolving now so that we can provide the infrastructure that society needs in the future. This is not an easy change for those that have grown to meet the needs of the past and find themselves poorly set up to meet the needs of the future.

But, when the history of the 21st century is written, I am confident that you will find a big chapter telling the story of the civil engineers and their essential contribution to civilised life.

This is one profession that really does matter!

Ed McCann is ICE vice president, membership
Featured Jobs

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Browse and apply online: newcivilengineercareers.com

Job title: Harbour Master
Salary: Competitive
Location: Saudi Arabia
The successful candidate should be degree qualified from a Nautical Academy and possess extensive operational port experience including pilotage. The role will be to coordinate with all the necessary local authorities in Saudi Arabia to ensure a fully operational busy port is smoothly working and also involves the management of a small team of two Marine Managers.
Link: https://bit.ly/2ygvfSD

Job title: Planning and Controls Manager - Leeds
Salary: Competitive
Location: Leeds
You will provide the leadership and direction for the Transpire Alliance on all things planning and project controls and lead the technical and assurance support for the project and controls function.
Link: https://bit.ly/3aVgNNh

Job title: Deputy Facilities Manager
Salary: Competitive
Location: London
BAM FM is recruiting a Deputy Facilities Manager based at Camden Schools, Camden. Reporting to the Facilities Manager, your main responsibility will be to support the Facilities Manager to ensure that the services provided to the authority are in accordance with the service agreement and authorities requirements (AR’s)
Link: https://bit.ly/3aQIhDz

Job title: Associate & Senior Civil Infrastructure Engineers
Salary: Up to £55,000 + Benefits
Location: Nottingham
Premier London consultancy with an office in Nottingham has a requirement for an Associate Civil Infrastructure Engineer and a Senior Civil Infrastructure Engineer to join the expanding civil infrastructure team.
Link: https://bit.ly/2Spa87k

Job title: Associate Structural Engineer/Chartered Senior Structural Engineer
Salary: Up to £55,000 + Benefits
Location: Manchester
Premier Structural Engineers in Manchester has a requirement for an Associate-level Structural Engineer (or an individual who is ready to step-up soon) to join the expanding office as it establishes its team structure.
Link: https://bit.ly/3d5SxaA

Job title: Building Envelope Specialist
Salary: Up to £75,000 + Benefits
Location: South West London
Candidates will need to be Chartered members of IStructE and/or ICE and must have extensive experience in due diligence and latent defect insurance projects and will have worked on cladding systems and have expert witness skills. They should be capable of dialoguing with clients and be willing to travel globally to suit projects.

Job title: Associate & Senior Civil Infrastructure Engineers
Salary: Up to £55,000 + Benefits
Location: Nottingham
Premier London consultancy with an office in Nottingham has a requirement for an Associate Civil Infrastructure Engineer and a Senior Civil Infrastructure Engineer to join the expanding civil infrastructure team.
Link: https://bit.ly/2Spa87k
“Their creative flair and initiative has greatly assisted us with our vision in these challenging times... New Civil Engineer will remain an essential and critical part of our strategy.”

Dave Knapp, Business Development & Property Manager, JT Macklay & Co Ltd

“Professional excellence in an informed, unbiased way”

Graham Hemming, Associate, WSP

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