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The views reflected in this bulletin do not necessarily reflect the views of the IHE

IHE Technical News

NOVEMBER/DECEMBER 2023

in partnership with **Highways**

Significant carbon savings achieved in Oxfordshire

Latest reports show Oxfordshire County Council's street lighting energy consumption has significantly decreased following LED conversion works, delivered by VolkerHighways.

The project, which involves converting 34,000 Lanterns to LEDs, along residential and high-speed routes across Oxfordshire roads, is now over 92% complete.

To date, from converting almost 32,500 lanterns to LEDs, approximately 4,800 tonnes of CO2 has been saved. That is the equivalent weight of almost 110 HGV lorries, at its maximum load.

When comparing the energy efficiency of the LEDs against the original conventional discharge lanterns, it equates to a 60% reduction in energy since the beginning of VolkerHighways' contract with Oxfordshire County Council. Saving £3.5 million per annum reduction in energy costs (based upon the current cost of twenty-three pence per kWh).

While the rollout of LED lantern replacements within

Oxfordshire is almost complete, attention now turns to replacing the ageing columns as these are nearing the end of their serviceable life. In iust seventeen months our team has replaced 75%, i.e., 13,514 of the 17,924 columns to be delivered as part of this project.

The works form part of VolkerHighways' five-year Highways Electrical Assets contract with Oxfordshire County Council, which began in December 2021. The team are responsible for planned and responsive maintenance of lighting assets across the county.

Councillor Andrew Gant, Oxfordshire County Council's Cabinet Member for Transport Management, said: "The LED streetlighting programme is the biggest single project that we, as a council, are undertaking to reduce our own carbon emissions.



"It will significantly help us to achieve our target of becoming a carbon neutral organisation by 2030 and save council taxpayers millions of pounds over the next two decades. It's a real win-win."

David Easton, Operations Director of VolkerHighways, said: "LEDs are attractive to many local authorities thanks to their efficiency, carbon and cost savings compared to conventional lanterns. We are pleased to see these high energy and cost savings for our valued client, Oxfordshire County Council."

VolkerHighways

Optimising lifecycle costs and environmental impact in road networks

Lifecycle costs and environmental impact

During the initial design stage of a 1.6 km link-road for the UK's Major Road Network, AECOM hired ORIS to optimise pavement design, taking into account environmental impact and maintenance needs. Using ORIS's digital project impact assessment capabilities, our client was able to assess different design options to find the optimal solution between cost reduction, carbon impact mitigation and limited natural resources consumption. A particular emphasis was made on anticipating maintenance needs to evaluate the long term costs over 60 years.

Project overview & methodology

Using ORIS on a 1.6 km link-road for the UK Major Road Network, different design options were considered including fully flexible pavement options compliant with DMRB standards, including Thin Surface Course System (TSCS), Hot Rolled Asphalt (HRA), and Flexible pavement (TSCS) on a Hydraulically Bound Mixture (HBM category B) layer. Rigid pavements were discarded due to low traffic volume and initial cost comparison.

AECOM used the Whole Life Costing and Key Performance Indicators generated by the ORIS platform analysis to select the preferred pavement design. The analysis included producing a maintenance life cycle plan and calculating the Net Present Service Value. Maintenance activities involved crack sealing and surface dressing, and overlays were discarded. Design lives of 12-40 years were considered for the pavement designs.

What were the key levers of improvement?

- Local materials: The sourcing of local construction materials was prioritised
- Circular economy: a by-product (steel slag) derived from the steel industry available locally were used in the surfacing of the permitted pavement designs to replace 50% of the aggregates, further reducing the consumption of natural resources while maintaining the performance standards.

Main outputs

Pavement construction cost The fully flexible TSCS design was the most cost-effective option in terms of direct construction cost (£1.75 million), providing a significant reduction of 7% compared to the flexible on HBM-B design (£1.88 million), and a reduction of 5.4% when compared to the fully flexible HRA design (£1.85 million).

Whole Life Cost (WLC)

The WLC appraisal factored in the

maintenance activities required by the design options and the periods of time in which it will be required. Based on the Net Present Service Value, the Fully Flexible TSCS proved to be the most economically beneficial design, with a NPSV of £ 3.23 million, followed by the flexible HBM-B on design, with a NPSV of £ 3.23 million (4% higher). The fully flexible HRA was the less economically beneficial option (NPSV of £ 3.42 million), despite the higher residual value at the end of the 60-year analysis period resulting from the replacement of surface and binder layers in year 60.

Material consumption

Over the required 60-year analysis period, the fully flexible TSCS generated the lowest material consumption ie. 83,400 tonnes. The flexible HBM-B design consumed about 86,600 tonnes, yielding the highest consumption due to the materials required for replacing the HBM-B layer over the 60-year analysis period. However, 50% of the aggregates used on the surface layer of the above mentioned designs were replaced by locally available steel slag, saving a total of 3.9 tonnes of natural resources.

Whole Life Carbon

In terms of environmental sustainability, the fully flexible TSCS

emerged as the most favourable pavement design option, emitting a total of 2,810,000 eq. kgCO2 equivalent over the analysis period. The carbon emissions of the fully flexible HRA and flexible on HBM- B design options were 10% and 11% higher, with 3,090,000 and 3,120,000 eq. kgCO2 equivalent emitted, respectively. In addition, approximately 58% of the carbon emissions were attributed to the maintenance activities, which emphasises the importance of evaluating the entire life cycle of an infrastructure project.

Empowering our client to deliver the optimal sustainable infrastructure design

ORIS is a powerful tool that enables sustainable and efficient infrastructure development. As the first construction materials intelligence platform for low impact infrastructure, ORIS offers innovative impact assessment capabilities that can be tailored to the unique needs of each project. By leveraging data-driven insights and multiple criteria analysis, ORIS helps decision-makers identify the most costeffective, environmentally friendly, and long-term maintenance solutions. This project is a perfect example of how ORIS can be used to achieve sustainable infrastructure development, promote circular economy, and reduce the environmental impact of construction projects.

ORIS

Wrekin invests in GEOs offering to support current high work levels



David Fisher, Head of Geosynthetics sales, Geosynthetic Division, Wrekin

With the Construction Products Association (CPA) predicting that infrastructure construction output is only expected to fall marginally, <u>Wrekin</u> <u>Products</u> is using this time to invest in its biaxial geogrid product range.

To support current high work levels, Wrekin's premium E'GRID and SX Grid biaxial geogrid product range has been refined from 11 to six products. The change means greater clarity of the options available for contractors, while retaining its ease of installation capabilities for faster construction. Larger stocks of the key products will also mean even better product availability. This allows us to service sites from single rolls, right through to thousand roll orders.

David Fisher, head of geosynthetics sales of the geosynthetic division at Wrekin Products, said: "While it is a difficult time for the sector, infrastructure projects have been predicted by the CMA to be less vulnerable than other areas of construction due to on the ground works of major projects continuing.

"By this new investment in our range, we are sending a clear message of support. Demand is still incredibly high for our geogrid solutions, which are ideal for applications like piling platforms, adoptable roads and rail. Now, contractors can benefit not only from an easier to understand range, but one that has even greater product availability too."

The E'GRID range, which has a 100-year design life and is ideal for high-risk applications such as adoptable roads and working platforms, is now available in a choice of: 30kN/m² 4m wide, 40 kN/ m² 4m wide and 30L (30 kN/m² large aperture) 4m wide. The SX Grid range, which has a 50-year design life and is especially useful for lower risk and temporary applications such as compounds and haul roads, is now available in 20 kN/m² 5.2m wide, 30 kN/m² 5.2m wide and 30 kN/m² 5.2m wide composite.

David continued: "The changes have furthermore had a positive impact on our pricing, allowing us to be even more competitive. For example, we've been able to introduce new price reductions within our geogrid range.

This is the first phase of a three-step development plan for Wrekin's Geogrid range, with future ambitions in place to continue to enhance the offering.

To find out more about the biaxial geogrid product range please visit www.wrekinproducts.com/ geosynthetics/geogrids

Wrekin

Valeraan and Lima Expresa: Al accident detection to improve Road Safety



The partnership between Valerann, global leader in ATMS solutions, and LIMA EXPRESA, a subsidiary of VINCI Highways and the concessionaire of Vía de Evitamiento and the Línea Amarilla express road, stands as a remarkable example of how technology is significantly improving road safety and traffic management. Faced with the challenges of increasing traffic, rising road incidents, and data fatigue, this collaboration leveraged the power of artificial intelligence to empower control centres, achieving transformative results.

The Vía de Evitamiento and the Línea Amarilla express roads are vital for the 10 million inhabitants of the Peruvian capital. Serving as primary connectors between key transport hubs, these arteries help to alleviate congestion in the historic centre of Lima while offering a 30-min reduction in journey times for their users. However, with the growing traffic currently standing at 200,000 vehicles per day, it is expected that the total number of road events in 2023 will reach 14,000, — a sharp 17% rise from 12,000 in 2022. This trend over past years showed an increased need for leveraging technology in traffic monitoring and management especially for incidents detection.

In 2021, LIMA EXPRESA's initiative to deploy an innovative automatic incidents detection system received co-financing from the Ministry of Production in Peru. To accomplish their goal, LIMA EXPRESA partnered with Valerann, global leader in advanced traffic monitoring solutions (ATMS). Lanternn by Valerann[™] (LbV) is an advanced analytics and AI software platform that integrates with the existing road infrastructure, ingests and continuously processes data streams from all available disparate sources, such as cameras, connected vehicles, loops, radars, crowdsourcing applications, satellites. By deriving data from unrelated sources, leveraging sophisticated AI and computer vision algorithms, the

solution delivers best in class data fusion. This removes road authorities' reliance on manual events verification and provides them with accurate real-time information on the exact location, type, cause, and severity of incidents – on a single pane of glass.

Using Lanternn by Valerann™, the LIMA EXPRESA team significantly reduced incident response time, increased road safety and improved resource management. Enabling complete monitoring coverage, the solution proved to detect over 95% of all road incidents in under five minutes. Further enhancing road safety, the system facilitated preventative measures for road accidents management by detecting pedestrians and stopped vehicles in potentially dangerous zones, along with conducting predictive analysis to foresee high-risk events.

Valerann

Re-flow field management review by Lagan Airport Maintenance

Lagan Airport Maintenance (LAML) was rapidly expanding, beginning to quickly outgrow their manual way of work. One of the business's key challenges was the quality and timeliness of information returning from remote sites. When documents returned from sites, they were left in piles, with files often going missing. This created additional work for office administrators and logistics planners, who'd have to then spend time finding and retrieving information.

Scheduling was conducted using legacy spreadsheet software, then having to be communicated by unreliable and time-consuming means. On sites, sign off documentation was lacking, and internal and external audit trails were suffering as a result. With limited oversight and unreliable processes, LAML appointed a general manager to streamline and enhance their way of working.

LAML's parent company had already taken a foray into digital transformation, adopting a mobilebased solution that facilitated site communication, toolbox talks and more. This solution, however, was not the right fit for the projects LAML was undertaking, and it could not be adjusted to fit their unique needs. Having experienced Re-flow's benefits at her previous company, general manager, Tricia Green, pitched the solution as an alternative to LAML's director and HSE manager.

Re-flow is a scalable, end-to-end field management solution that facilitates all major operational processes. This includes detailed job creation and distribution, scheduling, team communication, form functionality and more.

Being a digital solution, Re-flow comes with the instant benefit of being completely paperless. This means that data from sites is returned instantly, accessible through the system's desktop dashboard. Office administrators and logistics planners no longer need to spend time retrieving misplaced documents, with everything accessible through Re-flow at the touch of a finger.

Scheduling is also fully integrated into the system, eliminating the need for spreadsheet-based project planning. Events and tasks can easily be scheduled against created jobs, with the newly implemented drag-and-drop features making assigning vehicles, operatives and equipment more intuitive than ever. Common jobs can even be scheduled to recur on a regular basis, enabling effortless creation of MOTs, maintenance and repeating site visits.

For harvesting data on-site, Re-flow's form functionality provides the tools to effortlessly enforce compliance and ensure high-quality, instant information. Harvested through digital forms, users can pick from a catalogue of over 40 pre-built forms or build their own to regulatory standards. This keeps the system flexible, enabling forms to follow unique process and track any KPIs necessary.

Ensuring airtight compliance and auditability, all forms are tagged with a unique digital signature, time, date and location, with additional support for geofencing. With all data automatically stored in Re-flow and tagged with relevant information, building robust audit trails and reports becomes a breeze.



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Having fully adopted Re-flow, LAML were able to eliminate their manual, paper processes and begin benefiting from accurate, real-time data exchange. Near misses and safety observations could now be recorded in real time. Copies of signed site paperwork such as RAMS, start of shift briefings and point of work risk assessments are completed daily and easily visible through the dashboard, automatically alerting of any on-site concerns in real-time.

Vehicle and plant pre-use safety checks and defect sheets arrive back instantly with attached photographs, enabling the team to easily isolate defect plant or equipment, and immediately act on scheduling repairs and ordering replacement parts.

In-app tasks are now a part of operative's day-to-day, enabling the team to put greater focus on H&S management. Through use of the knowledge base, teams on-site have access to all of the company's latest policies, information and copies of all internal technical training. This includes COSHH assessments, toolbox talks and safety alerts.

Should any information be updated, office teams can communicate this in real-time, providing operatives access to the latest information. When audit trails need to be compiled, all communication between site and office is easily trackable, without the need for paperwork clutter, scanning or stage. Thanks to these changes, operatives have been able to save 15 minutes a day, while admin teams save an average of 40.

LAML now joins a community of hundreds of businesses nationwide that have embraced digital transformation and ensured sustainable growth for years to come. All of this, and more, can be achieved with Re-flow's award-winning field management software for civil engineering.

Re-flow

A proactive approach to highway maintenance

PROJECT – A1270 Broadland Northway (NDR) with Norfolk County Council

Background

Norfolk County Council, through their term maintenance contractor Tarmac, continued to take a proactive approach to highways maintenance in 2021. In a council press release, ClIr Martin Wilby, cabinet member for highways, infrastructure, and transport, said: "Proactive maintenance in the short term is a vital way to cut long term costs. Our focus is on providing a network that's reliable and helps support the economic recovery in our part of the country."



"Norfolk's asset Management Team looked at this as a possible way to reduce our whole-life costings, especially on our A road network, by extending the period before reconstruction. We found, which was written up in a 2016 internal report, that Reclamite did give us a whole-life cost benefit in comparison to other treatments, such as dressing, but in this case (on the A1270 Northern Broadway) it was even more beneficial due to a clause in the Development Consent Order (DCO) requiring the road to have a low noise level throughout its life. This ultimately means that one of Norfolk's normally preferred option (traditional Surface dressing) cannot be used, so to elongate the life of the present surface, Reclamite was prescribed. It is unclear exactly the extra life that will be achieved, but it is hoped that with such a large area of road this could save Millions of pounds in the years to come."

Solution

As part of the county wide activities, Roadtechs was the contractor chosen to apply a spray treatment to the A1270 Broadland Northway carriageway. This is 12.4 miles (20km) of dual carriageway. This was to be the first treatment of Reclamite on this road, with the next one planned for about 5 years' time. This primarily mechanical process reduces the carbon footprint by over 90% compared to traditional maintenance methods. Tarmac provided the traffic management for these works and kept the traffic flowing and the installation team

safe.

The quick to apply Reclamite treatment, minimised disruption to traffic and is more cost effective as it reduces long-term maintenance costs. Reclamite was chosen as it helps to keep good roads in good condition and has a vastly reduced carbon footprint when compared to some other conventional surface treatments. The process had been used successfully in several locations in Norfolk including in 2020 on the new A47/A143 link road near Gorleston.



Outcome

Norfolk County Council have been using this treatment for the past 10 years on their network. Over this period of time Norfolk used their own independent UKAS accredited laboratory (the Norfolk Partnership Laboratory now forms part of the Norse Group) to confirm the effectiveness of this treatment and where it fits in their asset management toolbox. 10 No 150mm cores were taken from the untreated and treated section of the carriageway and then tested to confirm the effectiveness of this treatment in having a positive change in the rheology of the binder. "Testing on the A1270 and other sites within Norfolk over the past Ten years on the Stone Mastic Asphalt Materials used in Norfolk, has shown that the reclamite has had a positive effect on the surface course, indicating it is lifting the softening point towards its initial values. it has been clear to see the effects of the treatment on the initial trial site ten years ago (A140 Daniels Road, Norwich outer ring road), as the section which has been treated is clearly visible, compared to the untreated section." Simon Shearwood, Senior Engineer

(Pavements & Structures), Norfolk Partnership Laboratory.

When the carriageway was constructed, it made use of the locally available aggregates with the minimum amount being brought in from neighbouring counties. So, the consideration on the carbon footprint has been carried through in this programme. Tarmac commented as follows - "Tarmac is committed to collaboratively working with our Client, Norfolk County Council, in embracing and trying alternative surface treatments to prolong the life expectancy of the existing carriageway surfacing on the network. This scheme is of particular interest to us, as it is on a road that Tarmac had supplied and laid the asphalt carriageway layers, when constructed and opened in 2018. We are keen to see the benefits of what Reclamite will bring to the longevity of the surface layer and how long it extends beyond an anticipated 15 year lifespan obvious benefits of this increased lifespan will be to reduce the whole life costs, delaying the eventual inconvenience to road users with associated works in planing out a worn carriageway and replacing it with new asphalt layers, and helping towards the goal of reducing the carbon emissions during construction works. Tarmac have recently developed a carbon calculator and are working towards being able to capture the carbon emissions for all types of pavement options including schemes where Reclamite has been applied. The carbon figure for spraying Reclamite on 50 lane miles was 14.18 (tCO2e)."

Roadtechs, based at Topcroft near Bungay is a specialist highways maintenance company which has over 30 years' experience. The money spent by Norfolk County Council on this programme found its way back into the local economy and supports local jobs at the same time.

Norfolk County Council was confident in its knowledge to introduce innovative solutions such as Reclamite as a surface extension / preservation treatment and has been reaping the benefits. We would encourage other local authorities, county councils and contractors to follow their lead and embrace this innovation. Reclamite is proven (in numerous locations across the UK), successful and 'green' – please consider how it could be used on your network.

The relationship between Roadtechs, Norfolk County Council and Tarmac is based on mutual trust, knowledge, and confidence, there is no doubt that this plays a key part in the

BOOK NOW

success.

We commissioned a video of the works and this can be accessed by clicking on this link https://surfacetreatments.co.uk/

#reclamite.

Please contact us to discuss how we can help with your local network.

Roadtechs

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Once logged in click on 'Invoices/Receipts' where you can view and download a copy of your invoice and make payment online. If you are set up for Direct Debit no further action is required.

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6 CPD Hours

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Wednesday 24th January 2024 Birmingham

One day course

A broad understanding of the law on Highways

Principally for highway engineers but also for anyone requiring additional knowledge of this area of law.

Highways passpørt

CASE ^{by} CASE



Welcome to our regular series of articles relating to Highway law, Court decision and other information from colleagues in the legal fraternity

Manholes and the Occupiers' Liability Act 1957

AG v Pembrokeshire County Council



In Samuel v Rhondda Cynon Taf County Borough Council and Dwr Cymru Welsh Water (LTL 30/01/2014) in which it was held that the Defendant Local Authority was not required to physically inspect every stop tap cover in the locality and that a visual inspection is sufficient. Dolmans represented the Defendant Local Authority in Samuel which involved third party apparatus in the adopted highway.

In the more recent case of AG v Pembrokeshire County Council, in which the Defendant Local Authority was again represented by Dolmans, the circumstances were somewhat different in that the case involved a manhole cover that was owned by the Defendant Local Authority and situated on land owned and occupied by the same Authority, albeit not part of the adopted highway. As such, various arguments needed to be highlighted on behalf of the Defendant Local Authority to account for these specific circumstances and these will be focused on below.

Background and Allegations

The Claimant alleged that he was walking his dog, on a grassed area located behind an industrial estate that was owned and occupied by the Defendant Local Authority, when he stood on a loose manhole cover that gave way, causing the Claimant to fall into the inspection chamber and sustain personal injuries.

The manhole cover was also owned by the Defendant Local Authority. The Claimant alleged that the said accident was caused by the Defendant Local Authority's negligence and/or breach of its duty under Section 2 of the Occupiers' Liability Act 1957 in having failed "to take such care as in all the circumstances of the case is reasonable to see that the visitor will be reasonably safe in using the premises for the purposes for which he is invited or permitted by the occupier to be there". In addition, the Claimant alleged that the Defendant Local Authority was guilty of nuisance.

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Reactive System

The Defendant Local Authority had a reactive system of inspection and maintenance in place at the location of the Claimant's alleged accident which was argued as being sufficient for the particular location. The Defendant Local Authority relied upon the decision in Cook v Swansea City Council (2017) EWCA Civ 2142 in which a reactive system was deemed reasonable in respect of icy conditions in the Defendant Local

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CASE ^{by} CASE

> AG v

Pembroke-

shire

County

Council

Authority's unmanned car parks.

Balancing Act and Additional Inspections

Reference was made to the 'balancing act' to be undertaken when considering what amounts to "such care as in all the circumstances of the case is reasonable". The factors to be considered in undertaking this 'balancing act' were set out by Hoffman LJ in the case of Tomlinson v Congleton BD (2004) UKHL 47 as follows:

- (i) The likelihood that someone may be injured;
- (ii) The seriousness of the injury that may occur;
- (iii) The social value of the activity that gives rise to the risk; and
- (iv) The cost of preventative measures.

Notwithstanding the reactive system in place at the time, the Defendant Local Authority in the current case employed grasscutters, who were on site at the relevant location every 2 to 3 weeks between April and September. They would undertake visual inspections of manhole covers in the vicinity as appropriate and report any issues regarding the same. There were, however, no such issues reported at the time of the last grass cutting visit prior to the date of the Claimant's alleged accident.

Indeed, the Defendant Local Authority also had no record of any similar complaints/accidents relating to the location of the Claimant's alleged accident during the 12 month period prior to the date of the same and had repaired the manhole following the Claimant's alleged accident. Taking the above into account, the fact that upon the Claimant's own admission the area was used infrequently and the seriousness or otherwise of the injuries that may occur, it was argued that to suggest that a system of regular inspection of such a grassed area is necessary would impose an impossibly onerous burden upon the Defendant Local Authority

Visual Inspections

The Claimant alleged that the manhole cover collapsed without warning and that the alleged defect was not visible. The Defendant Local Authority argued, therefore, that an inspection would not have revealed the alleged defect in any event. In raising this argument the Defendant Local Authority sought to rely upon the decision in Samuel, reiterating that it is not required to physically inspect every manhole cover in the locality and that a visual inspection is sufficient. The said case of Samuel related, of course, to a stop tap cover on the adopted highway where it was argued that a higher duty is owed, unlike the current case where the Claimant's alleged accident occurred on a grassed area located behind an industrial estate that was used infrequently.

Claim Dismissed

The Deputy District Judge who heard evidence on behalf of both parties at Trial dismissed the Claimant's claim on the basis that the system in place demonstrated that the Defendant Local Authority had taken reasonable steps to ensure the reasonable safety of the Claimant. The Judge considered that a reactive system in such an area where there was not heavy footfall was reasonable. There had been no previous complaints and/or similar accidents during the 12 month period prior to the date of the Claimant's alleged accident and the alleged defect had been repaired promptly following the same. The Judge also noted that the grasscutters provided an additional safeguard in the summer months as they would report any issues arising in the relevant area.

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Comment

With the assistance of a carefully drafted Defence, supported by witness evidence and appropriate case authorities, the Judge in this particular case was able to focus upon the relevant issues relating specifically to the extent of the Defendant Local Authority's duty under the Occupiers' Liability Act 1957 and the adequacy of a reactive system in those circumstances.