

CUSTOMER

National Highways

PROJECT

Concrete Roads Programme- driving digital transformation

SOLUTION

Trimble Catalyst and KOREC data capture software and portal

Completing the circle



Measurement within the KOREC Portal

How a clever field data capture app and a cm accurate low-cost GNSS have enabled National Highways to achieve the same amount of defect work in just one shift whilst saving around £20k on each 5km stretch of carriageway.

The digital revolution has taken hold on virtually every aspect of our lives and each day we witness technology branching out across all sectors and industries as they seek to raise productivity and streamline processes. Whilst the transport industry has in general profited from the digital revolution, specific areas such as highways maintenance are lagging behind, often still using pen and paper methods for data collection and analysis. This is something that National Highways is seeking to rectify with an innovative programme designed specifically for the concrete roads sector.



National Highways is investing £27.4 billion in the strategic road network (SRN) between 2020 and 2025 with digital data and technology being critical to its main objective, namely providing safer, smoother and more reliable journeys for its customers. Consequently, National Highways has been developing methods to enhance delivery efficiency and improve data quality to support long-term decision making.

Over the past three years, KOREC Group has been working closely with National Highways (and its delivery partners), identifying innovative new methods that can reduce both the cost of the works and the impact of construction on roads users and communities. These methods include mass data collection (mobile mapping), digital twins, IOT, augmented/mixed reality, cloud platform use (KOREC Portal), machine learning and of course, field data capture (KOREC app).

KOREC Portal is central to the project

Key to the handling and use of all data captured in the field, whether by mobile mapping or the KOREC data collection app and Trimble GNSS, is KOREC's K- Portal. Secure and easy to use, this simple cloud-based platform allowed National Highways to address three key concerns:

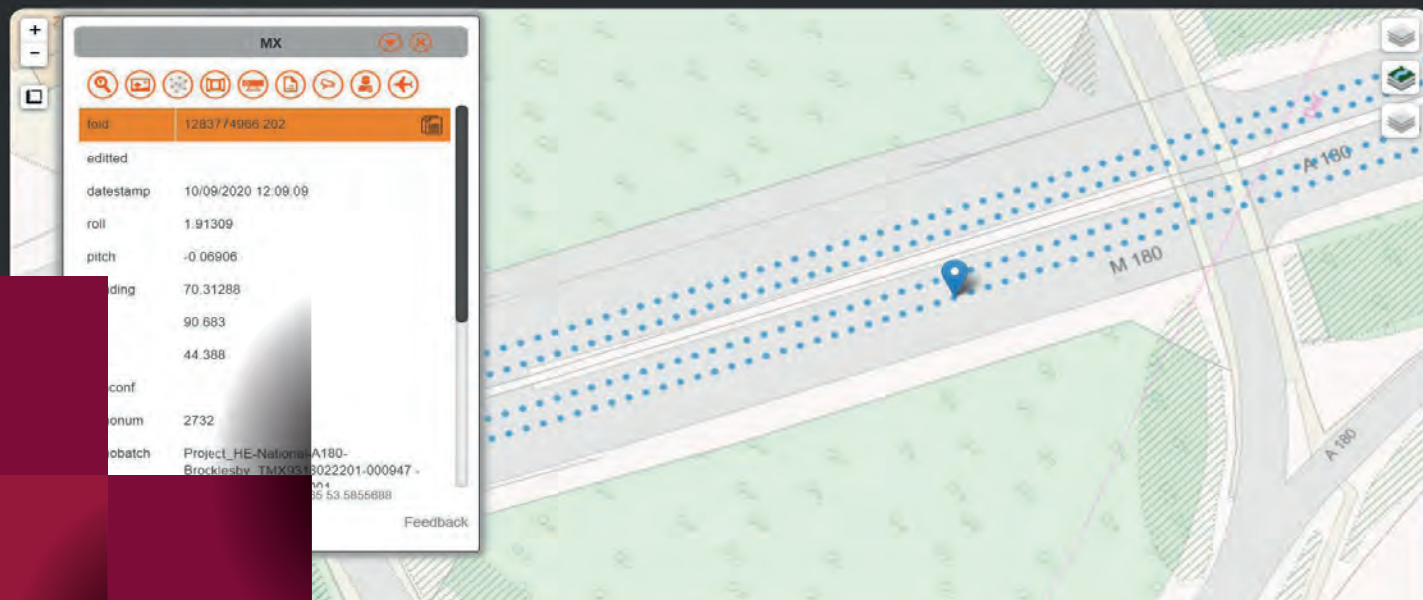
The benefits - KOREC field data capture solution

- Low cost, accurate and extremely easy to use
- Easy to issue work packages directly to contractors
- Ability to track works progress
- Automated production of shift reports
- Two-way data flow between field and office for increased efficiency
- Speed up approvals/handover



KOREC field data capture app

Map Review



Each blue dot can be clicked on for meta data such as position and time of capture

1. How to handle and share the dense data generated by mobile mapping systems?
2. How to use this data in the office for better collaboration?
3. How to use this data in the field for greater efficiency?

The KOREC Portal is unique in its ability to handle securely the large, dense point clouds generated by any manufacturer's mobile mapping system. Previous to the introduction of a digital system, it was extremely hard for National Highways to record useful information about each defect. This meant that the concrete roads team lacked the sort of historical information that would allow them to build up a record of how, when and by whom each defect was repaired. The new system will ensure that all attribute information attached to each defect will be easily accessible for interrogation, viewing etc. The portal also ensures two-way data flow between the office and the field (equipped with the KOREC field data capture app and Trimble Catalyst GNSS) enabling the issue of work packages directly to contractors as well as the automatic generation of shift reports.

Field data capture app as part of the workflow – completing the circle

For National Highways, it was vital that the field data capture side of the operation was as effective as the mobile mapping programme and portal functionality if they were to create the 360° digital workflow that they sought.

Determined to put an end to a pen and paper approach, National Highways required its new digital field data capture workflow to tie in with the project's larger overall themes of greater efficiency, creativity and innovation as well as the more specific aims of a BIM modelling approach to road maintenance, an approach that would see their mobile mapping data populated with intelligent field-based information. This would provide them with scope for both greater efficiency in existing applications and the development of new and experimental ones.

Following successful trials, National Highways invested in a number of systems comprising a Trimble Catalyst receiver (a low cost, on demand,

“Every time we use the solution, we save money”

National Highways on the new digital workflow



“ This isn't business as usual, this is business better. We fully expect to recuperate the innovation budget in savings as a result of using this technology. ”

Michael Ambrose - Technical Lead on the National Highways Concrete Roads Programme

cm accuracy GNSS) used in conjunction with the KOREC field data capture app running on a Trimble TDC600 rugged handheld. Three systems were purchased for use by National Highways supervisors during the trial and the projects that followed.

The solution was adapted to be fit for purpose in three particular ways:

1. Accurate defect location

Before: Previous methods of working had involved the location of potholes/defects etc marked on a strip map with a corresponding chainage to locate them. Using a road wheel, the contractor would then attempt to locate the correct defect but this often proved problematic. For example at night, or because some defects are quite subtle and hard to detect visually or because the road wheel hit a bump and span randomly putting the measurements out.

The inexactness of the method meant that on occasions shift teams of up to 20 could be called off site or even fix the wrong defect which would then require the time and attendant traffic management for a second visit. Additionally, sometimes the contractor would find the defect but because of the delays between the defect repair being designed and the work carried out (often months) the repair design would no longer be relevant and a paper report of the changes would have to be prepared for the office and sent back for verification.

Now: Out on site, all defect and repair information (based on the high-quality imagery collected by the mobile mapping survey) can be downloaded wirelessly onto the TDC600 logger with the on-board KOREC field data capture software. Defects are easy to locate with the software's navigation tool that guides the user to the exact spot. To make things even more straightforward, a new button on the software allows the user to rotate the map in the direction that the user is walking.

In the future this will be done through the use of Augmented Reality to add additional visual guidance. This augmented reality navigation tool will use the cm accuracy positioning provided by the Catalyst GNSS. The user will simply hold up the handheld which will then project the defect onto the position on the road where it physically exists allowing the contractor to walk towards it.

2. Improved workflow



The two-way data flow between the field and office vastly increases the efficiency of operation and speeds up processes. For example, if a repair design is no longer suitable for a repair, the field worker can take a georeferenced photograph of the defect, record changes on a form and then send it wirelessly to the KOREC Portal where it can be viewed by all permitted stakeholders. This allows the office team to redesign the repair and approve it in time for completion on the next shift.

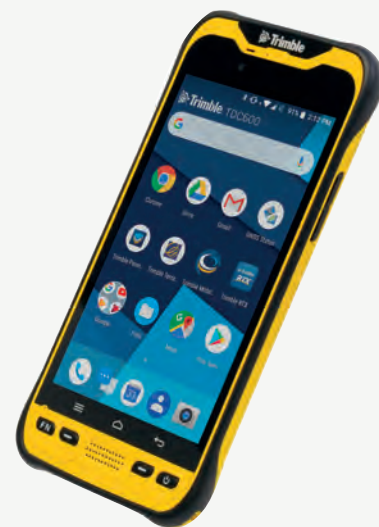
3. Automated shift reports

Traditionally, shift reports were created in the aftermath of each shift, often taking days due to their complexity and length and the amount of people

“Typically, to close a road and mark-out a 5km stretch of dual carriageway for defect repairs would take three shifts of 8 people and cost between £3k and £10k depending on the size of the job. Using the KOREC app functionality, we can now achieve the same amount of work in just one shift saving us around £20k on each 5km stretch.”

**Michael Ambrose -
Technical Lead on the
National Highways
Concrete Roads
Programme**

highways england driving forward		Automated Shift Diary v2	
	Date and Time	14-Nov-2020 16:09:19	
	Section ID	1500A12/231	
	Chainage	543.8	
	Point of Interest	Poor work	
	Survey Type	N/A	
	Comments	repair slipped and traffic'd	
	Date and Time	14-Nov-2020 11:15:42	
	Section ID	1500A12/231	
	Chainage	466.9	
	Point of Interest	New spall	
	Survey Type	N/A	
	Comments	new spall from old repair	



required to input data. For example, this data would include, attendance on site, changing weather conditions throughout the shift, overview of defects and issues and detailed reports on each defect. Collating these words, photos and locations manually was time consuming and subject to human errors.

Following consultation with National Highways, KOREC was able to fully automate this process to generate a full report based on information captured during the shift with the KOREC field data capture app. No extra steps or information were required. This report would automatically be sent as a PDF file to all the people who required it providing immediate visibility of work carried out and costs involved.

As well as time saving benefits, these reports are the foundation for a permanent digital record of work done on each and every defect. This information can be used in the future to assess the longevity of repairs based on the material used etc. A long term analysis will ensure that the most suitable materials are used in the future.

Where are we now?

After proving that this method worked well, in 2021 KOREC also worked with AECOM to survey fifty different concrete repair and renewal schemes, nationally, providing the data to Mott's for AI defect extraction and then subsequently to AECOM to develop a grading and deterioration model. This model would enable the identification of which sections of road needed priority attention as well as the overall repair requirements.

The KOREC Portal remains key to the project and all data is uploaded there so that it can be accessed by National Highways and AECOM. It has also been shared with all the contractors on the Concrete Roads framework to better inform the design and construction process.

KOREC has continued to work closely with NH to further develop the portal so that it can be used for design and repair supervision on site using KOREC Capture field software and Trimble Catalyst (low-cost cm accuracy GNSS). All contractors now have this field system and are actively using it to improve efficiencies.

CONTACT US

Please do get in touch for further information on any of the products or services mentioned in this case study, a demonstration, support or just a chat about your requirements.

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Measured Solutions
Construction | Surveying | Mapping



The System

Trimble Catalyst

A revolutionary GNSS subscription service with a range of accuracies available on demand, including -1cm precision. Lightweight, low-cost receiver perfect for equipping a whole workforce. Works with Android or iOS devices.

KOREC field data capture app

An easy-to-use data collection app with customisable forms and a secure web (cloud) based portal for form creation, device management, data handling etc.

Trimble TDC600

A lightweight, rugged, Android smartphone, capable of 2m accuracy or in this case linked the Catalyst DA2 receiver for cm accuracy. Long battery life for all day use in the field, high quality geo-referenced images and ability to share captured data live, through the secure web-based KOREC portal.