

PAVEMENT INVESTIGATIONS

Delivering expertise, precision, and industry-leading survey technology to support major infrastructure asset management





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Pavements around the UK and globally vary greatly, with multiple design standards and methods having been used over the years in infrastructure development. Effective asset management requires an understanding of how paved assets have been constructed and maintained therefore, and clients need to investigate pavement construction to help determine strength of underlying base layers, level of unbound material, and drainage characteristics.

We are the UK's leading provider of pavement investigation services and we hold extensive experience delivering pavement engineering and survey solutions across major and strategic infrastructure projects. We operate an advanced, industry-compliant survey fleet supported by a highly experienced pavement engineering team to deliver pavement investigatory solutions throughout the UK and overseas.

Our clients utilise our comprehensive capabilities for driving asset management planning and prioritisation, cost-efficient solutions, and independent quality assurance.



As a one-stop-shop for pavement investigation services and through our ability to deploy multiple plant on client projects, we offer significant benefits to our clients including:

- ✓ Better programming to reduce time on the network and minimise disruption
- ✓ Opportunities to share best practice to continually improve
- ✓ Identification of leaner ways of working
- ✓ Opportunities to innovate and provide bespoke surveying and testing solutions
- ✓ Provision of industry-leading and innovative survey technology

CORING & UNBOUND MATERIAL SAMPLING

Assessing pavement construction and material composition

Coring is the process of drilling cylindrical samples (cores) from an existing pavement structure — whether asphalt, concrete, or composite — to examine, test, and evaluate the materials and layer structure of the pavement. It is a standard and essential practice in pavement investigation, quality control, and rehabilitation design.

We deliver all aspects of highways and utility coring, and we have significant plant and labour resources available. We maximise safety, efficiency and quality of service, fulfilling client needs by providing clarity of performance and responsibility, value for money, and contract control.

All the information gathered during on site investigations is analysed in our UKAS accredited materials testing laboratory to provide clients with detailed and accurate pavement reports and asset management insights.



Prior to site works, we refer to best practice guidance when determining the number of samples required and we pre-inspect each site to determine any site-specific features that may impact on works such as bus stops, parking bays, schools, traffic speed and volumes, working hours restrictions, forward visibility for road users, and local business access requirements. We will work with you and other stakeholders to minimise disruption to road users.

Pavement Coring

We drill, reinstate, log, and analyse over 10,000 pavement core samples annually and we are capable of drilling to 1m in depth through bituminous and cementitious layers with core barrel diameters of 100mm, 150mm, 200mm and 300mm.

Operatives use tailored mobile data capture systems to record details on site including accurate locational / GPS co-ordinate information and high-quality photographs of the core extraction process.

Ground bearing capacity and the California Bearing Ratio (CBR) can be determined by Dynamic Cone Penetrometer (DCP) testing.

We also deliver tar testing in the form of PAK-Marker and PAH testing, which is undertaken in-house to ensure a comprehensive pavement evaluation is undertaken in a timely fashion.



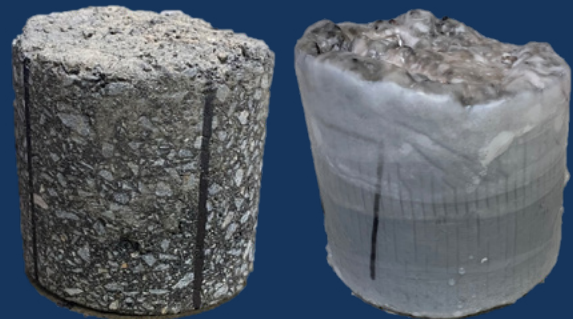
Utility Coring

Utility coring is becoming increasingly important in utility management and contractor performance monitoring, and we deliver utility coring programmes for a variety of clients.

For each batch of cores reported, a summary report will be provided including an overall performance summary and broken down by each utility, setting out the number and percentage of carriageway and footway cores which passed and failed at each testing stage.

Utility testing covers the following:

- Visual assessment of the utility reinstatement with photos provided
- Determination of bulk density, maximum density, and air void percentage of samples
- Depth pass / fail
- Air void pass / fail.



Unbound Material Sampling (UMS)

Building strong foundations starts with the right materials and Unbound Material Sampling (UMS) is the process of collecting and testing materials not bound by cement, bitumen, or other binding agents — such as gravel, crushed rock, sand, and soil — to assess their suitability for construction. UMS plays a crucial role in ensuring the performance, durability, and safety of roads, pavements, and other civil engineering structures. UMS applications include:

- **Quality assurance** – confirming that delivered or placed materials meet the required project specifications
- **Design confidence** – verifying that materials have the strength and stiffness needed for long-term performance
- **Regulatory compliance** – demonstrating adherence to key standards including BS EN 932, BS EN 1097, and ASTM D75 for aggregate sampling.

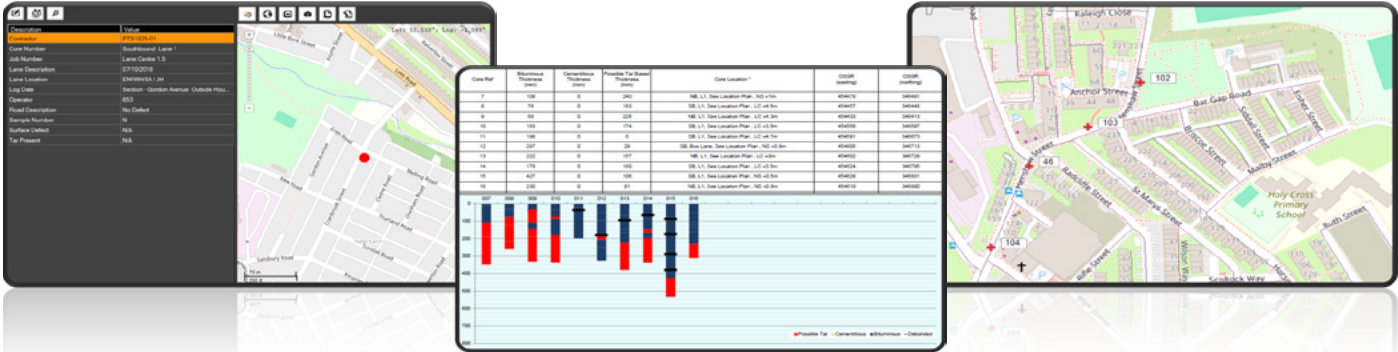
Our UMS procedures are carried out in accordance with BS 5930:2015 – Code of Practice for Ground Investigations and IAN 73/06, Section 4 – Draft Design Standard HD 25: Pavement Foundations. UMS is often used in conjunction with other testing methods such as GPR.



Delivering service enhancements

Core and unbound material sampling allows engineers and contractors to analyse the physical, chemical, and structural properties of tested pavements and subgrade materials, with standard reporting traditionally consisting of site plans, tabular reporting, and photographs.

Through an innovative approach we have implemented an interactive cloud-based system, allowing clients to access data results on any licensed device and in any location. Our XA[®] suite of software is GIS-based, and delivers spatial analysis and mapping of coring and UMS results in as near real-time as possible.



Our clients are able to:

- Visualise sample locations on interactive maps, improving spatial understanding of conditions
- Identify trends and inconsistencies across the network, e.g. if tar-bound material is found in one location, adjacent road sections can be flagged as areas for further investigation
- Integrate sample data with other infrastructure datasets, providing a holistic view of asset conditions
- Export GIS-compatible reports for further analysis, ensuring compatibility with client systems
- Correlate test results with environmental factors such as weather patterns to understand how flooding is affecting the tested locations
- Apply topographical analysis tools to predict asset degradation over time.

GROUND PENETRATING RADAR

Assessing pavement construction and condition through non-destructive testing

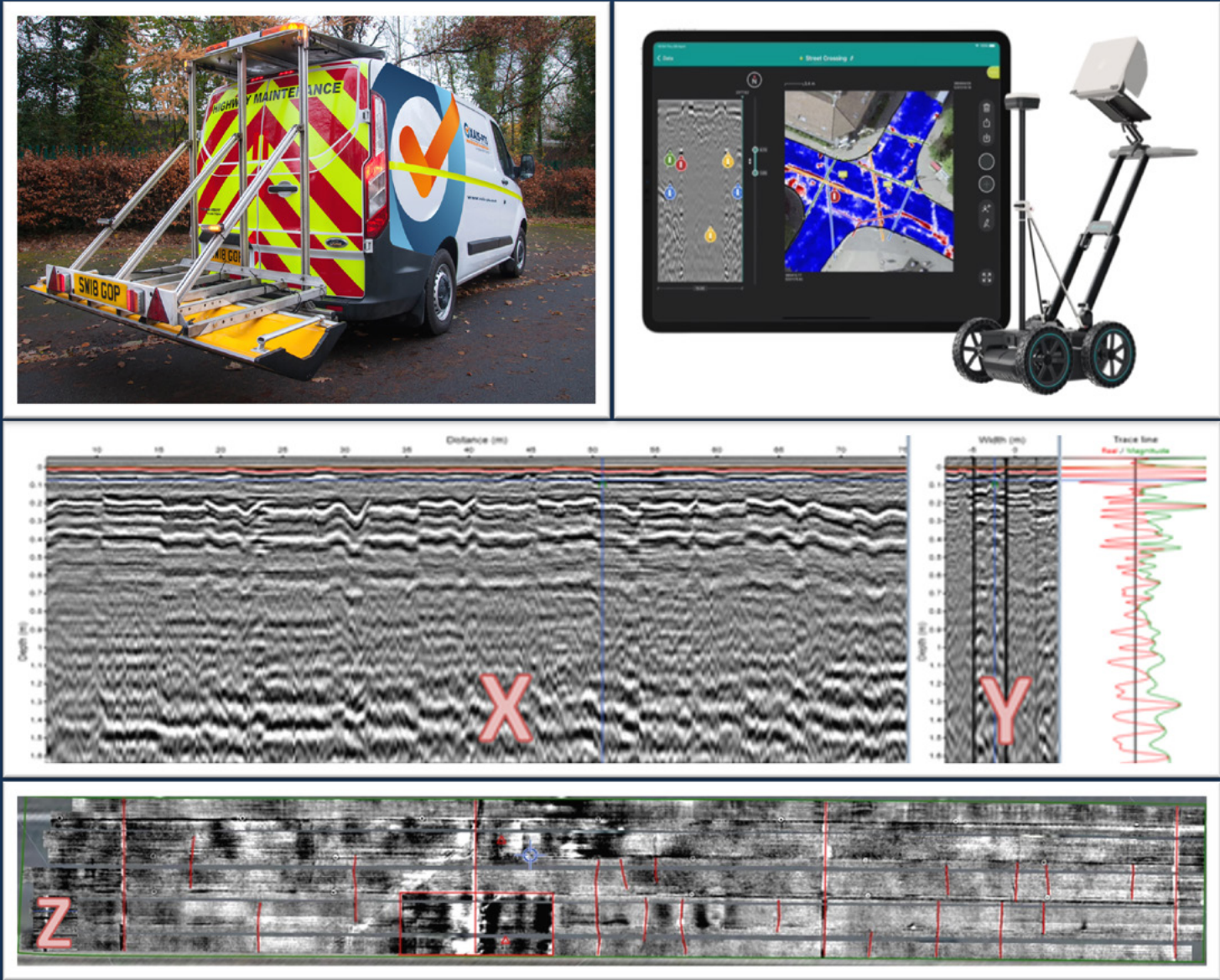
Ground Penetrating Radar (GPR) is a non-destructive pavement survey technique for identifying the thickness of the different paving layers, voids, or areas of damage. This method of subsurface profiling uses electromagnetic pulses transmitted into the pavement, and when the pulse encounters a change in material properties (e.g. pavement layer, pipe, reinforcement bar, etc.) the energy bounces off the target and returns to a receiving antenna. This returning signal is recorded as single line scans, colour coded, and stacked to create a detailed subsurface profile.

Our 3D GPR multi-channel array, which operates at traffic-speed, overcoming the limitations and expense of more traditional methods, can determine pavement make up, thickness of individual layers, construction changes, services, voids, and high moisture locations.

This survey technique delivers numerous and significant benefits for our clients by providing a greater understanding of the sub-surface make-up and condition of paved network assets, as well as providing a safer and more cost-effective survey methodology. We can support you with your projects from small schemes to full network coverage.

We also utilise the latest Proceq GPR Subsurface GS8000, which provides intuitive real-time visualization in 2D and 3D alongside superior data clarity. The GS8000 is a light weight and easy to use GPR device perfect for providing single line scans in remote locations where traffic-speed surveys are not possible. GPR applications include:

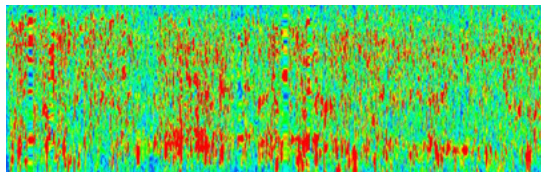
- Pavement thickness measurement
- Subsurface void detection
- Evaluating pavement integrity
- Detection of reinforcement steel (rebar)
- Assessing subgrade conditions
- Locating underground utilities
- Foundation layer evaluation
- Monitoring pavement deterioration over time
- Filter drain assessments
- Bridge deck inspections
- Layer interface mapping
- Detecting water infiltration.



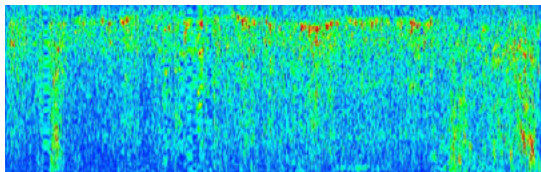
Filter Drain GPR Applications

Filter drains are gravel filled trenches that collect and move water as well as treating pollution, and over time their ability to remove water from the pavement surface and surroundings degrades due to sediment contamination. Floating water brings blocking agents (e.g. small size particles, dust etc.) that fill existing voids within the filter drains medium (aggregate). The objective of filter drain surveys is to measure the extent and intensity of clogging within the filter medium in accordance with CS 551.

Our step-frequency Proceq GS8000 system is mounted to a lightweight trolley and is suitable for walked surveys of filter drains. It offers manoeuvrability, allowing precise survey lines to be followed. A visual survey is also carried out on the filter drain to record the overall asset service level and the structural condition grading of the filter medium. Filter drains are graded based on the void ratio and structural condition, to allow targeted treatments where required.



GPR profile showing filter medium with a good void ratio

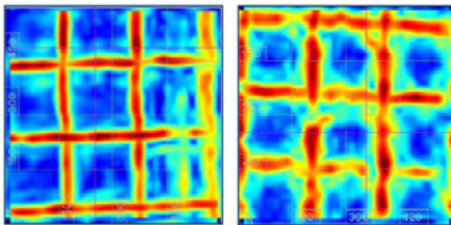


GPR profile showing filter medium with a reduced void ratio

Bridge Deck GPR Applications

The assessment of concrete bridge decks, as part of a scheduled maintenance programme, forms a key requirement for both transportation companies and local authorities. Traditional methods, such as hammer sounding and chain drag, rely heavily on inspector experience. GPR offers a non-intrusive, cost-effective alternative, delivering higher accuracy and more reliable results.

GPR detects embedded reinforcement, concrete slab thickness, and asphalt layer depth. The data can be used to create corrosion maps of steel rebars, supporting informed maintenance decisions.



Time slices of concrete rebar

FALLING WEIGHT DEFLECTOMETER

Delivering construction monitoring solutions in support of maintenance planning

Can we identify the performance of paved assets with respect to structural condition? Can we determine how many years usage we have left or what maintenance interventions and overlays could be used to prolong the life of flexible pavements? Construction monitoring solutions are key, and we operate the largest fleet of accredited Dynatest FWD's in the UK!

Falling Weight Deflectometer (FWD) is a non-destructive technique used to assess the structural capacity and performance of pavements by measuring their deflection under a load. Data is also vital to determining if the structural capacity of a new pavement is fit for purpose during the design phase. We operate:

- 3 x Heavy Weight Deflectometers – applying a test load in the range of 30 – 240kN
- 1 x Falling Weight Deflectometer – applying a test load in the range of 30 – 120kN
- 1 x Fast Falling Weight Deflectometer – the FastFWD is an accelerated version of the traditional FWD, designed to apply loads up to 5x quicker per drop cycle, enabling real-time simulation of long-term traffic affects. XAIS-PTS operate the only FastFWD in the UK!

FWD benefits and applications include:

- Assess the remaining life of the pavement and assess the impact of increasing road volumes, traffic types or load capacities on the future life and quality of the pavement
- Evaluate pavement rehabilitation and overlay requirements
- Report layer moduli (stiffness), deflection, curvature and sub-grade CBR
- Conduct ‘whole of life’ and economic cost benefit analysis of alternate pavement designs
- Provide quality assurance assessment of recent works against design life criteria
- Complete joint sealing evaluation
- Undertake void detection



DEFLECTOGRAPH

Assessing residual life to support maintenance prioritisation

Deflectograph (DFG) is a lorry-mounted automated deflection measuring system that is used to assess the structural condition of flexible pavements. Measurements of deflection are taken at approximately 4m intervals in both wheel-tracks while the machine is in motion. It works on the principle that as a loaded wheel passes over the pavement, the pavement deflects, and the size of the deflection is related to the strength of the pavement layers and subgrade.

This information can be integrated with details of the pavement construction and present and future traffic flows to determine the residual life of the pavement and the recommended overlay. Because the deflection is measured in the nearside and offside wheel tracks it is easy to determine if the whole width of the road requires strengthening or just repair of the (generally) nearside wheel track.



DFG benefits and applications include:

- Assess the structural condition and remaining life of the pavement
- Identify pavement rehabilitation and overlay requirements
- Supports long-term asset management planning
- Evaluate pavement deterioration trends and conduct lifecycle modelling
- Provides an optimum solution for network-level surveys

VISUAL CONDITION SURVEYS

Driving safety and efficiency through automated pavement surveys

CS 229 Visual Condition Surveys (VCS) assess pavement surface condition in line with National Highways standards, providing a consistent, systematic approach to identifying and recording surface defects. These surveys, undertaken in conjunction with other surveys such as GPR, FWD and coring, support effective maintenance planning, performance monitoring, and long-term asset management.

Traditionally, VCS were undertaken on foot, often making surveys time-consuming and costly, with traffic management required to ensure the safety of inspectors. At XAIS-PTS, we deliver VCS using our Multi-Functional Vehicles (MFVs), which are equipped with 2nd generation Laser Crack Measurement Systems (LCMS2) and high-resolution imagery. These advanced sensors capture detailed 2D imagery and 3D pavement surface profiles at traffic-speed, enhancing survey efficiency, accuracy, and safety.

Data is then analysed by pavement engineering specialists, with defects recorded using precise geo-referenced coordinates in accordance with CS 229. Supporting outputs — site sheets, schematic defect drawings, and photographic records — provide a clear, comprehensive view of pavement condition, enabling targeted maintenance and timely repair. As our VCS are completed through a machine-based method, we can also supplement standard VCS outputs with a variety of added value datasets such as GIS defect layers and geo-referenced web-hosted video.



"We deliver high-quality pavement investigations using innovative, compliant technologies to assess and optimise asset performance. By combining technical expertise with advanced analysis and support services, we provide tailored solutions that deliver lasting value for our clients."

JOHN MORGAN
OPERATIONS DIRECTOR

GET HELP FROM THE EXPERTS

Our pavement investigation services are built on years of operational experience underpinned by experts in survey technology and pavement engineering.

We offer pavement investigation solutions to meet your needs and budgets, and we will work collaboratively with you to identify the optimum solution.

So, if you need help with assessing and managing your infrastructure assets, contact our team today on **01772 792899** or send an email to: **sales@xais-pts.co.uk**



To learn more about our wider services, scan the QR codes to download our brochures:



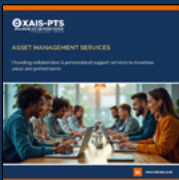
MATERIALS TESTING & CERTIFICATION



ASSET MANAGEMENT SURVEYS



ASSET MANAGEMENT SOFTWARE



ASSET MANAGEMENT SERVICES



PROGRAMME DEVELOPMENT, FEASIBILITY & ASSURANCE, DESIGN & DELIVERY



AIRPORT & AIRFIELD PAVEMENT INVESTIGATIONS

