St James's Burial Ground
delivering lasting learning

Caroline Raynor MCIfA (9008), Project Manager and Principal Archaeologist, Costain Skanska JV

Archaeological staff using iPads to carry out digital recording on site. Credit: C Raynor Costain-Skanksa JV

As infrastructure projects in the UK increase in size and scope, archaeological excavations equally increase in size and complexity. The enabling works for Euston Station, London, and particularly the work at St James's Burial Ground, are an excellent example of this.

Opened in 1789 and closed in 1853 due to the Metropolitan Burials Act, the site originally spanned 15,000m^2 and is believed to have received up to 61,000 burials. The expansion of Euston Station in the 1870s had a significant impact on the site, removing most of the paupers' ground, reducing the site to 11,000m^2 and potentially removing up to 20,000 burials. Despite this reduction in size, this is still the largest excavation of a post-medieval burial ground undertaken in the UK.

HS2's legal commitments, articulated in Schedule 20 of the High Speed Rail Act (London to West Midlands) 2017, the Heritage Memorandum, and the Historic Environment Research and Delivery Strategy (HERDS) set clear standards and requirements and provide the framework within which our archaeological excavations are delivered. https://www.gov.uk/government/publications/hs2-information-papers-environment. A legal undertaking with the

Images of the LEAN drying room, processing and storage facilities. Credit: Credit: C Raynor Costain-Skanksa JV

Church of England underpins the approach to burial grounds on the project.

Principal contractor Costain Skanska JV (CSjv) recognised that a task of this magnitude and complexity would require planning and management beyond that usually applied to burial ground excavations.

The HERDS aims to deliver outputs that generate a meaningful legacy, including learning about the practice of archaeology itself. The design of this project included the testing and delivery of new processes for delivering archaeology as a project output. These would be delivered through applying engineering and construction know-how to traditional archaeological activities. CSjv focused on making improvements to safety, efficiency, and archaeological recording methodology in the burial ground. Two of these are illustrated as brief case studies below.

Post-excavation processes

The scale of the works gave CSjv cause to re-assess the way in which the handling, processing and storage of cultural and skeletal remains is carried out. At the peak of work in St James's Gardens there was the potential for up to 138 burials per day to be excavated and removed for archaeological assessment. Care, dignity and respect for the assemblage, as well as security and integrity, were paramount. A four-stage archaeological facility (pre-store – wash – dry – assess – store) was established using the basic principles of LEAN, a process of identifying and eliminating waste (time, resources, activities or material) to streamline activities ensuring net gains in efficiency, productivity and safety.

It was determined that the facility should promote a positive working environment for the archaeological team. Often space for archaeological processing is not included at the early stages of project design. This can lead to sub-standard facilities without adequate capacity, tools and equipment. CSjv determined that simple design considerations such as anti-fatigue flooring, archaeology-themed images, and a radio increased the team's well-being and improved morale.

Capacity for the facility was based on process mapping, where information about peak flow rates informed the design of each work area. Shelving and workstations were ergonomically designed, with shelf heights set to the fifth centile measurement of a UK

female to mitigate the use of step ladders or ad hoc working at height (particularly important where the team was 43 per cent women). Tooling was also implemented to reduce any musculoskeletal issues that might arise from repetitive activity. Ergonomic brush sets were deployed in the wash bay and grab tools were used in the drying rooms to prevent over-stretching when collecting artefacts from shelves.

During ten months of archaeological assessment and finds processing (equivalent to over 4800 person hours worked) there were no reported health, safety or wellbeing incidents within the processing facility.

Digital recording

The investigation of the burial ground should have resulted in thousands of context sheets, photographic record sheets and scale drawings. MOLA Headland Infrastructure expressed a clear interest in delivering the project digitally. The GWSI-HERDS stipulates '*the development of a highly accessible and outstanding archival legacy*' with '*provision for the use of digital technology in order to aid decision-making, communication to interested parties and dissemination of ideas.*' Developing a fully digital system is a significant step for the industry, where the drive towards digital has been underway for some time. This reflects the desire to improve efficiency and quality in recording and expedite the sharing of data with third parties, including academic groups and local communities.

CSjv, supported by MOLA Headland Infrastructure, applied for HS2 Innovation Industry Partnership (I3P) funding. A grant of £212,000 was awarded to ensure that a full suite of digital recording could be carried out using iPads. The system was designed to be compliant with current Historic England requirements but is flexible and can be modified to accommodate changes. Mandatory fields, drop-down boxes and an integrated photo app ensured an increase in the quality and completeness of recording. The iPads were managed by a dedicated team to ensure protection, performance and longevity, with synchronisation to a UK-based server taking place daily to manage data security. A 2 per cent hardware failure rate was recorded during the ten months of excavation; a positive indicator that technology in archaeology is not only possible and highly effective but more sustainable than many would have previously thought!

Conclusion

The combined outputs of the activities described above fed on site into a high-performing interdisciplinary culture, and a team working towards shared objectives and values built around archaeology.

Using the LEAN process on site and within the labs ensured the protection of the integrity of archaeological data. It has delivered efficiency and value for money while improving the safety and wellbeing of the site teams. Osteological data was gathered quickly, efficiently and shared in real time with on-site teams to improve the site mitigation strategy and identify new HERDS objectives. Learning gained from applying these new processes, as well as about the site itself, was shared weekly with the wider site team, including construction and engineering disciplines, to increase the understanding of the value that archaeology brings to projects.

The digital recording generated an estimated 10 per cent increase in the speed of on-site recording and has improved the quality of recording, as well as allowing immediate data share to a wider group of specialists. Training and Equality, Diversity and Inclusion (EDI) benefits were also realised as the digital system aided those with visual impairments and dyslexia. This system also generated sustainability benefits with an estimated 17,560 pieces of paper being saved (the equivalent of two whole trees!)

These approaches can be applied to sites other than burial grounds and mark a significant change in the way large archaeological sites are managed.

Archaeological staff using iPads to carry out digital recording on site. Credit: Credit: C Raynor Costain-Skanksa JV

Caroline Raynor

Caroline is Construction Project Manager and Principal Archaeologist for the Costain Skanska Joint Venture on the HS2 Enabling Works at Euston. She has a particular interest in uniting the fields of archaeology and engineering.