Victoria Square – Archaeological Excavation

"...it was fantastic to see the scan data as is was being collected. The model and drawing output will add an extra dimension to our understanding of the site"
Audrey Gahan - Project Archaeologist and MD – Gahan and Long Ltd

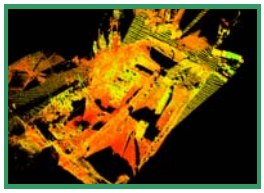
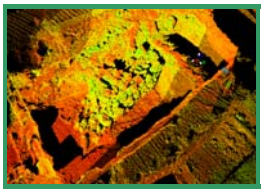
Scope: *3d point-cloud of archaeological excavation, 3d rendered models, 2d CAD drawings*

Client: *Gahan and Long Ltd, Archaeological Services*

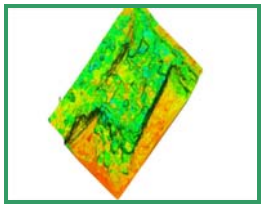
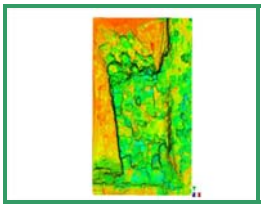
Date: *April 2004*

Background: The £250m regeneration of Belfast's historic Victoria Square area is the biggest ever commercial development in Northern Ireland. The development will be anchored by a new 200,000 sq ft (18,580 sq m) department store and will include a range of shop and store units, a health club, library, car parking, a variety of restaurants and a number of luxury apartments. The unique design will incorporate covered streets and the new Victoria Square which will be the largest dome covered shopping centre in Europe.
Gahan and Long Ltd (contracted pre-development Archaeologists) have been tasked with the excavation and recording of the sensitive archaeological heritage present in this historic quarter of Belfast.
As part of the traditional excavation, measurement and recording of uncovered archaeology on site, *Gahan and Long Ltd* decided to enhance their excavational record with a 3d laser scanning *High Definition Survey* (HDS) of the onsite excavations. *Gridpoint Solutions Ltd* where employed to scan, model, plan and provide datum levels of the archaeological features, as identified by the project archaeologist.

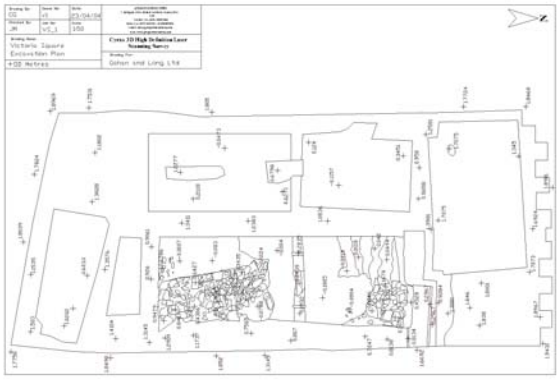

Workflow: The excavation survey was carried out using a Leica 2500 HDS 3d laser scanner at a resolution sufficient to record the geometry of in situ archaeological features. Scan targets were placed in and around the trench and connected to the local grid system and datum via a reflectorless EDM survey. Multiple 3d point-cloud scans of the excavation trench were collected as the scanner was moved around the scene. The 3d point-cloud scan data was viewed in real-time on the scanner laptop, allowing areas of archaeological significance to be quickly rescanned at a greater resolution when required. As the site was a working excavation, the archaeologists were not hindered by the presence of the scanning system and could continue working during the survey.
Cyclone™ software was used to register (join) the three point-clouds together and reorient the X, Y and Z axis to the local grid system. The registered 3d point-cloud of the excavation was cleaned of 'noise' (people and machinery moving through the scans) and uploaded to a desktop PC.

Back in the office the point-cloud was analysed in Cyclone™, 3d *mesh* and *wire-frame* rendered models were generated to aid visualisation and measurement of the archaeological features. The 3d models were then exported as standard CAD files.

The registered point-cloud was opened in CAD software using the 3d point-cloud analysis plug-in *CloudWorx*™. *CloudWorx*™ tools were used to "slice" the excavation cloud along the X, Y and Z axis and provide detailed 2d views of each slice.
Standard CAD drafting tools where used to trace and create scale section and plan excavation drawings from the point-cloud slices. Dimensions and datum levels were added to the drawings directly from the point cloud and the completed drawings supplied as digital files and scale plots. All necessary drawings and models where supplied to *Gahan and Long Ltd* within a week of the scanning project.



Project Facts

Field: *1 person scanner crew, 3 hrs*

Office: *1 Day*

Deliverable: *registered 3d point-cloud of excavation, rendered 3d models, 2d CAD plans, 3d CAD sections, datum level, scale plots*

Benefits

- *Remote non-evasive survey*
- *Health and Safety*
- *Survey Detail*
- *Survey Speed*