

# Data Capture for Underground BIM

Marc Jaspers, Guillaume Clin and Richard Harrison (New Zealand)

**Key words:** Engineering survey; Laser scanning; Positioning; Risk management; Spatial planning; BIM; services; asbuilt

## SUMMARY

The Avon River is the cultural backbone of Christchurch's CBD, it also turns out it's the backbone of Christchurch's underground services.

The opportunity to redirect the focus of the CBD to the Avon River arose after the 2010 and 2011 earthquakes and an amazing redevelopment of Cambridge and Oxford terraces adjacent to the Avon commenced.

Physical works confirmed the presence of a dense network of underground services which required accurate mapping to optimise the progress of this grand scheme. Beca engineers along with Coffeys and CERA reacted swiftly and designed a network of 238 service potholes (slot trenches) to establish definitively all conflicts between existing infrastructure and new construction.

Such a dense network of trenches over a large area provided a unique opportunity to effectively create a 3D model – an underground BIM - of the underground services throughout the project and see conflicts directly in relation to the 3D design.

High definition laser scanning and modelling of these services was the chosen methodology and was the first use of laser scanning to capture services information on such a large scale. The urgency of the project meant 620 individual scans containing 2739 individually modelled objects were completed over more than 3km in 10 weeks.

Such a model would be a powerful legacy item for the client and so several potential end users were identified. This variety of end users led to every service being allocated 15 attributes, in addition to 3D position, also being captured...that's a little over 41 thousand attributes captured, compiled, and

delivered in 6 different formats. The valuable photo-realistic point cloud data showing all the surrounding detail provides additional benefit for the client.

This paper presents the methodology by which this data was captured, processed and delivered, and reveals some of the important elements required for a successful underground BIM project.

---

Data Capture for Underground BIM (8136)  
Marc Jaspers, Guillaume Clin and Richard Harrison (New Zealand)

FIG Working Week 2016  
Recovery from Disaster  
Christchurch, New Zealand, May 2–6, 2016