

Architectural Services Department

Projects:

Preparation of Record Drawings for:
1. The Lady Hotung Welfare Centre
2. The Old Dairy Farm Senior Staff Quarters

Locations:

1. Kwu Tung, New Territories
2. Pok Fu Lam, Hong Kong

Type:

Revitalization Scheme

Scheduled Time of Completion:

November 2013

“They (BIM) provide an efficient and effective means for all stakeholders to readily understand the buildings,”

Mr Kevin Li,
Senior Architect,
Architectural Services Department.

BIM Partners Involved:

Project Owner:
Development Bureau, HKSARG

Project 1:

BIM Consultant:
isBIM Limited

Project 2:

BIM Consultant:
Vircon Limited

3D Laser Scanning Service:
Topcon Beijing (H.K.) Limited

From BIM to HIM (Heritage Information Management)

Hong Kong's Architectural Services Department employs BIM to boost understanding and conservation of historic buildings



Image courtesy of Architectural Services Department

Hong Kong's Architectural Services Department recently prepared two Resource Kits for Revitalising Schemes – covering the Lady Hotung Welfare Centre and the Old Dairy Farm Senior Staff Quarters. They were used by the Commissioner for Heritage's Office (CHO), which supports implementation of Hong Kong's policy on heritage conservation.

“Heritage Information is not only an integral part of conservation projects, it must be accurate and kept up-to-date long after an intervention is completed,” says Mr. Kevin Li, Senior Architect. “It is the basis for the monitoring, management, and routine maintenance of a site, and provides a way to transmit knowledge to future generations.”

The information is essential for understanding the fabrics – the roofs, walls, floors and other character-defining elements – of historic buildings. Through using a variety of equipment and



Image courtesy of Architectural Services Department

surveying techniques, site conditions can be recorded and evaluated for revitalisation. It's important to gather accurate information, as without an in-depth understanding of the site and the historic buildings, proposed developments could harm the site, undermining and impacting the heritage value and sustainability of the buildings.

Heritage project team members are from multiple disciplines. They should have a holistic view of the site, an in-depth understanding of the historical value, and adopt a minimum intervention to historic buildings. Accurate information is a crucial part of the process.



Image courtesy of Architectural Services Department

"It's also necessary to collect data in a cost effective and reliable manner, within the established accuracy tolerance and programme," says Mr Li.

Errors associated with traditional 2D drawings

The traditional way of documenting heritage buildings is by means of 2D plans, elevations and sections. Data is gathered manually and eventually has to be transformed by means of computer-aided drafting technique. The process involves site measurements, and converting data into drawings.

"Although the understanding of site conditions by means of 2D drawings has a long tradition, the plans, sections and elevations only supply accurate information at the specified locations," says Mr Li. "This means information could be fragmented. Features and dimensions shown in different drawings may not be consistent, and inaccurate data could lead to



Image courtesy of Architectural Services Department

design errors and abortive work.” This leaves scope for enhancing the process, by deploying BIM, which is not restricted to use in new designs and construction, but can be equally applied to and benefit the conservation and revitalisation of historic buildings. A 3D interactive model could provide a more realistic visualisation for stakeholders, so they can swiftly and accurately understand unique character of a historic buildings and the site. This in turn

will lead to the creation of a more sustainable design for heritage conservation work.

Photogrammetry and 3D laser scanning

“Ideally, the surveys should be carried out with minimum scaffolding and physical disruptions – which will reduce both time spent on preparation work and risks associated with outdoor surveying,” said Mr Li. The resource



Image courtesy of Architectural Services Department



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kit project team opted to use two main technologies for surveys: photogrammetry, and 3D laser scanning.

Photogrammetry was selected for the Lady Hotung Welfare Centre for its scale and surrounding. This recording process, in which 3D measurements are derived from photographs, allowing a thorough understanding of historic fabrics than typical survey methods.

The use of computer-aided close range photogrammetry software, interactive viewing software and BIM technology provided a comprehensive solution for recording, presenting and visualising the information for the Centre. Autodesk 123D Catch was used to convert high resolution images into mesh geometry in Autodesk's Cloud server. The interim product was then imported into Revit for calibration and further modeling.

In order to enhance the usefulness of the model, site topography and utility records are added. Where space constraints had

prevented satisfactory use of photogrammetry, supplementary structural survey data on the building's timber roof structure was added separately.

Trees obscure views of the Old Dairy Farm Senior Staff Quarters, making photogrammetry tough or impossible to use. Instead, the team opted to employ

proprietary 3D laser scanning equipment to obtain data. Much as with the Lady Hotung Welfare Centre, this data plus interactive viewing software and BIM technology provided a complete solution for recording, presenting and visualising the building information.

Helping stakeholders readily understand buildings

For both the Lady Hotung Welfare Centre and the Old Dairy Farm Senior Staff Quarters, the final survey products include 2D drawings, 3D models and animation clips. "They provide an efficient and effective means for

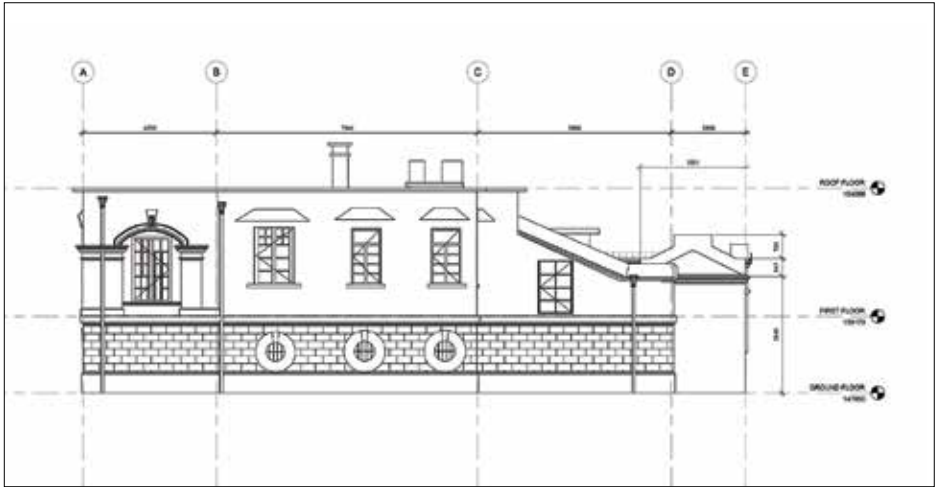


Image courtesy of Architectural Services Department

all stakeholders to readily understand the buildings,” says Mr Li. Drawings generated from the BIM models eliminate potential errors associated with traditional 2D drawings, whilst maintaining the required standards, and augmenting the visualisation and communication of the information.

“We are not aware of any heritage practitioners in Hong Kong using the same workflow, which we summarise as moving from BIM to HIM – Heritage Information Management,” says Mr Li.

“With more effort in organising the BIM

data, it will be possible to visualise changes to the historic buildings over the course of time,” predicts Mr Li. “Analyses of the models can help to gain an understanding of the changes, and formulate more comprehensive conservation strategies, so the heritage buildings can be better protected for future generations.”



Image courtesy of Architectural Services Department



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About Architectural Services Department

Architectural Services Department (ArchSD) performs the following three core functions in relation to Government-owned and Government-funded facilities:

- 1) Monitoring and advisory services;
- 2) Facilities upkeep; and
- 3) Facilities development.

ArchSD commits to provide quality services to the public and explore every opportunity to integrate innovative and sustainable elements into its projects for the betterment of the society with due consideration on cost effectiveness.

In recent years, ArchSD projects received some recognition including but not limited to the Hong Kong Institute of Architects Annual Awards, the Hong Kong Institute of Landscape Architects Design Awards, Quality Building Award and Green Building Award.