COMPANY
Architectural Services Department, HKSAR Government

PROJECT
Reprovisioning of Fu Shan Public Mortuary

LOCATION
Shatin, N.T.

TYPE
New Build

SCHEDULED TIME OF COMPLETION
Q1 2022

From BIM to DfMA: the reinvention of construction process of 21st century mortuary building

"Being the BIM pilot project in our Department, reprovisioning of Fu Shan Public Mortuary gives us the opportunity to practise full lifecycle of BIM. Thanks to the partnering with different stakeholders, the use of BIM in various stages has brought productivity, cost control, quality and safety of this highly complex project to the next level. We hope to realize the full potential of BIM and believe the current applications shall inspire us for more future projects."

– Thomas Wan

Chief Architect,
Architectural Services Department,
HKSAR Government

BIM PARTNERS

Nishimatsu Construction Co., Limited

ATAL Building Services Engineering Limited

RH STUDIO

AUTODESK PRODUCTS USED

Autodesk® Architecture, Engineering & Construction Collection

Autodesk® AutoCAD®

Autodesk® AutoCAD Mobile App

Autodesk® BIM 360® Docs

Autodesk® Dynamo

Autodesk® Ecotect™

Autodesk® Navisworks®Manage

Autodesk® Rendering

Autodesk® Revit®

Autodesk® Vehicle

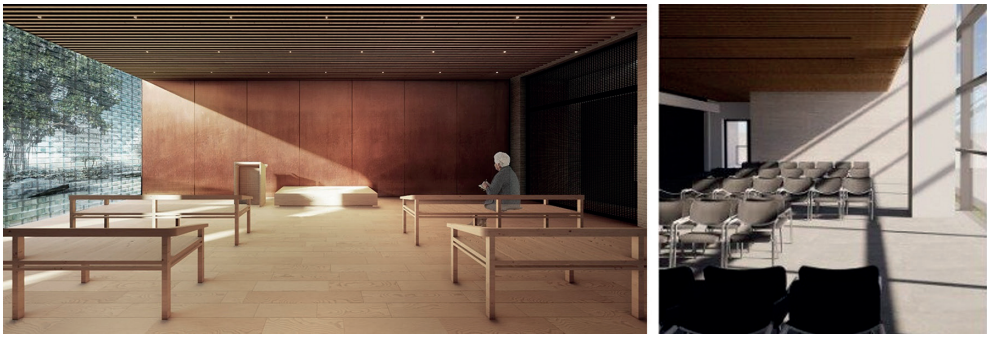
From BIM to DfMA: the reinvention of construction process of 21st century mortuary building
Image Courtesy of Architectural Services Department, HKSAR Government (ArchSD)

Project background

There are total four existing public mortuaries in Hong Kong. The key aims of Fu Shan Public Mortuary (FSPM) re-provisioning project were to increase the body storage capacity, to meet the current standards in infection control and the quality of mortuary service, and to rebrand mortuary through digitalization of services and new building image. Upon establishment, FSPM will become the largest public mortuary building in Hong Kong. The new FSPM comprises of both functional facilities including eight autopsy suites of different cases, X-ray and CT scan rooms, laboratories; and public facilities including public waiting hall, ceremony hall, resting lounges, interview rooms and facilities for bereavement services.

Design Visualization

BIM facilitates visualization throughout various stages of design development, from façade to interior design. It also makes communication to both client and contractor easy and effective. Virtual reality (VR) is created by using headset and motion tracking to help simulating user experience. By connecting to the BIM model, VR allows the stakeholders to experience the important functional spaces of the mortuary building e.g. ceremony hall, public waiting hall, the autopsy suites and viewing rooms etc. The whole process is beneficial to the project team since instant feedback could be obtained from the user to ensure that the end-product is fit for purpose and met all the operational requirements.



BIM facilitates visualization throughout all stages of design development, from exterior to interior design
Image Courtesy of ArchSD

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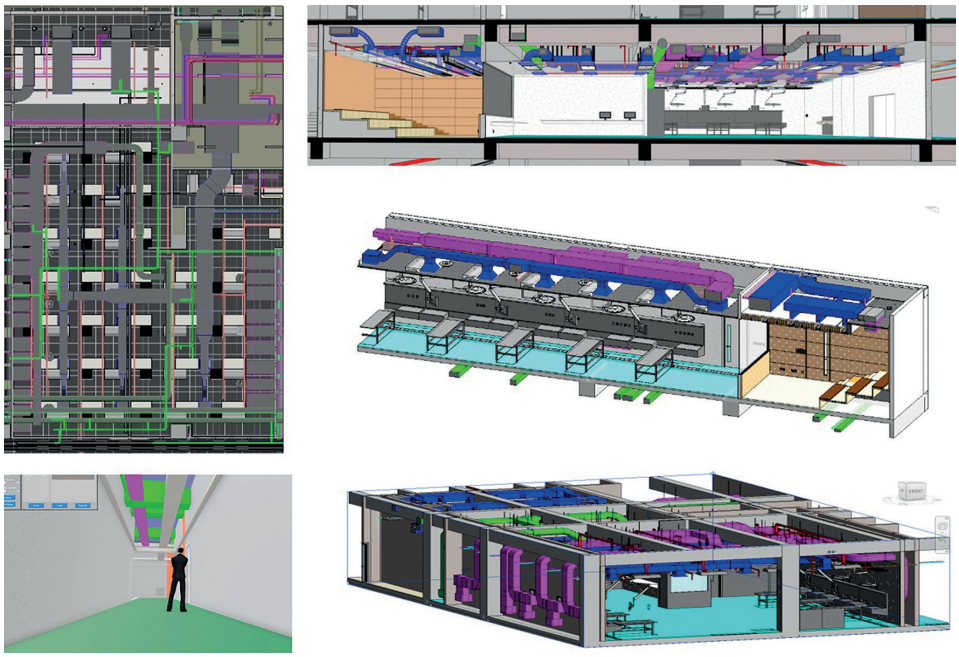


BIM allows collaboration among multi-disciplines at early stage which effectively resolves clashes and minimizes abortive works
Image Courtesy of ArchSD

BIM workflow and lifecycle

BIM Execution Plan (BEP) was prepared by the Contractor at the beginning of construction stage, which defined project needs, implementation and methodology producing deliverables from BIM. In this project, all BIM dimensions are involved to assist project management throughout construction life cycles. As BIM model had already introduced in design stage, methodology and obligation of these enriched data was defined in BEP as well.

Multi-disciplinary collaboration

The mortuary building is a rare and complex typology. It comprises of autopsy suites and other restricted zones which involve high complexity in architectural, structural and building services elements to suit operational need. Inputs from multi-disciplinary stakeholders require a dynamic integration throughout different stages of the project. BIM enhances communication collaborations at various areas such as autopsy suites, cold rooms and E&M installations above ceiling etc. In traditional project, E&M coordination are highly depended on contractor's work schedule during construction stage. In this project BIM allows collaboration between disciplines to start early. 3D views are available for easy communication for E&M planning. Clashes between builder's work and E&M installations were resolved before construction which facilitates future site progress and minimizes abortive works.

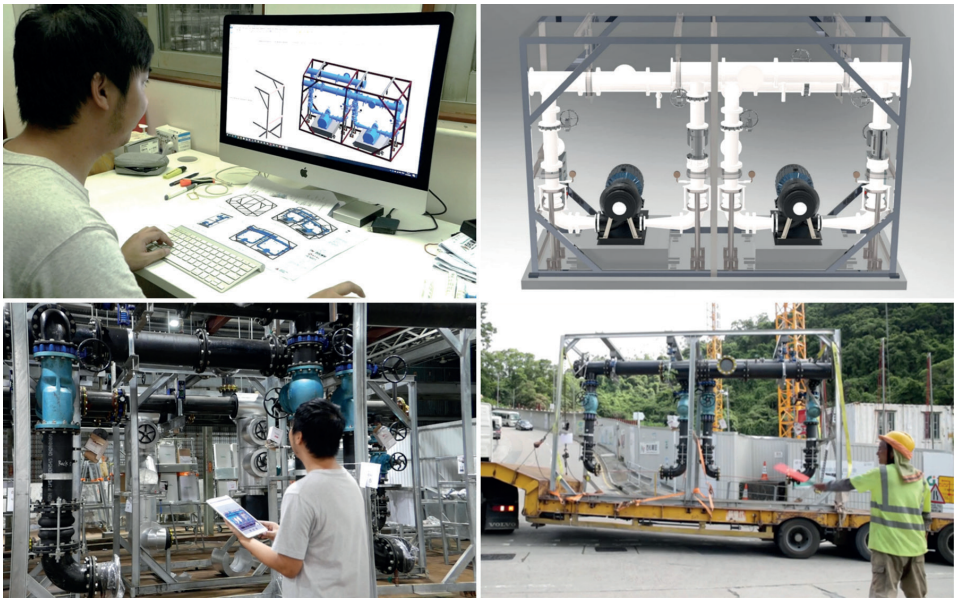
Prefabrication and DfMA of MEP modules

Building services provision and arrangement is an important part of a mortuary building. With the help of BIM, standardization and DfMA of MEP modules is made possible for major plant rooms including AHU room, switch room, FS and water pump room across multi-disciplines. Dimensions are precisely coordinated in 3D model with consideration of delivery and logistics. Fabrication can be carried out simultaneously with site construction work which greatly reduces time, cost and labour. The reduction of labour also minimized the risk of site incident and virus spread among workers in this pandemic time.

Construction planning and logistics

BIM simulation programme, such as Autodesk Navisworks, Autodesk Vehicle Tracking and Lumion, was used to illustrate the actual site conditions and constraints, i.e. actual dimension of materials to be delivered, vehicle size, congested logistic area, etc. Animations of the logistic progress are produced for different parties to review before deliveries. Construction programme is reviewed at the same time to eliminate obstacle for the delivery of precast units and ensure smooth installation of the DfMA equipment.

BIM facilitates site planning for precast installation. Simulation of delivery and installation process are made possible by using Autodesk softwares
Image Courtesy of ArchSD



Standardization and DfMA of MEP modules enhances buildability, reduces time, cost and labour.
Image Courtesy of ArchSD

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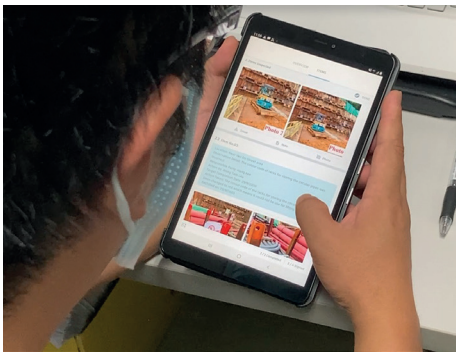
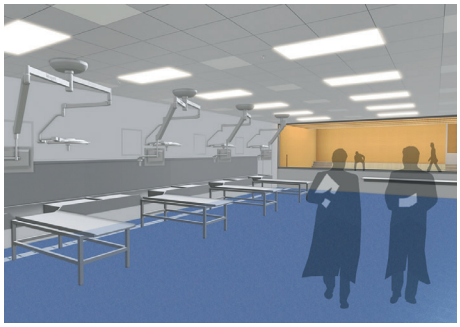
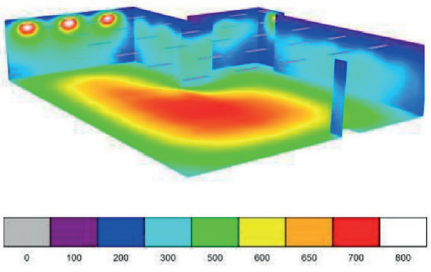
Instant comments on shop drawings and CSD submissions are done on BIM 360
Image Courtesy of ArchSD



CDE platform makes document management easy and accurate which is the foundation for project success
Image Courtesy of ArchSD



BIM provides basis for Air Flow Study by IES-Virtual Environment at autopsy suites
Image Courtesy of ArchSD



DIALux helps the calculation & visualization of lighting provision for outdoor and indoor areas especially for autopsy rooms
Image Courtesy of ArchSD

Cloud-based Common Data Environment (CDE)

Autodesk BIM 360 was adopted in this project for regular site safety & environmental supervision which allows instant record of irregularities by inspectors and endorsement of rectification reports. Also, Contractor makes use of the platform for instant record of inclement weather which allows project team to review the impact on the overall programme and assessment of EoT claim. Materials and shop drawings comment and approval from different parties (e.g. architect, structural engineer, building services engineer) were also carried out on the CDE which results in transparent and efficient communication throughout construction.

BIM during time of pandemic

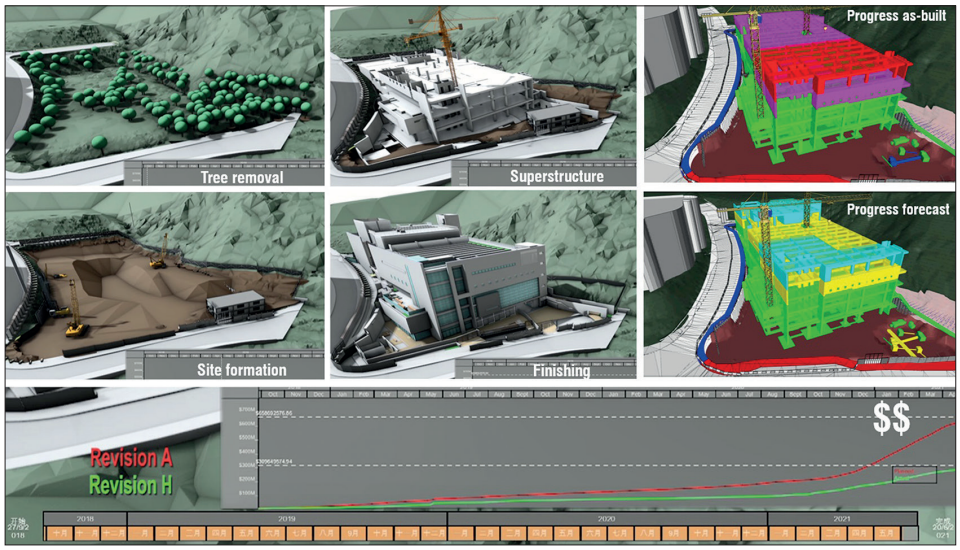
As Pandemic covers most of the time of this project, an alternative communication method should be considered in order to maintain effective coordination and also social distancing. The CDE platform (BIM 360) allows issues to be marked, commented and allocated to responsible person with simple clicks. Efficient information exchange and coordination are undisrupted even under the work from home arrangement.

Lighting and Airflow study

For the autopsy suite, BIM provides basis for lighting design by DIALux and air flow study by IES Virtual Environment. Value is added to lighting and air flow design which is critical to autopsy operation and to avoid cross-contamination in autopsy suite. Location of air grille and exhaust are placed in the optimized position so that pollutants and germs in air are removed before reaching human breathing level.

4D/5D simulation

4D/5D simulation of construction allows project team to have a better control on overall programme and cost forecast which improves cost predictability and resource management. As-built monthly progress and work forecast of different trades of work is also available with the help of BIM which facilitates progress comparison and monitoring. Some further studies included in this project, such as plant room spatial studies for maintenance purpose, and the handling, reuse and optimization of construction waste.



4D/5D simulation for construction and project management
Image Courtesy of ArchSD

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From virtual to reality, from design planning to construction
Image Courtesy of ArchSD

About Architectural Services Department, HKSAR Government

Architectural Services Department (ArchSD) was found in 1986 serving as one of the works departments under the Development Bureau of the HKSAR Government for the development and upkeep of public facilities. Our aim is to provide efficient and cost-effective professional and project management services for the design, construction, maintenance and refurbishment of government buildings and facilities. We also provide professional and technical advice to the Government and quasi-government organisations. Our mission is to serve and care for our community by enriching the living environment through high quality professional services; and to promote best practices in the building industry.

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