

Honorable Mentions

COMPANY

China Construction Engineering (Macau) Company Limited

PROJECT

Island District Health Services Complex, Macao - Main Buildings

LOCATION

Estr. Flor de Lotus, Cotai, Macao

TYPE

Government Project

SCHEDULED TIME OF COMPLETION

Oct, 2022

Deliver Better Hospital Project with BIM



About China Construction Engineering (Macau) Company Limited

Setting its footprint into Macao in 1981, China Construction Engineering (Macau) Co., Ltd. ("CCEM"), is a vertically integrated construction and investment conglomerate mainly engaged in infrastructure investment and construction projects. Parent company of CCEM is China State Construction Engineering Corporation that is currently ranked 13th in Fortune Global 500. For construction, CCEM is the pioneer and the leader which maintains long-term cooperation with one-third of local construction companies and provides jobs for the quarter of local construction workers at the peak. In Macao, CCEM is proud of having seven domestic flats per km² built by CCEM; one out of eight local people who lives in a domestic flat built by CCEM. CCEM leverages its outstanding construction and management expertise to undertake construction projects, mainly including hotel and casino resort, residential building, infrastructures, hospital, and educational facilities; civil engineering projects such as site formation and piling; mechanical and electrical engineering works.

BIM PARTNER

China State Construction Science and Technology Limited

AUTODESK PRODUCTS USED

Autodesk® 3ds Max®

Autodesk® AutoCAD®

Autodesk® Civil 3D®

Autodesk® Dynamo

Autodesk® Navisworks®

Autodesk® Revit®

Project Description

Island District Medical Complex is a public hospital, and comprises seven functional buildings. The Main Buildings with over MOP7.3 billion sum include two blocks of General Hospital, Auxiliary Services Building, and Administrative Building, that spans a site area of approximately 23,200m² and a total gross floor area of approximately 276,500m². After its completion, it will provide medical and surgical service with over 1,100 beds for patients, and will equip high-tech facilities for medical protection, radiation therapy, and organ transplant procedures advanced medical rooms.

Project Challenges

Other than some common challenges in typical construction project, there are several challenges which are faced along.

1. To have holistic project scheduling and construction planning to ensure the completion of this project with 838 working days;
2. To design and build of complex ELS for the 3-level basement with construction area over 37,300 m², including three car ramp entrances;
3. To coordinate and prepare Combined Integrated Services Drawings with limited ceiling zone/ restricted clear headroom requirement and sophisticated building services systems including over 16 ELV systems, medical gas system, automatic waste and linen collection system, and pneumatic tube system.

Solutions for challenges

The following BIM tactics are applied with the aim of dealing the challenges.

1. To produce 4D BIM and 5D BIM to visualize and to simulate the project scheduling and construction planning;
2. To utilize BIM to identify the clashes between ELS and permanent structural elements, and then to improve ELS design;
3. To take advantage of BIM-based design to improve coordination and communication process;
4. To apply Robotic Total Station and Augmented Reality technology integrated with BIM to assist site supervision and monitoring.

How does BIM benefit the project?

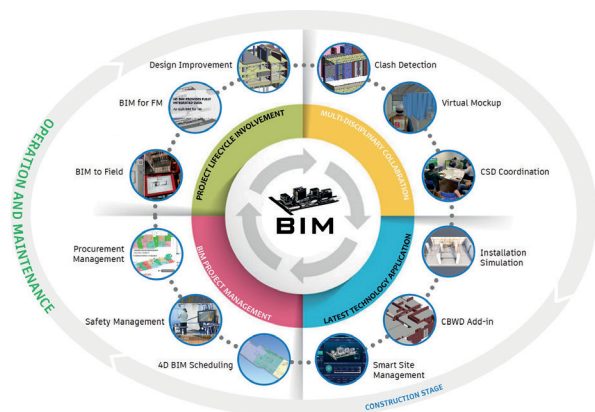
- Coordinating and updating various building systems directly in the 3D environment is more efficient and effective than updating 2D platform, especially for areas with high complexity. This practice improves the efficiency of project coordination as well as reduces the unnecessary back-and-forth coordination;
- Comparing to traditional method, it is more efficient to utilize Robotic Total Station for on-site checking and monitoring to significantly minimize manual errors and time saving;
- Better understanding on BIM can be achieved by all levels of project team members – including workers – via Augmented Reality, so as to improve communication and to ensure the accuracy of the installation.

Better with BIM

It is – without doubt – time-consuming and error-prone to create openings, to add dimensions and to tag in Revit; therefore some add-in tools in the market could facilitate automatic creation of openings and drawing generation. However, these add-in tools have some drawbacks for the production of Combined Builder's Work Drawings (CBWD). For example, most of tools only provide automated opening creation function without any automatic annotations added. Therefore, China State BIM Hong Kong Center has developed the CBWD add-in tools that could fully and seamlessly automate the whole process including the generation of plan and sectional views of Individual Shop Drawings.



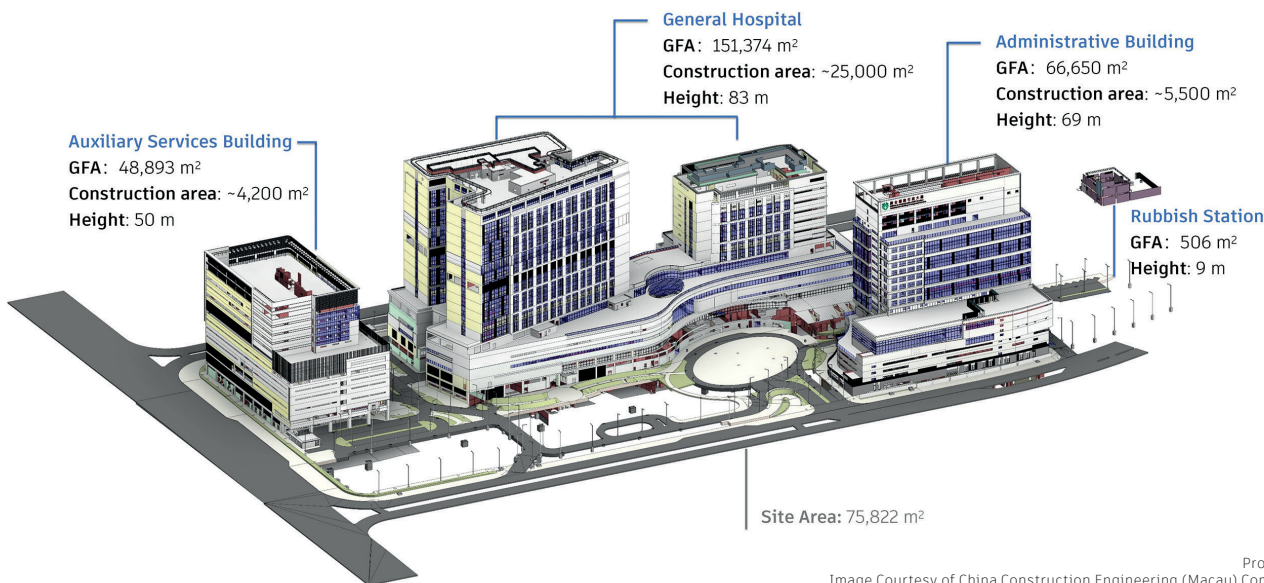
Island District Medical Complex, Macau
Image Courtesy of China Construction Engineering (Macau) Company Limited



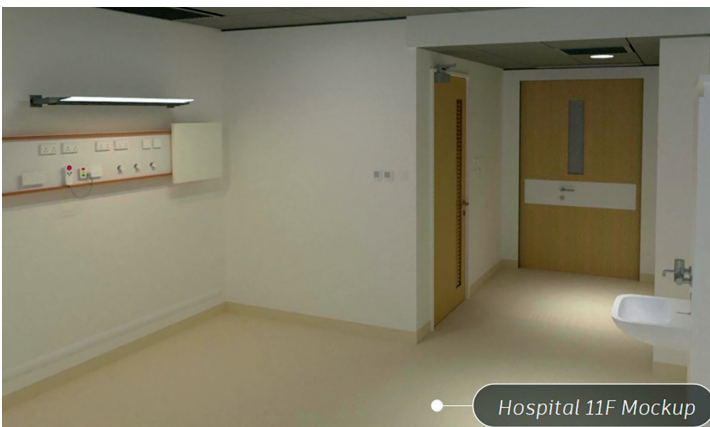
BIM Usage through the Building Life Cycle
Image Courtesy of China Construction Engineering (Macau) Company Limited



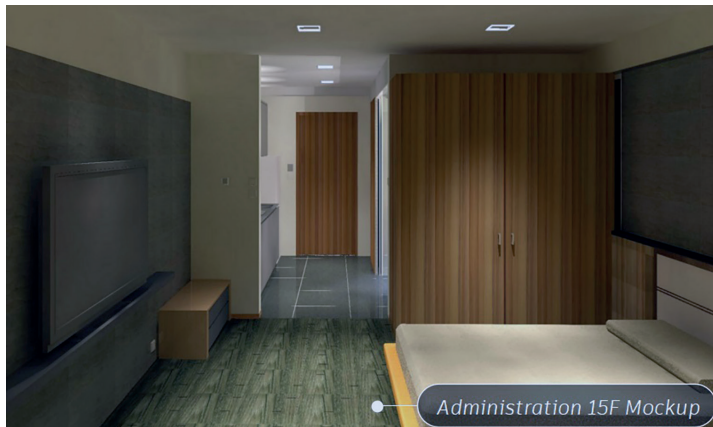
Smart Site Management System
Image Courtesy of China Construction Engineering (Macau) Company Limited



Project Overview
Image Courtesy of China Construction Engineering (Macau) Company Limited



Hospital 11F Mockup
Image Courtesy of China Construction Engineering (Macau) Company Limited



Administration 15F Mockup
Image Courtesy of China Construction Engineering (Macau) Company Limited