

COMPANY

Architectural Services Department, HKSAR
Shui On Joint Venture
Vircon Limited

PROJECT

Design and Construction of a purpose-built
Multi-Welfare Services Complex

LOCATION

Area 29, Kwu Tung North New Development Area

TYPE

Multi-welfare Services Complex

SCHEDULED TIME OF COMPLETION

Q4 2022

Stepping Forward to Construction 2.0 – with Digitalization, Innovation, BIM, MiC, MiMEP and DfMA

“One of the pioneer project of North East New Territories New Development Area sets a new benchmark for its kind. With the advantages of development collaboration by Building Information Modelling (BIM), Modular Integrated Construction (MiC), Multi-trade integrated MEP (MiMEP) and Design for Manufacture & Assembly (DfMA), the project achieves safety, less pollution and greater digital uses with innovation tools adopted. ArchSD, SOJV and Vircon believe that the tools we used will strive for the better future for the project lifecycle.”

— Ms. Xenia Kwan

Senior Project Manager,
Architectural Services Department, HKSAR

— Mr. TS Chan

Project Manager, Shui On Joint Venture

— Mr. Jim Yiu

Senior BIM Engineer,
Shui On Joint Venture

— Dr. Neo Chan

Director, Vircon Limited

BIM PARTNERS

P&T Architects and Engineers Limited

J. Roger Preston Limited

Southa Technical Limited

AUTODESK PRODUCTS USED

Autodesk® AutoCAD®

Autodesk® Civil 3D®

Autodesk Construction Cloud®

Autodesk Forge®

Autodesk® InfraWorks®

Autodesk® Navisworks® Freedom

Autodesk® Navisworks® Manage

Autodesk® ReCap® Pro

Autodesk® Revit®

Autodesk® Vehicle Tracking



Isometric view of rendering
Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited

Multi-welfare Services Complex

Multi-welfare Services Complex is located at Area 29 of Kwu Tung North New Development Area. It spans a site area of approx. 10,300 m² and a total gross floor area of approx. 44,000 m². Managed by ArchSD, the project was commissioned to SOJV for the design and construction of the complex in December 2019. The project consists of a 8-storey building, providing 1,750 places of residential care homes for

the elderly, care and attention home for disabled persons, and day activity centre cum hostel for mentally disabled persons. The MWSC will provide reprovisioning accommodation for the eligible elderly residents currently living in Dills Corner Garden in the vicinity.

BIM Adoption and key statement

To align with project vision and building concept, the project team integrated



Off-site MiC production factory in Humen (虎門), China
Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited



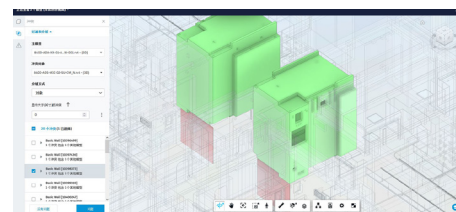
Integration of BIM technology with Construction Project Management System (CPMS) by R&D SOCAM Development
Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited

from massive trades, visualized 4D construction sequence was presented to frontline supervisors as well as workers to “easy-to-understand” the steps of installation for each prefabricated component. Furthermore, in order to prevent industrial accidents and enhance the safety awareness for workers involved, VR enabled BIM training kit is well prepared for them to experience the site workplace and all potential risks in the virtual environment to meet “safety first” spirit and protocol.

Benefits of BIM and Innovation

The use of BIM significantly improves the communication among project teams and enhance the design and manufacturing quality of MiC. Since project commencement in Dec 2019, a short summary of achievements was presented on the environment, community, and economy.

In this project, a total of 1,764 MiC



Clash analysis and collaboration in BIM 360 Platform
Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited

BIM with innovation and technology during whole project lifecycle, which includes MiC, Design for Manufacture and Assembly (DfMA), Multi-trade Integrated MEP (MiMEP), Safety enhancement, Smart Building and Digitalization. The extensive use of BIM can nurture promising coordination, valuable design, and ultimately be beneficial to all stakeholders in the project.

Collaboration of BIM + Common Data Environment + open BIM Integrated with Autodesk

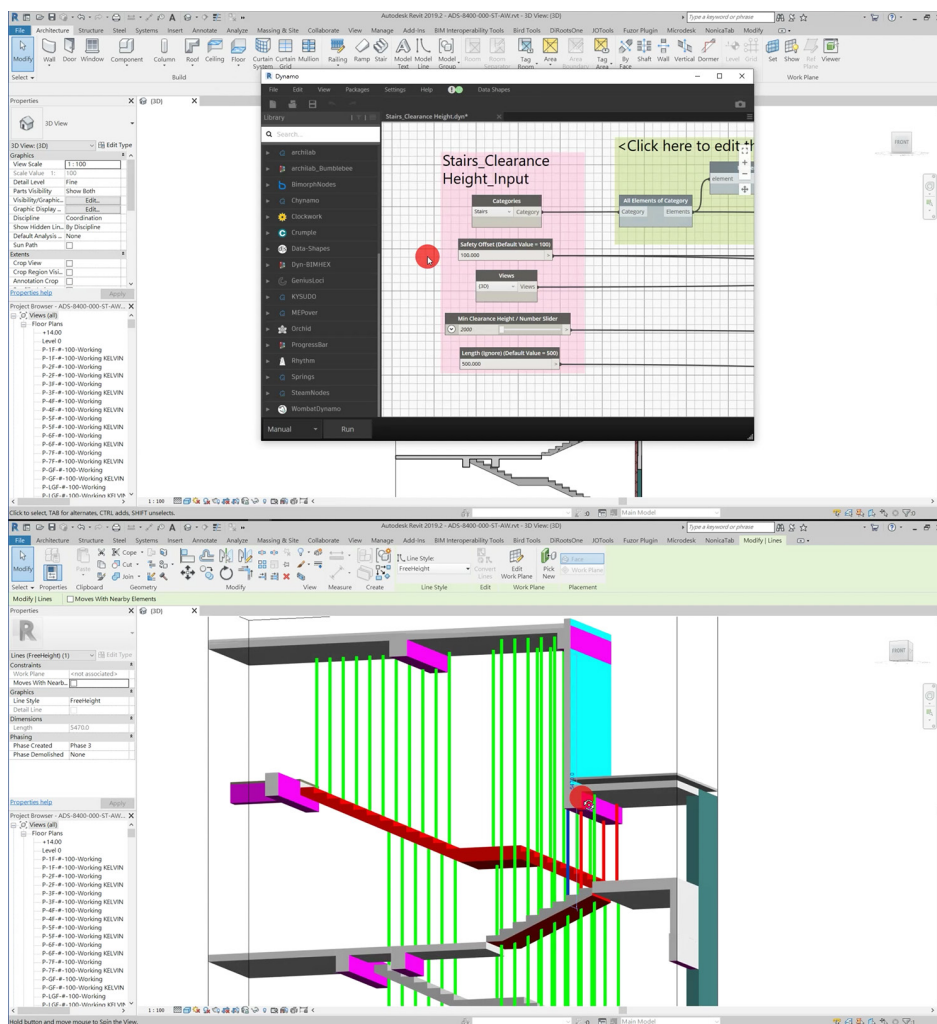
To enhance whole project coordination efficiency throughout the project lifecycle, all stakeholders are encouraged to make effective use of the innovative and integrative digital platforms, to timely update, review and provide feedbacks on project matters with the support of BIM. CDE BIM 360 serves as the core carrier for Project Information Models (PIM) and documents. Autodesk Revit and Navisworks also support with open BIM collaboration, which defines the schema in neutralizing BIM formats, to smoothen the information exchange across different digital platforms. The sophisticated collaboration practice of CDE will continue to as-built stage. In the meantime, integration with other types of technology has also been practised and further investigated.

Combination of Modular Integrated Construction (MiC), Multi-trade integrated MEP (MiMEP) & Design for Manufacture and Assembly (DfMA)

To achieve well-organized preparation, all stakeholders are involved to build up the MiC module in early design stage into BIM model. After first BIM module prototype has been released, further detailed coordination could be proceeded by analyzed BIM Data; such as concrete volume and weight of MEP services extracted for accurate structural analysis to design assembly methods etc. The BIM module prototype is further developed with technical details.

To ensure the buildability in the construction site, experience gained from off-site mockup trial run is applied to further developing reliable BIM model by optimising design through BIM simulation before off-site fabrication.

As the MiC construction is a relatively new technology and construction method in Hong Kong, there is a lack of experienced site workers. The chaotic situation and high-risk construction during the installation is predictable. To enhance the understanding of the 16-day MiC installation cycle involving frontline



Automatic checking of staircase headroom by Autodesk Dynamo
Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited



Interior Rendering of MiC Dormitory
Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited

pandemic in the past few years, quarantine measures are required for both entering and returning from Mainland. To support the factory-based project team members to conduct routine inspection and management on MiC production, continuous and instant information exchange between project site and MiC factory was accomplished by means of CDE.

Therefore, it is important to setup the Common Data Environment (CDE) for information and knowledge exchange, especially when project team members are working at different locations.



First Run of MiC Mock up and lifting for future MiC Installation
Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited

Warning” were recorded in 2021 and hence the risk of heat stroke can be reduced.

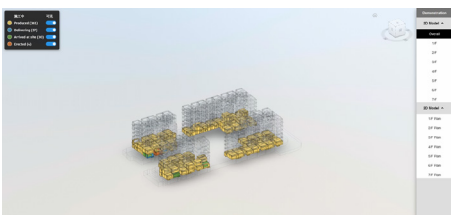
Good Practice: Sample Showcase of Practicing Innovative Ideas

This project trivially demonstrates that initial BIM standardization, as guided by CIC BIM Standards - General (Ver 2.1), DevB BIM harmonisation guidelines v1.0, and ISO 19650 in design and construction stage, and ArchSD BIM Guide for Facilities Upkeep (Version 2.0), will open the door to plenty of technology integration opportunities. Innovations could not be achieved without solid foundation of reliable metadata. Such foundation, to our fortune, has been collaboratively set up by huge pool of stakeholders throughout the project lifecycle.



Cycle Installation of trunking by Multi-trade Integrated MEP (MiMEP) in MiC corridor
Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited

At the design stage, Architect, Structural Engineer, BS Engineer and Specialist Sub-contractors paid joint effort in the BIM input process through regular design workshops. This workflow allows reliable and data-rich BIM model for application in other deliverables. For instance, clash analysis, phase planning, financial model, digital fabrication, etc.

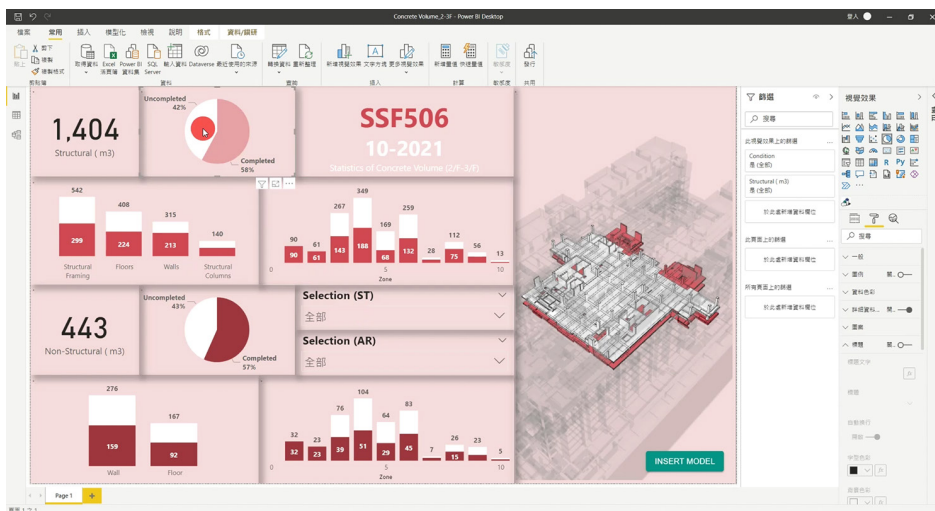


Integration of RFID with BIM in Common Data Environment
Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited

Full adoption of CDE also demonstrates another good practice. Due to COVID-19

modules were successfully installed, and no MiC module was discarded due to fall-short of standard. As 42% of total CFA was constructed by MiC technology, in-situ dust and noise nuisance to the surrounding environment, together with construction waste, has been diminished compared to traditional in-situ construction method.

For health and safety, MiC modules were fabricated on ground level inside the factory. It eliminates the risk of fall from height for those who are working-above-ground like formwork erection and rebar fixing. In addition, the indoor working environment protects the workers from suffering adverse weather condition. For example, 58 days “Very Hot Weather



Implementation of dashboard to demonstrate the instant data of concrete volume
Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited



Overall Bird View, Pioneer MiC project located in Kwu Tung North
Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited

About Architectural Services Department, HKSAR

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 vision is to serve and take care of our community by enriching the living environment through high quality professional services; and to promote best practices in the building industry.

About Shui On Joint Venture (HKSE 00983.HK)

A member of SOCAM Development Limited, SOJV is a joint venture of Shui On Building Contractors Limited and Shui On Construction Co., Ltd., combining solid and extensive experience in the construction of public housing, commercial and institutional projects for the government and major institutions.

SOJV has integrated the client, design consultants and various specialist contractors into a single work team so that the design intent and buildability are recognized by all parties throughout the entire development process.

The Shui On corporate culture is based on its commitment to integrity, quality, innovation and excellence, on a set of corporate governance principles, and it is our quest for perfection that has brought Shui On so far. The “Better Tomorrow 2021-2030” strategy sets out what SOJV aims to achieve, as the Company moves to create a positive impact on the economy, environment and the community.

About Vircon Limited

With over 20 years of experience, Vircon Limited is an ISO 19650 certified Hong Kong's premier Digital Twin & BIM solution provider. We have successfully implemented 300+ local and international projects. Vircon is dedicated to providing high quality services and products, customer satisfaction, and continual improvement of our processes. Our Digital Consultants and BIM Specialists help clients to improve safety, optimize production, reduce costs, and mitigate risk throughout the Building Life Cycle. We pride ourselves on supporting innovation, sustainability, and social impact.