

COMPANY

Drainage Services Department, HKSAR Government
AECOM Asia Company Limited
Kwan Lee - Chun Wo Joint Venture

PROJECT

Shek Wu Hui Effluent Polishing Plant - Main Works Stage 1 - Civil Works for Sewage Treatment Facilities

LOCATION

Shek Wu Hui, Hong Kong

TYPE

DSD - Sewerage & Sewage Treatment

SCHEDULED TIME OF COMPLETION

Mar 2024



群利 - 俊和聯營體
KL - CW JV

About the Drainage Services Department, HKSAR Government

The Drainage Services Department of the HKSAR Government, the DSD, provides world-class wastewater and stormwater drainage services enabling the sustainable development of Hong Kong. The DSD continuously improves drainage services, throughout the territory, in a cost-effective and environmentally responsible manner. Through its many successful projects and initiatives, the DSD strengthens relationships with community, industry and worldwide partners.

About AECOM Asia Company Limited

AECOM is a premier multi-disciplinary engineering firm, delivering professional project lifecycle and management services on all types of buildings and infrastructure. AECOM solves complex engineering challenges and helps their clients to realise their built projects in order to improve livelihood and create sustainable legacies for generations.

About Kwan Lee - Chun Wo Joint Venture

Kwan Lee - Chun Wo Joint Venture is a partnership between two leading companies in the construction industry of Hong Kong and is one of the main contractors to realise the next phase of the Shek Wu Hui Effluent Polishing Plant.

Kwan Lee Holding Limited, founded in 1993, provides road improvement, drainage, sewage and pipe installation works and site formation works, with a passion and commitment in local civil engineering construction.

Chun Wo Construction and Engineering Company Limited, is engaged in the core construction and property development business. An acclaimed contractor and developer in Asia, Chun Wo's dynamic growth, in city and infrastructure development, makes it possible to improve people's quality of life at every turn.

BIM PARTNERS

Syntegrate Limited

Blue BIM Limited

AUTODESK PRODUCTS USED

Autodesk® AutoCAD®

Autodesk® BIM 360®

Autodesk® BIM 360® Docs

Autodesk® BIM Collaborate Pro

Autodesk® Civil 3D®

Autodesk® Dynamo Studio

Autodesk® Navisworks® Manage

Autodesk® ReCap®

Autodesk® Revit®

Project Description

The existing Shek Wu Hui Sewage Treatment Works (SWHSTW) has been operating for 30 years, treating sewage generated from Sheung Shui, Fanling and adjacent districts. The design capacity of the existing SWHSTW was 93,000 m³/day. After sewage treatment and ultra-violet disinfection, the treated effluent is discharged to Ng Tung River.

As the next phase of upgrading the SWHSTW, the current project, Shek Wu Hui Effluent Polishing Plant - Main Works Stage 1, or SWHEPP, comprises the proposed Inlet Works No. 1, Primary Sedimentation Tanks No. 1 - 4, Bioreactor No. 2A & 2B, Membrane Facilities Building No. 2, SAS Pumping Station, auxiliary facilities, and associated works. After completion of Main Works Stage 1, SWHEPP's treatment capacity will be increased to 190,000 m³/day.

Project Challenges

In the design and construction stages, one of our team's principal responsibilities is to protect and maintain existing infrastructures and record all as-built data. The effluent polishing plant has been in operation since 1978 and contains a massive amount of underground utilities in addition to its existing buildings. Most of the as-built data had not been captured in any form of BIM. The project team found numerous differences between the real conditions and the official records. After creating a reliable model of the existing conditions, the BIM team could evaluate clashes between the proposed design and existing structures.

Additionally, site work is always susceptible to real-world constraints, which means that, wherever the as-built structure deviated from the proposed, extra time and workload was required to update the as-built data into the BIM model.

Solutions for Challenges

Our project utilises BIM technology to form a BIM-based working practice and a Common Data Environment (CDE) is used as the construction collaboration platform. Inter-teams working efficiency showed noticeable improvement with the issues identified in the model and resolved through a BIM-enabled workflow. BIM models from the different contracts making up SWHEPP must be federated to coordinate interfacing works and for interference checks. Our contract, has the complexity of being one out of four main contracts that make up the Main Works Stage 1 and we have interfacing works with two other main contractors; hence, the use of real-time Design Collaboration facilitated by BIM Collaborate Pro on our CDE is essential to our productivity. The Independent BIM Consultant manages our CDE to control the BIM model's delivery at various stages of construction.

In the immediate future, the preparation of the Asset Information Model, with verified as-builts, COBie exports, asset data input, and interoperability with operations-phase Asset Management processes will be the focus for post-construction BIM activities.

How does BIM benefit the project?

BIM technology has been and will continue to be widely applied in this project from design conception to site operation, and as such, is highly relevant to all stakeholders.

Through BIM, we visualise, evaluate and form accurate predictions of future site conditions. From that, we are able to make effective plans and take proper actions on site. We visualise the existing and proposed design at the work area to identify clashes and site constraints, and implement protection measures for the existing underground utility services. As work proceeds, the utility services model is progressively updated with the findings of the ground radar survey and inspection pit excavations.

4D phasing and construction methods simulation models demonstrate construction sequences and allows the project team to visualise and refine the construction process to meet Key Date requirements.

Cost modelling or 5D modelling, through quantity takeoffs from the Revit models, supports the quantity surveying team in managing and monitoring material orders and the progress of sub-contractors' works.

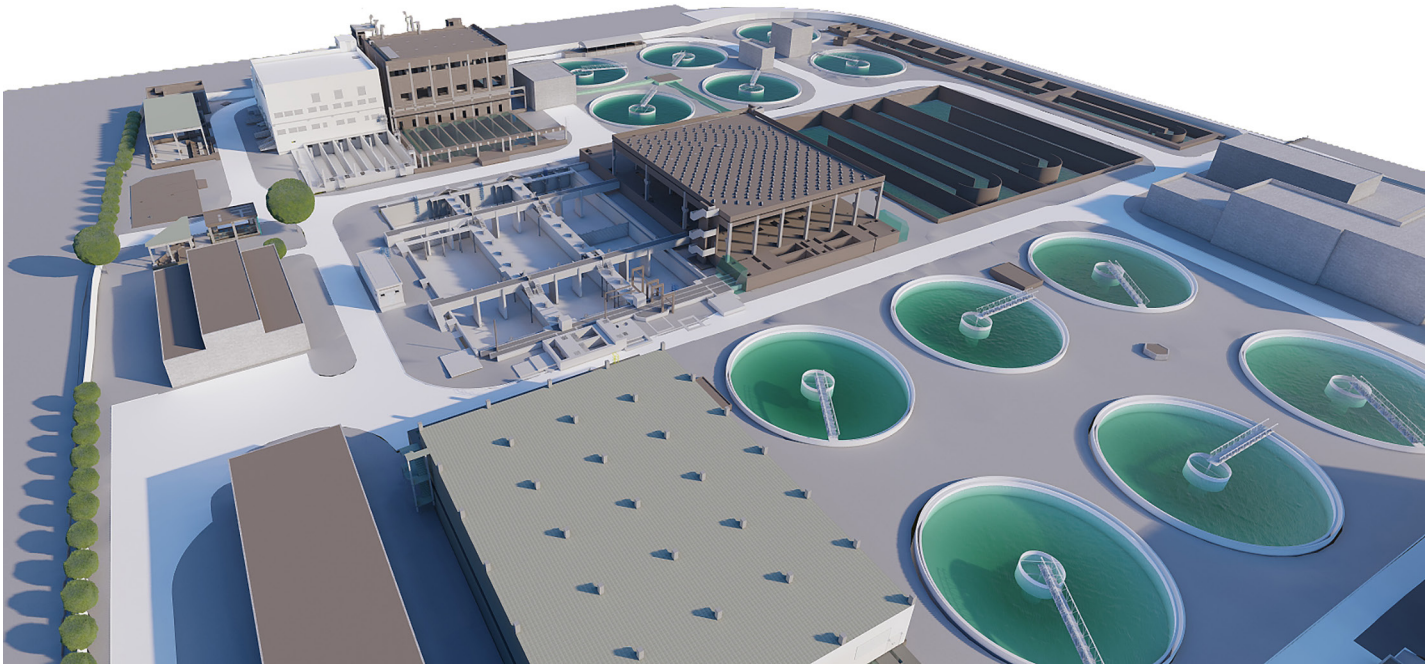
Overall, BIM has demonstrably maximised the time-efficiency of our work and reduced wastage in material resources.

Better with BIM

BIM creates value across multiple activities, not only for design and construction, but also safety and material management.

3D Virtual Reality (3DVR) is a cost-efficient way to identify clashes in the design or discrepancies between the BIM model and as-built structures. Also, 3DVR can clearly convey the spatial conditions of working underground, help workers understand the dangers of working in such spaces, help the safety team to evaluate risks and assist in the preparation for such works.

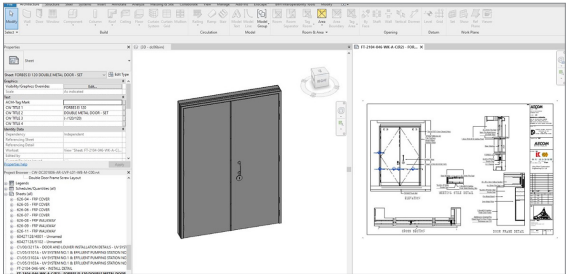
RFID and the Web-based Building Component Management System (BCMS) incorporates IoT and RFID technologies into the materials tracking process and enables real-time monitoring of the installation of building components. Data (including delivery tracking, installation, component data, and maintenance records etc.) is synchronised with the BIM to create reports to maximise the data accuracy of the project life cycle.



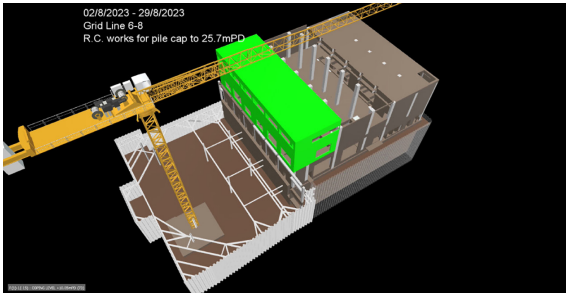
Overview of Shek Wu Hui Effluent Polishing Plant (SWHEPP)
Image Courtesy of Drainage Services Department, HKSAR Government and AECOM Asia Company Limited and Kwan Lee - Chun Wo Joint Venture



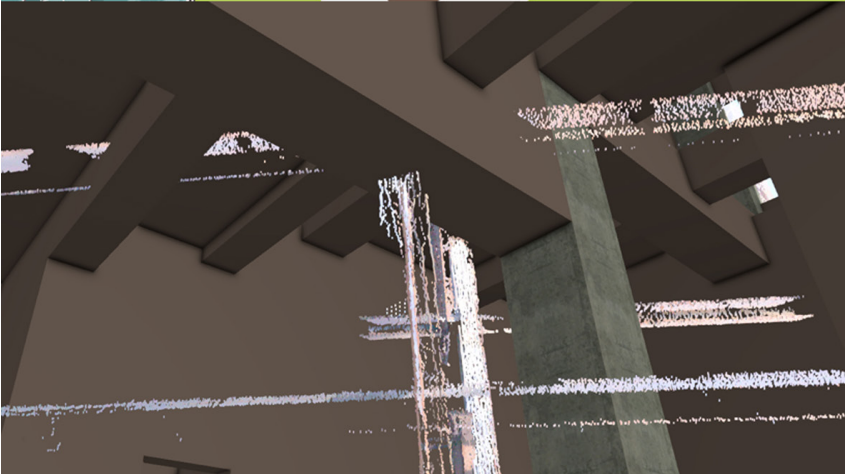
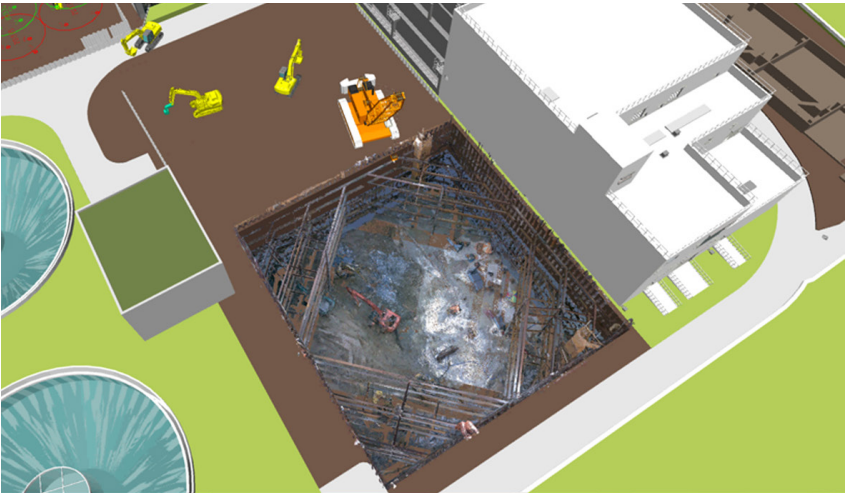
CDE for real-time Design Collaboration and Activities
Image Courtesy of Drainage Services Department, HKSAR Government and AECOM Asia Company Limited and Kwan Lee - Chun Wo Joint Venture



Shop drawing of door component in Revit
Image Courtesy of Drainage Services Department, HKSAR Government and AECOM Asia Company Limited and Kwan Lee - Chun Wo Joint Venture



4D Modelling (Phase Planning) and Site Utilisation Plans
Image Courtesy of Drainage Services Department, HKSAR Government and AECOM Asia Company Limited and Kwan Lee - Chun Wo Joint Venture



3DVR for clash detection between model and as-built structure
Image Courtesy of Drainage Services Department, HKSAR Government and AECOM Asia Company Limited and Kwan Lee - Chun Wo Joint Venture



Section diagram of Shek Wu Hui Effluent Polishing Plant (SWHEPP)
Image Courtesy of Drainage Services Department, HKSAR Government and AECOM Asia Company Limited and Kwan Lee - Chun Wo Joint Venture