

## COMPANY

Architectural Services Department, HKSAR  
Shui On Joint Venture

## PROJECT

Design and Construction of Drainage Services  
Department Office Building at Cheung Sha Wan  
Sewage Pumping Station

## LOCATION

Within the existing Cheung Sha Wan Sewage  
Pumping Station in West Kowloon

## TYPE

Government Office

## SCHEDULED TIME OF COMPLETION

Q1 2025

# BIM: The Foundation of Innovation in Construction

“BIM can be used for planning, design, construction, and operation of the facility. It helps architects, engineers, and constructors visualize what is to be built in a simulated environment to identify any potential design, construction, or operational issues.

Application of BIM can decrease project cost, increase productivity and quality, and reduce project delivery time. BIM simulates the construction project in a virtual environment. When completed, the building information model contains precise geometry and relevant data needed to support the design, procurement, fabrication, and construction activities required to realize the building. After completion, this model can also be used for operations and maintenance purposes.”

— Wan Wai Ho

Senior Project Manager,  
Shui On Joint Venture

## BIM PARTNERS

**Wong & Ouyang (HK) Limited**  
**WSP Hong Kong Limited**  
**WSP (Asia) Limited**

## AUTODESK PRODUCTS USED

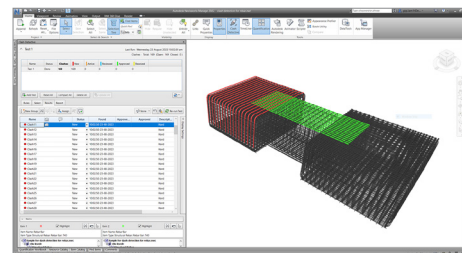
**Autodesk® AutoCAD®**  
**Autodesk® BIM 360®**  
**Autodesk® Dynamo**  
**Autodesk® Navisworks®**  
**Autodesk® ReCap®**  
**Autodesk® Revit®**



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

## Project Background

The Drainage Services Department Building (DSD Building) at Cheung Sha Wan Sewage Pumping Station (“CSWSPS”) is the new administrative centre to provide support to the operation of the urban drainage network in Hong Kong. It rationalizes the various DSD’s satellite offices scattered around Hong Kong into one coherent complex. The DSD



Confirm with fixer and engineer after clash detection of rebar model.  
Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture

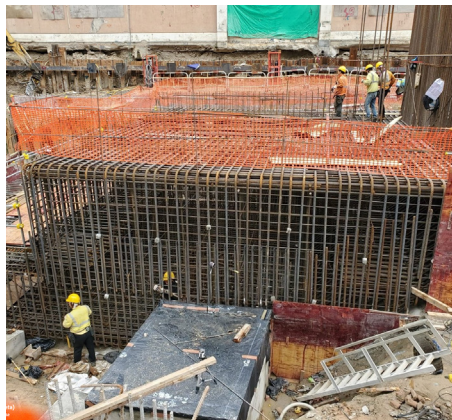
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Bar Bending Schedule (BBS) are generated.  
Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture

Building (21 storey) is an innovative, fit for purpose, and integrated government office building which accommodate the offices of the Drainage Service Department (DSD) upon completion and provides facilities for the joint-user, Social Welfare Department (SWD). It spans a site area of approx. 4,000 m<sup>2</sup> and a total Net Operational floor area of approx. 19,220 m<sup>2</sup>. The project was commissioned to SOJV for the design and construction of the building in 2021 Q1.

### BIM Adoption

In our project, the project team integrated BIM with innovation and technology during whole project life cycle, which includes Pre-fabricated Steel Reinforcement with BIM adoption on Bar Bending Schedule, MiC Design and Safety enhancement. The extensive use of BIM has the capacity to transform and enhance performance by decreasing inefficiencies, improving productivity and increasing collaboration among project stakeholders.



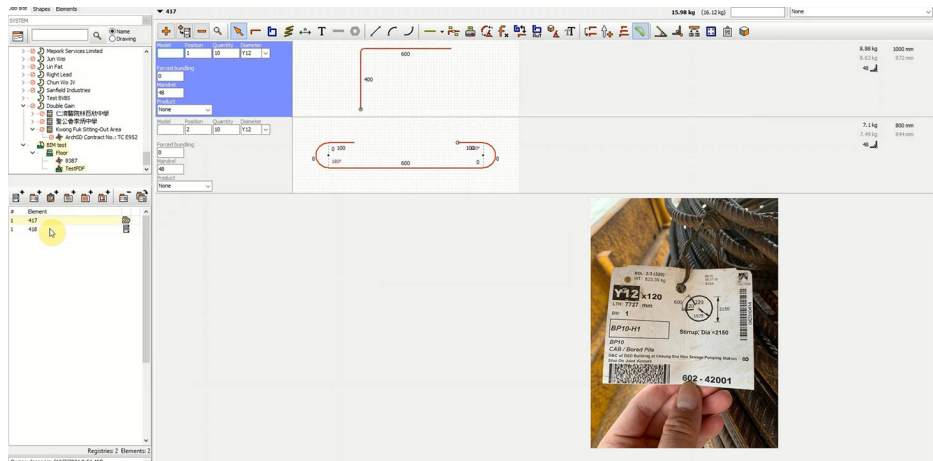
Rebars are delivered from factory to site and fixed. Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture

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R Links
ShuiOn -
BF2D@Hj8387er#p01e17706en285@e6.841597ed12@gDefault@s50@v@G1219@w88@r1069@w180@w0@r1069@w32@w88@r1069@w180@w0@1219@w0@C88@

BF2D - 2D bending shape
@H - Header block.
j - project number, r - schedule no/drawing, i - revision, p - bar mark, l - bar length (mm),
n - quantity, e - weight (kg), d - diameter (mm), g - steel grade, s - diameter of mandrel (mm),
v - designer
@G - Geometry block
l - leg/segment length, w - angle of the following bend, r - radius of bend
    
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Export file into BVBS data format and distribute to prefabrication yard. Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture



Upload the data and produce the production tag. Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture



Leica Handheld Scanner for conducting 3D scanning works. Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture

### BIM Collaboration and Common Data Environment

A CDE (BIM 360) creates confidence and helps to build trust among the project participants to capture a complete record of the project with a unique data ownership model that eliminates barriers to collaboration, increasing adoption and data sharing across the entire project team. This trust results in greater adoption, which yields more project data and insights. It also creates an unalterable audit trail, helping to reduce disputes and drive faster resolution.

### Pre-fabricated Steel Reinforcement with BIM adoption on Bar Bending Schedule

Processing steel reinforcement is an on-site activity that includes cutting and bending, which are time-consuming and uneconomical. When moving toward the construction automation, off-site prefabrication is important with the aid of Building Information Modeling (BIM) and Industry Foundation Classes (IFC) which are utilized as a collaborative approach to facilitate the fabrication workflow and data interoperability.

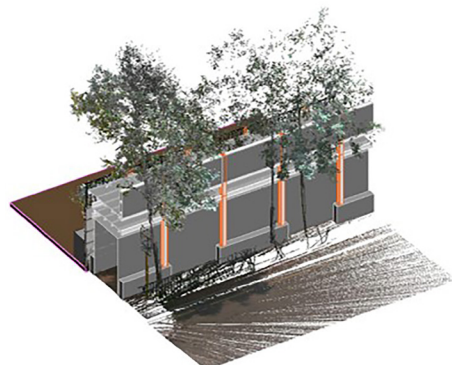
BIM and steel fabrication machine codes (BVBS) with openBIM standards are integrated to interoperate the computerized design and prefabrication automation of steel reinforcement. Therefore, rebar model is required to be generated according to the design drawing by Autodesk Revit first. After resolving the clash of rebars with

structural engineer and fixer, rebar model can be finalized and Bar Bending Schedule is then generated. The information will be further utilized to generate fabrication machine codes (expressed in Bundesvereinigung der Bausoftware or BVBS) and detailing drawings to facilitate the assembly with the aid of BIM.

Based on this bar bending schedule, the BVBS machine codes can be generated by plug in software as it contains all required attributes for steel reinforcement cutting and bending. These codes then distribute to cut and bend services provider and input to the production system for processing and production by automatic bar processing machines with auto bar sorting and tagging functions. Pre-fabricated steel reinforcing bar products will be tagged in bundle for easy identification and tracking. It could also facilitate in products be delivered to site in the correct and agreed order to suit the site progress and construction sequence.

### Coordination of Existing Trees and Temporary Hoarding

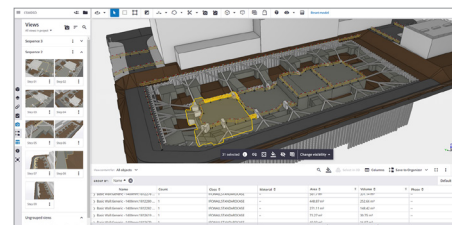
In order to study the conflict between hoarding and existing trees, revit model of hoarding and point cloud of existing trees (Prepared by Handheld Laser Scanner) are generated. The size of trees can be clearly indicated and well coordinated with temporary hoarding before actual installation. It is also a faster and safety method than the traditional survey method to record the size of the existing trees.



Isometric view of point cloud model of existing trees and BIM model of temporary hoarding. Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture



Visualize the entire building in AR (Hololens 2) and review the outlook on surrounding environment.  
Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture



Upload the ELS model to Trimble Connect.  
Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture

### Augmented Reality (AR) - Hololens 2

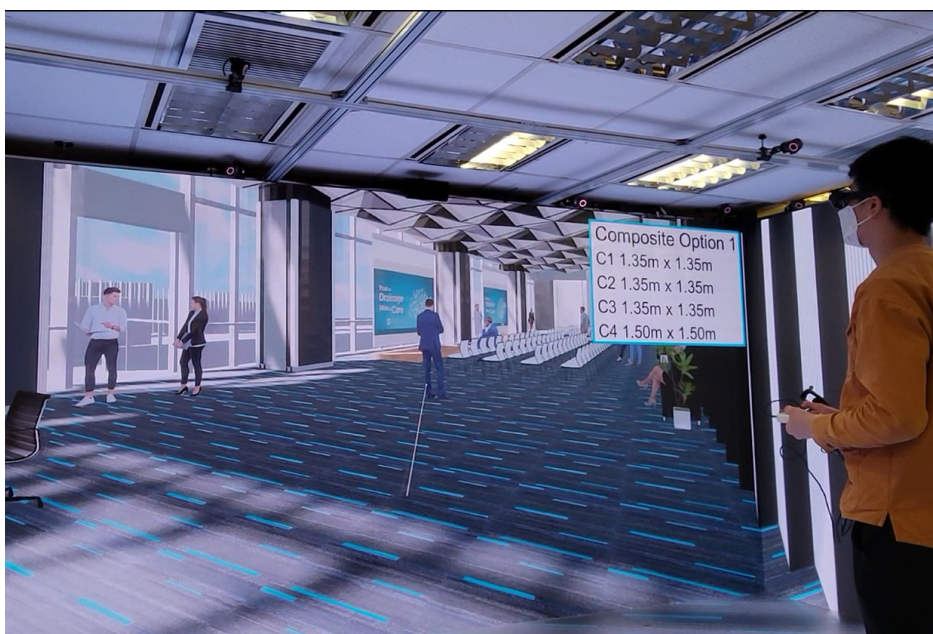
Microsoft Hololens is a completely self-contained, wireless, holographic computer. It enables users to take a look at what is known as AR. In our project, Hololens 2 is used to visualize the entire building in AR and review the outlook on surrounding environment. Also, we can visualize the ELS works (BIM model) in the future at site and review any better safety measures should be provided.

### 3D Interactive Walkthrough by Unity at CAVE System

Using a game engine (Unity) can represent how efficient the volume of space is utilized in architecture than a simple rendering. While the user walkthrough the room, they can have a option to press and change the column sizes, partition wall options and features wall options. In this connection, the designer can provide various options to the client more efficiently.



Visualize the ELS works model at site by AR.  
Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture



In the CAVE system, user can walk through the room and have a option to press or change the column sizes, partition wall options and features wall options.  
Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture



Overall view of DSD Building.  
Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture

### 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.