COMPANY
Water Supplies Department, HKSAR Government
AJC Joint Venture
Black & Veatch Hong Kong Limited
WSP (Asia) Limited

PROJECT
Design, Build and Operate First Stage of Tseung Kwan O Desalination Plant

LOCATION
Tseung Kwan O (TKO) Area 137, Hong Kong

TYPE
Design, Build and Operate

SCHEDULED TIME OF COMPLETION
2023

Global Synergy - Fresh water resilience for Hong Kong through BIM

水務署 Water Supplies Department

acciona JEC AJC JOINT VENTURE

BLACK & VEATCH

WSP

Project Description

WSD proposed to construct a seawater desalination plant, using reverse osmosis (RO) technology (process using partially permeable membrane to remove ions, unwanted molecules and larger particles from seawater turning it into drinking water) with a water production capacity at 135,000 m3 per day with provision for future expansion to production capacity up to 270,000 m3 per day. To cater for extreme dry weather brought about by climate change, Hong Kong needs to develop strategic alternative water resource which is not susceptible to climate change to build resilience in fresh water supply.

Project Challenges

The most pressing challenge was to tackle the coordination of multiple stakeholders from six geographical regions due to conflicting time zones, working culture, difference design practice (Revit, Plant 3D and COBie) and information sharing.

Besides, the project needs will change throughout its lifecycle, from design, construction to operation and maintenance, to suit the stage and operational requirements. Accessing the correct and up-to-date information is essential to prevent abortive work in design coordination. Establishing an accurate BIM model of the constructed assets for continuous supervision of assets and workflows of site activities will benefit the construction phase.

For facility management, it is also vital to integrate the data and essential information within the model for operation and maintenance application throughout its lifecycle.

Solutions for challenges

The project adopts BIM360 as the project centralization design and data platform. Within this common data environment (CDE), the 3D model (visualization made possible via BIM) is utilized for the design development, multi-discipline coordination, even the document submission, review and approval are also conducted within the same platform. The information sharing is so instantaneous, which breaks the constraints in geographical location and time zone. It prevents any misleading and incorrect information exchange. Moreover, the platform can also maintain those revision record for future analysis and history checking. By adopting the difference design applications, the project teams utilize the .rfa format within the Revit and Plant 3D for the collaborative arrangement. For future facility management, it will utilize the COBie plugin in Autodesk Revit/BIM for data collection.

How does BIM benefit the project?

By utilizing this cloud-based BIM360 collaboration platform, standardized design collaboration technique, revit work-sharing and the online conference facilities, the multi-region design teammates can discuss the design details on the same platform. It assists the team in working through project checkpoints effectively and achieving the project deliverable schedule within the target time frame.

Through visualizing the elements in BIM360, the complex technology such as ActiDAFF (pre-treatment process which combines flotation and granular bed filtration) and Reverse Osmosis can be easily explained to teammates with different background. It can also highlight the main design consideration for the architectural team, the structural team, and the fire services team, optimizing the decision-making process to suit the process need and the local regulation.

Better with BIM

Without the BIM, all the documents/drawings are just in 2D. It relies heavily on the teammates' experience in reading these 2D drawings for this kind of complex project. With BIM in place, the plant will be in 2D, 3D and 4D. It provides us with a clear, complete and thorough view each component of the plant before construction.

Integration with Virtual Reality technology would enable users to visualize the plant in a virtual world. This can increase communication efficiency and facilitate training of workers during construction and operation phase.

To acquire point cloud data by Scan, it provides the site work information to plan for the DfMA, site transport arrangement, availability for the delivery route and the on site installation sequence.

About Water Supplies Department, HKSAR Government

The Water Supplies Department (WSD) is responsible for providing reliable and adequate supplies of fresh water and seawater (for flushing) to a population of over 7.5 million in Hong Kong for the territory's sustainable and long-term developments. In 2019/20, WSD supplied 998 million cubic metres (Mm3) of fresh water and 310 Mm3 of seawater with about 3.08 million customer accounts (as at 31 March 2020).

About AJC Joint Venture

AJC Joint Venture is a consortium of top tier contractors (including Acciona Agua, JEC Engineering and China State) to apply their expertise to design, build and operate the first reverse osmosis (RO) desalination plant in Hong Kong.

About Black & Veatch Hong Kong Limited

Black & Veatch Hong Kong Limited is WSD's Consultant who committed itself to grow a collaborative team across the globe and providing innovative solutions to the world's most important needs.

About WSP (Asia) Limited

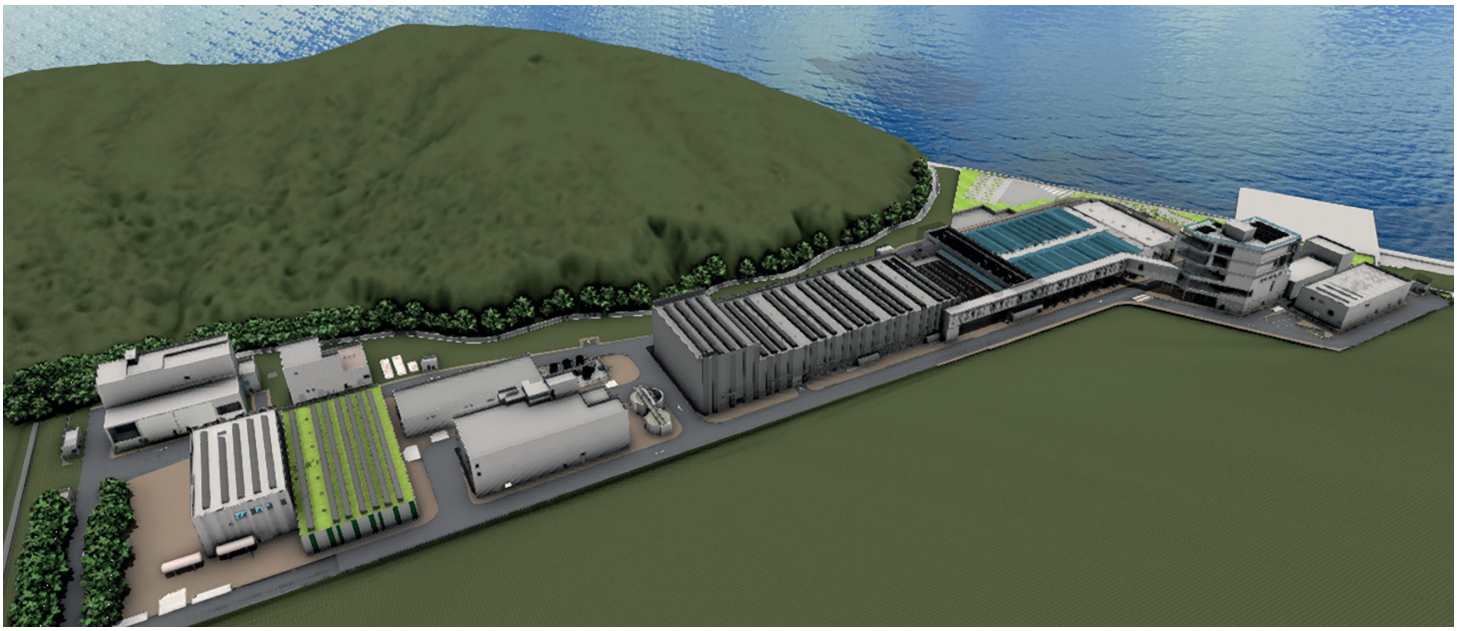
WSP (Asia) Limited is AJC's Consultant who looks at complex problems from different angles and delivers solutions that break paradigms.

BIM PARTNERS

WSP Hong Kong Limited
Architectural Project Unit Limited
Arcadis Hong Kong Limited

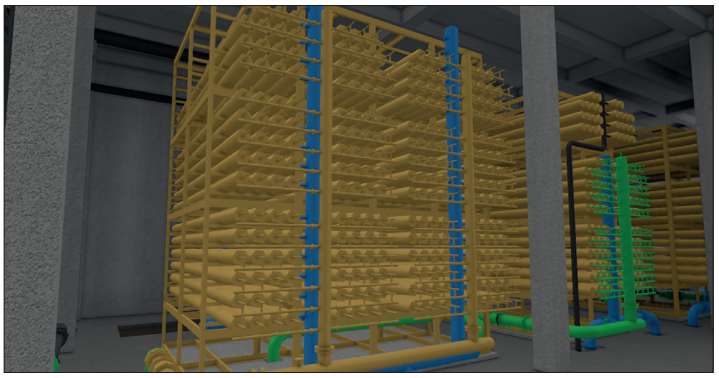
AUTODESK PRODUCTS USED

AutoCAD Plant 3D
BIM360 (Docs, Design, Coordinate)
Civil 3D
COBie (Revit Add-ins)
Dynamo
Enscape (Revit Add-ins)
Navisworks
Recap Pro

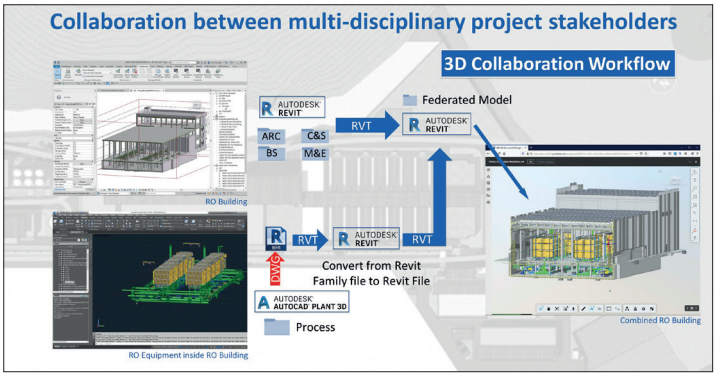


TKO Desalination Plant Overall View
Image Courtesy of Water Supplies Department, HKSAR Government and AJC Joint Venture and Black & Veatch Hong Kong Limited and WSP (Asia) Limited

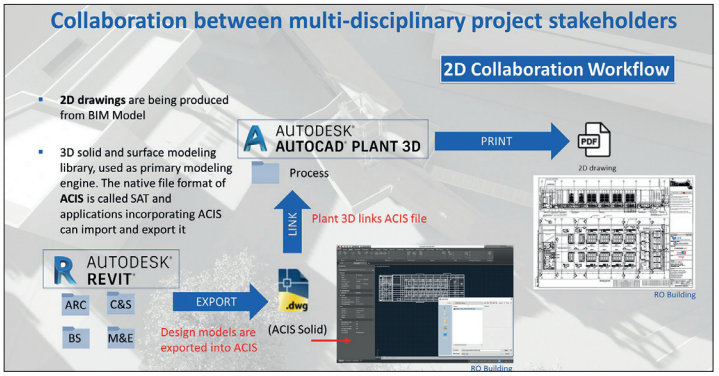
4D Simulation
Image Courtesy of Water Supplies Department, HKSAR Government and AJC Joint Venture and Black & Veatch Hong Kong Limited and WSP (Asia) Limited



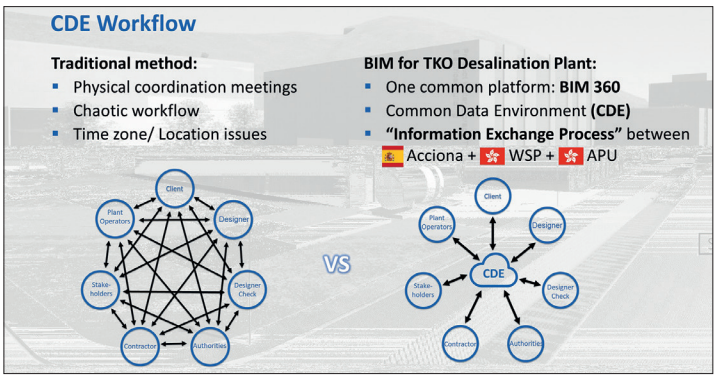
Reverse Osmiosis Building inside view
Image Courtesy of Water Supplies Department, HKSAR Government and AJC Joint Venture and Black & Veatch Hong Kong Limited and WSP (Asia) Limited



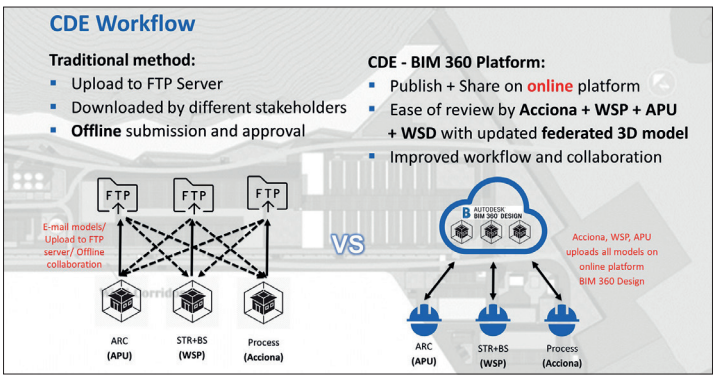
3D Collaboation Workflow
Image Courtesy of Water Supplies Department, HKSAR Government and AJC Joint Venture and Black & Veatch Hong Kong Limited and WSP (Asia) Limited



2D Collaboation Workflow
Image Courtesy of Water Supplies Department, HKSAR Government and AJC Joint Venture and Black & Veatch Hong Kong Limited and WSP (Asia) Limited



Common Data Environment Workflow1
Image Courtesy of Water Supplies Department, HKSAR Government and AJC Joint Venture and Black & Veatch Hong Kong Limited and WSP (Asia) Limited



Common Data Environment Workflow2
Image Courtesy of Water Supplies Department, HKSAR Government and AJC Joint Venture and Black & Veatch Hong Kong Limited and WSP (Asia) Limited