

COMPANY

MTR Corporation Limited
Arup

PROJECT

MTR C1601 Kwu Tung Station for Northern Link

LOCATION

Ma Tso Lung Road and Ho Sheung Heung Road, which is also the town center of the future Kwu Tung North (KTN) New Development Area (NDA)

TYPE

Public Transport

SCHEDULED TIME OF COMPLETION

Kwu Tung Station for East Rail Line – 2027
Kwu Tung Station for Northern Link – 2034

Construction Challenges Overcame with CDE and BIM in Kwu Tung Station



About MTR Corporation Limited

To Keep Cities Moving, MTR makes encounters happen and rendezvous for a more connected tomorrow. As a recognised world-class operator of sustainable rail transport services, we are a leader in safety, reliability, customer service and efficiency.

MTR has extensive end-to-end railway expertise with 45 years of railway projects experience from design to planning and construction through to commissioning, maintenance and operations. Going beyond railway delivery and operation, MTR also creates and manages dynamic communities around its network through seamless integration of rail, commercial and property development.

With more than 50,000 dedicated staff*, MTR carries over 10 million passenger journeys worldwide every weekday in Hong Kong, Mainland China, Australia, the United Kingdom and Sweden. Together, we Go Smart and Go Beyond.

*includes our subsidiaries, associates and joint ventures in Hong Kong and worldwide

About Arup

Dedicated to sustainable development, Arup is a collective of designers, consultants and experts working globally. Founded to be humane and excellent, we collaborate with our clients and partners using imagination, technology, and rigour to shape a better world. Arup opened its Hong Kong office in 1976, and today it operates as the firm's largest office in East Asia with more than 2,000 people, serving as a creative powerhouse that makes a difference in this part of the world. The Hong Kong office benefits from Arup's global network of offices and draws upon global resources and expertise to solve any problems requiring specialist skills.

BIM PARTNER

Arcadis

AUTODESK PRODUCTS USED

Autodesk® 3ds Max®
Autodesk® Architecture, Engineering & Construction Collection
Autodesk® AutoCAD®
Autodesk® Construction Cloud®
Autodesk® Civil 3D®
Autodesk® Dynamo
Autodesk® Navisworks®
Autodesk® ReCap® Pro
Autodesk® Revit®

Project Description

The Kwu Tung Station is located in the town centre of the future Kwu Tung North New Development Area (NDA), near residential, retail, leisure, and community amenities. It will facilitate travel for residents and help unlock the potential of surrounding areas. The detailed design of Kwu Tung Station on the Lok Ma Chau Spur Line has been completed, with construction starting in 2023 and expected to finish in 2027.

Project Challenges

The Kwu Tung Station on the East Rail Line project requires construction works atop the operating East Rail Line while maintaining daily railway operations, making the construction process extremely challenging. To accelerate and safeguard the overall construction programme and facilitate the development of the Northern Metropolis for Hong Kong, the design period of Kwu Tung Station was greatly shortened. To embrace the digital construction trend, Kwu Tung Station was selected as one of the first projects of MTR to fully adopt CDE and BIM. Over 8700 project drawings were produced from coordinated models and reviewed in the project CDE.

Solutions for Challenges

The compressing timeline doesn't mean sacrificing quality or accuracy. The project team utilised BIM and CDE to explore options in real time to optimise design and enhance safety. Existing conditions such as the supporting tunnel box, topography, trees, underground utilities and site boundaries were first digitalised to facilitate layout planning and justification for the design. Automations were used to generate room names in 3D to facilitate spatial coordination via Autodesk Construction Cloud. The coordinated models formed the base of various engineering designs such as passenger and energy simulations, structural and geotechnical assessments, optimisations for underground utilities, tree removal, MiC, logistic, planning and cost.

How does BIM benefit the project?

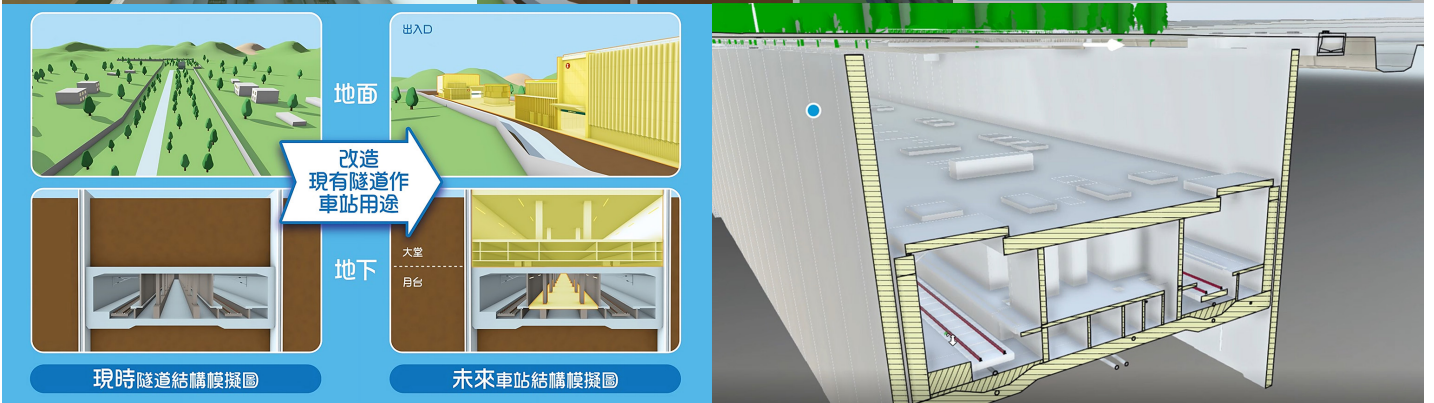
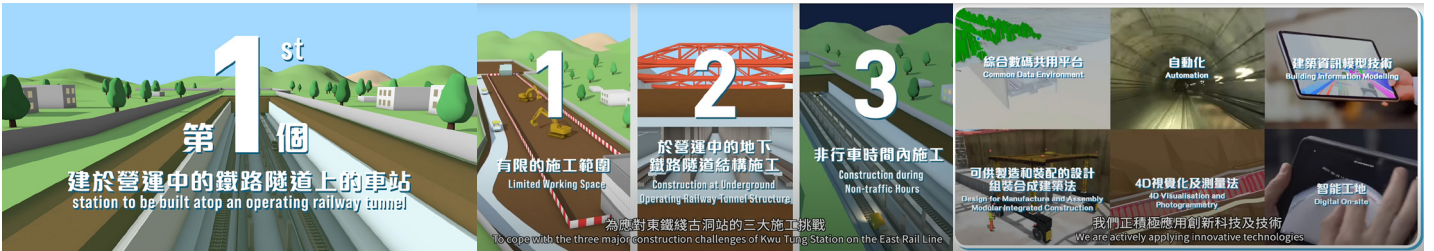
Kwu Tung Station is supported by the existing East Rail Line tunnel box structure, which lacks pile support. The design team must maximise the concrete volume of the new station to counteract groundwater buoyancy while also ensuring adequate space for passengers, tunnel air circulation and building services. Located in the centre of the new town, the team needs to coordinate urban planning and civil works, especially underground utilities, to enhance construction efficiency, safety, and public needs. Utilising BIM and CDE ensures a 'single source of truth' across disciplines within the accelerated schedule to manage production of drawings, engineering analyses, and stakeholder engagement materials.

Better with BIM

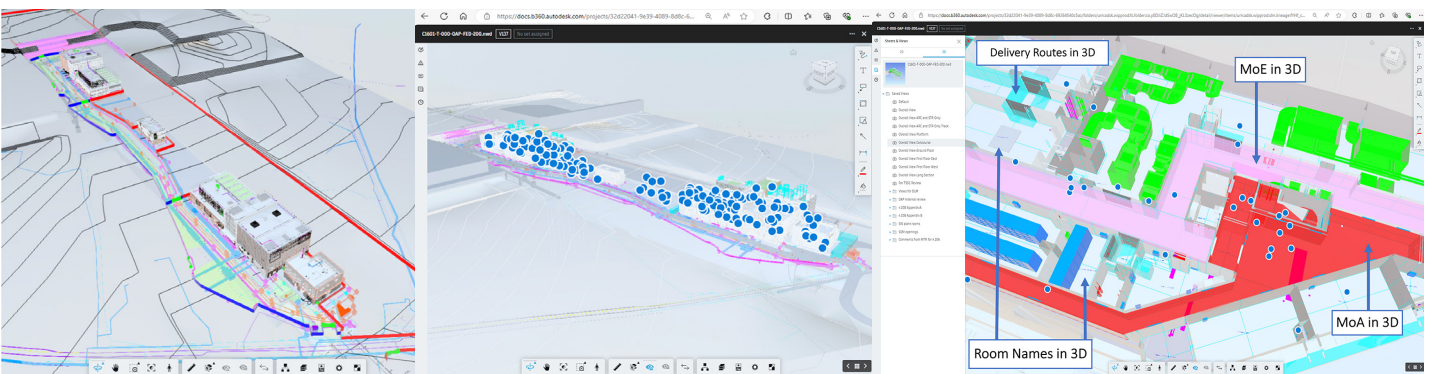
BIM offers significant benefits for the Kwu Tung Station project. It enhances collaboration among stakeholders, improving communication and integration. The 3D models aid in understanding design concepts and facilitate informed decision-making. Coordinated models in Autodesk Construction Cloud enable both the consultant and the owner to early identify conflicts, reducing costly changes during construction. Additionally, BIM allows for efficient planning and resource allocation, leading to potential cost savings. It promotes sustainability by assessing energy efficient options, ensuring regulatory compliance, and enhancing safety by simulating construction processes. The project's CDE provides a centralised repository for accurate records and serves as a foundation for further digital developments.



The Design of Kwu Tung Station
Image Courtesy of MTR Corporation Limited and Arup



Construction Challenges Overcome with CDE and BIM in Kwu Tung Station
Image Courtesy of MTR Corporation Limited and Arup



Model Coordination via Autodesk Construction Cloud
Image Courtesy of MTR Corporation Limited and Arup