The BIM Museum - Unveiling Our Time Journey

COMPANY

Architectural Services Department, the Government of the Hong Kong Special Administrative Region

P&T Architects Limited

China State Construction Engineering (Hong Kong) Limited

PROJECT

Leisure and Cultural Complex at Tin Yip Road, Tin Shui Wai Phase 1 (Heritage Conservation and Resource Centre)

LOCATION

Tin Yip Road, Tin Shui Wai

TYPE

Building

SCHEDULED TIME OF COMPLETION

Q1 2027

"By integrating architectural and building technologies with heritage conservation, we not only solved complex engineering challenges but also preserved cultural assets for the next generation. BIM empowered us to turn tradition into a living legacy."

–Billy LAW
Chief Project Manager 302, Architectural Services Department, the Government of the Hong Kong Special Administrative Region

–Sian WONG
Architect (BIM Manger), P&T Architects Limited

–Becky CHAN
BIM Manager, China State Construction Engineering (Hong Kong) Limited

BIM PARTNER

Transcendence Company Limited

AUTODESK PRODUCTS USED

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Autodesk® AutoCAD®
Autodesk® BIM 360®
Autodesk® BIM Collaborate Pro
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Exterior render: overall HCRC architectural massing.
Image Courtesy of Architectural Services Department, the Government of the Hong Kong Special Administrative Region and P&T Architects Limited and China State Construction Engineering (Hong Kong) Limited

Project Background

The Heritage Conservation and Resource Centre (HCRC) is Hong Kong's first purpose-built centre that combines high-standard conservation and storage with publicly visible studios and educational interaction zones. The project is located on Tin Yip Road, Tin Shui Wai, with a site area of approximately 4,924 m^2 and a construction floor area of approximately 44,980 m^2. Scheduled for completion in Q1 2027, HCRC spans from design through construction and targets museum-grade environmental performance. BIM was adopted comprehensively across architecture, structure, building services, façade, foundation, utilities, lifts, quantity surveying, and project management. Its application covers multiple building lifecycle stages: design development, coordination, digital fabrication support (CSD/CBWD), 4D construction phasing, QA/QC and compliance checking, and handover-readiness for asset management. The project team features multi-disciplinary collaboration among P&T Architects Limited, China State Construction Engineering (Hong Kong) Limited, and the Architectural Services Department, supported by a structured BIM organisation of BIM Director/Manager, Project Director, discipline BIM coordinators (AR/BS/ST), site managers, engineers, QS, and off-site BIM modellers. A role-based Common Data Environment (CDE) underpins information governance and secure sharing among designers, contractors, specialist subcontractors (MEP, lift, façade), and AM/FM stakeholders.

Value and ROI of BIM

BIM delivered clear, measurable value. Collaboration on CDE shortened coordination cycles by more than 25%, while structured clash detection and coordinated issue resolution reduced RFIs and errors by over 30%. Automated documentation–such as

CSD/CBWD generation and tagging—cut drafting effort from days to 30–75 minutes, with 514 walls, 118 slabs, and 72 beams processed in under five minutes. Model-driven QTOs for concrete and link-bridge steel improved procurement accuracy and reduced waste and carbon. 4D phasing validated sequences, crane positions, and logistics, preventing time-based clashes and resequencing. Novel simulations for heritage bus loading confirmed clearances and turning radii, avoiding late-stage redesign and site disruption. OpenBIM QA/QC with IFC and BCF increased compliance, transparency, and auditability. Collectively, these outcomes translated into reduced rework, streamlined workflows, lower operational costs, and a stronger return on investment throughout design and construction.

Innovation Highlights

The HCRC showcases several industry-leading innovations. The "BIM Museum" automation performs autonomous room searching and equipment/furniture counting, outputting reports and 3D spatial visualizations. Tasks that previously took three days now complete in three minutes, enabling research-grade documentation and curation planning. Mixed Reality (MR) was used onsite to pinpoint air-leakage weak points—such as flange, sleeve, door, and window joints—linking field observations with BIM-based CFD studies to uphold stringent airtightness targets essential for conservation. A parametric façade workflow was introduced for documentation and coordination, with BMU access simulations detecting unreachable corners before construction and informing maintainability refinements. Together, these approaches extend BIM beyond geometry into intelligent analytics, environmental performance assurance, and lifecycle planning.

BIM Goals and Rationale

The project's BIM goals were tailored to its conservation mission. First, achieve museum-grade airtightness and environmental control to safeguard artefacts and collections. Second, de-risk the complex, non-orthogonal façade's constructability and long-term maintenance through parametric modelling and BMU access verification. Third, minimize rework and RFIs via robust clash detection, analytics, and digital-fabrication-ready documentation. Fourth, provide a single source of truth for multi-trade coordination, compliance, and eventual asset handover. These goals align with the Government's policy and standards and the project's need for repeatable, auditable processes across a large, highly specialized facility.

BIM Process and Workflow

BIM governance is anchored in a CDE with a clear hierarchy (WIP, Shared, Published, Archive, As-built) and strict model naming per DEVB BIM Harmonisation Guidelines (v2.1), enabling fast identification of discipline, version, and scope without opening files. Federation spans AR, BS, ST, façade, foundation, utilities, and lift models. Clash detections were conducted with issues synchronising back to issues tracking platforms with custom attributes (level, trade, priority, target date, RFI links). Weekly dashboards are generated by exporting issue logs and auto-refreshing visualizations, providing a single source of truth for open/closed status, age, zone, and trade—accelerating closure by about 30%. 4D simulations link the BIM model to the master programme to validate sequencing, site access, and logistics, including specialty heritage bus operations. Smart site management via the C-SMART Central Management Platform (4SLS) integrates IoT, AI, and wearables, while Open3Dhk and UUIS connect open city and underground utilities data for context-aware planning. DWSS digitizes RFIs, comments, approvals, and photo records for end-to-end supervision.

Standards, KPIs, and Performance

The project adheres to a comprehensive standards stack: DEVB BIM Harmonisation Guidelines for Works Departments (v2.1); ArchSD BIM Guides for Architecture, Structure, Building Services, Cost Estimation, and Facilities Upkeep (v2.0); EMSD BIM-AM Standards and Guidelines (2022, v3.0); LandsD BIM–GIS Integration Guidelines (June 2023); and CIC BIM Standards – General (2024). Performance is tracked through KPIs including more than 25% time savings in coordination, over 30% reduction in RFIs and errors, validated airtightness via BIM-based CFD analyses, and quantified reductions in waste and carbon. OpenBIM Quality Platform with IFC-based rule checks and BCF-linked issues ensures compliance and creates a transparent audit trail across software ecosystems, supporting lifecycle management and handover readiness.

Challenges and Continuous Improvement

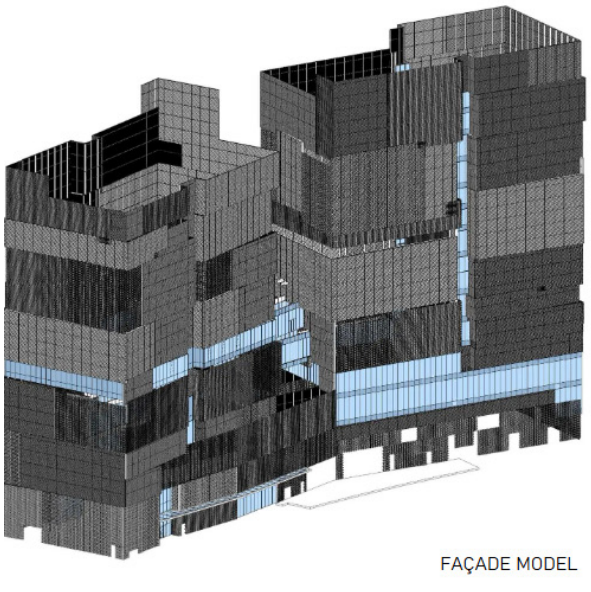
Two primary challenges shaped the BIM strategy. First, coordinating an irregular, non-vertical façade with reliable BMU access demanded parametric integration and early simulation to detect unreachable corners, leading to design refinements that improve long-term maintainability. Second, ensuring airtightness across a large inventory of specialized rooms required meticulous attention to joint types and workmanship. The team leveraged MR for onsite visualization, tied findings to CFD results, and implemented targeted detailing to reduce leakage risk. Looking forward, the project identifies pathways for improvement: more automated optimization and AI-generated design, stronger links to digital fabrication and DfMA, and continued enhancement of QA/QC rule sets to further reduce cycle time and manual effort.

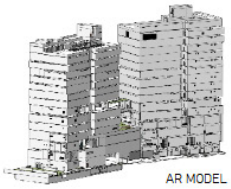
From Traditional to BIM-Enhanced Practice

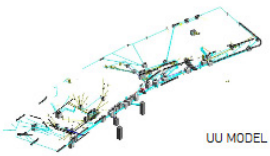
Traditional delivery relied on 2D coordination, manual counts for equipment/furniture, email-based RFI trails, and late-stage clash discovery—often causing rework and delays. The BIM-enhanced approach replaces these pain points with federated models and structured clash-to-closure workflows, API-driven documentation for CSD/CBWD and tagging, and autonomous asset analytics that produce instant Excel outputs and 3D spatial maps. 4D simulations validate sequencing and logistics in advance; MR brings field QA into the digital loop for airtightness; OpenBIM QA/QC ensures cross-platform compliance; and DWSS centralizes site supervision and approvals. The net effect is a faster, more reliable, and auditable delivery process that aligns with strict public works standards and museum-grade performance requirements.

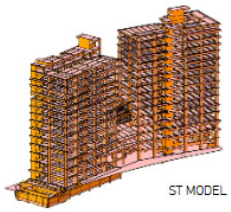
Intelligent Workflows to Share with the Industry

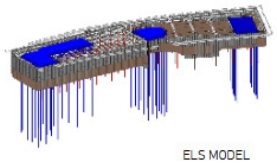
HCRC offers several replicable, high-impact workflows. The Autonomous "BIM Museum" shows how multi-platform scripting can transform room-based asset discovery and reporting, cutting effort from days to minutes and elevating data fidelity for curation and O&M planning. The airtightness-by-design framework integrates BIM-based CFD with MR-enabled field verification, providing a practical playbook for archives, labs, and healthcare environments that demand stable environmental conditions. The parametric façade pipeline balances design freedom with BIM compliance and maintainability checks. OpenBIM quality control, grounded in IFC and BCF, demonstrates how to standardize QA/QC across vendors and disciplines. Finally, API-driven documentation exemplifies how targeted automation can drastically reduce drafting cycles while improving clarity for site installation. These methods, combined with 4D phasing and specialty logistics simulations, offer a robust template for complex cultural and conservation-led projects.

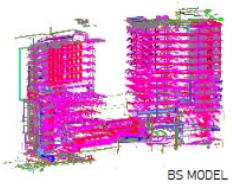


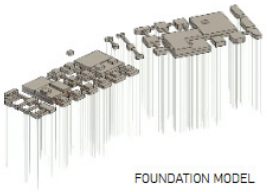




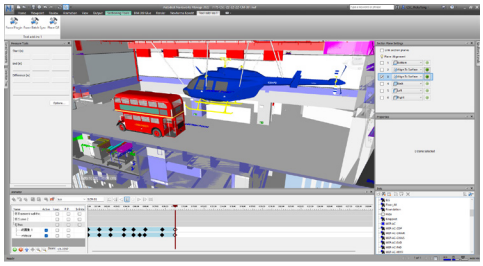






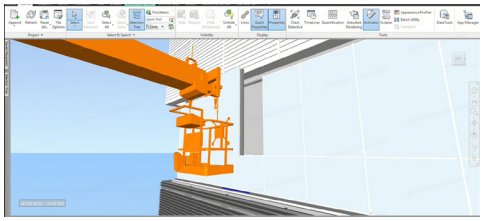


Federated AR/ST/BS model for coordination.
Image Courtesy of Architectural Services Department, the Government of the Hong Kong Special Administrative Region and P&T Architects Limited and China State Construction Engineering (Hong Kong) Limited



4D simulation: heritage bus logistics and clearances.
Image Courtesy of Architectural Services Department, the Government of the Hong Kong Special Administrative Region and P&T Architects Limited and China State Construction Engineering (Hong Kong) Limited

Mixed Reality airtightness review using HoloLens.
Image Courtesy of Architectural Services Department, the Government of the Hong Kong Special Administrative Region and P&T Architects Limited and China State Construction Engineering (Hong Kong) Limited



façade installation simulation for constructability.
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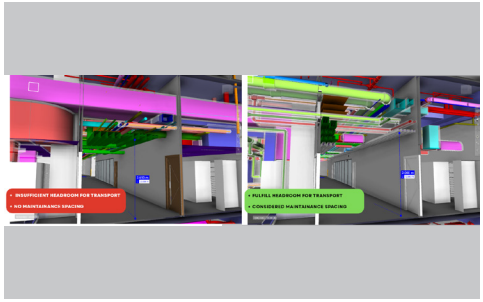

MEP coordination: clash detection and resolution in BIM.
Image Courtesy of Architectural Services Department, the Government of the Hong Kong Special Administrative Region and P&T Architects Limited and China State Construction Engineering (Hong Kong) Limited

openBIM with Open3Dhk: site context integration.
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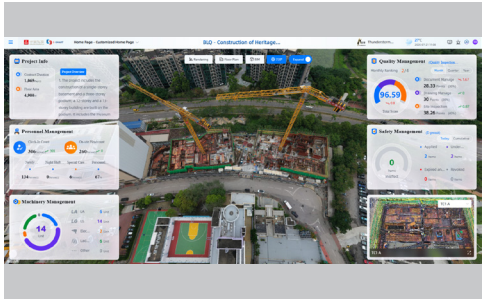

C Smart CMP: smart site safety management platform.
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