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Development Bureau  
Technical Circular (Works) No. 9/2019

Adoption of Building Information Modelling  
for Capital Works Projects in Hong Kong

**Scope**

This Circular sets out the policy and requirements on the adoption of Building Information Modelling (BIM) technology.

2. This Circular applies to works either by government staff, consultants or contractors.

**Effective Date**

3. This Circular takes effect on **1 January 2020**.

**Effect on Existing Circulars and Circular Memoranda**

4. This Circular supersedes DEVB TC(W) No. 18/2018.

## **Background**

5. In its meeting in April 2013, Works Policies Coordination Committee (WPCC) endorsed the proposal to adopt an incremental strategy in using BIM technology in public works projects. Pilot projects with relatively complex building and/or structural works, and of different nature (such as water/sewage treatment plant, various building projects, etc.) were selected for trial with a view to obtaining more information on the performance of the technology in public works projects in various aspects.

6. In 2014, WPCC endorsed the proposal to promote wider use of BIM technology in different stages of public works projects of any nature, scale or complexity and explore the use of BIM technology for asset management so as to enable staff of Works Departments (WDs) from senior management to frontline staff to appreciate the benefits of the technology and acquire the hands-on experience.

7. Under the endorsed proposal, WDs should continue to provide training to their staff from introductory level to advanced level for the smooth delivery of pilot projects and to establish a pool of colleagues capable of building up and administering BIM models.

8. The Government is firmly committed to the promotion and adoption of BIM technology in capital works projects with a view to enhancing the design, construction, project management, asset management and improving the overall productivity of the construction industry. In this connection, DEVB TC(W) No. 7/2017 was issued to require consultants and contractors to use this modelling technology when undertaking design of major government capital works projects from 2018 onwards. Subsequently, DEVB TC(W) No. 18/2018 was also issued to mandate some BIM uses relating to construction planning (4-D) and cost estimation (5-D) so as to promote adoption of BIM technology in public works projects.

9. Superseding DEVB TC(W) No. 18/2018, this Circular enhances the implementation requirements for BIM adoption in response to WDs' feedback and extends the scope of mandatory BIM uses to certain applications in investigation, feasibility and planning stage, design for digital fabrication as well

as sustainability evaluation (6-D) so as to further foster adoption of BIM technology in public works projects.

## **Policy**

10. Capital works projects with project estimates more than **\$30 Million**<sup>1</sup> shall use BIM technology. The policy is applicable to projects in the investigation, feasibility, planning, design or construction stages in the Capital Works Programme irrespective of the modes of delivery as detailed in the ensuing paragraphs. For entrustment works, sub-vented capital works projects and works that are undertaken by private parties but will be handed back to the Government for maintenance, the BIM adoption policy is covered in paragraph 16.

## **BIM Adoption for Government Projects**

### Investigation, Feasibility and Planning Stage

11. Sometimes a detailed information model may not be required at the early stage of a project or has little reference value at subsequent stages. Thus, the use of BIM technology is optional for projects during the stage of preparing Technical Feasibility Statement (TFS). However, WDs should adopt mandatory BIM uses in certain applications in the investigation, feasibility and planning stage after TFS has been approved in accordance with the Financial Circular No. 7/2017.

### Design Stage

12. The use of BIM technology is mandatory for all projects to be designed under Design and Construction consultancy agreements (DC) or Investigation, Design and Construction consultancy agreements (IDC) and all in-house projects.

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<sup>1</sup> Project estimate data recorded in the FSTB Capital Works Expenditure database.

### Construction Stage

13. All tenders for construction contracts are required to use BIM technology. For contracts that do not adopt BIM technology in the design, the use of BIM technology shall at least cover the requirement for an as-built BIM model.

14. For the avoidance of doubt, this requirement applies also to Design-Build and Design-Build-Operate projects.

### **Asset Management**

15. In addition to enhancing productivity and reducing risks and costs of our capital works projects, BIM technology can also optimize operation and maintenance. The development of this branch of the technology is fast and handover of information models for operation and maintenance should become standard practice. WDs should critically review their departmental asset management strategy in order to leverage the technology to enter into the digital built environment. Besides, BIM models contain rich information of built assets which can facilitate the integration between BIM and GIS as well as the development of Common Spatial Data Infrastructure (CSDI). Therefore, WDs should provide their as-built BIM models to LandsD as far as practicable to facilitate the development of BIM data repository of Hong Kong.

### **BIM Adoption for Entrustment Projects, Sub-vented Projects and Private Projects to be Handed Over to Government**

16. This BIM adoption policy is also applicable to entrusted project within Government departments. For projects entrusted to organizations outside Government (Airport Authority, MTR Corporation Limited, private developers, etc.), sub-vented projects and private projects to be handed over to the Government, the scope of BIM implementation should be aligned with the BIM adoption/implementation policy of the organisations. However, WDs shall encourage these organizations to use BIM technology as far as practicable.

## **Mandatory BIM Uses**

17. A number of mature BIM uses have been identified and a list of mandatory and optional BIM uses in **Annex 1** should be implemented in capital works projects. To keep up with the fast BIM technology development, the BIM uses in works projects will be reviewed and updated from time to time.

## **Exemption**

18. On exceptional grounds such as serious contractual implications, substantial impact on project delivery or projects of little technical content<sup>2</sup>, the Heads of WDs may exempt the adoption of BIM technology or part of mandatory BIM uses as required under this Circular. WDs shall appropriately keep records on such decision and inform the DEVB of the approvals for exemptions with detailed justifications.

## **BIM Software**

19. Specific brand names and models of BIM software shall not be stated in tender specifications of consultancy studies and works tenders. Notwithstanding considerations on compatibility, product makes and models should not be specified. WDs shall ensure that tender specifications must be performance and function based.

## **Production of Two-Dimensional Drawings**

20. The industry used to adopt two-dimensional (2D) Computer Aided Drafting (CAD) drawings and WDs have been following the “CAD Standard for Works Projects (CSWP)” for 2D CAD drawings. For BIM projects, 2D drawings shall be generated from the 3D BIM model. WDs and their engaged consultants/contractors shall cease producing 2D drawings by other platforms if

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<sup>2</sup> Project’s main scope of works has little technical content such as operation of public fill banks, paving and painting works, slope maintenance works, greening works, maintenance works under term contracts and procurement of vehicles.

those drawings can be generated from the 3D BIM model. 2D drawings which are generated from the 3D BIM model need not follow CSWP.

### **Contractual Requirements**

21. Contractual provisions adopted in pilot projects may continue to be used until advised otherwise. To cater for cases where small consultant or contractor firms may not be very well equipped with BIM expertise, provisions will be stipulated in the agreement or contract allowing the consultant or contractor to engage BIM sub-consultant or sub-contractor to assist them. The agreement or contract shall also contain terms requiring the consultant or contractor to train up a number of staff of the employer/their staff and their sub-consultant/sub-contractor staff. Sample provisions for the training requirements are enclosed in **Annex 2** for reference.

### **Construction Innovation and Technology Fund (CITF)**

22. The Government launched the CITF in October 2018, which provides financial assistance to the local construction industry on, among others, BIM training and procurement of BIM software and hardware for experiential use and project adoption of BIM technology. WDs should encourage their engaged consultants/contractors and sub-consultants/sub-contractors to apply for the CITF.

### **Enquiries**

23. Enquiries on this Circular should be addressed to Chief Assistant Secretary (Works) 4.

**( LAM Sai-hung )**  
**Permanent Secretary for Development (Works)**

**BIM Uses**

1. Works Departments shall adopt the stipulated mandatory BIM uses in respective stages of a project. Works Departments may adopt the optional BIM uses when necessary.

|    | <b>BIM Use</b>                          | <b>Investigation,<br/>Feasibility<br/>and Planning</b> | <b>Design</b>        | <b>Construction</b>  |
|----|-----------------------------------------|--------------------------------------------------------|----------------------|----------------------|
| 1  | Design Authoring                        | <u>M<sup>h</sup></u>                                   | M                    | M                    |
| 2  | Design Reviews                          | <u>M<sup>h</sup></u>                                   | M                    | M                    |
| 3  | Existing Conditions Modelling           | <u>M<sup>i</sup></u>                                   | M                    | M                    |
| 4  | Site Analysis                           | <u>M<sup>i</sup></u>                                   | M                    |                      |
| 5  | 3D Coordination                         |                                                        | M                    | M                    |
| 6  | Cost Estimation                         | O                                                      | M <sup>a</sup>       | M <sup>b</sup>       |
| 7  | Engineering Analysis                    |                                                        | O                    | O                    |
| 8  | Facility Energy Analysis                |                                                        | O                    | O                    |
| 9  | Sustainability Evaluation               | O                                                      | <u>M<sup>j</sup></u> | <u>M<sup>j</sup></u> |
| 10 | Space Programming                       | O                                                      | M <sup>c</sup>       |                      |
| 11 | Phase Planning (4D Modelling)           |                                                        | M <sup>d</sup>       | M                    |
| 12 | Digital Fabrication                     |                                                        | <u>M<sup>k</sup></u> | M <sup>e</sup>       |
| 13 | Site Utilization Planning               |                                                        |                      | M <sup>f</sup>       |
| 14 | 3D Control and Planning                 |                                                        |                      | O                    |
| 15 | As-Built Modelling                      |                                                        |                      | M                    |
| 16 | Project Systems Analysis                |                                                        |                      | O                    |
| 17 | Maintenance Scheduling                  |                                                        |                      | M <sup>g</sup>       |
| 18 | Space Management and Tracking           |                                                        |                      | O                    |
| 19 | Asset Management                        |                                                        |                      | O                    |
| 20 | Drawing Generation (Drawing Production) |                                                        | M                    | M                    |

Legend:

M – Mandatory BIM Use for the mentioned stage, including that carried forward from previous stage. The underlined items are new mandatory BIM uses.

O – Optional BIM Use

Notes:

- a. Mandatory for project cost budgeting, project cost control and cost evaluation on design options, etc. at design stage as far as practicable.
- b. Mandatory for project cost control, cost evaluation on variation of works, cash flow/spending analysis, etc. at construction stage as far as practicable.
- c. Mandatory for checking client spatial requirements such as compliance with the approved schedule of accommodations, reference plot ratio for building projects and site coverage of greenery for building projects, or other spatial requirements relevant to building/civil projects as considered appropriate.
- d. Mandatory for the construction activities with very high to extreme risk level identified from the Systematic Risk Management (SRM) according to ETWB TC(W) No. 6/2005 or other activities as considered appropriate at design stage.
- e. Mandatory for digitalizing the construction details in the BIM model for mass customized components such as metal cladding, acoustic panels, building façade panels, ceiling panels, acoustic barriers, metal structural members, etc. which are of large quantities and variety in dimensions, shapes, geometries, etc. and modular construction units<sup>3</sup>.
- f. Mandatory for the construction activities with very high to extreme risk level identified from the SRM according to ETWB TC(W) No. 6/2005 or other activities as considered appropriate at construction stage.
- g. Mandatory for providing maintenance attributes for facility structures, fabrics and equipment in the as-built models as considered appropriate.
- h. Mandatory for developing/reviewing digital 3D design scheme for a new construction project after TFS has been approved by the WB of DEVB.
- i. Mandatory for collecting sufficient and necessary existing site conditions as far as practicable to develop the design scheme and conduct the site analysis for new construction projects.
- j. Mandatory for building projects which aim to obtain the Gold or above rating of “BEAM Plus NB 2.0” certification with credit(s) for “BIM Integration”.
- k. Mandatory for modular construction units including those for MiC, DfMA, prefabrication of BS/MEP installations as appropriate.

2. Explanations of each of the above BIM use shall be referred to the latest version of the BIM Standard(s) of the Construction Industry Council.

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<sup>3</sup> Modular construction units refer to construction units which are modularized in the design, integrated with all construction components/elements as far as practical, constructed in either off-site or on-site prefabrication yards and then delivered to the site for installation/fixing.

3. The additional mandatory BIM uses as underlined in the above table shall be adopted for all T&F proposals or construction works tenders to be invited on or after 1 January 2020.

**Organization, Training and Sub-contracting Requirements**

**BIM Team Structure**

The Consultant/Contractor\* shall propose and establish a BIM team that are appropriate for the scale and complexity of the Assignment/Contract\*, highlighting key roles and responsibilities of each position, within [14]<sup>#</sup> calendar days after commencement of Assignment/Contract\*. The team shall be led by a BIM Team Leader who holds a key position in the Consultant/Contractor's\* project team structure. The BIM team shall include sufficient and technically competent resources in order to complete all BIM tasks and deliverables specified in the Assignment/Contract\*. Notwithstanding, the BIM team shall comprise at least [3]<sup>#</sup> personnel well trained in relevant disciplines. These personnel shall have qualifications as follows:

(a) BIM Team Leader

- (i) shall either have corporate membership of an appropriate professional institution or shall have a minimum of five years relevant post-qualification experience plus university degree or equivalent in an appropriate engineering or construction-related discipline; and
- (ii) shall have a minimum of three years of practical experience in management of BIM projects.

OR

shall be a CIC-Certified BIM Manager (CCBM)

(b) BIM Coordinator

- (i) shall have a minimum of three years related construction project experience; and
- (ii) shall have a minimum of one year practical experience in BIM projects..

The BIM Team Leader shall be responsible for the overall BIM managements and process controls. The BIM Team Leader shall delegate BIM Coordinator(s) for handling BIM tasks such as BIM modelling, collaborate information exchange amongst related stakeholders and maintain a drawing/information register to record the information to be incorporated in the model(s).

For any proposed staff movement or change in the BIM team, the Consultant/Contractor\* shall provide a CV of the replacement personnel together with evidence of equivalent BIM competency to the Director/Engineer/Supervising Officer\* within [7]<sup>#</sup> calendar days for approval.

### **BIM Sub-Consultant/Sub-Contractor\***

If the Consultant/Contractor\* does not have the necessary expertise, the Consultant/Contractor\* shall engage a sub-consultant/sub-contractor\* with suitable expertise for the performance of BIM related tasks. If the Consultant/Contractor\* intends to or is required to sub-contracts the BIM works to a BIM sub-consultant/sub-contractor\*, the Consultant/Contractor\* shall obtain approval from the Director/Engineer/Supervising Officer\* before formal engagement and shall indicate this clearly in the project team structure. The positions of the staff members from the BIM sub-consultant/sub-contractor\* shall also be indicated clearly in the BIM team organisation structure.

### **BIM Training Requirements**

The Consultant/Contractor\* is required to nominate his staff or sub-consultant/sub-contractor\*'s staff to attend, within [6]<sup>#</sup> months from the commencement of the Assignment/Contract\*, suitable BIM skill training courses under the pre-approved list of the CITF managed by the CIC and ensure their successful completion of the attended training courses:

- [4]<sup>#</sup> staff members for the Consultant/Contractor\* and
- [4]<sup>#</sup> staff members for the engaged sub-consultant(s)/sub-contractor(s).

\* Delete as appropriate

# The number is for reference only and should be suitably determined by the WD according to the nature, scale, complexity, mode of project delivery, number of consultant/contractor/sub-consultant/sub-contractor involved, etc. of the project.