

Alberta Infrastructure

Digital Project Delivery

Building Information Modelling

Design-Builder Requirements



Infrastructure

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Building Information Modelling Objective

The Province's objective for the use of Building Information Modelling (BIM) is to deliver higher value in quality, timeliness, cost, and a useable product for Facility Management (FM) at the end of the project construction lifecycle. While the objective of BIM is to have information contained in a model, the asset information associated to elements in a Record Model a contained in the COBie file.

1. BIM Manager

- .1 The Design-Builder shall designate one individual, the BIM Manager, who is accountable to the Province for:
 - .1 Ensuring compliance with the Province’s BIM Design-Builder Requirements.
 - .2 Coordinating and attending the BIM kick-off meeting with the Province within two (2) weeks of project award.
 - .3 Developing, maintaining, updating, distributing, and providing clarifications to the BIM Execution Plan (BEP).
 - .4 Facilitating the implementation of BIM procedures as detailed in the BEP and ensuring the reliability of information in the Design-Builder’s deliverables.
 - .5 Creating the Record Model by coordinating updates to the Design Models.
 - .6 Leading and facilitating all BIM project meetings with project team members, including the Province.
 - .7 Executing quality control (QC) processes for proper modeling, standards adherence and classification of all required elements.

2. BIM Execution Plan (BEP)

- .1 The BEP is a process management document created by the Design-Builder in consultation with the Province. The BEP shall define how the Design-Builder teams use BIM to meet the Province’s Requirements. The Design-Builder shall:
 - .1 Use the BEP template (GOA-AI-TSB-SPE_BEP_Template) provided by the Province as the basis for the BEP, with additional modifications according to the needs of the Design-Builder.
 - .2 Submit the BEP to the Province within 30 days following project award for review and confirmation of acceptance.
 - .3 Resubmit the BEP to the Province for review and confirmation of acceptance whenever it is revised.

3. Model Requirements

3.1 General

- .1 All elements within the scope of work shall be modelled at a Level of Development (LOD) defined by the Design-Builder in the BEP.
- .2 All schedules, detailing, and annotations shall be created natively in the model authoring software. Dimensions shall not be overridden.
- .3 All existing conditions for renovation or retrofit projects shall be modeled and include all disciplines affected by the proposed work.

3.2 BIM Software

- .1 The Province is vendor neutral regarding the use of specific model authoring software. Model authoring software shall:
 - .1 Support the most current ISO 16739 standard (Industry Foundation Classes (IFC) for data sharing in the construction and FM industries).
 - .2 Have parametric modelling capabilities.
 - .3 Be used as intended. All elements shall be modeled or created using the tool within the software that is designated for that specific element or purpose.

3.3 Level of Development

- .1 The Design-Builder shall develop a project specific LOD matrix that includes:
 - .1 Element geometry at all project phases.
 - .2 Element data at all project phases.
 - .3 Element tolerances for the Record Model.
 - .4 Assignment of responsibility for elements.
- .2 The LOD defined for each project design phase shall effectively communicate design intent.

3.4 Geo-referencing

- .1 All models shall be referenced to one of the following coordinate systems:
 - .1 NAD83 3TM 114 for projects in Edmonton and Calgary.
 - .2 NAD83 10TM 115 for projects in the remainder of Alberta.
- .2 All buildings shall have a project base point (defined origin 0,0,0) and be related to a survey point (such as a geodetic survey marker).
- .3 All elements shall be modeled at true scale and at true elevation above sea level.
- .4 All elements shall be oriented in accordance with the geographical north orientation (true north).

3.5 Rooms and Spaces

- .1 All rooms and spaces shall be generated with the appropriate tool and associated with bounding elements.
- .2 There shall be no space gaps in the model.
- .3 Bounding boxes shall be used to represent rooms and spaces.
- .4 Project rooms and spaces shall be named and numbered consistently across all models.
- .5 All rooms and spaces shall be classified according to the Province's Asset Classification Standard.
- .6 Any exceptions to the above shall be outlined and justified in the BEP.

3.6 Model Structure

- .1 Models shall be separated by discipline. Each discipline model shall contain the elements that relate to their discipline’s design.
- .2 Model divisions shall be documented in the BEP.
- .3 Elements shall not be duplicated across discipline models.

3.7 Mechanical, Electrical, Plumbing (MEP) Systems

- .1 The model shall be structured such that any individual MEP System and all its elements are connected and can be traced and isolated throughout the facility.
- .2 The systems list shall be agreed upon by the Design-Builder and the Province and documented in the BEP.

3.8 Element Properties

- .1 All elements shall be assigned the correct categorization. Exceptions to element categories based on software limitations shall be outlined in the BEP.
- .2 All elements shall be classified in accordance with the Province’s Asset Classification Standard. There shall be no exceptions to element classifications.
- .3 Schedules shall be derived from the properties of the model and remain unaltered. Schedules shall not be augmented with unconnected data.
- .4 Element properties shall be populated with accurate information of the specified or designed assets.
- .5 Additional element properties shall include the following properties as listed in Table 1:

Table 1: Additional Element Property Classifications

Property	Definition	Applies to
AI_Type_Class	Defines the Province’s classification of asset types	COBie assets
AI_System_Class	Defines the Province’s classification of Systems	All elements
AI_Space_Class	Defines the Province’s classification of spaces and rooms	Spaces and rooms

3.9 Coordination

- .1 The Design-Builder shall use the models to perform spatial coordination and interference checks at all design and construction phases.
- .2 Define the coordination and interference review process in the BEP.

3.10 Record Modelling

- .1 The Design-Builder is not required to migrate asset data contained in the Construction Operations Building information exchange (COBie) file to the Record Model.
- .2 The Design-Builder shall update the model geometry throughout the construction phase of the project to reflect approved project changes, including:
 - .1 Project change orders.
 - .2 Site instructions.
 - .3 RFI responses and clarifications.
 - .4 Shop drawings.
 - .5 As-Built Drawings.
- .3 The Design-Builder shall provide evidence of updates to the design model to the Province upon request.
- .4 The Record Model shall contain the accurate representation of all assets included in the COBie File, including:
 - .1 The as-built quantity and size
 - .2 The actual orientation, location, elevation, and routing of major services
 - .3 The connection to the appropriate system in the model as per the As-Built drawings
- .5 The LOD for the Record Model shall, at a minimum, be equivalent to the LOD specified at final design phase.
- .6 The Record Model shall not include the original manufacturer's data parameters.
- .7 All views and sheets produced to create contract drawings for the project shall remain in the model.
- .8 The Record Model shall be submitted within 30 days of project Substantial Performance.
- .9 The Record Model shall be submitted within one version year of the current model authoring software release.
- .10 The Design-Builder shall update the COBie file, provided by the Province, with a unique element identifier from the model as per the Province's COBie Requirements.
- .11 The Design-Builder shall submit the updated Record COBie file at Substantial Performance.

4. Model Availability

- .1 The Design-Builder shall submit all project models, including Construction Models (if available) to the Province at a frequency defined in the BEP.

5. Delivery Requirements

5.1 Model Delivery

- .1 All model files shall be delivered in the native model authoring format at the designated project phases documented in the BEP.

- .2 The Design-Builder shall deliver an IFC (2x3 coordination view V2.0) file to the Province upon request.
- .3 The model delivery package shall include:
 - .1 A Model Submittal Report (the Province shall provide Model Submittal Report Template).
 - .2 All model files.
 - .3 All linked/referenced files.
 - .4 Any additional setting file that is necessary to extract or print any information from the model.
- .4 All models delivered at designated project phases shall be cleaned of extraneous working material before being delivered. This extraneous material may include:
 - .1 Abandoned design.
 - .2 Unused elements.
 - .3 Empty layers.
 - .4 Inaccurate content which may be produced in BIM production.

5.2 Drawing Delivery

- .1 All drawing submissions shall be produced directly from the model authoring software.
- .2 All drawings shall be contained in the model and display all views, model elements, schedules, and annotations used to produce the drawings.