

Digital Project Delivery

Alberta Infrastructure Building Information Modelling Consultant Requirements

Change History

Date	Version	Description
March 2018	V1.0	First Release
March 2020	V2.0	Minor revisions/clarifications to the following: Change History, Related Requirements, 2.0 BIM Meetings, 5.0 Quality Control, 6.0 BIM Submittals

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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 is contained in the COBie file.

Related Requirements

Alberta Infrastructure's COBie Requirements

Alberta Infrastructure's BIM Execution Plan Template

1. BIM Manager

- .1 The Consultant shall designate one individual, the BIM Manager, who will act as the single point of contact to the Province for the BIM submittals.
- .2 The BIM Manager shall be accountable for:
 - .1 Ensuring compliance with the Province's BIM Consultant Requirements.
 - .2 Coordinating and facilitating all project BIM meetings with the Province.
 - .3 Developing, maintaining, updating, distributing, and providing clarifications to the BIM Execution Plan (BEP).
 - .4 Executing the BIM procedures as detailed in the BEP and ensuring the reliability of information in the Consultant's deliverables.
 - .5 Executing quality control (QC) processes for proper modeling, standards adherence, and classification of all required elements.
 - .6 Creating the Record Model by coordinating updates to the Design Models.

2. BIM Meetings

- .1 The Consultant shall hold one BIM kickoff meeting within two (2) weeks of project award.
- .2 The Consultant shall lead and facilitate recurring BIM project meetings with project team members, including the Province, at a frequency defined in the BEP.

3. BIM Execution Plan (BEP)

- .1 The BEP is a process management document created by the Consultant in consultation with the Province. The Consultant 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 Consultant.

- .2 Revise BEP to reflect changes to the following:
 - .1 Roles and Staffing
 - .2 Collaboration Procedures
 - .3 Quality Control and Quality Assurance
 - .4 Level of Development
 - .5 MEP Systems
 - .6 Technology Infrastructure
 - .7 Model Organization
 - .8 Interference check process
 - .9 Delivery and Updates
 - .10 Requested Exceptions
- .3 Deliver the AEP to the Province in accordance with Section 6 *BIM Submittals*.
- .4 Resubmit the BEP to the Province following any revisions for review and confirmation of acceptance.

4. Model Requirements

4.1 General

- .1 The International System of Units (S.I.) shall be used in all models. The unit for linear dimensioning is the millimetre, except where the scope requires the use of the metre, such as in site plans. Integers shall indicate millimetres. Decimal numbers with three decimal places shall indicate metres.
- .2 Models and elements shall use English as the default language.
- .3 All elements within the scope of work shall be modelled at a Level of Development (LOD) defined by the Consultant in the BEP.
- .4 All schedules, detailing, and annotations shall be created natively in the model authoring software. Dimensions shall not be overridden.
- .5 All drawings shall be produced directly from the model authoring software.
- .6 All drawings shall be contained in the model and display all views, model elements, schedules, and annotations used to produce the drawings.
- .7 All existing conditions for renovation or retrofit projects shall be modeled and include all disciplines affected by the proposed work.
- .8 Elements shall not be duplicated across discipline models. Any exceptions shall be outlined and justified in the BEP.

4.2 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.

4.3 Level of Development

- .1 The Consultant 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.

4.4 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).

4.5 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.

4.6 Model Structure

- .1 Models shall be separated by discipline. Each discipline model shall contain the elements that relate to their discipline's design. Exceptions to model structure shall be outlined in the BEP.
- .2 Model divisions shall be documented in the BEP.

4.7 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 Consultant and the Province and documented in the BEP.

4.8 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 Project Asset Classification Standards, provided by the Province. There shall be no exceptions to element classifications.
- .3 Schedules shall be derived from the properties of the model and remain unaltered.
- .4 Schedules shall not be augmented with unconnected data.
- .5 Element properties shall be populated with accurate information of the specified or designed assets.
- .6 Custom element properties and their uses shall be listed in the BEP.
- .7 Additional element properties shall include those 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

4.9 Coordination

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

4.10 Record Modelling

- .1 The Consultant is not required to migrate asset data contained in the Construction Operations Building information exchange (COBie) file to the Record Model.
- .2 The Consultant 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 Consultant shall provide evidence of updates to the design model to the Province upon request.
- .4 The Record Model shall contain:
 - .1 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
 - .3 Connections to the appropriate systems.
 - .2 Routing of major services.
- .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 one version year of the current model authoring software release and in accordance with Section 6 *BIM Submittals*.

5. Quality Control

- .1 The Consultant shall:
 - .1 Preform quality control procedures, as defined in the BEP, prior to every model submission to the Province.
 - .2 Use the Model Compliance Form Template, provided by the Province, as the basis for the quality control, with additional modifications according to the needs of the Consultant.
 - .3 Submit the Model Compliance Form to the Province in accordance with Section 6 *BIM Submittals*.

6. BIM Submittals

6.1 General

- .1 All BIM submittal files shall be named in accordance with the Project Codification Standard provided by the Province.
- .2 All model files shall be delivered to the Province in the native model authoring format.
- .3 All models delivered to the Province 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.
- .4 The Consultant shall deliver an IFC (2x3 coordination view V2.0) file to the Province upon request.

6.2 Progress Model Submittals

- .1 The Consultant shall provide the following submittals to the Province at a frequency defined in the BEP:
 - .1 Updates to the BEP in accordance with Section 3 *BIM Execution Plan*.
 - .2 Updates to all project model files in accordance with Section 4 *Model Requirements*.
- .2 The Consultant shall provide additional progress model submission files to the Province upon request.

6.3 Formal Model Submittals

- .1 The Consultant shall submit:

- .1 The BEP to the Province within 30 days following project award for review and confirmation of acceptance.
 - .2 The final Record Model, in accordance with Section 4.10 *Record Modelling*, within 30 days of receipt of final As-Built Drawings.
- .2 The Consultant shall submit formal Model Submittal Packages at the designated project phases defined in the BEP.
- .3 Formal Model Submittal Packages shall include:
 - .1 All project model files, in accordance with Section 4 *Model Requirements*.
 - .2 A completed model compliance report in accordance with Section 5 *Quality Control*.
 - .3 The current version of BEP, in accordance with Section 3 *BIM Execution Plan*.
 - .4 All linked/referenced files.
 - .5 Any additional setting file that is necessary to extract or print any information from the model.