

Queen's  
UNIVERSITY

**BIM EXECUTION PLAN**

**Queen's University**

June 2023

## BIM EXECUTION PLAN AGREEMENT

The Prime Consultant hereby agrees to the adoption of this BIM Execution Plan (BxP found at: <https://www.queensu.ca/facilities/building-design-standards>) by affixing their signature below. They are also committed to deploying the BIM approach, and ensuring adherence by stakeholders, in the start-up, planning, and implementation phases of the project.

Name	Title	Signature	Date
	Prime Consultant		

### BIM Execution Plan Highlights

- Project Shall be managed in Queen's Autodesk Construction Cloud
- Revit models shall be hosted in Queen's Autodesk Construction Cloud
- Revit shall be used for energy simulations. Energy simulation submissions shall be included in, but are not limited to, the 33%, 66%, and 99% design submissions.
- Revit shall be used in conjunction with the Autodesk BIM Interoperability Tools add-in, specifically the Model Checker. Model Check results shall be included in, but are not limited to, the 33%, 66%, and 99% design submissions.
- An as built record Revit model shall be submitted at project closeout with an energy simulation and a 100% score on the Model Check.

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## Definitions

**Prime Consultant:** The consultant that is retained by Queen's for the provision of the main part of professional services and is responsible for the overall management and coordination of the consultant team.

**ACC:** Autodesk Construction Cloud, an online common data environment configured to host an ongoing project including working models, project documents, review workflows, Issues lists, and other functionalities.

**BTM:** BIM Tender Model; the model submitted for Tender to the Owner to be put out for bid.

**BIFCM:** BIM Issue for Construction Model; the model as it was submitted to the Owner for the Issue for Construction stage.

**BRM:** Building Information Model Record Model; the model as it was submitted to the Owner at the end of the project. To include all changes made during construction compared to the Issue for Construction model.

**BIM Native Format:** standard format for the designated BIM model authoring software to be used on the project. Eg. .rvt

**CDE:** Common Data Environment, such as Autodesk Construction Cloud.

**Autodesk Interoperability Tools:** A suite of tools available from Autodesk which includes the Model Checker to be used on this project.

**Model Checker:** Part of the Interoperability Tools in Revit. An xml file will be provided by Queen's University and is to be used to run checks on the Model at each submission throughout the project.

**High-Trust linking:** Project teams are linking directly to other teams' working models. This requires View permissions to the folders for users requiring access to link the models.

**Medium-Trust linking:** Project teams are linking to published models within the public Shared folder. No additional folder permissions are required.

**Low-Trust linking:** Project teams are linking to published & consumed models that are within their own teams Consumed folder. No additional folder permissions are required.

## PRESENTATION OF THE DOCUMENT

### 1.1. Purpose of the document

The intent of this BIM Execution Plan (hereinafter referred to as BxP), is to provide a framework that will accompany and guide designers, estimators, managers, and any other person affected by BIM for the duration of the project. This plan outlines the roles and responsibilities of each party, the detail, and scope of information to be shared, relevant business processes and supporting software.

In addition, this document will aim to:

- Standardize the BIM process
- Control the quality of deliverables as well as the review and approval process
- Ensure good BIM practices during the Project
- Define document exchange platforms and file formats
- Establish the frequency of exchanges / revisions
- Establish the principles of collaboration and coordination
- Identify the levels of development (LOD) of the models according to the phases
- Define modeling, scheduling, and estimation methods, processes, and tools

### 1.2. Data Utilization and Ownership

It is important to Queen's University (QU) to own, reuse, and properly manage building data throughout the facility lifecycle. QU places significant importance on the accurate creation, management, and stewardship of building information during the design and documentation process. The design process shall allow refinements during and after the construction process, with the goal of delivering project data in support of the owner, and utilization in facility management. QU shall have ownership of all CAD files, BIM Models, and Facility data developed for the Project. QU may make use of this data following any deliverable.

The authors of these models and their related data, referred to as the Model Element Authors (MEAs), agree to grant the use of their models for the purpose of designing, constructing, operating, maintaining, and performing other tasks stipulated or implied in the project contract to all project members.

### 1.3. Document Instructions & Applicability

The use of this BxP template is required for BIM utilization on all QU projects. The Project Team led by the Prime Consultant shall review this template and acknowledge the BIM project requirements herein.

### 1.4. Current BIM Status

At the outset of each project, QU will confirm the existence and status of the current building model available for all involved parties, including current model's software version. All parties must agree on software version for the project before starting.

### 1.5. Project Standards

All projects must adhere to current Queen's University Standards.

## 2. PROJECT INFORMATION

### 2.1. Project Description

All project specific information is to be obtained from the RFP.

### 2.2. Project Milestones/Phases

All project specific information is to be obtained from the RFP.

### 3. BIM OBJECTIVES and USES

#### 3.1. BIM objectives for the Project Team

Here are the BIM objectives we want to achieve for this project:

BIM OBJECTIVE		RESPONSIBILITY	OBJECTIVE MET IF...
Improve communication through use of standardized BIM software to present, review, track, and manage project data	OWNER	Provide and facilitate information and standards required by stakeholders	All stakeholders, within reason, have access to and understand use of provided platform.
	STAKEHOLDER	Utilise owner provided platform and standards to complete project.	All data and documentation can be traced to project start. Reports generated for records.
Achieve optimum, cost-efficient design solutions for building systems such as mechanical, electrical, and structural.	OWNER	Request and review building analysis reports and participate in decision making	Building performance analysis has been completed and coordination with responsible parties has led to design alterations based on data obtained.
	STAKEHOLDER	Complete analysis and provide reports to owner.	
Provide a thorough and concise description of the building through accurate and consistent documentation	OWNER	Provide clear requirements for all project phases and facilitate communication between responsible parties.	Documentation review demonstrates that adherence to standards laid out in contract documents and issues have been taken into consideration for future.
	STAKEHOLDER	Adhere to owner requirements and standards, meet deadlines	Deadlines have been met, standards for documentation have been followed and recorded, issues regarding standards have been raised for future improvement.
Accurate documentation of building systems and geometry for maintenance and operations of the facility	OWNER	Define parameters required for facility operations data	Record models obtained, with 100% as-managed components containing required parameters for operational management.
	STAKEHOLDER	Site measure existing elements, ensure all changes to original design are included in Record Model	



Use of Record Model to track, analyze, and report proposed and current use of space and related resources within facility	OWNER	Define information required for sufficient analysis of space and their uses	Record models obtained, (with 100% as-managed components verified within acceptable tolerance), available to be used for next project
	STAKEHOLDER	Ensure full BIM related area and space related meta-data is provide	Documentation provided related to area usage according to local standards, verified within acceptable tolerance.
Use of Record Drawings to enhance internal BIM data specific to QU	OWNER	Maintain BIM library and identify information to be added, improved, updated, or removed.	Interrogate and incorporate all Record Models and elements and document updates to library.
	STAKEHOLDER	Provide record models, include all changes to design intent and improve upon existing data.	Record models obtained, with 100% as-managed components verified within acceptable tolerance.

### 3.2. BIM Uses

BIM requirements defined below are for typical project setup and must be reviewed and discussed in relation to the current project. Alterations to the table below can be made if agreed upon by all parties in concert with the contract documents.

PLAN		DESIGN		CONSTRUCTION		OPERATE	
X	Programming	X	Design Authoring		Site usage planning		Building maintenance scheduling
	Site Analysis	X	Design Review	X	Construction system design		Building system analysis
X	Sustainability (LEED)	X	3D Coordination (clash)	X	3D Coordination (clash)	X	Asset management
X	3D Rendering at Feasibility Stage	X	Structural analysis		Digital Fabrication	X	Space management / tracking
		X	Lighting analysis	X	3D control and planning		Disaster planning
		X	Energy analysis	X	Record modeling	X	Record modeling
		X	Mechanical analysis				
			Other analysis				
		X	Sustainability (LEED)				
			Validation code	X	Drones and 3D scanning		
	Phase planning (4D)		Phase planning (4D)	X	Phase planning (4D)		Phase planning (4D)
X	Cost estimate	X	Cost estimate	X	Cost estimate		Cost estimate
	Existing conditions modeling		Existing conditions modeling		Existing conditions modeling	X	Existing conditions modeling

### 3.3. Energy Analysis Requirements

At a minimum all new projects will be required to provide energy analysis documentation in PDF format at 33%, 66% and 99% review submissions. Revit Annual Building Energy Simulation will be the standard requirement and any additional software used for analysis must be coordinated and confirmed with the Prime Consultant. Submission requirements for agreed upon additional software must be in PDF format.

Results of the analysis will be reviewed alongside the design. Online software within the AEC Collection, such as Insight, shall be used to review and inform design choices as necessary, with the goal being to design towards optimal energy performance.

Other analysis within Revit, such as Solar and Lighting, can be undertaken and results coordinated with the Prime Consultant as necessary.

## 4. INDIVIDUAL ROLES AND RESPONSIBILITIES

### 4.1. Table of responsibilities

Summary of the different levels of responsibility according to the roles.

	Direction					Management				Production		
	Support for the preparation of contractual documents	Research and development, Technology watch	Processes and procedures	Implementation and deployment	BIM Execution Plan	Project Review	Training	Model Coordination and Model Exchange	Model Review, Integrity	Content creation	Modeling	Deliverables
<b>BIM Director/Prime Consultant</b>												
<b>BIM Manager</b>												
<b>BIM Coordinator</b>												
<b>BIM Modeler</b>												

### 4.2. Organizational Roles

#### 4.2.1. Prime Consultant

**The Prime Consultant** is responsible for directing the project team's efforts and technologically overseeing the project. They will ensure compliance with the BIM Execution Plan is observed. The Prime Consultant must ensure that BIM objectives are met.

Here is the non-exhaustive list of responsibilities for Prime Consultant.

- Organize the BIM kick-off meeting focusing mainly on the BIM Execution Plan and is responsible for the schedule, meetings, and minutes of meetings, all of which are to be saved to the project folder on the Autodesk Construction Cloud (ACC).
- Organize BIM Coordination meetings if necessary, including all professionals.
- BIM Execution Plan
  - Implementation of the BxP, drafting, and updating
  - Chair and coordinate BxP meetings and take minutes.
  - Ensure that their team complies with the agreed upon BIM Execution Plan
- Ensure that BIM goals and objectives are met.
- Point of contact with Autodesk and other vendors, as needed, to facilitate the smooth running of the project.

- Monitor conflict resolution and interdisciplinary technical coordination under the responsibility of professionals.
- Participate in the multidisciplinary coordination of BIM processes and BxP.
- Identify the need for common interdisciplinary shared parameters.
- Follow up on interference reports with the team for possible corrections.
- Manage software, plug-ins, and service pack versions with the IT department and ensure that all stakeholders have the same version.
- Act as the main contact for BIM-related issues with all relevant project stakeholders and oversee collaboration between all stakeholders.
- Provide support to BIM Managers from a strategic point of view and act as the main contact for all stakeholders and manage BIM collaboration between them.
- Coordinate with the project team to ensure that final BIM model deliveries are complete and BxP compliant.
- Ensure installation and maintenance of computer equipment, both mobile and fixed, where applicable.
- Coordinate the delivery of the models of each stakeholder, especially those of the contractors and subcontractors, for their construction models and shop drawings and those that will follow.
- Track the exchange of models via the project CDE and track their progress, especially at the final handover and provisional acceptance.
- Track all issues in the Issues list of the ACC Docs module, and ensure open issues are closed by the end of the project.
- Review, correct, or delegate critical warnings to modelers.
- Identify the needs and actions required on the models and ensure their follow-up.
- Quality control and verification of project files.
- Check the level of development and control as defined for each phase of the project.
- Participate in design review and model coordination sessions.
- Verify that the models are properly organized in the document management system.
- Ensure that 2D documents extracted from the BIM models of their discipline comply with the requirements of this BxP.
- Defines the model Coordinates and is responsible for the discipline central file
- Validate 3D coordination by visual review and interference detection.
- Addition of information to the models provided for 4D and 5D analysis, to be determined during the construction phase with the General Contractor.
- Site Logistics (4D)
- Model-based quantification to estimate costs (5D)
- Control the creation of new models.
- Create federated models. (Federated models combine the working MEP, ARCH, etc. models into one model)

## 5. COLLABORATION

### 5.1. Meetings

Meetings for interdisciplinary BIM coordination are required and must be carried out throughout the duration of the project per the direction of the Prime Consultant. Refer to contract documents for required list of meetings. The Prime Consultant will act as a facilitator and is responsible for including appropriate BIM representation at all meetings. The presence of project managers may be relevant from time to time.

### 5.2. Collaboration Requirements

Standard model exchange will take place weekly on the ACC platform. Additional exchanges will be at the discretion of the Prime Consultant in cooperation with participating stakeholders (to be discussed at the first BxP meeting). Once the Subcontractors are involved, they will share their models/documentation via **Autodesk Construction Cloud (ACC)**.

When a team publishes a submission or coordination package, it is the responsibility of each other team to review and consume this package in a timely manner. All published models are available to all project stakeholders through the Shared folder. These models are for review and markup only. All versions are maintained on the platform and can be reviewed and compared at any time.

The Prime Consultant will be responsible for overseeing collaboration and resolving BIM related questions or issues as required.

Software version to be used on the project should be the most recent and must be agreed upon prior to documentation start. Use of alternate versions will be at the discretion of the Prime Consultant.

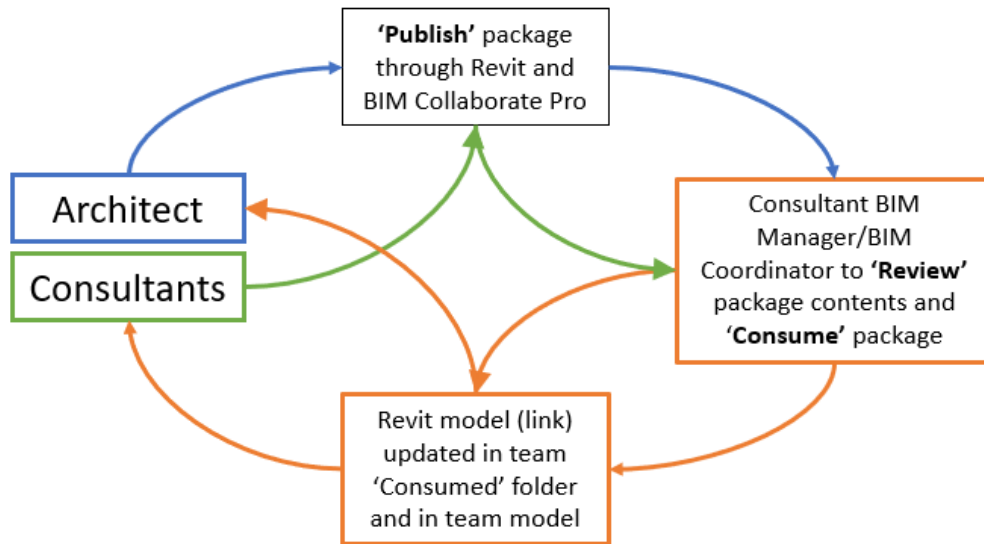
SOFTWARE	STORAGE TYPE	COLLABORATION USE	PROJECT MEMBER
Autodesk Revit	ACC Docs/ Collaborate Pro	Design Authoring, design review, visual 3D coordination	Design consultants and client
Autodesk Civil 3D	ACC Docs/ Collaborate Pro	Master Coordinates and 3D Topography	Civil Consultant
Autodesk AutoCAD	ACC Docs/ Collaborate Pro	Early schematic design	Consultants not using Revit
Autodesk Navisworks Manage	ACC Docs /Collaborate Pro	3D Clash detections, federated models	Design Consultants and GC

### 5.3. Model Sharing

All models shall be shared according to ACC publishing methods laid out in the following sections. The process of cross-discipline file sharing will be the platform standard Publish and Consume workflow unless otherwise agreed upon between all parties involved in the review of this BxP, while remaining within the ACC environment.

### 5.3.1. Standard Package sharing workflow.

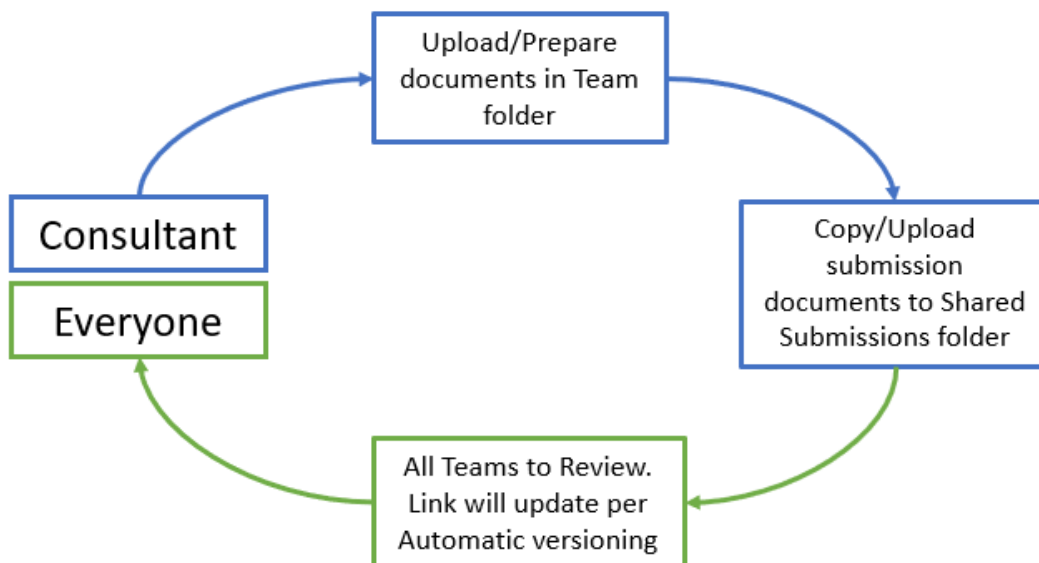
All work to be shared for periodic coordination requirements, official submissions etc. must follow the “low trust” workflow of being published through the Design Collaboration area of the ACC.



### 5.3.2. Non-Revit Document Submission Workflow

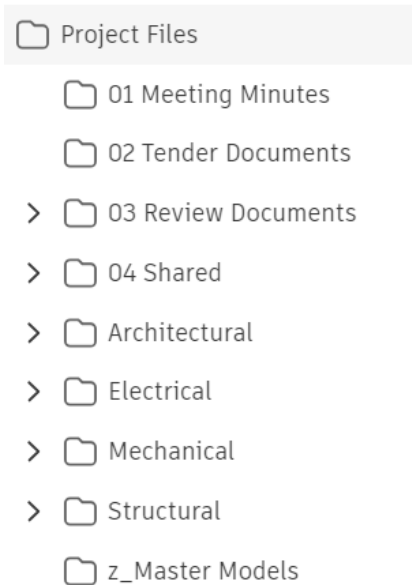
Any project not using the workflow defined in 5.3.1 due to a current Revit model not existing and a new model not in contract, will submit weekly coordination packages per the Shared Submissions folder where all other teams will have access to view and link the files. All teams will review and link to these document sets as necessary for coordination.

The following workflow applies:



## 5.4. Document management

Project folder structure will include, but is not limited to, one folder per discipline/consultant, and additional folders as follows:



### *01 Meeting Minutes*

All meeting minutes, regardless of software used to record initially, shall be uploaded by the Prime Consultant to **01 Meeting Minutes** folder in PDF or Microsoft Word format.

### *02 Tender Documents*

This folder is for documents that were submit as a part of the tender package. All tender documents are to be saved to this folder.

### *03 Reviewed Documents*

This folder is for project documents that have been prepared as a part of the design process and are being submit to Queen's for review. A subfolder shall be created for the respective review and all review documents are to be copied to the subfolder.

### *04 Shared*

This folder is a default folder, accessible by Everyone. It will automatically collect the latest of all published package documentation.

### *Discipline Folders*

These folders are to be accessible only to the people directly related to each discipline. These permissions will be assigned by the Prime Consultant.

Each discipline will have complete control over the internal structure of their team folder.

#### 5.4.1. z\_Master Models Folder

This folder is for the initial transfer of Queen's University current record models (if applicable) from the 001 Master Buildings project. Each discipline shall download their discipline model from the z\_Master Models folder and workshare it back to their team folder to begin project work.

### 5.5. Access Rights

Queen's University staff will have Account Administrative and Project Administrative Access to all projects on their Hub. Each discipline will have at least one user with Folder Control access to the project folder. The Queen's Project Manager will be responsible for adding the Prime Consultant and all Queen's staff to the project. The Prime Consultant will be responsible for inviting and assigning roles to all other project participants. Standard roles and their permissions are outlined below:

ROLE	PERMISSION SET
Queen's Project Staff	Project Admin, Folder Control
Prime Consultant	Project Admin, Folder Control
Project Manager (discipline)	Project Member, Folder Control (discipline)
BIM Manager (discipline)	Project Member, Folder Control (discipline)
BIM Coordinator (discipline)	Project Member, Folder Control (discipline)
BIM Author	Project Member, View+Download+Upload+Edit

Prime Consultant is responsible for adding new members to the project within the ACC.

### 5.6. Coordination of Deliverables

Each discipline will manage its own submissions within the ACC Platform.

Production work requiring links to other discipline models/files will be done using standard Low Trust file linking or as specified in RFP documents. Prime Consultant to coordinate.

Creation of static milestone documentation shall be coordinated by the Prime Consultant.

#### 5.6.1. Model Linking Methods

The typical Design Collaboration method for linking models between disciplines is accomplished using the low-trust method of linking a published document from a Consumed folder. This method is outlined in section 5.3.1.

In the event that this workflow is insufficient or more involved than necessary given the scope of the project, the Prime Consultant can authorize the use of a high-trust linking method, whereby all authoring model working files are linked directly into each disciplines' production model. This method facilitates immediate visibility into ongoing work by all teams thereby removing the necessity to wait for scheduled published packages to be reviewed and consumed.



This method will require each team folder to be accessible by each other discipline to be able to link directly to the working model. The Prime Consultant will be responsible for permission sets.

### 5.6.2. Imported Files

Absolutely no files should be Imported into the Revit Model, such as CAD (dwg) or PDF files. All files *must* be linked unless approved by the Prime Consultant. Upon the approval of an imported file, under no circumstances should that import be exploded into the main model file. *This will cause irreparable damage to the model.*

## 6. QUALITY CONTROL

### 6.1. General

Each discipline is responsible for auditing their work before all official submissions. Additionally, the BIM Manager of each discipline must verify that the model meets the standards and BIM objectives contained within the Revit BIM Interoperability Tools Model Checker check set provided by Queen’s University.

Results in the form of a .pdf file will be provided with each standard submission (i.e., 33%, 66%, 99%, per contract documents). Only the Record Model submission must reach 100% pass rate. All other submission scores are for internal quality control and progress tracking. Record Model scores that do not meet 100% pass rate will be subject to the review of the Prime Consultant and require resubmission after revisions.

#### 6.1.1. Model Checker Metrics

### 6.2. Interference check

Detection of collisions between different modeled elements using Navisworks or ACC Model Coordination is required. BIM Manager of each discipline shall check their own models prior to publishing. Each team shall create a Coordination Space within the ACC Platform to clash specific disciplines. Periodic meetings will be necessary to facilitate the resolution of all clashes in a timely manner. The Prime Consultant will be responsible for coordinating and leading these meetings.

Prime Consultant will determine format and distribution of any required clash detection reports. Clashes are to be created as Issues and managed from the ACC platform as well as within Revit and/or Navisworks.

Use this matrix to make interference detections in the correct order.

DISCIPLINE	ARCHITECTURE	STRUCTURE	HVAC	PLUMBING	ELECTRICAL
ARCHITECTURE (A)	PREREQUISITE				
STRUCTURE (S)	1_A-S	PREREQUISITE	2_H-S	4_P-S	8_E-S
HVAC (H)	3_A-H		PREREQUISITE	5_P-H	9_E-H
PLUMBING (P)	6_A-P			PREREQUISITE	10_E-P
ELECTRICAL (E)	7_A-E				PREREQUISITE

This table indicates the ideal order in which the checks should be done (1 first, followed by 2 etc). The letters following the numbers are a summary of the two disciplines involved. For example, 1\_A-S = First Check of Architecture with Structure; 2\_H-S = second check, HVAC and Structure.

The Prime Consultant remains responsible for the total coordination of the project.

## 7. DELIVERABLES AND PROCESSES

### 7.1. General

The Prime Consultant oversees the Queen’s-owned ACC DOCS environment as per the list of responsibilities in section 4.2.1. Version tracking is managed automatically by the ACC platform, and it is possible to compare changes between file versions and access the history of all versions.

### 7.2. Deliverables Matrix

The following table proposes different deliverables related to the role responsible in relation to the various stakeholders involved. Deliverables are subject to change based on scope of the project and must be reviewed and amended, if required, as part of this BxP. All parties must be aware of and agree to the deliverables outlined here.

Deliverable	Prime Consultant	Architecture	Structure	MEP	Civil
BIM Execution Plan					
Architectural Models and Plans					
Structural Models and Plans					
MEP Models and Plans					
Models and Civil Plans					
Templates and Site Maps					
Specialized and Manufacturing Contractors’ Plans and Models					
Creation and maintenance of families (by discipline)					
3d scan or Drone during construction					
As constructed (point cloud)					
Models as built					
IFC Model for Verification					
IFC Model for Archiving					

### 7.3. Calendar of deliverables

The schedule of deliverables should be coordinated with the project completion schedule.

Refer to RFP document(s).

### 7.4. Format of deliverables

For the purpose of assisting construction, the BIMs developed by the consultant will be used, evolved, and transferred in the following sequence:

1. BIM Tender Model (BTM): to the owner for their records in the form of native BIM format (i.e. .rvt).
2. To the RFP candidates at 100% CD Development for the purpose of reviewing the working drawings and specifications for the preparation of a formal written bid.

Note: The BTM may be amended during the bid process via addenda.

3. The BIM Record Model (BRM) shall be transferred to the owner by the consultant in native BIM format (i.e. .rvt).
4. The owner shall retain the right to use the BIM model, the BTM, the BIM Issue for Construction Model (BIFCM), and the BRM as necessary through life maintenance, repair, and modification of the building without recourse to the consultant and / or Constructor.
5. The last Revit file sent to the owner to be purged and compacted and a procedural document explaining how the model works, how to navigate it, etc., must be provided at the same time. All unnecessary or unused elements (view templates, view filters, tables, families, views, unnecessary work planes, etc.) should be removed from the document.
6. A Federated file is also requested in both native file format (.rvt), and Navisworks (.nwd).

### 7.5. Required file formats

The following file formats are required at all major releases and milestones, such as for bid, construction, as built, etc.

- PDF, DWG, RVT, NWD.

## 8. BIM MODEL MANAGEMENT

### 8.1. List of Software and Versions

All Software used must be listed here and agreed upon by all parties. Software version will be the latest version available, and any exceptions must be approved by all parties and Prime Consultant.

BIM usage	Software Requirements
Architecture	Revit (current version)
Structure	Revit (current version)
MEP	Revit (current version)
Civil	Compatible with Revit (Civil 3D)
Estimating	
3D Scan	
4D Planning	
Visualization	Revit Cloud Rendering
Clash Detection	Navisworks Manage, Autodesk Construction Cloud Model Coordination
Site management	
Revit Plug-ins	
Collaboration	Autodesk BIM Collaborate Pro/ ACC Docs
Communication	ACC and emails
Documentation Management	ACC Docs

Software updates during the project will be coordinated by the Prime Consultant. No firm can change version or update without the approval of the Prime Consultant who will coordinate the change for everyone to avoid versioning or other problems.

### 8.2. Model Requirements

#### 8.2.1. Design Model

The design Model is to be made available in the ACC for the Queen's University’s analysis and audit at all major project milestones. The Prime Consultant will regularly interface with the architect. The model will be uploaded and submitted to Queen’s University by using the ACC platform at milestones and specific intervals. The model is to be coordinated with all major disciplines as defined in this document.

The model must be used as an analytical tool to investigate architectural solutions while exploring elements of the design. It should assist in the functional program development and validate with

regards to space distribution and functionality. It should facilitate investigations of buildings and energy performance while providing the process for building systems integration.

The BIM model should assist the team with sustainable and green strategies. Material and methods analysis should be an integral process and incorporated into the BIM and related processes.

The Design model is to be made available to inform and assist the construction process.

#### 8.2.2. Tender Model

The Tender model(s) will be submitted to Queen's University by the Prime Consultant via the ACC platform.

#### 8.2.3. Construction Model

The Issued for Construction model represents the final Design Model. It will be in Revit, and Navisworks format compiled and prepared by the Consultant team. It will be given to the owner and construction manager as part of the Issued for Construction documents. The Construction model will be an editable working model fit for use by the construction manager and is for reference only. All construction must take place per the agreed upon contractual documentation. The Navisworks model is free to be shared as deemed necessary by the Prime Consultant and General Contractor as it is read only.

#### 8.2.4. As-built Model

The As-built Model will be a BIM file compiled and prepared by the Construction Manager.

#### 8.2.5. Record Model

The Record Model shall, at a minimum, contain Architectural, Structural, and MEP system information. The Record Model will, in addition, contain all relevant Design, Construction, 4D Coordination Models, and Subcontractor Fabrication Models as required in contract documents.

The Record Model will be in BIM native format (i.e. .rvt) and Navisworks format (.nwd) compiled and prepared by the Consultant team. Each discipline will document all RFIs to their discipline. As-built changes marked-up by the Construction manager and issued by the Owner during the construction phase will be captured by the General Contractor. Scope of As-built changes to be agreed upon between Owner and Consultant team and set out in the contract. The completed model will be given to the Owner as the Record model upon substantial completion.

#### 8.2.6. Reference file

The goal of Queen's University is to maintain a full campus map of each building and surrounding landscape. This file will contain links to each campus building model together in a master project. This model will be updated as projects are completed. The campus map will contain master site coordinates which will be synchronized with each campus building model. Each new project will start from the existing building model and will contain any necessary site coordinates, structural grids, and datum levels which should not be altered.

All disciplines not already contained in the building model at the beginning of a project must obtain coordinates, grids, and levels from the provided model.

The Project Manager to manage project start and confirm the most up to date model is being used and ensure preservation of coordinates, grids, and levels.

### 8.3. Naming Conventions

#### 8.3.1. Model file nomenclature

Here are examples of descriptions by Discipline, their letter being in parentheses.

To standardize the way files are named, here are the nomenclature rules.

**Building Number\_Discipline\_Subdiscipline\_Building\_RevitVersion.rvt**

**Note: Each section must be separated by an underscore.**

*Example of nomenclature:*

**194\_M\_PL\_PAC\_R20.rvt**

**1<sup>st</sup> section** – Building Number

**2<sup>nd</sup> section** – Discipline 1 letter (see tables below).

**3<sup>rd</sup> section** – Sub-discipline 2-3 letters (only if necessary; see tables below).

**4<sup>th</sup> section** – Indicates the building acronym – to be determined at beginning of project.

**5<sup>th</sup> section** – Indicates the version of Revit.

ARCHITECTURE (A)	
ENVELOPE	ENV
FURNITURE (IF REQUIRED)	FUR
SITE	SITE

STRUCTURE (S)	
STRUCTURE	STR

ELECTRICAL (E)	
LIGHTING	LG

MECHANICAL (M)	
GENERAL (LEGEND, DETAILS, DIAGRAMS)	GM
VENTILATION AND REGULATION	VR
VENTILATION	VE
REGULATION	RE
PLUMBING	PL
FIRE PROTECTION	FP
HEATING AND COOLING	HC

### 8.3.2. Nomenclature of worksets

Worksets should be named in a consistent and logical manner to provide adequate control over the efficiency of the model, allowing for members of design teams to collaborate with clear intent. Workset complexity will be subject to project type and will be at the direction of the Prime Consultant in coordination with disciplines. The principles set out below can be amended in agreement with all parties. The use of levels or zones may not be necessary based on the size of the project and will be agreed upon by all parties at the outset of the project.

### 8.3.3. Principles

- Workset1 must not be renamed or used under any circumstances.
- All grids and levels in each model shall be placed on the Shared Levels and Grids workset.
- No special characters and no accents in workset names.
- Each discipline will begin its own Workset names with the single letter defined in section 8.3.1
- Each linked file will be placed on an individual Workset where the letter “L” will follow discipline letter.
- To identify them easily, Worksets that do not need to be opened by other disciplines must begin with the letter Z. *(Z will take priority over all other nomenclature)*
- Each building can be divided, horizontally or vertically, into levels or zones. *(Must be coordinated between all project participants)*
- Workset content description will follow all agreed upon naming conventions.

Example: **Z-L-discipline-level and/or zone-content description**

WORKSET NAME	EXAMPLE OF USE
<b>A-L01-CORE</b>	Core elements on Level 1 within the Architectural model
<b>Z-L-S-STR MODEL</b>	Linked model within the Structural model, not necessary to be opened by others
<b>M-DUCTS</b>	Mechanical workset containing ducts, small project, no zone, or level required
<b>A-L04-EAST-INTERIORS</b>	Architectural model, Level 4, East zone, interior partitions (incl. doors)
<b>A-WEST-CORE</b>	Architectural model, West zone, vertical core elements spanning all levels

### 8.3.4. Nomenclature of Parameters & Parameter Data

It is understood that the general families of the project will not have rules of global nomenclature and that each discipline will be able to use its own families. All families brought into the Queen's University Revit template will have project parameters applied to them and it is the responsibility of the disciplines to ensure all required parameters contain the relevant information. Some parameter values will be reviewed by the Model Checker.

The parameters will present themselves within the Instance Properties of the elements and will have the prefix "QU\_". Discipline specific parameter names will have a 2-letter abbreviation of the discipline following the "QU\_", e.g., QU\_EL\_ for Electrical. All parameters will be present in the Revit Template at project start and no additional parameters shall be necessary unless specifically required on a per project basis. Prime Consultant to authorize all new parameters.

If a new parameter is required, such as any parameter not included in the Queen's parameters list, it must follow the nomenclature outlined here:

**QU\_Discipline\_ParameterName**

**Note: Each section must be separated by an underscore.**

*Example of nomenclature:*

**QU\_GE\_InstallationDate**

Discipline	Abbreviation
Mechanical	ME
Electrical	EL
General	GE

### 8.3.5. Date Format

All parameters requiring a date entry must follow YYYY/MM/DD format.

E.g., 22/06/27

### 8.3.6. Equipment Tags

All Equipment Tag (QU\_GE\_EQUIPMENT TAG) values must be a unique identifier. In the case of multiple pieces of identical equipment, a number will be added to individually identify each instance. E.g., AHU1 & AHU2

**For details on equipment abbreviations refer to Queens University Naming Conventions Standards documents: <https://www.queensu.ca/facilities/building-design-standards>.**



### 8.3.7. Revit Template

Queens University will provide a Revit Template file for the purposes of transferring Project Parameters to all discipline files.

All disciplines involved in the project shall use Transfer Project Standards within Revit to transfer all Queen's University project parameters into their working model. These project parameters will be applied to mechanical and electrical equipment. It is the responsibility of the discipline to ensure all parameter information is accurate at the time of submission. The content of these parameters will be subject to scrutiny during the Model Check.

#### 8.3.7.1. Titleblock

Queens University maintains three titleblock sizes – 24x36, 18x24, and 11x17. These will be provided as part of the Queen's University Revit Template and shall be used by all disciplines.

### 8.4. Native object components

Model components shall be native to the Revit platform. Unless otherwise agreed, components shall not consist of .DWG, .SKP, .OBJ, .SAT imports, etc., within Revit components, as this can increase risk of unstable families and corruption of the project file.

### 8.5. Detail items

Unless otherwise stated in the Level of Development below, detail lines, filled regions, and detail items shall not be used for defining any objects in the model (only at detail level). Symbolic lines or Detail items within families may be used (as component report counts and data). Also, 3D Generic geometry may be used in some locations, but shall always occupy the maximum dimensions of the object it's representing.

### 8.6. Space and Room naming

Numbering and naming are to be determined by architect in consultation with Prime Consultant.

### 8.7. Model Phases

Shall be the same for all disciplines and be agreed upon in the BIM Execution Plan meetings.

### 8.8. Project lineweights

Queen's University has not defined lineweights. All parties will use their own standards.

### 8.9. Level of Development (LOD)

We define the level of development of the models according to the type of deliverable. Typically, the closer you get to the submission for construction, the higher the level of development of the models will be. The progress of a BIM model is therefore measured according to its level of development. (ref: BIM forum 2021, GSA). Refer the additional LOD document provided along with this BxP.