UNIVERSITY OF CALGARY

BIM / VDC

Consultant Requirement

December 2024, Ver 2.0

Developed by Facilities Development

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1. Executive Summary

University of Calgary (UCalgary) Facilities recognizes the value of Building Information Modeling (BIM), and Virtual Design and Construction (VDC) to improve our capital facility projects, and our internal building management program. We are committed to adopting BIM as a tool for project documentation and development, record documentation and to support the Integrated Workplace Management System (IWMS).

In addition to the Design Standard section 8.0 *Project Digital Delivery*, the BIM / VDC Consultant Requirement is a guide to assist the consultant team in planning and developing models and metadata. It provides guidance around the scope of BIM modeling and metadata required by UCalgary. Related Design Standard sections:

- Section 8.1 Drawing Standard
- Section 8.2.1 Drawing Standard Appendix 1 - Glossary (Abbreviation and Definition)
- Section 8.2.2 Drawing Standard Appendix 2 - Asset Naming Convention
- Section 8.2.3 Drawing Standard Appendix 3 - Equipment Standard
- Section 8.3 CAD Standards
- Section 8.6 Required Consultant Document Submission
- Section 9.7 Room Naming Convention

Throughout the project development, the following UCalgary departments will review the BIM, project metadata and associated documentation for verification, accuracy and delivery.

- Campus Architecture (CA), Facilities Development (FD)
- Campus Engineering (CE) & Capital Renewal, FD
- Operations & Maintenance, Facilities Management (FM)
- Caretaking, FM
- Archibus, FM
- Energy Planning & Innovation, Office of Sustainability (OS)
- Information Technology

If you have any questions about the BIM/VDC Consultant Requirement, please contact Campus Architecture.

2. BIM Deliverables

General project deliverables refer to Design Standard 8.6 - *Required Consultant Document Submission*. For BIM projects, the prime consultant shall be responsible for the following additional deliverables.

Project Phase	BIM Deliverable	File Format
Contract Award	Outline Design BIM Execution Plan (BxP-D)	Word or PDF
Schematic Design (SD)	Detailed Design BIM Execution Plan (BxP-D)	Word or PDF
	Design intent models	Revit (RVT) for Architectural (A)
Design Development (DD)	Design intent models	Revit (RVT) for A, I, S, M, E
	Federated/Shared DD model	Navisworks (NWD)
Construction Document (CD)	Detailed design intent models: At 60% CD and IFC (for each tender package); Underground utilities and grading to be included	Revit (RVT) for A, I, S, M, E, C
	Federated/Shared IFC model	Navisworks (NWD)
Project Closeout	Record models - refer to figure 2.2 Underground utilities and grading to be included	Revit (RVT) for A, I, S, M, E, C
	Federated/Shared record model	Navisworks (NWD)

2.1 Design BIM Execution Plan (BxP-D)

The BIM Project Execution Plan (BxP) establishes a basis for better communication between BIM parties, and a schedule for BIM development. The UCalgary BIM/VDC Consultant Requirement should serve as a road map for helping create the BxP-D. The prime consultant shall lead the development of BxP-D, and submit the detailed BxP-D to UCalgary at the completion of schematic design. Within 15 business days of submission, the BxP-D will be reviewed for approval by UCalgary. BxP-D is a live tool for the design team. Keep UCalgary up to date with any deviations or changes. Required information to be addressed in BxP-D[1]:

- **Overview Information**: Document the reason for creating the BxP.
- **Project Information**: Include project number, project location, project description, and critical schedule dates for future reference.
- **Key Project Personnel Contacts**
- **Project Goals / BIM Objectives**: Document the strategic value and specific uses for BIM on the project as defined by the project team in the initial step of the planning procedure.
- **Organizational Roles and Staffing**: Define the project coordinator(s) of the BIM planning and execution process throughout the various stages of the project. Identify the organization(s) who will initiate the development of the BIM Plan, as well as the required staff to successfully implement the plan.
- **BIM Process Design**: Clearly illustrate the execution process through the use of process maps.
- **BIM Information Exchanges**: The model elements and level of detail required to implement each BIM Use should be clearly defined in the information exchanges requirements.
- **BIM and Facility Data Requirements**: The owner's requirements for BIM must be documented and understood.

[1] UCalgary references The Pennsylvania State University BIM Project Execution Planning Guide - Version 2.2.

- **Collaboration Procedures**: Develop electronic and collaboration activity procedures. This includes the definition of model management procedures (e.g. file structures and file permissions) as well as typical meeting schedules and agendas.
- **Model Quality Control Procedures**: Ensure and monitor the project participants to meet the defined requirements throughout the project.
- **Technology Infrastructure Needs**: Define the hardware, software (version) and network infrastructure
- **Model Structure**: Document items such as model structure, file naming structure, coordinate system, workset structure, phase description and modelling standards.
- **Project Deliverables**: Document deliverables required by UCalgary.
- **Delivery Strategy / Contracts**: Define the delivery strategy which will be used on the project. The delivery strategy, e.g. design-build vs. design-bid-build, will impact implementation and it will also impact the language which should be incorporated into the contracts to ensure successful BIM implementation.

2.2 BIM Model

UCalgary needs to own, reuse and manage building data throughout the facility lifecycle. Consequently, UCalgary places significant importance on the accurate creation, management and stewardship of building information during model creation, and UCalgary expects that data created during design and construction will be reused throughout construction and into facility management. Record model(s) shall be provided at the end of construction to further the lifecycle and development efforts. The model content for each of these deliverables should be clearly defined within the contract documents for each responsible party, as well as in the BxP-D.

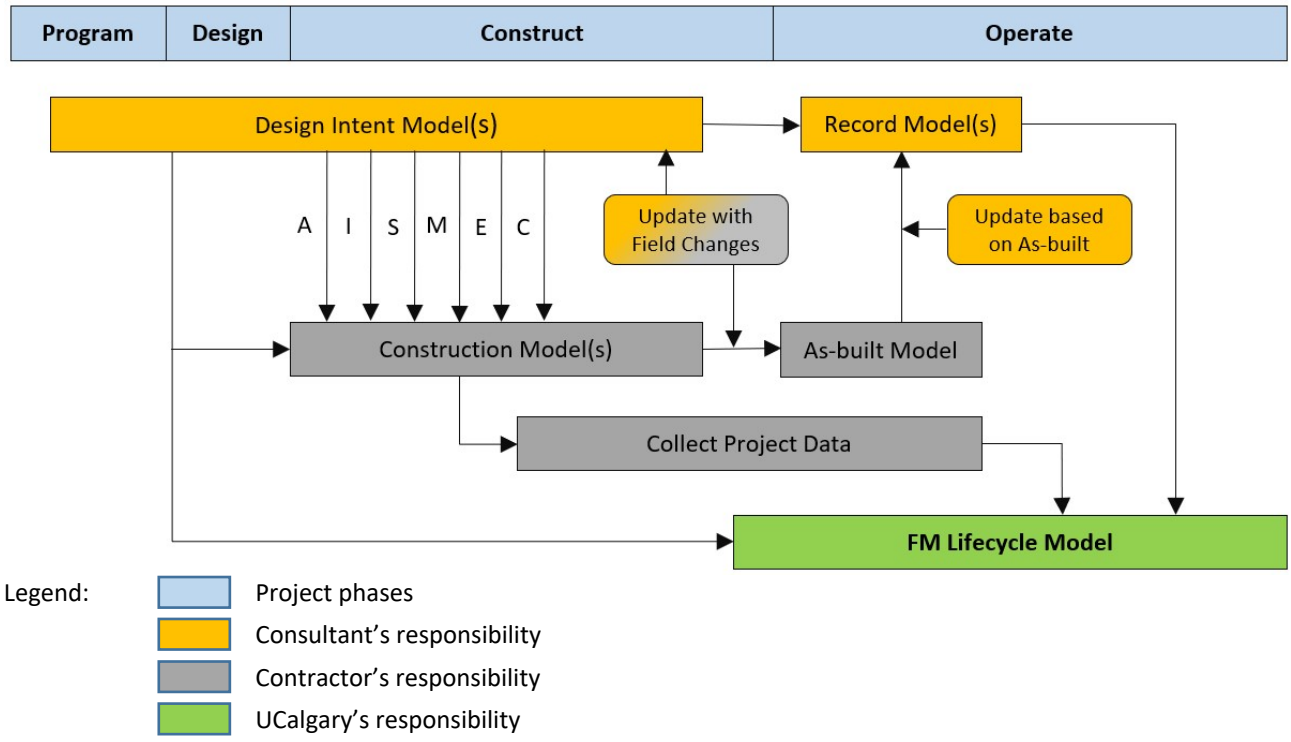


Figure 2.2 Lifecycle Model Process

2.2.1 BIM Model Level of Development (LOD)

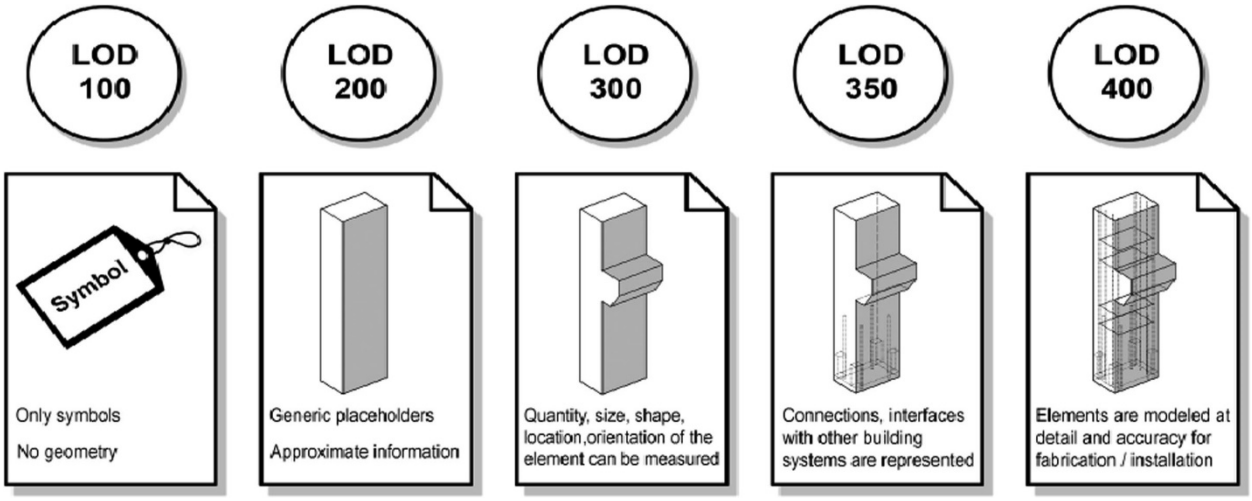


Figure 2.2.1 LOD Infographic

LOD is an important planning tool for setting goals and managing the team's expectations. LOD is the maximum amount of information and geometry authorized for use by others and addresses the information, geometry, and organization needed to complete specific BIM uses in the given timeframe. UCalgary provides LOD guidelines for the model. Figure 2.2 legend applies to the following table. The LOD will be further addressed and developed using a Model Development Specification (MDS) once the project is awarded. The initial MDS shall be developed by the prime consultant and UCalgary after project kick-off and shall be submitted with the BxP-D.

Phase	SD	DD	CD	Construction		As-built	Record
LOD Guideline	200	200/300	300	350		300/350	300

All information needed to describe the contract documents shall be graphically or alphanumerically included in and derived from the models only. Only the specifications are not included. No documentation of the models should happen outside of the BIM authoring software and all project elements should be modelled to their required LOD outlined in the MDS.

At the end of each specific design deliverable, the prime consultant will transmit the model files to UCalgary to confirm LOD modeling, as well as system compatibility and naming standards.

2.2.2 Design Intent Models

These models shall address the complete design process, scope and phases. They will show the architectural, interior design and engineering intentions of the design for the project. The consultant teams will design the collaborative environment, which either each discipline works in their own model to be linked in the federated model, or all disciplines work with a single shared model.

2.2.3 Detailed Design Intent Models

Project models are developed incrementally. More details are added as a project progresses. All information needed to describe the "contract documents" shall be graphically or alphanumerically

included in and derived from these models. These models will show the intentions of construction design for the project.

2.2.4 Federated/Shared Design Intent Model

This model shall be a single deliverable at the end of design development (DD), issued for construction (IFC) and closeout (record).

2.2.5 **Federated As-built Model** (by the contractors)

The federated as-built model serves the final model based on updated coordination models including all field changes and data requirements, and it represents the actual assembly of the building. The CM will work with all consultants and sub-trades to finalize this construction model into an as-built model.

2.2.6 Record Models

Record models are made up of detailed design intent models updated to match all as-built conditions to create an accurate representation of the physical conditions, environment, and simple asset geometry. Details are not required by the University (i.e. fabrication elements). The record models MUST contain accurate room numbers and asset tags, following the UCalgary Design Standards.

The prime consultant is responsible for coordination of all disciplines' BIM models. The record BIM model (to an agreed standard) must be readable and useable on the UCalgary's systems upon delivery at the end of construction and must have been validated and coordinated by the prime consultant.

2.3 Facility Asset Data

UCalgary intends to integrate the final deliverables, including the record models, into their lifecycle management solution. To meet this objective, it is important that the data requirements presented in section 6 are followed so they can be validated by the UCalgary's IWMS. The integration of the as-built data into the IWMS is critical to O&M procedures. Electronic data from the model and as-built conditions allows the FM team to start planning for building startup and tracking building operations; instead of spending time "catching-up" with data entry after taking control of the building.

UCalgary does not attempt to track more metadata than can be practically used or maintained. These assets consist of the physical building, systems, surrounding environment, and equipment. Asset data specifications have indicated how to format design data so it can be consumed downstream into IWMS. UCalgary bi-directionally links asset in the FM lifecycle model to IWMS, and utilizes the data contained in the model to populate IWMS.

3. BIM Processes

3.1 Meeting Procedure

Design and Construct teams are responsible for defining the required meetings, frequency and needed participants to support the project BIM deliverables. UCalgary requires at least the following meetings.

3.1.1 Design BIM Kickoff Meeting

At the beginning of DD phase, the design team shall facilitate a project BIM kickoff meeting, which will review the UCalgary BIM/VDC Consultant Requirement and the Design BIM Execution Plan (BxP-D).

3.1.2 Contractor's VDC Meeting

Consultants should attend all relevant VDC meetings during construction.

3.2 Design and BIM Model Review

Discussions regarding processes and best practices to ensure model quality should be reviewed as a project team. At project milestones, these requirements in the model and metadata will be reviewed to confirm that each model and its corresponding metadata/documents are being developed in accordance with the UCalgary's intended use. The goal is to ensure that the processes are being followed throughout the project; that there are no issues during construction that may result in a significant loss of metadata upon exchange of information.

Model sharing should not be limited to just the Architecture, Engineering and Construction (AEC) team members. During the design through construction, commissioning and closeout, the project teams should engage key UCalgary stakeholders in an on-going model review process. UCalgary's personnel as directed by the PM, such as:

- Campus Architecture (CA), FD
- Campus Engineering (CE) & Capital Renewal, FD
- Operations & Maintenance, FM
- Caretaking, FM
- Archibus, FM
- Energy Planning & Innovation, OS
- Information Technology

Model reviews should occur through regularly scheduled model sharing and in-person model-based reviews as outlined in the BxP-D. Documentation reviews at the end of all design phases will be performed paperless in an integrated environment e.g. Bluebeam, set up by the prime consultant. All markups need to be reviewed by each parties' respective lead prior to changes being made to the documents. Process, timing and review durations shall be outlined in the BxP-D.

UCalgary requires one interactive model review led by the design team and their model managers at the 60% construction document milestone. This review will focus on sharing the model via a live 3D review where project team members will have the opportunity to ask questions and address concerns that would not be noticed in the traditional 2D review processes. Additional model reviews may occur at the discretion of the UCalgary's PM and would need to be scheduled in a timely fashion.

Tracking markups and/or comments during the review should follow this process:

Mark-Up Colors	Description
Black	Original document
Red	Corrections to documents. Edits in this color provide direction for revisions, additions, or deletions to the documents that are to be included in the updated documents.
Blue	Notation from document editor. Edits in this color provide direction that is NOT to be specifically added or deleted from the documents.
Green	Questions from design team members picking up markups or comments back to the originator. This is to seek clarification or direction. (Note: utilize this work method only when comment originator is not available for immediate clarification.)
Orange	Reviewer's acceptance to markups and comments in the document. This is the markups list color only.
Yellow	Corrections to documents have been incorporated and design team has back-checked their work. This can be highlighted in the document, but should also be added as a reply to the markup in the markups list.

4. Technology

4.1 Authoring Software

All consultants are required to use the following design authoring software. Projects will remain on the same software release throughout the life of the project unless approved by the entire team.

- Autodesk Revit (Acceptable version up to Revit 2025)

4.2 Coordination Software

The consultant teams are required to provide a platform for collaboration and live model review. Coordination software shall be used for assembling the various design models to electronically identify, collectively coordinate resolutions, and track and publish interference reports between all disciplines. The technical disciplines shall be responsible for updating their models to reflect the coordinated resolution.

4.3 Additional Tools

The consultant teams are encouraged to explore options to use the BIM and other electronic tools to enhance the project quality and delivery times. UCalgary is interested in fostering and supporting innovation, and encourages bold steps toward trying new ways to improve business process efficiency, design, and project outcomes.

5. Revit Models

5.1 Revit File Naming Convention

Revit model deliverables should have a file name that consists of four [4] distinct sections delineated by the following format:

[UCalgary Project BAS Number]_[UCalgary Building Code]_[Discipline]_[Revit Version].rvt

For example:

Architectural model	BAS200123_ABC_A_R2025.rvt
Interior Design model	BAS200123_ABC_I_R2025.rvt
Structural model	BAS200123_ABC_S_R2025.rvt
Mechanical model	BAS200123_ABC_M_R2025.rvt
Electrical model	BAS200123_ABC_E_R2025.rvt
Life safety and fire protection	BAS200123_ABC_LF_R2025.rvt

If model deliverables require additional breakdown due to file size or project complexity, naming convention can be modified. Review with UCalgary before proceeding.

5.2 Model Requirements

The models shall consist of objects that represent the actual dimensions of the building elements and the equipment to be installed in the project. BIM/VDC coordination requires the following model structure and features:

- Revit model deliverables should not have imported or linked 2D AutoCAD files associated with them.
- All 3D model files submitted for clash detection shall be “clean”. All extraneous 2D references and/or 3D elements must be stripped from the model files.
- If the project contains multiple buildings, each building needs to be modelled separately.
- The architectural model shall establish the floor elevation protocol for other disciplines to follow.
- All building elements must be coordinated into one file and should be modelled by their specific discipline. For example, architectural models should not include any of the structural elements contained in the structural model; or any interior partitions contained in interior design model.
- In federated model, duplicate 3D fixtures should not exist between linked models. For example, architectural can show 2D elements for plumbing fixtures that are then 3D modelled in that location in the mechanical model.
- The model components should include all information, parameters and annotations required to produce accurate drawing, detail and schedule.
- Clearance zones are required for door swings, MEP equipment for access, service space, meter reading, clear space required by relevant code authorities, and operational elements needing service space. Clearance zones must be modelled and checked for conflicts with other elements.
- Ideally, model elements shall be derived from the Revit default library, as these will work in IWMS. Custom created and manufacturer’s model elements need to be reviewed by Campus Architecture for compatibility with IWMS. Refer to Revit Families section.

5.2.1 Geo-referencing and Origin Point

In addition to the geometric data and information specific to the project, project teams shall also capture the full extent of the assets on campus that extends beyond the exterior walls of the building. While the spatial and asset information about a building may be seen at a micro-level of BIM, the larger geospatial and site information/context should be seen at the macro-level. The information to be captured by the design and construction team will be in accordance with survey requirements for use in UCalgary's GIS applications. This mutual integration of building, site and GIS data will bring a holistic BIM approach to the operation and planning phases.

To align with the City of Calgary spatial data standard, UCalgary uses the following reference system:

- Horizontal datum: North American Datum (NAD) 1983 CSRS
- Coordinate system: 3TM 114 (EPSG:3780)
- Vertical datum: CGVD2013
- Geoid model: CGG2013

UCalgary requires models to be correctly placed in 3D space using the real-world coordinate system for the building. The prime consultant's BIM manager shall establish the project shared coordinate system across all BIM data files allowing them to be referenced without modification. Once established, spatial coordinates shall only be changed by approval from UCalgary. Any model(s) of existing buildings relevant to the project shall be converted into the coordinate system used for each designed building. The location of the building at real-world coordinates, true heights, and shared coordinate systems are established by the BIM Manager in the site model.

These requirements form the basis of defining the projects' relative building coordinate system and need to be coordinated between the civil, architectural and structural disciplines at the beginning of the project and be listed in the BxP-D. The project origin (intersection of structural grid A and 1) shall be aligned with the project base point.

All models must be in the correct location in 3D space (x, y and z coordinates). Models should be inserted by auto-origin to origin. The correct insertion point is critical, and each model should align properly without modification when linking and coordinating. All models should contain their own grids and levels to ensure the correct location.

5.2.2 Project North

For the purpose of specifying horizontal locations and orientations of objects in models and drawings, the following definitions apply:

True north: Orientation of objects in a model or a drawing in accordance with the geographical north orientation. Locations have the correct coordinates in accordance with the coordinate system of Calgary.

Project north: Objects in a model are oriented for the convenience of the modelling and drafting process. The orientation and location of the building are defined by the prime consultant and followed by all other disciplines. Project north must be defined in terms of its rotation angle relative to true north to at least 8 decimal places. All models and documents shall follow the project north orientation.

5.2.3 Tolerances

According to State of Minnesota BIM GUIDELINE (2014), "'Model Tolerance' is different from 'Field Tolerance' that will vary for different trades based on their specifications. This model tolerance is a measure of accuracy of the model objects as they are placed in the 3D BIM. Even if the objects in the model are placed to an accuracy of 1/256" in the model but the dimensioned drawings from the model contain dimensions to the level of accuracy of 1/8" of an inch, 1/8" of an inch will be treated as the 'Model Tolerance'. Model Tolerance will vary based on objects and existing conditions modeled. The model tolerances shall be discussed and agreed upon by all BIM team members" (p. 28).

BIM Deliverable	Discipline	Tolerance
Existing Condition Models	Civil	Accurate to +/- 50 mm of existing size Accurate to +/- 300 mm of existing location
Existing Condition Models	Architectural Structural Mechanical Electrical	Accurate to +/- 5 mm of existing size Accurate to +/- 50 mm of existing location
Design Intent Models	All disciplines	Accurate to +/- 5 mm of design intent size Accurate to +/- 50 mm of design intent location
Trade Coordination Models	All disciplines	Accurate to +/- 1.5 mm of actual size Accurate to +/- 25 mm of actual location
Shop Drawing Models	All disciplines	Accurate to +/- 1.5 mm of actual size Accurate to +/- 25 mm of actual location
As-built Models	All disciplines	Accurate to +/- 1.5 mm of actual size Accurate to +/- 25 mm of actual location
Record Models	All disciplines	Accurate to +/- 1.5 mm of actual size Accurate to +/- 25 mm of actual location

5.2.4 Revit Families

Revit family is simple but representative geometry, parametric, easy for users to modify.

- Revit family should be created by Revit object only. If a family starts with a DWG, SAT or 3DM file, these files should only use as a reference for the creation of native Revit geometry and then removed from the family. Imported data can cause performance issues in Revit models and will not work with IWMS.
- UCalgary requires only the 2D lines shall be visible, the solid extrusion shall be turned off in the visibility setting in the family plan view.

5.2.5 Room

In federated model, room information in all other discipline models must reference the room information assigned in the architectural model. There is no overlap room information between each discipline model.

5.2.5.1 Room Name & Number

Refer to UCalgary Design Standard 8.6.2.4 for room number assignment and 8.2.4 for room naming convention. All room numbering must be approved by Campus Architecture prior to integration into the model. The room numbers shall be assigned to the number parameter in Revit for each room or space. This process gives the room/space a unique identifier and serves as the primary connector for room data between Revit and the UCalgary IWMS.

5.2.5.2 Room Boundary

UCalgary requires that a room is measured to the inside face of the exterior or interior walls, excluding column(s) within the room. Where a glazed wall surface extends to the floor level, the room boundary is to the inside face of the glazing frame. Revit should automatically delineate this based on the footprint of surrounding walls. In an open office area, use the Revit room separation line at the center of the workstation panel to define spaces within the open office.

5.2.5.3 Room Schedule

Other than standard design and construction project schedules, UCalgary also requires a room schedule to indicate the room name, room number and room area in the deliverable model.

5.2.6 Walls, Floors, Ceilings, Roofs

Each wall, roof, floor & ceiling shall depict to exact height, length, width and ratings (thermal, acoustic, fire) to reflect the component types accurately. These components should be modelled with the necessary intelligence to produce accurate plans, sections and elevations. Insulation, double-layered systems, or enclosures should also be modelled.

5.2.7 Doors, Windows and Louvers

Doors, windows and louvres shall depict to represent their actual size, type and location. Doors and windows shall be modelled with the necessary intelligence to produce an accurate window and door schedules.

5.3 Revit Model Submission Requirement

The prime consultant should use eTransmit to deliver the master Revit model. The eTransmit shall be setup as illustrated. All Revit models should accept the prime design option before submission. If the workset and phase description are not included in the BxP-D, the prime consultant is required to attach a separate description document.

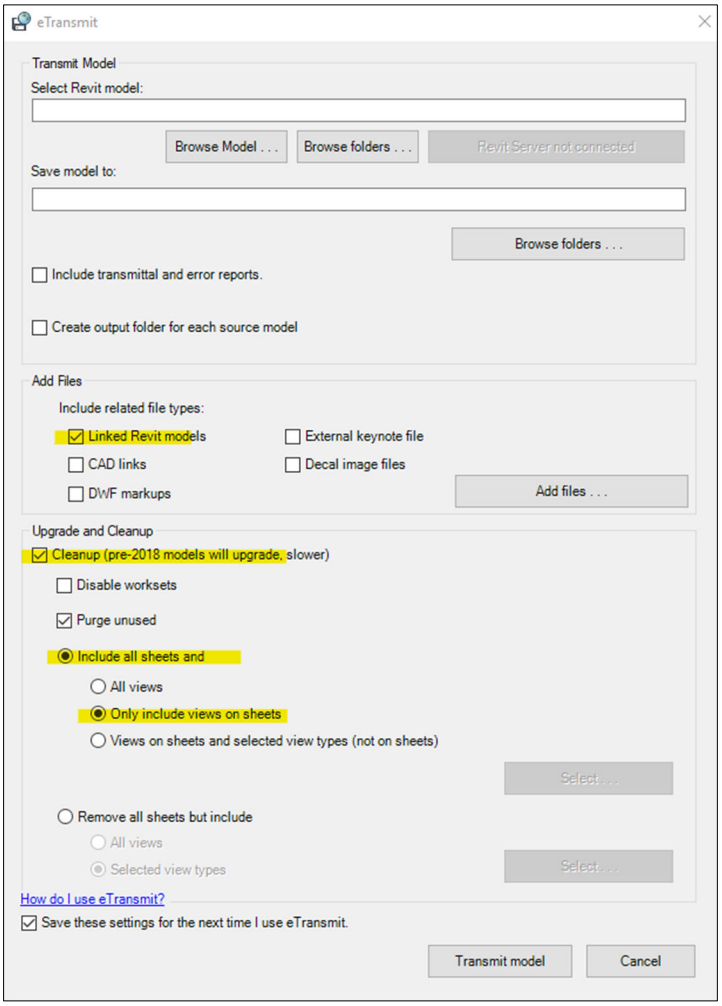
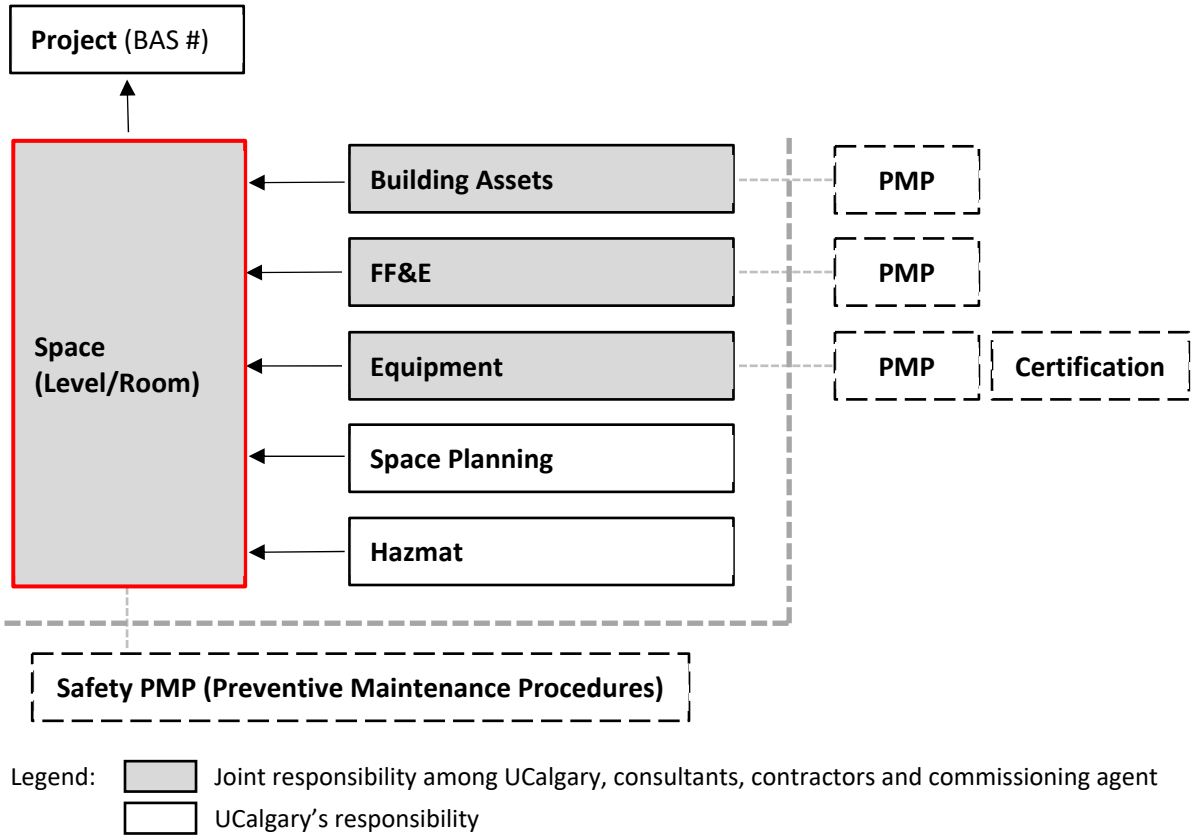


Figure 5.3 eTransmit Model Setup

6. Facility Asset Data

6.1 Facility Asset Data Structure in IWMS

The space assets are the core in the Facilities' IWMS, and "accommodate" other physical assets, e.g. FF&E and equipment. Preventive Maintenance Procedures (PMP) will then be assigned to space assets, building assets, equipment, and furniture, fixture & equipment (FF&E).



6.2 Facility Asset Data Matrix

BIM and associated metadata will serve as the "live" data source throughout the life of the project, starting with design. Data collection of any asset is not limited to a single discipline of a specific category. It can be a collaborative effort among UCalgary, consultants, contractors and commissioning agent. It is important that there is a balance of structured information to support both design and constructability as well as building maintenance and operations information. Further review and explanations of the process can be reviewed and evaluated at the project BIM kick-off meeting.

The facility assets are categorized as space, building, equipment and FF&E. To clarify some headings in the following matrix:

- **AEC Parameter**: UCalgary requires the use of Revit default parameters with the custom shared parameters* identified in the following matrix for all asset fields.
- **Data Format**: Required units of measurement or data input options

- **Data Owner**: Early in the project, the consultant team should identify an individual to own each area of data responsibility in the asset tables below. Throughout the project these data fields should be updated and coordinated.
- **Authoring Software:** Refer to section 4.1 Authoring Software.

Clarification of fields used in this section:

- **UC_Equipment Barcode**: The consultant team creates this shared parameter in Revit as a placeholder and leave the value blank. The contractor will populate the data in the construction model.
- **UC_Equipment Standard**: UCalgary inventories assets by using a universally applied Equipment Standard, which naming convention is descripted in Design Standards section 8.2.3 *Equipment Standard*. The consultant team will populate the data inRevit, and submit to UCalgary as part of tender review package.
- **UC_Equipment Tag**: Refers to the alpha numeric code on the equipment lamacoids and Design Standards Section 8.2.2 - *Equipment Asset Naming Convention*.
- **UC_Area/System Served**: Require detailed description to help FM service calls. Examples:

Example of Equipment	Example of Area/System Served Values
Supply Fan Wall	Level 1 – 6: NE corners
Stair Pressurization Unit	Stair [Room no.]
Booster Pump	Domestic cold water (Feeding LEVEL 7 - 15)
Grey Water Pump	Level 1 -7: toilets, urinals
Heat Exchanger	Primary chilled water for building cooling

6.3 Space Asset Fields

AEC Parameter	Parameter Type	Data Format	Data Owner	Authoring Software	Remark
UC_Building Code*	Text	Up to 8 characters	Architect	Revit	Refer to Facilities Building List
Level	Text	Up to 4 characters	Architect	Revit	UC provides info
Rooms: Number	Text	Up to 8 characters	Architect	Revit	Refer to DS 8.6.2.4 CA to review and approve
Rooms: Name	Text		Architect	Revit	Refer to DS 8.2.4 CA to review and approve
Rooms: Area	Number	m2	Architect	Revit	CP to review and approve
UC_Fire Rating*	Number	minute	Architect	Revit	
UC_ Wall Finish*	Text	Up to 32 characters	Architect or Interior Designer	Revit	Special finish only (wood, stone, tile, etc.)
UC_ Ceiling Finish*	Text	Up to 32 characters	Architect or Interior Designer	Revit	Special finish only (wood, specialized acoustic, etc.)
UC_ Wall Base Finish*	Text	Up to 32 characters	Architect or Interior Designer	Revit	Special finish only (wood; MDF; tile, etc.)

6.4 Building Asset Fields

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
Doors					
UC_Equipment Barcode*	Text	Up to 8 characters			Revit
UC_Equipment Standard*	Text	DOORX-EXTX-XXXXX DOORX-FIRE-XXXXX DOORX-INTX-XXXXX DOORX-OHEL-XXXXX DOORX-OHMA-XXXXX DOORX-SHTR-XXXXX	Exterior door Fire egress door Interior door Elec operated overhead Mechanically overhead Shutters	Architect	Revit
Door: Mark	Text			Architect	Revit
Door: Width	Number	mm		Architect	Revit
Door: Height	Number	mm		Architect	Revit
Door: Thickness	Number	mm		Architect	Revit
Door: Fire Rating	Number	minute		Architect	Revit
Door: Type Mark	Text	A; B; C; D; E; F; G…		Architect	Revit
Door: Door Material	Text	MDF; Metal; Wood		Architect	Revit
Door: Finish	Text	Laminate; PT; Stain; Veneer		Architect	Revit
Door: Frame Type	Text	1; 2; 3; 4; 5		Architect	Revit
Door: Frame Material	Text	MDF; Pressed Steel; Wood		Architect	Revit
Door: Frame Finish	Text	PT; Stain; Veneer		Architect	Revit
Glazing Type	Text			Architect	Revit
Hardware Group	Text			Architect	Revit
Floor Finish		*Model floor finish object within each room including elevator			
UC_Equipment Barcode*	Text	Up to 8 characters			Revit
UC_Equipment Standard*	Text	FLOOR-FINI-XXXXX		Architect	Revit
UC_Building Code*	Text	Up to 8 characters		Architect	Revit
Level	Text	Up to 4 characters		Architect	Revit
Rooms: Number	Text	Up to 8 characters		Architect	Revit
Floor Finish: Area	Number	m2		Architect	Revit
Floor Finish: Type	Text	Carpet; Laminate; LVT; Metal; Polished Concrete; Quarry; RSF; Rubber; Stone; Terrazzo; Tile; VCT; Wood		Architect or Interior Designer	Revit
UC_Caretaking Category*	Text	Up to 16 characters			Revit

AEC Parameter	Parameter Type	Data Format	Data Owner	Authoring Software
Roof Finish		*Model roof finish object within each section		
UC_Equipment Barcode*	Text	Up to 8 characters		Revit
UC_Equipment Standard*	Text	ROOFX-XXXX-XXXXX	Architect	Revit
UC_Building Code*	Text	Up to 8 characters	Architect	Revit
Level	Text	Up to 4 characters	Architect	Revit
Rooms: Number	Text	Up to 8 characters	Architect	Revit
Roof Finish Area	Number	m2	Architect	Revit
Roof Finish Type	Text	Up to 32 characters	Architect	Revit

6.5 Equipment and FF&E Asset Fields

6.5.1 Equipment and FF&E Asset Fields for All

ALL equipment and FF&E asset need to include the fields in this section.

AEC Parameter	Parameter Type	Data Format	Data Owner	Authoring Software	Remark
UC_Equipment Barcode*	Text	Up to 8 characters		Revit	
UC_Equipment Standard*	Text	Up to 16 characters	Engineer	Revit	Refer to section 6.2
UC_Building Code*	Text	Up to 8 characters	Architect	Revit	Refer to Facilities Building List
Level	Text	Up to 4 characters	Architect	Revit	UC provides info
Rooms: Number	Text	Up to 8 characters	Architect	Revit	Refer to DS 8.6.2.4
UC_Equipment Tag*	Text	Up to 32 characters	Engineer	Revit	Refer to section 6.2
UC_Area/System Served*	Text	Up to 64 characters	Engineer	Revit	Refer to section 6.2

6.5.2 FF&E Asset Specifics

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
Dock Leveler					
UC_Equipment Standard*	Text	DOCKL-HYDR-XXXXX DOCKL-MECH-XXXXX	Hydraulic Mechanical	Engineer	Revit
Fume Hood					
UC_Equipment Standard*	Text	FHOOD-XXXX-XXXXX		Engineer	Revit
UC_Type*	Text	Canopy; Fume Hood; Snorkel		Engineer	Revit
UC_Width*	Text	ft		Engineer	Revit
UC_Duty*	Text	Chemical; Radioisotope; Other		Engineer	Revit
UC_Control*	Text	Constant Volume; Variable Volume		Engineer	Revit

6.5.3 Mechanical Equipment Asset Specifics

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
Air Conditioning Unit / Air Conditioning Condenser					
UC_Equipment Standard*	Text	ACUXX-XXXX-XXXXX		Engineer	Revit
Air Handling Unit					
UC_Equipment Standard*	Text	AHUXX-XXXX-XXXXX AHUXX-RETX-XXXXX AHUXX-SUPX-XXXXX	AHU system AHU - return fan AHU - supply fan	Engineer	Revit
Coil Type	Text	Chilled Water; Glycol; Hot Water		Engineer	Revit
Air Handling Condenser					
UC_Equipment Standard*	Text	AHUXX-CUXX-XXXXX		Engineer	Revit
Air Handling Energy Wheel					
UC_Equipment Standard*	Text	AHUXX-HRWX-XXXXX		Engineer	Revit
Backflow Prevention Assembly					
UC_Equipment Standard*	Text	BFPXX-XXXX-XXXXX		Engineer	Revit
Barrier					
UC_Equipment Standard*	Text	BARRX-AIRX-XXXXX BARRX-H2OX-XXXXX	Air curtain Water curtain	Engineer	Revit
Building Management System (BMS)					
UC_Equipment Standard*	Text	BMSXX-FLRX-XXXXX BMSXX-MGMT-XXXXX BMSXX-MODU-XXXXX	Floor level network Mgmt level network Modular building control	Engineer	Revit
Chillers					
UC_Equipment Standard*	Text	CHLLR-XXXX-XXXXX		Engineer	Revit
Compressors					
UC_Equipment Standard*	Text	COMPX-AIRX-XXXXX COMPX-GASX-XXXXX COMPX-REFR-XXXXX	Air compressor Gas compressor Packaged refrigeration	Engineer	Revit

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
Cooling Tower					
UC_Equipment Standard*	Text	COOLX-TOWR-XXXXX COOLX-EVAP-XXXXX	Chilled water cooling Evaporative cooling	Engineer	Revit
Dampers					
UC_Equipment Standard*	Text	DAMPR-FIRE-XXXXX DAMPR-HVAC-XXXXX	Fire/Smoke damper HVAC damper	Engineer	Revit
UC_Duty*	Text	Fire; Smoke Back Draft; Exhaust; Fresh Air; Mix Air; Relief		Engineer	Revit
Elevators					
UC_Equipment Standard*	Text	ELEVA-XXXX-XXXXX		Engineer	Revit
UC_Type*	Text	Hydraulic; Traction		Engineer	Revit
Emergency Shower					
UC_Equipment Standard*	Text	EMESH-UNIT-XXXXX EMESH-XXXX-XXXXX	Shower, eye, sink Shower, eye, dr hose	Engineer	Revit
UC_Duty*	Text	Emergency Body; Emergency Eyewash; Hand Deluge; Portable; Residential Body; Unit - Hand, Eye and Body		Engineer	Revit
Fan Coils					
UC_Equipment Standard*	Text	FCOIL-XXXX-XXXXX		Engineer	Revit
UC_Duty*	Text	Unit Heater; Wall Heater		Engineer	Revit
Fan System					
UC_Equipment Standard*	Text	FANSY-DUST-XXXXX FANSY-EXHX-XXXXX FANSY-FUME-XXXXX FANSY-GENX-XXXXX FANSY-KITC-XXXXX FANSY-LABX-XXXXX FANSY-RETX-XXXXX FANSY-SPUX-XXXXX FANSY-SUPX-XXXXX FANSY-TRAN-XXXXX	Fan - duct collection Fan - exhaust Fan - fume hood Fan - general exhaust Fan - kitchen exhaust Fan - lab exhaust Fan - return air Stair pressurization unit Fan - supply air Fan - transfer	Engineer	Revit
Fan Type	Text	Axial; Centrifugal; Plenum		Engineer	Revit

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
Fire Hoses					
UC_Equipment Standard*	Text	FIREX-HOSE-XXXXX		Engineer	Revit
Fire Suppression System					
UC_Equipment Standard*	Text	FSSYS-XXXX-XXXXX		Engineer	Revit
UC_Duty*	Text	Computer Room; Fire; Kitchen			Revit
Gas Fired Appliance					
UC_Equipment Standard*	Text	GFAXX-XXXX-XXXXX		Engineer	Revit
UC_Duty*	Text	Furnace; Humidifier; Kiln; MUA-Makeup Air Unit; RTU-Direct; RTU-Indirect; Unit Heater		Engineer	Revit
Humidifier					
UC_Equipment Standard*	Text	HUMID-XXXX-XXXXX		Engineer	Revit
Dehumidifier					
UC_Equipment Standard*	Text	HUMID-DEHU-XXXXX		Engineer	Revit
Fan Type	Text	Axial; Centrifugal; Plenum		Engineer	Revit
Lifts and **Cranes**					
UC_Equipment Standard*	Text	LIFTS-AUTO-XXXXX LIFTS-SCIS-XXXXX CRANE-XXXX-XXXXX	Automotive lift/hoist Scissor lift Crane	Engineer	Revit
Meter-Mechanical					
UC_Equipment Standard*	Text	METER-CHWX-XXXXX METER-COND-XXXXX METER-DION-XXXXX METER-DOWA-COLDX METER-DOWA-HOTXX METER-HTGX-XXXXX METER-MWAT-XXXXX METER-NGAS-XXXXX METER-RIVE-XXXXX	Chilled water Condensate Deionized water Domestic cold water Domestic hot water Heating water Makeup water Natural gas River water	Engineer	Revit

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
		METER-STEA-XXXXX	Steam supply		
Piping System					
UC_Equipment Standard*	Text	PIPSY-CAIR-XXXXX PIPSY-CHWX-XXXXX PIPSY-DEWA-XXXXX PIPSY-DOWA-TREA PIPSY-DOWA-XXXXX PIPSY-FUEL-XXXXX PIPSY-GLYX-XXXXX PIPSY-GREY-XXXXX PIPSY-HTGX-XXXXX PIPSY-LAIR-XXXXX PIPSY-LPGX-SITEX PIPSY-MGAS-XXXXX PIPSY-NGXX-XXXXX PIPSY-NPOT-XXXXX PIPSY-RAWT-XXXXX PIPSY-RAWX-XXXXX PIPSY-SANI-BIOSW PIPSY-SANI-LEV2X PIPSY-SANI-XXXXX PIPSY-STEA-XXXXX PIPSY-STRM-XXXXX PIPSY-VACU-XXXXX	Compressed air Chilled water Demineralized water Domestic water Domestic water Fuel transfer Glycol heating system Grey water system Hot water heating sys Lab compressed air Liquefied petrol gas Medical gas Natural gas Non potable water Raw water treatment Raw water Storm water bioswale Sanitary level 2 sys Sanitary dwv Steam supply Storm water Vacuum	Engineer	Revit
Piping System - Fire					
UC_Equipment Standard*	Text	PIPSY-SPRK-XXXXX PIPSY-STND-XXXXX	Fire sprinkler Fire standpipe	Engineer	Revit
UC_Type*	Text	Dry Pipe; Preaction; Sprinkler		Engineer	Revit
UC_Location*	Text	Branch Isolation; Floor Isolation; Riser Isolation; Sprinkler Tree		Engineer	Revit
Pumps					
UC_Equipment Standard*	Text	PUMPX-CHWX-XXXXX PUMPX-COND-XXXXX PUMPX-DOWA-BOOST PUMPX-DOWA-XXXXX PUMPX-FIRE-XXXXX PUMPX-FUEL-XXXXX PUMPX-GLYX-XXXXX PUMPX-GREY-XXXXX PUMPX-HTGX-XXXXX PUMPX-RECR-XXXXX	Pump - chilled water Pump - condensate Domestic water booster Domestic Water Pump - fire system Pump - fuel transfer Pump - glycol system Pump - grey water Pump - heating Pump - recirculating Pump - river water	Engineer	Revit

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
		PUMPX-RIVE-XXXXX PUMPX-SANI-XXXXX PUMPX-STRM-XXXXX PUMPX-VACU-XXXXX PUMPX-WELL-XXXXX PUMPX-XXXX-XXXXX	Pump - sump-sanitary Pump - sump-storm Pump - vacuum Pump - well Pump - general		
Pressure Vessels					
UC_Equipment Standard*	Text	PVARX-XXXX-XXXXX PVCEX-XXXX-XXXXX PVEXT-XXXX-XXXXX PVJVX-XXXX-XXXXX PVSTX-DOWA-XXXXX PVSTX-XXXX-XXXXX PVVTX-XXXX-XXXXX PVXXX-DGTX-XXXXX PVXXX-STER-XXXXX PVXXX-TEST-XXXXX PVXXX-XXXX-XXXXX	PV - air receiver Convertor/exchanger PV - expansion tank PV - steam kettle PV - DHW storage tank PV - storage tank PV - vacuum tank PV - biodigester PV - sterilizer PV - Lab test vessel Pressure vessel	Engineer	Revit
Pressure Vessel - Hot Water Boiler					
UC_Equipment Standard*	Text	PVBXX-XXXX-XXXXX		Engineer	Revit
UC_Type*	Text	Fire Tube; Water Tube		Engineer	Revit
UC_Fuel Type*	Text	Diesel Oil; Electric; Fuel; LPG; Natural Gas		Engineer	Revit
UC_Induction Burner Fan*	Text	Yes; No		Engineer	Revit
Pressure Vessel - Steam Boiler					
UC_Equipment Standard*	Text	PVBXX-STEA-XXXXX		Engineer	Revit
UC_Fuel Type*	Text	Diesel Oil; Electric; Fuel; LPG; Natural Gas		Engineer	Revit
Tank					
UC_Equipment Standard*	Text	TANKX-ADTK-XXXXX TANKX-COND-XXXXX TANKX-DAYX-XXXXX TANKX-DOWA-HOTXX TANKX-FUEL-XXXXX TANKX-GREY-XXXXX TANKX-OILX-XXXXX TANKX-RAWX-XXXXX TANKX-RIVE-XXXXX TANKX-SEDI-XXXXX TANKX-SEPT-XXXXX	Tank - acid dilution Steam condensate Tank - glycol fill day Tank -domestic water Tank - fuel storage Tank - grey water Tank -used oil storage Tank - raw water Tank - river water Tank - sediment Tank - sanitary septic	Engineer	Revit

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
		TANKX-VACU-XXXXX TANKX-WATR-XXXXX	Tank - vacuum Tank - water storage		
Water Cooler / Bottle Filler					
UC_Equipment Standard*	Text	WTCLR- XXXX-XXXXX		Engineer	Revit
Water Treatment System					
UC_Equipment Standard*	Text	WATER-FLTR-XXXXX WATER-RECY-XXXXX WATER-SOFT-XXXXX WATER-TRSY-DIXXX WATER-TRSY-CHEMX WATER-TRSY-GLYXX WATER-TRSY-ROXXX	Water filtration Grey water recycle Water softener Deionized water Chemical/heating wt Glycol treatment Reverse osmosis	Engineer	Revit

6.5.4 Electrical Equipment Asset Specifics

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
Additional Equipment Asset Fields for All Electrical Asset					
UC_Electrical Panel Name*	Text			Engineer	Revit
UC_Electrical Panel Circuit*	Text	Circuit Name/Number		Engineer	Revit
Clock System					
UC_Equipment Standard*	Text	CLOCK-FMXX-XXXXX CLOCK-TIME-XXXXX	Clock - FM Correction Clock - time clock	Engineer	Revit
Controllers					
UC_Equipment Standard*	Text	DSXXX-XXXX-XXXXX FPCXX-XXXX-XXXXX MOTOR-CNTL-XXXXX	Access ctrl hardware Fire pump Motor control center	Engineer	Revit
Dryers					

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
UC_Equipment Standard*	Text	DRYER-CAIR-XXXXX DRYER-HAND-XXXXX DRYER-LINT-XXXXX	Compressed air dryer Hand dryer Clothes	Engineer	Revit
Electric Heaters					
UC_Equipment Standard*	Text	ELECT-HEAT-XXXXX		Engineer	Revit
Fire Alarm System					
UC_Equipment Standard*	Text	FASXX-SMOK-XXXXX FASYS-XXXX-XXXXX	Smoke alarm Fire alarm system	Engineer	Revit
UC_Duty *	Text	Beam Smoke Detector; Bell; Duct Smoke Detector; Fire Alarm Panel; Flow Switch; Heat Detector; Horn; Pull Station; Smoke Detector; Speakers; Strobes		Engineer	Revit
Fixed Gas Detection System					
UC_Equipment Standard*	Text	FGDSX-XXXX-XXXXX		Engineer	Revit
UC_Type*	Text	CH4; CL3; CO; NH3; NH4; O2; R134A		Engineer	Revit
Emergency Power Generator System					
UC_Equipment Standard*	Text	EMPOW-CNTR-XXXXX EMPOW-GENX-STDBY EMPOW-GENX-XXXXX EMPOW-TRAN-XXXXX	Emerg power control Standby generator Emergency generator Emerg transfer switch	Engineer	Revit
High Voltage Distribution (Main Switchgear)					
UC_Equipment Standard*	Text	GROUN-DIST-XXXXX HVOLT-CAPS-XXXXX HVOLT-DBRK-XXXXX HVOLT-DISC-XXXXX HVOLT-DIST-XXXXX HVOLT-DUCT-XXXXX HVOLT-GEAR-XXXXX HVOLT-MANH-XXXXX HVOLT-MTRX-XXXXX HVOLT-NGRX-XXXXX HVOLT-TBRK-XXXXX	Grounding Power fac capacitor Distribution breaker Disconnect switch Distribution cable Dist'n duct bank Switchgear Distribution manhole Metering Neutral grnd resistor Tie breaker	Engineer	Revit
Lighting System					
UC_Equipment Standard*	Text	LIGHT-CONT-XXXXX LIGHT-EMCT-XXXXX	Control equip dimmer Emerg sys centralized	Engineer	Revit

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
		LIGHT-EMPK-XXXXX LIGHT-EXIT-XXXXX LIGHT-EXTB-XXXXX LIGHT-EXTS-XXXXX LIGHT-INTX-XXXXX LIGHT-PLOT-XXXXX	Emerg battery pack Emerg exit lighting Exterior bldg lighting Exterior site lighting Interior bldg lighting Parking lot lighting		
Lamp Type	Text	Fluorescent; HID; HPS; LED; Metal Halide		Engineer	Revit
Fixture Type	Text	Recessed; Surface Mount; Suspended		Engineer	Revit
Low Voltage Distribution (Main Switchgear)					
UC_Equipment Standard*	Text	LVOLT-BORD-XXXXX LVOLT-BRAN-XXXXX LVOLT-CABL-XXXXX LVOLT-DBRK-XXXXX LVOLT-FEED-XXXXX LVOLT-PANL-XXXXX LVOLT-TBRK-XXXXX LVOLT-TVSS-XXXXX	Distribution board Branch wiring&device Cable busduct Distribution breaker Board feeder Panel, breaker, disc Tie breaker TVSS	Engineer	Revit
Meter - Electrical Utility					
UC_Equipment Standard*	Text	METER-ELEC-XXXXX		Engineer	Revit
Motor Starter					
UC_Equipment Standard*	Text	MOTOR-STRX-XXXXX		Engineer	Revit
Power System Conditioners					
UC_Equipment Standard*	Text	HARMO-MITI-XXXXX POWER-QUAL-XXXXX	Harmonic mit reactor Power sys conditioner	Engineer	Revit
Relay					
UC_Equipment Standard*	Text	RELAY-PROT-XXXXX		Engineer	Revit
Solar System					
UC_Equipment Standard*	Text	SOLAR-COLL-XXXXX		Engineer	Revit
Component	Text	Batteries; Photovoltaic Inverter; Photovoltaic Solar Collectors		Engineer	Revit
Transformer					

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
UC_Equipment Standard*	Text	HVOLT-DRYT-XXXXX HVOLT-LIQT-XXXXX LVOLT-TRAN-XXXXX	HV - dry type HV - liquid type LV transformer	Engineer	Revit
Insulating Fluid	Text	PCB; Silicone		Engineer	Revit
UPS System					
UC_Equipment Standard*	Text	LVOLT-UPSC-XXXXX LVOLT-UPST-XXXXX LVOLT-UPSX-XXXXX SWGRX-BATT-XXXXX	BMS power backup Telecom backup UPS system Switchgear backup	Engineer	Revit
Electrical Variable Frequency Drive					
UC_Equipment Standard*	Text	VFDXX-XXXX-XXXXX		Engineer	Revit

Revision History

Revision Date	Version	Description
March 2023	1.0	Baseline version
August 10, 2023	1.0	Added Revision History table to end of document and reset to Version 1.0.
December 2, 2024	2.0	Revised BIM Deliverables - BIM Model LOD Guideline Added Revit Model Requirement - Tolerances Revised data owner of Facility Asset Data “UC_Equipment Standard” Added and deleted some mechanical and electrical equipment