



**UNIVERSITY OF  
CALGARY**

# **BIM / VDC**

## **Contractor Requirement**

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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 Contractor Requirement is a guide to assist the construction team in planning service for creating a VDC to IWMS vision. It provides guidance around the scope of BIM/VDC modeling and metadata required by UCalgary.

Related Design Standard sections:

- Section 8.2.2 Drawing Standard Appendix 2 - Asset Naming Convention
- Section 8.2.3 Drawing Standard Appendix 3 - Equipment Standard
- Section 9.7 Room Naming Convention

Throughout the construction, the following UCalgary departments will review the BIM/VDC, 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 Contractor Requirement, please contact Campus Architecture.

## 2. BIM Deliverables

The Construction Manager (CM) shall ensure that all major trades' models are coordinated and clash free.

Project Phase	BIM/VDC Deliverable	File Format
<b>Contract Award</b>	Outline Construction BIM Execution Plan (BxP-C)	Word or PDF
<b>Construction</b>	Detailed Construction BIM Execution Plan (BxP-C)	Word or PDF
	Equipment barcodes	Photos of equipment
	Facility asset data	
	O&M manual & report of each tagged equipment	PDF
	Reality capture	
<b>Project Closeout</b>	Federated as-built model	Navisworks (NWD)

### 2.1 Construction BIM Execution Plan (BxP-C)

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 Contractor Requirement should serve as a road map for helping create the BxP-C. The Construction Manager (CM) will create a BxP-C outlining the strategy and schedule for utilizing BIM and VDC technology to execute construction related activities and project coordination, and to comply with the requirements set out there. This should be presented in outline form as part of the proposal and upon award should be developed into a complete BxP-C. BxP-C is a live tool for the construction team. Keep UCalgary up to date with any deviations or changes. Required information to be addressed in BxP-C<sup>1</sup>:

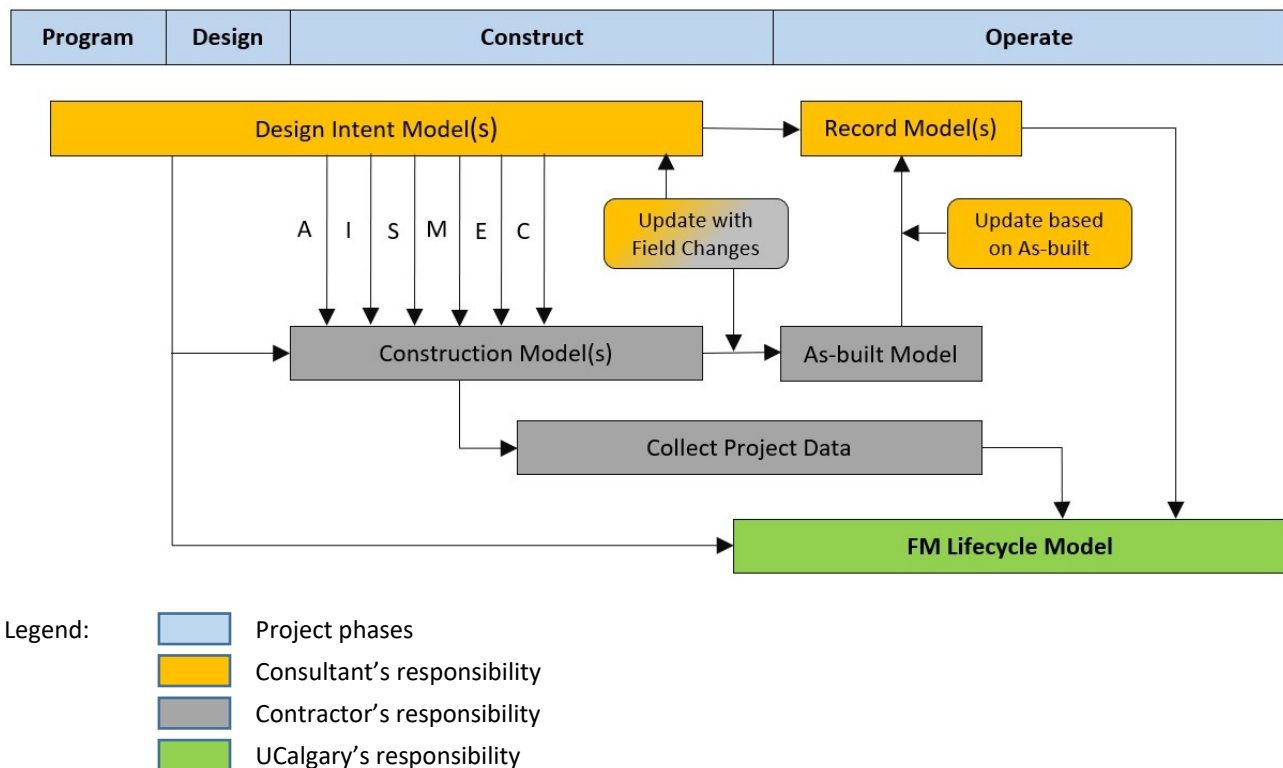
- **Overview Information:** Document the reason for creating the BxP.
- **Project Information:** Include project number, project location, project description, and critical schedule dates for future reference.
- **Key Project Personnel Contacts**
- **Project Goals / BIM Objectives:** Document the strategic 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.
- **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.

<sup>1</sup> UCalgary references The Pennsylvania State University BIM Project Execution Planning Guide - Version 2.2.

- **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. The construction models are to be developed during construction by the CM, contractor and/or sub-trades. As-built model(s) shall be provided by the CM at the end of construction for consultant to complete the record model(s).



*Figure 2.2 Lifecycle Model Process*

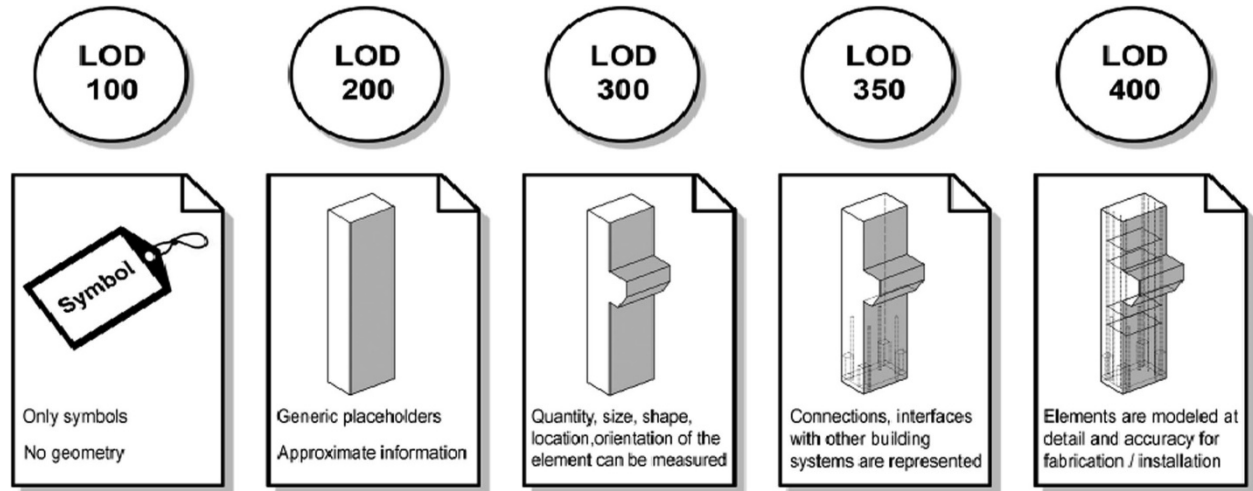
**2.2.1 BIM Model Level of Development (LOD)**


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. The CM shall continue to develop once the contract is awarded, and submit with the BxP-C.

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

**2.2.2 Federated Coordination Model**

All construction modeling should reflect the exact geometric properties of the materials and/or systems being submitted. These models may include fabrication, shop drawing and other models for coordination. Once federated with all the design, construction, sub-trade, etc. models, this is to be referred to as the coordination model.

The CM will work with the design team and sub-trades to respond the RFIs and submittals, and will adjust the construction models accordingly while also using it for constructability analysis. If so determined in the BXP-C, the CM’s construction model may replace the design model during construction and within the coordination model. Sub-trade models are to be analyzed based on the design and be incorporated into the coordination model.

**2.2.3 Federated Construction Model**

Models based on submittals, RFI’s, or owner-directed changes; maintaining the model during construction based on construction activities and developed to reflect the actual fabrication of the building. These models are to include fabrication, shop drawing and other models developed during coordination and constructability reviews. The model is to always reflect the revised contract documents and can be used for scheduling analysis, construction sequencing if so desired.

The consultants will respond to the RFIs and submittals, and adjust the design models accordingly. The contractor will update this model throughout construction with supplier and sub-trade models.

#### 2.2.4 Federated As-built Model

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.

### 2.3 Equipment Barcode

The contractor is responsible for assigning equipment barcode and placing the equipment plate on the equipment on-site following the Appendix A “Barcode Placement Standard Operating Procedures.” UCalgary Facilities Management (FM) provides the contractor with a series of ‘peel and stick’ barcode numbers, metal plates and cable ties. UCalgary requires the contractor to submit photos of equipment with the installed barcodes.

If the project upgrades or replaces existing equipment, submit a list of the old barcodes, together with data (like the plate information of vessels) when these are removed or replaced.

### 2.4 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.

### 2.5 O&M Manual & Report

Contractors must submit the O&M manual & report of individual equipment items, floor and roof finish types in a combined PDF. The PDF file naming convention is

[UCalgary Building Code]-[Equipment Tag or Floor/Roof Finish Type].pdf

One document can cover multiple equipment units. The file name can be altered to follow these examples:

- ABC-AHU-1.pdf (AHU #1 in building ABC)
- ABC- P-DOWA-2\_4.pdf (Domestic water pump #2 to #4 in building ABC)

Record the file name in the field asset management software. The document must contain the following information:

- Commissioning functional tests
- Field test reports

- Job, resource & spare information
- Manufacture certificates
- Manufacture installation instructions
- Manufacturer test reports
- Material test reports
- Materials certificates
- Operations & maintenance manual
- Product certificates
- Product data
- Product test reports
- Shop drawings
- Spare parts list
- Start-up report
- As-built finish schedule
- Warranty

## 2.6 Reality Capture

The contractor is required to deliver the following reality capture. The data format and the data storage medium shall be defined in the BxP-C for acceptability.

### 2.6.1 Laser Scanning

At a minimum, scan all mechanical rooms, electrical rooms and washrooms. Where required by the project, scan additional spaces such as laboratories, surgery spaces, imaging rooms, etc. that have a significant amount of concealed services above the ceiling and/or behind walls.

- Scan at two project phases: prior to being enclosed (pre-board) and project close-out.
- Capture all equipment or rough-in details with installed barcodes and lamacoid plates
- Legible nameplates of all barcoded equipment where visible in the laser scan (otherwise please include in the 360-degree photo)
- Align the scan point cloud to match project coordinates
- RCP scan file format is required.

### 2.6.2 360-degree photos

The contractor shall provide digital 360-degree photographs of the spaces/rooms/equipment not included in the laser scanning (2.6.1 above).

- Photograph at two project phases: prior to being enclosed (pre-board) and project close-out.
- Space photographs need to capture all walls, ceilings, floors or slabs in the concealed spaces.
- Capture equipment or rough-in details with installed barcodes and lamacoid plates
- Legible nameplates of all barcoded equipment

The file naming convention of equipment photo is:

[UCalgary Building Code]-[Equipment Tag]\_[Sequence of photos if multiple files for one equipment]

- Equipment tag examples: AHU-1, SPU-1
- The sequence number is 1, 2, 3, etc.



### 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 Construction BIM Kickoff Meeting

After award of the project, the contractor shall facilitate a project BIM kickoff meeting, which will review UCalgary BIM/VDC Requirements and the Construction BIM Execution Plan (BxP-C).

##### 3.1.2 Barcode Orientation Meeting

Prior to installation of the first barcode, the contractor shall facilitate a barcode orientation meeting. UCalgary FM representative will review barcode installation requirements and answer questions from the construction team.

##### 3.1.3 Contractor's VDC Meeting

Consultants should attend all relevant VDC meetings during construction.

#### 3.2 Facility Asset Data Collection

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 this document be followed so they can be validated by the UCalgary's IWMS. The integration of the as-built data into the IWMS is critical to UCalgary's 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's data specifications have indicated how to format design and construction data so it can be consumed downstream into the facility software. The data sets include information necessary to building operation, all of which is integrated into this BIM/VDC workflow.

Quarterly, at a minimum, the CM shall include UCalgary and all BIM managers in a meeting for the purpose of assessing and/or executing FM data reviews and/or transfers from the construction process. The CM will be responsible for coordinating with UCalgary to ensure all custom metadata fields and documentation needed for facilities O&M are produced and filed correctly. It will be the UCalgary's responsibility to integrate systems so that metadata and documentation is transferred to the IWMS.

Many data identified in *BIM/VDC Requirement* are collected by the contractors once the equipment are installed. The contractors submit individual equipment data in an agreed format, and identify equipment parent and child relationship. The contractors will also verify the required design data with the actual equipment on site.

## 4. Technology

### 4.1 Authoring Software

All contractors 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 construction 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 trades shall be responsible for updating their models to reflect the coordinated resolution.

### 4.3 Field Asset Management Tool (FAMT)

A secure, cloud-based, web or mobile Field Asset Management application that delivers a complete field management solution shall be used. This system will electronically enable workflows for quality, commissioning and document management processes in the field and in the office; proven to reduce rework, delays and eliminate paper.

- Autodesk BIM 360 Field, or agreed software

### 4.4 Additional Tools

The construction 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

The following requirements apply to both design intent models and construction models.

### 5.1 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 (Design BIM Execution Plan). 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 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.

### 5.3 Tolerances

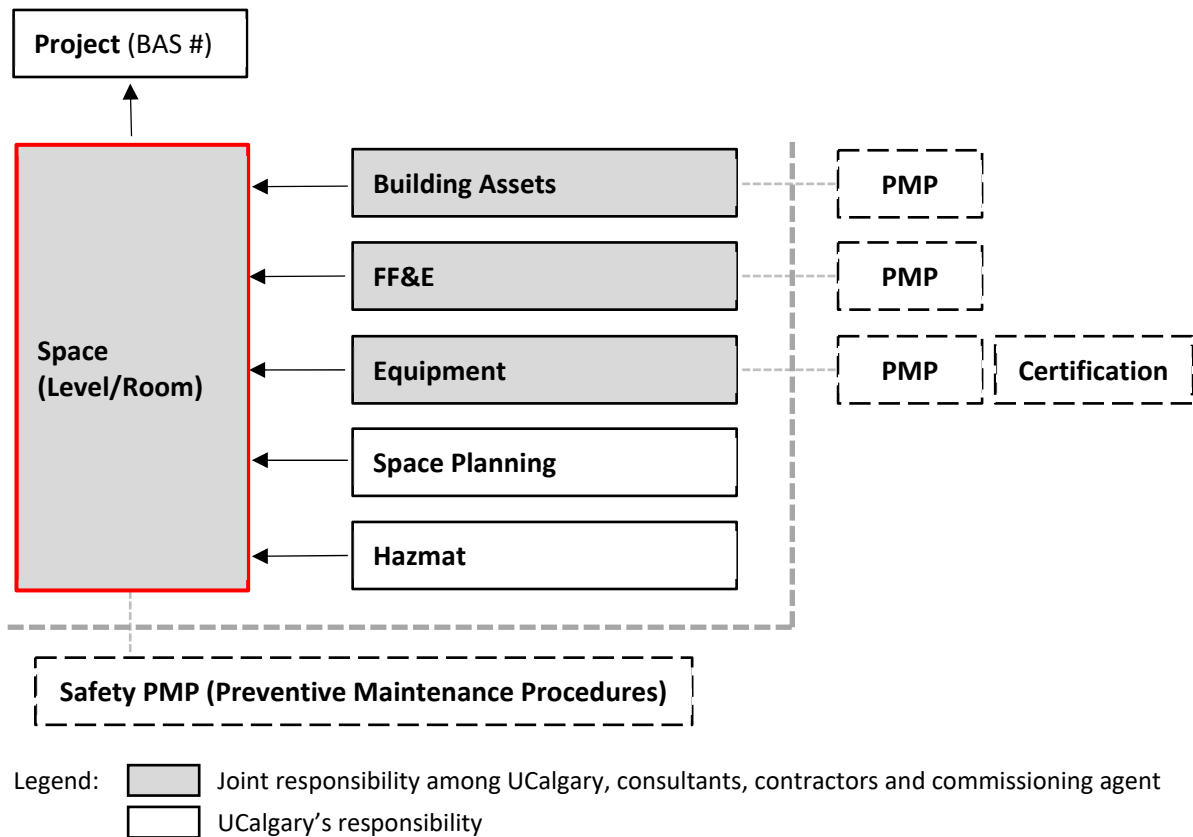
According to State of Minnesota BIM GUIDELINE (2014), “‘Model Tolerance’ is different from ‘Field Tolerance’ that will vary for different trades based on their specifications. This model tolerance is a measure of accuracy of the model objects as they are placed in the 3D BIM. Even if the objects in the 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).

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

## 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. Some equipment assets contain the "common" components (e.g. motor) with metadata, which are gathered as child equipment group. 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:** If a Data Owner is listed as Architect or Engineer, this data is entered in the design intent model by the consultant, and is required to be verified against the installed equipment by the contractor. Any deficiency should be reported back to the consultant. The Contractor’s fields of responsibility must be complete upon installation of all equipment on site.
- **Authoring Software:** Refer to section 4.1 Authoring Software and section 4.3 Field Asset Management Tool (FAMT).

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 install the barcode and populate the data in the construction model.
- **UC\_Equipment Standard:** The consultant team creates this shared parameter in Revit as a placeholder and leave the value blank. UCalgary inventories assets by using a universally applied Equipment Standard, which naming convention is described in [Design Standards](#) section 8.2.3 *Equipment Standard*. The possible data are listed for the contractors to understand which asset UCalgary tracks in IWMS. UCalgary FM team will populate the data in the Field Asset Management Tool (FAMT).
- **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	Stairwell [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

- **Require IP Address:** Field value is Yes, No, N/A. Contractor coordinates with UCalgary Central IT and inputs whether the equipment has an IP address or not. If an equipment with IP address is decommissioned or replaced, the trade will have to coordinate with Central IT.
- **Warranty Start Date:** If the warranty start date is unknown, the date of substantial performance shall be used.

Further requirements:

- **Format of date:** is YYYY-MM-DD. It is not acceptable to only fill in the year.
- **Unit of measurement:** Include unit of measurement with an equipment field value, which should be taken from the manufacture plate or manual.

### 6.3 Equipment Barcode

Refer to Appendix A “Barcode Placement Standard Operating Procedures”, UCalgary barcodes equipment based on building (e.g., distribution breaker), system (e.g., piping), or unit (e.g., AHU).

When physical barcodes are impossible to be installed to some equipment, the barcode number will still be used and logged in the UCalgary IWMS. The physical barcode tag shall not be used for other equipment, and needs to be returned to the Facilities Maintenance Planning team. For example, AHU fan wall system will be physically barcoded, and each single fan unit shall be “virtually” barcoded.

The “common” equipment components (e.g. motor) in child equipment group are not barcoded.

#### 6.4 Space Asset Fields

Contractor will verify room number, finishes of wall, ceiling and wall base on site, and report any deficiency on the drawing to the consultant.

#### 6.5 Building Asset Fields

AEC Parameter	Parameter Type	Data Format	Data Owner	Authoring Software
<b>Floor Finish</b>				
UC_Equipment Barcode*	Text	Up to 8 characters	Contractor	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: Type	Text	Carpet; Laminate; LVT; Metal; Polished Concrete; Quarry; RSF; Rubber; Stone; Terrazzo; Tile; VCT; Wood	Architect or Interior Designer	Revit
Manufacturer	Text	Up to 32 characters	Contractor	FAMT
Model Number	Text	Up to 32 characters	Contractor	FAMT
Date of Manufacture	Date	yyyy-mm-dd	Contractor	FAMT
Warranty Start Date	Date	yyyy-mm-dd	Contractor	FAMT
Warranty Duration	Number	year	Contractor	FAMT
O&M Manual	Text	Up to 32 characters	Contractor	FAMT
<b>Roof Finish</b>				
UC_Equipment Barcode*	Text	Up to 8 characters	Contractor	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 Type	Text	Up to 32 characters	Architect	Revit
Manufacturer	Text	Up to 32 characters	Contractor	FAMT

AEC Parameter	Parameter Type	Data Format	Data Owner	Authoring Software
Model Number	Text	Up to 32 characters	Contractor	FAMT
Date of Manufacture	Date	yyyy-mm-dd	Contractor	FAMT
Install Date	Date	yyyy-mm-dd	Contractor	FAMT
Warranty Start Date	Date	yyyy-mm-dd	Contractor	FAMT
Warranty Duration	Number	year	Contractor	FAMT
O&M Manual	Text	Up to 32 characters	Contractor	FAMT

## 6.6 Equipment and FF&E Asset Fields

### 6.6.1 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	Contractor	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 <a href="#">Facilities Building List</a>
Level	Text	Up to 4 characters	Architect	Revit	UC provides info
Rooms: Number	Text	Up to 8 characters	Architect	Revit	Refer to <a href="#">DS</a> 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
Require IP Address	Text	Yes, No, N/A	Contractor	FAMT	Refer to section 6.2
MAC Address	Text	Up to 32 characters	Contractor	FAMT	
Manufacturer	Text	Up to 32 characters	Contractor	FAMT	
Model Number	Text	Up to 32 characters	Contractor	FAMT	
Serial Number	Text	Up to 32 characters	Contractor	FAMT	
Date of Manufacture	Date	yyyy-mm-dd	Contractor	FAMT	Refer to section 6.2
Install Date	Date	yyyy-mm-dd	Contractor	FAMT	Refer to section 6.2
Warranty Start Date	Date	yyyy-mm-dd	Contractor	FAMT	Refer to section 6.2
Warranty Duration	Number	year	Contractor	FAMT	
Recommended Maintenance Frequency	Text	Up to 16 characters	Contractor	FAMT	
O&M Manual	Text	Up to 32 characters	Contractor	FAMT	Refer to section 2.7



**6.6.2 FF&E Asset Specifics**

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
<b>Dock Leveler</b>					
UC_Equipment Standard*	Text	DOCKL-HYDR-XXXXX DOCKL-MECH-XXXXX	Hydraulic Mechanical	Engineer	Revit
<b>Fume Hood</b>					
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
Hood Volume	Text	CFM		Contractor	FAMT

**6.6.3 Mechanical Equipment Asset Specifics**

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
<b>Air Conditioning Unit / Air Conditioning Condenser</b>					
UC_Equipment Standard*	Text	ACUXX-XXXX-XXXXX		Engineer	Revit
Capacity	Text	KW; Tons		Contractor	FAMT
Motor	Text	Yes; No		Contractor	FAMT
Compressor Type	Text	Centrifugal; Heat Pump; Magnetic; Screw		Contractor	FAMT
Number of Compressors	Text			Contractor	FAMT
R-Type	Text			Contractor	FAMT
Full Factory Refrigerant Charged	Text	Kg; LBS/OZ		Contractor	FAMT
Motor Group (Multiple)					
<b>Air Handling Unit</b>					
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
Capacity	Text	KW; Tons; BTU		Contractor	FAMT
Variable Speed Drive	Text			Contractor	FAMT
Fan Volume	Text	CFM		Contractor	FAMT
Total Static Pressure	Text	kPa; inch-w/c		Contractor	FAMT

AEC Parameter	Parameter Type	Data Format	Data Owner	Authoring Software
Type of Control	Text	DDC; Pneumatic	Contractor	FAMT
Energy Recovery	Text	Energy Wheel; Heat Pipe; Runaround Coil	Contractor	FAMT
Motor Group (Multiple)				
Coil Group (Multiple)				
<b>Air Handling Condenser</b>				
UC_Equipment Standard*	Text	AHUXX-CUXX-XXXXX	Engineer	Revit
Capacity	Text	KW; Tons	Contractor	FAMT
Motor	Text	Yes; No	Contractor	FAMT
Compressor Type	Text	Centrifugal; Heat Pump; Magnetic; Screw	Contractor	FAMT
Number of Compressors	Text		Contractor	FAMT
R-Type	Text		Contractor	FAMT
Full Factory Refrigerant Charged	Text	Kg; LBS/OZ	Contractor	FAMT
Motor Group (Multiple)				
<b>Air Handling Energy Wheel</b>				
UC_Equipment Standard*	Text	AHUXX-HRWX-XXXXX	Engineer	Revit
Motor Group (Multiple)				
<b>Backflow Prevention Assembly</b>				
UC_Equipment Standard*	Text	BFPXX-XXXX-XXXXX	Engineer	Revit
Size	Text	in	Contractor	FAMT
<b>Barrier</b>				
UC_Equipment Standard*	Text	BARRX-AIRX-XXXXX BARRX-H2OX-XXXXX	Air curtain Water curtain	Engineer Revit
Capacity	Text	BTU/Hr	Contractor	FAMT
Transmission	Text	Belt Drive; Direct Drive	Contractor	FAMT
Motor Capacity	Text	KW; HP	Contractor	FAMT
Motor Voltage	Text	V	Contractor	FAMT
Motor Amperage	Text	A	Contractor	FAMT
Motor Speed	Text	RPM	Contractor	FAMT
Fan Model Number	Text		Contractor	FAMT
Fan Number	Text		Contractor	FAMT

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
<b>Building Management System (BMS)</b>					
UC_Equipment Standard*	Text	BMSXX-FLRX-XXXXX BMSXX-MGMT-XXXXX BMSXX-MODU-XXXXX	Floor level network Mgmt level network Modular building control	Engineer	Revit
Software Version (network)	Text			Contractor	FAMT
Firmware Version (Building)	Text			Contractor	FAMT
Application Number (FLN)	Text			Contractor	FAMT
<b>Chillers</b>					
UC_Equipment Standard*	Text	CHLLR-XXXX-XXXXX		Engineer	Revit
Capacity	Text	KW; Tons		Contractor	FAMT
Variable Speed Drive	Text	Yes; No		Contractor	FAMT
Compressor Type	Text	Centrifugal; Heat Pump; Magnetic; Reciprocating; Screw		Contractor	FAMT
Number of Compressors	Text			Contractor	FAMT
R-Type	Text			Contractor	FAMT
Full Factory Refrigerant Charged	Text	Kg; LBS/OZ		Contractor	FAMT
Evaporator Flow Rate	Text	LPS; GPM		Contractor	FAMT
Evaporator Fluid Type	Text			Contractor	FAMT
Condenser Flow Rate	Text	LPS; GPM		Contractor	FAMT
Motor Group (Multiple)					
<b>Compressors</b>					
UC_Equipment Standard*	Text	COMPX-AIRX-XXXXX COMPX-GASX-XXXXX COMPX-REFR-XXXXX	Air compressor Gas compressor Packaged refrigeration	Engineer	Revit
Type	Text	Centrifugal; Heat Pump; Magnetic; Screw		Contractor	FAMT
Number of Compressors	Text			Contractor	FAMT
R-Type	Text			Contractor	FAMT
Full Factory Refrigerant Charged	Text	Kg; LBS/OZ		Contractor	FAMT
Motor Group (Multiple)					
<b>Cooling Tower</b>					
UC_Equipment Standard*	Text	COOLX-TOWR-XXXXX COOLX-EVAP-XXXXX	Chilled water cooling Evaporative cooling	Engineer	Revit
Capacity	Text	KW; Tons		Contractor	FAMT

AEC Parameter	Parameter Type	Data Format	Data Owner	Authoring Software
Variable Speed Drive	Text	Yes; No	Contractor	FAMT
Nominal Evaporator Flow Rate	Text	LPS; GPM	Contractor	FAMT
Water Treatment	Text		Contractor	FAMT
Package Unit	Text	Yes; No	Contractor	FAMT
Motor Group				
<b>Dampers</b>				
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
Damper Model Number	Text			Contractor FAMT
Blade Type	Text	OB; PB		Contractor FAMT
Drive Position	Text	Left; Right; Both		Contractor FAMT
Install Type	Text	IN; FL; EF		Contractor FAMT
Actuator Model Number	Text			Contractor FAMT
Actuator Type	Text	Electronic; Pneumatic		Contractor FAMT
<b>Elevators</b>				
UC_Equipment Standard*	Text	ELEVA-XXXX-XXXXX		Engineer Revit
UC_Type*	Text	Hydraulic; Traction		Engineer Revit
AEDARSA Number	Text			Contractor FAMT
Lifting Capacity	Text	KG		Contractor FAMT
Pump Manufacturer	Text			Contractor FAMT
Pump Model Number	Text			Contractor FAMT
Pump Serial Number	Text			Contractor FAMT
Elevator Capture	Text	Yes; No		Contractor FAMT
Elevator Alternative Floor	Text	Yes; No		Contractor FAMT
Motor Group				
<b>Emergency Shower</b>				
UC_Equipment Standard*	Text	EMESH-UNIT-XXXXX EMESH-XXXX-XXXXX	Shower, eye, sink Shower, eye, dr hose	Engineer Revit

AEC Parameter	Parameter Type	Data Format	Data Owner	Authoring Software
UC_Duty*	Text	Emergency Body; Emergency Eyewash; Hand Deluge; Portable; Residential Body; Unit - Hand, Eye and Body	Engineer	Revit
<b>Fan Coils</b>				
UC_Equipment Standard*	Text	FCOIL-XXXX-XXXXX	Engineer	Revit
UC_Duty*	Text	Unit Heater; Wall Heater	Engineer	Revit
Capacity	Text	BTU/Hr	Contractor	FAMT
Transmission	Text	Belt Drive; Direct Drive	Contractor	FAMT
Motor Capacity	Text	KW; HP	Contractor	FAMT
Motor Voltage	Text	V	Contractor	FAMT
Motor Amperage	Text	A	Contractor	FAMT
Motor Speed	Text	RPM	Contractor	FAMT
Fan Model Number	Text		Contractor	FAMT
Fan Number	Text		Contractor	FAMT
<b>Fan System</b>				
UC_Equipment Standard*	Text	FANSY-DUST-XXXXX    Fan - duct collection FANSY-EXHX-XXXXX    Fan - exhaust FANSY-FUME-XXXXX    Fan - fume hood FANSY-GENX-XXXXX    Fan - general exhaust FANSY-KITC-XXXXX    Fan - kitchen exhaust FANSY-LABX-XXXXX    Fan - lab exhaust FANSY-RETX-XXXXX    Fan - return air FANSY-SPUX-XXXXX    Stair pressurization unit FANSY-SUPX-XXXXX    Fan - supply air FANSY-TRAN-XXXXX    Fan - transfer	Engineer	Revit
Fan Type	Text	Axial; Centrifugal; Plenum	Engineer	Revit
Fan Group				
Motor Group				
<b>Fire Hoses</b>				
UC_Equipment Standard*	Text	FIREX-HOSE-XXXXX	Engineer	Revit
Connection Size	Number	mm; in	Contractor	FAMT
Length	Number	m; ft	Contractor	FAMT
Forestry Fire Fighting Hose	Text	Yes; No	Contractor	FAMT

AEC Parameter	Parameter Type	Data Format	Data Owner	Authoring Software
<b>Fire Suppression System</b>				
UC_Equipment Standard*	Text	FSSYS-XXXX-XXXXX	Engineer	Revit
UC_Duty*	Text	Computer Room; Fire; Kitchen	Engineer	Revit
Number of Tanks Required	Text		Contractor	FAMT
Type of Chemical	Text	CO; Inergen; Kitchen Agent; Sapphire	Contractor	FAMT
Capacity	Text		Contractor	FAMT
<b>Gas Fired Appliance</b>				
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
CFM	Text	LPS; CFM	Contractor	FAMT
Capacity	Text	KW; BTU	Contractor	FAMT
Type of Control	Text	DDC; Electric; Pneumatic	Contractor	FAMT
Fuel Type	Text	Natural Gas; Petroleum; Propane	Contractor	FAMT
Package Unit	Text	Yes; No	Contractor	FAMT
<b>Motor Group</b>				
<b>Humidifier</b>				
UC_Equipment Standard*	Text	HUMID-XXXX-XXXXX	Engineer	Revit
Capacity	Text	LB/Hr; GPM	Contractor	FAMT
Medium	Text	Steam; Water	Contractor	FAMT
Fan	Text	Yes; No	Contractor	FAMT
<b>Dehumidifier</b>				
UC_Equipment Standard*	Text	HUMID-DEHU-XXXXX	Engineer	Revit
Fan Type	Text	Axial; Centrifugal; Plenum	Engineer	Revit
Capacity	Text	Tons	Contractor	FAMT
Compressor Type	Text	Centrifugal; Heat Pump; Magnetic; Screw	Contractor	FAMT
Number of Compressors	Text		Contractor	FAMT
R-Type	Text		Contractor	FAMT
Full Factory Refrigerant Charged	Text	Kg; LBS/OZ	Contractor	FAMT
<b>Fan Group</b>				
<b>Motor Group (Multiple)</b>				

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
<b>Lifts and Cranes</b>					
UC_Equipment Standard*	Text	LIFTS-AUTO-XXXXX LIFTS-SCIS-XXXXX CRANE-XXXX-XXXXX	Automotive lift/hoist Scissor lift Crane	Engineer	Revit
Capacity	Text	Kg		Contractor	FAMT
Motor Manufacturer	Text			Contractor	FAMT
Motor Model	Text			Contractor	FAMT
Motor Serial Number	Text			Contractor	FAMT
Motor Cat No.	Text			Contractor	FAMT
Motor Capacity	Text	KW; HP		Contractor	FAMT
<b>Meter-Mechanical</b>					
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 METER-STEAM-XXXXX	Chilled water Condensate Deionized water Domestic cold water Domestic hot water Heating water Makeup water Natural gas River water Steam supply	Engineer	Revit
Flow Range Minimum	Text	LPS; GPM		Contractor	FAMT
Flow Range Maximum	Text	LPS; GPM		Contractor	FAMT
Pipe Size	Text	In		Contractor	FAMT
Pipe Schedule	Text	20; 40; 80; 120; 140; 160		Contractor	FAMT
Pipe Material	Text	Cast-iron; Copper; PVC		Contractor	FAMT
Flange to Flange	Text	mm; in		Contractor	FAMT
Pressure	Text	High; Low		Contractor	FAMT
Rotor Size (Steam Meter)	Text			Contractor	FAMT
<b>Piping System</b>					
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	Compressed air Chilled water Demineralized water Domestic water Domestic water Fuel transfer Glycol heating system Grey water system	Engineer	Revit

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
		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-STEAM-XXXXX PIPSY-STRM-XXXXX PIPSY-VACU-XXXXX	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		
System Volume	Text	L		Contractor	FAMT
Pipe Schedule	Text	20; 40; 80; 120; 140; 160		Contractor	FAMT
Stainless Steel Type	Text	304; 316; 409; 410; 430		Contractor	FAMT
<b>Piping System - Fire</b>					
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
Pipe Schedule	Text	20; 40; 80; 120; 140; 160		Contractor	FAMT
Stainless Steel Type	Text	304; 316; 409; 410; 430		Contractor	FAMT
System Volume	Text	L		Contractor	FAMT
System Pressure	Text	kPa ; PSI		Contractor	FAMT
Glycol Level/Strength	Text	DEG C; DEG F		Contractor	FAMT
Water Flow	Text	Supervised; Timing		Contractor	FAMT
Isolation Valve Supervisory	Text	Yes; No		Contractor	FAMT
<b>Pumps</b>					
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	Pump - chilled water Pump - condensate Domestic water booster Domestic Water Pump - fire system Pump - fuel transfer Pump - glycol system Pump - grey water	Engineer	Revit



AEC Parameter	Parameter Type	Data Format	Data Owner	Authoring Software
		PUMPX-HTGX-XXXXX Pump - heating PUMPX-RECR-XXXXX Pump - recirculating PUMPX-RIVE-XXXXX Pump - river water PUMPX-SANI-XXXXX Pump - sump-sanitary PUMPX-STRM-XXXXX Pump - sump-storm PUMPX-VACU-XXXXX Pump - vacuum PUMPX-WELL-XXXXX Pump - well PUMPX-XXXX-XXXXX Pump - general		
Volume Flow Rate	Text	LPS; GPM	Contractor	FAMT
Head Pressure	Text	kPa ; PSI	Contractor	FAMT
Motor Group				
<b>Pressure Vessels</b>				
UC_Equipment Standard*	Text	PVARX-XXXX-XXXXX PV - air receiver PVCEX-XXXX-XXXXX Convertor/exchanger PVEXT-XXXX-XXXXX PV - expansion tank PVJVX-XXXX-XXXXX PV - steam kettle PVSTX-DOWA-XXXXX PV - DHW storage tank PVSTX-XXXX-XXXXX PV - storage tank PVVTX-XXXX-XXXXX PV - vacuum tank PVXXX-DGTX-XXXXX PV - biodigester PVXXX-STER-XXXXX PV - sterilizer PVXXX-TEST-XXXXX PV - Lab test vessel PVXXX-XXXX-XXXXX Pressure vessel	Engineer	Revit
CRN Number	Text		Contractor	FAMT
ABSA Number	Text		Contractor	FAMT
NB Number	Text		Contractor	FAMT
MAWP (Max Allowable Working Pressure)	Text	kPa ; PSI	Contractor	FAMT
MDMT (Min Design Material Temperature)	Text	DEG F; DEG C	Contractor	FAMT
Minimum Design Material pressure	Text	mm; in	Contractor	FAMT
<b>Pressure Vessel - Hot Water Boiler</b>				
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
Capacity	Text	KW; BTU	Contractor	FAMT

AEC Parameter	Parameter Type	Data Format	Data Owner	Authoring Software
Maximum Operating Pressure	Text	kPa ; PSI	Contractor	FAMT
Normal Operating Pressure	Text	kPa ; PSI	Contractor	FAMT
Temperature Pressure Relief Valve Size	Text	kPa ; PSI	Contractor	FAMT
Temperature Pressure Relief Discharge Rate	Text	BTU/Hr	Contractor	FAMT
Fan Manufacture	Text		Contractor	FAMT
Fan Model Number	Text		Contractor	FAMT
Fan Serial Number	Text		Contractor	FAMT
CRN Number	Text		Contractor	FAMT
ABSA Number	Text		Contractor	FAMT
NB Number	Text		Contractor	FAMT
MAWP (Max Allowable Working Pressure)	Text	kPa ; PSI	Contractor	FAMT
MDMT (Min Design Material Temperature)	Text	DEG F; DEG C	Contractor	FAMT
Minimum Design Material pressure	Text	mm; in	Contractor	FAMT
<b>Pressure Vessel - Steam Boiler</b>				
UC_Equipment Standard*	Text	PVBXX-STEAM-XXXXX	Engineer	Revit
UC_Fuel Type*	Text	Diesel Oil; Electric; Fuel; LPG; Natural Gas	Engineer	Revit
Capacity	Text	KW; LBS/Hr	Contractor	FAMT
Heating Surface Area	Text	Ft <sup>2</sup>	Contractor	FAMT
Maximum Operating Pressure	Text	kPa ; PSI	Contractor	FAMT
Normal Operating Pressure	Text	kPa ; PSI	Contractor	FAMT
Number of Sections	Text		Contractor	FAMT
Pressure Relief Valve	Text	kPa ; PSI	Contractor	FAMT
Temperature Pressure Relief Discharge Rate	Text	BTU/Hr	Contractor	FAMT
Induction Burner Fan	Text	Yes; No	Contractor	FAMT
Fan Manufacture	Text		Contractor	FAMT
Fan Model Number	Text		Contractor	FAMT
Fan Serial Number	Text		Contractor	FAMT
CRN Number	Text		Contractor	FAMT
ABSA Number	Text		Contractor	FAMT

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
NB Number	Text			Contractor	FAMT
MAWP (Max Allowable Working Pressure)	Text	kPa ; PSI		Contractor	FAMT
MDMT (Min Design Material Temperature)	Text	DEG F; DEG C		Contractor	FAMT
Minimum Design Material pressure	Text	mm; in		Contractor	FAMT
<b>Tank</b>					
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 TANKX-VACU-XXXXX TANKX-WATR-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 Tank - vacuum Tank - water storage	Engineer	Revit
<b>Water Cooler / Bottle Filler</b>					
UC_Equipment Standard*	Text	WTCLR-XXXX-XXXXX		Engineer	Revit
<b>Water Treatment System</b>					
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
Size	Text	L; GAL		Contractor	FAMT
UV Conditioning	Text	Yes; No		Contractor	FAMT
Chemical Injection	Text	Yes; No		Contractor	FAMT

**6.6.4 Electrical Equipment Asset Specifics**

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
<b>Additional Equipment Asset Fields for All Electrical</b>					
UC_Electrical Panel Name*	Text			Engineer	Revit
UC_Electrical Panel Circuit*	Text	Circuit Name/Number		Engineer	Revit
Voltage	Text	V		Contractor	FAMT
Phase	Text	1; 3		Contractor	FAMT
Hertz	Text	HZ		Contractor	FAMT
Ampacity	Text	A		Contractor	FAMT
Maximum Overload Protection	Text	FLA		Contractor	FAMT
<b>Clock System</b>					
UC_Equipment Standard*	Text	CLOCK-FMXX-XXXXX CLOCK-TIME-XXXXX	Clock - FM Correction Clock - time clock	Engineer	Revit
<b>Controllers</b>					
UC_Equipment Standard*	Text	DSXXX-XXXX-XXXXX FPCXX-XXXX-XXXXX MOTOR-CNTL-XXXXX	Access ctrl hardware Fire pump Motor control center	Engineer	Revit
<b>Dryers</b>					
UC_Equipment Standard*	Text	DRYER-CAIR-XXXXX DRYER-HAND-XXXXX DRYER-LINT-XXXXX	Compressed air dryer Hand dryer Clothes	Engineer	Revit
<b>Electric Heaters</b>					
UC_Equipment Standard*	Text	ELECT-HEAT-XXXXX		Engineer	Revit
Capacity	Text	KW		Contractor	FAMT
<b>Fire Alarm System</b>					
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

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
<b>Fixed Gas Detection System</b>					
UC_Equipment Standard*	Text	FGDSX-XXXX-XXXXX		Engineer	Revit
UC_Type*	Text	CH4; CL3; CO; NH3; NH4; O2; R134A		Engineer	Revit
Span Level	Text	%; ppm		Contractor	FAMT
Warning Level	Text	%; ppm		Contractor	FAMT
Alarm Level	Text	%; ppm		Contractor	FAMT
Date of the Sensor Installation	Text	yyyy-mm-dd		Contractor	FAMT
<b>Emergency Power Generator System</b>					
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
Capacity	Text	KW		Contractor	FAMT
Fuel Type	Text	Diesel; Natural Gas; Propane; Biofuel		Contractor	FAMT
KVA Rating	Text	KVA		Contractor	FAMT
<b>High Voltage Distribution (Main Switchgear)</b>					
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
Wire Size	Text	AWG		Contractor	FAMT
Cable Percentage	Text	%		Contractor	FAMT
Primary Voltage	Text	V		Contractor	FAMT
Secondary Voltage	Text	V		Contractor	FAMT
Switchgear Type	Text	Air; Gas; Vacuum		Contractor	FAMT
Nema Rating	Text			Contractor	FAMT

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
<b>Lighting System</b>					
UC_Equipment Standard*	Text	LIGHT-CONT-XXXXX LIGHT-EMCT-XXXXX LIGHT-EMPK-XXXXX LIGHT-EXIT-XXXXX LIGHT-EXTB-XXXXX LIGHT-EXTS-XXXXX LIGHT-INTX-XXXXX LIGHT-PLOT-XXXXX	Control equip dimmer Emerg sys centralized Emerg battery pack Emerg exit lighting Exterior bldg lighting Exterior site lighting Interior bldg lighting Parking lot lighting	Engineer	Revit
Lamp Type	Text	Fluorescent; HID; HPS; LED; Metal Halide		Engineer	Revit
Fixture Type	Text	Recessed; Surface Mount; Suspended		Engineer	Revit
Ballast/Driver Model	Text			Contractor	FAMT
<b>Low Voltage Distribution (Main Switchgear)</b>					
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
Wire Size	Text	AWG		Contractor	FAMT
Cable Percentage	Text	%		Contractor	FAMT
Primary Voltage	Text	V		Contractor	FAMT
Secondary Voltage	Text	V		Contractor	FAMT
Switchgear Type	Text	Air; Gas; Vacuum		Contractor	FAMT
Nema Rating	Text			Contractor	FAMT
<b>Meter - Electrical Utility</b>					
UC_Equipment Standard*	Text	METER-ELEC-XXXXX		Engineer	Revit
Primary Voltage	Text	V		Contractor	FAMT
Secondary Voltage	Text	V		Contractor	FAMT
Current Transformer (CT)	Text	A		Contractor	FAMT
Power Transformer (PT)	Text	KW; KVA		Contractor	FAMT
Short Circuit	Text			Contractor	FAMT

AEC Parameter	Parameter Type	Data Format		Data Owner	Authoring Software
<b>Motor Starter</b>					
UC_Equipment Standard*	Text	MOTOR-STRX-XXXXX		Engineer	Revit
<b>Power System Conditioners</b>					
UC_Equipment Standard*	Text	HARMO-MITI-XXXXX POWER-QUAL-XXXXX	Harmonic mit reactor Power sys conditioner	Engineer	Revit
<b>Relay</b>					
UC_Equipment Standard*	Text	RELAY-PROT-XXXXX		Engineer	Revit
Primary Voltage	Text	V		Contractor	FAMT
Secondary Voltage	Text	V		Contractor	FAMT
<b>Solar System</b>					
UC_Equipment Standard*	Text	SOLAR-COLL-XXXXX		Engineer	Revit
Component	Text	Batteries; Photovoltaic Inverter; Photovoltaic Solar Collectors		Engineer	Revit
Capacity	Text	KW		Contractor	FAMT
<b>Transformer</b>					
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
Primary Voltage	Text	V		Contractor	FAMT
Secondary Voltage	Text	V		Contractor	FAMT
KVA Rating	Text	KVA		Contractor	FAMT
<b>UPS System</b>					
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
Wattage	Text	W		Contractor	FAMT
Battery Voltage	Text	V		Contractor	FAMT
Battery Type	Text	VRLA; VLA		Contractor	FAMT

AEC Parameter	Parameter Type	Data Format	Data Owner	Authoring Software
<b>Electrical Variable Frequency Drive</b>				
UC_Equipment Standard*	Text	VFDXX-XXXX-XXXXX	Engineer	Revit
Motor Capacity	Text	KW; HP	Contractor	FAMT
Input Hertz	Text	Hz	Contractor	FAMT
Output Hertz Maximum	Text	Hz	Contractor	FAMT

### 6.6.5 Child Equipment Asset Group Specifics

AEC Parameter	Parameter Type	Data Format	Data Owner	Authoring Software
<b>Coil</b>				
Length	Text	m; ft	Contractor	FAMT
Width	Text	mm; in	Contractor	FAMT
Height	Text	m; ft	Contractor	FAMT
Number of Passes	Text		Contractor	FAMT
Tube Diameter	Text	mm; in	Contractor	FAMT
Fin Spacing	Text	mm; in	Contractor	FAMT
Maximum Temperature Rating	Text	DEG C; DEG F	Contractor	FAMT
Maximum Pressure Rating	Text	kPa ; PSI	Contractor	FAMT
Delta T	Text	DEG C; DEG F	Contractor	FAMT
Connection Size	Text	In; mm	Contractor	FAMT
<b>Fan</b>				
Fan Volume	Text	CMPS; CFM	Contractor	FAMT
Static Pressure	Text	kPa; inch-w/c	Contractor	FAMT
Sheave	Text		Contractor	FAMT
Bearing	Text	DE; ODE	Contractor	FAMT
Transmission	Text	Belt Drive; Direct Drive	Contractor	FAMT
Type of Control	Text	Pneumatic; DDC	Contractor	FAMT
<b>Motor</b>				
Motor Manufacturer	Text		Contractor	FAMT
Motor Model	Text		Contractor	FAMT
Motor Serial Number	Text		Contractor	FAMT



AEC Parameter	Parameter Type	Data Format	Data Owner	Authoring Software
Motor Cat No.	Text		Contractor	FAMT
Motor Capacity	Text	KW; HP	Contractor	FAMT
Motor Voltage	Text	V	Contractor	FAMT
Phase	Text	1; 3	Contractor	FAMT
Hertz	Text	HZ	Contractor	FAMT
Motor Amperage	Text	A	Contractor	FAMT
Motor Speed	Text	RPM	Contractor	FAMT
Motor Frame	Text		Contractor	FAMT
Motor Enclosure	Text	Explosion Proof; ODP; TEFC	Contractor	FAMT
Motor Sheave	Text		Contractor	FAMT
Motor Bearing	Text	DE / ODE	Contractor	FAMT
Belt Size	Text		Contractor	FAMT
Quantity of Belts	Number		Contractor	FAMT
NEMA Efficiency	Percentage	%	Contractor	FAMT
Motor Class	Text		Contractor	FAMT

**Revision History**

<b>Revision Date</b>	<b>Version</b>	<b>Description</b>
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.
October 16, 2023	2.0	Revised BIM Deliverables - BIM Model LOD Guideline Added Revit Model Requirement - Tolerances Added Appendix A "Barcode Placement Standard Operating Procedures"
December 16, 2024	3.0	Revised data owner of Facility Asset Data "UC_Equipment Standard" Added and deleted various mechanical and electrical equipment in Section 6.6.3 and 6.6.4
January 17, 2025	4.0	Revised Data Owner and Authoring Software columns of tables in Section 6. New barcode placement procedure at the top of on page 1 of Appendix A.

## APPENDIX A

### Barcode Placement Standard Operating Procedures

Barcode will be placed to all UCalgary tracking assets. The labels can be applied in three ways.

- For system and building based entities, the self-adhesive barcode labels will be placed in a building/system electronic binder that resides in the Maintenance Planning office.
- For most unit based entities, the barcode labels will be applied directly to a piece of equipment by peeling off the barcode backing and placing on a visible clean flat surface of the item to be barcoded. When multiple barcodes all placed close together as shown in example photo 42, the equipment standard must be displayed with each barcode for clarification purpose.
- The barcode could also be applied on a metal plate with a seal wire, and be placed in a visible location on the item to be barcoded. The process is illustrated at the end of this document.

The UCalgary Facilities Maintenance Planning team supplies all self-adhesive barcode labels, plates and seal wires.

## Mechanical Equipment Barcode Placement

Air Handling Units (AHUXX-XXXX-XXXXX, AHUXX-SUPX-XXXXX, AHUXX-RETX-XXXXX) (Unit based)

The self-adhesive barcode label will be applied as close as practical to the air handling unit # and equipment data plate, and directly to the fan body. (See example 1 and 2)

Air Conditioning Units (ACUXX-XXXX-XXXXX) (Unit based)

The self-adhesive barcode label will be applied as close as practical to the air conditioning unit # and equipment data plate, and directly to the fan body.

Backflow Preventers (BFPXX-XXXX-XXXXX) (Unit based)

The self adhesive barcode label will be applied to a 2-1/2" x 3-1/2" aluminum plate (supplied by the university) and fastened to the backflow preventer with a stain less wire c/w compressible seal to a location on the backflow device so as not to be removable but easily visible. (See example 3)

Chillers (CHLLR-XXXX-XXXXX) (Unit based)

The self-adhesive barcode label will be applied directly to the unit's control panel in a visible location and/or as near to the manufacturer's data rating plate as possible. (See example 4)

Cooling Tower (COOLX-TOWR-XXXXX) (Unit based)

The self-adhesive barcode label will be applied directly to the unit's name plate in a visible location and/or as near to the manufacturer's data rating plate as possible.

Compactors (WBINS-CPACT-XXXXX) (Unit based)

The self-adhesive barcode label will be applied directly to the unit's name plate in a visible location and/or as near to the manufacturer's data rating plate as possible.

Compressed Air Dryer (DRYER-CAIR-XXXXX) (Unit based)

Hand Dryer (DRYER-HAND-XXXXX) (Unit based)

The self-adhesive barcode label will be applied directly to the unit's name plate in a visible location and/or as near to the manufacturer's data rating plate as possible.

Air Compressors (COMPX-XXXX-XXXXX) (Unit based)

The self-adhesive barcode label will be applied to the compressor housing near the manufacturer's name and data rating plate or on a 2-1/2" x 3-1/2" aluminum plate (supplied by the university) and fastened to an easily visible portion of the compressor. (Note: smaller compressors do not usually have a containment housing and the barcode plate can be secured to a portion of the frame in a visible location.) (See example 5)

Cranes (CRANE-XXXX-XXXXX) (Unit based)

The self-adhesive barcode label will be applied directly to the unit's name plate and/or in a visible location where the motor or power supply is located and/or as near to the manufacturer's data rating plate as possible. In the case of chain falls, the self-adhesive barcode label will be applied directly to the unit.

Electrically Operated Overhead Doors (DOORX-OHEL-XXXXX) (Unit based)

Fire Egress Doors (DOORX-FIRE-XXXXX) (Unit based)

The self-adhesive barcode label will be applied directly to the unit's name plate in a visible location and/or as near to the manufacturer's data rating plate as possible on the drive unit.

Emergency Showers (EMESH-XXXX-XXXXX) (Unit based)

The self-adhesive barcode label may be applied directly to the units panel activation handle, directly to the shower head bowl, or on the newer cabinet models directly to the unit in a visible location. Older models of showers may require a 2-1/2" 3-1/2" aluminum plate (supplied by the university) and will be fastened to the unit with a stainless wire c/w compressible seal to a visible location on the unit.

Dust Collection Fan System (FANSY-DUST-XXXXX) (System based)

Exhaust Fan System (FANSY-EXHX-XXXXX) (System based)

Fume Hood Exhaust System (FANSY-FUME-XXXXX) (System based)

Pressurization Fan System (FANSY-PRES-XXXXX) (System based)

Return Fan System (FANSY-RETX-XXXXX) (System based)

Supply Fan System (FANSY-SUPX-XXXXX) (System based)

In the case of fan units that serve multiple purposes i.e. heating coils, cooling coils, and/or serve more than one level or area, where there are several maintenance procedures applied to the unit, the self-adhesive barcode label will be applied directly to the unit's name plate in a visible location, and/or as near to the manufacturer's data rating plate as possible. It may be used for multiple levels of maintenance expertise procedures, an example would be an exhaust fan that is serving laboratory

snorkel exhausts where the fan is barcoded individually and the snorkels are barcoded by unit. (See example 6)

Ceiling Fans (FANXX-XXXX-XXXXX) (Unit based)

Portable Fans (FANXX-PORT-XXXXX) (Unit based)

The self-adhesive barcode label will be applied directly to the unit.

Smoke Fans (FANXX-XXXX-XXXXX) (Unit based)

The self-adhesive barcode label will be applied directly to the unit's name plate in a visible location and/or as near to the manufacturer's data rating plate as possible.

Fan coils (FCOIL-XXXX-XXXXX) (Unit based)

Fan coils such as unit heaters, recessed wall mounted force flow units will be barcoded by the self-adhesive barcode label being applied directly to the unit's name plate in a visible location and/or as near to the manufacturer's data rating plate as possible on the drive unit.

Washroom Fixtures (FIXTX-WASH-XXXXX) (Building based)

Laboratory Fixtures (FIXTX-LABX-XXXXX) (Building based)

Kitchen Fixtures (FIXTX-KITC-XXXXX) (Building based)

Plumbing fixtures are a building based entity. A self-adhesive barcode label will be placed in a building/system electronic binder that resides in the Maintenance Planning office and will also be available online.

Gas Fired Appliances (GFAXX-XXXX-XXXXX) (Unit based)

The self-adhesive barcode label will be applied directly to the unit. (See example 7 and 8)

Grease Interceptors (GRTRA-XXXX-XXXXX) (Unit based)

The self-adhesive barcode label will be applied directly to the unit. (See example 9)

Humidifiers (HUMID-XXXX-XXXXX) (Unit based)

The self-adhesive barcode label will be applied directly to the unit and will require a 2-1/2" x 3-1/2" aluminum plate (supplied by the university) and fastened to the unit with a stainless wire c/w compressible seal to a visible location on the unit.

Automobile Hoist (LIFTS-AUTO-XXXXX) (Unit based)

Scissor Lift (LIFTS-SCIS-XXXXX) (Unit based)

The self-adhesive barcode label will be applied directly to the unit's name plate in a visible location and/or as near to the manufacturer's data rating plate as possible.

Compressed Air Piping System Control AIR (PIPSY-CAIR-XXXXX) (System based)

Chilled Water Piping System (PIPSY-CHWX-XXXXX) (System based)

Demineralized Water Piping System (PIPSY-DEWA-XXXXX) (System based)

Domestic Water Piping System	(PIPSY-DOWA-XXXXX)	(System based)
Glycol Heating Water Piping System	(PIPSY-GLYX-XXXXX)	(System based)
Heating Water Piping System	(PIPSY-HTGX-XXXXX)	(System based)
Compressed Air Piping System Lab Air	(PIPSY-LAIR-XXXXX)	(System based)
Liquid Petroleum Gas Piping System	(PIPSY-LPGX-XXXXX)	(System based)
Natural Gas Piping System	(PIPSY-NGXX-XXXXX)	(System based)
Non Potable Water System	(PIPSY-NPOT-XXXXX)	(System based)
RO Treated Water Piping System	(PIPSY-ROWA-XXXXX)	(System based)
Sanitary Drainage Piping System	(PIPSY-SANI-XXXXX)	(System based)
Steam Piping System	(PIPSY-STEAM-XXXXX)	(System based)
Storm Water Drainage Piping System	(PIPSY-STRM-XXXXX)	(System based)

Piping Systems are a system based entity. A self-adhesive barcode label will be placed in a building/system electronic binder that resides in the Maintenance Planning office and will also be available online.

Domestic Booster Pump	(PUMPX-DOBO-XXXXX)	(Unit based)
Fire Sprinkler System Excess Pressure Pump	(PUMPX-EPXX-XXXXX)	(Unit based)
Fire Pump	(PUMPX-FIRE-XXXXX)	(Unit based)
Portable Fuel Transfer Pump	(PUMPX-FUEL-XXXXX)	(Unit based)
Heating Water Pump	(PUMPX-HTGX-XXXXX)	(Unit based)
Make up Heating Water Pump	(PUMPX-MAKW-XXXXX)	(Unit based)
Pool Pump	(PUMPX-POOL-XXXXX)	(Unit based)
Gas Engine Portable Pumps	(PUMPX-PORT-XXXXX)	(Unit based)
Re-Circulation Pump	(PUMPX-RECR-XXXXX)	(Unit based)
Sanitary Sump Pump	(PUMPX-SANI-XXXXX)	(Unit based)
Storm Water Sump Pump	(PUMPX-STRM-XXXXX)	(Unit based)
Vacuum Pump	(PUMPX-VACU-XXXXX)	(Unit based)

The self-adhesive barcode label will be applied directly to the unit and will require a 2-1/2" x 3-1/2" aluminum plate (supplied by the university) and fastened to the unit with a stainless wire c/w compressible seal to a visible location on the unit, on base mounted pumps to the power supply or on inline pumps to pump housing flange bolt. (See example 10)

Pressure Vessel Air Receiver	(PVARX-XXXX-XXXXX)	(Unit based)
Pressure Vessel Boiler	(PVBXX-XXXX-XXXXX)	(Unit based)
Pressure Vessel Expansion Tank	(PVEXT-XXXX-XXXXX)	(Unit based)
Pressure Vessel Storage Tank	(PVSTX-XXXX-XXXXX)	(Unit based)
Pressure Vessel Digester	(PVXXX-DIGE-XXXXX)	(Unit based)
Pressure Vessel Sterilizers	(PVXXX-STER-XXXXX)	(Unit based)

The self-adhesive barcode label will be applied directly to the unit's name plate in a visible location and/or as near to the manufacturer's data rating plate as possible.

Pressure Vessel Convertor Exchanger (PVCEX-XXXX-XXXXX) (Unit based)

The self-adhesive barcode label will be applied directly to the unit and will require a 2-1/2" x 3-1/2" aluminum plate (supplied by the university) and fastened to the unit with a stainless wire c/ w compressible seal to a visible location on the exchanger usually the tube sheet head plate studs. (See example 11)

Acid Neutralizing Tanks (TANKX-ADTK-XXXXX) (Unit based)

Glycol Feed Tanks (TANKX-DAYX-XXXXX) (Unit based)

Water Storage Tank (TANKX-WATR-XXXXX) (Unit based)

Expansion Tanks (PVEXT-XXXX-XXXXX) (Unit based)

Storage Tanks (PVSTX-XXXX-XXXXX) (Unit based)

The self-adhesive barcode label will be applied directly to the storage tank or expansion tank or neutralizing tank next to or directly under the manufacturer's name plate or manufacturer's data rating plate and/or in the most visible possible location. (See example 12 to 16)

Sediment Tanks (TANKX-SEDI-XXXXX) (Building based)

Sediment tanks are building based entity. A self-adhesive barcode label will be placed in a building/system binder that resides in the Maintenance Planning office and will also be available online.

Septic Tanks (TANKX-SEPT-XXXXX) (System based)

Septic Tanks are a system based entity. A self-adhesive barcode label will be placed in a building/system binder that resides in the Maintenance Planning office and will also be available online.

Domestic Water Treatment System (TREAT-DOWA-XXXXX) (System based)

The self-adhesive barcode label will be applied directly to the unit's name plate in a visible location and/or as near to the manufacturer's data rating plate as possible.

Swamp Coolers (SWAMP-XXXX-XXXXX) (Unit based)

The self-adhesive barcode label will be applied directly to the unit's name plate in a visible location and/or as near to the manufacturer's data rating plate as possible.

Water Softener (WATER-SOFT-XXXXX) (Unit based)

The self-adhesive barcode label will be applied directly to the unit's name plate in a visible location and/or as near to the manufacturer's data rating plate as possible.

Water Coolers (WTCLR-XXXX-XXXXX) (Unit based)

The self-adhesive barcode label will be applied directly to the unit's name plate in a visible location and/or as near to the manufacturer's data rating plate as possible.



## Life Safety Equipment Barcode Placement

Main Fire Panel (FASYS-XXXX-XXXXX) (Unit based)  
Apply the barcode to the front top right corner of the fire panel. (See example 21)

Nodes and Extenders (FASYS-XXXX-XXXXX) (System based)  
Apply barcode to the front top right corner of cabinets.

Fire Pump and Transfer Switch Controller (FASYS-XXXX-XXXXX) (Unit based)  
Apply barcode below main disconnect for both

Pre-Action System (PIPSY-SPRK-XXXXX) (System Based)  
Use barcode applied to metal plate and hang on piping system in a visible location. (See example 22)

## Electrical Equipment Barcode Placement

Wireless Clock System (CLOCK-FMXX-XXXXX) (Building based)  
Assigned by the university and located in binders. One barcode for building.

Door Security (DSXXX-XXXX-XXXXX) (Unit based)  
Apply barcode to doors of the control panels along with the access label. Barcode preferred location is the top right hand corner of main power control cabinet. Bottom left is acceptable as a secondary location. One barcode per power supply. Place additional signage to all control cabinets for entry. (See example 31)

Electric Heaters (ELECT-HEAT-XXXXX) (Unit based)  
Locate on front of unit at top right hand corner of heater.

Generators (EMPOW-GENX-XXXXX) (Unit based)  
Apply barcode above/below motor manufacturer's data rating plate. (See example 32 and 33)

Emergency Transfer Switches (EMPOW-TRAN-XXXXX) (Unit based)  
Apply barcode on front of door, near manufacturer's data rating plate, where room is available. (See example 34)

Main Distribution Grounding Plate (GROUN-DSYS-XXXXX) (Building based)  
Apply barcode to metal plate and using tie wrap affix to ground bar support rod. (See example 35)

Line Filters and Reactors (HARMO-MITI-XXXXX) (Unit based)  
Apply barcode to front top right hand corner if cover is solid metal, if ventilated cover apply to top of device where visible.

High Voltage Disconnects (HVOLT-DISC-XXXXX) (Unit based)  
Apply barcode below widow and centered if possible or near data rating plate for switchgear. (See example 36)

Main Distribution Transformers (HVOLT-DRYT-XXXXX) (Unit based)  
Apply barcode centered on front of transformer beside manufacturer's data rating plate.

Lighting Control (LIGHT-CNTL-XXXXX) (Unit based)  
Locate on control unit where visible.

Emergency Lighting Centralized (LIGHT-EMCT-XXXXX) (Unit based)  
Apply barcode near manufacturer's rating plate or on front of unit where visible.

Emergency Lighting Battery Packs (LIGHT-EMPK-XXXXX) (Unit based)  
Apply barcode to unit where visible. Preferred location to be on the front of the unit, at the top right hand corner of the battery pack. (See example 37)

Emergency Remote Heads (LIGHT-EMPK-XXXXX) (Unit based)  
Locate on base plate. Barcode sized to fit base plate.

Exit Lighting (LIGHT-EXIT-XXXXX) (Building based)  
Assigned by the university and located in binders. One barcode for building.

Exterior Building Lighting (LIGHT-EXTX-XXXXX) (Building based)  
Assigned by the university and located in binders. One barcode for building.

Interior Building Lighting (LIGHT-INTX-XXXXX) (Building based)  
Assigned by the university and located in binders. One barcode for entire building.

Lightning Protection (LITNG-PROT-XXXXX) (Building based)  
Assigned by the university and located in binders. One barcode for building.

Wiring Devices (LVOLT-BRAN-XXXXX) (Building based)  
Assigned by the university and located in binders. One barcode for building.

Cabling/Bus Duct (LVOLT-CABL-XXXXX) (Building based)  
Assigned by the university and located in binders. One barcode for building.

Main Distribution Breakers (LVOLT-DBRK-XXXXX) (Unit based)  
Apply barcode beside or below manufacturer's data rating plate or centered below breaker.

Current Distribution Panel Boards (LVOLT-PANL-XXXXX) (Unit based)  
Apply barcode to front top right hand corner.

Disconnects (LVOLT-PANL-XXXXX) (Unit based)  
Apply barcode to front top right hand corner of disconnect or door where adequate room is available.

Panel Boards (LVOLT-PANL-XXXXX) (Unit based)  
Apply barcode to the front top right hand corner of panel board. (See example 38)

Transformers (LVOLT-TRAN-XXXXX) (Unit based)  
Apply barcode to front top right hand corner of front cover or below manufacturer's data rating plate.  
(See example 39)

Uninterruptible Power Supplies (LVOLT-UPSC-XXXXX) (Unit based)  
For BMS Control panels. Locate on unit where visible, top or Side of UPS. Apply barcode to side of UPS where location is at a higher level and top is not visible. Preferred location is beside the manufacturer's data label. (See example 40 and 41)

Metering (METER-ELEC-XXXXX) (Unit based)  
Apply barcode below or beside metering where visible and room is available. (See example 42)

Motor Control Centers (MOTOR-CNTL-XXXXX) (Unit based)  
Apply barcode to the front top of motor control center and beside manufacturer's data rating plate.  
(See example 43)

Motor Starters Stand Alone (MOTOR-STRX-XXXXX) (Unit based)  
Apply barcode to front top right hand corner of starter where adequate room is available.

Surge Protection Devices (POWER-QUAL-XXXXX) (Unit based)  
Apply barcode centered above display. Optional is to locate below or beside display. (See example 44)

Pump Controller (PUMPX-SANI-XXXXX) (Unit based)  
The self-adhesive barcode label will be applied directly to the unit's nameplate in a visible location and/or as near to the manufacturer's data rating plate as possible. (See example 45)

Pump Controller (PUMPX-STRM-XXXXX) (Unit based)  
The self-adhesive barcode label will be applied directly to the unit's nameplate in a visible location and/or as near to the manufacturer's data rating plate as possible. (See example 46)

Building Illuminated Signage (SIGNX-ILLB-XXXXX) (Unit based)  
Locate barcode where visible on sign.

Solar Collectors (SOLAR-COLL-XXXXX) (Building based)  
Assigned by the university and located in binders. One barcode for building.

Variable Frequency Drives (VFDXX-XXXX-XXXXX) (Unit based)  
Apply barcode to front of drive below display. (See example 47 to 49)

## Architectural and Structural Equipment

Barrier Free Components	(BARRI-XXXX-XXXXX)	(Building based)
Casework	(CASEX-XXXX-XXXXX)	(Building based)
Ceilings	(CEILX-XXXX-XXXXX)	(Building based)
Ceiling Finishes	(CEILX-FINI-XXXXX)	(Building based)
Exterior Doors	(DOORX-EXTX-XXXXX)	(Building based)
Fire Doors	(DOORX-FIRE-XXXXX)	(Building based)
Interior Doors	(DOORX-INTX-XXXXX)	(Building based)
Expansion Joints and Seals	(EXPAN-XXXX-XXXXX)	(Building based)
Interior Partition Fire Stopping	(FIPRO-INTX-XXXXX)	(Building based)
Structural framing of Floors	(FLOOR-STFR-XXXXX)	(Building based)
Floor Finishes	(FLOOR-FINI-XXXXX)	(Building based)
Foundations Footings Slabs Piles Columns	(FOUND-XXXX-XXXXX)	(Building based)
Insulation	(INSUL-XXXX-XXXXX)	(Building based)
Ramps	(RAMPS-XXXX-XXXXX)	(Building based)
Roofing	(ROOFX-XXXX-XXXXX)	(Unit based)



Example 1. Air Handling Unit



Example 2. Makeup Air Unit



Example 3. Backflow Preventors



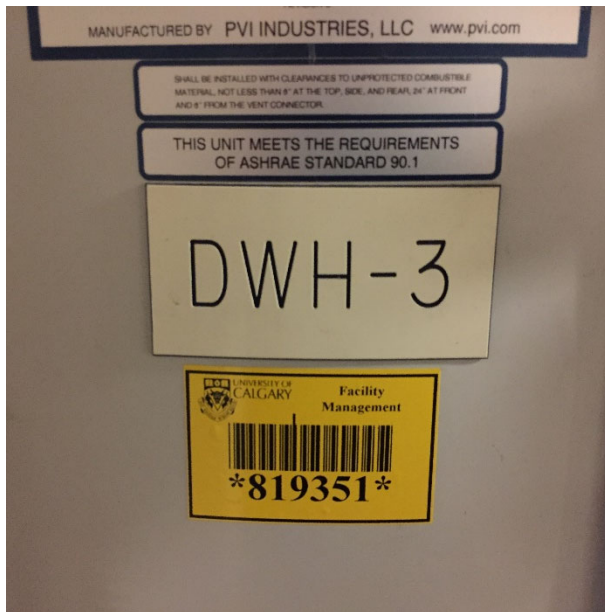
Example 4. Chiller



Example 5. Air Compressor



Example 6. Exhaust Fan



Example 7. Domestic Water Heater



Example 8. Domestic Water Heater



Example 9. Grease Interceptor



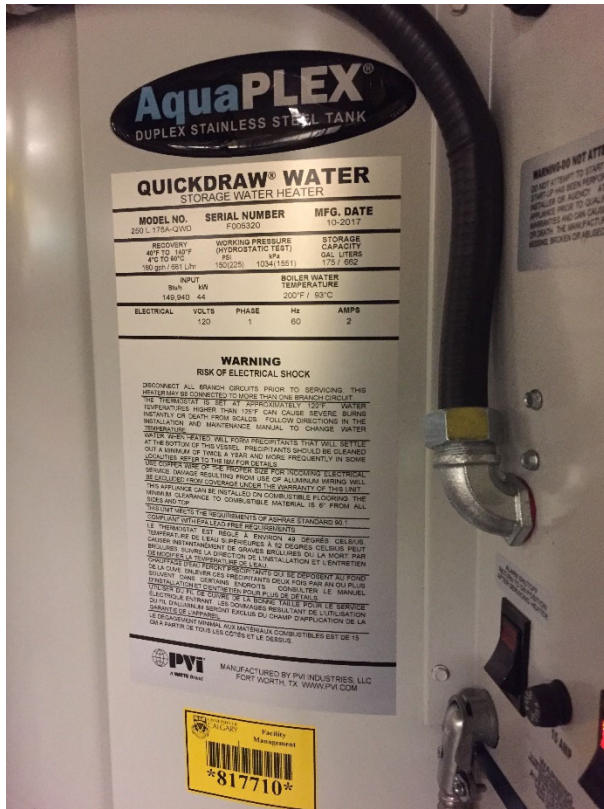
Example 10. Vacuum Pump



Example 11. Plate Heat Exchanger



Example 12. Glycol Feed Tank



Example 13. Water Storage Tank



Example 14. Water Storage Tank



Example 15. Expansion Tank



Example 16. Expansion Tank





Example 21. Fire Alarm Panel



Example 22. Sprinkler



Example 31. Door Access Panels



Example 32. Generator



Example 33. Indoor Generator



Example 34. Transfer Switch



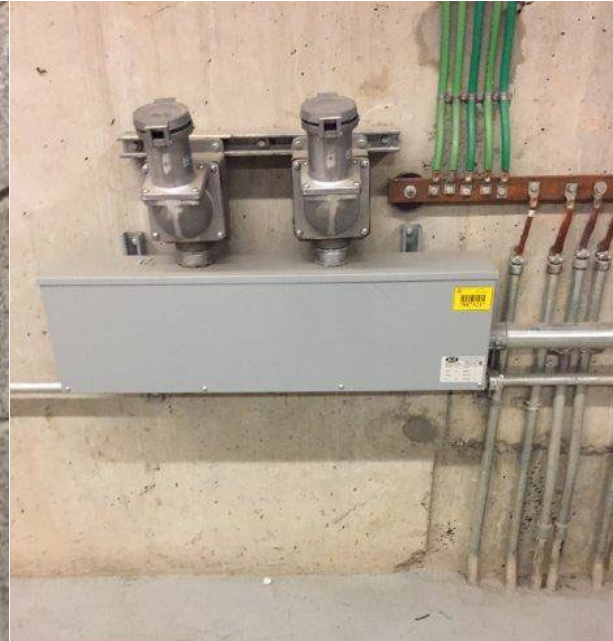
Example 35. Main Electrical Distribution Ground Bar



Example 36. Disconnect



Example 37. Emergency Lighting Battery Pack



Example 38. Splitter



Example 39. Low Voltage Transformer



Example 40. Controls UPS



Example 41. Controls UPS



Example 42. Electrical Utilities Metering



Example 43. Motor Control Center



Example 44. Surge Protection Device



Example 45. Pump Controller



Example 46. Sump Pump Controller



Example 47. Danfoss VFD



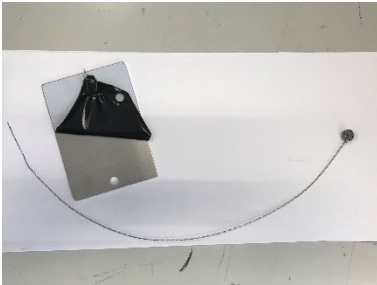
Example 48. Danfoss VFD



Example 49. ABB VFD

## Barcode Placement on Metal Plate

1. 2-1/2" x 3-1/2" aluminum plate and a stainless wire c/w compressible seal



2. Apply self-adhesive barcode label to metal plate.



3. Loop the wire.



4. Fasten the wire seal.

