THE NEW SURREY HOSPITAL

AND

BC CANCER CENTRE PROJECT

Schedule 1 – Statement of Requirements

Appendix 1U – BIM Requirements

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APPENDIX 1U – BIM REQUIREMENTS

PART 1. DEFINITIONS

1.1.1 In this Appendix, in addition to the definitions set out in Schedule 1 [Statement of Requirements] of this Agreement:

1.1.1.1 "**Appointed Party**" means a party directly contracted by the Design-Builder.

1.1.1.2 "**Asset Information Model (AIM)**" is an Information Model which compiles the data and information necessary to support Asset Management post-handover.

1.1.1.3 "**Asset Information Requirements (AIR)**" define the information required to operate and maintain a built Asset.

1.1.1.4 "Asset Registry" has the meaning as set out in Section 3.2 BIM Uses.

1.1.1.5 "**BIM Execution Plan**" means a document developed by the Design-Builder in response to this BIM Requirements document which details how the Design-Builder is to successfully implement Building Information Modeling (BIM) on the Project.

1.1.1.6 "**Capability**" means measure of ability to perform and function.

1.1.1.7 "**Capacity**" means resources, such as hardware and software, available to perform and function.

1.1.1.8 "**Common Data Environment (CDE)**" is the single source of information used to collect, manage, and disseminate information for the whole Project team.

1.1.1.9 "**Construction Operation Building Information Exchange (COBie)**" is an information repository which serves as single source of information for the Project.

1.1.1.10 "**Exchange Information Requirements (EIR)**" means the Authority's specification for what, when, how and for whom information in connection with the Agreement is to be produced as may be identified in the Information Particulars and/or provided in accordance with the Information Standard.

1.1.1.11 "**Federated Information Model**" means an Information Model consisting of connected but distinct individual Information Models.

1.1.1.12 "**Federation Strategy**" is a plan for the production of information by separate Task Teams.

1.1.1.13 **"Hard Clash"** means when two BIM objects occupy the same space in the model, such a column running through a wall or pipework through a beam. The Authority and the Design-Builder will mutually agree which BIM objects will be included within each clash set as part of the clash detection procedures set out in the agreed BIM Execution Plan.

1.1.1.14 "**Information Container"** means the unique identification of a file, such as cost plan, a schedule, a drawing, an Information Model, etc.

1.1.1.15 "**Information Delivery Plan**" means a schedule of information containers and delivery dates, for a specific Task Team as may be applicable to the Appointee and/or any (Task Information Delivery Plan) and for the Design-Builder (Master Information Delivery Plan).

1.1.1.16 "**Information Model**" means a set of structured and/or unstructured information containing any combination of geometrical information, alphanumerical information, and documentation.

1.1.1.17 "**International Foundation Classes (.ifc)**" are the accepted non propriety file format.

1.1.1.18 "**Information Management Risk Register**" means risk register containing the risks associated with the timely delivery of information as may be identified in the BIM Requirements, BIM Execution Plan, and/or provided in accordance with the information standard.

1.1.1.19 "**Level of Development (LOD)**" is the level of completeness to which model elements are developed.

1.1.1.20 "**Level of Information Need**" is the framework which defines the extent and granularity of information, i.e., the Level of Development.

1.1.1.21 "**Mobilization Plan**" means a plan for the mobilization of the Design-Builder's resources in accordance with the information standard.

1.1.1.22 "**Project Information Model (PIM)**" is the Information Model developed during the Design and Construction phases of a Project.

1.1.1.23 "**Responsibility Matrix"** means the document setting out information management functions and either Project or Asset information management tasks, or information deliverables as appropriate.

1.1.1.24 **"Soft Clash"** means when a BIM object has not been given the necessary geometric or spatial tolerance or when its clearance zone is breached by another BIM object, such as a beam breaching the necessary clearance zones for the maintenance of an air conditioning unit. The Authority and the Design-Builder will mutually agree which BIM objects and their respective spatial requirements and tolerances will be included within each clash set as part of the clash detection procedures set out in the agreed BIM Execution Plan.

1.1.1.25 "**Task Team**" means parties appointed and assembled by the Design-Builder to perform a specific task, for example, the architecture team or the subcontractor who is designing/constructing curtain walling.

1.1.1.26 "**Volume"** means a manageable spatial subdivision of a Project.

PART 2. INFORMATION AND SCOPE

2.1 Document Purpose

2.1.1 This document defines the Authority's BIM Requirements for the Design-Builder in accordance with ISO 19650-2:2018. Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) — Information management using building information modelling – Part 2: Delivery phase of the Assets. The BIM Requirements and the accompanying information needs will be defined within this document to support the Request for Proposal (RFP) documentation by communicating the information requirements for delivery of the Project, in a way that is specific, measurable, achievable, realistic, and aligned to specific Project stages.

2.2 Response to the BIM Requirements

2.2.1 The Design-Builder will provide the following:

2.2.1.1 BIM Execution Plan, which will:

2.2.1.1(1) Propose their response to the information requirements set out here;

2.2.1.1(2) Detail how the information deliverables will be achieved by documenting the modeling practices, processes, and protocols to be followed;

2.2.1.1(3) Set out the Design-Builder's high-level responsibility matrix which illustrates the allocated responsibility for each element of the Information Model;

2.2.1.1(4) Clearly map the sections within the BIM Execution Plan against the sections included within this document; and

2.2.1.1(5) Define any areas of agreed non-compliance with these requirements.

2.2.1.2 The BIM Execution Plan is a critical, living document that is to be developed and kept current by the Design-Builder throughout the duration of the Project. The Design-Builder will develop the BIM Execution Plan to confirm the response to the information requirements. Along with the models, the BIM Execution Plan is required to be submitted as part of each required Submittal in line with the information delivery milestones and information exchange points in Section 5.1. A suggested template for the BIM Execution Plan is provided in Attachment 1 [BIM Execution Plan Template].

2.2.1.3 Information Delivery Risk Register, which will:

2.2.1.3(1) Identify and assess risks associated with information management and information production; and

2.2.1.3(2) Decide how to combine information management risks with the other risks being identified.

2.2.1.4 Task Teams Capability and Capacity Assessment Summary, which will:

2.2.1.4(1) Define each Task Team's Capability and Capacity to produce and manage information; and

2.2.1.4(2) Identify the availability of information technology (IT) within each Task Team.

2.2.1.5 It is essential that all members of the Design-Builder and all awarded Appointed Parties throughout the agreement demonstrate the required capabilities to implement BIM successfully in a Project.

2.2.1.6 Information Management Mobilization Plan, which will:

2.2.1.6(1) Inform the Authority of the Design-Builder's approach to the mobilization of BIM and information management processes, including but not limited to the testing of information exchange and delivery, common data environments, other software and hardware requirements, and training and education.

2.2.1.7 The Design-Builder will:

2.2.1.7(1) Refine, if necessary, update, and confirm the contents of the documentation identified above; and

2.2.1.7(2) Collate and share the Task Information Delivery Plans to establish the Design-Builder's Master Information Delivery Plan as per Section 5.2.

2.3 Applicable Standards and Documentation

2.3.1 The Design-Builder will be aware of and follow recognized industry standards and best practice throughout the Design, Construction, and handover stages. The below table outline the core documents and standards to be utilized on this Project.

Standard/Document	Description	
ISO 19650-1:2018	Organization and digitization of information about buildings and civil engineering works,	Part 1: Concepts and principles

Standard/Document	Description	
ISO 19650-2:2018	including building information modelling (BIM) — Information management using building information modelling	Part 2: Delivery phase of the Assets
ISO 19650-3:2020		Part 3: Operational phase of the Assets
ISO 19650-5:2020		Part 5: Security-minded approach to information management
Facilities Space Information & Drawing Services	FHA CAD Standards for Consultants Facilities Systems & Support (FSS)	
BIM Forum	Level of Development Specification 2020 for Building Information Models	Guide and Commentary
		Part I
		Part II
NBIMS-US V3	National BIM Standard- United States: COBie standard	
OmniClass™ Construction Classification System	OmniClass™ is designed to provide a standardized basis for classifying information created and used by the North American architectural, Engineering and Construction (AEC) industry.	

2.4 BIM Contacts

2.4.1 Personnel will be identified within each organization as a point of contact for BIM implementation with reference to the BIM Execution Plan. The relevant personnel known at the Project outset have been provided below.

Role	Organization	Contact Name	Email
Authority: Facilities, Maintenance and Operations	Fraser Health Authority	TBC	TBC
Authority: Asset, Risk and Quality	Fraser Health Authority	TBC	TBC
Authority's BIM Consultant	BIM Academy	Thomas Lund	Thomas.Lund@bimacademy.global
	Ryder Architecture	Jesse Reimer	JReimer@ryderarchitecture.com

2.4.2 All queries must be directed through contacts who will engage with the relevant stakeholders on the Project team's behalf.

PART 3. BIM GOALS AND USES

The Authority is implementing a Building Information Modelling (BIM) process for the Project. Its vision for this process and overall goal is defined as:

To utilize a BIM process to derive consistent digital data that can be used to drive downstream uses throughout the entire life cycle of the facility, from the Design Team, through the Construction Team and on into Facilities Maintenance and Operations."

3.1 BIM Goals

3.1.1 The purpose of this section is to describe the expected purposes of the models and information throughout the Project. It is important that the Design-Builder team engage with these strategic requirements, which have been identified as follows:

3.1.1.1 Management of virtual coordination;

3.1.1.2 Management of duplication across models;

3.1.1.3 Compliance with the Authority's BIM Requirements;

3.1.1.4 Management of required clearances for maintenance and replacement;

3.1.1.5 Incorporation of any existing facilities conditions;

3.1.1.6 Management of Project phasing and multiple tenders;

3.1.1.7 Tracking of Assets across models;

3.1.1.8 Collection of Asset information for operation and maintenance (O&M) phase;

3.1.1.9 Identification of Asset parent / child relationships and system;

3.1.1.10 Identification of Assets based on Asset information collected during the BIM processes;

3.1.1.11 Obtaining manufactures instruction manuals for Preventative Maintenance Program development; and,

3.1.1.12 Generation of record (as-built) Information Models for O&M and future renovations, refurbishments or upgrades.

3.2 BIM Uses

3.2.1 The following table sets out the BIM uses to be applied on the Project as a minimum, using the MoSCoW method (M – Must have; S – Should have; C – Could have; W – Won't have this time). "Must have" is a non-negotiable requirement. "Should have" is not a requirement but a strongly desirable BIM use for the Authority as a value-adding activity to both the Authority and the Design-Builder. "Could have" is not a requirement but is a desirable BIM use for the Authority if there is a measurable impact on cost or schedule.

"Won't have this time" is not a requirement and is not a desirable BIM use for the Authority, but might be of benefit to the Design-Builder.

3.2.2 These BIM uses are non-exhaustive, and the Design-Builder is expected where possible to demonstrate innovative approaches to BIM and information management throughout the Project process. All BIM uses to be implemented on the Project will be set out in the BIM Execution Plan and carried out in line with the agreed Project's information standard and Project's information production methods and procedures.

BIM Use		Description	MoSCoW
Forward Planning	Existing conditions modeling	The 3D modelling of the existing conditions for a site, facilities on a site, or a specific area within a facility, in this case using laser scanning.	W
	Visualization and communication	The creation of visualizations using the models to support marketing or user engagement. This may include walkthroughs, model renders, enhanced visuals, interactive models for smartphones etc. Any design reviews with the Project team or user consultations will use the model as support.	S
Management	Model-based cost management (5D)	The accurate quantity take-offs and cost plan creation throughout the lifecycle of a Project using the 3D models, including rapid demonstrations of the cost impact of changes.	C
	Model-based Construction scheduling (4D)	The 3D sequencing of Project phases and/or detailed Construction sequencing, including simulated site conditions during Construction	C
	Construction system design	The design and analysis of Construction systems, such as formwork, glazing and scaffolding.	C
Design Authoring	3D Coordination and clash detection	The identification, monitoring and removal of any hard or soft clashes affecting the design intent or model quality through the federation of the Project models.	M
	Assurance and Data Validation	The rule-based analysis of models to determine deficiencies in model authoring and design.	M
	Data Classification	The use of a standardized data structure, taxonomy and Asset naming across all Assets and Projects.	M
	Design Authoring	The modelling of the design using information loaded objects in such a quality as to all for other BIM uses to be derived from the models. This includes authoring of bespoke objects.	M
	Drawing Generation	2D graphical information is extracted from the model to communicate design information and meet contractual obligations	M

BIM Use		Description	MoSCoW
	Design and Construction Reviews	The 3D view and review of the models to provide feedbacks to validate multiple design or Construction aspects.	M
	Spatial Planning and Optimization	The assessment of design performance regarding spatial requirements, including optimum ratios against standard concept model	C
Analysis	Energy / Building Analysis	The analysis of the Asset's energy performance using intelligent model analysis software.	C
	Sustainability Evaluation	The use the model to support Project assessment for the environmental statement, LEED and other applicable sustainable goals set.	C
	Structural Analysis	The analysis and virtual testing of the Asset's structural performance using intelligent model analysis software.	C
	Evacuation Analysis	The use of 3D modelling to simulate crowd movement in evacuation situates and normal operations.	C
Construction	Digital Fabrication	The use of modelled components for fabrication, especially in case of pre-fabrication.	M
	Field Management / Tracking	The utilization of field BIM software during Construction and handover on site to manage, track, task and report safety, commissioning and handover documents which are linked to the BIM	M
	Laser Scanning	The utilization of 3D laser scanning technology to produce an accurate point cloud of the site and/or Assets.	S
	Record Modelling	The accurate modelling of the physical conditions, environment, and Assets of a facility.	M
Operation & Maintenance	Facilities and Asset Management	The operation and maintenance of the facilities using the models and their information.	M
	Asset Registry	Asset information collected through BIM to be transferred to Computer Maintenance Management System (Maximo) for Operation and Maintenance.	M
	Preventative Maintenance	The linking of BIM information, such as Operation and Maintenance manuals, to systems which support operation and maintenance.	M

PART 4. BIM PROJECT PARTICIPANT ROLES

4.1 Authority

4.1.1 The Authority will to the extent that such obligations are within the scope of the Design-Builder's obligations under the Agreement, arrange for:

4.1.1.1 The distribution of the required standards and information to support the BIM goals;

4.1.1.2 The review and updating (if necessary) as and when required of the BIM requirements, including the Project's information standard and information production methods and procedures, until the point of Substantial Completion is complete and is transitioned to the Operation and Maintenance phase;

4.1.1.3 The review of the BIM Execution Plan and its associated BIM documentation, including any requested exemptions, in accordance with Schedule 2 [Review Procedure] to the Agreement or, after the Substantial Completion Date; and

4.1.1.4 The review and comment on submitted deliverables.

4.2 Authority's BIM Consultant

4.2.1 The Authority will retain an independent consultant (the Authority's BIM Consultant) to audit the models and associated information, to ensure compliance with the requirements set out within this document and check that the data generated can support the proposed goals. Other responsibilities include the following:

4.2.1.1 Provide guidance to the Design-Builder and support them and the Authority throughout the Project;

4.2.1.2 Audit and validate the Information Models and its associated data to ensure the BIM Requirements are being met;

4.2.1.3 Monitor the BIM process and protocols to ensure agreed standards, methods and procedures are being followed in accordance with the BIM Requirements and BIM Execution Plan;

4.2.1.4 Generate progress reports on the audit, validation and monitoring exercises to identify areas for improvement; and

4.2.1.5 Compile and validate the Asset Registry data as required by the BIM requirements in line with the required data schema (COBie).

4.3 Design-Builder

4.3.1 All parties appointed by the Design-Builder will comply with the BIM Requirements insofar as they are applicable to them. It is the responsibility of the Design-Builder participants to define the BIM Execution Plan and the associated documentation set out in Section 2.2, which is to be utilized within the respective team to address specific issues and achieve the stated goals.

PART 5. INFORMATION DELIVERY MILESTONES

5.1 Information Exchange Points

5.1.1 The BIM Execution Plan will set out the required key Information Exchange Points (data drops) and their purpose in relation to the design phases and key Project milestones. Information exchange points will be aligned with the Submittal Schedule in accordance with Schedule 1 [Statement of Requirements] and Schedule 2 [Review Procedure]. Formal published Information Deliverables will be exchanged 4 weeks on the identified exchange delivery dates prior to the end of a stage to advise the decision gateways at the key decision points. These information deliverables will be subject to the compliance review procedures specified in Section 7.9. Specific dates will be agreed within BIM coordination meetings.

5.1.2 Compliance reviews will be conducted throughout Design and Construction as set out in Schedule 1 [Statement of Requirements], refer to Section 2.5 Submittal Documents.

5.2 Information Delivery Plans

5.2.1 The Design-Builder is to provide a Master Information Delivery Plan which collates each of their Appointed Party's Task Information Delivery Plans and aligns the deliverables to the above Information Exchange Points and the Submittal Schedule. Task and Master Information Delivery Plans will be kept up to date throughout the Agreement to ensure all information is provided by the right party at the right time for the required needs.

5.2.2 The Design-Builder is to propose by way of the Task and Master Information Delivery Plans a timeline for progress review submissions during Design and Construction for the Authority to review in accordance with Schedule 2 [Review Procedure].

5.2.3 A template has been provided in Attachment 2 [Task Information Delivery Plan Template] for optional use.

5.3 Exchange Information Requirements

5.3.1 All Record Models are to be submitted for Substantial Completion. The Authority will only consider Record Models which have incorporated / resolved all audit and compliance feedback and with a fully coordinated COBie database, as per Section 6.4.

PART 6. INFORMATION STANDARD

The Design-Builder will outline any additions and/or amendments to this information standard within the BIM Execution Plan. Any resulting impacts on the information delivery milestones or any risks to the information management process will also be clearly outlined within the BIM Execution Plan and Information Delivery Risk Register.

6.1 Information Container Identification

6.1.1 The Design-Builder, including all Appointed Parties, is required to provide all information electronically with naming conventions aligned to the Canadian National Annex provided

in ISO 19650-2:2018. All project information (including all two- and three-dimensional information) are to be stored in a Common Data Environment as per Section 7.3.

6.1.2 All Project information will adhere to the following convention for field codification:

Field	Project	Originator	Volume	Location	Type	Role	Number
Example:	302	BIMA	XXX	L02	LEG	A	0123

Where;

Field	Descriptor	Reference
Project	Single common Project identifier	Defined by the Authority within Attachment 3.
Originator	Unique identifier for each organization.	Defined by Design-Builder in BIM Execution Plan
Volume	Unique identifier for each Volume.	Defined by Design-Builder in BIM Execution Plan
Location	Unique identifier for each location.	Defined by the Authority within Attachment 3.
Type	Unique identifier for each type of information.	Based on Omniclass (Table 36 – Level 2 titles)
Role	Unique identifier for each role.	Defined by the Authority within Attachment 3.
Number	Sequential number when it is one of a series and not distinguished by any other of the fields.	N/A

6.1.3 The full file naming convention as known at the Project outset is provided in Attachment 3. This convention will be expanded with any unique, Project-specific codes within the BIM Execution Plan and updated as required, e.g., when new organizations join the Project. Project-specific nomenclature will be detailed in the BIM Execution Plan.

6.1.4 The following identification requirements apply:

6.1.4.1 Design information, such as drawings, will follow the CAD standards provided in Attachment 4;

6.1.4.2 Drawings will clearly indicate in the title block whether they have been extracted from the model files and if they have, drawings will clearly indicate, in the title block, the model files (by file name/no.) they have been extracted from; and

6.1.4.3 Federated models or visualizations will clearly confirm the model/drawing files (by file name/no.) they have been federated from.

6.2 Structuring and Classification of Information

6.2.1 All information deliverables and Assets will be classified according to a specified classification system which is compliant with ISO 12006-2. As a minimum, the Omniclass Construction Classification System will be used for the organization, sorting, and retrieval of Asset information for all tracked Assets. The Design-Builder will apply the appropriate Classification Number to all tracked Assets (Table 23: Products) and to all spatial rooms and areas (Table 13: Spaces) in accordance with Attachment 9 [Specific Structured Data Requirements (COBie)].

6.2.2 The Design-Builder will review the use of this system with respect to the delivery requirements and specify any amendments or additions, where appropriate, in the BIM Execution Plan.

6.3 Level of Information Need

6.3.1 The level of information need is used to determine both the level of geometry detail and level of associated information for any given model element at an agreed Project work stage. Defining the level of information need informs Task Teams of the degree of information reliability when using the model.

6.3.2 The Authority requires the Design Builder to use the Level of Development (LOD) definitions as specified by BIM Forum (see Attachment 5 [BIM Forum LOD Part I] and Attachment 6 [BIM Forum LOD Part II]). The BIM Execution Plan will outline how the levels of definition and information develop across the Project stages in accordance with the specified method. These will be agreed and confirmed following the Agreement of the Design-Builder by means of the Task and Master Information Delivery Plans. An overview of the definitions is provided below.

LOD	Model Element Content Requirements	Example (Light Fixture)
100	LOD 100 elements are not geometric representations. Examples are information attached to other model elements or symbols showing the existence of a component but not its shape, size, or precise location. Any information derived from LOD 100 elements must be considered approximate.	Cost/sf attached to floor slabs
200	At this LOD elements are generic placeholders. They may be recognizable as the components they represent, or they may be volumes for space reservation. Any information derived from LOD 200 elements must be considered approximate.	Light fixture, generic/approximate size/shape/location
300	The quantity, size, shape, location, and orientation of the element as designed can be measured directly from the model without referring to non-modeled information such as notes or dimension call-outs. The Project origin is defined and the element is located accurately with respect to the Project origin.	Design specified 2x4 troffer, specific size/shape/location
350	Parts necessary for coordination of the element with nearby or attached elements are modeled. These parts will include such items as supports	Actual model, Lightolier

LOD	Model Element Content Requirements	Example (Light Fixture)
	and connections. The quantity, size, shape, location, and orientation of the element as designed can be measured directly from the model without referring to non-modeled information such as notes or dimension call-outs.	DPA2G12LS232, specific size/shape/location
400	An LOD 400 element is modeled at sufficient detail and accuracy for fabrication of the represented component. The quantity, size, shape, location, and orientation of the element as designed can be measured directly from the model without referring to non-modeled information such as notes or dimension call-outs.	As 350, plus special mounting details, as in a decorative soffit

6.3.3 At Record Model submission, all Tracked Assets, as set out in Attachment 7 [Tracked Asset Schedule], will be modeled to an appropriate level of geometric detail according to the use of the information. This includes accounting for clearance zones for maintenance activities as set out in the Agreement. Non-geometric information will be provided in line accordance with the grading provided in Attachment 8 [Tracked Asset Grading] and Attachment 10 [Tracked Asset Data Requirements].

6.4 Delivery Strategy for Asset Information

6.4.1 This section defines the information exchange standard for Asset information and enables the Authority to obtain proposals with regards to Asset information delivery into Authority's Facilities Management environment, as identified in Section 7.1.

6.4.2 An Asset Information Model (AIM) will be delivered at the final information exchange point as per Section 5.1. The specific Assets and their structured data requirements as aligned to the COBie data schema are provided in Attachment 7 [Tracked Asset Schedule] and Attachment 9 [Specific Structured Data Requirements] respectively. These lists are not exhaustive. Any Assets that are included in the Design that may be considered as tracked or graded as maintainable but are not included in Attachment 7 [Tracked Asset Schedule] and or Attachment 8 [Tracked Asset Grading] will be discussed and verified if deemed applicable by the Authority, and added to the lists as appropriate

6.4.3 The Design-Builder is responsible for ensuring the property set and Asset information delivered is aligned to the COBie format. The proposed methodology and process for the best delivery of the Authority's required Asset information will be outlined in the BIM Execution Plan and the associated Master Information Delivery Plan. This will include Assets included within the Design-Builder's scope for the Design Integration, Procurement, Coordination, Delivery, Setup, Installation and Commissioning of all Category A Equipment, Category B Equipment, Category C Equipment and Category D Equipment, as defined in Appendix 1H [Equipment and Furniture].

6.4.4 Some design best practices for use within the Autodesk Revit platform are as follows:

6.4.4.1 The configuration and use of the Classification Management and COBie Extension Interoperability Tool plugins will be agreed upon before starting design;

6.4.4.2 Each Task Team's workflow must be adjusted to ensure that drawing schedules are created from data found in their BIM files; and,

6.4.4.3 All third-party content (e.g., objects sourced from a manufacturer) will be tested and, if applicable, mapped for COBie compliance.

6.4.5 The COBie data schema requires the follow to maintain the integrity of data, which will be validated by the Authority's BIM Consultant:

6.4.5.1 Every Component will be assigned to at least one Space;

6.4.5.2 Every Component will be assigned to one Type;

6.4.5.3 Every Component will be assigned to at least one System;

6.4.5.4 Every reference to other sheets will be valid; and,

6.4.5.5 Every reference to PickList enumerations and classifications will be valid.

6.4.6 The Design-Builder is required to utilize consistent parameters and naming strategies, in line with the Authority's documented room and Asset naming protocols. The following table summarizes the convention required for Asset naming, based on a variety of equipment types.

Asset Name (Component.Name)	Plain Language Description	Naming Convention
CHW-P-15HP-06	Pump 06 within the Chilled Water system	System Category – Asset Category – Asset Number Identifier
CHW-P-15HP-06-VFD-06	Variable Flow Device 06 within Pump 06 within the Chilled Water system	System Category – Asset Category – Asset Number Identifier
V-6T04	Transformer, Vital, 600V ~120/208V (T-2)	Electrical Branch – Voltage – Asset Category Abbreviation - Asset Number Identifier [1]
BED-53	Bed 53	Asset Category – Asset Number Identifier

[1] See Attachment 12 [Electrical Labelling Schema]

6.5 Health & Safety and Risk Management

6.5.1 The purpose of this section is to enable the Authority to define how BIM based working will support Health & Safety and Risk Management monitoring.

6.5.2 The Design-Builder will demonstrate an innovative approach to Health & Safety and Risk Management, particularly in the way that BIM can reduce risks through early identification and mitigation. Any approach to Health & Safety and Risk Management practices using BIM will be outlined within the BIM Execution Plan. Suggested areas for consideration are:

6.5.2.1 Access and maintenance strategy;

6.5.2.2 Management of residual risk;

6.5.2.3 Equipment route;

6.5.2.4 Site orientation / welfare;

6.5.2.5 Temporary works;

6.5.2.6 Designer risk assessment; and,

6.5.2.7 Risk scheduling.

6.6 Project Coordinates

6.6.1 All model information will adopt the same coordinate system to ensure efficient collaborative working and must always be adhered to throughout the Project lifecycle. It is advised that the Design-Builder and their appointed parties will check the location of all models continuously throughout the design process, ensuring there are no clashes or conflicting Project coordinates. Maintaining a shared coordinate system amongst all Project team members is an essential part of delivering a BIM-enabled Project.

6.6.2 The Design-Builder will be required to establish a master origin point [A] for all consultants to use, using a specified coordinate system and define this correctly within their site set-up model. All measurements will be relative to the master origin point and will be provided in the Metric System (meters and millimeters). Any information authored in Imperial units must be converted to Metric prior to delivery. It is the responsibility of the design author to perform the unit conversion.

6.6.3 The Design-Builder will be responsible for the creation and dissemination of this Site set-up model. All information relating to Project reference points, including the coordinate system used, will be agreed in the BIM Execution Plan. The minimum information to be provided is outlined within the table below.

Master Origin Point	Coordinate Axis	Coordinate Value
[A]	Easting (m)	Defined by Design-Builder in BIM Execution Plan
	Northing (m)	Defined by Design-Builder in BIM Execution Plan
	Elevation / Datum (m)	Defined by Design-Builder in BIM Execution Plan
	Angle to True North (˚)	Defined by Design-Builder in BIM Execution Plan

PART 7. INFORMATION PRODUCTION METHODS AND PROCEDURES

The Design-Builder will outline any additions and / or amendments to the information production methods and procedures identified here within the BIM Execution Plan.

7.1 Software Platforms

7.1.1 The following software applications and versions are currently utilized by the Authority:

Software Type	Application	Version (if applicable)
Computer Maintenance Management System	IBM Maximo	
Integrated Workplace Management System	Archibus	

7.1.2 The Authority requires the Design-Builder and their Appointed Parties to utilize the following software applications:

Type / BIM Use	Discipline	Application	Version (if applicable)
BIM Authoring Software	Architectural, Mechanical, Electrical, Plumbing	Autodesk Revit	Current version or one version back at the time of initial Project award.
Data Classification	All relevant parties	Autodesk Classification Manager for Revit	Most recent version
Asset Registry	All relevant parties	Autodesk COBie Extension for Revit	Most recent version

7.1.3 As a minimum, the Design-Builder will outline the software platforms to be used to fulfil the relevant BIM uses specified in Section 3.2 in the BIM Execution Plan. In addition, the Design-Builder agrees that:

7.1.3.1 All model authoring software platforms will be capable of producing International Foundation Classes (.ifc) file formats to support collaborative working, or as a minimum be able to support in the production of COBie information from the 3D model elements. It is expected that the Design-Builder will update the software version so that the Record Model is the current version at each Relevant Substantial Completion Date.

7.1.3.2 The 3D-based, virtual coordination software platform will be software-agnostic and cloud-based to allow all parties to collaborate and coordinate on BIM files. This tool will assist with the tracking and management of Authority comments and revisions during the process described in Schedule 2 [Review Procedure];

7.1.3.3 The 3D-based, virtual coordination software platform will have the ability to automate the clash detection and review process based on customizable settings, using the model geometry and underlying component information. It will track issues, assign responsibility, and save views of issues.

7.1.3.4 Access to the 3D-based, virtual coordination software platform will be provided to the Authority, the Authority's BIM Consultant, and the Commissioning Authority without the Authority to purchase proprietary design software or incur licensing fees.

7.1.3.5 Any update or change in the software used, including the version applied, will be discussed, and agreed with the Authority and the Design-Builder, and reflected in the BIM Execution Plan.

7.1.3.6 All parties must be able to demonstrate sufficient knowledge and skill within the relevant identified software platforms by way of a Capability Assessment as part of the tender response as per Section 2.2. Any gaps in capability will be addressed with appropriate education and/or training as appropriate and identified as an activity within the Design-Builder's Mobilization Plan, to be submitted as part of the tender response.

7.1.3.7 All parties must be able to demonstrate access to sufficient hardware and IT capacity to deliver the information required with the specified software by way of a Capacity Assessment as part of the tender response as per Section 2.2. Any gap in capacity will be addressed within the Design-Builder's Mobilization Plan, to be submitted as part of the tender response.

7.2 Information Exchange Formats

7.2.1 For each required information exchange, information will be required in the following formats derived from the same dataset, with the following conditions:

7.2.1.1 The table below is provided as an overview only, as the specified information exchange formats will be confirmed and set out in the BIM Execution Plan and in the corresponding Information Delivery Plans.

7.2.1.2 The BIM Execution Plan will also include confirmation of the version of each format to be applied to the Project, and any additional formats deemed necessary by the Design-Builder.

Phase	Info. Exchange	Non-Geometric			Geometric			COBie
		PDF	DOC	XLS	DWG	Native	.ifc	
30%	1	Y	N	N	Y	Y	Y	Y
50%	2	Y	N	N	Y	Y	Y	Y
70%	3	Y	N	N	Y	Y	Y	Y
90%	4	Y	N	N	Y	Y	Y	Y
100%	5	Y	N	Y	Y	Y	Y	Y
Record	6	Y	Y	Y	Y	Y	Y	Y

7.2.2 This table sets out high-level requirements. For example, compliance reviews will be conducted throughout design and Construction which will require specified formats which may not align to the requirements set out in this table.

7.3 Common Data Environment (CDE)

7.3.1 The Project team will exchange electronic information using a Common Data Environment provided by the Design-Builder. The goal of the system is to ensure an accurate record of the Construction of the facility, as understood by all team members. A CDE is typically served by a Document Management System that facilitates the sharing of data/information among Task Teams. The procured system will enable:

7.3.1.1 All uploaded information to have a unique ID based upon the identification convention specified in Section 6.1;

7.3.1.2 All uploaded information to have the following attributes assigned as metadata:

7.3.1.2(1) Status code (suitability of information), in accordance with the Canadian National Annex to ISO 19650-2:2018;

7.3.1.2(2) Revision code, in accordance with the Canadian National Annex to ISO 19650-2:2018; and

7.3.1.2(3) Classification, in accordance with Omniclass (Table 36 – Information).

7.3.1.3 The ability for information containers to transition between states and the recording of the name of user and date when information container revisions transition between each state; and

7.3.1.4 Controlled access at the information container level.

7.3.2 Within the CDE, the Design-Builder, including Appointed Parties, are responsible for the following:

7.3.2.1 Uploading and issuing all relevant information via the CDE;

7.3.2.2 Safeguarding a copy of the information on a secure server within their own organization;

7.3.2.3 Downloading relevant files from the CDE;

7.3.2.4 Using file naming conventions as detailed within the BIM Requirements and BIM Execution Plan;

7.3.2.5 Uploading the information in file formats are described in the BIM Requirements and BIM Execution Plan;

7.3.2.6 Ensuring that none of the uploaded files are corrupted or contain any viruses or malware;

7.3.2.7 Ensure that the last valid revision of each file is uploaded; and,

7.3.2.8 Report to the Design-Builder's CDE manager / coordinator any issues encountered in the form or content of files within the CDE.

7.3.3 The Design-Builder will arrange for all parties, including the Authority and the Authority's BIM Consultant, to have reasonable access to the information in the CDE Solution.

7.4 Collaborative Working

7.4.1 All information will be uploaded and logged on the CDE in line with the information exchange protocols described in ISO 19650-2:2018. This will ensure consistent and accessible information is provided to the Project team, and accountability can be determined by the Design-Builder. Details of the collaboration process must be provided in the BIM Execution Plan, including:

7.4.1.1 The process of sharing information between team members;

7.4.1.2 The quality assurance process and publishing information to the Authority;

7.4.1.3 The frequency of information exchanges for coordination exercises and/or meetings; and

7.4.1.4 Details of Information Model review workshops and other collaborative working practices, e.g., the utilization of 3D model(s) at design and/or site meetings.

7.5 Modeling Requirements

7.5.1 The Project collaboration process and any common modelling standards to be adopted by the Design-Builder will be identified and addressed within the BIM Execution Plan. These include:

7.5.1.1 Modelling methodologies (e.g., 3D, placeholders, etc.);

7.5.1.2 Levels of information need;

7.5.1.3 Incorporation of metadata;

7.5.1.4 Use of material properties;

7.5.1.5 Object libraries;

7.5.1.6 Communication and model review workshops; and

7.5.1.7 Frequency and formats of information exchanges and model reviews.

7.5.2 The Design-Builder will also set out how they intend to model the equipment they are responsible for such as Category A Equipment, Category B Equipment, Category C Equipment and Category D Equipment (excluding furniture) as defined in Appendix 1H [Equipment and Furniture].

7.6 Coordination and Clash Detection

7.6.1 The Design-Builder will be responsible for setting up and leading internal model review and coordination meetings.

7.6.2 The Design-Builder will establish a strategy within the BIM Execution Plan for sharing models internally and externally, and for coordinating and performing clash analysis. Clash detection software will be used during the coordination process to determine field conflicts by comparing the 3D models and specified within the software schedule provided in the BIM Execution Plan in accordance with Section 7.1. Any comments, issues and viewpoints are to be exported and exchanged through the defined file formats.

7.6.3 Within the BIM Execution Plan, the Design-Builder will provide proposals for how models and information will be coordinated, managed, and reported throughout the Project lifecycle. This will include:

7.6.3.1 Details of the clash detection process, including:

7.6.3.1(1) Software, in accordance with Section 7.1;

7.6.3.1(2) Process overview;

7.6.3.1(3) Responsibilities;

7.6.3.1(4) Outputs (including file formats);

7.6.3.1(5) Frequency of coordination workshops; and

7.6.3.1(6) Attendees of coordination workshops.

7.6.3.2 Technical query workflow

7.6.3.3 Tolerance strategy

7.6.3.4 Clash resolution process

7.6.4 The Design-Builder is to visually demonstrate their use of the latest federated multi-disciplinary 3D model for coordination purposes within the progress review. The Design-Builder will also be required to produce a Coordination Report at each Submittal phase to demonstrate that a controlled process is being followed in accordance with the BIM Execution Plan.

7.7 Security and Distribution of Information

7.7.1 Unless agreed with Authority, all Project information is to be treated as confidential. The Design-Builder will provide a protocol for uploading information to the CDE, which will be fully adopted by all parties. The BIM Execution Plan will also set out the process for monitoring, managing, and complying with these requirements.

7.7.2 All parties will adhere to the security requirements defined in ISO 19650-5:2020 and are required to have appropriate back-up, firewall and anti-virus facilities in place within their own organization. These procedures must be taken to secure the data and meet any restraints imposed by the Authority.

7.8 Federation Strategy

7.8.1 This section sets out any requirements surrounding data segregation using a Federation Strategy. The Design-Builder will work with the Authority to set out a proposed Federation Strategy within the BIM Execution Plan. The Design-Builder will outline how the Project Information Model (PIM) is intended to be divided based upon an identified information container breakdown structure.

7.8.2 As a minimum, each set of information containers within the Federation Strategy will be assigned with the Task Team responsible for their production.

7.8.3 Individual Information Models will not exceed 250mb at information exchange points as set out in Section 7.2 of Schedule 1 Appendix 1U to ensure model performance and ability to transmit data is not affected. Federated models, in turn, will not exceed 500mb upon information exchange. It is the responsibility of the Design-Builder to proactively manage this requirement utilizing an appropriate Federation Strategy.

7.9 Compliance Plan and Quality Assurance

7.9.1 The purpose of this section is to enable the Design-Builder to communicate how the integrity of the model and other data sources will be maintained. It will also ensure the Design-Builder is using best practices in the development and file exchange of models and facility data. This is an ongoing process, which is to be conducted by the Design-Builder and validated by the Authority's BIM Consultant at both Project milestones and at regular intervals to ensure that each model is being constructed in accordance with the BIM Standards and is suitably modeled for its intended use. The goal is to ensure that there are no unresolved issues during Construction.

7.9.2 The Authority requires the Design-Builder to comply with the following BIM Standards and any associated documentation throughout the Project process:

7.9.2.1 The Information Protocol

7.9.2.2 BIM Requirements

7.9.2.3 Master Information Delivery Plan (MIDP)

7.9.2.4 BIM Execution Plan (BEP)

7.9.2.5 Level of Information Need

7.9.3 The Authority's BIM Consultant will conduct BIM Compliance Reviews to ensure that the required BIM process is being followed. This will not address any design considerations or code compliance.

7.9.4 The Review will consider the following issues:

7.9.4.1 Quality assurance/control procedures

7.9.4.2 Software used to support quality control procedures

7.9.4.3 The level of assurance that can be given

7.9.4.4 Retaining data integrity/accuracy in model format and its 2D output

7.9.4.5 Managing models and data during the period of aftercare

7.9.5 The BIM Execution Plan will stipulate how the Design-Builder will monitor the as-built Construction so that they can reflect this in the models. This will include the method, workflow and frequency in which the as-built conditions are captured, and how they are to be compared against the as-designed information. Approved changes made through Site Instructions, Requests for Information, and Change Orders will be incorporated in the model, which will also accurately display the current location of the tracked Assets within acceptable tolerances. It is the Design-Builder's responsibility to ensure any Construction activity that occurs as a result of deviating from the as-designed information is sufficiently documented within the Information Models and associated documentation, as agreed with the Authority.

7.9.6 Compliance approval by the Authority and the Authority's BIM Consultant will be required on Record submission to meet Substantial Completion.

7.10 Record Model Updating

7.10.1 It is of critical importance to the Authority that the Information Models provided at each Submittal point are an accurate representation of the actual built Asset. To that end, the Design-Builder is required to provide in the BEP their timeline and workflow for providing the information required to support the update of the Information Models to reflect changes. This includes schematics, single line diagrams and panel schedules to reflect the equipment controlled.

PART 8. REFERENCE INFORMATION AND SHARED RESOURCES

Reference information and shared resources will use open data standards to avoid interoperability issues and be hosted in the Project CDE to prevent document duplication and version control issues. Status codes within the metadata will indicate the intended suitability of the information for use.

8.1 Reference Information

8.1.1 The below table sets out reference information, to be provided by Authority, for use by the Design-Builder and their Appointed Parties.

Reference Information	File Format(s)	Location
No reference information known.	*N/A*	*N/A*

8.2 Shared Resources

8.2.1 The below table sets out the resources which are intended to be shared by Authority with the Design-Builder and their Appointed Parties.

Shared Resource	Location
Task Information Delivery Plan template	Attachment 2
BIM Execution Plan template	Attachment 1
BIM Forum LOD	https://bimforum.org/lod/
Omniclass Classification Tables	https://www.csiresources.org/standards/omniclass/standards-omniclass-about
NBIMS – US National BIM Standard	https://www.nationalbimstandard.org/

PART 9. INFORMATION PROTOCOL

9.1 Use of Information

9.1.1 Models are to be shared with all parties as defined / required by the Authority in accordance with Schedule 1 [Statement of Requirements] to the Agreement, however, the Authority reserves the right to request additional model submissions if deemed necessary, without such request being a Change.

9.2 Transfer of Information

9.2.1 The Design-Builder will be responsible for delivering the information required by Schedule 1 [Statement of Requirements] for which they are responsible. They will carry out a risk assessment to inform the preparation of the effective management of information throughout the Project and to reflect the long-term Asset information management strategy.

9.3 Liability

9.3.1 Each Party will have no liability to the other Party arising out of any modification or amendment to, or any transmission, copying or use of the Information Model or any proprietary work contained therein, by the receiving Party or any other party, apart from the issuing Party's subconsultants, subcontractors, suppliers or agents, for any purpose

other than the permitted purpose. The permitted purpose means any purpose related to the works (and/or (without limitation) the Construction, refurbishment, extension, operation, management and/or maintenance of the works) which is consistent with:

9.3.1.1 the applicable Level of Information Need of the relevant information in line with Section 6.3;

9.3.1.2 the applicable status code of the information within the CDE Solution and its workflows in accordance with ISO19650-2:2018 (see Attachment 3 [Information container identification convention] for permitted status codes); and

9.3.1.3 the purpose for which the relevant material was prepared in line with the authorized BIM uses as per Section 3.2.

9.3.2 The ownership and responsibility for each Information Model resides with the party that generated it. The Agreement respectively set out the rights of the Authority to use of the full Design Model.

PART 10. ATTACHMENTS

Attachment 1 – BIM Execution Plan Template

Attachment 2 – Task Information Delivery Plan Template

Attachment 3 – Information Container Identification Convention

Attachment 4 – FHA CAD Standards

Attachment 5 – BIM Forum LOD – Part I

Attachment 6 – BIM Forum LOD – Part II

Attachment 7 – Tracked Asset Schedule

Attachment 8 – Tracked Asset Grading

Attachment 9 – Specific Structured Data Requirements (COBie)

Attachment 10 – Tracked Asset Data Requirements

Attachment 11 – Asset Classification

Attachment 12 – Electrical Labeling Schema

APPENDIX 1U – BIM REQUIREMENTS

10.1 Attachment 1: BIM Execution Plan Template

10.2 Attachment 2: Task Information Delivery Plan Template

10.3 Attachment 3: Information container identification convention

10.4 Attachment 4: FHA CAD standards

10.5 Attachment 5: BIM Forum LOD – Part I

10.6 Attachment 6: BIM Forum LOD – PART II

10.7 Attachment 7: Tracked Asset Schedule

10.8 Attachment 8: Tracked Asset Grading

10.9 Attachment 9: Specific Structured Data requirements (COBie)

10.10 Attachment 10: Tracked Asset Data Requirements

10.11 Attachment 11: Asset Classification

10.12 Attachment 12: Electrical Labelling Schema