APPENDIX 2B

BIM REQUIREMENTS

TABLE OF CONTENTS

1 ACRONYMS

Attachment A: List of acronyms included in the BIM Requirements.

2 DEFINITIONS

In this Appendix, in addition to the definitions set out in Schedule 1 [Definitions and Interpretation] to the Project Agreement or the Construction Management Agreement, as the case may be:

Attachment B: Contains the definitions of the main BIM terms mentioned in the BIM Requirements.

"**Relevant Element**" means any of the New Tower, the Energy Centre, the SFB Expansion, the CPPS or any Renovated Space.

"**Relevant Substantial Completion Date**" means the date each Relevant Element reaches Substantial Completion in accordance with the Project Agreement or Construction Management Agreement, as the case may be.

3 BIM PROJECT PARTICIPANT ROLES

Roles in the BIM Requirements documents are defined as follows:

- Work effort required in relation to Design as defined in the Project Agreement or the Construction Management Agreement, as applicable. This role is defined as the "Design Team". Project Co and the Construction Manager will determine which firms or individuals form part of the Design Team for each Agreement, provided that the Design Team shall be the same for both Agreements.
- Work effort required in relation to Construction as defined in the Project Agreement or the Construction Management Agreement, as applicable. This role is defined as the "Construction Team". Project Co and the Construction Manager will determine which firms or individuals form part of the Construction Team for each Agreement.

Regardless of whether the BIM Requirements refer to the Design Team or the Construction Team:

- for the purposes of the Project Agreement, all obligations related to these roles shall be obligations of Project Co; and
- for the purposes of the Construction Management Agreement, all obligations related to these roles shall be obligations of the Construction Manager, provided that where in accordance with Good Industry Practice a particular obligation would be appropriately assigned to a Trade Contractor, the Construction Manager may fulfil its obligations by including the obligation in the relevant Trade Contract.

3.1 Design and Construction

This document uses the terms Design Team and Construction Team to refer to work effort required, relative to BIM processes, during Design and during Construction, irrespective of the contract type being used.

3.1.1 Participation

For the purposes of the Authority's BIM process, all participants involved in the Design Team and Construction Team are required to conform to the BIM Requirements set out in this document.

It is the responsibility of the Design Team and Construction Team project participants to define within the Project Execution Plan (PEP) the responsible parties, workflows, processes and protocols they intend to utilize within the respective team to address specific issues and achieve the stated goals.

"Attachment D: Project Execution Plan (PEP) – Outline Requirements – Design Team and Construction Team" outlines the specific criteria that are to be addressed.

3.2 The Authority

The Authority will undertake the following:

- Distribute required standards and information to support the BIM goals.
- Review the Project Execution Plan (PEP), including any requested exemptions, in accordance with Appendix 2C [User Consultation and Review Procedure] to the Project Agreement or, after the Substantial Completion Date, the Construction Management Agreement.
- Review and comment on submitted deliverables, i.e. design models, asset information and data upload.

3.3 The Authority's BIM Consultant

The Authority will retain an independent consultant (Authority's BIM Consultant) to audit the models, to ensure compliance with these BIM Requirements and check that the data generated can support the proposed goals. Other responsibilities include the following:

- Provide guidance to the Design Team and Construction Team.
- Audit with report Design Model data to ensure BIM Requirements are being met.
- Monitor BIM process and protocols to ensure agreed processes are being followed.
- Generate the Design Model Asset Registry.
- Prepare, host and monitor the cloud-based environment for asset information upload.
- Generate progress reports on the data and document upload progress.
- Compile the data for transfer to Computer Maintenance Management System (CMMS), IBM Maximo.

4 INTRODUCTION/OVERVEW STATEMENT

The Authority is implementing a Building Information Management (BIM) process for its Capital Projects. Its vision for this process and overall goal can be 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".

4.1 BIM Goals

The Authority is keen to benefit from an integrated BIM process including the following:

- Management of virtual coordination.
- Management of duplication across models.
- Compliance with the Authority's BIM Requirements.
- Management of required clearances for maintenance and replacement.
- Incorporation of existing facilities conditions.
- Management of project phasing and multiple tenders.
- Tracking of assets across models.
- Collection of asset information for operation and maintenance (O&M) phase.
- Identification of asset parent / child relationships and system.
- Identification of assets based on asset information collected during the BIM processes.
- Obtaining manufactures instruction manuals for Preventative Maintenance Program development.

- Generation of record Revit model by the Design Team for O&M and future renovations, refurbishments or upgrades.

4.2 BIM Platform - Software

The Authority's software platform will be Autodesk Revit.

Prior to the start of work, to ensure synchronization with the Authority's workflows, the Design Team must confirm with the Authority which versions and build they propose to use - see 6.2.1.

4.3 Classification Systems

To remove the requirement for a stringent naming schema, the Authority has selected OmniClass 2012, Table 23 Products and Table 13 – Spaces, as the classification management system for organization, sorting, and retrieval of asset information for all tracked assets.

The Design Team must incorporate the correct Classification Number, as identified in the Data and Geometry Specification, as defined in 5.2.2.1 of this document, for all tracked Assets and all Rooms, including shafts and interstitial floors.

5   BIM REQUIREMENTS

The BIM Requirements Document Set is comprised of two (2) interrelated documents as noted below:

5.1 BIM Requirements – This document

5.2 BIM Requirements Specification (DGS, DCS + Rooms) (xlsx. File) - Attachment G

A spreadsheet that details the following, in three Tabs:
- Notes / Key tab.
- DCS/DGS tab: Assets that are considered Tracked Assets and against which additional data and documents will be collected for onward migration to CMMS:
  - o   All Tracked Assets within the Design must be modelled in the design models with a parametric object.
- Rooms: OmniClass number for Room Types.

A PDF version is included in Attachment G of this document and the excel file was provided in the RFP data room.

5.2.1 Notes Tab:

Basic instructions for how to use the document.

5.2.2 Tracked Assets - DGS/DCS Tab:

5.2.2.1 Data and Geometry Specification – DGS – Design Team Requirements

This section of the spreadsheet, organized by OmniClass Table 23, groups and defines those assets that, if present within the design, must be represented by a parametric modeled object incorporating the correct OmniClass number. The Design Team will work with the Authority and the Authority's BIM Consultant toward an agreed DGS.

These assets are defined as 'Tracked Assets' and are of critical importance to the Authority.

- Asset Hierarchies and Classifications:

  The Authority will transform the BIM data into an Asset Hierarchy prior to upload into CMMS.

The Design Team must adhere to the following structure:
1. **Discipline** - top parent (e.g. Mechanical or Electrical)
2. **System** (e.g. Chilled Water or Vital Electrical Distribution)
3. **Specific Asset Relationship** (e.g. VFDs related to associated pumps or electrical equipment related to assets that they are fed from)

Attachment I: Contains a sample of these Asset Hierarchies for context.

In addition, the Authority will require System / Asset Type Classifications for each Tracked Asset.

This is to improve searching and maintenance cost reporting (Attachment J provides a sample of these classifications).

In order to facilitate the data transformation process, the Design Team is required to utilize consistent parameters / naming strategies to allow for identification of the parent / child relationships and appropriate classifications. Specifically, the Mark field must follow the specified Mark / Asset Name structure and System name / System abbreviation fields. These must be used consistently and align with the Asset Category Acronyms and System Acronyms provided in Attachment E.

The Mark schema for these 'Tracked Assets' is critical and must follow the Authority structure to ensure that parent / child relationships, along with the following relevant information, is captured.

The following table explains the required Asset Hierarchy Schema:

DGS	Parameter	CMMS Usage/Field	Example	Notes
Design Team	Mark (Instance Parameter in Revit)	Asset Name	CHW-P-06-VFD-06	See Mark / Asset Name, Naming Structure samples below
	Asset Description (Shared Parameter in Revit)	Asset Description	VFD, Chilled Water Pump 6	Clear accurate name compiled as follows: Asset Type (DGS column B), System Name, other critical information for identification of the asset
	Type Mark (Type Parameter in Revit)	Component of Classification	VFD	See Attachment E for Asset Category Acronyms
	OmniClass # 2012 - Table 23 (Revit Built-In / Classification Manager Parameter)	Classification	23 35 17 15 Variable Frequency Drives	OmniClass # and Title
	System Name (Revit Built-In Parameter)	Classification / Hierarchy	Chilled Water	See Attachment E for System Names
	System Abbreviation – Revit built-in Parameter	Classification / Hierarchy	CHW	See Attachment E for System Abbreviations
	Location – Building - (Project Information in Revit)	Location	BH Acute Tower	As defined in the PEP

Location – Floor (Revit Level)	Location	01 floor	As defined in the PEP
Location – Room Number (Revit Room Number Parameter)	Location	Rm 101	As defined by the Authority for the project
Location – Type Room OmniClass # Table 13 (Shared Parameter in Revit)	Location	13 23 23 21 Service Space	As placed in Architectural models

The following table summarizes some Mark / Asset Name, Naming Structures samples for a variety of equipment types:

Asset Name	Mark / Asset Name	Mark / Asset Name, Naming Structure Breakdown
Pump, Chilled Water (P-6)	CHW-P-06	System Abbreviation – Asset Category Abbreviation – Asset Number Identifier
VFD, Chilled Water, Pump 6 (VFD-06)	CHW-P-06-VFD-06	System Abbreviation – Parent Asset Category Abbreviation – Parent Asset Number Identifier – Asset Category Abbreviation – Asset Number Identifier (i.e. 06)
Transformer, Vital, 600V ~120/208V (T-2)	V-6T04	Electrical Branch – Voltage – Asset Category Abbreviation - Asset Number Identifier (see Attachment K for details on Electrical Labelling Schema)
Bed 53	BED-53	Asset Category Abbreviation – Asset Number Identifier

The overall strategy to be adopted and followed for managing this schema must be consistent across the 'Redevelopment' and be recorded in the PEP. Project Co will submit its strategy to the Authority as a Submittal for review in accordance with Appendix 2C [User Consultation and Review Procedure] to the Project Agreement and the same strategy will be used for the Construction Management Agreement.

The DGS includes both the Asset Category / Asset Type and OmniClass number for Tracked Assets.

5.2.2.2 Data Collection Specification – DCS – Construction Team Requirements

This section defines the additional information that is to be provided relative to each tracked asset type and instance. The Construction Team is required to provide all information, for all required data fields, as set out in the DCS. The Construction Team will work towards an agreed DCS with the Authority and the Authority's BIM Consultant.

Data and Document upload requirements are specific to each Tracked Asset type and are specified in the DCS.

The following table highlights the timeline for upload fields:

Timeline		Attributes	Example	Notes
Construction Team	Shop Drawing Approval	Shop Drawings (Approved)	PDF File	Software generated PDF by Asset Type
		Vendor / Supplier	AAABBBCCC	
		Manufacturer	AAABBBCCC	
		Model	ACH550	
		Serial No	2133702396	
		Pressure Vessel #	PV1234567	If it is registered as Pressure Vessel in BC
		Manufacturers Instruction Manuals	PDF file	Required for PM development – software generated PDF
	Prior to: Substantial	Installation Date	YYYY-MM-DD	
		Warranty End Date	YYYY-MM-DD	Required for all under warranty
		Asset Number	XXXXX	Maximo Number (provided by the Authority)
		Additional Notes		If any

5.2.3 Asset Number

The Construction Team is required to install a unique Asset Number on each instance of a Tracked Asset as defined in the DGS / Asset Management Requirements. In addition, this unique Asset Number must also be entered against the exact same asset on the Authority's External Database.

The Authority will provide a range of Asset numbers for use. Asset Label requirements are included in the Asset Management Requirements, Appendix 2K to Schedule 2 [Design and Construction Protocols] to the Project Agreement. The same requirements will apply to the Construction Management Agreement.

5.3 Ownership

The ownership and responsibility for each individual digital model resides with the party that generated it. The Project Agreement and the Construction Management Agreement respectively set out the rights of the Authority to use of the full Design Model.

Models are to be shared with all parties as defined / required by the Authority in accordance with Schedule 3 [Design and Construction Specifications] to the Project Agreement, however, the Authority reserves the right to request additional model submissions if deemed necessary, without such request being a Change. Models must be provided in their native state, retaining all links, attachments, and sheets applicable for the submission. Models should have been purged of unnecessary families and extraneous objects.

- The printed and digital 2D paper (PDF/DWF) drawings derived from the models, not the models themselves, will still constitute the Design for the purpose of the Project Agreement and the Construction Management Agreement respectively.
- The use of shared Models and the inherent data will be at the risk of the user.

5.4 Goals

To support downstream uses of the model data, the Authority has three specific BIM goals as outlined below. To enable the data generated within the Revit models to support these goals, the Authority requires that the Design Team and Construction Team adhere to Revit practices defined in Attachment C: Design Revit Required Model / Data Structure.

5.4.1 Validation – 'One Version of the Truth'

The BIM Requirements have been developed not only to ensure consistency of documentation for the Authority over time but to facilitate the ability to search, sort, filter the data, the focus being to ensure that 'Data Fit for Purpose' is being generated within the model data sets.

5.4.2 Visualization – 'Clear Understanding for All'

Utilizing the inherent power of a BIM process to enhance the communication of design intent, particularly to groups unfamiliar with interpreting 2D drawings, as well as to validate program requirements, coordinate for access and constructability, and generally test for form, fit and function, the Authority requires that a 3D model with full functionality be made available for all Design and User Consultation Group meetings.

5.4.3 Data Access – 'Search, Sort and Filter'

Since the inherent structure of the design model data provides the foundation for collection of additional data and documents for onward mapping to the Authority's end use Computer Maintenance Management System (CMMS), it is critical that the Record Model be an accurate representation of the built Relevant Element and be delivered to the Authority at each Relevant Substantial Completion Date. Assets identified as 'Tracked' in the DGS/DCS are required to be modeled when present in the design. The Design Team and Construction Team are required to detail in their PEP the process they plan to use to track the relationship between 'parent' and 'child' or linked assets across models.

6 BIM DESIGN TEAM

A BIM project inherently requires a collaborative approach from all participants. This section is separated into four stages: Strategy, Modeling, Virtual Coordination and BIM Compliance Review. Each section contains required BIM outcomes and requires the Design Team and Construction Team to document in the PEP the workflows, processes and protocols they plan to use to achieve them.

6.1 Strategy

The strategy stage covers the steps related to planning the Design process. During this stage, the following questions should be answered and recorded in the PEP:

- What will be modeled?
- What are the Data and Geometry requirements for the modeled elements?
- Who is responsible for doing what, at what point during the timeline of the project?
- What are the communication processes and data exchange protocols?
- What model practices are appropriate for the project?

The DGS defines the Tracked Assets and the minimum Level of Geometric Development required by project submittal.

6.1.1 Project Execution Plan (PEP)

The PEP provides clarity as to the strategy being adopted to address the challenges associated with working collaboratively, with multiple models. In addition, it provides an

opportunity to document modeling practices, processes and protocols to be followed and defines any areas of agreed non-compliance with these requirements.

The PEP is a critical, living document that is to be developed and kept current by the Design Team and Construction Team throughout the duration of the project. Along with the models, it is required to be submitted as part of each required Submittal.

Attachment D: Design Team Topics identifies issues that should be addressed in the PEP.
- The first submission of the PEP is to be provided 10 days before the BIM Design Kick-off meeting.
- After each Relevant Substantial Completion Date, the PEP will be used by the Authority as a guide on how to maintain and update the models throughout the life of the Relevant Element.

6.1.2 BIM Design Kick-off

Project Co will convene the BIM Design Team Kick-off Meeting at which:

- The Authority's BIM Consultant will respond to workflow strategies, information exchanges, etc. documented in the PEP.
- The Authority's BIM Consultant will clarify questions raised, explain the Compliance Review process and be available to respond, as required, to issues and propose acceptable solutions for agreement.

The BIM Design Team Kick-off meeting must occur within one month of the Effective Date, so that modeling strategies can be agreed before modeling efforts are too far advanced.

BIM Requirements Specification (DGS, DCS + Rooms xlsx. File) - this spreadsheet contains minimum modeling and data requirements for Tracked Assets and Rooms at different submittal stages.

The specification is comprised of three tabs:
- Notes – LOD definition and explanations regarding how to use the document.
- Tracked Assets, organized into groupings by Type, along with the required parameters that must be included relative to those assets
- Rooms – OmniClass # for room types along with required parameters that must be included.

The DGS is a template document. Not all assets / rooms on the spreadsheet will be present within a project. Any agreed adjustment to the DGS requirements must be recorded in the PEP. The Design Team and Construction Team will work with the Authority and the Authority's BIM Consultant towards an agreed DGS, DCS + Rooms Specifications.

6.1.3 Products (OmniClass Table 23) and Spaces (Table 13)

It is mandatory that Tracked Assets (Table 23) and Architectural Rooms (Table 13) contain an accurate number. The OmniClass # used should be the lowest (most detailed) level available, to maximize the granularity at which the data can be sorted, filtered and organized.

6.1.4 Level of Detail (Geometry)

The DGS provides the Authority's definition for the minimum required level of geometric development required for all Tracked Assets by Submittal:
- Level of Detail is used as a tool to communicate minimum geometric expectations, regarding tracked assets.

- The Design Team should define in the PEP the LOD requirements for all other elements / objects.

For clarity, at a general level (independent of specific assets), Level of Detail (LOD) is understood to be as follows:

Attribute	LOD 100	LOD 200	LOD 300
Quantity	Approximate	Accurate	Accurate
3D Shape	Representational	Approximate	Accurate
Size	Representational	Approximate	Accurate
Location	Approximate	Accurate	Accurate
Elevation	Approximate	Accurate	Accurate
Orientation	-	Approximate	Accurate
Object/Assembly/System	-	Generic	Specific
2D Output	Approximate	Accurate	Accurate

6.1.5 Level of Development (Data)
Specific required parameters relative to Tracked Assets are defined in the DGS along with the project phase by which the information should be present in the data set.

6.1.6 Tracked Assets
The DGS identifies model elements that must be modeled, if part of the Design. These are assets that are important for Facilities Maintenance and Operations (FMO). These Tracked Assets will have additional data and documents associated to them during Construction. The required Data and Documents are defined in the Data Collection Specification (DCS), included in the same tab.

If sequential tendering is planned, a parameter must be incorporated to place tracked assets within their relative tender package.

6.2 Modeling
The goal for the Authority is to receive from the Design Team a data-rich building model that will react consistently and predictably when modified, and that will provide structured data for use during all stages of the building's life cycle.

6.2.1 Design Authoring Software
The Authority requires that the Design Team use Autodesk Revit as the model authoring software. The version must be either the current version or one version back at the time of initial project award. The agreed version and build are to be documented in the project's PEP.

- The Design Team is required to update the Revit version so that the Record Model is the current version as at each Relevant Substantial Completion Date.
- Civil Engineering Consultants must use a 3-Dimensional (3D) Computer Aided Design (CAD) platform such as Autodesk Civil 3D.
- Additional specialist consultants (e.g. kitchen, elevator, specialist equipment) must generate models capable of coordination and data collection / extraction.
- A strategy must be included in the PEP to establish a process for coordination with the landscape consultant.

Other specialized visualization software solutions that the Design Team may use to meet specific Preliminary Design Review requirements are to be recorded in the PEP.

6.2.2 Design Team Model Requirements

Since capturing the relationship between Tracked Assets is of critical importance for the Authority, the Design Team is to adhere to the naming schema outlined in 5.2.2.1. using the required parameters as appropriate:

- The Mark / Type Mark must be used when placing Asset Names on sheets and generating the various schedules.
- Schedules, incorporating any Tracked Asset must be generated from the Revit database.
- Attachment C: Design Team: Revit Modeling and Data Requirements - Sets out issues that need to be addressed / achieved.

The expectation from the Authority is that the design rationale is inherent in the design models being generated: e.g. flows, pressures, capacities of systems.

6.2.3 Existing Facilities: Renovations / Extensions

The expectation is that, where feasible, all work shall be undertaken using a BIM process. For clarity, existing conditions will be modeled in the Design Models for virtual coordination purposes only and will not considered as part of the Tracked Assets listed in the DGS and DCS. Hence existing conditions will be excluded from the tracked asset management BIM process.

The Design Team is required to detail in the PEP any areas where a CAD workflow is proposed and their anticipated process for the capture of new tracked asset information located within this area.

If a CAD workflow is to be used, then the Authority's CAD standards included in Attachment H will apply.

6.2.4 Record Model Update

It is of critical importance to the Authority that the Design models provided at each Relevant Substantial Completion Date be an accurate geometric representation inclusive of the design rationale of what has actually been constructed.

To achieve this, the Design Team must record in the PEP the process and timeline they propose to use to capture, within the Design models, the geometry and design rationale changes that have occurred during Construction. The process should define the timeline, milestone checks for update, along with the accuracy that is to be applied to the design rationale, systems and assets.

The Authority's BIM Consultant has the right to audit models at the agreed milestone checks, which should occur at a minimum every three months during Construction to ensure that this process is occurring.

However, there is no requirement to replace original design rationale data with installed tracked asset information.

6.3 Virtual coordination

6.3.1 Virtual Coordination Reviews

Virtual coordination is a key process in helping to mitigate risk for the project and the Authority. The Design Team must document in the PEP the process they propose to follow.

The following is to be addressed:
- Management of the virtual coordination process:

- o   Hard Clashes – physical conflict between two pieces of geometry / objects.
- o   Soft Clashes – objects impinging on required clearances for code, maintenance or replacement needs. Clearances for maintenance must include the required access column to reach the equipment.
- o   Building Review – to resolve potential constructability or design issues not highlighted by either a soft or hard clash.
- o   Colour coding used to distinguish model elements / systems.
- o   Software to be used and shared with the Authority. The software must include either a free viewer or at least five (5) number of licences, for use by the Authority.
- o   Frequency of reviews and meetings.
- o   Management of issues, how they will be tracked, prioritized, assigned and shared with the Authority. The following should be considered in the workflow:

unique identifier of the issue	graphical representation of the issue
date	status field
location	severity / risk
level	assignment of responsibility
disciplines involved	timeline for resolution

The Design Team will be required to provide a Virtual Coordination Report, at each submittal phase, to demonstrate that a controlled process is being followed.

Without accurately created and placed model elements, the value of conducting virtual coordination decreases and the risk of downstream coordination issues increases, frequently leading to long-term issues for effective maintenance of the facility. The Design Team must record in their PEP the strategy that will be used to mitigate this risk by defining the minimum requirements for model objects, not defined in the DGS, being placed within the design models.

6.3.2 Virtual Coordination Software
The following should be noted when selecting virtual coordination software:
- Software must have the ability to:
  - o   Automate the clash review process based on customizable settings using the model geometry and underlying component information.
  - o   Uniquely track issues, assign responsibility and save views of issues.

6.3.3 Virtual Coordination Software Access
Provide access to Virtual Coordination Software to the Authority, Authority's BIM Consultant and Commissioning Authority.

6.4   BIM Compliance Review
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.

The Review will consider the following issues:

- Project / Model Consistency – alignment with the BIM Requirements and the PEP:
  - o   PEP Readability / Clarity / Alignment with Models, Phasing Consistency, Cleanup, Duplications / Placeholder Objects.
- Model Coordination:
  - o   Modeling Precision, Clearances, Virtual Coordination.
- Asset Extraction:

- o Modeled Objects, Geometry LOD, Scope Clarification, In-place Families, Asset Granularity.
- Asset Location:
  - o Model Alignment, Room Bounding, Existing Rooms, Associated Room, Level, Room Type and Multiple Repetitive Rooms / Floors.
- Asset Classification:
  - o OmniClass 2012 classification, Consistent Category, Descriptive Names, System Naming.
- Data Clarity:
  - o Built-in Parameters, Object Relationship, Views and Schedule Data Usage.

6.4.1 BIM Compliance Review Deliverables

6.4.1.1 Design Phase Submission Timeline

Submission will be aligned with the Submittals in accordance with Schedule 3 [Design and Construction Specifications] to the Project Agreement and Appendix 2C [User Consultation and Review Procedure] to the Project Agreement and Appendix 2C [User Consultation and Review Procedure] to the Construction Management Agreement, as applicable.

6.4.1.2 Design Phase Submission Requirements

For each BIM Compliance Review, the Design Team will be required to provide the following:

- Revit Models – All disciplines (Architectural, Interiors, Structural, Mechanical, Electrical).
- Source software files – Civil, Landscape, specialist sub-consultants.
- Consolidated PDF sheet set – by discipline, including Civil, Landscape and Specialty Consultants.
- Updated PEP.
- Virtual Coordination Report and access to the free viewer as required in 6.3.3.

6.4.1.3 Authority's BIM Consultant

After a BIM Compliance Review, the Authority's BIM Consultant will be responsible for providing:

- Reviewed PEP.
- BIM Compliance Review Report.

The Design Team must resolve all issues flagged in this report prior to the next Compliance Review.

7 ISSUED FOR CONSTRUCTION (IFC) DELIVERABLES

Design Phase: IFC Deliverables:

- Updated Design Phase PEP.
- Revit Models – all disciplines.
- Source software files – Civil, Landscape, specialist sub-consultants, single line diagrams, existing facilities and other approved exceptions.
- PDF of consolidated sheet sets, by discipline, including Civil, Landscape and specialty consultants.

8   BIM CONSTRUCTION

This section is focused on the BIM processes and specific requirements that need to be fulfilled to ensure that the Authority achieves its goals.

It is separated into five sections: Strategy, Construction, Virtual Coordination, Record Model Updating and BIM Progress Review. Each section contains required BIM outcomes and deliverables.

8.1   Strategy

8.1.1 Data Collection Specification (DCS) (Attachment G)

The DCS, part of the DGS, is a template document that defines the data and documents required to be collected, relative to Tracked Assets.

The Authority's BIM Consultant will generate a project specific Asset Registry for Construction based on the IFC Design Models. This Asset Registry will specify all Tracked Assets against which additional data and documents must be uploaded during Construction.

8.1.2 Project Execution Plan

The Construction Team must continue to develop and maintain the Project Execution Plan (PEP) initiated during the Design.

Attachment D contains an outline of the issues that must be addressed in the PEP. The Construction Team will have this completed prior to the BIM Construction Kick-off meeting.

The Construction Team is required to provide specific workflow strategies in the PEP, to address BIM Requirements: e.g. Virtual Coordination, Design Model Update.

Of critical importance for the data and document upload is definition of scope and contact information for all parties required to provide information for upload to the External Database maintained by the Authority's BIM Consultant.

8.1.3 BIM Construction Kick-off Meeting

The Construction Team will convene a BIM Construction Kick-off meeting to be held within 30 days after the issuance of the first IFC documents for each Relevant Element. This meeting is an essential step to open lines of communication.

The Authority's BIM Consultant will provide a general review of the BIM requirements, identify areas of focus for the project and clarify any issues.

The Construction Team will table a draft Construction PEP and be prepared to discuss:

- Workflow strategies and information exchanges.
- Project timeline (simplified to better visualize BIM requirements in the context of the Construction).
- Asset Registry and Data and Document collection requirements.

Issues flagged / raised during the BIM Construction Kick-off meeting must be addressed and resolved in the PEP.

8.2   Construction

8.2.1 Asset Registry

The Authority's BIM Consultant will provide the Construction Team with an Asset Registry, generated from the design models. This document will list all the Tracked Asset types and instances present in the project.

The Construction Team will notify the Authority of any assets, requiring maintenance, which have been changed or are not included on the Asset Registry.

8.2.2 Construction Team

The Construction Team is required to:
- Assign all items on the Asset Registry to a specific Sub-Contractor or Trade Contractor.
- Advise of any Tracked Assets within a Sub-Contractor or Trade Contractor scope which are not included on the Asset Registry.
- Provide the following information to the Authority's BIM Consultant:

Sub-Contractor or Trade Contractor Name	Contact Person	Email Address

This information should be provided within four (4) weeks of each Sub-Contractor or Trade Contractor contract award.

Each Sub-Contractor or Trade Contractor will be required to upload all specified data and documents in accordance with the Data Collection Specification (DCS), to the External Database hosted by the Authority's BIM Consultant.

The Data Collection Specification, part of the Data and Geometry Specification is provided in Attachment G. This is a master list; not all asset types will be present in the design.

The Design Team and Construction Team will work with the Authority and the Authority's BIM Consultant towards an agreed DGS, DCS + Rooms Specifications.

Section: 5.2.2.2 provides an example list of asset information attributes along with the timeline for when information is to have been uploaded.

Information must be uploaded to the External Database:
- Some information is specific to the instance of each Asset Type: e.g. Serial Number, Maximo Number.
- Some information may be general relative to the Asset Type: e.g. Manufacturer.

The Construction Team must record in the PEP their workflow to capture this information and upload it to the External Database.

The goal is for the Authority to have all the information required to maintain and operate each Relevant Element at each Relevant Substantial Completion Date.

8.2.3 External Database: Data and Document Collection Environment

Unless otherwise noted, it is the responsibility of the Authority's BIM Consultant to provide, for the duration of the project, an External Database. This environment will be a cloud-based External Database that supports the association of data and documents to the Design model elements, such as approved shop drawings, and other installed information.

The Authority's BIM Consultant will be responsible for:
- Generating the Asset Registry from the IFC Design Models.
- Providing the interface for upload and management of the External Database.
- Working with the Construction Team to undertake a QC review for alignment between the Design Model Asset Registry and the Sub-Contractor or Trade Contractor scopes.
- Aligning responsibility for information upload amongst the responsible Sub-Contractors or Trade Contractors.

- Generating accounts so that project participants can access and review information.
- Providing a training session to the appointed responsible party, including a video, to support data upload.
- Providing a progress report on upload progress to the Authority.
- Transferring uploaded information to the Authority's CMMS solution at each Relevant Substantial Completion Date.

The Construction Team will:
- Appoint a responsible party to ensure compliance.
- Work with the Authority's BIM Consultant to define Sub-Contractor or Trade Contractor scopes and responsibility.
- Provide and upload both metadata (text, dates) and documents to the External Database. Each required data field must be completed with the relevant information.
- Address issues flagged or concerns raised about upload progress.
- Undertake a QA/QC process to validate the uploaded information, this process to be documented in the PEP.

The Authority will:
- Undertake QA/QC reviews of uploaded data.

All information is to have been provided and reviewed by each Relevant Substantial Completion Date.

8.2.4 Tracked Asset Data Collection

Approval of shop drawings is the trigger for the Data and Document Collection to begin, as specific information has now become certain: e.g. shop drawing approval provides certainty regarding manufacturer, model, vendor, manufacture's instruction manual, etc.

The expectation, unless agreed otherwise and recorded in the PEP, is as follows:

- The Construction Team will provide, to the Authority's BIM Consultant, and keep up to date a schedule for anticipated shop drawing approval.
- Each PDF file will be specific to the asset type.
- All required information as specified in 5.2.2.2 will be provided within 4 weeks of shop drawing approval.
- All uploaded PDF's, including stamped approved shop drawings provided by Sub-Contractors or Trade Contractors, must be submitted as software-generated PDF's. No scanned documents will be accepted.
- Manufacturers' instruction manuals must be uploaded to the External Database as soon as they become available, to support development of critical preventative maintenance programs.

8.2.5 Constructability Analysis

The Construction Team is expected to be an active participant in the BIM process, reviewing the Design for constructability issues, maximizing the efficiency of the construction schedule and evaluating opportunities for prefabrication off-site.

8.3 Virtual coordination

8.3.1 Virtual Coordination Software

Virtual coordination is a key process to help mitigate risk and, as such, is to be used for coordination of the project. The expectation is that Design Models will be used, in conjunction with fabrication models, to mitigate risk and maximize efficiency and quality.

The following should be noted:
- Software must have the ability to:
  - Automate the clash review process based on customizable settings using the model geometry and underlying component information.
  - Uniquely track issues, assign responsibility and save views of issues.

8.3.2 Virtual Coordination Reviews

The Construction Team must document in the PEP the processes, participants, fabrication software and coordination software they propose to use.

The following information should be considered:

- Hard Clashes, Soft Clashes (space for code / maintenance / replacement).
- Resolution of any remaining design issues.
- Coordination of fabrication level models, which should include hangers, seismic restraints, supports, accessories, etc. that have not been modeled during Design.
- List of Sub-Contractors or Trade Contractors providing fabrication models and the systems being represented.
- Tracking and reporting of any changes to Tracked Asset, location, orientation, or access requirements for maintenance.
- Method of capturing changes that require feedback and update to the design models.
- Virtual coordination to ensure that space required for maintenance and replacement of Tracked Assets is retained.
- Workflow for tracking, assigning and resolution of issues, including reporting progress.
- Workflow for increasing efficiency of construction through prefabrication, construction sequencing and on time delivery.

The Construction Team is required to provide a Virtual Coordination report, every three months, to demonstrate that the process is occurring.

8.3.3 Virtual Coordination Software Access

Provide access to Virtual Coordination Software, via either a free viewer or at least five number licences, to the Authority, the Authority's BIM Consultant and the Commissioning Authority.

8.4 Record Model Updating

It is of critical importance to the Authority that the Design Models, see Section 6.2.4, provided at each Relevant Substantial Completion Date are an accurate representation of the actual built Relevant Element. To that end, the Construction Team is required to provide in the PEP their timeline and workflow for providing the information required to support the update of the Design Models to reflect changes. This includes schematics, single line diagrams and panel schedules to reflect the equipment controlled.

The PEP should also record the accuracy of the information being relayed relative to different systems /assets, rooms, underground services, etc.

The following should be considered:

- Size and routings (pipe / ducts).
- Count / Number (added / removed elements).
- Location (Level/ Room, x, y).
- Elevation (z).

The Design Team must update the Design Models during Construction so that the External Database is kept current and, at each Relevant Substantial Completion Date, the models reflect the built Relevant Element.

Changes that impact Tracked Assets must be recorded and reported to the Authority's BIM Consultants so that, if required, the External Database can be updated.

The Design Team will reshare the updated models as requested to support the update of the External Database.

8.5 BIM progress review

8.5.1 Construction
To provide:
- Progress reports every three months during the early stages of the Construction phase.
- Progress reports every month during the last six months of the project:
  - By Sub-Contractor or Trade Contractor, showing progress and review, for required data and document upload.
  - Record Model update, including highlighting of any replaced, altered or relocated tracked assets.

8.5.2 Authority's BIM Consultant
Will perform BIM Compliance Reviews to ensure that the required processes, as defined by the Construction Team in the PEP, meet the outcomes defined in these BIM Requirements.

The Construction Team and the Authority will agree and define in the PEP the frequency and schedule for the BIM Compliance Reviews.

Following each review, a Report will be generated and shared by the Authority's BIM Consultant. Issues flagged are to be resolved prior to the next Review.

8.5.3 Submission timeline
The Construction Team to propose in the PEP a timeline for progress review submissions during Construction for Authority for review in accordance with Appendix 2C [User Consultation and Review Procedure] to the Project Agreement or the Construction Management Agreement, as the case may be.

8.5.4 Submission required
The following defines the information that must be made available to the Authority's BIM Consultant and the Authority for each BIM Progress Review:

8.5.4.1 Construction
- Updated Design Models (RVT).
- Data and Document progress report.
- List of Tracked Asset Changes.
- Updated PEP.

8.5.4.2 Authority's BIM Consultant
- Periodic BIM Progress Report.

9 SUBSTANTIAL COMPLETION BIM DELIVERABLES
The following requirements are specific to BIM Deliverables and are to be available at each Relevant Substantial Completion Date.

9.1 Design Team and Construction Team Deliverables
The following must be delivered to the Authority at each Relevant Substantial Completion Date:

- Record Design Models (RVT) updated to the version agreed in the PEP.
- DWGs (non-Revit, i.e. Civil, Landscape, Single Line Diagrams, existing facilities and agreed exceptions).
- Final consolidated Record drawings set (PDF).
- Final Data and Document collection report – demonstrating full compliance.
- Design Specifications (PDF).
- Completed Project PEP – (Design and Construction).
- Federated Fabrication Models.

9.2 Authority's BIM Consultant
Will provide the following:

- Tracked Asset information and associated data and documents, exported in a format to be agreed, for import into the Authority's CMMS (Maximo).
- Project information extracted from the External Database, as a consolidated digital building.

10 ATTACHMENTS

10.1 Attachment A – Acronyms

10.2 Attachment B – Glossary

10.3 Attachment C – Design Team Revit Modeling and Data Requirements

10.4 Attachment D – Project Execution Plan (PEP) – Outline Requirements – Design Team and Construction Team

10.5 Attachment E –Asset Category Acronyms and System Acronyms

10.6 Attachment F – FSS Naming Conventions

10.7 Attachment G – BIM Requirements Specification (DGS, DCS + Rooms)
The DGS + DCS Excel Template will be provided in a digital format to the successful proponent
- Legend Tab
- Tracked Assets Tab
  - o Tracked Assets (Design)
  - o Data + Document Collection (Construction)
- Room Data Requirements Tab
  - o Room classification (Design)

10.8 Attachment H – FHA – CAD Standards for Consultants FSS (Nov 2019 V22)

10.9 Attachment I - Asset Hierarchy Samples

10.10Attachment J – Sample Asset Classification

10.11Attachment K – Electrical Labelling Schema

10.1 Attachment A – Acronyms

3D	Three Dimensions (x,y,z)
2D	Two Dimensions (x,y)
BIM	Building Information Management
CAD	Computer Aided Design
CMMS	Computerized Maintenance Management System
DCS	Data Collection Specification (Construction)
DGS	Data and Geometry Specification (Design)
FM	Facilities Management
FMO	Facility Maintenance and Operations
FSS	Facility Systems and Support
HVAC	Heating Ventilation and Air Conditioning
IFC	Issued for Construction
LOD	Level of Development
PDF	Portable Document Format (file format)
PEP	Project Execution Plan
QA	Quality Assurance
QC	Quality Control
RVT	Revit Project (file type)

10.2 Attachment B – Glossary

Term	Definition
Asset Registry	A list of Tracked Assets within a Design Model that will have additional data and documents associated and which will be transferred to the Authority's CMMS.
BIM Compliance Review	Structured Review of the Design Models to check for compliance with the BIM Requirements.
BIM Requirements Specification	A spreadsheet aligning for Design and Construction all Tracked Assets requirements and Room Types to OmniClass Tables 23 and 13.
Clash Review Process	A Virtual Coordination activity that utilizes software rules and automation for the purpose of identification of physical and clearance (hard and soft) clashes.
Consolidated Digital Building	Augmented database that ties all required data and documents generated and collected during the project to the relevant 'Record Model' objects.
Construction Model	A model (Revit) optionally developed and managed by Construction for internal purposes such as enhanced virtual coordination, constructability and sequencing optimization.
Document Collection Specification (DCS)	A master list of Model Elements that are Tracked Assets (transferred to CMMS) defining data and document upload requirements by OmniClass.
Data and Geometry Specification (DGS)	A spreadsheet used to communicate Design data and geometry requirements, organized by OmniClass Table 23 and 13, for all assets tracked by the Authority.
Design Model	Individual models (Revit) that are created and maintained exclusively by members of Design and used to produce Construction Documents. These models are required to be kept current throughout construction incorporating construction changes.
External Database (Data Collection Environment)	Cloud-based platform for the upload of required data and documents relative to tracked assets.
Fabrication Model	Highly detailed model generated by a Sub-Contractor or Trade Contractor to enable prefabrication and detailed virtual coordination prior to construction. Fabrication models will be used for enhanced virtual coordination, not for association of data for FMO purposes.
Federated Model	A consolidated model that is comprised of multiple models from various sources whose identity or integrity cannot be modified.
Level of Detail (LOD)	A three-number code assigned to communicate the geometric development of a Model Element (100, 200, 300).
Model Element	A 3D virtual representation of an object. May be at varying Levels of Detail.
Project Execution Plan (PEP)	The Project Execution Plan (PEP) is an editable "living document" which is to be maintained and updated by the Design Team and the Construction Team throughout

Term	Definition
	the life of the Phase 1 Project life. It is meant to capture project information, modeling and workflow strategies specific to a given project.
Record Model	Final updated 'Design Models' (Revit), including changes during construction that record the completed, as-built condition.
Site Model	A 3D Civil Engineering model (non-Revit), containing underground services.
Tracked Asset	A Model Element the Authority will maintain post-substantial completion.
Virtual Coordination Report	A report to comply with the requirements outlined in the BIM Requirements, to be generated and shared with the Authority's BIM Consultant, for the purpose of documenting and demonstrating that Virtual Coordination is occurring, and that issues are trending down towards resolution.
Virtual Coordination	BIM workflow associated with a Clash Review Process, used to find issues and assign responsibility for resolution. *Hard clashes* are clashes that occur due to the physical conflict of two objects not being able to occupy the same space. *Soft clashes* are additional clashes set up to account for known clearance requirements for code, maintenance or replacement.

10.3 Attachment C: Design Team Revit Modeling and Data Requirements

Design Team: Modeling and Data Requirements			
		Title / Topic	**Comments**
1	**Model Consistency**		
	1	PEP Reliability	• Workflows and definitions approved in the PEP must be reflected in the models. • Attention must be given to Model Breakdown Strategy, Project File Names, Standard Levels, Phasing Strategy and Workset Strategy
	2	Phasing Consistency	• Phasing Strategy proposed in the PEP must be followed, and be consistent, i.e. no Comments parameter reading 'existing' and Revit phase set to 'New Construction'.
	3	Cleanup	• CD and IFC submission models should not contain abandoned designs, testing models, empty worksets, personal views, 'Design Options' or unnecessary AutoCAD files. • All families not part of the project should be purged.
	4	Duplications / Placeholder Objects	• To ensure clarity and ensure that only the intended element is used, all duplicate / placeholder objects must be identified as such (e.g. 'PLC' acronym inside 'Mark'). Record in the PEP how this is to be achieved. • All placeholder elements must be removed from the data set by 90% CD submission.
2	**Model Coordination**		
	1	Modeling Precision	• To support effective virtual coordination, the expectation is that elements will be model to represent their correct size and location in space, including slopes and insulation when applicable. • The Design Team should record in the PEP any elements that will not meet this fundamental requirement. • Use of the out of the box "Basic Ceiling" is not allowed. The use of this element with no thickness, is a known and documented issue that causes problems downstream.
	2	Clearances	• Mechanical and electrical equipment must comply with clearance requirements for code, maintenance or replacement. • A strategy to ensure proper clearances must be described by the 'Design Phase Team' in the PEP (e.g. Model a solid geometry as a 'Generic Model' within the Revit Family Editor and assign to the subcategory 'Clearance').
	3	Virtual Coordination	• Virtual Coordination is expected to occur throughout the Design phase. The expectation is that by the end of this phase the models will be virtually clash free. • Strategies for managing clearances for non modeled systems / objects (i.e. sprinkler, pneumatic tube) must be recorded in the PEP

3	**Assets Extraction**	
1	Modeled Objects	• All elements, in the design, identified in the DGS as Tracked Assets must be modeled. Any exception must be documented in the PEP for review / approval
2	Geometry (LOD)	• It is a fundamental requirement that objects shown in sheets are modeled (not lines, filled regions or symbols). • All tracked asset LOD must match the DGS • Image files representing drawings is prohibited • 2D representation can only be used for elements that do not impact Virtual Coordination and are not Tracked Assets. However, these elements must be modeled as families
3	Scope Clarification	• The strategy for identifying assets as Existing or Future elements, or those that are not included in the contract (NIC) or purchased by the Authority and installed by others, must be consistently used across all models and recorded in the PEP • If using sequential tendering, all tracked assets must contain their tender package association in a parameter.
4	In-place Families	• In-place families cannot be used for Tracked Assets.
5	Asset Granularity	• In some cases, assets can be split up unnecessarily in multiple instances or several assets can be combined into one object (e.g. skids). The breakdown of tracked assets into component parts should be in alignment with the DGS. Exceptions must be recorded in the PEP.
4	**Assets Location**	
1	Model Alignment	• All Federated models, including Civil files and laser scans, must be assembled utilizing the established Revit model origin datum to ensure accurate project geo referencing. • Grids and Levels must be consistently named and located across all models.
2	Room Bounding	• Architectural rooms will be used to categorize Tracked Assets in the models. To achieve adequate quantification of components inside a room, room objects must use level offsets from the structural floor elevation in the associated level to the underside of the next structural floor / slab / deck above. • Ceiling, Floor and Wall Finishes must not be "Room Bounding'
3	Existing Rooms	• For areas where Tracked Assets (including other disciplines) are being added or modified in Existing Areas, those rooms must be modeled using separation lines if necessary, to ensure objects can be properly assigned to the correct room.
4	Associated Room	• Each Tracked Asset must be associated to one specific room. • There should be no unplaced, redundant or overlapping rooms present in any model. • A strategy to capture location / room information, within interstitial floors must be documented in the PEP for approval. • Exterior and roof 'rooms' must be modeled using room separation lines and placed with the correct height, to capture elements outside the building envelope.

			• Exterior / Roof rooms must be identified with a prefix.
	5	Associated Level	• Tracked assets must be associated to the correct level, i.e. the level they are immediately above. • Special care must be taken when copying elements inside a model. • Modeling across multiple levels should be avoided.
	6	Associated Room Type	• The relationships amongst Tracked Assets, Rooms and Room Types must be captured for FMO purposes. A strategy to provide this information must be described in the PEP.
	7	Multiple Repetitive / Rooms / Floors	• All tracked assets must be modeled on all levels. • Each unique floor plate must be modeled in its entirety. • A strategy to provide this information must be described in the PEP.
5	**Assets Classification**		
	1	OmniClass Classification	• OmniClass version 2012 must be used to identify all modeled Tracked Assets, using the OmniClass number defined in the DGS. • The process for populating the OmniClass number for Component and System Families must be described in the PEP, considering that System Families do not have the OmniClass built-in parameter.
	2	Consistent Category	• The built-in Revit categories must be used to place Tracked Assets • 'Generic Models' and 'Specialty Equipment' categories should not be used to model tracked assets. • Any requested exemption must be recorded in the PEP.
	3	Descriptive Names	• The use of 'Standard', 'Default', 'Company Initials' prefix, or the use of number alone is prohibited. • Family Name and Type Name must follow a consistent theme of naming general to specific as these will be used to identify objects during the construction phase.
	4	System Naming	• The Design Team must use the 'prefix' in 'Attachment C' to identify systems within the model dataset.
6	**Data Clarity**		
	1	Built-in Parameters	• Built-in Parameters must be used when present, unless an approved process is recorded in the PEP. Using these parameters ensures that the data is where it is expected to be and that it can be consistently used. • Custom or Shared Parameters should only be used if a 'Built-in' Parameter is not available. • Built-in Parameters should not be duplicated.
	2	Object Relationship	• The built-in parameters 'Mark' must be used to capture Parent / Child hierarchy. • Shared parameters 'Equipment Unit Served' and 'Equipment Controlled' must be used to capture equipment connections
	3	Views and Schedules Data Usage	• 2D text notes will not be accepted to identify tracked assets. Any notes or descriptions shown in documentation must be reflected in the modeled object parameters. • All project views and schedules must be generated directly from the model and its underlying data. Exceptions to this rule are limited to schematic diagrams, wiring diagrams, point to point diagrams, riser diagrams, details and 2D CAD details when approved

END OF Design Team: Modeling and Data Requirements

10.4 Attachment D: Project Execution Plan – Outline Requirements – Design Team and Construction Team

	Title / Topic		Comments
PEP: Design Team Topics			
	Title / Topic		**Comments**
1	**Project Information**		ID, Name, Description, Address, Contract Type, BIM Requirements Version, Standard Units, Number and Name of Buildings
2	**Building Information**		ID, Name, Project Type (new/existing/renovation), Target Occupancy Date
3	**Schedules and Frequencies**		
	1	Project Timeline	Project Schedule, List of Submittals with proposed dates, List of Tender Packages with milestone submission dates
	2	BIM Activities	BIM Design Kickoff meeting date, Frequency of BIM Meetings, Virtual Coordination sessions and Cost Estimates
	3	BIM Exchanges	Frequency of Model Exchanges
4	**Team Definition**		BIM related participants with role, organization, name, email, phone, time zone
5	**Software**		
	1	Platforms and versions	Design authoring, design analysis (structural, lighting, power, energy, cost), issue tracking, specifications, virtual coordination, collaboration, communications, file/document exchange and management.
6	**Standards**		
	1	Naming structure	Disciplines, Models, Links, Levels, Worksets
	2	Sheets	Sheet sizes, Text Styles, Numbering structure
7	**Model Information**		
	1	Files	Discipline/content, name, authoring company
	2	External Links (.dwg, .ifc)	Discipline/content, name, authoring company
	3	Levels	Name, project elevation, site elevation, description
	4	Phases	Name, description
	5	Worksets	Name, description, default visibility (on/off)
Strategies and Workflows			
1	**Modeling Strategies**		
	1	Model Breakdown	Required for larger projects to keep model size manageable

	2	Model Alignment	Define Project Origin, Coordinate System and True North orientation
	3	Phasing Strategy	Required to be consistent across all models
	4	Clearances	Define how required clearances will be modeled and managed
	5	Typical Floors / Room Types	Modeling strategy to work with repetitive elements, floors, rooms
2	**Workflow Issues Strategies**		
	1	Multiple Models	Process for managing multiple models within a discipline
	2	Non-Revit Models	Describe the process to coordinate across different software types
	3	Revit version update	Describe strategy to be used to update all models
	4	Object duplication	Strategy for managing duplication across all models (e.g. openings, housekeeping pads, plumbing fixtures, lighting fixtures, stairs, ceilings etc.)
	5	Parent Child Relationship	Strategy for managing the naming requirement amongst tracked assets (e.g. equipment and power source, card read / door#, pump / system) within the same model and across models.
		New Elements within Existing Hospital	Define strategy for modeling existing elements to be relocated, new tracked assets located in existing rooms and / or connected to existing systems.
3	**Virtual Coordination Strategies**		
	1	Clash Detection	Proposed process to find issues (hard and soft clashes)
	2	Issue Tracking	Proposed process for assigning, and resolving issues
	3	Risk Mitigation	Describe the process for mitigating the risk for running virtual coordination with systems that have not been modeled, i.e. sprinkler system.
4	**Data Quality Strategies**		
	1	OmniClass	Describe process to populate OmniClass 2012 number (built-in parameter, classification manager add-in or other) and the QC process to check for accuracy.
	2	Systems	Describe process to be used to ensure that all mechanical and electrical assets are associated with consistent systems.
	3	Mark and Type Mark	Define the QA/QC process to ensure consistent use across all models
5	**Existing Conditions Strategies**		
	1	Risk Assessment	Develop Risk Assessment / Analysis template

	2	Record Drawings	Detail strategy for mitigating risk relative to record drawings
	3	Existing Hospital	Define extent of modeling to be undertaken
	4	Interface between New and Old	Define strategy for modeling the interface between new and existing
7		**Project Specific Amendments and Exclusions**	Provide list of, and reasons for, any requested exemptions to the Authority's BIM Requirements. All requested exemptions require approval.
END OF Design Team PEP			

PEP: Construction Team Topics			
	Title / Topic		**Comments**
1	**Team Definition**		BIM related participants with role, organization, name, email, phone, time zone
	1	Sub-Contractor or Trade Contractor Information	List of Sub-Contractors or Trade Contractors responsible for data and document upload and their scope of work
2	**Virtual Coordination**		
	1	Design Model Sign-off	Process for sign-off on use of Design Models (if required)
	2	Fabrication Models	List fabrication models (if provided)
	3	Software	Types and versions
	4	Timeline	Coordination session schedule, required participants
	5	Strategy + Workflows	Sharing strategy, resolution process, feedback, management of process for maintenance of service access and replacement paths
3	**Construction Sequencing**		Define strategy and workflows to optimize construction sequencing – list models that will be used
4	**Design Model Update**		
	1	Update Strategy	Define strategy, workflows and frequency for model updates
	2	Laser Scanning	If part of the strategy, define frequency, areas, timeline, accuracy and QC process
5	**Data and Document Upload**		Define strategy for managing participation and checking quality of the data and documents uploaded
	1	Data and Document Upload Timeline	Provide timeline for asset information data and file upload
6	**Project Schedule**		Provide updated project schedule, including model update, data and document upload and substantial completion timelines

END OF Construction Team PEP

10.5 Attachment E – Asset Category Acronyms and System Acronyms

10.6 Attachment F – FSS Naming Conventions

Shown

10.7 Attachment G – BIM Requirements Specifications (DGS, DCS + Rooms)

The DGS + DCS Excel Template will be provided in a digital format to the successful proponent.

- Notes Tab
- Tracked Assets Tab
  - Tracked Assets (Design)
  - Data + Document Collection (Construction)
- Room Type Classification Tab
  - Room Classification (Design)

10.8 Attachment H – CAD Standards for Consultants FSS (Nov 2019 V22)

For existing facilities renovations only where approved

10.9 Attachment I – Asset Hierarchy Samples

10.10 Attachment J – Sample Asset Classification

10.11 Attachment K – Electrical Labelling Schema