COORDINATED COMBINED SERVICES MODEL (CCSM) BIM REQUIREMENTS

1.1   **General**

1.1.1   The Contractor shall be responsible to develop and update Pre-Final Design CCSM, Final Design CCSM and Updated Final Design CCSM to form a complete project, services and / or systems prior to construction.

1.1.2   The Contractor shall be accountable for the data and information accuracy in the Pre-Final Design CCSM, Final Design CCSM and Updated Final Design CCSM.

1.1.3   The Contractor shall produce the combined services sheet views generated directly from the CCSM for modelling records and the Authority's record.

1.1.4   The cut-off dates of model information exchange specified in **Appendix B of Particular Specification** shall be documented in the BEP.

1.1.5   The colour codes for clash detection analysis will be issued to the Contractor upon Contract award.

1.1.6   The Contractor shall coordinate and obtain the latest approved or latest updated CCSM from Interfacing Parties to ensure the accuracy and consistency between the CCSM within the Contract and the Interfacing Parties' BIM models.

1.1.7   The Contractor shall ensure that the version of BIM models received from Interfacing Parties for the CCSM development are up to date for the purpose of supporting construction coordination and design interfacing. The Contractor shall notify the respective Interfacing Parties and the Engineer immediately of any discrepancy found therein prior to CCSM creation.

1.1.8   The Contractor shall facilitate ICE Meetings and virtual review meetings with all parties within the Contract and Interfacing Parties to resolve all necessary design and coordination conflicts on design, penetration openings, maintenance and installation clearances between the Contract and the interfacing contracts.

1.1.9   The Contractor shall participate in all necessary ICE Meetings and other BIM related meetings facilitated by Interfacing Parties to resolve all necessary design and coordination conflicts on design, penetration openings, installation and maintenance clearances between the Contract and the interfacing contracts and upon request by the Engineer.

1.1.10   The Contractor shall facilitate regular virtual design review meetings to discuss and resolve all identified design and coordination conflicts found in the CCSM. The BIM Manager shall issue the updated clash check analysis report prior to each scheduled meeting. The virtual design review meeting agenda shall include but not limited to clash detection, maintainability of equipment and model view definitions. It shall commence within six (6) months from Contract award and continued after Basic Structure Completion (BSC) dates and document in the BEP.

1.1.11   The Contractor shall ensure that the comments from Interfacing Parties are updated in the Final Design CCSM and Updated Final Design CCSM, SEM drawings and Conduit Management Drawings (CMD) as part of the sign-off exercises.

1.1.12   The Contractor shall print out the viewpoints with comments for the sign-off exercises, all signed-off comments shall be documented as part of the status report and incorporated in the CCSM as a complete signed-off CCSM submission.

1.2   CCSM Modelling Requirements

1.2.1   The Contractor shall coordinate with Interfacing Parties on all sizes of conduit routings to be modelled in the BIM models. The Contractor shall ensure the model accuracy and consistency between the BIM models within the Contract, and the BIM models and Conduit Management Drawings (CMD) developed by Interfacing Parties.

1.2.2   The CCSM shall include the scope of work within the Contract and Interfacing Parties to form a complete project, services and systems. The Contractor shall coordinate with Interfacing Parties to ensure all interfacing works are included in the CCSM. The Contractor shall be responsible for resolving all data losses due to conversion of the model version and format.

1.2.3   The Contractor shall be responsible to update CCSM to validate that the identified conflicts stated in the clash check analysis report are resolved on a monthly basis.

1.3   Clash Check Analysis Requirements

1.3.1   The Contractor shall facilitate thorough clash detection analyses to identify and resolve all design and construction conflicts prior to construction.

1.3.2   The design and construction conflicts shall encompass the hard and soft clashes found in the clash check analysis. The Contractor shall submit the types of model checks, the hard and soft clashes to be identified and clash resolution proposals to the Engineer for acceptance prior to CCSM creation. The accepted proposals shall be documented in the BEP.

1.3.3   The Contractor shall achieve zero tolerance hard clashes between the elements and components and to resolve all soft clashes pertaining to non-compliance requirements, required installation and maintenance clearances, and other necessary clearances.

1.3.4   The Contractor shall resolve the following critical clashes but not limited to:

(a)   400mm spacing between all services and the ceiling system in public areas;

(b)   150mm spacing between all services;

(c)   1700mm clearance in height for the cable chamber level / UPV along the escape / access paths;

(d)   2100mm clearance in height for all firemen and exit staircases;

(e)   2100mm clearance in height for the service corridors; and

(f)   3000mm clearance along the equipment replacement routes.

1.3.5   The Contractor shall submit the CCSM and clash check analysis and resolution report for the CCSM submission. The report shall include but not limited to:

(a)   Indication of clash detection / omission settings used in all clash detection;

(b)   Clash detection matrix indicating the numbers of clash between various disciplines;

(c)   Coordination and clash detection between CCSM and Architectural / Structural design models;

(d)   Coordination and clash detection between Interfacing Parties' models;

(e)   Identification of all clashes with differentiation of valid and invalid clashes; and

(f)   Classification of coordination issues and clashes with the three (3) different levels of priorities:

   (i)   Clashes that can only be resolved through design changes shall be categorised as Code 3 and be brought to the Engineer's attention;

   (ii)   Clashes that involved more than two (2) Interfacing Parties shall be grouped together as a clash group and be categorised as Code 2; and

   (iii)   Clashes that involved only two (2) Interfacing Parties shall be categorised as Code 1.

1.3.6   The Contractor shall include the viewpoints in the CCSM capturing areas with Code 3 clashes and non-compliance clashes that requires the Engineer's attention. The annotations to these viewpoints shall align to the clash check analysis report for ease of identification.