ATTACHMENT O - BIM REQUIREMENTS – ARCHITECT/ENGINEER CONTRACT

PART 1 – GENERAL

Section 1.1.   SUMMARY

1.1.1.   This document establishes general and administrative requirements pertaining to Building Information Modeling (BIM) to meet Facilities Information Management (FIM) expectations for projects of various sizes and delivered under various contracting methodologies.

1.1.2.   BIM practices require cooperation and involvement of all parties throughout the project delivery process, regardless of the delivery method being used for a given project.

1.1.3.   BIM practices encompass and coordinate traditionally separate functions of design and construction in order to assemble all related building information into one that will provide the information needed to efficiently operate and maintain the facility once Substantial Completion has been achieved and the Project has been turned over to the Owner.

1.1.4.   It is of primary concern that all building modeling and facility information developed during the design and construction of the Project be timely and efficiently developed, maintained and exchanged from initiation of the Project through Final Completion in accord with all Contract Documents and with the Owner's operational and maintenance needs. Throughout the Project lifecycle, the A/E is expected to systematically demonstrate to the Owner that all building and system information is current to the extent that it can be at a given time during the design and construction process.

1.1.5.   It shall be the responsibility of the A/E, and each of its consultants to have or obtain, at their cost, the trained personnel, hardware, and software necessary to successfully fulfill their respective obligations as set forth in the BIM Execution Plan.

Section 1.2.   COORDINATION, DATA VALIDATION AND TRANSFER

1.2.1.   BIM Team
    1.2.1.1. Owner's Members
        1.4.1.1.1.   Representatives assigned by Owner's Designated Representative
        1.4.1.1.2.   A/E, including A/E and sub-consultant BIM manager(s), except for projects implemented with design-build methodology
        1.4.1.1.3.   Test, Adjust and Balance Firm (TAB): the owner may engage a Test Adjust and Balance firm for the project under a separate contract. When engaged for the project, the TAB firm shall be a part of the BIM team and shall provide services as set forth in the specifications and its separate contract.

    1.2.1.2. A/E's Members
        1.2.1.2.1.   Individuals, each having authority to act on behalf of the entity they represent, explicitly organized to implement all BIM and FIM activities through coordinated actions.
        1.2.1.2.2. A/E, including A/E sub-consultant BIM manager(s), (for projects implemented with design-build methodology

1.2.2.   Scheduling
    1.2.2.1. Design (Preconstruction) Phase

1.2.2.1.1. For projects implemented using the competitive sealed proposal, construction manager-at-risk, or job order contracting methodology, the A/E shall integrate all BIM activities into its Project Work Plan and the design schedule.

1.2.2.1.2. For projects implemented using the construction manager-at-risk or design- build methodology, the Contractor shall integrate all BIM activities into the Baseline Schedule and the Work Progress Schedule and shall ensure that BIM requirements are clearly set forth in all solicitation documents used to select subcontractors or suppliers for the Project. All parties will address scheduling problems and make necessary notifications in a timely manner to expedite all BIM activities.

1.2.2.2. Construction Phase

1.2.2.2.1. Contractor shall integrate all BIM activities into the Baseline Schedule and the Work Progress Schedule. All parties will address scheduling problems and make necessary notifications in a timely manner to expedite all BIM activities.

1.2.2.2.2. Contractor shall provide the initial schedule of primary BIM activities at the project kick-off meeting. Prior to the start of Schematic Design, Contractor shall have incorporated and integrated all BIM activities into the Baseline Schedule and Work Progress Schedule with appropriately linked predecessors and successors.

1.2.3 Data Validation

1.4.3.1 Model data validation (Design thru As-Builds) shall occur during the Schematic Design, Design Development, Construction Documents and As-Build Stages.

1.2.4 Data Transfer

1.4.4.1 Model Data Transfer (Design and As Build) Phases. Prior to transfer to the Builder the A/E team is responsible for field verification of all model representations, dimensions, element sizes, shape, location, quantity and orientation. Non- graphic information may also be attached to the Model Elements

Section 1.3. ROLES AND RESPONSIBILITIES

1.3.1. Roles and responsibilities of BIM Team members are set forth below to help to clarify the Owner's expectations with respect to the BIM and FIM processes.

1.3.2. Owner's Role and Responsibilities:

1.3.2.1. Provide specifications related to the format and content for the Project Information Matrix. These specifications are to include the identification of Tier 1. Data and Tier 2 Data required for the Project.

1.3.2.2. Provide initial direction as to the extent the BIM is to be used on the Project. BIM Level to be used on the Project.

1.3.2.3. Approve the BIM Execution Plan and A/E's and Contractor's schedules for completing all BIM activities.

1.3.2.4. Participate in BIM Team meetings.

1.3.2.5. Review and validate adequacy of Building Model development and project data collection.

1.3.3. A/E's Role and Responsibilities:

1.3.3.1. Attend BIM Team meetings.

1.3.3.2. Incorporate all BIM activities into the design Work Plan and the design phase schedule.

1.3.3.3. Produce for Owner's approval, the initial BIM Execution Plan, the initial Project Information Matrix of all devices, systems and equipment supplied.

1.3.3.4. Review and approve Contractor's edits to the BIM Execution Plan, and the Project Information Matrix.

PART 2- EXECUTION

2.1   BIM EXECUTION PLAN

2.1.1   Throughout its development, efforts shall be made to align the responsibilities set forth in the BIM Execution Plan with the skills customarily contributed by each party associated with the Project. The BIM Execution Plan shall be considered as a "living document" that is to be updated and refined throughout the life of the Project and shall be available for review and verification by Owner at any time.

2.1.2   To the extent practical, the BIM Execution Plan shall minimize redundant efforts in favor of a single, organized approach to all activities required to successfully complete the BIM- FIM process. It shall also identify and specify;

    2.1.2.1.   The extent to which Building Model(s) are to be used on the Project.
    2.1.2.2   Describe the BIM-related responsibilities of all project stakeholders
    2.1.2.3   Specify the due date for each BIM deliverable
    2.1.2.4.   Address all required BIM uses for the project, including but not limited to:
        1. BIM-based design
        2. 2D deliverables extracted from the BIM
        3. 3D visualization for stakeholder/customer communication
        4. BIM-based spatial validation
        5. Automated clash detection
        6. BIM-based collaborative design reviews
        7. BIM and COBie data updates in the construction phase
        8. IFC export tools and mapping document

2.1.2.5 the drawings to be generated from the Building Model(s) and the process(es) to be used for generating two-dimensional drawings from the Building Model(s) to ensure that all generated drawings adhere to Owner's CAD standards drawing structure, content, data elements and delivery as defined in the Owner's Design Guidelines.

2.1.3   Development and refinement of the BIM Execution Plan shall be included as an agenda item for all Project Team meetings throughout the Preconstruction (Design) Phase of the Project. As and when appropriate, the discussion items shall include, as a minimum;

    2.1.3.1. The status of the development of the BIM Execution Plan,
    2.1.3.2. The identification of any issues related to the timing for exchanging information between the various Building Models and the timing and the means and methods for entering information into the Project Information Matrix,
    2.1.3.3. The Level of Development of each of the Building Models,
    2.1.3.4. The Depth of Detail for information within the Building Models and to be entered into the Project Information Matrix.

2.2   EXTRACTED DATABASE

2.2.1   Unless Owner specifically agrees otherwise, all data input into the model(s) or CAD drawings shall be extracted from its various sources and delivered in a single Microsoft Access database. This Extracted Database shall include:

    2.2.1.1 Equipment data gathered during the course of design and construction that is related to equipment listed in the PIM, but for which a data field does not exist within the PIM. This data may or may not physically reside with a table or schedule located within the drawings or specifications.
    2.2.1.2 Fixed equipment data gathered during the course of design and construction that is not associated with equipment listed in the PIM (e.g. manufacturer's maintenance

information related to sinks, faucets, light fixtures, life safety items, etc.). This data may or may not physically reside with a table or schedule located within the drawings or specifications.

2.2.1.3 Data related to all fixed architectural and finish features (e.g. manufacturer's maintenance information related to doors, hardware, finishes, glazing, etc.). This data may or may not physically reside with a table or schedule located within the drawings or specifications.

2.2.1.4 All information that is contained within a schedule or table located within the drawings.

2.2.1.5 All information contained within a schedule or table within the specifications.

2.3   DOCUMENT INDEX

2.3.1   An index shall be included with each document delivery. The document index shall be in the form of a Microsoft Excel spreadsheet and shall identify every file included in the delivery. Identification information shall include;

2.3.1.1 Owner's project number.

2.3.1.2 Owner's project name.

2.3.1.3 File name.

2.3.1.4 File description.

2.3.1.5 Identity of the file authoring entity (i.e. who generated the file A/E, consultant, Contractor, Subcontractor).

2.3.1.6 Cross references to any required support files.

2.4   LASER SCANS

2.4.1   Laser scan deliverables shall be in the form of three-dimensional models or two-dimensional drawings as set forth below in the BIM-FIM Deliverables section of this document and the final point cloud file generated by the laser scan used to create the models or drawings.

2.5   RECORD DOCUMENTS

2.5.1   Unless Owner specifically directs or agrees otherwise, A/E and Contractor shall provide all Project Record Documentation as defined in the Definitions section of this document. When any questions arise as to whether documentation, electronic or hard copy, should be considered

2.6   STANDARDS AND REQUIREMENTS

2.61   The National BIM Standard (NBIMS) is an open source standard for BIM. Major products of NBIMS are the Information Exchanges (i.e.) which define a purpose, components and attributes for BIM development. Industry Foundation Classes (IFC) are documented in NBIMS information exchanges.

2.62   National CAD Standard (NCS)- NBIMS is incorporating the National CAD Standards with BIM to support drawing production and publishing or construction documents. DGS can review and update its Drawing and Publishing Requirements as necessary.

2.6.3   Construction Specification Institute – Omniclass is a faceted building information classification made up of interrelated tables that define the built environment.

2.6.4   Uniformat and MasterFormat- The use of Uniformat and OmniClass will be defined in the BIMxP for the project. Cost Estimation is delivered in Uniformat II in the Study Phases and in both Uniformat II to Level 3 and CSI MasterFormat in the Design Phase.

2.7   BIM-FIM DELIVERABLES

2.7.1   The BIM-FIM deliverables shall be set forth in the BIM Execution Plan and are based upon this Project requirements. All files delivered in portable document file (pdf) format shall be searchable (i.e. "smart" or "vector" pdf's). Unless Owner expressly agrees otherwise the deliverables for each Project type shall be as follows:

2.7.1.1 Project Deliverables

2.7.1.1.1   BIM Execution Plan

2.7.1.1.2   Project Information Matrix

2.7.1.1.3   Design Model(s) – in the most current release of Autodesk REVIT.   In order to achieve maximum usage of the deliverables for Post Construction Facilities Management purposes the following modelling guidelines shall be adhered to unless owners BIM representative agrees otherwise.

2.8.1.1.4   A/E and consultants shall utilize REVIT to generate all final as-build construction models.

2.8.1.1.5   Construction Model(s) – in the most current release of Autodesk REVIT.   In order to achieve maximum usage of the deliverables for Post Construction Facilities Management purposes the following modelling guidelines shall be adhered to unless owners BIM representative agrees otherwise.

2.8.1.1.6.   Contractor and subcontractors shall utilize REVIT to generate all final as-build construction models.

2.8.1.1.7.   All physical items that are documented in a table, schedule, list, external spreadsheet/database, submittal, RFI, ASI, etc. that pertain to final completion of the project will be required to be represented within the model as a 3-D object with inherent parameters or as part of a property set, etc.

2.8.1.1.8   Laser Scans – Laser Scans shall be delivered in 3-D REVIT models as well as the final Point Cloud file from which the model (s) were generated.

2.8.1.1.9.   Media Type and Format   All models, drawings, submittals, RFI's, Spreadsheets, databases, and any other deliverable shall be provided to the owner on a Windows 10 compatible USB 2.0 "Plug and Play" portable hard drive. BIM shall be submitted in both the native file format of the BIM authoring tool and in industry foundation classes (IFC) format.

2.8   OWNERSHIP AND RIGHTS DATA

2.8.1 For all DGS projects, DGS has ownership and rights to all data and other deliverables developed and provided by the A/E in accordance with the applicable provisions of the A/E contract. These rules extend to Building Information Models and associated data developed for DGS projects.