The Commonwealth of Massachusetts
Executive Office for Administration and Finance
Division of Capital Asset Management and Maintenance
One Ashburton Place
Boston, Massachusetts
02108

CHARLES D. BAKER
GOVERNOR

KARYN E. POLITO
LIEUTENANT GOVERNOR

KRISTEN LEPORE
SECRETARY
ADMINISTRATION & FINANCE

CAROL W. GLADSTONE
COMMISSIONER

EXHIBIT BIM

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BUILDING INFORMATION MODELING (BIM)
LIST OF DESIGN, PRECONSTRUCTION AND CONSTRUCTION SERVICES

SOFTWARE

A) The project shall be designed and implemented using Building Information Modeling (BIM) software. This includes all subsidiary (discipline) models as may be necessary for design, analysis, fabrication and construction. The Architect or Construction Manager (CM), or a subcontractor through the Architect or the CM, may request from the DCAMM project manager an exception to the standard requirement of designing and implementing BIM for all subsidiary (discipline) models. The DCAMM project manager's decision shall be final.

MODELING GOALS

A) Throughout the design and construction phases, BIM will be utilized to develop a parametric model, derived data, and the coordinated discipline models for the project.

1. Throughout the pre-construction phases, the Architect's (sometimes referred to as the "Designer") project design software and discipline specific tools will be utilized to develop and model the design of the project, to tag material components, systems and/or assemblies, generate schedule and derived data, create data bases, perform required analysis, clash avoidance, and develop 2-D and 3-D presentations and reviews. During construction, the Architect will develop, model and incorporate relevant approved change order sketches (SK's). Prior to achieving Final Completion of construction the Architect will incorporate all recorded (as-built) conditions into the model. (NOTE: Approved shop drawings and submittals will not be included into the model).

2. During the pre-construction phases on a CM at Risk project, the Construction Manager (CM) will use the Architect's model to generate quantity takeoffs for estimating purposes, develop periodic clash reports and facilitate clash resolution reviews. During construction, the CM will provide virtual scheduling with updates, and utilize the upgraded models during coordination meetings to inform tradesmen of affected phases of construction. The model shall be used in the field to support reviews, site logistics, and ongoing construction.

3. On some renovation projects, the Study may indicate that Building Information Modeling software and processes may be inappropriate for the design and construction phases of the project. In such instances, the Study team will advise DCAMM of the possible reason(s) why utilizing BIM may be inappropriate. The DCAMM Project Manager will make the final determination regarding the use of BIM. Irrespective of the decision, data appropriate for entry into the New CAMIS Tririga data base will be captured during the design and construction phases of the project.

GENERAL REQUIREMENTS

A) A description of how the modeling goals will be met (i.e., a BIM Execution Plan (BIMxP)) is required by the Architect and, subsequently, by the Construction Manager (CM) or General Contractor (GC) as applicable. Note: The terms "CM" and "GC" are sometimes used interchangeably herein and the intent is for the appropriate reference to apply depending on the type of project under construction.

DCAMM will provide a template of its standard BIM Execution Plan (the "BIM Execution Plan Template") to the Architect to create the "Architect's BIM Execution Plan". The Architect's BIMxP shall identify how the Architect and the engineering disciplines (i.e., the design team) will develop, be responsible for, and incorporate their information into the coordination model, and provide decision support and model reviews. The BIM model will be developed, managed and coordinated by the Architect. The Architect's BIMxP will identify their proposed in-house or outsourcing plan, and all software programs that will be used to satisfy the design modeling goals, analysis, decision support and reviews. The BIMxP must be consistent with the format and principles of the BIM Execution Plan Template (the "BIMxP Template"). See also the Building Information Modeling Guide (BIM Guide) for further guidance. The BIM Guide explains the requirements and procedures for the delivery of BIM services, and the development of BIM submissions supporting DCAMM study, design, and construction product delivery. The BIM Guide complements *The Designers Procedures Manual,* the *Designer's Contract* with DCAMM and the *Owner-CM and the Owner-GC Agreements.* The *BIMxP Template* and the *BIM Guide* are incorporated herein by reference and copies are available on DCAMM's website. In the event of any conflict between the BIMxP Template or BIM Guide, and this Exhibit BIM or the contract documents between DCAMM and the Designer, Construction Manager or General Contractor, then the provisions of this Exhibit BIM and the respective contract documents will take precedence.

For CM at Risk projects, it is recognized that the Construction Manager (CM) may be named before the Architect has completed the Design Intent Model. The primary activity of the CM in this situation will be the provision of pre-construction services per the CM's contract. It is expected the CM will be proficient in Building Information Modeling technology. Where such services may impact the development of the Building Information Model, the Architect will collaborate with the CM to insure the BIM reflects the input of the CM. Furthermore, the CM will advise the Architect in matters where the expertise of the CM can complement and/or supplement that of the Architect.

For Design-Bid-Build projects and Design-Build (including MGL c. 25A energy) projects, the Architect will provide a copy of the Design Intent BIM Model to the General Contractor (GC). The GC will augment the BIM Model reflecting the input of discipline sub-contractors, trades, and others who will ultimately affect the content and data of the as- built model. In all instances, the Architect bears ultimate responsibility for the content and accuracy of the model, and for the data contained in the model and/or associated therewith. The terms "CM" and "GC" are sometimes used interchangeably herein and the intent is for the appropriate reference to apply depending on the type of project under construction.

B) All model deliverables shall be saved and delivered in their native format (i.e., rvt for Revit, .pln for ArchiCAD, etc.) and in IFC format, .dwg and .dwf format, .nwd, nwf, nwc as required and placed on the required FTP or project website (with appropriate securities and versioning controls) site for the entire project team to review.

C) The project team will have access to the current model on the project site throughout the design, pre-construction and construction phases. "Project team" is defined as: Architect, Engineering Consultants to the Architect, relevant third parties, DCAMM and CM.

D) A team approach is required for the BIM process. To this end, the Architect and/or the CM will make available to all parties appropriate access to the model via collaboration software such as BIM 360. The model will be used simultaneously with different parties for different tasks. For example, as part the integration and virtual coordination scope of work, the Architect will make design files available to the CM who will integrate all 3D content into the appropriate Navisworks program to satisfy the CM modeling goals. The Architect and CM will work collaboratively to resolve all detected clashes and develop an end product model that represents a fully workable, constructible project; with phasing projected and linked to the virtual schedule. If early packages are bid, it is understood that the model may not be fully developed for those work elements (i.e., substructure, superstructure and under-slab utilities); however, the end product model that will be used for final bids must be complete and approved by the DCAMM Project Manager prior to receiving final bids.

1. Physical conflicts exceeding the specified tolerance of 0.5 inch (to be adjusted in consultation with the project design team and DCAMM) will be documented and provided to the Architect for review.

2. All adjustments to resolve conflicts, as determined by the design team, will be incorporated in the 3D model before a new integration and clash detection iteration is performed.

3. Attendance at specific coordination meetings with the design team, the CM and DCAMM, is required. These milestones will be identified in the BIMxP. At the discretion of the DCAMM Project Manager, collaboration tools such as Autodesk 360 may be used.

4. The Architect, and the CM or GC as appropriate will be responsible to update the DCAMM Project Manager on the status of the model coordination, analysis, virtual scheduling and quantity takeoffs in a bi-monthly BIM report submitted to DCAMM.

COMMUNICATION AND MANAGEMENT

A) The Architect, and the CM or GC as appropriate, shall each appoint a "BIM Manager". The BIM Manager(s) will be responsible for receiving modeling information from their related team and to ensure the model information is correct, being communicated, updated and incorporated into a master building information model. Each party is responsible for maintaining any individual design or analysis models and providing their modeling information, at appropriate intervals.

B) An FTP or project website or other appropriate collaboration/communications tools will be provided by the Architect throughout the design and construction phases. The project site will be used by the project team. The FTP site will be password protected and is required to be accessible for only one project.

C) Data management and standards is a primary role of the Architect's BIM Manager, with oversight of BIM activities of the CM or GC. Uniformat and Omniclass for model element identification and classification

is to be used. Adherence to appropriate DCAMM CAD standards, functional space naming, and room numbering will be documented in the BIMxP. COBie data documentation may be a required project goal.

BIM MODEL ELEMENTS

A) Site/Civil Elements

1. Existing Conditions Modeling

    a. Existing site grading surface modeling of the entire property. The surface model shall extend 50' beyond the property line in all directions to provide site context to the information model.
    b. Existing manhole locations shall be modeled with appropriate depth and size of existing structures. Pipe inverts and pipe sizes should be modeled and extended 10' minimum in direction of pipe location from the existing manholes.
    c. Elements to include in the basic site plan model are:
    -Surface model contours
    -Architectural massing model of surrounding buildings
    -Driveways
    -Parking areas
    -Walkways
    -Landscaping beds
    -Trees
    -Utility Poles
    -Other Street Furniture
    -Major underground utilities (primary electrical feed, water mains, sewer connection, etc.)

2. Proposed Site Modeling

    a. Proposed site grading surface model should extend to the property line.
    b. Proposed manholes and piping elevations should be modeled with sloping or
    c. All underground piping should be modeled to within 10' of the proposed building footprint.
    d. All proposed vehicular paving and pedestrian walkway paths should be modeled with appropriate slopes and elevations.

B) Architectural Elements

1. The architectural model is to include, without limitation, partition walls, ceilings, chases, door and window openings, exterior envelope, roof, stairs and railings.

    a. Interior partitions at correct thickness and height.
    -Tag material types (masonry, drywall, shaft wall, glass block, etc.)
    b. MEP chases (vertical)
    c. Elevator shafts
    d. Stairwells
    e. Finish floor at correct elevation and thickness
    f. Ceilings at correct elevation and thickness Tag material types (drywall, acoustical, etc.)
    g. Exterior envelope at correct thickness with proposed exterior material facing to the outside
    -Tag material types (masonry, curtain wall, metal panel, rain screen, etc.)
    h. Interior and exterior door sizes and locations

i. Reflected ceiling plans of all levels with recessed light locations modeled with approximate dimensions and elevations of lighting fixtures, speakers, etc.
j. Furniture layouts corresponding to the Furnishings and Equipment (F&E) requirements of the client agencies. Furniture and equipment simulations to be similar in dimensions to actual proposed (use manufacturers blocks if available).
k. All interior storage units, cabinetry, racks, shelving, etc.

C) Structural Elements

1. Structural modeling will be developed first to correspond with the early bid package document preparation. It will include, but not be limited to, all substructure elements (i.e., spread footings, piles, foundations, grade beams, etc.), all superstructure elements (i.e., beams, columns, girders, framing and bracing sans connection details, shear elements, etc.), structural floor and roof decks, elevator shafts and stairwells.

2. Most steel fabricators use 3D modeling to plan their work. If this is done their model should be procured and infused into the design model, via Navisworks, in order to have a more accurate model prior to soliciting final bids. If a fabricator's structural model is unavailable prior to completion of the final bid package, the design model should be updated to the Designer's (Structural Engineer) final structural design.

3. All openings.

D) Mechanical, Electrical, Plumbing and Fire Protection (MEPFP) Elements

1. MEPFP modeling will include, but not be limited to, all horizontal and vertical solid and flexible duct runs, modeled at correct sizes, slopes and shapes. All mechanical equipment elements should be designed and modeled based on largest case manufacturers equipment (i.e., RTU's, VAV boxes, boilers, generators, chillers, etc.), in order to assure adequate physical space to accommodate "worst case" scenarios.

   a. Mechanical / sheet metal
      -Ducts
      -Air handling equipment
      -Boilers
      -Pumps
      -Associated piping
      -Supply and return louvers, grilles and diffusers
   b. Plumbing
      -Piping (piping to be modeled to its outside diameter, including insulation)
      -Risers
      -Pitched drains (i.e., roof drain mains, etc.)
      -Pumps and equipment
      -Fixtures will be located with penetration stub into walls, floors and ceilings
      -Sleeved objects will be located in all exterior and load bearing wall penetrations to the correct outside diameter
   c. Electrical
      -All major equipment and conduit
      -Switchgear

-Transformers
-Panel boards
-Generators
-Conduit
-Locate and model all lighting fixtures as the overall required embed volume

d. Fire Protection
-Equipment (i.e., fire pumps, hose racks, standpipes, etc.)
-Risers
-All piping

4D CONSTRUCTION PHASING MODEL

A) General Information Modeling Requirements

1. The CM shall review the coordinated design model at various stages of design for constructability, costing and scheduling purposes.

2. The Architect shall incorporate reasonable changes requested by the CM. If, for quantification purposes, the CM needs component information rather than assembly information (i.e., components of a cavity or veneer exterior wall assembly), the Architect will accommodate the CM and update the model accordingly. If the CM plans to construct the project in phases for scheduling purposes, the CM will inform the Architect of planned construction phasing and the CM will update the model accordingly.

B) Preparation of the 4D Construction Phasing Model

1. The CM shall integrate its approved, electronic CPM schedule with the coordinated design model using Navisworks module (or approved equal). This will occur at approximately 50% DD's (with emphasis on early package elements), 50% CD's, and 100% CD's, or more frequently if required by the DCAMM Project Manager. At completion of CD's a two-week minimum time period will be used to provide a final clash detection review and report with work points, accommodate any last minute changes or modifications by the Architect, and allow the Architect to correct any clashes prior to soliciting final package bids. The intent is to provide bidders with bid documents, based on a coordinated model that can be constructed within the scheduled timeframe barring unforeseen conditions and/or Owner-initiated changes.

2. The CM is responsible for model object / schedule activity resolution and correlation. The CM will provide the Architect with any revised phasing logic information so appropriate model edits that may be required can be accommodated.

3. The CM will use “Task Types” and “Appearance Definitions” within Navisworks (or approved equal) to communicate the following:

   a. (trades by color)
   b (critical path by color)
   c. (other)

4. The CM or GC shall use the Navisworks or other approved scheduling software to communicate design intent, means and methods (where possible) and sequencing of work to subcontractors in pre-

bid meetings.

5. Updated or "status" 4D schedules will be prepared for monthly construction coordination meetings. There is the need to have 4D Virtual Construction Model meetings (beginning of each month), chaired by the CM, at which all subcontractors field supervisors whose tradesmen will work that month will need to address the projected following month of work. In the event that one or more subcontractors may prepare 3D models for their own execution of work the CM shall review for acceptability and, if deemed acceptable and consistent with the CM's control of the work and the DCAMM Project Manager, the CM shall incorporate this 3D content into the coordinated design (Navisworks, or equal) model.

OWNERSHIP

A) In addition to the record documents required by the specifications, the master building information model, and the subsidiary models provided for design and construction of the project will, upon completion of the project, be property of DCAMM and the parties agree to provide DCAMM, as deliverables prior to Final Completion, the most recent version of all files. Upon DCAMM request, the parties will provide the most updated BIM models.

For any questions, please feel free to contact:
Vincent Cirigliano at vincent.cirigliano@state.ma.us 617-727-4030 ext. 31214
Michael Costello at michael.costello1@state.ma.us 617-727-4030 ext. 31500

***This document has been revised to give further explication to DCAMM's requirements.**