

MHS Facility Life Cycle Management (FLCM) Building Information Modeling (BIM) Minimum Requirements



Building World Class Healthcare

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This document represents the details of the minimum BIM requirements for the DoD's MHS facilities projects as noted in the UFC 4-510-01. Additional BIM requirements should be incorporated on projects where appropriate in support of definitive objectives.

The primary function of this document is to ensure coordinated BIM standards for the MHS with a FLCM perspective.

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Please submit all comments relating to this document to:

Mr. Russell Manning, 703.681.4324, russell.manning@tma.osd.mil

OSD-Health Affairs (OCFO/PPMD)
5111 Leesburg Pike, Suite 407
Falls Church, VA 22041

File Name

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Minimum Building Information Modeling (BIM) Requirements

The following information reflects the minimum BIM requirements referenced by the UFC 4-510-01 Chapter 20.

20-1 DEFINITIONS.

20-1.1 **Product.** An object-based representation of the physical and functional characteristics of a facility. The Building Information Model (BIM) serves as a shared knowledge resource for information about the facility, forming a reliable basis for decisions during its lifecycle from inception forward. The “Model” is defined as 3D graphics that includes Facility Data.

20-1.2 **Process.** A collection of defined model uses, workflows, and modeling methods used to achieve specific, repeatable, and reliable information results from the model. Modeling methods affect the quality of the information generated from a model. When and why the model is used and shared impacts the effective and efficient use of the BIM for desired project outcomes and decision support.

20-1.3 **Data Definition.** Supports the data standards and data requirements for BIM use. Data continuity allows for the reliable exchange of information in a context where both sender and receiver understand the information. “Facility Data” is defined as associated intelligent attribute data.

20-2 DESIGN & CONSTRUCTION AGENT REQUIREMENTS.

20-2.1 Design and Construction Agents shall ensure proper synchronization of the BIM requirements with the project acquisition strategy(ies) (delivery, contracting and procurement methods). As an example: for traditional project delivery methods, requirements for data synchronization during construction may be established during the design contract execution, and must be coordinated with the construction contract.

20-2.2 Design & Construction Agents shall coordinate approval from HA/PPMD prior to granting any exceptions or exclusions to these minimum requirements using the waivers process described in UFC 4-510-01 Section 1-4.3.

20-2.3 Exceptions to direct data storage in the model will be made on a project by project basis. Minimum data requirements noted in Section 20-4 shall be resident and tracked in the BIM unless a waiver is granted. Waivers to maintain data external to the model will require key parameters to be synchronized with the model to ensure data continuity as noted below.

20-2.3.1.1 Room Parameters (Section 20-4.1.3). Proposals to keep data external to the model shall include a link via the unique identifier “Project_Room_ID” in the model.

20-2.3.1.2 RPIE Parameters (Section 20-4.1.5). Proposals to keep data external to the model shall include a link via the unique identifier “Project_Room_ID” and a globally unique identifier (GUID) for the individual piece of equipment in the model.

20-2.4 Medical Equipment & Furniture Parameters. (Section 20-4.1.6). Proposals to keep data external to the model shall include a link via the unique identifier “Project_Equipment_ID” in the model.

20-2.5 Design & Construction Agents shall coordinate with HA/PPMD prior to contract award if alternatives to the AEC National CADD Standard are being proposed to ensure the Military Health System (MHS) data management processes are fully supported by the contract deliverables.

20-2.6 Design and Construction Agents shall ensure the BIM execution plan is in support of the MHS BIM objectives prior to approval of the BIM Execution Plan.

20-2.6.1 Design and Construction Agents shall coordinate contract requirements to ensure appropriate contractual controls exist to ensure timely and effective implementation of the BIM Execution Plan. Such controls may include: No payment for design or construction until the Plan is acceptable to the Government; or withholding of payment for design and construction for unacceptable performance in executing the Plan.

20-2.7 Design & Construction Agents shall ensure contracts are coordinated to align responsibility with the chosen acquisition strategy for section 20-5.5.

20-3 BIM FORMAT & MINIMUM REQUIREMENTS.

20-3.1 Multiple BIM platforms will generally be used across the design specialties and trades taking advantage of the strengths of the various platforms, therefore no specific BIM platform shall be mandated for military healthcare system projects without written consent from the Health Affairs (HA) / Portfolio Planning and Management Division (PPMD). The prime contractor’s BIM Execution Plan (see section 20-3.3) shall define the BIM tools to be used in the execution of the project.

20-3.1.1 **IFC Coordination View.** The Contractor’s selected BIM application(s) and software(s) shall be certified in the IFC (Industry Foundation Class) Coordination View (2x3 or better. See www.iai-na.org). Submit any deviations from or additions to the IFC property sets for any new spaces, systems, and equipment for Government acceptance.

20-3.2 Contractors will use the Model and Facility Data to produce accurate Construction Documents. BIM associated submittals shall conform to the standards described in this chapter as a minimum. Exceptions must be approved by HA/PPMD.

20-3.3 **BIM Project Execution Plan.** Prior to the Initial Design Conference / design kick off and construction kickoff meeting, the contractor shall submit a BIM Project Execution Plan ("Plan" or "PxP"), documenting viability of the BIM design and analysis technologies selected for the Project Model (integrated with the AEC CAD Standard) from concept development through As-Builts as a design, production, coordination, construction, and documentation tool and the collaborative process by which it shall be implemented. The Government shall confirm acceptability of the Plan or advise as to additional processes or activities necessary to be incorporated into the Plan. Plan shall include the minimums defined herein. The plan shall be synchronized with the project acquisition strategy (delivery, contracting, and procurement methods) applied.

20-3.3.1 The Plan shall describe uses of BIM during design and construction phases to include value management, interference management, and design-change tracking, or such other uses as the Contractor proposes. Additionally the Plan shall describe the handoff of BIM data and model to the Military Health System (MHS) over the course of the project execution and turn over. A USACE BIM Project Execution Plan (PxP) example and templates can be found on the USACE BIM Technology Center at <https://cadbim.usace.army.mil/default.aspx?p=s&t=18&i=23>.

20-3.3.2 The Plan shall identify how the BIM data will be managed and interoperate (data storage, sharing, viewing, quality control parameters in section 20-4.2, and updating, as necessary) among all project team members.

20-3.3.3 Within thirty (30) days after the acceptance of the Plan, conduct a demonstration at the Initial Design (and Construction, if separate contracts) Conference to review the Plan for clarification, and to verify the functionality of Model technology workflow and processes. If modifications are required, the Contractor shall complete the modifications and resubmit the final Plan for Government acceptance.

20-3.4 **Design Deliverables.** Develop all designs using Building Information Modeling (BIM) and Computer Aided Design (CAD) software. Design submittal drawings shall be sized per contract requirements and suitable for A3 (11"x17") legible scaled reproduction.

20-3.4.1 **Drawings.** The use of BIM does not negate the need for delivery of CAD files used for the creation of the Construction Documents Drawings. Specification of a

CAD file format for these drawings submitted shall not be used to limit which BIM application(s) or software(s) may be used for project development and execution.

20-4 BIM REQUIREMENTS.

20-4.1.1 **Facility Data.** Develop the Facility Data, consisting of a set of intelligent elements for the Model (e.g., doors, air handlers, electrical panels). This Facility Data shall include all material definitions, qualities, and attributes that are necessary for the Project facility design, construction and in support of operations and maintenance. Environmental sustainability analysis is encouraged.

20-4.1.2 The required parameters for the BIM model project, room, area/zone, objects as discussed in 20-4.1.3 through 20-4.1.6.

20-4.1.3 **Minimum Project Parameters.** The project model shall as a minimum have the project level parameters in accordance with Table 20-1.

20-4.1.4 **Minimum Room Parameters.** The project model shall have the room project level parameters in accordance with Table 20-2. The data shall be entered for each parameter which is applicable to the given room. The contractor shall maintain an exportable table from the BIM that provides the parameters listed in Table 20-2 and Table 20-3.

20-4.1.4.1 UFC 4-510-01 Appendix A Room Data to include: architectural, mechanical, electrical, plumbing, lighting and acoustical design criteria requirements.

20-4.1.5 **Minimum Real Property Installed Equipment (RPIE) Parameters.** The project model shall have the RPIE object level parameters in accordance with Table 20-4. The data shall be entered for each parameter which is applicable to the given RPIE item. The contractor shall maintain an exportable table from the BIM that provides the parameters listed in Table 20-3, Table 20-4, and Table 20-5.

20-4.1.5.1 Data shall be exportable to COBie (version 2.3) for the MHS (COBIE-MHS). All deliverables shall include a copy of the COBIE-MHS export for the RPIE.

20-4.1.6 **Minimum Medical Equipment & Furniture Parameters.** The project model shall as a minimum have the Project Room Content Report (PRCR) object level parameters in accordance with Table 20-6. The data shall be entered for each parameter which is applicable to the given PRC item. The contractor shall maintain an exportable table from the BIM that provides the parameters listed in Table 20-6, Table 20-7, and Table 20-8.

20-4.1.6.1 Data shall be exportable to COBie (version 2.3) for the MHS (COBIE-MHS). All deliverables shall include a copy of the COBIE-MHS export for the medical equipment.

20-4.1.7 **Model Content.** The Contractor's Model shall include, at a minimum, the requirements of section 20-6.

20-4.1.8 **Model Granularity.** Models may vary in level of detail for individual elements within a model, but at a minimum must include all features that would be included on a quarter inch (1/4" = 1'0") scaled drawing (e.g. at least 1/16th, 1/8th and 1/4th), or appropriately scaled civil drawings.

20-4.1.9 **Output.** Submitted CAD drawings (e.g. plans, elevations, sections, schedules, details, etc.) shall be derived (commonly known as extractions, views or sheets) and maintained from the submitted Model and Facility Data.

20-4.2 Quality Control.

20-4.2.1 Implement quality control (QC) parameters for the Model, including:

20-4.2.1.1 *CAD Standards Checks.* QC checking performed to ensure that the fonts, dimensions, line styles, levels and other contract document formatting issues are followed per the AEC National CADD Standard (<http://www.buildingsmartalliance.org/index.php/ncs/>). Alternative standards may be applied OCONUS if specified in the SOFA or as required by Host Nation standards with Government approval.

20-4.2.1.2 *Model Standards Checks.* QC validation used to ensure that the Project Facility Data set has no undefined, incorrectly defined or duplicated elements. Report non-compliant elements and corrective action plan to correct non-compliant elements. Provide the government with detailed justification and request government approval for any non-compliant element which the contractor proposes to be allowed to remain in the Model.

20-4.2.1.3 *Other Parameters.* Develop such other QC parameters as Contractor deems appropriate for the Project and provide to the Government for concurrence.

20-4.3 Design and Construction Reviews.

20-4.3.1 Perform design and construction reviews at each submittal stage under section 20-5 to test the Model. This model review shall correlate to actual submittal provided to the Government. Minimum model reviews include:

20-4.3.1.1 *Visual Checks.* Check to ensure the design intent has been followed and that there are no unintended elements in the Model.

20-4.3.1.2 *Interference Management Checks.* Locate conflicting spatial data in the Model where two elements are occupying the same space. Log hard interferences (e.g., mechanical vs. structural or mechanical vs. mechanical overlaps in the same location) and soft interferences (e.g. conflicts regarding equipment clearance, service access, fireproofing, insulation) in a written report and resolve.

20-4.3.1.3 *IFC Coordination View.* Provide an IFC Coordination View in IFC Express format for all deliverables. Provide exported property set data for all IFC supported named building elements.

20-4.3.1.4 *Program for Design (PFD) Validation Check.* Provide report of comparison of contracted PFD to actual design PFD. The comparison shall either be done within the model platform itself or an external project review program approved by the Government. Actual NSF for the design shall be automatically generated within the model and not manually entered. The PFD validation check shall have a minimum of the following data points listed: PFD Room Code, Design Room Number, Department, Sub Department, Space Type, Room Name, PFD Target NSF, Design Actual NSF, Calculated Delta between Target and Actual NSF for room, calculated exceeds critical delta (yes or no), and SEPS "Project_Room_ID". The project team shall establish a target "critical" delta or allowable variance for rooms at the beginning of the project (e.g. 2%). The PFD validation report will indicate rooms that fall outside of these established criteria.

20-4.3.1.5 *Project Room Contents (PRC) Validation Check.* Provide report of comparison of approved PRC list by room to actual design PRC. The comparison shall either be done within the model platform itself or an external project review program approved by the Government. The report shall provide a list of rooms where the design PRC does not match the approved PRC and the specific items that do not match. The non-matching items list shall include at a minimum the PRC equipment item approved and expected, and the designed PRC item not matching.

20-4.3.1.6 *Gross Area Tabulation Calculation.* The contractor shall calculate the departmental gross square feet / meters (GSF / GSM) and the building GSF / GSM using the model's automatic calculation attributes in accordance with this UFC's gross square footage calculation guidance.

20-4.3.1.6.1 Departmental Gross Area Tabulation report shall as a minimum identify the total departmental gross area factor.

20-4.3.1.6.2 Total building Gross Area Tabulation report shall as a minimum identify total mechanical gross, circulation gross, electrical gross and overall building gross area factor.

20-4.3.1.7 *Other Parameters.* Develop such other Review parameters as the Contractor deems appropriate for the Project and provide to the Government for concurrence.

20-5 SUBMITTAL REQUIREMENTS

20-5.1 **Submittal Requirements.** Provide submittals in compliance with BIM Execution Plan deliverables at stages as described hereinafter.

20-5.1.1 At each stage in section 20-5.2 through 20-5.5 provide a Contractor-certified written report with each design submittal, confirming that consistency checks as identified in section 20-4.2 and 20-4.3 have been completed for the design submittal. This report shall be discussed as part of the design review conference and shall address cross-discipline interferences, if any.

20-5.1.2 At each Stage in section 20-5.2 through 20-5.5 (not applicable to section 20-5.4 unless specified in the contract or BIM Execution Plan), provide the Government with:

20-5.1.2.1 The Model, Facility Data, Workspace and CAD Data files in native BIM/CAD.

20-5.1.2.2 A 3-D interactive review format of the Model in Bentley Navigator, Navisworks, Adobe 3D PDF 9.0 (or later), Google Earth KMZ or other format per Execution Plan requirements. The file format for reviews can change between submittals.

20-5.2 Interim Design Submittals.

20-5.2.1 **BIM and CAD Data.** The Model shall include the requirements identified in section 20-4, as applicable to the Interim Design package(s).

20-5.2.1.1 The BIM Execution Plan shall include details of the interim design submittals and expected level of detail for each coordinated design element/system.

20-5.2.1.2 Each interim design submittal model shall include the parameters noted in sections 20-4.1.3 through 20-4.1.6 regardless of availability of the actual data. Parameters shall have data entered in accordance with the BIM Execution Plan. SEPS BIM Export Room data must be loaded no later than the first design submittal indicating individual rooms.

20-5.3 Final Design Submissions and Design Complete Submittals.

20-5.3.1 **BIM and CAD Data.** The Model shall include all design elements identified in section 20-6, unless otherwise agreed by the Government.

20-5.3.1.1 Secure Government acceptance of the Model before proceeding with commencement of construction.

20-5.4 Submittals – Over-The-Shoulder Progress Reviews.

20-5.4.1 Periodic quality control meetings or construction progress review meetings shall include quality control reviews on the implementation and use of the Model, including interference management and design change tracking information.

20-5.5 Final As-Builts BIM and CAD Data.

20-5.5.1 The following minimums shall be applicable to either the designer or builder (construction contractor) for a given project as specified in the contract.

20-5.5.1.1 Submit the final Model, Facility, and CAD Data files reflecting as-built conditions for Government Approval prior to project closeout.

20-5.5.1.2 As-builts Models shall contain updated and accurate parameter data at the time of submittal. Parameters minimum data shall be as indicated in sections 20-4.1.1 through 20-4.1.6.

20-6 BIM MODEL MINIMUM REQUIREMENTS AND OUTPUT

20-6.1 **General Provisions.** The deliverable Model shall be developed to include the systems described below as they would be built and the processes of installing them, and to reflect final as-built conditions. The deliverable model at the interim design stage and at the final design stage (“released for construction”) shall be developed to include as many of the systems described below as are necessary and appropriate at that design stage.

20-6.2 **Architectural/Interior Design.** The Architectural systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing. Additional minimum Model requirements include:

20-6.2.1 Spaces. The Model shall include spaces defining accurate net square footage and net volume, and holding data for the room finish schedule for including room

names and numbers. Include programmatic information provided by the Government or validated program to verify design space against programmed space using information to validate quantities. Minimum space requirement parameter data is listed in section 20-3.

20-6.2.2 Walls and Curtain Walls. Each wall shall be depicted to the exact height, length, width and ratings (thermal, acoustic, fire) to properly reflect wall types. The Model shall include all walls, both interior and exterior, and the necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.

20-6.2.3 Doors, Windows and Louvers. Doors, windows and louvers shall be depicted to represent their actual size, type and location. Doors and windows shall be modeled with the necessary intelligence to produce accurate window and door schedules.

20-6.2.4 Roof. The Model shall include the roof configuration, drainage system, penetrations, specialties, and the necessary intelligence to produce accurate plans, building sections and generic wall sections where roof design elements are depicted.

20-6.2.5 Floors. The floor slab shall be developed in the structural Model and then referenced by the architectural Model for each floor of the Project building.

20-6.2.6 Ceilings. All heights and other dimensions of ceilings, including soffits, ceiling materials, or other special conditions shall be depicted in the Model with the necessary intelligence to produce accurate plans, building sections and generic wall sections where ceiling design elements are depicted.

20-6.2.7 Vertical Circulation. All continuous vertical components (i.e., non-structural shafts, architectural stairs, handrails and guardrails) shall be accurately depicted and shall include the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.

20-6.2.8 Architectural Specialties and Woodwork. All architectural specialties (i.e., toilet room accessories, toilet partitions, grab bars, lockers, and display cases) and woodwork (i.e., cabinetry and counters) shall be accurately depicted with the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.

20-6.2.9 Signage. The Model shall include all signage and the necessary intelligence to produce accurate plans and schedules.

20-6.2.10 Schedules. Provide door, window, hardware, sets using Builders Hardware Manufacturers Association (BHMA) designations, flooring, and wall finish, and

signage schedules from the Model, indicating the type, materials and finishes used in the design.

20-6.3 **Furniture/Fixtures/Equipment.** 3D representation of FFE elements is preferred. For projects with an extensive systems furniture layout that may impact BIM system performance the Contractor will contact the Government for consideration of 2D representation. The FFE systems Model may vary in level of detail for individual elements throughout interim design submittals, however at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

20-6.3.1 Furniture. The furniture systems Model may vary in level of detail for individual elements within a Model, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing, and shall include all relevant office equipment and furniture system layouts, with necessary intelligence to produce accurate plans, sections, perspectives and elevations necessary to completely depict furniture systems locations and sizes.

20-6.3.1.1 *System Coordination.* Furniture that makes use of electrical, data, plumbing or other features shall include the necessary intelligence to produce coordinated documents and data.

20-6.3.1.2 *Fixtures and Equipment.* Fixtures and equipment shall be depicted to meet layout requirements with the necessary intelligence to produce accurate plans, elevations, sections and schedules depicting their configuration.

20-6.3.1.3 *Medical or laboratory Equipment* provided in the PRC shall as a minimum be shown with accurate volumetric representations and loaded with appropriate MILSTD 1691 data set. The graphical representation (minimum volumetric representation) and parametric data shall be updated as the plan develops accurately representing the current planning details.

20-6.3.1.4 *Schedules.* Provide furniture and equipment schedules from the model indicating the materials, finishes, mechanical, and electrical requirements.

20-6.4 **Structural.** The structural systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a 1:48 or quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

20-6.4.1 Foundations. All necessary foundation and/or footing elements, with necessary intelligence to produce accurate plans and elevations.

20-6.4.2 Floor Slabs. Structural floor slabs shall be depicted, including all necessary recesses, curbs, pads, closure pours, and major penetrations accurately depicted.

20-6.4.3 Structural Steel. All steel columns, primary and secondary framing members, and steel bracing for the roof and floor systems (including decks), including all necessary intelligence to produce accurate structural steel framing plans and related building/wall sections.

20-6.4.4 Cast-in-Place Concrete. All walls, columns, and beams, including necessary intelligence to produce accurate plans and building/wall sections depicting cast-in-place concrete elements.

20-6.4.5 Expansion/Contraction Joints. Joints shall be accurately depicted.

20-6.4.6 Stairs. The structural Model shall include all necessary openings and framing members for stair systems, including necessary intelligence to produce accurate plans and building/wall sections depicting stair design elements.

20-6.4.7 Shafts and Pits. The structural Model shall include all necessary shafts, pits, and openings, including necessary intelligence to produce accurate plans and building/wall sections depicting these design elements.

20-6.5 **Mechanical**. The mechanical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Small diameter (less than 1-1/2" NPS) field-routed piping is not required in the model. Additional minimum Model requirements include:

20-6.5.1 HVAC. All necessary heating, ventilating, air-conditioning and specialty equipment, including air distribution ducts for supply, return, and ventilation and exhaust ducts, including control system, registers, diffusers, grills and hydronic baseboards with necessary intelligence to produce accurate plans, elevations, building/wall sections and schedules.

20-6.5.1.1 *Mechanical Piping*. All necessary piping and fixture layouts, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, and schedules.

20-6.5.2 Plumbing. All necessary plumbing piping and fixture layouts, floor and area drains, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules.

20-6.5.3 Equipment Clearances. All HVAC and Plumbing equipment clearances shall be modeled for use in interference management and maintenance access requirements.

20-6.5.4 Elevator Equipment. The Model shall include the necessary equipment and control system, including necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.

20-6.6 **Electrical/Telecommunications**. The electrical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Small diameter (less than 1-1/2"Ø) field-routed conduit is not required in the model. Additional minimum Model requirements include:

20-6.6.1 Interior Electrical Power and Lighting. All necessary interior electrical components (i.e., lighting, receptacles, special and general purpose power receptacles, lighting fixtures, panelboards, cable trays and control systems), including necessary intelligence to produce accurate plans, details and schedules. Lighting and power built into furniture/equipment shall be modeled.

20-6.6.2 Special Electrical Systems. All necessary special electrical components (i.e., security, Mass Notification, Public Address, nurse call and other special occupancies, and control systems), including necessary intelligence to produce accurate plans, details and schedules.

20-6.6.3 Grounding Systems. All necessary grounding components (i.e., lightning protection systems, static grounding systems, communications grounding systems, bonding), including necessary intelligence to produce accurate plans, details and schedules.

20-6.6.4 Communications. All existing and new communications service controls and connections, both above ground and underground with necessary intelligence to produce accurate plans, details and schedules. Cable tray routing shall be modeled without detail of cable contents.

20-6.6.5 Exterior Building Lighting. All necessary exterior lighting with necessary intelligence to produce accurate plans, elevations and schedules. The exterior building lighting Model shall include all necessary lighting, relevant existing and proposed support utility lines and equipment required with necessary intelligence to produce accurate plans, details and schedules.

20-6.6.6 Equipment Clearances. The model shall incorporate and define all electrical and communications working spaces, clearances, and required access.

20-6.7 **Fire Protection.** The fire protection system Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

20-6.7.1 Fire Protection System. All relevant fire protection components (i.e., branch piping, sprinkler heads, fittings, drains, pumps, tanks, sensors, control panels) with necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules. All fire protection piping shall be modeled.

20-6.7.2 Fire Alarms. Fire alarm/mass notification devices and detection system shall be indicated with necessary intelligence to produce accurate plans depicting them.

20-6.8 **Civil.** The civil Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a 1:1200 or one inch (1"=100') scaled drawing. Additional minimum Model requirements include:

20-6.8.1 Terrain (DTM). All relevant site conditions and proposed grading, including necessary intelligence to produce accurate Project site topographical plans and cross sections.

20-6.8.2 Drainage. All existing and new drainage piping, including upgrades thereto, including necessary intelligence to produce accurate plans and profiles for the Project site.

20-6.8.3 Storm Water and Sanitary Sewers. All existing and new sewer structures and piping, including upgrades thereto, on the Project site with necessary connections to mains or other distribution points as appropriate, including necessary intelligence to produce accurate plans and profiles for the Project site.

20-6.8.4 Utilities. All necessary new utilities connections from the Project building(s) to the existing or newly-created utilities, and all existing above ground and underground utility conduits, including necessary intelligence to produce accurate plans and site-sections.

20-6.8.5 Roads and Parking. All necessary roadways and parking lots or parking structures, including necessary intelligence to produce accurate plans, profiles and cross-sections.

20-7 OWNERSHIP AND RIGHTS TO DATA

20-7.1 **Ownership.** The Government has ownership of and rights at the date of Closeout Submittal to all CAD files, BIM Model, and Facility Data developed for the Project in accordance with FAR Part 27. The Government may make use of this data following any deliverable, including interim or final submittals.

20-7.2 Electronic submittals shall be on digital media acceptable to the Government. The electronic submittals shall be organized and structured supportive of archival and retrieval. The electronic submittals shall have a “dash-board” type feature to assist viewers navigate through the digital media and associated files. Files not using names which readily identify their content shall have appropriate Meta data attached to include searchable short descriptions of the file’s content or relevance.

NOTE: The table parameter names may change in the final, but that does not change the approval of this document. These tables accurately reflect data intent to achieve the FLCM goals of various users in the MHS FLCM process. The table parameter names are in final coordination with BuildingSmart, IFC (COBIE v2.30), other federal agencies (VA, GSA, etc.) and DMLSS-FM. The number of variables is not expected to change.

Appendix of Tables

The following tables reflect data element requirements, naming convention to be used for the various data elements, format restrictions, responsibility and data element responsible authority.

The note references apply to the following tables.

- Note 1 – To be determined in the BIM Execution Plan. The designer will at a minimum create the parameter in the model.
- Note 2 – Shall be automatically calculated by the BIM platform utilized.
- Note 3 – Derived from the SEPS BIM Export Files
- Note 4 – Designer
- Note 5 – Mechanical, electrical, administrative, circulation, inpatient bed room, etc.
- Note 6 – Shall be coordinated with the government to match intended signage.
- Note 7 – Reference Table 20-1 for parameter details and data should be drawn from the respective parameters.
- Note 8 – Reference Table 20-2 for parameter details and data should be drawn from the respective parameters.
- Note 9 – Shall be coordinated with the government ensure correct naming/classification structure/label is utilized.
- Characters: 0.00 represents a number to two decimal places; if the type is “text” the number entered represents the maximum number of text characters allowed.
- Use established IFC parameters where relevant.

Table 20-1 Project Level Parameters

Parameter Name	Description	Type	Characters	Responsible Authority
CD_Const_A	Calendar days in contract for construction at award	Integer		Note 1
CD_Const_F	Calendar days in contract for construction at completion	Integer		Note 1
CD_Design_A	Calendar days in original design at award	Integer		Note 4
CD_Design_F	Calendar days total for design at completion of design	Integer		Note 4

Parameter Name	Description	Type	Characters	Responsible Authority
Const_Comp	Date construction complete actual	Date	DD/MM/YYYY	Note 1
Const_ContOff	Design & Construction Agent and office responsible for design award (e.g. USACE – NAD)	Text	50	Note 1
Cost_Arch	Construction Contract cost, architectural components for the project - actual	Number	0.00	Note 1
Cost_Control	Construction Contract cost, controls components for the project - actual	Number	0.00	Note 1
Cost_Cx	Construction Contract cost, commissioning (Cx) components for the project - actual	Number	0.00	Note 1
Cost_Elec	Construction Contract cost, electrical components for the project - actual	Number	0.00	Note 1
Cost_IT	Construction Contract cost, information technology components for the project - actual	Number	0.00	Note 1
Cost_LEED	LEED premium cost for construction	Number	0.00	Note 1
Cost_LOGCATA	Total cost of LOGCAT A items included in the project	Number	0.00	Note 1
Cost_Mech	Construction Contract cost, mechanical components for the project - actual	Number	0.00	Note 1
Cost_Plumb	Construction Contract cost, plumbing components for the project - actual	Number	0.00	Note 1
Cost_Struct	Construction Contract cost, structural components for the project - actual	Number	0.00	Note 1
Cost_Total_A	Total construction cost for the project at contract award	Number	0.00	Note 1

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Parameter Name	Description	Type	Characters	Responsible Authority
Cost_Total_F	Total construction cost for the project at project completion	Number	0.00	Note 1
Currency	Currency used on project	Text	25	Note 1
Currency_Rate	Currency rate to USD for project	Number	0.00	Note 1
Design_Comp	Date that the design was completed, actual	Date	DD/MM/YYYY	Note 4
Design_ContOff	Design & Construction Agent and office responsible for design award (e.g. USACE – NAD)	Text	50	Note 4
Installation	Project location – installation, base, station name	Text	100	Note 1
Location_Country	Project location, country	Text	75	Note 1
Location_State	Project location, state	Text	75	Note 1
Location_Town	Project location, town	Text	75	Note 1
Location_Zip	Project location, postal code	Text	00000-0000	Note 1
NTP_Const	Date of notice to proceed was given for construction	Date	DD/MM/YYYY	Note 1
NTP_Design	Date of notice to proceed was given for design	Date	DD/MM/YYYY	Note 4
Organization	Organizational name (e.g. Tripler Army Medical Center)	Text	100	Note 1, 2
PFD_GSF_A	Gross square feet in the PFD at the award of the contract	Integer		Note 4
PFD_NSF_A	Net square feet in the PFD at the award of the contract	Integer		Note 4
PN	Project Number	Text	25	Note 1, 5
PName	Project name	Text	100	Note 1, 5
RPUID	Real property unique identification number	Text	25	Note 1
Total Items 36				

Table 20-2 Room Level Parameters

Parameter Name	Description	Type	Characters	Responsible Authority
Fire_Zone	Fire Safety Zone – to allow color diagram development	Text	10	Note 1
DMIS	DMIS ID (as associated with the room’s department)	Text	25	Note 3, 4
Gross_Count	Default YES. Yes indicates it counts in the space gross calculation for the building according to the UFC	Yes/No		Note 1
Hazardous_Materials	Room contains hazardous materials	Yes/No		Note 1
Master_RoomSpecs_Formal_Room_Name	Master room name from SEPS export	Text	150	Note 1, 3
NSF	Net square feet for the space	Integer		Note 2
NSF_Programmed	NSF programmed from the SEPS export	Integer	5	Note 1, 3
Omniclass_Code	Associated omni-class code	Text	17	Note 1
Project_Dept_AgencyName	Department owning space	Text	150	Note 1, 3
Project_FA_AgencyName	Department functional area classification	Text	150	Note 1, 3
Project_Room_ID	Project room ID	Integer		Note 1, 3
Project_Room_Name	Space name	Text	100	Note 1, 3
Room	Room Number	Text	15	Note 1, 4, 6
Room_Code	Room code from SEPS export	Text	5	Note 1, 3
Room_POC	Local point(s) of contact for the space	Text	100	Note 1
Security_Requirement	Security requirements for space	Text	45	Note 1
Shielded_Room	Space is shield (e.g. lead shielding)	Yes/No		Note 1

Parameter Name	Description	Type	Characters	Responsible Authority
Total Items 17				

Table 20-3 Associated Schedule Data from Project & Room Level Parameters

Parameter Name	Description	Type	Characters	Responsible Authority
DMIS				Note 7
Floor_Number	Floor number	Text	15	Note 1, 5
Installation				Note 7
RPUID				Note 7
Total Items 4				

Table 20-4 Real Property Installed Equipment (RPIE) Object Parameters

Parameter Name	Description	Type	Characters	Responsible Authority
Acquisition_Cost	Cost of the RPIE item	Number	0.00	Note 1
Areas_Supported	Areas of the building supported by this RPIE item	Text	40	Note 1
Assembly_Category	DMLSS RPIE Hierarchy	Text	60	Note 1, 9
Barcode	Unique barcode number assigned – no duplicates	Text	20	Note 1, 9
Capacity_Unit	Capacity of the piece of RPIE (e.g. BTUs, Tons, KVA, etc.) Must be a valid capacity from the “DMLSS Capacity Unit” table	Text	20	Note 1
Capacity_Value	The value of the capacity based on the “Capacity_Unit” associated	Text	11	Note 1

Parameter Name	Description	Type	Characters	Responsible Authority
Catalog_No	RPIE item catalog number by manufacturer	Text	20	Note 1
Equipment_Hazard	Hazard associated with RPIE item. Must be a valid hazard in the "DMLSS Hazard" table.	Text	20	Note 1
Facility_SubSystem	DMLSS RPIE Hierarchy subsystem	Text	60	Note 1, 9
Facility_System	DMLSS RPIE Hierarchy system	Text	60	Note 1, 9
Index_Number	Unique identifier assigned by the medical treatment facility (MTF) – no duplicates	Text	25	Note 1, 9
Installation_Date	Date of installation	Date	DD/MM/YYYY	Note 1
Life_Expectancy	Expected operational life (in years) of the RPIE item	Integer		Note 1
Manufacturer	RPIE item manufacturer	Text	40	Note 1
Model	RPIE model number	Text	20	Note 1
Nomenclature	Generic name used for managed equipment in the DMLSS RPIE Hierarchy	Text	40	Note 1, 9
PM_Parent	Preventive maintenance schedule required on this item, but must be done with maintenance or a parent item	Text	1	Note 1
PM_Related	If "PM-Parent" is Yes, then list the parent RPIE item's "Index_No" here	Text	25	Note 1
PM_Sched	Preventive maintenance schedule required Y – yes, or N – No	Text	1	Note 1
QA_Method	R – random, A – automatic; associated with government maintenance over life of RPIE item (Quality Assurance)	Text	1	Note 1, 9

Parameter Name	Description	Type	Characters	Responsible Authority
QC_Method	R – random, A – automatic; associated with government maintenance over life of RPIE item (Quality Control)	Text	1	Note 1, 9
Risk_Assignmen t	Risk value assigned to the piece of equipment relating to the criticality of the that specific piece of RPIE. Must be a valid DMLSS Risk Assignment value.	Text	25	Note 1, 9
Serial_No	RPIE serial number	Text	20	Note 1
Specification_Un it	Unit of measure for the RPIE item. (e.g. amperes, voltage, hertz, etc.)	Text	20	Note 1
Specification_Va lue	The value of the specification based on the “Specification_Unit” associated	Text	11	Note 1
Total Items 29				
Warranty_Labor _Expiration	Date on which the terms of the warranty for labor end	Date	DD/MM/YYYY	Note 1
Warranty_Parts_ Expiration	Date on which the terms of the warranty for parts end	Date	DD/MM/YYYY	Note 1
Warranty_Start	Date the warranty starts for the RPIE item	Date	DD/MM/YYYY	Note 1
Warranty_Vendo r	Vendor organization that holds the warranty responsibility	Text	40	Note 1
Total Items 30				

Table 20-5 Associated Schedule Data from Room Level Parameters

Parameter Name	Description	Type	Characters	Responsible Authority
Room				Note 8
Total Items 1				

Table 20-6 Medical Equipment and Furniture Object Parameters

Parameter Name	Description	Type	Characters	Responsible Authority
Cost	Current estimated or actual cost of the item	Numeric	0.00	Note 1
Currency	Currency used on project	Text	25	Note 1
Currency_Rate	Currency rate to USD for project	Number	0.00	Note 1
JSN	Joint Service Number	Text	5	Note 1, 3
Logistics_Category	Actual logistics category used for this item in the project	Text	1	Note 1
Project_Equipment_ID	Project room contents ID	Integer		Note 1, 3
Project_Room_ID	Link in the SEPS data set to the unique room ID	Integer		Note 1, 3
QTY	Quantity, typically = 1	Numeric	0.00	Note 1
Total Items 8				

Table 20-7 Medical Equipment and Furniture Object Parameters (as applicable to the specific piece of equipment)

Parameter Name	Description	Type	Characters	Responsible Authority
Amps1	As defined in the MIL-STD 1691	Numeric	0.00	Note 1
Amps2	As defined in the MIL-STD 1691	Numeric	0.00	Note 1
Army_Cat	As defined in the MIL-STD 1691	Text	1	Note 1
BTUPerHour	As defined in the MIL-STD 1691	Text	6	Note 1
Date_Appr	As defined in the MIL-STD 1691	DATETIME	0.00	Note 1
Depth_CEN	As defined in the MIL-STD 1691	Numeric	0.00	Note 1
Depth_IN	As defined in the MIL-STD 1691	Numeric	0.00	Note 1
Desc	As defined in the MIL-STD 1691	Text	3000	Note 1

Parameter Name	Description	Type	Characters	Responsible Authority
FS_Army	As defined in the MIL-STD 1691	Text	1	Note 1
FS_Navy	As defined in the MIL-STD 1691	Text	1	Note 1
FS_USAF	As defined in the MIL-STD 1691	Text	1	Note 1
FS_VA	As defined in the MIL-STD 1691	Text	1	Note 1
Height_CEN	As defined in the MIL-STD 1691	Numeric	0.00	Note 1
Height_IN	As defined in the MIL-STD 1691	Numeric	0.00	Note 1
Hertz	As defined in the MIL-STD 1691	Text	5	Note 1
Hertz_dep	As defined in the MIL-STD 1691	Text	1	Note 1
Hertz_swit	As defined in the MIL-STD 1691	Text	1	Note 1
JSN_Name	As defined in the MIL-STD 1691	Text	50	Note 1
Mean_Price	As defined in the MIL-STD 1691	Numeric	0.00	Note 1
Navy_Cat	As defined in the MIL-STD 1691	Text	1	Note 1
NSN	As defined in the MIL-STD 1691	Text	13	Note 1
Phase1	As defined in the MIL-STD 1691	Numeric	0.00	Note 1
Phase2	As defined in the MIL-STD 1691	Numeric	0.00	Note 1
Price_Date	As defined in the MIL-STD 1691	DATETIM E	0.00	Note 1
Project_JSN_Co mment	As defined in the MIL-STD 1691	Text	100	Note 1
Unit_Issue	As defined in the MIL-STD 1691	Text	2	Note 1
USAF_Cat	As defined in the MIL-STD 1691	Text	1	Note 1
Utility_1	As defined in the MIL-STD 1691	Text	1	Note 1
Utility_2	As defined in the MIL-STD 1691	Text	1	Note 1
Utility_3	As defined in the MIL-STD 1691	Text	1	Note 1

Parameter Name	Description	Type	Characters	Responsible Authority
Utility_4	As defined in the MIL-STD 1691	Text	1	Note 1
Utility_5	As defined in the MIL-STD 1691	Text	1	Note 1
Utility_6	As defined in the MIL-STD 1691	Text	1	Note 1
VA_Cat	As defined in the MIL-STD 1691	Text	1	Note 1
Volts1	As defined in the MIL-STD 1691	Numeric	0.00	Note 1
Volts2	As defined in the MIL-STD 1691	Numeric	0.00	Note 1
Watts1	As defined in the MIL-STD 1691	Numeric	0.00	Note 1
Watts2	As defined in the MIL-STD 1691	Numeric	0.00	Note 1
Weight_AV	As defined in the MIL-STD 1691	Numeric	0.00	Note 1
Weight_MET	As defined in the MIL-STD 1691	Numeric	0.00	Note 1
Width_CEN	As defined in the MIL-STD 1691	Numeric	0.00	Note 1
Width_IN	As defined in the MIL-STD 1691	Numeric	0.00	Note 1
Total Items 42				

Table 20-8 Associated Schedule Data from Project and Room Level Parameters

Parameter Name	Description	Type	Characters	Responsible Authority
PN	Project Number	Text	25	Note 1, 5
PName	Project name	Text	100	Note 1, 5
Room	Room number in which the equipment is located	Text		
TotalCostPerItem	Quantity x Cost	Numeric	0.00	Note 1
Total Items 4				

Appendix Matrix of Submittals & Schedules

The following matrix represents a consolidated reference to submittal requirements defined in this document. The submittals are in concert with, and do not replace or usurp UFC 4-510-01 Appendix B or Request for Proposal (RFP), Scope of Work (SOW) or Performance Work Schedule (PWS).

Deliverable / Schedule	Description	Cross Reference to Section
Model Tests	The contractor shall conduct model tests to address class detection / inference management validating discipline and trade coordination of submittal deliverables; PFD validation; PRCR validation; gross (total building and departmental) validation; other checks as proposed by the contractor	20-4.3 <i>Associated with 20-5</i>
Schedule: Medical Equipment & Furniture Data	Medical Equipment & Furniture (associated with the PRCR) object data parameters to be displayed as a schedule and included as part of the project submittals.	20-4.1.6
Schedule: Project Data	Project level data parameters that shall be displayed as a schedule and included as part of the project submittals.	20-4.1.3
Schedule: Room Data	Room level data parameters that shall be displayed as a schedule and included as part of the project submittals.	20-4.1.4
Schedule: RPIE Data	Real Property Installed Equipment object data parameters to be displayed as a schedule and included as part of the project submittals.	20-4.1.5
Submittal: BIM Execution Plan	To be submitted to the government 30 days prior the initial meetings for the contracts as defined in the referenced section.	20-3.3
Submittal: COBie-MHS Data for Medical Equipment & Furniture	The contractor shall submit an extract of the data for the Medical Equipment & Furniture in the COBie-MHS format. Submittal with interim deliverables, are intended to be used as “draft” submittal prior to the final to ensure the final is in compliance with the COBie-MHS structure and accepted by the Government.	20-4.1.6.1

Deliverable / Schedule	Description	Cross Reference to Section
Submittal: COBie-MHS Data for RPIE	The contractor shall submit an extract of the data for the RPIE in the COBie-MHS format. Submittal with interim deliverables, are intended to be used as “draft” submittal prior to the final to ensure the final is in compliance with the COBie-MHS structure and accepted by the Government.	20-4.1.5.1
Submittal: Final As-Built	Submitted by the contractor on the project responsible for providing as-built documentation for the project.	20-5.5
Submittal: Final Design / Design Complete	Concurrent with the project “final design” submittal(s) as defined in the project contract (e.g. S-6/S-7, for construction documents, or equivalent).	20-5.3
Submittal: Interim Design	Concurrent with the project submittals as defined in the project contract (e.g. S-1 or equivalent through S-5 or equivalent) and defined in the accepted BIM Execution Plan for the project.	20-5.2
Submittal: Over-The-Shoulder	Over-the-shoulder progress reviews are used primarily as visual in process coordination reviews and as such typically have no electronic or hardcopy deliverable other than associated meeting minutes unless defined otherwise in the BIM Execution Plan or project contract.	20-5.4

Acronyms List

The following is a list of acronyms relevant to this PIP.

Acronym	Represents
AFCEE	Air Force Center for Engineering and the Environment
BHMA	Builders Hardware Manufacturers Association (http://www.buildershardware.com/)
BIM	Building Information Model Building Information Modeling
BOD	Beneficial Occupancy Date
BUMED	Bureau of Medicine (Navy)
CAFM	Computer Aided Facility Management
cdays	Calendar Days
CIDM	Capital Investment Decision Model
CIP	Capital Investment Proposal
CMMS	Computerized Maintenance Management System
CO2	Carbon Dioxide
CSI	Construction Specifications Institute
DMLSS	Defense Medical Logistics Standard Support
DMLSS-ET&M	DMLSS – Equipment Technology and Management
DMLSS-FM	Defense Medical Logistics Standard Support – Facility Management
DN	Diameter Nominal (metric equivalent of NPS)
DoD	Department of Defense
DTM	Digital Terrain Model
FLCM	Facility Life Cycle Management
FM	Facility Management Facility Manager
HFD	Health Facility Division
HFPA	US Army Health Facility Planning Agency
IFC	Industry Foundation Class
IFD	International Framework for Dictionaries – Open Source (http://dev.ifd-library.org/)
LCC	Life Cycle Cost
LCCA	Life Cycle Cost Analysis

Acronym	Represents
MEP	Mechanical, Electrical and Plumbing
MHS	Military Health System
MILSTD	Military Standard
NAVFAC	Naval Facilities Engineering Command
NPS	Nominal Pipe Size
OmniClass	OmniClass Construction Classification System – Open Source (http://www.omniclass.org/)
OSD-HA	Office of the Secretary of Defense for Health Affairs
PIP	Process Improvement Proposal
PPMD	Portfolio Planning and Management Division
ROI	Return On Investment
RPIE	Real Property Installed Equipment
SEPS	Space and Equipment Planning System
SOW	Scope of Work Statement of Work
SRM	Sustainment Restoration and Modernization
SROI	Sustainable Return on Investment
TMA	Tricare Management Activity
USACE	United States Army Corps of Engineers
USAMEDCOM	United States Army Medical Command