

The Minneapolis VA BIM Standards – v1.0

1. Introduction

The goal of implementing Building Information Modelling (BIM) is to deliver higher value and maximize lifecycle building performance to support VA's mission to deliver excellent medical services.

This document includes the following key BIM standards:

- Implementation
- BIM Management Plan (BMP)
- BIM Roles and Responsibilities
- Model Sharing
- Collaboration Procedures
- BIM Uses
- 3-D Models, Formats, and Model Structures
- Technology Platform and Software
- Modeling Requirements
- Files, Security, Waivers
- Drawing, Requirements for Paper Printing

1.1 Standards

Projects contractually required to be completed using Building Information Modeling (BIM) authoring software shall adhere to:

- The VA BIM Guide; v1.0
- The Minneapolis VA BIM Standards (this document - 15 pages)

1.1.1 The VA BIM Guide

This document is the national standard issued by *U.S. Department of Veterans Affairs (VA) Office of Construction & Facilities Management (CFM)*.

The current version can be downloaded from: <http://www.cfm.va.gov/til/bim/BIMGuide/>

1.2.1 The Minneapolis VA BIM Standards

This document expands upon the generalized national standard, The VA BIM Guide, to define more specific standards for VISN 23. The requirements in this document supersede those found in the national standard.

2. Implementation

2.1 Acquisition Strategy

All work shall be completed in Autodesk® Revit® software. This section provides an overview of the master model structure and A/E model acquisition process for a new project.

2.2 Revit® Model Organization

The Minneapolis VA Revit model organization:

- 140583 VA Master Composite.rvt
 - BLDG 49_Arch.rvt

 - BLDG 70_Core and Shell.rvt
 - BLDG 70_Level 00.rvt
 - BLDG 70_Level 00_Area A.rvt
 - BLDG 70_Level 00_Area B.rvt
 - Etc.
 - BLDG 70_Level 01.rvt
 - BLDG 70_Level 01_Area A.rvt
 - BLDG 70_Level 01_Area B.rvt
 - Etc.
 - BLDG 70_Level 02.rvt
 - BLDG 70_Level 02_Area A.rvt
 - BLDG 70_Level 02_Area B.rvt
 - Etc.
 - BLDG 70_Level 03.rvt
 - BLDG 70_Level 03_Area A.rvt
 - BLDG 70_Level 03_Area B.rvt
 - Etc.
 - BLDG 70_Level 04.rvt
 - BLDG 70_Level 04_Area A.rvt
 - BLDG 70_Level 04_Area B.rvt
 - Etc.

 - BLDG 70_Pneumatic Tube System_Master.rvt
 - BLDG 70_Hydraulics.rvt
 - BLDG 70_Med Gas.rvt

 - BLDG 70_MEP Master.rvt

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Note: the Core and Shell model contains building elements which rarely change; structural floor, columns, stair and mechanical shafts, etc. Changes required to the Core and Shell model must be coordinated with MSP VA Engineering

Model Accuracy: Each of the models state that “no guarantee is implied as to the accuracy of dimensions or building features shown and users of the models assume full responsibility for verifying its accuracy.”

All Revit Worksets in the provided Revit models are to be maintained and used.

2.3 Revit® Model Check-out Process

Projects must be developed using the provided Minneapolis VA Revit® models. MSP VA Engineering will provide the necessary files and mark those files as being checked out. All elements in the provided models represent the most accurate electronic information. The design team will update the model if any discrepancies are found within the specific work area. Generic elements, such as walls, doors, etc., should be updated when needed within the context of the specific work being performed.

Level of Detail (LOD) shall be 300-350.

Important: When possible, do not delete an element to create a new element in the same place. Rather, select the element and swap it out via the Type Selector. Deleting an element will cause hosted elements to become unhosted in linked models.

3. BIM Management Plan (BMP)

To simplify this requirement the MSP VA has created a form to be filled out.

3.1 Design BMP

Per the National VA BIM Guide, a Design BMP shall be submitted to MSP VA Engineering at the beginning of the project. Through this process, the team members and VA project management shall jointly agree on how, when, why, to what level, and for which project outcomes BIM will be used. The BMP should be considered a living document and shall be continually developed and refined throughout the project development lifecycle.

The Design Team shall submit the BMP to VA for review and approval before the start of schematic design. At a minimum, the BMP shall contain the following:

- a. The project acquisition strategy (DBB, DB, IDC) and how the Design BIM will support the project delivery activity
- b. Overall plan for achieving VA BIM requirements
- c. Strategy for hosting, transfer, and access of data between technical disciplines (use of model server, extranet, access, security, etc.) A technical evaluation of the options to match the IT technical needs of the size and complexity of the project, and to provide access by the Design/Construction Team and various VA stakeholders, peer reviewers, etc.

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- d. Animations/graphics showing major building equipment and medical equipment space clearance reservations for operations, repair, maintenance, replacement
- e. Animations/graphics showing functionality of medical staff issues (nurses' walking distances, nurse-patient sightlines, etc), patient queuing and pharmacy deliveries, supply, processing, and delivery, etc.
- f. Proposed BIM software to be used by each technical discipline team member
- g. Energy modeling strategies
- h. Project schedule aligned to BIM development and progress submittals per VA Submission Standards. Schedule to include:
 - Software compatibility testing schedule (if required)
 - Proposed BIM workshops and training as needed
 - Progress BIMs per Design Document Submission
- i. Strategy for import of PFD VA-SEPS information and data export for Facility Management.
- j. File formats used for project submittal and file exchange
- k. File exchange protocol
- l. Strategy for establishing and managing shared file server⁴, if used
- m. Strategy for COBIE integration
- n. Documentation of any proposed deviation from VA BIM Standards for VA approval
- o. Legal status of the Design Model will have for construction (Binding, Informational, Reference, Reuse)
- p. Strategy for updating and coordinating changes during construction into the final BIM model deliverable files
- q. BIM qualifications, experience, and contact information for the following: BIM Manager; Technical Discipline Lead BIM Coordinators for all major disciplines (Architect, Civil, MEP, Structural, etc.)
- r. Model cleanup procedures shall be performed prior to project closeout.

3.2 Construction BMP

At this time, the Minneapolis VA does not require the contractor to engage in the Building Information Modeling process. Therefore a Construction BMP is not required by the contractor.

3.3 Software Compatibility

The Revit® model version shall not change, i.e. be upgraded, from the version in which it was provided at project acquisition unless written permission is given from Minneapolis VA Engineering. The Minneapolis VA master model dataset must remain in the same version for compatibility. **It will be the responsibility of the AE Firms to reconstruct the model in the proper version before final project close out will be approved.**

4. BIM Roles and Responsibilities

4.1 Design Team BIM Manager

Per the National VA Guidelines, an individual will be assigned the role of “Design Team BIM Manager” for the entire project. This person will be the primary contact person for BIM related questions. This person will have sufficient Revit experience to ensure the approved BIM Management Plan (BMP) is carried out.

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See the National VA Guidelines for specific duties.

4.2 Technical Discipline (Design) Lead BIM Coordinators

Per the National VA Guidelines, each discipline must designate an individual as lead Revit BIM technician. This person will be responsible for coordination and BIM management within their specific discipline.

4.3 Construction BIM Manager

The Minneapolis VA does not currently require a Construction BIM Manager. The design team will update the model using the as-built drawings provided by the contractor.

4.4 Team Continuity

The MSP VA requires that the same individuals work on the project throughout its duration for efficiency and consistency in design and communication. It is understood that sometimes this is out of the control of an AE firm if, for example, a person leaves the firm. Any changes to the design team roster must be submitted in writing and approved by the MSP VA Project Manager.

5. Model Sharing

5.1 Design

Prior to project close out, separate copies of each technical Revit model will be provided to Minneapolis VA Engineering.

5.1.1 Revit Model Check-in Process

At the end of the project, the Revit model must be processed and prepared such that the detail level is the same as the model originally received. All of the following shall be removed:

- Sheets
- Drafting Views
- Schedules
- Legends
- Elements to be deleted:
 - Free-standing furniture; e.g. chairs, tables, file cabinets, etc.
 - Free-standing Medical Equipment; e.g. crash cart, ???
 - All demolished elements

For clarity, the following elements shall remain in the model:

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- Crash rails on walls
- Built-in casework
- Headwalls
- Large medical equipment; e.g. CT, MRI, Dental X-Ray, Etc.

The model shall be Purged and all elements shall be set to **Phase: Existing**.

5.2 Construction Bidding

The BIM data will not be accessibly by contractors during bidding at this time.

5.3 Construction Phase

The BIM data will not be accessible by contractors during bidding at this time.

6. Collaboration Procedures

This section will not be required by the MSP VA as it is expected quality of service required to fulfil the requirements of these standards.

7. BIM Uses

7.1 Space and Medical Equipment Validation

The VA-SEPS tools are not currently employed at the Minneapolis VA. This process/benefit may be rolled into the new Maximo FM toolset. Thus, the VA-SEPS parameters and data will not be required at this time.

7.2 Architecture – Spatial and Material Design Models

See national standard.

7.3 Energy Analysis

At this time Energy Analysis will not be required. AE Firms are encouraged to perform Energy Analysis as the opportunity arises to improve project performance and decrease lifecycle costs.

7.4 Design Visualization for Communication, Functional Analysis, & Constructability

During design, special consideration may be given to medical staff and maintenance issues. BIM may be used to validate:

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- Nurses' walking distances
- Nurse-station sightlines
- Process areas where timing and volume may be problematic (such as patient queuing for waiting rooms and pharmacy, pharmacy delivery routes/timing)
- Supply, Processing, & Distribution (SPD)
- Animations/graphics showing major building equipment and medical equipment space clearance reservations for operations, repair, maintenance, replacement
- Color coding of floorplates for determining medical room/department locations and square footages, and circulation
- Constructability

7.5 Building System Models – Structural, MEPF, and Interiors

Structural, MEPF, and interior design information is required to be developed in BIM.

Note: The structural elements are contained within the architectural “core and shell” model given the existing nature of the facilities. A/E firms must work with VA Engineering to incorporate any new structural elements into the “core and shell” model.

Fire mains should be added to as-builts.

7.6 Masterplan Space Scheduling and Sequencing – 4D

This is item not required at this time.

7.7 Communication of Construction Scheduling and Sequencing - 4D

This is item not required at this time.

7.8 COBIE/Commissioning

Per the national VA BIM Standards, COBie is required; see section 10.9, Final Deliverables.

This information will be exported from Revit based on a forthcoming IBM Maximo workflow.

7.9 Clash Detection/Coordination

- a) The design BIM shall be free of major interferences between building components. Given the Minneapolis VA requires all design BIM work to be carried out in Revit, **it is acceptable to do clash detection within Revit.** Using another, more sophisticated tool, such as Autodesk Navisworks or Bentley Navigator, is also acceptable.

Clash reports shall be provided at 95% CD and 100% CD. The report shall indicate the model is clash free—and acceptable clashes flagged as such. Note: an acceptable clash is where elements clash due to standard modeling practices; for example, a duct passing through a wall—walls are

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not usually modified for duct routes.

Color coding by trades is not required in the models.

b) Consider the following during the clash detection process:

1. **Architecture + Structural:** Below-grade spaces, proposed floor plates with major penetrations, floor-to-floor heights, beam clearances, heavy utilities locations, floor loads, core, and vertical shafts, beam depths and required clearances, patient lift mechanisms, slab thickness, columns, column caps, and seismic bracing. Provide adequate space for construction and maintenance access to structural elements, building equipment, and distribution systems.
2. **Architecture + MEPF:** Structural and space elements, flow and isolation requirements, proposed functional area configurations, floor-to-floor heights, fire containment, vertical and horizontal transportation. Possible future expansions shall be considered and shall be clash-free.
3. **MEPF/HVAC + Architecture, Structure, and Telecommunications:** Main distribution and collection systems, configurations and sizes for piping, duct, conduit, power wiring, blowers; diffusers; intakes, large compressors. Clearance reservations for equipment maintenance filter removal, and equipment removal and replacement shall be modeled with the equipment, and sign-off on the adequacy of the space reservations shall be obtained from the facility Chief Engineer.
4. **Architecture + Life Safety Fire Protection:** Safe zone and fire suppression pipe location, egress paths and exit distance requirements, equipment, and pipe penetrations.
5. **Medical Equipment + Architecture, MEPF, HVAC, Structural:** Medical major equipment positioning and location requirements, medical gases distribution and waste collection, cryogen supply piping for MRI and labs, and cryogen cooling compressors, nurse call systems, public communications, and building controls. This includes major medical equipment adjacencies and shielding barriers, pipes, and venting and air intake locations and other limitations.
6. **Architecture/HVAC + Interiors:** Clash analysis shall include ductwork and piping + ceilings and FF&E¹² + HVAC.
7. **Space Validation:** All usable areas shall have a Room (Architecture model) or Space (MEP models). These shall match with architectural requirements and data values, and all shall be coordinated with values given in the PFD.
8. **General Model Quality Checking:** All walls shall be properly joined to prevent “space leaks” in areas defined by enclosing walls. Rooms/Spaces shall not conflict. Use **Room/Space Separation Lines** to segregate in open areas.
9. **Security:** Security setbacks + structure + site.

10. Accessibility Compliance: Wheelchair pathways and clearances + structure. (If using Solibri Model Checker or other rules-based model checking software, accessibility compliance can be checked automatically.)

7.10 Virtual Testing and Balancing

We will require the actual loads from commissioning and these values will replace the design loads (no need to maintain the original design load information separately).

Space Airflow Schedule				
Number	Name	Calculated Supply Airflow	Actual Supply Airflow	Airflow Delta
System Type	Type	Mark	Flow	
115	Instruction	1457 CFM	1470 CFM	13 CFM
Supply Air	24x24 - 8 Neck	SD 1-12-109	360 CFM	
Supply Air	24x24 - 8 Neck	SD 1-12-110	450 CFM	
Supply Air	24x24 - 8 Neck	SD 1-12-111	330 CFM	
Supply Air	24x24 - 8 Neck	SD 1-12-112	330 CFM	
116	Conference	580 CFM	0 CFM	-580 CFM
117	Instruction	523 CFM	0 CFM	-523 CFM
118	Electrical	45 CFM	0 CFM	-45 CFM
119	Sprinkler Main	57 CFM	0 CFM	-57 CFM

7.11 Additional BIM Uses

The design team is encouraged to use additional tools to design and analysis a given project. However, do not use tools or add-ins that are required to be purchased/owned by the VA or other A/E firms. See the nationally VA BIM Guide for some suggestions on how to further leverage the BIM within your design process.

8. BIM Uses 3D Models, Formats, and Model Structures

8.1 General

The BIM(s) shall consist of objects and elements that represent the actual dimensions of the building elements and the building equipment that will be installed on the project. BIM coordination requires the following model structure and features:

- a) The floor elevation protocol has been established in the provided models. The main Core and Shell model is the basis for all Copy/Monitored levels. New projects shall Copy/Monitor the Structural BIMs levels.

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- b) Clearance Reservations: All Revit content shall include any required clearances for equipment access and maintenance.
- c) The granularity of elements in the model shall correspond with the proposed sequence of the installation at the site. For example, if a wall is interrupted at each level by a floor, the wall shall start and stop at each level and not just continue through it.
- d) **Omit this item;** models are not “submitted” for clash detection. Clash detection is the responsibility of the A/E firm.
- e) When emailing notification of file uploads or for any other email correspondence pertaining to the project, all email subject line headings must be prefaced with the acronym for the Project Name.

8.2 Subcontractor coordination

The BIM aspects of this requirement are not required. However, subcontractor coordination is an expected quality of service.

8.3 Digital Fabrication

See national standard.

9. Technology Platform and Software

9.1 Approved BIM Software for VA Projects

The Minneapolis VA requires all projects be completed natively in Autodesk Revit. No other BIM authoring tool or conversion will be accepted.

TYPE (These are general categories. Listed software can be used for more than one “Type.”)	SOFTWARE (no order of preference)
Planning/Preliminary Cost Estimates	VA-SEPS, Onuma Planning System (OPS), DProfiler, Tokmo, CodeBook
Authoring – Design (Architecture, Structural)	Revit
Authoring – MEPF (Engineering & Construction)	Revit
Authoring – Civil	Bentley Inroads and Geopak, Autodesk Civil 3D
Coordination (clash detection)	NavisWorks Manage, Bentley Navigator, Solibri Model Checker, Autodesk BIM360 Glue, EPM Model Server, BIMServer
4D Scheduling	Synchro, Vico, NavisWorks Simulate, Primavera, MS Project, Bentley Navigator, Revit
5D Cost Estimating	Innovaya, Vico, Tokmo
Specifications	Speclink-e, E-Specs
Model Checking Validation, IFC File Optimizer	Solibri or equal
COBIE	Tokmo COBIE exchange
Energy Analysis ¹⁴	EcoDesigner, Ecotect, eQuest, Green Building Studio, EnergyPlus, Sefaira, Insight & Revit.

10. Modeling Requirements

10.1 General

See national standard.

10.2 Types of Model Elements

Model elements should be optimized for use in the BIM. Content must not be copyrighted. The VA owns all models, including content. Revit families are to be created using native Revit geometry – not imported from other programs such as DWG, DNG or SKP. Note that Autodesk FormIt geometry is considered native Revit geometry and therefore may be used within the Revit model.

If new model elements are required, they should be modified to include shared parameters needed to appear in the VA provided schedules. A standard Shared Parameters file is available from the MSP VA. If new shared parameters are required, coordinate with the MSP VA to update the master file. Requests must be made in writing and approved prior to implementation due to the importance of maintaining a master shared parameter file in Revit.

10.3 Model Geographic Location

The model's geographic location is defined in the provided model(s) and should not be changed. For new projects, Revit's **Project Base Point** shall correspond to the intersection of structural grids **A** and **1**. The **Survey Base Point** shall be adjusted to align with a Geo-referenced survey DWG file.

10.4 Points of Reference

Omit this section as it is not relevant in Revit.

10.5 Requirements for Modeling Space

Omit this section as the MSP VA does not utilize the VA-SEPS workflow.

10.6 Meta Data

The BIM model(s) shall carry the following information (via Project Information):

- a. Project ID – *VA Construction Project Number*
- b. Station ID – *VA Station Number*
- c. Project Name – *VA Project Name*

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10.7 Space Naming and Coding

The room name and number for existing rooms shall not be changed unless instructed otherwise. New rooms shall conform to the Minneapolis VA Standard.

- a. Building ID – *VA Building Number*
- b. Wing
- c. Floor
- d. Department
- e. Sub-department
- f. Space Name – *English Name & Abbreviation*
- g. Room Number – *VA Wayfinding Room Number*
- h. Room Number – *Construction Document Number (used on large complex projects for builder use)*
- i. Space Code – *VA-SEPS Room Code*
- j. Unique Space Number – *GUID*¹⁷
- k. Space Function - *OmniClass*¹⁸
- l. Space Type - *Uniformat*
- m. Space Measurement - *Net Square Footage (NSF)*,¹⁹ *Department Net Square Footage (DNSF)*, *Department Gross Square Footage (DGSF)*, and *Building Gross Square Footage (BGSF)*

10.8 Medical and Mechanical Equipment, etc. Coding

Per the national standard, each individual piece of medical equipment and building mechanical equipment shall include the following attributes (via provided Shared Parameters) and be maintained throughout the Design and Construction BIM models:

- a. Item Name – *English Name & Abbreviation*
- b. Item Code - *VA-SEPS Joint Services Number (JSN)*²⁰
- c. Unique Item Number - *GUID*
- d. Item Function – *OmniClass*
- e. Item Tracking Number – *Category Stock Number (CSN)* [for medical equipment]
- f. Blank field for ECRI code or other (to come later)
- g. Other data available from *VA-SEPS* that is accommodated by the *COBIE*²¹ spreadsheet and is appropriate to the LoD for the submission phase.

10.9 Final BIM Deliverables

It is VA's intention to use the BIM model for Facilities Management upon Occupancy. As previously stated, the Revit model shall be "cleaned" and returned to the VA prior to project close-out.

The following files shall be submitted:

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- Cleaned Revit models
- Composite IFC file
- COBIE database containing room/space data and product information

Electronic documents/files required by this document shall be provided on CD/DVD.

11. Files, Security, Waivers

11.1 Project Folder Structure

The A/E firm is free to use a custom folder structure. However, the Revit models provided shall not be renamed.

11.2 Data Security

Please refer to the national standard for this topic.

11.3 Waivers

Please refer to the national standard for this topic.

12. Drawing Requirements for Paper Printing

12.1 General

Sheets shall be created within the Revit model. Revit's view placement and cross-referencing features shall be employed. The sheet index shall be a live view of all sheets in the host model and for all linked models.

12.2 Diffuser Symbols

Only use the diffuser content provided with the Revit MEP models. If additional types are required, follow the pattern established for name, graphics, LOD and sub-categories.

12.3 Font

Only use the text types provided within the Revit model. Remove all additional fonts that may be added to the model when external content is loaded. These text styles, in conjunction with each view's scale, define the font and size.

12.4 Line Styles and Line Weights

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These are defined in the provided Revit models and should not be changed.

12.5 MEP Details

Omit this item as it does not apply to Revit.

12.6 Room Naming Abbreviations

See national standard.

12.7 Titleblock

Use provided MSP VA Revit titleblock and predefined parameters.

12.8 Uniform Parameters for Objects

See national standard.

12.9 VA Standard Details

See national standard.

12.10 Casework / Millwork Finishes

Assign appropriate Revit materials to casework content.

12.11 Casework / Millwork Finish Legend

See national standard.

12.12 Doors

Only use the provided Revit door library on MSP VA projects.

12.13 Interior Partition Types

Use the provided Revit wall types. If new types are required, the pattern implied should be followed for naming and structure definition.

12.14 Model Integrated Text

Use tags and text styles provided within the model

12.15 Room Finishes

Room finished shall be entered into the provided parameters associated with Room elements.

12.16 Finish Legend (aka Finish Schedule)

The provided Room Finish Schedule shall be used in the construction documents to define the finishes for the project.

12.17 Room Numbering

Follow the room numbering pattern in the provided model. Coordinate with the MSP VA is an area to be remodeled does not have enough available numbers relative to the existing adjacent rooms. The room name and number shall be entered into the built-in Revit *Room Name* and *Room Number* parameters. Spaces, in the MEP model, shall be adjusted so the Space Name and Space Number match the corresponding Room properties. **TIP:** Use the Space Renaming Utility provided by Autodesk to automate this task.

12.18 Wayfinding

See national standard.

16. Glossary

Refer to the national VA BIM Guidelines for this item.