

UNL

## **NU - BUILDING INFORMATION MODELING GUIDELINES**

Standard Practices and Definitions

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## **Acknowledgements**

The University of Nebraska is indebted to those many organizations that have helped pave the path for Owner organizations in the development of Building Information Modeling (BIM) Guidelines, Standard Practices, and Execution strategies. We wish to acknowledge that progress in this area has helped provide a framework for University of Nebraska. Our hope is that as we move forward in the use of BIM, our progress and experiences will help others as well.

Special thanks and acknowledgement:

- University of South Carolina
- University of South Florida
- Western Michigan University
- Duke University

## **BIM Process Decision Criteria for BIM process for NU Projects**

- 1) If the project budget exceeds \$500K - BIM is recommended.
- 2) If the project budget exceeds \$2 Million - BIM is mandatory unless waived by the NU Project Manager (PM).
- 3) If the project area exceeds 5,000 SqFt - BIM is recommended.
- 4) If the project area will exceed 25,000 SqFt - BIM is mandatory unless waived by the NU PM.
- 5) If the project type is a new building OR an addition to an existing building - BIM is mandatory unless waived by the NU PM.
- 6) If the majority of the project scope is mechanical, electrical and plumbing - BIM is recommended but all information outlined in Appendix B shall be provided.

## General

### PURPOSE OF DOCUMENT

NU has adopted Building Information Modeling (BIM) as a process for recording project documentation, development and as-built record documentation for select projects. Our goal is to achieve the following benefits from BIM.

**Visualization:** To improve client communication by providing multiple opportunities for visualization and review during each project phase.

**Reduction in construction costs and change orders:** To identify opportunities to drive project savings early in the project.

**Information:** To develop a model that could serve as a central repository for the best available facility information at any point of time.

This guideline should be used to develop the Building Information Model but it is not intended to replace or supersede the NU Design Deliverable Checklist.

To comment or discuss an issue with the content of this document, please contact the NU PM. Any BIM models provided by NU are for reference only. On-site verification of existing conditions is still required.

### BUILDING INFORMATION MODEL DEFINITION

Building Information Modeling (BIM) is a process that is focused on the development, use, and transfer of a Model to improve the design, communication, construction and operations of a project from design through project closeout, operation, renovation, and removal. The term “*model*” is used in these guidelines a 3D parametric digital representation of building elements and data.

### MODEL OWNERSHIP

NU will retain ownership of all documentation throughout the BIM process including the Autodesk® Revit® Architecture central file, MEP, and Structure model(s), Navisworks® files and all other associated document types. Models are to be made available to all key stakeholders by the AE to visualize, coordinate, schedule, and analyze design intent and constructability throughout the project. The AE is responsible for development of

a suitable template that fulfills all requirements of the BIM Execution Plan. The AE will be responsible for periodically uploading updated models as directed by the NU Project Manager.

## **MODEL REQUIREMENTS**

### **SOFTWARE**

The design and construction Team is required to use software compatible with NU's electronic project collaboration environment: Autodesk AutoCAD 2 (Current Version), Autodesk REVIT Architecture (Project Approved Version).

### **MODEL FILE TEMPLATE AND COORDINATES**

The design team shall use the default templates provided by Revit. Spatial coordinates shall be set at the beginning of project. It is the design team's responsibility to verify the accuracy of all coordinates and to provide a grid intersection at (0, 0). Survey elevations shall be based on established USGS datum, tied to local coordinates, and, importable into current NUGIS mapping software. AE to coordinate with NU GIS Coordinator and NU PM for verification of this step.

### **MODEL QUALITY**

If BIM is provided as part of the design team scope of services, the team shall provide a BIM Execution Plan as part of their contract. The design team will be responsible for making any changes/additions/modifications to the model as requested by NU, prior to as-built document submission.

### **BIM COORDINATOR**

The design team shall assign a BIM coordinator for the project. The BIM coordinator will serve as the primary contact for any model related issues and will be responsible for developing a BIM schedule. NU facilities staff will review the model periodically.

The primary responsibilities for the BIM coordinator role shall include the following.

- 1) Schedule for coordination of BIM activities with clearly identified responsibilities for all team members.
- 2) Approval of families and components to be used in the project and verifying that each item contains NU required information. Creation of a legend showing all families and components used in the project. (Refer to Appendix B for mandatory information on mechanical and electrical components that should be included in final model.)
- 3) Ensuring that each trade with the exception of architectural and structural, to be color-coded in Navisworks per Chart provided in Appendix A if Navisworks will be utilized for construction schedule animation or clash detection.
- 4) Ensuring all project members provide updated models as the project progresses.
- 5) Conduct BIM coordination meetings on a periodic basis to discuss modeling issues.
- 6) Identification of duplicates and overlaps in the model by regular visual inspection. In addition, no unnecessary floating objects, reference lines/planes and in-place mass shall exist in the model. Visual inspection by BIM coordinator shall include:
  - Cross sectioning through building
  - Architectural and Structural misalignment
  - Verifying circulation, exit route signage, ADA requirements and identifying potential trip hazard or obstacle in movement within the space.
- 7) When creating a model of an existing structure, ensure that the AutoCAD links to be removed when providing the final model.
- 8) Ensuring that updated model is periodically uploaded to NU's Capital Project Management Software Platform and as part of the review process during each phase. Models to be named per following format : YYYYMMDD\_PURPOSE \_PROJECTNUMBER\_ (Monthly update or review). For example: For a model uploaded to eBuilder for 100% design review for project number 11258 on May, 26 2017 would be named – 11258\_052617\_DDreview. For a model uploaded to eBuilder during construction as a monthly update for project number 11258 on May, 26 2017 would be named – 11258\_052617\_Mayupdate

## **LEVEL OF DEVELOPMENT (LOD)**

The approximate LOD required for each phase of project is identified in the BIM Deliverable checklist. Please refer to AIA **G202-2013, Article 2** for LOD model element content requirements and uses.

## BIM Deliverable Checklist

The BIM deliverable checklist does not replace the University of Nebraska A/E Design deliverables checklist. The intent of the BIM Deliverable checklist is to help the design team and contractors ensure that the model provided meets NU expectations and that the model can be used for the identified purpose at each project phase.

Item	Schematic Design	Design Development	Construction Document	Construction	End of project
<b>Approximate LOD</b>					
<b>Model to be used for (* Optional)</b>	<ul style="list-style-type: none"> <li>Project Phasing</li> <li>Space layout</li> <li>Preliminary cost estimating (\$/Sft)</li> <li>Program verification</li> </ul>	<ul style="list-style-type: none"> <li>Preliminary Project Schedule</li> <li>Preliminary Cost estimate*</li> <li>Constructability review</li> </ul>	<ul style="list-style-type: none"> <li>Energy Analysis*</li> <li>Clash Detection</li> <li>Accurate renderings for visualization of actual building</li> </ul>	<ul style="list-style-type: none"> <li>Detailed cost estimate</li> <li>Project Schedule*</li> <li>Constructability analysis</li> <li>Material takeoff*</li> <li>Building Inspection</li> </ul>	<ul style="list-style-type: none"> <li>As-Built documentation</li> <li>As-Built verification*</li> <li>Punch list*</li> </ul>
<b>University of Nebraska expectations from AE and Contractor</b>	<ul style="list-style-type: none"> <li>For renovation, projects, to provide a model capable of showing existing structure, structure to be demolished and new construction together in the 3D view.</li> </ul>	<ul style="list-style-type: none"> <li>To provide a model that includes all furniture layout with best or closest match components.</li> <li>Model to provide coordination reviews for Structural vs MEPF and MEPF vs MEPF</li> </ul>	<ul style="list-style-type: none"> <li>Model to provide coordination reviews for Structural vs MEPF and MEPF vs MEPF</li> <li>All information included per Appendix B</li> <li>To provide a color coded (per appendix B) Navisworks model for 100% CD review.</li> </ul>	<ul style="list-style-type: none"> <li>Model to show construction zone, Material storage, parking and logistics.</li> <li>Model to be periodically updated per changes on site (and schedule*)</li> </ul>	<ul style="list-style-type: none"> <li>The model development has progressed successfully to accurately represent the actual construction and can be used as a central repository for information.</li> </ul>
<b>Action items for A/E in Blue and Contractor in Green</b>	<ul style="list-style-type: none"> <li>Try to locate cameras and not change their positions as model develops.</li> </ul>	<ul style="list-style-type: none"> <li>Try to present walkthroughs for clients.</li> <li>If involved at DD, identify long lead items and schedule/constructability issues</li> </ul>	<ul style="list-style-type: none"> <li>Try to provide maximum construction details if difficult to model.</li> <li>Evaluate A/E model quality and develop a BIM Execution plan accordingly.</li> </ul>	<ul style="list-style-type: none"> <li>Create a legend for extra material that includes date and time of material submitted.</li> <li>Create legend to record status of O&amp;M's and warranties.</li> </ul>	



## APPENDIX A

HVAC Pipe: Lime Green  
Lights: Yellow  
Fire Sprinklers: Red  
Ceilings: Orange  
Steel: Maroon  
Methane: Forest Green

Electrical: Cyan  
HVAC Duct: Blue  
Plumbing: Magenta  
Framing: Purple  
Concrete: Grey



There is no need for individual trades to change their working color schemes; these will be altered when imported into Navisworks by the BIM Facilitator.

Figure 1- Adopted from USC BIM Guidelines version 1.6\_April 18, 2012