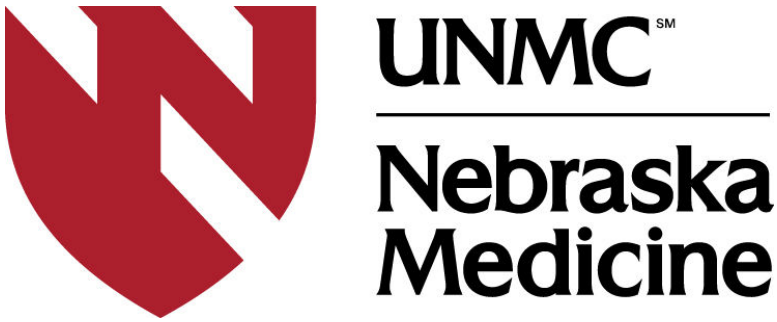


BIM Execution Plan Example

EXAMPLE LAB

November 6, 2020

Template Version 1.0

Table of Contents

1 – Project Vision

The project team will utilize BIM to reduce clashes in building systems and to support the coordination of unique medical equipment with tight clearances.

Project Overview

The Nebraska Medicine DOC/UT Cath Labs project consists of over 6,000 SF distributed on two levels in an existing building. The project requires an incredible amount of geometry coordination for articulating arms and clearances of medical equipment for proper movement and functioning. As such, the team will utilize 3D content and visualization to ensure successful implementation.

BIM Execution Plan Goal

The intent of this BIM Execution Plan is to provide a framework that will let the owner, Technology Integrator (TI) and architect/engineer (AE) deploy Building Information Modeling (BIM) technology and best practices on this project faster and more cost-effectively. This plan delineates roles and responsibilities of each party, the detail and scope of information to be shared, relevant business processes, and supporting software. This document represents the best practices known to the team at the time of its preparation. Proposed revisions will be reviewed among the team and adopted as appropriate during the course of the project delivery.

Desired Outcomes

- The BIMxP process enables **streamlined communication** between owner, architect/engineer, and contractor regarding digital BIM assets and data.
- The BIMxP process **creates accountability** for BIM assets among all project participants and establishes defined roles expected to be present among project participants.
- The BIMxP document provides useful information that can **support model authoring and coordination** requirements and protocols.
- The BIMxP equips the team with processes and protocols to support the implementation of BIM standards for more **reliable and consistent models.**

Contract Alignment

The use of Building Information Modeling (BIM) is specified as a project requirement project within the project contract. This BIM Execution Plan (BEP, BxP, or BIMxP) is a tool for supporting specific BIM-related project requirements, responsibilities, protocols, and deliverables. The following contractual documents and sections are used to specify BIM-related delivery requirements, exhibits, and references.

Architect/Engineer's Contract

- Section 1.1.1, item 9 references required BIM deliverables from the architect to the owner.
- Section 1.1.1, item 11 references transmittal of DBIM data provided by the owner, including a model describing existing conditions.
- Section 1.1.2, item 3 and 14 references BIM data hand off procedures for Program Verification.
- Section 1.1.6, item 20 references BIM data hand off procedures for FM integration.
- Section 1.1.8, item 14 references BIM data hand off procedures for use during construction.
- Section 1.1.9, item 4 references BIM data hand off procedures for record model and FM integration.

Contractor's Contract

- Section reference…
- Section reference…
- …

2 – Project Information

General Information

*Note: * indicates project information that should be included in the metadata or properties in each associated project BIM and CAD files exactly as indicated here.*

Project Name*:	Nebraska Medicine DOC/UT Cath Labs
Project Description:	Interior renovation of two stories connecting three buildings to accommodate new labs
Project Address*:	S. 42nd Street and Emile Street
Project Reference Number*:	3002.667.00
Project Size (Square Area):	6,539
Project Program:	Office and medium to high hazard areas
Owner Name*:	University of Nebraska Medical Center
Owner Project Contact:	Nathan Adams
End User/Functional Client:	Department of Surgery
Contract Type:	MSA
Architect/Engineer*:	Architecture Firm 1
Contractor:	TBD

3 – Project Team Roles & Responsibilities

BIM Role Definitions

BIM Manager

The BIM Manager is responsible for overseeing the project BIM efforts, aligning project deliverables with BIM production, coordinating with BIM leadership in other disciplines, performing BIM QA/QC reviews, overseeing the coordination of models and adherence to design standards. BIM management is primarily associated with digital BIM-related processes as executed by the architect/engineer, design, and engineering trades.

VDC Manager

The Virtual Design and Construction (VDC) Manager is responsible for overseeing the project virtual construction efforts – including the creation of digital models and data for facilitating construction coordination, ordering, and scheduling. VDC is primarily associated with digital BIM-related processes as executed by the contractor and construction trades.

Model Manager

A model manager refers to a project participant that is given specific model authoring and coordination responsibilities in the project as it pertains to specific model uses, level of development requirements, and documentation requirements.

Project Team Contacts

The following represents BIM-related project contacts for Owner, Architect/Engineer, and Contractor. An extended directory of project participant and contacts for subconsultants is available in Exhibit A.

Owner – University of Nebraska Medical Center

Role	Name	E-Mail	Phone
Project Manager			
Project Planner			
BIM/VDC Manager			

Architect/Engineer – [Organization Name]

Role	Name	E-Mail	Phone
Project Manager			
Project Architect/Engineer			
Design Lead			
BIM Manager			
Model Manager Lead			

Role	Name	E-Mail	Phone
Code/Compliance Lead			

Contractor – [Organization Name]

Role	Name	E-Mail	Phone
Project Manager			
Superintendent			
VDC Manager Lead			

4 – BIMxP Participant Review and Acceptance

This acceptance section is a 'non-binding' agreement that the contents of this BIM Execution Plan are acceptable, and the signatories will make their best effort to adhere to process and protocols described herein. Published versions of the BIM Execution Plan (also commonly referred to as BIMxP, BEP, or BxP) must be reviewed and signed by project participants within seven (7) days of distribution.

Signatories of the BIMxP confirm that they have:

1. Received the document,
2. Reviewed the contents of the plan,
3. Provided appropriate feedback, comments, and revisions, if any,
4. Agreed with the approaches and requirements outlined in the plan.

Organization	Project Manager	Signature	Date
Owner			
Architect/Engineer			
Contractor			

5 – Building Information Model Uses

Model Use Responsibility Matrix

The following outlines the expected uses of Building Information Models by project participants over the course of the project. *(A complete list of model use definitions can be found in Exhibit B.)*

Architect/Engineer

Model Use	Model Element Notes	Users
2D Documentation	Applies to all model elements and views – including data and geometry - required to meet the architect/engineer's 2D documentation requirements.	• Architect/Engineer • Contractors
As-Constructed Representation	Applies to all model elements.	• Owner
BIM FM Integration	Applies to the element categories as described in the UNMC/NM BIM Standards & Guidelines document.	• Owner
Clash Detection	Applies to all element geometry that are required to meet minimum levels of detail to facilitate coordination and clash detection activities (see LOD matrix).	• Architect/Engineer • Contractors
Design Authoring	Applies to all model elements required to convey design intent at an appropriate level of detail.	• Architect/Engineer
~~**Space Programming**~~	~~Applies to calculations that can be queries and scheduled from Revit elements including and especially rooms.~~	~~• Architect/Engineer~~ ~~• Owner~~

Contractor

Model Use	Model Element Notes	Users
Clash Detection	Applies to all element geometry that are required to meet minimum levels of detail to facilitate coordination and clash detection activities (see LOD matrix).	• Architect/Engineer • Contractors
~~**Field BIM**~~	~~Applies to model elements that will undergo review and issue reporting from the construction site.~~	~~• Contractors~~
Spatial Analysis	Applies to all element geometry that are required to meet minimum levels of detail to facilitate coordination and clash detection activities (see LOD matrix).	• Architect/Engineer • Contractors

Level of Development Definitions

Level 100

General locations, tags, symbols, and 2D objects

A model element or object may be graphically represented with symbols or other representation. The model element does not possess accurate geometric information, dimensions, object data, or precise locations in the model.

- **Example 1:** A 2D drafted space outline (CAD or room separators) designating a general area.
- **Example 2:** A general symbol indicated the rough location and layout of an equipment or fixture.

Level 200

'Conceptual' or 'generic' 3D geometry and data with overall dimensions

A model element or object is graphically and generically represented in the model with approximations for size, shape, location, and orientation. Object data may be attached to the object to provide general context for what the object is.

- **Example 1:** A placed room object enclosed by generic room bounding objects with area reporting.
- **Example 2:** A generic 3D object with overall dimensions and placement location.

Level 300

3D geometry and data used for reliable overall dimensions, schedules, and quantities

A model element or object is graphically represented in the model with specific system and assembly information with respect to quantity, shape, size, location, and orientation. Additional object data may be attached to the object used for callouts, scheduling, and notes. **When provided in CA phase, the placement location and data represent as-construction conditions.**

- **Example 1:** A placed room object enclosed by specific room bounding objects (wall types, doors) with area reporting and standard room data integration.
- **Example 2:** A categorized 3D object with specific types, dimensions, clearances, and placement location. The object would include relevant meta-data pertaining to its identity for scheduling and reporting.

Model Element FM LOD Matrix (Owner Priority)

Authored By		Model Element Category	LOD 100% SD	LOD 100% DD	LOD 100% CD	LOD 100% CA
A/E	Vendor					
•		Areas/Rooms	100	200	300	300
•		Casework	200	200	300	300
•		Ceilings	100	200	300	300
•		Doors	100	200	300	300
•		Electrical Equipment	100	200	200	300
•		Exterior Walls	200	200	300	300
•		Furniture	200	200	200	300
•		Mechanical Equipment	200	200	200	300
•		Interior Walls	200	200	300	300
•		Interior Finishes	200	200	200	300
•		Levels	100	100	100	100
•		Medical/Specialty Equipment	200	300	300	300

6 – Coordination Approach

Project Technology & Software

Model Authoring Tools

Model Authoring refers to the tools used to create and edit BIM elements, geometry, and data. The following tools and versions shall be used by the team to author BIM objects

- **Software:** Revit
- **Version:** 2020

Coordination Tools

Coordination refers to the tools used to perform checks on a model and between models. Coordination tools support activities such as clash detection.

- **Software:** Navisworks
- **Version:** 2020

Collaboration Tools

Collaboration refers to tools used for continuous coordination and co-authoring of models. The project design and construction team shall employ collaboration tools for document sharing and federated models.

- **Software:** BIM360
- **Modules:**
  - Design Collaboration for Revit
  - Document Management
  - Field Module

Analysis Tools

Analysis refers to the tools used to perform digital analysis or simulation. Analysis tools may be specialized and based on a discipline's need.

Additional analysis tools (beyond those already listed) will not be necessary on this project.

Software Upgrade Protocol

Design and construction projects may have schedules that span multiple software versions. Revit utilizes annual upgrade cycles and collaboration tools – such as BIM360 – provide the ability to automatically upgrade project models.

This project timeline exists within the anticipated upgrade cycle of one Revit version. However, an upgrade will not be executed at times other than milestones. The project will begin in Revit 2020 and could be upgraded to 2021 before or after construction.

Model Datums

Origin Points

Project origin points establish common location information for model object geometry and are used to support coordination activities such as clash detection. A project may use 1 or several project origin point systems to location their project. This project's location data is as follows:

Origin Type	X (latitude)	Y (longitude)	Z (elevation)	North Rotation (degrees)
Real-World Location	41.254081	95.976522	1145.0	0
Revit Project Base	0	0	0	0
Survey Point	41.254081	95.976522	1145.0	0

Datums and Other References

Projects may possess additional reference or datum points to properly location the project in reference to other objects. If those references exist, please provide information below.

File name	File Location	File Type	Author
UNMC-BLDG1-Existing.rvt	Relative	Revit	UNMC
UNMC-BLDG2-Existing.rvt	Relative	Revit	UNMC
UNMC-BLDG3-Existing.rvt	Relative	Revit	UNMC

Coordination Protocols

Coordination Schedule & Milestones

See attached project schedule as confirmed by the project team on Nov 6, 2020.

Data Exchange & Coordination Protocols

The following process maps describe standard processes for coordinating model-based information among project participants at key milestones. The milestones at which these activities will occur is defined in the project schedule.

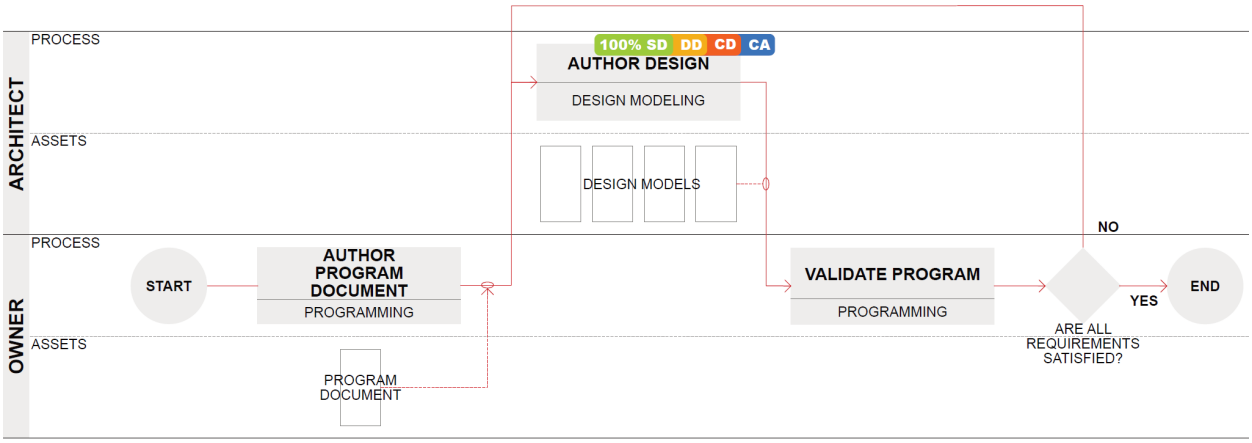
The following participants should consider their involving in these processes as follows:

- **Project Managers** *(owner, architect/engineer, and contractor*) – Account for the activities to occur within project schedule and staffing assumptions.
- **BIM/VDC Managers** *(owner, architect/engineer, contractor)* – Coordinate your procedures and activities respecting the recommended processes outlined in this BIMxP.

7 – Information Exchanges & Digital Deliverables

Programming

Spatial Analysis Validation



Process Diagram 1

Goal – A repeatable and streamlined workflow for procuring, integrating, managing, and validating owner space program data within a model-based programming and design process.

Deliverable – Architect/Engineer shall deliver design models that contain the following information:

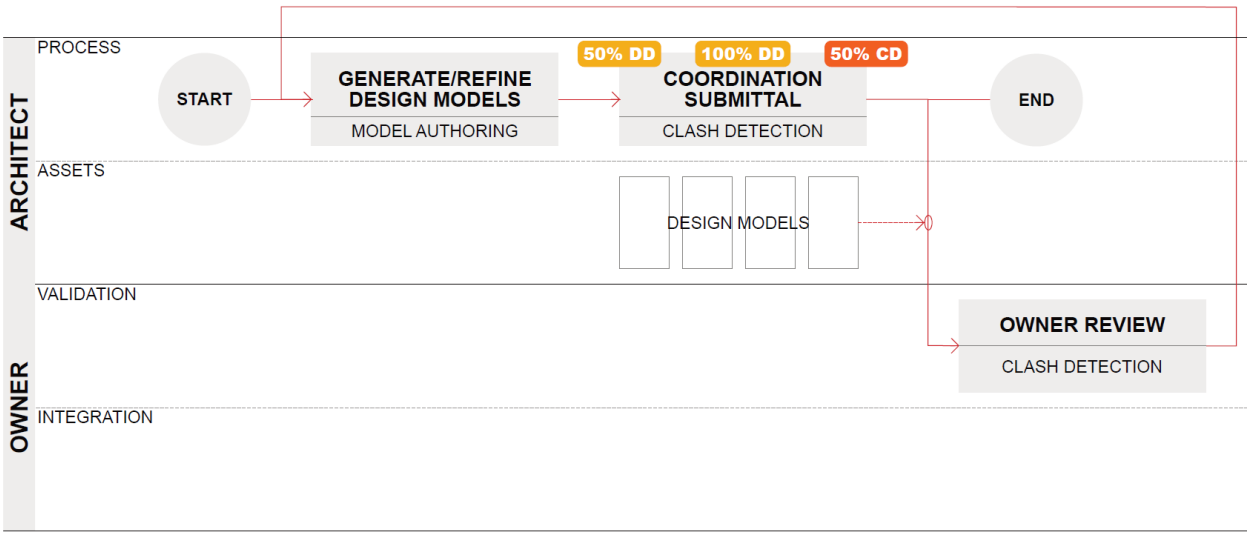
- Rooms contain accurate space use codes
- Rooms contain original program area value
- Room area as currently designed

Validation – UNMC will utilize model harvesting technology to automatically review any changes in the proposed room areas and notify the architect/engineer of any adjustments needed.

Requirement	SD	DD	CD	CA
Spatial Analysis Validation *+100% SD and DD submissions shall only be required if the project requires Spatial Analysis Validation.* **90% CD submission shall be in coordination with FM Integration (Design).* ***100% CA submission shall be in coordination with FM Integration (Closeout).*	100% +	100% +	90% *	100% **

Design

Clash Detection



Process Diagram 2

Goal – A repeatable and streamlined workflow performing model-based coordination and clash detection during design stages and among project design stakeholders.

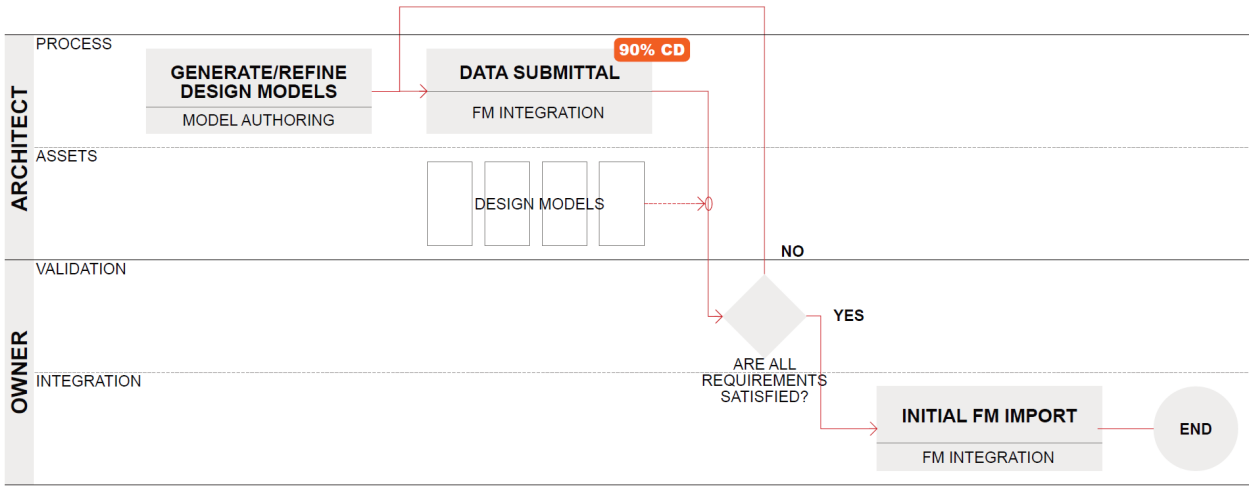
Deliverable – Architect/Engineer shall deliver a report summation of current coordination efforts within the design team including:

- Major clashes across disciplines as detected by the project's model coordination platform
- Assigned action items including responsible party and deadline for correction

Validation – UNMC will review the coordination progress and identify focus areas, if needed.

Requirement	SD	DD	CD	CA
Clash Detection (Design)	-	50% 100%	50%	-

FM Integration



Process Diagram 3

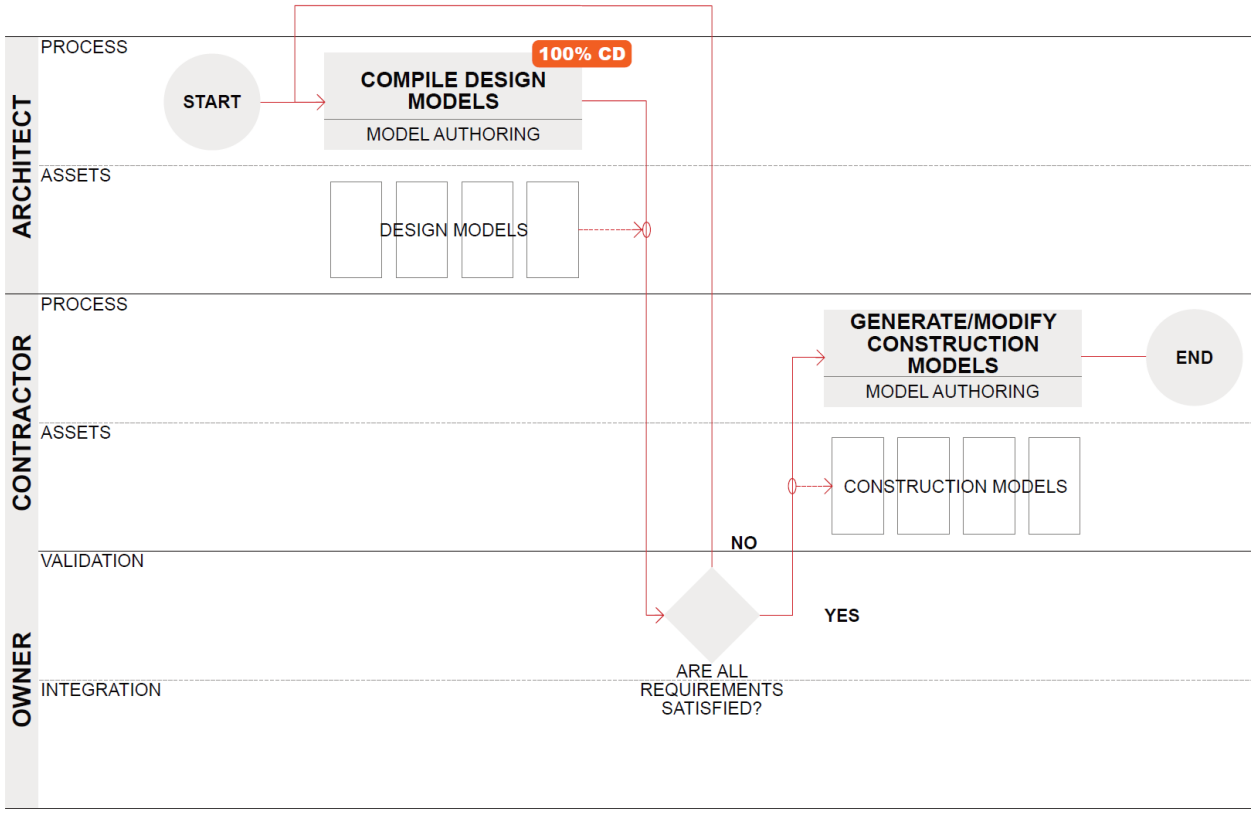
Goal - A repeatable and streamlined workflow for testing and verifying the project BIM data for future FM integration during the design stages.

Deliverable – Architect/Engineer shall furnish design models with accurate model geometry and data that satisfies all sections of the BIM Standards & Guidelines document.

Validation – UNMC will utilize model harvesting technology to analyze the completion and accuracy of all modeled elements' parameter information. Any missing or incorrect information shall be corrected and furnished by the architect/engineer before the deliverable is accepted.

Requirement	SD	DD	CD	CA
FM Integration (Design)	-	-	90%	-

Model Handoff



Process Diagram 4

Goal - A repeatable and streamlined workflow for transferring building information models from the architect/engineer to the owner.

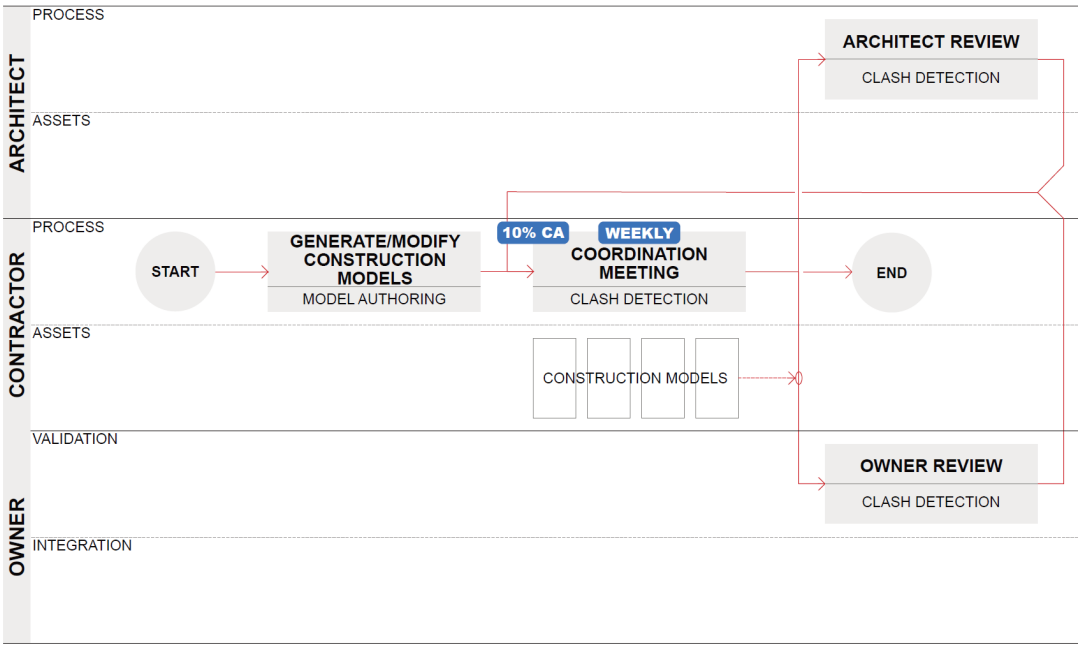
Deliverable – Architect/Engineer shall furnish design models with accurate model geometry and data for reference by the project's contractor for pre-construction processes.

Validation – UNMC will review the models for accuracy.

Requirement	SD	DD	CD	CA
Model Handoff (Design)	-	-	100%	-

Construction

Clash Detection



Process Diagram 5

Goal – A repeatable and streamlined workflow performing model-based coordination and clash detection during construction stages.

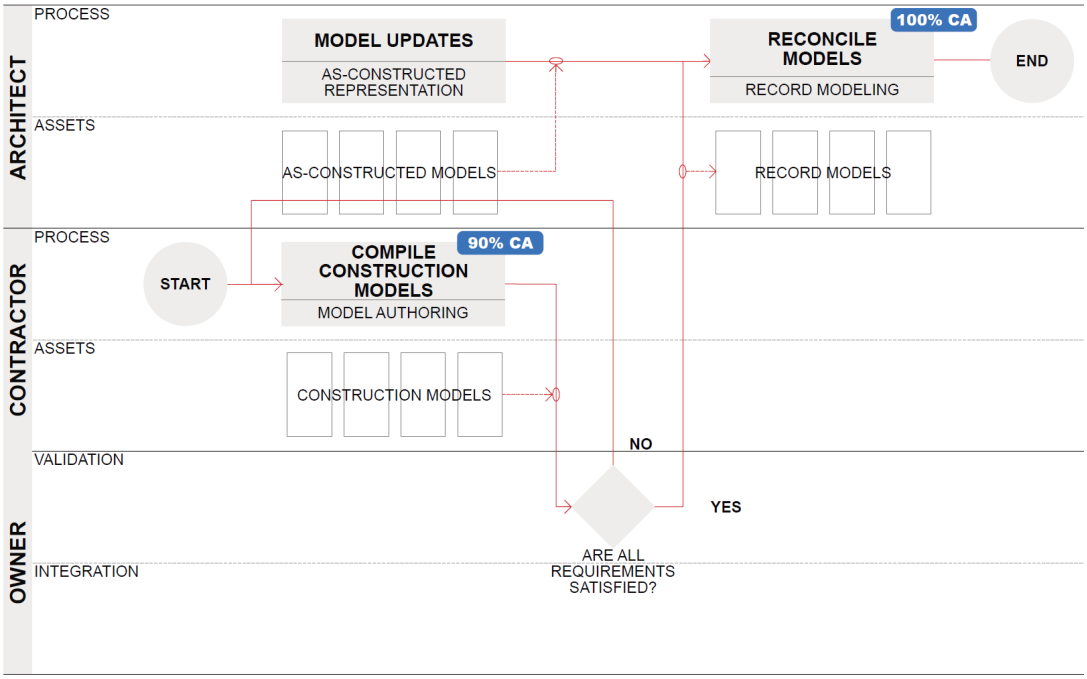
Deliverable – Contractor shall deliver a weekly report summation of current coordination efforts within the construction team including:

- Major clashes across trades as detected by the project's model coordination platform
- Assigned action items including responsible party and deadline for correction

Validation – UNMC and Architect/Engineer will review the coordination progress and identify focus areas, if needed.

Requirement	SD	DD	CD	CA
Clash Detection (Construction) **Coordination review shall occur weekly.*	-	-	-	10+% *

Model Handoff



Process Diagram 6

Goal – A repeatable and streamlined workflow for transferring building information models among contractor, architect/engineer, and owner during construction stages.

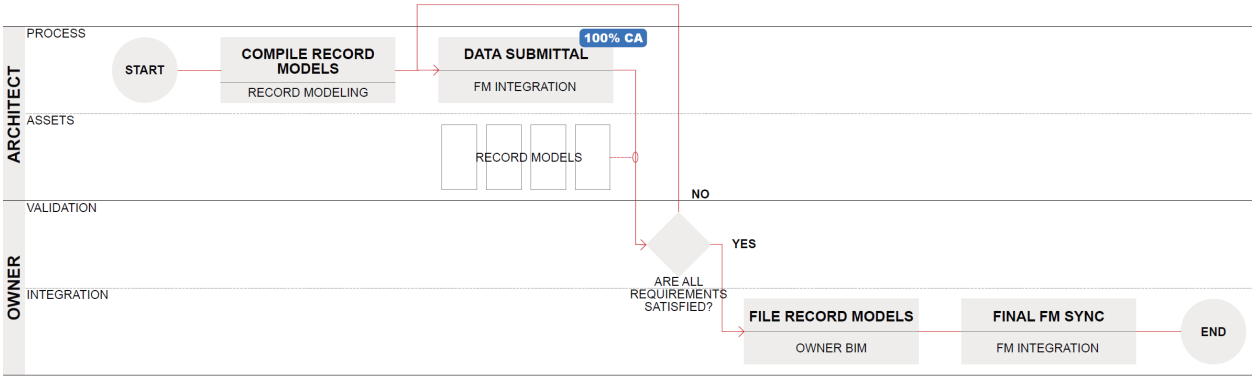
Deliverable – Contractor shall furnish construction models with accurate model geometry and data for reference by the project's architect/engineer for record modeling purposes.

Validation – UNMC will review the models for accuracy.

Requirement	SD	DD	CD	CA
Model Handoff (Construction)	-	-	-	90%

Closeout

FM Integration



Process Diagram 7

Goal - A repeatable and streamlined workflow for integrating building information models with the owner's facilities management system at project closeout.

Deliverable – Architect/Engineer shall furnish record models that have reconciled the architect/engineer's as-constructed data, the contractor's construction data, and physical conditions. This model shall contain geometry and data that satisfies all sections of the BIM Standards & Guidelines document.

Validation – UNMC will utilize model harvesting technology to analyze the completion and accuracy of all modeled elements' parameter information. Any missing or incorrect information shall be corrected and furnished by the architect/engineer before the deliverable is accepted.

Requirement	SD	DD	CD	CA
FM Integration (Closeout)	-	-	-	100%

8 – Output Format Requirements

Model List

The following represents a complete list of Building Information Models used in this project. Each model should comply with naming standards defined in the UNMC BIM Guidelines (see Exhibit B)

File name	File Type	Discipline	Author
21400-BLDG-EXAMPLE LAB-ARCH-V20.RVT	Revit 2020	Arch	FIRM1
21400-BLDG-EXAMPLE LAB-STRUCT-V20.RVT	Revit 2020	Struct	FIRM2
21400-BLDG-EXAMPLE LAB-MEP-V20.RVT	Revit 2020	MEP	FIRM3

EXHIBIT A – Extended Project Team Contact

Structural Engineer – [Organization Name]

Role	Name	E-Mail	Phone
Project Manager			
Project Engineer			
BIM Manager			
Model Manager Lead			

Mechanical Engineer – [Organization Name]

Role	Name	E-Mail	Phone
Project Manager			
Project Engineer			
BIM Manager			
Model Manager Lead			

Plumbing Engineer – [Organization Name]

Role	Name	E-Mail	Phone
Project Manager			
Project Engineer			
BIM Manager			
Model Manager Lead			

Electrical Engineer – [Organization Name]

Role	Name	E-Mail	Phone
Project Manager			
Project Engineer			
BIM Manager			

Role	Name	E-Mail	Phone
Model Manager Lead			

Civil and Landscape – [Organization Name]

Role	Name	E-Mail	Phone
Project Manager			
Project Engineer			
BIM Manager			
Model Manager Lead			

EXHIBIT B – Model Use Definitions

Model Uses mandated for the project have direct correlation with the deliverables and BIM quality checks. Each Model Use describes how the Owner wants the design and construction team to utilize the model and model data throughout the Project.

The following is a list of Model Use definitions common in projects where BIM is utilized. These definitions - when correlated with the contractual responsibilities of project participants - indicate the expectations for how a participant's model can be used to facilitate project activities.

Source: http://bimexcellence.com/model-uses/

Model Use	Definition
2D Documentation	A Model Use representing how 2D Drawings are extracted from information-rich 3D models. 2D Documentation typically include 2D plans, 2D section, 2D elevations and 2D details
3D Detailing	A Model Use representing how three-dimensional details are extracted from information-rich 3D models. 3D Detailing typically include hybrid 2D-3D annotated views
Accessibility Analysis	A Model Use where 3D models are used to assess whether a Facility allows direct (unassisted) or indirect access for people with disabilities, or special needs such as vision, hearing and mobility impairment
As-constructed Representation	A Model Use where 3D models are generated to serve as temporary As-Built Models or more permanent Record Models. As-constructed Representation are based on either manual means (e.g. using a tape measure) and/or semi-automated processes (e.g. Laser Scanning)
Asset Procurement	A Model Use where 3D models are used to manage the procurement of operational Assets (e.g. replacement parts and Furniture, Fixtures and Equipment). Asset Procurement includes valuation, negotiations, tendering, purchasing, leasing, long-term hiring, stock-take, and asset disposal…Also refer to Asset Acquisition
BIM/FM Integration (BIMFMI)	A Model Use representing the integration of BIM technologies and processes with Facility Management deliverables, databases and workflows
BIM/GIS Overlapping	A Model Use representing how BIModels are used to populate and/or integrate with Geographic Information Systems
Clash Detection	A Model Use representing the use of 3D Models to coordinate different disciplines (e.g. structural and mechanical) and to identify/resolve possible clashes between virtual elements prior to actual construction or fabrication. Also refer to Clash Avoidance
Code Checking & Validation	A Model Use representing the process of inspecting a file, document or BIModel for compliance against predefined specifications or established design, performance or safety codes. Also refer to Model Validation
Conceptualization	Conceptualization is a Model Use allowing the initial investigation of design possibilities and spatial requirements. Conceptualization occur during the Conceptual Design sub-phase and may utilize specialized Spatial Analysis Tools
Constructability Analysis	A Model Use where the 3D model is used to review construction processes/methods during the Design Phase. The aim of Constructability Analysis is to identify potential obstacles, design flaws, schedule delays and cost overruns
Construction Planning	A Model Use where the BIModel is used to plan, organise or test construction activities against constraints (e.g. time, human resources and materials)…Also refer to Construction Management

Cost Estimation	A Model Use representing how 3D models are used to generate feasibility studies and compare different budgetary options
Design Authoring	A Model Use representing the process of developing Generative Models or Parametric Models for design exploration, design communication and design iteration purposes. Design authoring is a key BIM activity leading to model-based 2D Documentation, 3D Detailing and other model-based deliverables
Egress and Ingress	A Model Use where 3D models are used to simulate individual/crowd behaviour within a Facility, either during normal operations or during emergency situations. Egress and Ingress simulations assist in identifying and improving access, circulation and exit routes...See also Disaster Planning
Field BIM	A Model Use representing how 3D models and related databases are accessed in the field (i.e. on the construction site). Through a tablet, laptop, smart phone or wearable equipment, the user would inspect designs, send requests for clarifications, mark drawings/models, complete a checklist, report an issue, or conduct information-rich, site-based activities
Handover and Commissioning	A Model Use representing how 3D models are used to bridge Construction Phase deliverables with Operation Phase requirements. Handover and Commissioning comprises the documents (e.g. manuals, certificates and warranties) to be submitted, and activities to be completed (e.g. testing and operational training) before an asset (or asset component) is transferred from its builder/supplier to its owner/operator
Quantity Take-off	A Model Use representing how 3D models are used to calculate the quantity of Furniture, Fixtures and Equipment or building materials for the purpose of generating Cost Estimates
Selection and Specification	A Model Use representing how 3D models are used for elemental/material identification, selection, specification and procurement
Space Management	A Model Use where 3D models are used to manage the occupancy of rooms and spaces within physical assets. Space Management is a subset of Asset Management
Space Programming	Space Programming is a Model Use where the 3D models are used to investigate the client's spatial requirements. Space Programming occur during the Conceptual Design sub-phase and may utilize specialized Spatial Analysis Tools
Spatial Analysis	A Model Use representing the utilization of 3D models to coordinate the placement of objects and account for their spatial requirements (e.g. access panels and keep-clear areas) within a 3D space. Also refer to Clash Avoidance and Clash Detection
Survey	A Model Use where 3D models are used to establish the dimensional relationships, including horizontal distances, elevations, directions, and angles, on the earth's surface. Surveying is typically used to locate property boundaries, generating maps and establishing construction layout
Visual Communication	A Model Use where 3D models are generated or enhanced for the purposes of communicating visual, spatial or functional qualities through renderings, fly-throughs, scenography and holography

EXHIBIT C – BIM Standards & Guidelines

BIM Standards and Guidelines are a separate document and can be located at [LINK].

EXHIBIT D – Process Diagrams

Process Diagrams (as referenced in *Section 6 – Coordination Approach*) are a separate document and can be located at [LINK].