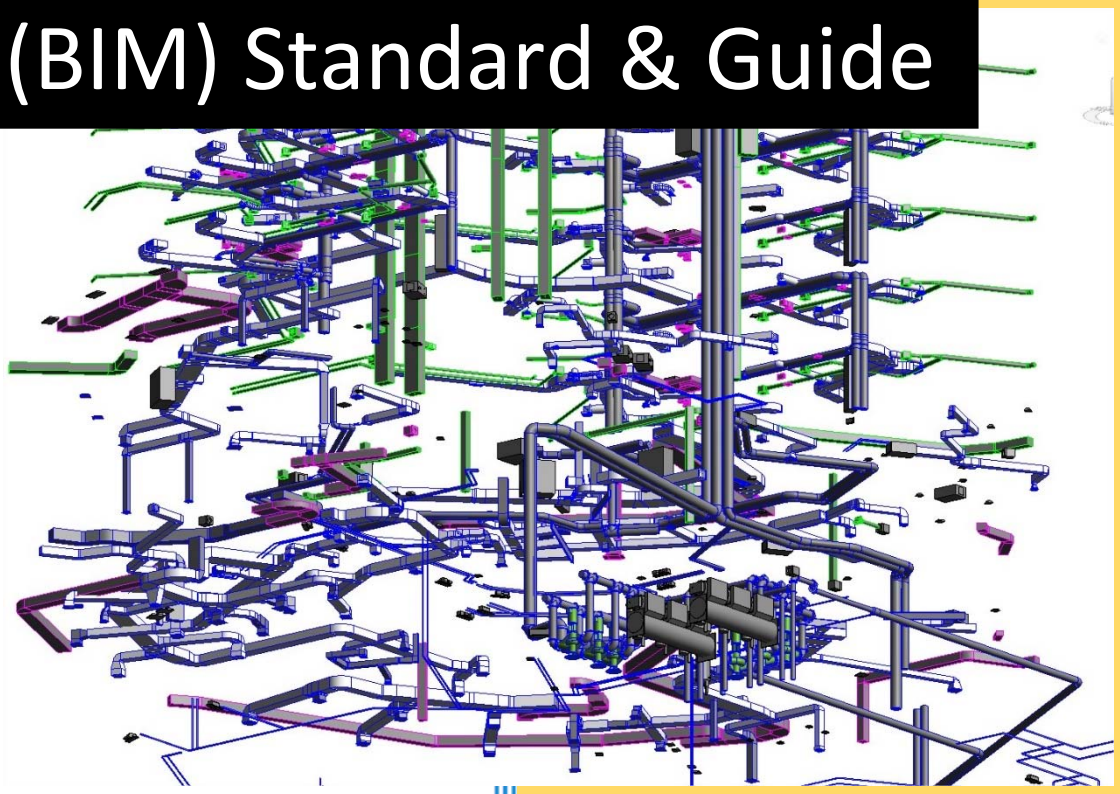
Building Information Modeling (BIM) Standard & Guide



FIU | FLORIDA INTERNATIONAL UNIVERSITY

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INTRODUCTION

In promoting the use of Building Information Modeling (BIM) 3D technology, Florida International University (FIU) has created this BIM Standard to define the Design and Construction BIM scope of work and the university's operational intent for data usage when using BIM on new FIU Construction projects, major renovations and other projects. It is the University's hope that by creating this Standard, they will continue to encourage further industry adoption of building information modeling both on the professional and academic level, and to allow the University's Facility Management Department to achieve cost savings from BIM by making it easier for management personnel and future design and construction teams to access information about the buildings from the technology.

BIM will be used as a tool to improve quality, cost and schedule by assisting in the coordination of trades, reducing field conflicts and improving the overall design and construction process. In creating this Standard, the University, its Consultants and local market BIM experts explored options in the implementation of building information modeling to determine optimum practical strategy. This Standard is a reflection of the teams work and will be reviewed periodically to ensure that it is reflected of current best practices.

This Guide will be incorporated by reference into FIU design and construction project contracts and annual contracts.

Intent:

It is FIU's intent to use BIM on all design and construction projects in the future and to reuse design and construction BIMs and data for facility lifecycle management, capital planning, future alterations, additions and renovations. To achieve this end, the BIMs must be structured to achieve this desired purpose and the FIU BIM Standard will require that all design and construction deliverables for the projects be created and derived from building information models.

BIM Goals:

- ✓ To maximize the value of BIM for the University;
- ✓ BIM as an initial planning and program validation tool;
- ✓ BIM as a visualization tool for campus master planning;
- ✓ BIM as a visualization, coordination and communication tool during design, construction and facility operations;
- ✓ BIM as a resource for the design and construction of future alterations to buildings;
- ✓ BIM for constructability and maintainability review to minimize change orders;
- ✓ BIM for collecting and exchanging facility data through the use of an open standard, the Construction Operations Building information exchange (COBie), from design through construction to facility operations;
- ✓ To use FIU BIMs as case studies for educational curriculum.

Additional goals and uses of BIM exist, and if so required, will be detailed in the RFP, RFQ, Contract and /or BIM Project Execution plan (BIMPxP).

BIM Uses:

Throughout the design, construction and operations process, various FIU departments and user groups will be reviewing the BIMs and verifying that the model content is accurate and up to date and that FIU BIM protocols are being followed. These stakeholders have various needs and uses for the BIMs.

The following is a list of FIU's BIM Expectations by Department:

- Planning Department

  The BIMs may be used for:

  - ✓ Space Planning & Visual 3D Analysis
  - ✓ Way finding
  - ✓ Feasibility studies
  - ✓ GIS data input management
  - ✓ Campus Master Planning
  - ✓ Evaluation of sites for new buildings
  - ✓ Design of spaces between buildings including circulation routes, utilities, landscape and hardscape
  - ✓ Management of campus-wide 3D information for utilities and civil engineering infrastructure elements.

- FIU Construction Project Manager

  The BIMs may be used for:

  - ✓ Pay application justification
  - ✓ Change Order clarification
  - ✓ Design for Maintenance Reviews
  - ✓ Clash Detection and Coordination
  - ✓ Construction staging and Phasing Plan Approval
  - ✓ Scheduling

- Facilities Management Operations Department

  The BIMs may be used for:

  - ✓ Design for Maintenance Reviews
  - ✓ Preventative Maintenance
  - ✓ Corrective Maintenance
  - ✓ Scheduled Inspections
  - ✓ Asset Management
  - ✓ Inventory
  - ✓ Visualization
  - ✓ Schematic Diagram of Systems

IT Department

The BIMs may be used for:

- ✓ Information Data Exchange from BIM to Maximo FIU's Facilities Computerized Maintenance Management System via COBie.

- ✓ Security Camera Layout
- ✓ Access Controls

- o Academic Space Planning

  The BIMs may be used for:

  Area Calculations

  Room Classifications

  User Groups:

  The BIMs may be used for:

  Review of Program and space layout, access, design reviews.

BIM output can be utilized in a variety of ways to provide stakeholders with a greater understanding of how a building is to be used, designed, constructed, maintained and adopted over time.

The various support activities in which BIM shall be utilized for FIU BIM projects shall be as follows:

Capital planning support:

The model may be required to support owner planning activities for capital project development. The model will be of sufficient development to assist the owner in reviewing renovation and systems requirements for future projects. Planning review may include assessment of structural, mechanical, electrical, and other systems, roofing fenestration and doors, circulation in and around the building, underground utilities, as well as shading and views.

Pre-Design and Programming

For each campus FIU shall develop Programming Requirements which shall define space and adjacency requirements to be adhered for individual projects. These requirements shall be based upon the Education Plant Survey and Campus Master Plan. As-Built Records of Existing Facilities shall be included in this documentation and provided to project teams for their use during the Pre-Design phase. Where possible, all programming and as built data provided by FIU shall be expected to be incorporated in to their design processes for reference and verification purposes.

Site Conditions - Existing Conditions and New Construction

For new construction and renovation projects, the modeling of the project site and the existing structures, shall be included in the BIM requirements. Depending upon the project site, a model of the site may be provided by FIU or by an external consultant using an approved IFC Compliant, 3D Site and Utility Modeling BIM tool. Where no model exists, the Design Team must create one.

For all projects, the modeling of existing buildings shall be performed based upon provided as-built information, with field verification or electronic measurements conducted by Project team to validate the level of accuracy.

For all existing conditions to be directly impacted, altered, or to be demolished by a proposed renovation, Project Designers shall model those conditions to the appropriate level of detail that will clearly demonstrate the design intent to building stakeholders, other Project Team Members, and construction trades directly involved with executing this change.

Proposed site conditions shall reference campus benchmarks, and reference existing surveys. New site and utility conditions shall be modeled in 3D, and shall coordinate system and spatial models three dimensionally. Where other systems are directly impacted by landscape features (i.e. vegetation, irrigation), those elements shall be modeled with correct size and clearance requirements in BIM.

Architectural Model - Spatial and Material Design Models

The Architectural Spatial model evolves during the design process, and the information modeled in BIM shall be further refined as a project progresses toward construction. In the early phases of design, an Architectural Model may be as simple as a massing model validating program requirements, basic geometries, and building orientation to climate and site conditions.

As the design progresses, design options shall develop and need to be clearly documented and delineated in the Model. Likewise, as materials and components are selected, generic assemblies shall be assigned material properties, sizes, track LEED values, and other specific component information to clearly define various building features such as walls, floors, roofs, doors and windows. Program space requirements shall be modeled in the spatial model and validated using schedules and other validation tools designated by the Department for the specific project.

Space and Program Validation

The Design Team shall implement an iterative BIM-enabled process to validate their adherence to the Program in terms of Space and Equipment. That process can be established using the BIM authoring software being used to produce the design, or it can be done using specialized Program Validation software that utilizes the Design BIMs to validate adherence to the program. The Design Team shall disclose the specifics of what software and format(s) will be used to perform Program Validation when putting together the Design BIMPxP. Continued validation of the program and project requirements are required as part of the BIM deliverable.

Design Visualization

Design Visualization refers to animations, fly-throughs, real-time walk-throughs, augmented reality, static 3D renderings, 4D, and 3D Physical Models exported directly from a BIM Authoring Tools. The BIMs shall be used to communicate the intent and workability of the proposed design solutions in various ways and through various means to project stakeholders including FIU project managers, end users, maintenance staff and financial stakeholders. For example, maintenance managers may review maintenance clearances for air handlers in mechanical rooms and for VAV boxes above ceilings. FIU encourages the Design & Construction Teams to find efficient and effective ways to communicate their intent using BIM. At a minimum, the BIMs shall be used for design reviews, submittals, and construction documents.

The Design and Construction Teams shall identify what specific means of visualization will be used for design review and review submittals when putting together the BIMPxP. Those means may include, but would not be limited to, the following:

- ✓ Images (Screen Shots, Renderings)
- ✓ Animations (Fly-through, Panoramic immersion)
- ✓ Federated BIMs in a Read-only format. It is the Design & Construction Team's responsibility to make a free viewer available to the user.

Special consideration shall be given to security, safety and maintenance issues. At a minimum visualization strategies shall be used to help analyze the following areas and needs:

- ✓ Egress and other life safety related circulation
- ✓ ADA Accessibility
- ✓ Serviceability of equipment
- ✓ Building Security (Access Control & Surveillance)
- ✓ Daylight and artificial light levels
- ✓ Crime Prevention through Environmental Design (CPTED)

It should be noted that even though the BIMs contain most of the source information needed for visualization, they may require further refinement in specific animation and visualization software to accomplish intended results.

System Models - Structural, MEPF and Civil design

With current technology, building systems are best organized as separate BIMs. Similar to the Architectural models, the level of detail in these models shall evolve as design progresses such that these systems are accurately modeled, and include sufficient performance, clearance, and LEED requirements as part of the BIM. All underground utilities shall be 3D objects located at topographic elevations, illustrating nominal sizes and type. The Owner may wish to integrate the BIMs into an energy management system so models may be required to provide a level of development to support and analyze electronic management systems or other monitoring and control systems.

Leadership in Energy and Environmental Design (LEED) Analysis

Design Teams shall utilize energy modeling and sustainable design software that extracts BIM data in the appropriate file format for the analysis tool to perform energy simulation and life cycle cost calculations to validate their energy modeling. The Architectural model will be used as the basis of the analysis along with associated material and building system information. Proper modeling techniques shall be used with environmental parameters. The Design and Construction Teams shall disclose the specifics of what software format(s) will be used to perform the Energy Validation Analysis when putting together the BIMPxP. Energy simulation and life-cycle cost calculations shall be based upon information extracted directly from BIM technology and validated by energy modeling, whole building commissioning requirements and LEED Certification when applicable. Utilization of the Model for lighting and acoustical studies is encouraged.

Spatial Coordination & Constructability Review

Spatial coordination means coordination between systems and components in the Design & Construction BIMs appropriate to the design and construction phases. This process differs from Clash Detection in that clashes may be deemed allowable by the Design Team depending on what systems are conflicting. Clashes are not acceptable during Construction. The Design and Construction Teams shall assure constructability by using a Federated Design BIM. A constructability review meeting where the Design & Construction Teams invite FIU to participate is expected at least once during DD and CD phases and throughout construction.

4D Scheduling and Sequencing

If required by FIU, BIMs shall be linked to a scheduling application to create a virtual, visual schedule that depicts construction sequencing and activities. This 4D model will show the sequencing of activities in space and time and accounting for constraints such as procurement lead time/logistics, resources, spatial constraints, and weather among others to help improve accuracy and to better understand the schedule.

The Primary elements that FIU will require in a 4D simulation include but are not limited to:

Discipline	Minimum Required
Structural Systems	All structural framing components including foundations, grade beams, columns, load bearing walls, floor and roof decks and support
Exterior building envelope	Stud walls, Exterior Panels and assemblies, curtain walls, openings, glazing
Interior partitions	Main plumbing walls and wall assemblies
Mechanical system	Main Ductwork and Equipment, (Separated by floors)
Electrical	Main runs and Equipment, Separated by floors
Roof systems	Roof Assemblies, Major Equipment, Openings
Site work and ground plane	Excavation work, footings, foundations, on-grade Slab
Plumbing	Main Connection lines from site, main plumbing lines

5D Estimation

Cost estimation shall be prepared from the Project Team's BIM Process. The Design Team shall extract square foot and system information using BIM Authoring software and other BIM integrated tools to support comparative cost analysis and options studied. Output should be able to convert to spreadsheets.

If required by FIU, at the Schematic Design (SD) phase given the low level of development of the BIMs, it is understood that any 5D use shall be at a macro level and used as a validator for Probable Cost Estimates. As the BIMs LOD progress through the design phases, the Design Team shall use the quantities in the BIMs as a validator for their Estimates. It will be the responsibility of the Design Team to specify when they are writing the BIMPxP what method and software they will use to perform this task.

a) Planning – Probable Cost
b) SD – Probable Cost & quantity Takeoff based on Square Footage

c) DD – Probable Cost & quantity Takeoff based on available BIMs at LOD 200
d) CD – Probable Cost & quantity Takeoff based on available BIMs at LOD 300

Design for Maintenance (D4M) Review

Using a Federated BIM, the Designer and Construction teams shall demonstrate there is sufficient access to perform proper maintenance activities on building systems and their associated components. D4M reviews differ from constructability reviews as they seek to ensure that elements surrounding these components do not hinder accessibility to safely perform scheduled or corrective maintenance activities.

The schedule of when these reviews take place will be defined in the BIMPxP, but at a minimum the Design and Construction Teams will incorporate them into constructability reviews. Reviews should address access at a minimum: all asset types requiring COBie data set deliverables. Although some elements may be closely located to components, FIU may deem the restricted clearance allowable. This shall not be in conflict with any code required clearances. D4M Review meetings where the Design & Construction Teams invite FIU Facilities Management Group are expected at least once during DD and CD phases and at least once during construction.

Shop Drawings, Sleeve Drawings and Fabrication

a) Shop drawings
Shop Drawings shall be produced directly from the construction BIMs. No parallel 2D process will be accepted without prior approval.
b) Sleeve Drawings
Sleeve drawings for cast-in-place or precast systems shall be produced after BIM Coordination is completed for the area of construction requiring the sleeve drawings.
c) Fabrication & Preassembly
Whenever possible the Construction Team shall use the Construction BIMs to fabricate or preassemble their systems.

BIM in the field for Installation

The GC shall take measures to assure that what is being installed at the field is what was agreed upon on the Coordinated Federated Construction BIM. Any deviations must be documented as updates to the BIMs and the party responsible for resulting conflicts will be liable for costs associated with such deviations.

REQUIREMENTS

BIM is mandated on all construction projects (new and additions/ alterations, building utility) with a total project funding of $2 M or greater.

BIM is mandated on all construction projects regardless of size if the project has already been designed in a BIM platform. This includes remodeling and renovation projects.

BIM is preferred on all other projects.

Sustainable design principles and LEED Credit Documentation shall be included in the BIMs to analyze, document and verify project goals.

BIM Technology can and should be used when applicable to develop and establish a baseline performance. Analytic tools include but are not limited to building envelope, orientation, daylighting, energy consumption, renewable energy, space/ program validation and life-cycle cost analysis. Acoustic modeling may be required for specialized rooms such as lecture halls, auditoriums and theaters.

Building information models shall be created that include all geometry, physical characteristics, and product data needed to describe the design and construction work. All drawings and schedules required for assessment, review, bidding, and construction shall be derived from these models either directly (as in schedules, floor plans, etc.) or indirectly (as may be the case with details).

General Overview of Deliverables

Milestones	Deliverable
Contract Award	Final BIMPxP
Conceptual Schematic Phase	Architectural Massing Model Preliminary Energy/ Solar Orientation Analysis
Advanced Schematic Design Phase	Architectural Model Schematic Energy Model Program & Space Validation Massing Model Civil Model COBie Data
Design Development	Architectural Model Civil Model(s) MEP Model(s) Structural Model Program Validation Report Discipline Interference Reports Sustainable Design & LEED Credit Documentation COBie Data
Construction Documents	Architectural Model Civil Model MEP Model(s) Structural Model Pre-bid Collision Report Phasing Models (if applicable) COBie Data
Bidding	Federated Model Design BIMPxP
Construction Phase	Coordination Models Collision Reports Architectural MEP/ FP Models

	Structural Models Fabrication Models (if applicable) Phasing Models COBie Data
Project Close-out	Record Model - Architect As Built Model - Contractor Record Documents Project Drawings O &M Manuals COBie Data

FIU requires that all design and construction deliverables for BIM projects be created and derived from Building Information Models (BIMs) and that data associated to be COBie compliant. Both Native File and IFC File Formats may be required as a final deliverable

All BIMs regardless of software shall be the same scale and in imperial units.

At regular predetermined intervals throughout the design and construction phases FIU will require the Design & Construction Teams to submit individual BIMs, Federated BIMs, drawings, documents and COBie files as contract deliverables. These deliverables are complements to the typical 2D deliverable usually expected from the Design & Construction Teams at each regular project milestone or phase. Project specific deliverables will be further defined in the BIM Project Execution Plan (BIMPxP).

Two dimensional (2D) documents

To promote efficiency and continuity, the 2D construction documents must be extracted directly from the Design BIMs and both the BIMs and the 2D Deliverables will be integral parts of the contract documents. Two dimensional details, enlargements, General Notes, externally-generated Schedules, and specifications will take precedence over the Design BIMs.

FIU expects 2D Deliverables, namely Site Plans, Plans, Sections, Elevations and the Schedules typically found in construction documents to be extracted directly from the BIMs. The BIMs shall include all elements and information needed to produce Permit Documents for Design Intent, Shop Drawings for Construction installation, Record BIM As-Built, and COBie data sets.

2D CAD drawing information for the purposes of assembling a printed set of plans shall be derived from the BIM(s) to the fullest extent possible. All BIM information shall be fully parametric so that all applicable information regarding fixtures and/or elements can be generated for the schedules.

Ownership & Reuse:

The Model Files are considered the intellectual property of the Model authors. Sharing of the Models does not affect the Model author's copyright or intellectual property rights in any way.

Upon receipt of any deliverable, Florida International University has and will maintain ownership of all CAD files, BIM and Facility Data developed for the project.

The Owner will have unlimited use of the Design, Construction and Data Models produced for the Project. The Owner acknowledges that the Design, Construction and Data Models are an Instrument of the Designer's or Contractor's Service and that the author of the Models does not represent or

guarantee that the Models will be useful to the Owner for any purposes beyond those uses that they were authored for.

BIM Execution Plan

The BIM Execution Plan is a living document that will continue to mature over the course of project deliverable and milestones.

The National Building Information Modeling Standard- United States (most current version at contract award) shall be used as the basis of the BIMPxP. The BIM protocols, roles and responsibilities customized for the needs of each project requiring BIM will be addressed in the BIMPxP of the Design & Construction Teams. No more than thirty (30) days after the contract is awarded, a project-specific BIMPxP shall be developed. FIU will review the BIMPxP and make comments and suggestions. The Design & Construction Teams will then have two (2) weeks to incorporate and adopt said changes.

The Architect and Contractor must each submit a BIMPxP that includes roles and responsibilities of the teams demonstrating a high level of project integration and process workflow. The BIMPxP shall be developed jointly with both Architect and Contractor when feasible and as early on in the project as possible.

Upon Contractor or CM selection a Joint BIM Project Execution Plan (JBIMPxP) must be created and will become the final BIMPxP. All parties including the Architect, Engineers, Contractors, Trades, Owner and any Consultants affected by its content must agree with signature to the JBIMPxP and will be held accountable for its content and execution.

At a minimum the BIMPxP and JBIMPxP should address the following:

- BIM Project Execution Plan Overview
- Project Information
- Key Project Contact
- Project Goals / BIM Uses
- Organizational Roles / Staffing
- BIM Process Design
- BIM Information Exchanges
- BIM and Facility Data Requirements
- Collaboration Procedures
- Quality Control
- Technological Infrastructure Needs
- Model Structure
- Project Deliverables
- Delivery Strategy / Contract

Model Progression Schedule

A Model Progression Schedule shall be used as a tool to help Model Contributors throughout the Design, Construction and Operation phases understand what should be included in the BIMs when at each project milestone. The MPS shall be based on the CSI's OmniClass Table 22 Work Results, formerly known as MasterFormat, the version currently in the NIBMS-US Standard. It shall be the responsibility of

the Design & Construction Teams to tailor the MPS to meet the requirements of this standard and their project-specific needs. An MPS shall be submitted along with the BIMPxP for review by FIU. You will find a sample MPS in the Appendix of this document.

LOD vs. Level of Detail

When talking about ***Level of Detail*** one generally refers to an object, while ***Level of Development*** is generally referred to when evaluating the reliability of the information contained in a building system or a discipline as relevant to a specific BIM Use Case. For example, a low level of detail object can be part of an LOD 500 BIM. For the purposes set forth in this standard LOD will always mean Level of Development. FIU will adopt the definitions established by the BIMForum's 2013 Draft LOD Specification.

LOD Definition

The AIA describes the concept of LOD as an identification of the "…specific minimum content requirements and associated Authorized Uses for each Model Element at [six] progressively detailed levels of completeness."

Following are the Fundamental LOD Definitions:

- LOD 100 – Conceptual
  "The Model Element may be graphically represented in the Model with a symbol or other generic representation, but does not satisfy the requirements for LOD 200. Information related to the Model Element (i.e. cost per square foot, tonnage of HVAC, etc.) can be derived from other Model Elements."
- LOD 200 – Generic Placeholders
  "The Model Element is graphically represented within the Model as a generic system, object, or assembly with approximate quantities, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element."
- LOD 300 – Specific Assemblies
  "The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation. Non-graphic information may also be attached to the Model element."
- LOD 350 – Hybrid of Specific & Detailed Assemblies
  "The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of size, shape, location, orientation and interfaces with other building systems. Non-graphic information may also be attached to the Model Element."
- LOD 400 – Detailed Assemblies
  "The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of size, shape, location, quantity, and

orientation with detailing, fabrication assembly, and installation information. Non-graphic information may also be attached to the Model Element."

- LOD 500 – As-Built
  "The Model Element is a field-verified representation in terms of size, shape, location, quantity, and orientation. Non-graphic information may also be attached to the Model Elements."

Model Accuracy & Tolerances:

The following tolerances apply to elements that require LOD 300 or higher.

PHASE	DISCIPLINE	TOLERANCE
EXISTING CONDITIONS MODEL	CIVIL (UNDERGROUND)	ACCURATE TO +/- (2") OF ACTUAL SIZE ACCURATE TO +/- (12") OF ACTUAL LOCATION
EXISTING CONDITIONS MODEL (ACCESSIBLE ITEMS)	ARCHITECTURAL STRUCTURAL MEPFP	ACCURATE TO +/- (1/8") OF DESIGN INTENT SIZE ACCURATE TO +/- (2") OF DESIGN INTENT LOCATION
DESIGN DOCUMENT MODELS	CIVIL ARCHITECTURAL STRUCTURAL MEPFP	ACCURATE TO +/- (1/8") OF DESIGN INTENT SIZE ACCURATE TO +/- (2") OF DESIGN INTENT LOCATION
SHOP DRAWINGS MODELS	CIVIL INTERIORS ENVELOPE STRUCTURAL MEPFP	ACCURATE TO +/- (1/16") OF ACTUAL SIZE ACCURATE TO +/- (1") OF ACTUAL LOCATION
AS-BUILT MODELS	INTERIORS NOT RELATED TO CODE	ACCURATE TO +/- (1/8") OF ACTUAL SIZE ACCURATE TO +/- (2") OF ACTUAL LOCATION
AS-BUILT MODELS	INTERIORS RELATED TO CODE	ACCURATE TO +/- (1/8") OF ACTUAL SIZE ACCURATE TO +/- (1/4") OF ACTUAL LOCATION
AS-BUILT MODELS	CIVIL INTERIORS ENVELOPE STRUCTURAL MEPFP	ACCURATE TO +/- (1/16") OF ACTUAL SIZE ACCURATE TO +/- (2") OF ACTUAL LOCATION

General Information

FIU currently uses Autodesk Products and mandates the use of Revit and Naviswork for BIM projects for quality assurance for a final deliverable.

In keeping with the spirit of transparent and open workflows, the University has adopted an open standard for data exchanges using COBie.

Design and Construction teams that use software other than Revit and Navisworks must assure data integration, quality of information, and interoperability with FIU's databases. The Design and Construction teams must provide the University with access and visibility to the BIMs during all phases of the project, while ensuring COBie compliance.

Project Teams must get approval when using products other than the following software: Revit, Civil 3D and Navisworks. Project teams will be required to show that they have previous experience with the software and IFC conversions on past projects with references and that they can meet the BIMs and data exchange requirements that are outlined in this Standard.

Software

It is the responsibility of both the Design Team and Prime Contractor to have or obtain, at their cost, the trained personnel, hardware, and software needed to successfully use BIM for the project. Equipment used by the subcontractors during the on-site coordination meetings must meet the requirements of the software being implemented so as not to cause delays in modeling. All technical disciplines shall be responsible for their data integration and data reliability of their work and coordinated BIMs.

Compatibility: Software used for Design and Construction team shall be compatible and be Industry Foundation Class (IFC) certified as needed for IFC deliverables.

Data Exchange Open Standards: To ensure the life-cycle use of building Information and interoperability between BIMs using competing but approved software, FIU allows that data be exchanged in IFC where applicable.

IFC Certification: BIM authoring software shall be certified to the latest release of the Industry Foundation Class (IFC) performed by the buildingSMART International. A list of IFC certified software can be found at http://www.buildingsmart.org/compliance/certified-software/

IFC - The IFC files must come from IFC certified software for export and be the IFC Coordination View (2x3). The coordination view shall contain:

a) Building spatial structure
b) Building elements and spaces with their semantic information
c) IFC Property sets as well as native properties

Approved vendors: FIU requires parametric, object oriented software applications that are able to be used in a collaborative environment. All software platforms used for FIU projects shall be compliant with:

- Where required, the most current version of Industry Foundation Class (IFC) certified by building Smart International
- Commercially available collaboration software that provides interoperability between the different software applications (ex. NavisWorks or equal).
- Traditional 2D documentation shall be prepared BIM authoring software and plans, elevations, sections, schedules, and details shall be derived and fully coordinated with the coordinated building model.

Versions

Versioning of software shall be managed by the BIM teams throughout the project lifecycle. The version number of any software to be used including collaboration software (e.g. Revit, Navisworks, etc.) must be announced at the start of the project and must be maintained throughout the project close-out unless the team as a whole agrees to upgrade to a newer version. The versioning of software must be identified in the BIMPxP.

Geo - Reference

The Architects will set the spatial coordinates at the beginning of the project. The coordinates will be accurately geo-referenced to a permanent campus monument. This will be coordinated between the Civil Engineer, the Architects and FIU. It is the Architects responsibility to verify the accuracy of the coordinates and to provide a grid intersection at 0, 0 for all other team members.

Datum: All objects in models are to be modeled at true scale and at true elevation above sea level in accordance with the datum to be provided by Florida International University.

Project North

Definitions: For the purpose of specifying horizontal locations and orientations of objects in models and drawings the following definitions apply:

True North: Orientation of objects in a model or a drawing in accordance with the geographical North orientation. Locations have the correct coordinates in accordance with the state plane coordinate system of Florida.

Project North: Objects in a model are oriented for convenience of the modeling and drafting process. Project North is one defined orientation and location of the building defined by the Architect-Engineer and followed by all project participants. Project North must be defined in terms of its rotation angle relative to true North to at least 8 decimal places.

Project North: All models and documents shall follow the Project North orientation and location.

File Sharing Platform

The Model Files are considered the intellectual property of the Model authors. Sharing of the Models does not affect the Model author's copyright or intellectual property rights in any way. FIU requires the Project Team to establish an accessible file sharing platform, for common access of all BIMs. Project Teams should update the BIMs on the file sharing platform no less than bi-monthly during Design and weekly during Coordination and Construction, or as requested by FIU.

Versioning of files enables an audit trail of the modeling process and enables FIU and the team to determine which BIM's constitute the current version. FIU requires that BIMs versions be preserved through a versioning process and not overwritten. The Version Management Process (VMP) should be clearly detailed in the BIMPxP so that external reference links can be maintained.

File Structure & Naming

All Project central files and model files shall have a consistent naming convention as established by the principle design firm for discipline specific model coordination. The Design Team BIM Manager shall coordinate this activity with all sub-consultants and design disciplines.

Model views shall have a consistent naming convention as established by the Design Team BIM Manager. Consistent view naming allows for the automatic sorting of views for ease of identification. The protocol facilitates low maintenance of the view name as project conditions change throughout the Project.

Sheet Sizes and Naming Conventions

Preferred format size for Construction Drawings is 24" X 36" (Architectural "D" Size). Other sizes may be used if required and approved by FIU.

Sheet names should be descriptive of drawing content and the building discipline represented (i.e., A-1, P-1, and M-1 would be typical designations for Architectural, Plumbing, and Mechanical Drawings, respectively).

Units and Tolerances

For Project Teams using Revit: The Revit Project Units and Tolerances settings affect the way that information in the model is displayed. It does not limit tolerances of how things are modeled. The Project will utilize the Revit Project Unit settings as established by the Architect's model manager. Modifications to the settings should be made as necessary and agreed to by the Project Team.

Compensation

The use of BIM on a project should not result in increased fees, and BIM deliverables at the minimum levels of development shall be included in the basic fee as negotiated. There are items that should be reviewed by the owner prior to issuance of the request for qualification and bid document for the potential cost impact that may be associated with unique modeling and/or data requirements. Requests for additional embedded data in a model may result in additional service fees to compensate for the level of effort required. BIM deliverables at a higher LOD required by the owner shall be identified in the schedule of additional services.

The cost for purchasing BIM authoring software and training will not be compensated by the owner for the projects requiring BIM implementation. If the owner or contracting authority requires software license(s) for their use, the costs will be included as a reimbursable expense.

Additional service fees beyond the basic services may be considered for further model development and enhancement during the construction phase, but not for typical as-built or post construction documentation requirements. This remains the CM's responsibility.

Specific management or coordination requirements of contractor models may be negotiated as necessary through specific project requirements and additional services if necessary.

Construction manager requirements for BIM management and participation will be described in the request for qualifications, and will be incorporated into the construction manager's fee proposal. Contractor modeling requirements will be described within the bid documents, and will be included in the contractor's bid.

BIMS will be used by FIU to verify pay applications and invoicing from the Design and Construction Teams.

BIM Roles & Responsibilities

The Owner and Project Team roles may vary from project to project depending on the BIM experience and proficiency of that project's Design and Construction Teams. Following is an overview.

Owners Role & Responsibility

The primary role of the Owner is to monitor the BIM processes in all stages of design, construction into Operations and to insure that FIU's BIM Standard is adhered to throughout design, construction, close-out and commissioning.

Some of the Owners, or Owners representatives' responsibilities include the following:

a. FIU BIM Standard Oversight: FIU Staff and/or BIM representatives will do regular model and content checks on all Design and Construction BIM projects to ensure that FIU BIM Standards requirements are correctly being delivered and that the BIM data is COBie compliant.

b. Review, evaluate, and comment on the BIM Execution Plans (BIMPxP) provided by both the Design Team, the General Contractor and the Construction Manager and ensure that it meets with the FIU BIM Standard.

c. Conduct two BIM kickoff meetings: FIU Staff and /or BIM representative will participate in a BIM Project kick-off meeting at the start of the project with the entire Design Team including major consultants including but not limited to, Mechanical, Electrical, Plumbing, Civil and Structural, which shall be led by the Prime Consultant or its BIM representative. A second meeting will be held upon once a Contractor or Construction Manager has been selected and shall include the Design Team and the major construction trades including, but not limited to, Mechanical, Electrical, Plumbing, Fire Protection, Civil, and Structural, which shall be led by the Prime Contractor or its BIM representative.

d. Conduct BIM review meetings as necessary: FIU Staff and / or BIM Representative will coordinate and participate in BIM review meetings at all phases of design and construction. BIM reviews can include visual examination of the Federated models, model assembly, clash detection for all major trades modeled, and COBie compliance.

e. Model Handover Coordination: FIU Staff and / or BIM Representative will help facilitate the hand-over of the design BIMs to the general contractor.

f. Date Integration for Facilities Management: FIU Staff and / or BIM Representative will define the FM model / data requirements and review access and clearances to equipment that needs to be serviced and maintained.

Design Team Roles & Responsibility

Design Project Manager (PM)

The Project Manager is the ultimate point of contact for the overall project. The individual can serve as the BIM Manager if he/she has the relevant BIM experience depending on the size and complexity of the project.

Design BIM PM (BPM)

The design team shall have a dedicated Project BIM Manager that has sufficient experience for the size and complexity of the project and shall be proficient in the authoring and coordination of BIMs. This individual will serve as the main point of contact for project-related BIM & VDC information.

This Design BIM PM shall be qualified enough to implement the Design BIMPxP and interface with outside BIM stakeholders. Those stakeholders will include, at a minimum, FIU's PM and BIM Controller, but may also include various FIU end user groups, and the Contractor and its subcontractors when they are already known and are a part of the Design & Construction Teams.

COBie Coordinator

The COBie Coordinator will be responsible for the COBie process including assigning room information in the Architectural model. All other project models using room information must reference the room information assigned in the Architectural model. This will ensure the proper location information is provided in the COBie deliverable. If the case where room-naming conventions are provided by FIU, the room names must be strictly enforced in the COBie deliverables. The COBie Coordinator will collect Asset Data for export to Maximo.

Some of the Design Teams responsibilities include the following:

1. Responsible for the overall development and delivery of the Building Information Model.
2. Monitors compliance with the BIM Execution Plan and related BIM Level of ~~Detail~~ Development (LOD) Matrix.
3. Responsible for the development, coordination, publication, and verification that all BIM configurations are in place as required for the integration of the design phase and construction phase model information, elements, etc.
4. Coordinates the file management procedures and protocols for the BIMs
5. Responsible for the coordination and set-up of shared file servers to be utilized for the Model, including related access, permissions, protocols, etc.
6. Prepares, assembles, and facilitates the use of the Model for design meetings, coordination meetings, and BIM deliverables.
7. Assumes responsibility for the proper classification of all spaces, equipment, and components within the Model for COBie compliance and Maximo import.
8. Schedules, coordinates, and facilitates BIM technical meetings between all design disciplines and Owner.
9. Coordinates and facilitates the clash detection and coordination efforts among all design disciplines.
10. Determines the project BIM geo-reference point(s), and ensures that the models from all design disciplines are properly referenced and coordinated with the geo-reference point(s).

11. Primary interface with FIU Facilities Group and IT Managers for BIM data and file transfers as required at each design phase or otherwise necessary.
12. Ensures that the BIM design deliverables specified and/or required by contract are provided in accordance with the Contract Documents.
13. Ensures that the 2D project drawings and project specifications produced for bidding and construction purposes are properly derived from and adequately represent the information contained within the Model.
14. Coordinates with the Construction BIM Manager to ensure that all requirements for the final BIMs deliverables are achieved.
15. Coordinates with the Construction BIM Manager on the JBIMPxP.

Construction Team Roles & Responsibility

Construction PM (PM)

The Project Manager is the ultimate point of contact for the overall project. This individual can also serve as the BIM Manager for the project if he/she has the relevant BIM experience with the size and complexity of the project.

Construction BIM PM (BPM)

The Construction team shall have a dedicated BIM PM to the project that has sufficient experience for the size and complexity of the project and shall be proficient in the management of project BIMs. This individual will serve as the main point of contact for BIM. The Construction BIM PM shall be qualified to implement the Construction BIMPxP and interface with outside BIM stakeholders.

COBie/ Information Coordinator

The Construction COBie Coordinator will be responsible for coordinating the COBie process with the design team's COBie Coordinator and for completing his/her assigned portion of the COBie deliverable including make, model, description, serial number and installation date.

Some of the Construction Teams responsibilities include the following:

1. Coordinates with Design Team BIMPM on the creation of the JBIMPxP.
2. Responsible for the overall development of BIMs content and information that is developed from construction operations.
3. Serves as the main point of contact for BIM related issues between the Construction Team, Subcontractors, Suppliers, and the Design Team, FIU, and others as required.
4. Ensures that the Construction Team has the necessary hardware, BIM authoring and analysis software, and adequate training to facilitate the use of the BIMs as a tool during construction.
5. Responsible for the integration and/or coordination of the construction schedule with the Construction BIMs.
6. Facilitates the use of trade models for the purpose of trade coordination and clash detection (when available or provided by trade contractors).
7. Communicates requests by trade contractors for data extraction sets to the Design Team and ensures that these requests are fulfilled.
8. Coordinates with the Design Team to facilitate timely updates to the Construction BIMs for design changes that may occur after construction has commenced

9. Works with Lead Trade Fabrication Modelers as may be required for procurement and construction activities.
10. Coordinates updates to the BIMs as necessary to reflect the “as-built” or “as-constructed” conditions in the final As-Built BIMs.

Process and BIM Workflows

BIM is a process for creating and managing all of the information on a project – before, during and after construction. The true value of BIM can only be realized when it is taken beyond the design team – to subcontractors, the owner and facility managers. Designing and building is a complex process that requires a tremendous amount of collaboration, dedication and hard work. Using the BIM Process defined below, Project teams can benefit from BIM by utilizing models created by all members of the design and construction team to improve project coordination and scheduling while also improving overall quality while minimizing project risk. This FIU BIM Standard is intended to incorporate BIM as an integral part of FIU’s Planning, Design, Construction and Facilities Management processes. Any deviation of this guide must be documented in advance by the Project Team and then reviewed and approved by FIU prior to commencement.

General Requirement

The 3D models shall consist of 3D-Solids (not lines or wire frames) that represent the actual dimensions of the building elements and the equipment that will be installed on the project.

Existing Conditions

The Design Team shall model all existing conditions needed to explain the extent of the construction work for alterations and additions projects. The extent of modeling beyond the affected areas and the level information to be included will be determined based on project needs. These requirements may be stated in the project program or discussed during the project kickoff meeting. The BIMPxP should define the agreed upon scope of the modeling effort.

Topographic and Property Line Surveying

Detailed requirements of what is to be included in surveying deliverables is managed by FIU staff in consultation with the Design Team on a project-by-project basis. Surveys shall be provided in electronic format and should include at minimum: 3D topographic information, paving and retaining walls. The file(s) shall be in a format that allows for importing into the Design Team’s BIM authoring software.

Model Information Requests (MIR) / Request for Information (RFI)

Establishing a collaborative use of the BIMs during the design and construction process, the Designers, Contractors, and FIU can work proactively to resolve issues together and reduce the number of RFI’s / MIR’s generated. Project BIMs shall be used for model geometry and extract graphical information for generating Model Information Requests. Clash reports may also be issued by the General Contractor as background information for MIRs

The design and construction teams will be responsible for timely updates to their models based on MIR and RFI responses. The architect’s BIM manager will work with their consulting engineers to incorporate changes or updates to their models and the General Contractors / Construction Managers BIM manager will update the Construction model(s).

Contractor's fabrication models shall be coordinated with the design model. Any conflicts to the design model that need to be made prior to fabrication and construction shall be reported to the Design Team in the form of MIR.

If required by contract, the Design Team will manage and update the Design BIM(s) through the end of the construction phase, incorporating all updates and/or revisions to the model(s) as necessary to reflect design changes initiated by MIR, RFI, Owner Changes, or coordination with existing conditions.

Change Orders

It is the Construction Team's responsibility to ensure that Clash Detection and Coordination is used to the fullest extent in order to avoid any problems during installation. FIU will not accept change orders due to failed construction BIM coordination. Coordination shall be complete and the Construction Federated BIM shall show zero non-justified clashes between the Building components prior to construction and installation.

Spatial Coordination & Constructability Requirements

The Design Team is to use automated conflict checking software for this phase of the work and shall be outlined in the BIMPxP. The collision report should show any outstanding coordination issues between the Design Team members.

Level One Collisions	Level Two Collisions	Level Three Collision
Level One Collisions are reported collisions that are considered critical to the design and construction process. These collisions have been assigned the highest priority and should be rectified within the model as soon as possible:	Level Two Collisions are reported collisions that are considered important to the design and construction process. These collisions have been assigned a greater priority and should be rectified during project meetings during design:	Level Three Collision are reported collisions that while considered important to the correctness of the model will generally be changing on a regular basis throughout the design and construction process. These collisions have been assigned a lower level of priority and should be rectified before the phase submission of the models:
Mechanical Ductwork and Piping vs. Ceilings	Casework vs. Electrical Fixtures and Devices	Casework vs. Walls
Mechanical Ductwork and Piping vs. Rated Walls (For coordination of Dampers and other mech. equipment needs	Furnishings vs. Electrical Fixtures and Devices	Plumbing Piping vs. Electrical Equipment, Fixtures, and Devices
Mechanical Ductwork and Piping vs. Structure (Columns, Beams, Framing, etc.)	Structure (Columns, Beams, Framing, etc.) vs. Specialty Equipment	Plumbing Piping vs. Mechanical Equipment, Fixtures, and Devices
All Equipment and their applicable Clearances vs. Walls	Structure (Columns, Beams, Framing, etc.) vs. Electrical Equipment, Fixtures and Devices	ADA Clear Space Requirements vs. Doors, Fixtures, Walls, Structure

Level One Collisions	Level Two Collisions	Level Three Collision
All Equipment and their applicable Clearances vs. Structure	Ductwork and Piping vs. Electrical Equipment, Fixtures, and Devices	
Mechanical Equipment and Fixtures vs. Electrical Equipment and Fixtures	Ductwork vs. Floors	
Mechanical Ductwork and Piping vs. Plumbing Piping		

While the above collisions have been assigned priorities other collisions will exist within the models. The collisions are not all ignorable nor should they be discarded. Some collisions will exist because the software available is not yet mature enough to support the modeling efforts. The intention should be to have a model that is as error and collision free as possible at each submission phase with documented proof that the design team addressed the prior collisions above.

Collisions should be tracked at a minimum by generating numbered viewpoints in a collision detection software such as Autodesk Navisworks, and placing them in dated folders. These reports should be shared with the project team so that team members may review and correct issues that pertain to them in a systematic and timely way.

Federated models shall follow the trade colors listed below:

a. Architecture: White
b. Structural Steel: Maroon
c. Concrete: Gray
d. HVAC Equipment: Gold
e. HVAC Supply Duct/Diffuser: Blue
f. HVAC Return Duct/Diffuser: Magenta
g. HVAC Pipe: Gold
h. Electrical Equipment: Dark Yellow
i. Electrical Conduits: Light Yellow
j. Communication Conduit: Light Blue
k. Electrical Cable Tray: Dark Orange
l. Electrical Lighting: Yellow
m. Plumbing Water: Cyan
n. Plumbing Sewer: Magenta
o. Plumbing Storm Drain: Green
p. Fire Protection: Red
q. Pneumatic Tube: Dark Green
r. Equipment: Light Green
s. Specialty Gas: Light Green
t. Security Systems: Orange
u. Fire Alarm: Fuchsia

BIM Use Matrix Minimum Requirements

The BIM Uses currently highlighted in green and checked with an (Y) are required by FIU at a minimum. Additional BIM uses may be selective and on a per project basis and will be detailed either in the Project initial request for information or contract. This BIM Use Matrix must be competed and incorporated into the BIMPxP and agreed upon by all project participants

Y	Plan	Y	Design	Y	Construct	Y	Operate
	PROGRAMMING	Y	DESIGN AUTHORING		SITE UTILIZATION PLANNING		BUILDING SYSTEM ANALYSIS
	SITE ANALYSIS	Y	PROGRESS REVIEWS	Y	CONSTRUCTION SYSTEM DESIGN		ASSET MANAGEMENT
	CAMPUS MASTER MODEL INTEGRATION	Y	3D COORDINATION AND CLASH DETECTION	Y	3D COORDINATION AND CLASH DETECTION		SPACE MANAGEMENT AND TRACKING
	NAMING CONVENTIONS		STRUCTURAL ANALYSIS		DIGITAL FABRICATION		DIASTER PLANNING
			ENERGY ANALYSIS	Y	RECORD MODEL	Y	BIM2MAXIMO
			LIGHTING ANALYSIS		FIELD AND MATERIAL TRACKING		
		Y	PROGRAM VALIDATION		DIGITAL LAYOUT – BIM2FIELD		
			MECHANICAL ANALYSIS				
			OTHER ENG. ANALYSIS SUSTAINABILITY (LEED) EVALUATION		LASER SCANNING AND POINT CLOUD INTEGRATION		
			PROGRAM / CODE VALIDATION				
			PRELIMINARY CONSTRUCTION SCHEDULING (4D)		CONSTRUCTION SCHEDULING (4D)		
			COST ESTIMATION (5D)		COST ESTIMATION (5D)		
			AS BUILT MODEL	Y	AS BUILT MODEL		
	EXISTING CONDITION MODELING	Y	EXISTING CONDITIONS MODELING		EXISTING CONDITION MODELING		EXISTING CONDITION MODELING
			CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBie)		CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBie)		CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBie)

Progress of Models & Review

There will be different types of Collaboration and model review meetings needed for the project, including general progress meetings, design coordination meetings, etc. The following table includes, but is not limited to, some of the types of potential meetings necessary for the project, meeting host(s), required attendees, and required technology. FIU understands that these meeting may be actual, virtual and/ or a combination of both.

Meeting Type	Host	Required Attendees	Notes
BIMPxP Meeting	Prime Consultant	Design Team, Owner, BIM Consultant	Meeting to develop BIM Execution Plan.

Meeting Type	Host	Required Attendees	Notes
Design Meeting	Architect or Design Discipline	Design Team	Meeting to review BIM Progress and Project Design Development.
Design Presentations	Owner/ User Group	Owner, Design Team, CM, User Group, BIM Consultant	BIM Presentation to Project Team for approval and reviews.
Design Team Coordination	Architect or Design Discipline	Design Team Owner at request CM at request	BIM Coordination / Clash Detection. Constructability and Value Engineering review
Design4Maintenance	Architect or Design Discipline	Owner, Facility Managers, Design Team, CM, BIM Consultant	BIMs to review equipment maintainability and "soft clash" for clearances.
COBie Data Meeting	Owner / IT	Owner/ IT, Design Team, CM, BIM Consultant	Review BIMs for data compliance and test import.
Model Handover Meeting	Owner / Design Team, CM, GC	Owner/ IT, Design Team, CM, BIM Consultant	Meeting to discuss and test interoperability and file exchange.
JBIMPxP	Prime Contractor	CM, GC, Design Team, Owner, BIM Consultant	Meeting to further develop the BIM Project Execution Plan upon contractor selection.
Contractor / CM Team Coordination	CM, GC, Owner	Owner, CM, GC, Trades, Architect, BIM Consultant	Review of BIMs for Clash Detection and Trade Coordination.
Contractor Handover / Close-out	CM, GC, Owner	Owner, CM, GC, Architect, BIM Consultant.	Meeting to finalize Record BIMs and As-built BIMs for close-out.

Planning Stage Requirements

FIU will develop or work with a consultant to develop a detailed building program (also known as "space program"), listing all the spaces, groups, or functions that are required in the building, approximate areas, desired adjacencies, inter-relationships, and any other specific requirements. The Design Team is strongly encouraged to use electronic programming and planning tools that integrate this detailed building program into BIM Authoring software. These tools should be used for the remaining phases and for submissions on the project.

Area Calculations

The Design Professional shall calculate the area of the project using the following method and compare this information to the owner's requirements as outlined in the detailed building program.

Area calculations shall be determined as follows:

1. Building Gross Square Feet: Determine the total building gross square feet by adding the sum of the floor areas of the building included within the outside faces of exterior walls for all stories, or areas that have floor surfaces. Gross area should be computed by measuring from the outside face of exterior walls, disregarding cornices, pilasters, buttresses, etc., which extend beyond the wall face. Gross area should include basements (except unexcavated portions), attics, garages, enclosed porches, penthouses, mechanical equipment floors, lobbies, mezzanines, all balconies (inside and outside) utilized for operational functions, and corridors, provided they are within the outside face lines of the building. Stairways, elevator shafts, mechanical service shafts, and ducts are to be counted as gross area on each floor through which the shaft passes. Exclude open courts and light wells, portions of upper floors eliminated by rooms or lobbies that rise above single floor height, and non-enclosed covered walkways.

2. Net Assignable Square Feet: Determine the sum of room areas excluding non-assignable areas. Room area is defined as the net area of the room in square feet, measured between the inside surfaces of walls and partitions. Non-assignable areas include interior circulation space (including stairs), custodial areas, mechanical areas, structural areas, public rest rooms, exterior circulation space (including stairs), elevators, and telephone/data communication equipment areas.

3. Non-Assignable Square Feet: Determine the net room area of all non-assignable spaces as defined in Item 2 above.

4. Covered Walkway Gross Square Feet: Measure floor area, excluding any areas which were included in Building Gross Square Feet calculations.

5. Impervious Surface Gross Square Feet: Measure impervious surfaces created as part of the project site plan including sidewalks, service drives, parking, plazas, etc. that are not covered in Paragraph 3 above.

Program Deliverables

At a minimum a CSV Format spreadsheet will be required to track and compare requirements to actual as it relates to the detailed building program. Variances must be notes and explained.

Design Stage Requirements

All information needed to describe the "detailed design" shall be graphically or alphanumerically included in and derived from these models only, except for the Specifications. Documentation of the models shall not happen outside of the BIM Authoring software.

Model Content Requirements

A Model Progression Schedule shall be used as a tool to help Model Contributors throughout the Design, Construction and Operation phases understand what should be included in the BIMs when at each project milestone. It is the responsibility of the Design and Construction Team to use the MPS as part of the BIMPxP to establish how they progressively reach FIU's expectations. FIU defines a minimum BIM content expectation for CD's at an LOD 300.

Architecture:

Model the architectural elements to a level that defines the design intent and accurately represents the design solution. The detail and responsibility to fulfill these modeling requirements should be addressed fully within the BIM Execution Plan.

The model shall include the following architectural elements:

- Architectural Site plan
    - Paving, grades, sidewalks, curbs, gutters, site amenities and other elements typically included on enlarged scale site drawings in building vicinity.
- Existing conditions to the extent required
- Demolished items to the extent required
- New interior and exterior walls including but not limited to:
    - Doors, windows, openings, louvers and vents.
    - Interior and exterior soffits, overhangs, sun control elements
    - Parapets, screening elements
    - Architectural precast
- Floor, ceiling and roof systems including but not limited to:
    - Appropriate structural items listed below if not provided by the structural engineer and
    - Integrated into the architectural model for coordination and document generation.
    - Insulation, ceiling systems, and floor are to be included.
    - Roof, floor and ceiling slopes, if needed, shall be modeled.
    - Soffits, openings, scuppers, conductor heads, downspouts, gutters and accessories will also be modeled.
- Elevators, stairs, ramps, guardrails for balconies and level changes, and railings for stairs and ramps should be included.
- Casework, shelving, and other interior architectural elements
- Furnishings, fixtures, and equipment (if not provided by others and integrated into the architectural model for coordination and document generation.)
- Furniture (Fixed and Loose)
- Furniture Systems
- Specialty equipment (food service, medical, etc.)
- Model mechanical, electrical and plumbing items that require architectural space (toilets/sinks/etc.), require color/finish selection (louvers, diffusers, etc.) or affect 3D visualization (lighting fixtures) unless provided by engineers.
- Clearance zones for access, door swings, service space requirements, gauge reading, and other operational clearance must be modeled as part of all equipment and checked for conflicts with other elements. These clearance zones should be modeled as invisible solids within the object.

Structural

Model the following structural elements. The detail and responsibility to fulfill these modeling requirements should be addressed fully within the BIM Execution Plan.

The model shall include the following structural elements:

Foundations such as:

- Spread Foundations
- Caisson Foundations

- Pile Foundations
- Mat Foundations
- Load-bearing Wall Foundations

Framing such as:

- Steel Columns (with correct shape and size)
- Steel Floor C-Joists
- Open Web Joists
- Joist Girders
- Steel Beams (with correct shape and size)
- Precast Concrete Elements (Hollow Core Plank may be modeled as a slab unless the hollow core is being used for mechanical systems and coordination with those systems needs to occur)
- Cast-In-Place Concrete Elements
- Floors including overall extents and openings
- Model overall thickness of wood floor systems
- Wood Posts/Column
- All other Joists
- Wood Trusses
- Solid Wood or Laminated Beams

Wall Types including openings

- Load Bearing Walls – for calculations only (Masonry, Concrete, Cold-Formed Steel, and Wood)
- Model overall thickness of Cold-Formed Steel and Wood Stud walls (individual members may be modeled at the Design Team's option)
- Structural Foundation Walls including brick ledges

These items may be modeled at the Design Team's option:

- Steel reinforcing in concrete
- Embeds in concrete

Miscellaneous Steel

- Angles for openings, deck bearing, etc.
- Channels for mechanical units needed for coordination reviews between structural and mechanical
- Lintels (unless considered a major member)

HVAC

Model the following HVAC elements at a minimum. The detail and responsibility to fulfill these modeling requirements should be addressed fully within the BIMPxP.

The model shall include the following HVAC elements:

- Equipment
  - Fans, VAV's, compressors, chillers, cooling towers, air handlers etc.
- Distribution
  - Supply, return, exhaust, relief and outside air ductwork modeled to outside face dimension or duct insulation (whichever is greater)
  - Duct Joints
  - Diffusers, grilles, louvers, hoods, radiant panels, perimeter units, wall units
- Pipes larger than 3/4" diameter, include any insulation in model.

- Clearance zones for access, door swings, service space requirements, gauge reading, and other operational clearance must be modeled as part of the HVAC equipment and checked for conflicts with other elements. These clearance zones should be modeled as invisible solids within the object.

Electrical System

Model the following Electrical elements at a minimum. The detail and responsibility to fulfill these modeling requirements should be addressed fully within the BIMPxP.

The model shall include the following Electrical elements:

- Power and Telecommunications
    - Interior and exterior transformers, emergency generators, and other equipment
    - Main and distribution panels and switchgear including access clearances
    - Main IDF's
    - Feeders and conduit larger than 3/4"diameter
    - Outlets, switches, junction boxes and pull boxes
- Lighting
    - Permanently mounted lighting fixtures (moveable, plug-in fixtures need not be modeled as part of the electrical package unless needed for plug load calculations or for estimating purposes within a loose furnishings package. Should be discussed and agreed upon within the BIM Execution Plan)
    - Lighting Controls and sensors
    - Switches
    - Junction Boxes
- Fire Alarm and Security Systems
    - Input devices
    - Notification devices
    - Associated equipment and access clearances
    - Permanently mounted fixtures
- Building Controls
- Clearance zones for access, door swings, service space requirements, gauge reading, valve clearances and other operational clearance must be modeled as part of the electrical equipment for collision checking. These clearance zones should be modeled as invisible solids within the object.

Plumbing & Fire Protection

Model the following Plumbing & Fire Protection elements at a minimum. The detail and responsibility to fulfill these modeling requirements should be addressed fully within the BIMPxP.

The model shall include the following Plumbing & Fire Protection elements:

- Waste and Vent Piping sized at and over 3/4" diameter, includes any insulation in model.
    - Roof and floor drains, leaders, sumps, grease interceptors, tanks, water treatments and other major items.
- Supply Piping larger than 3/4" diameter, includes any insulation in model.
    - Domestic Booster Pumps
- Fixtures: sinks, toilet fixtures, water tanks, floor sinks

- Fire protection
    - Sprinkler lines larger than 3/4”diameter
    - Sprinkler heads, Fire Protection Pumps
    - Stand pipes, wall hydrants, fire department connections, risers, including valve clearances
- Clearance zones for access, service space requirements, gauge reading, valve clearances and other operational clearance must be modeled as part of the plumbing and fire protections system and checked for conflicts with other elements. These clearance zones should be modeled as invisible solids within the object.

Civil Engineering

Model the following Civil elements at a minimum. The detail and responsibility to fulfill these modeling requirements should be addressed fully within the BIMPxP.

The model shall include the following Civil elements:

- Topography – 3D terrain of all site work as designed, including retaining walls. This model should include the site and surrounding areas that contribute to the site’s drainage system or otherwise impact on the site. In most cases this will require that adjacent roadways be modeled.
- Landscaping elements: planting areas, such as raised planting beds and berms, parking islands, pools/ponds/other water features, terraces and other items not included elsewhere in the model.
- Storm water management structures, pump stations, fueling systems, manholes and other major items that impact on the overall project understanding or which may become project design constraints. All items must be geo-referenced such that all elements can be viewed as an overlay in the building information model.

Specialty Consultants

Model the following Specialty elements at a minimum. The detail and responsibility to fulfill these modeling requirements should be addressed fully within the BIMPxP.

The model shall include the following Specialty elements:

- Equipment provided or specified by said consultant
- Rough-in connection points for power, data, communications, water service and waste, gas, steam, or other needed utilities.
- Extent of specialty consultant modeling shall be coordinated with the Design Team and described in the BIM Execution Plan.
- Clearance zones for access, doors swings, service space requirements, controls, gauge reading, and other operational clearance must be modeled as part of the equipment and checked for conflicts with other elements.

Design Deliverables

The Design Team shall be responsible for providing a coordinated and assembled BIM in a collaboration software format (Navisworks or equal) and separate copies of each technical discipline model in the original software authoring tool, as well as a 2D plan set including Specification Manual, derived from the assembled BIM, for contract bidding. (See table above)

Design Team - Native file format(s) of Design Models (version as agreed in BIMPxP)

Design Team – Native file of federated Design Coordination model

Design Team - IFC (Coordination View) files at 100% CDs or final design stage deliverable

Design Team— Provide COBIE compliant file containing room and product data information (see COBie Section of the Standard)

Bidding Phase

During bidding, the use of BIM Standards will be announced and reviewed with potential bidders, and then reviewed with the selected General Contractor and major sub-contractors prior to the start of construction. The solicitation for bids shall define the legal status of the model to the bidders (binding, informational, reference, etc.) by determining the Contract Record Document (the Model(s) or the extracted 2D plan set).

Contractor Bidding

Contractors who are bidding on this project are to review the BIM Execution Plan, this FIU's BUILDING INFORMATION MODELING (BIM) Standard for bidding. Contractor will follow the guidelines and requirements as set forth by the BIM Execution Plan and this Standard.

Construction Phase Requirements

It is the Contractor's responsibility to assure that all major trades are modeled and used for clash detection, construction phasing, and installation coordination.

General

During construction the Design Team shall update the models with all addendum, accepted alternates and/or value enhancement proposals and share those updated models with the Construction team in a timely manner.

Model Sharing

The Contractor shall have access to the Design BIMs during construction. Regardless of whether or not the Design Models(s) is the Contract Record Document, after a contract is awarded for construction the coordinated design BIM and all native BIM files shall be provided to the appropriate contractor entities as needed.

The Contractor shall review the BIM Execution Plan with the Design Team and FIU and submit any Addendums within thirty (30) days of contract award. The Design Team and FIU will review and approve of any Addendum within fourteen (14) days of submittal.

Model Content Requirements

A Model Progression Schedule shall be used as a tool to help Model Contributors throughout the Design, Construction and Operation phases understand what should be included in the BIMs when at each project milestone. The Construction Models should reflect the exact geometric properties of the materials and/or systems being submitted. These models should reflect the exact material properties and performance data. It is the responsibility of the Design and Construction Team to use the MPS as part of the BIMPxP or JBIMPxP to establish how they progressively reach FIU's expectations. FIU defines a minimum BIM content expectation for Construction Coordination at an LOD 350.

The models shall include, but are not limited to:

1. Architectural Model

- Wall thickness and height – Required for routing main utilities, locating VAV boxes, identifying priority wall framing, wall penetrations, fire stopping.
- Hard ceilings and soffits – Required for identifying HVAC diffuser locations, electrical fixture locations, and routing of utilities with openings for diffusers and lights.
- Exteriors walls / storefront – Required for identifying the location of rain water leaders.
- Shafts, wall chases – Required for identifying the correct locations of plumbing vents, and HVAC shafts.
- Architectural features requiring utilities – Required for utility routing.
- Architectural features in mechanical spaces – Required for utility routing.

2. Structural Model

- Beams and columns
- Braces and gusset plates
- Supplemental steel
- Miscellaneous supports for equipment, toilet partitions, etc.
- External wall framing connections

3. Drywall/Framing Model

- Studs, bottom and top track
- Kickers or other drywall supports
- Roof framing

4. Concrete

- Footings and foundations
- Area of influence zones under foundations
- Slabs and slab depressions

5. Mechanical Model

- Medium pressure duct – Required for coordination and routing of other trades as well as pre-fabrication.
- Low pressure duct – Required for coordination and routing of other trades as well as pre-fabrication.
- Shaft locations – Required for coordination and routing of other trades and for locating smoke dampers, etc.
- Flanges
- VAV boxes – Required for pre-fabrication purposes, coordination with HVAC heating hot water piping, tagged with correct Equipment ID.
- Fire smoke dampers – Required in coordination, tagged with correct Equipment ID.
- Flex ducts – Required for showing how low pressure ducts connect to the diffusers.

- Diffuser locations and sizes – Required for coordination of finish utilities with the other fixtures in a room (like electrical fixtures, etc.).
- All duct and pipe insulation – Should be included where required so that the maximum sizes are represented in the model. – Required for coordination.
- Hangers and seismic bracing – Required for coordination and routing of other trades and for inserting the deck correctly before installation begins.
- HVAC piping to VAV boxes – Main lines are required for coordinating with other trades; also required if they will be pre-fabricated; connections to VAV boxes can be left for field routing.
- HVAC piping to Equipment – Main lines are required for coordinating with other trades; also required if they will be pre-fabricated; final connections to equipment need to be coordinated on model as well.
- Underground utilities - required for underground MEP / FP coordination.
- Mechanical room
- All equipment – Required for coordinating with other trades, tagged with correct Equipment ID.

6. Electrical Model

- Branch and feeder conduits – Required for coordination with other trades and for pre-fabrication. Conduits 3/4” and greater need to be modeled. Flex and MC not required.
- All underground conduits – Required for underground MEP / FP coordination.
- Junction boxes and Pull Boxes – Required for coordination with other trades.
- Lighting fixtures – Required for coordination with other trades and finish utilities like ceiling grid, sprinkler heads, HVAC diffusers and specialty lighting. Tag with Circuit number.
- All lighting supports for special lighting – Required for routing and coordination of other trades.
- Cable trays and other supports – Required for coordination with other trades.
- Hangers and seismic bracing – Required for coordination with other trades and for inserting the deck.
- Equipment Panels – Required for coordinating with wall framing to determine backing, etc. Tag with Panel number.
- Electrical rooms – Required for coordination with wall framing and other trades.
- Bundles of cable or wiring – Useful for coordination and pre-fabrication.
- Outlets and switch locations in rooms – Useful for pre-fabrication and coordination. Tag with Circuit number.
- Electrical power off buttons
- All equipment including transformers, TVSS devices, etc. – Required for coordinating with other trades.

7. Plumbing Model

- Plumbing fixtures – Required for coordination with other MEP trades.
- Graded cast iron pipe lines – Required for coordination with other trades and pre- fabrication.
- Underground storm and sewer pipes – Required for underground utilities coordination and for prefabrication.
- Waste and vent lines – Required for coordination with other trades and with architectural walls, shafts and for pre-fabrication.

- Cold and hot water piping – Required for coordination with other trades and for pre-fabrication. Identify valves and tag with appropriate valve number.
- Hangers and seismic bracing details – Required for coordination with other trades and for inserting before installation.
- Specialty piping – Required for coordination with other trades and for pre- fabrication.
- All equipment – Required for coordination.

8. Sprinkler Model

- Sprinkler mains and branches – Required for coordination with other trades and for pre-fabrication.
- Sprinkler head drops – Required for coordination with finish utilities like electrical lighting, diffusers, etc.
- Sprinkler pipes – Required if hard pipe is used, useful if the newer type of flex pipe is used.
- Hangers and seismic bracing – Required for coordination with other trades and for inserting the deck
- Correctly before installation begins.
- Underground utilities - required for underground MEP / FP coordination.
- All equipment – Required for coordination.

9. Process Piping Model

- Process piping – All piping, valves, actuators, and fittings required for coordination with other trades.
- Hangers and seismic bracing – Required for coordination and routing of other trades and for inserting the deck correctly before installation begins.
- Process equipment – A model of each piece of equipment must be provided by the equipment manufacturer for coordination with other trades.

10. Controls Model

- Conduit and tubing – All Instrument Air, power and control wiring conduit, conduit and distribution boxes serving control tubing are required for coordinating with other trades.
- Equipment panels – Required with associated conduit and gutters in the model for space coordination with other trades as well as determining backing.
- Raceways - required for coordination with other trades.

Construction Deliverable

Upon Substantial Completion, BIM files shall be summited to FIU,and shall be cleaned of extraneous “scrap” or “working space” layers, stories, abandoned designs, object creation and testing places, empty layers, and other content which is typically produced in BIM construction coordination.

The Contractor shall be responsible for providing FIU a federated as-built Model that includes all building systems. The Model shall be coordinated and clash free.

Contractor—Native file of the final federated as-built Model for building systems used in the multi-discipline coordination process (version as agreed in BIM PXP)

Contractor—Native file formats used in the final federated as-built Model for building systems for the multi-discipline coordination process (version as agreed in BIM PXP)

Contractor—IFC files of as-built models (version as agreed in BIM PXP)

Contractor—Provide COBIE compliant file containing room and product data information (see COBie Section of the Standard)

Pay Application Verification

An application for payment is a document that identifies and presents a method on how a contractor will be paid. The application for payment contains the services or items that are being incorporated or jobs being executed under a contract agreement. An application for payment provides both the owner and the contractor, with a method of controlling what items or materials have been provided by the contractor.

FIU will be using BIMs as part of the pay application process. BIMs should accurate reflect the percentage complete on the pay request or a written explanation must be given to explain any variance.

As-Built Model

FIU recognizes the complementary nature of the Design and Construction Models that are created during the Project and that, at the end of the project, components from both models will be compiled into an As-Built Model. For example, the architectural design model may be used as background for individual trade Component Models as part of the Construction Model, and eventually the As-Built Model.

Responsibilities Related to the Final As-Built Model

Design Team Responsibilities

1. The Design Team will update the Architectural and Structural model(s) through the end of the construction phase, incorporating all updates and/or revisions to the model(s) as necessary to reflect design changes initiated by ASI, RFI, MIRs, Owner Changes, or coordination with existing conditions.

Construction Team Responsibilities

1. During the construction phase, the Construction Team will maintain “red-line” as-built drawings.

2. At Substantial Completion, the Construction Team will:

    a. Make all necessary updates and/or revisions to the model(s) to reflect the as-built information to the tolerance specified in the Standard or agreed upon in the BIMPxP. It is the responsibility of each subcontractor to keep accurate “red-line” markups from the field in order to produce accurate as-built models and drawings.

    b. Final updates to material/equipment data and properties where installations differ from the “basis of design” included in the Design Team Model(s).

    c. Incorporation or linking of certain close-out documents to the Federated Model (as agreed in BIM PXP).

3. All model updates by the Construction Team shall be complete one (1) week prior to Final Completion at which time all the required close out deliverables shall be transmitted to the FIU (as agreed in BIM PXP).

Archiving of Models

At the completion of each delivery phase, BIMs should be archived and stored with the project file folder with a heading corresponding to the submittal typ. (100% Construction Documents). This folder structure and archiving naming structure should be detailed in the BIMPxP or JBIMPxP.

Information Exchanges

Construction Operations Building Information Exchange (COBie) Workflow, Roles and Responsibilities and Deliverables

Construction Operations Building information exchange (COBie) was created to standardize the exchange of information between construction and Facilities Mangers at handover in a consistent format. Standardizing information exchanges eliminates the need for repeated or custom mapping. Once a standard is adopted, the software vendors can incorporate the Standard into their applications and users do not have to worry about connecting databases as they can be pre-mapped.

Although the COBie deliverable format has been in practice for several years, it had not been incorporated into software development plans as it was not considered a "standard". In 2011, COBie Standard was adopted into the National Building Information Modeling Standard- United States, Version 2 (NBIMS-US v2). Now as a recognized standard, COBie has been implemented by BIM authoring tool software vendors as well CMMS providers. For a complete list of COBie capable software can be found on the buildingSMARTalliance website at http://www.nibs.org/?page=bsa_cobiemm

Information on how to use COBie may be found at http://www.wbdg.org/resources/cobie.p

This section is intended to:

- ✓ Describe the **List of Assets** requiring COBie Data Set
- ✓ Define the **Roles and Responsibilities** of Design & Construction Team members for COBie deliverables
- ✓ Identify both the COBie and FIU **specified data sets** (attributes) to meet the required deliverable,
- ✓ Recommend **best practices**
- ✓ Discuss data **validation processes** for quality control
- ✓ Provide a COBie **Deliverable Progression Schedule**

A. List of Assets requiring COBie Data Set

FIU will require COBie data sets for all components on the Equipment List per the Construction Documents that require any of the following:

FIU BIM Asset List

Discipline	Asset Types:
M	1. Air Handling Unit
M	2. VAV box
M	3. Variable Frequency Drive
E	4. Generator
M	5. Boiler
A	6. Elevator
M	7. Air Compressor
M	8. Vacuum Pump
	9. Freezer (Walk in) (If applicable)
	10. Air Cooled Chiller (If applicable)
M	11. Condenser Unit
M	12. Fan Coil Unit
M	13. Exhaust Fan (Laboratory Exhaust Fans) (If applicable)
	14. Fume Hood (If applicable)
P	15. Fire Pump
M	16. Chilled Water Pump
P	17. Booster Pump
P	18. Domestic Water Pump
	19. RO Water Pump/Skid (If applicable)
	20. Water Softener (If applicable)
E	21. Fire Alarm Panel
P	22. Back Flow Preventer
	23. Water Heater (If applicable)
	24. Rack Cage Washer (If applicable)
	25. Bulk Sterilizer (If applicable)
	26. Chilled Beam (If applicable)
E	27. Building Automation System (BAS) Panel
E	28. Electrical sub meter
E	29. BTU meter

B. Roles & Responsibilities

All COBie deliverables will be provided in the COBie Standard file format conforming to version 2, release 4, (COBie2 2.40). A sample COBie deliverable format file containing FIU additional data sets may be provided upon request from FIU.

The chart below identifies the minimum COBie data set required by FIU. The first available collection point of each attribute has been identify as either at 100% Design (D_{100}), after Contractor approved submittals (C_{SA}), or after Contractor installations (C_I). The responsible party for providing and collecting the COBie data set will be either assigned to the Design Team (Architect or Engineer (A/E) or Construction Team (Contractor) as part of the BIMPxP.

FIU Required Data set	A/E D_{100}	A/E C_{SA}	Contractor C_I	A/E RECORD
For each Facility				
Facility Name	✓✓			✓✓
Facility Type	✓✓			✓✓
Project Name	✓✓			✓✓
Site Name	✓✓			✓✓
Linear Units	✓✓			✓✓
Area Units	✓✓			✓✓
Volume Units	✓✓			✓✓
Currency Unit	✓✓			✓✓
Area Measurement	✓✓			✓✓
Project number	✓✓			✓✓
For each Floor				
Floor Name	✓✓			✓✓
Floor Classification	✓✓			✓✓
Description	✓✓			✓✓
For each Room				
Room Name	✓✓			✓✓
Space Classification	✓✓			✓✓
Floor Name	✓✓			✓✓
Space Description	✓✓			✓✓
For each Asset Type				
Asset Type Name	✓✓			✓✓
Asset Type Classification	✓✓			✓✓
Asset Type Description	✓✓			✓✓
Asset Type	✓✓			✓✓
Manufacturer		✓✓		✓✓
Model Number		✓✓		✓✓
Warranty Guarantor- Parts		✓✓		✓✓
Warranty Duration- Parts		✓✓		✓✓
Warranty Guarantor- Labor		✓✓		✓✓
Warranty Duration- Labor		✓✓		✓✓
Warranty Duration- Units		✓✓		✓✓
Vendor		✓✓		✓✓
Purchase Order		✓✓		✓✓
Purchase Price		✓✓		✓✓
For each Asset				
Asset Name	✓✓			✓✓
Asset Type Name	✓✓			✓✓
Asset Room Location	✓✓			✓✓
Asset Description	✓✓			✓✓
Asset #	✓✓			✓✓
Serial #			✓✓	✓✓
Installation Date			✓✓	✓✓
For each Contact				
Email	✓✓	✓✓		✓✓
Classification	✓✓	✓✓		✓✓
Company	✓✓	✓✓		✓✓
Phone	✓✓	✓✓		✓✓
For all Tabs				
Created by	✓✓	✓✓		✓✓
Date	✓✓	✓✓		✓✓
Ex Ref	✓✓	✓✓		✓✓

A/E	Holds the Design Team Prime Contract
Contractor	Holds the Construction Team Prime Contract
D_{100}	100% design stage/CD
C_{SA}	Contractor Approved submittals
C_I	Contractor Installation

In the case where FIU may request additional sets of data to be provided, it will then be the responsibility of the Design & Construction Teams to add those attribute names to the chart, and identify when first available and who is responsible for collection. A revised chart should become part of the approved BIMPxP plan.

C. COBie tabs required FIU:

At this time, FIU is only requiring the following tabs in the COBie2 2.40 file to be provided:

- ✓ Contact
- ✓ Facility
- ✓ Floor
- ✓ Space
- ✓ Type
- ✓ Component

D. Classification tables

Unless otherwise provided, the use of OmniClass tables for classification designations is required. These tables may be found at http://www.omniclass.org/

Use the following the OmniClass Classification tables for:

Facility Classification
OmniClass Table 11 - Construction Entities by Function

Space Classification
OmniClass Table 13 Spaces by Function*

Type Classification
OmniClass Table 23 – Products *

Contact Classification
OmniClass Table 34 – Organizational Roles

***OmniClass tables adopted by the National BIM Standard- US v2**

For the following classifications use the enumerated list of values below:

Floor Classification
Site
Level
Roof

E. COBie Standard and FIU specified data set

The chart below is the information that required and is intended to clarify where the data should reside in a COBie formatted file deliverable (.xlsx).

FIU Required Data set	Required by	Appears in COBie Tab	Under Column	Comments
For each Facility				
Facility Name	COBie- Std	Facility	Name	Provided by FIU
Facility Type	COBie- Std	Facility	Category	Provided by FIU
Project Name	COBie- Std	Facility	Project name	Provided by FIU
Site Name	COBie- Std	Facility	Site name	Provided by FIU
Linear Units	COBie- Std	Facility	Linear Units	Default - FEET
Area Units	COBie- Std	Facility	Area Units	Default - SQUARE FEET
Volume Units	COBie- Std	Facility	Volume Units	Default - CUBIC FEET
Currency Unit	COBie- Std	Facility	Currency Unit	Default - USD
Area Measurement	COBie- Std	Facility	Area Measurement	Provided by FIU
Project number	FIU	Facility	Project number	FIU project number under which asset was installed
For each Floor				
Floor Name	COBie- Std	Floor	Name	
Floor Classification	COBie- Std	Floor	Category	
Description	COBie- Std	Floor	Description	
For each Room				
Room Name	COBie- Std	Space	Name	Per BIM Specification
Space Classification	COBie- Std	Space	Category	Per BIM Specification
Floor Name	COBie- Std	Space	Level	
Space Description	COBie- Std	Space	Description	
For each Asset Type				
Asset Type Name	COBie- Std	Type	Name	Per BIM Specification
Asset Type Classification	COBie- Std	Type	Category	Per BIM Specification
Asset Type Description	COBie- Std	Type	Description	
Asset Type	COBie- Std	Type	Asset Type	Default - FIXED
Manufacturer	COBie- Std	Type	Manufacturer	
Model Number	COBie- Std	Type	Model Number	
Warranty Guarantor- Parts	COBie- Std	Type	Warranty Guarantor- Parts	email address
Warranty Duration- Parts	COBie- Std	Type	Warranty Duration- Parts	email address
Warranty Guarantor- Labor	COBie- Std	Type	Warranty Guarantor- Labor	email address
Warranty Duration- Labor	COBie- Std	Type	Warranty Duration- Labor	email address
Warranty Duration- Units	COBie- Std	Type	Warranty Duration- Units	Default - YEAR
Vendor	FIU	Type	Vendor	FIU purchased equipment only
Purchase Order	FIU	Type	Purchase Order	FIU purchased equipment only
Purchase Price	FIU	Type	Purchase Price	FIU purchased equipment only
For each Asset				
Asset Name	COBie- Std	Component	Name	Per BIM Specification
Asset Type Name	COBie- Std	Component	Type Name	
Asset Room Location	COBie- Std	Component	Space	
Asset Description	COBie- Std	Component	Description	
Asset #	FIU	Component	Asset #	Provided by FIU
Serial #	FIU	Component	Serial Number	Engineered equipment only- at a minumium on AHU, Chillers, Boilers
Installation Date	FIU	Component	Installation Date	Default - Date of beneficial occupancy
For each Contact				
Email	COBie- Std	Contacts	Name	
Classification	COBie- Std	Contacts	Category	
Company	COBie- Std	Contacts	Company	
Phone	COBie- Std	Contacts	Phone	
For all Tabs				
Created by	COBie- Std	All	Created by	email address
Date	COBie- Std	All	Created on	
Ex Ref	COBie- Std	All	EXRef	Used when data is exported from BIM software

F. Best Practices

In cases where a model is provided, the most efficient method is to extract information directly from data embedded in the BIMs. Several options are available for extracting data.

Software Tools & BIM servers

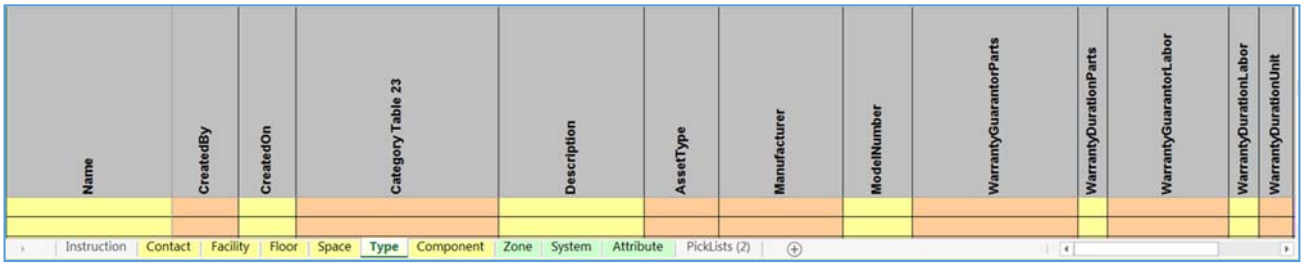
Leveraging the BIM authoring software is the most cost effective way to deliver a COBie formatted file. It is becoming more common that BIM software's have COBie data export capabilities through

plug-ins. There are also open source BIM server's available utilizing IFC files with COBie data extraction features.

Use of COBie Schedules in the BIM file

It is recommended to create COBie schedules in the BIM file with headings that match the required tabs in the COBie deliverable file. These schedules can also be used to efficiently visual check that all required information has been provided. Also allows for quick corrections before extracting into COBie formatted file for submissions. Shown below is an example of a COBie schedule created in a BIM matching the required data set headings of a tab in the COBie deliverable format.

COBie Types Schedule									
Type Name	Type Classification	Type Description	Asset Type	Manufacture	ModelNumber	WarrantyGuarantorParts	WarrantyDurationParts	WarrantyGuarantorLabor	WarrantyDurationLabor
1 D	Air Ductwork		FIXED	Manufact		WarrantyGuarantorParts	WarrantyDurationPart	WarrantyGuarantorLabor	WarrantyDurationLabor
1.5 D	Air Ductwork		FIXED	Manufact		WarrantyGuarantorParts	WarrantyDurationPart	WarrantyGuarantorLabor	WarrantyDurationLabor
1.5 W	Air Ductwork		FIXED	Manufact		WarrantyGuarantorParts	WarrantyDurationPart	WarrantyGuarantorLabor	WarrantyDurationLabor
2 D	Air Ductwork		FIXED	Manufact		WarrantyGuarantorParts	WarrantyDurationPart	WarrantyGuarantorLabor	WarrantyDurationLabor
3.9 LPS - 0.8 Meter Head	Pumps		FIXED	Manufact		WarrantyGuarantorParts	WarrantyDurationPart	WarrantyGuarantorLabor	WarrantyDurationLabor
15 mm Pendent	Fire Fighting Sprinkler Heads		FIXED	Manufact		WarrantyGuarantorParts	WarrantyDurationPart	WarrantyGuarantorLabor	WarrantyDurationLabor



Manual entry data in the COBie standard formatted file: One option for providing COBie deliverables is to manually enter the required information into a COBie formatted file. On projects with limited amount of assets or no model was provide, manual entry may be reasonable choice. However on projects with large amounts of new assets, manual entry may not be the most cost effective method for collection.

Data Validation

Providing the completed COBie deliverable in the correct format is essential. Each responsible party is required to validate and ensure that all the COBie data sets are provided with correct information for each asset listed in the contract prior to submittal to FIU.

Upon delivery of the COBie formatted file (s), FIU will run a data validation report which will identify any errors/warnings due to missing, invalid entry, or corrupt data. The report will be reviewed with responsible parties to identify corrective measure or agree to accept data as received.

The responsible party, at no additional cost to FIU, will have five (5) working days to correct all identified errors and resubmit an updated COBie formatted file to FIU to rerun validation report. If a second validation report shows new errors or any unresolved previous errors on the revised deliverable, the submittal will be rejected until all errors have been addressed.

G. COBie Progression Schedule (CPS)

FIU will implement a Transition to Operations approach to allow the facility management team time to prepare for the new assets by requiring progressive delivery of COBie data sets based on Project Phases. In some cases, there could be multiple deliverables within one project phase. The complete schedule of deliverables is to be stated in the BIMPxP.

The **first COBie file deliverable** will be from the Design Team with a data set using the 100% design model provided in the contract documents or created from 2D contract documents. This first deliverable will be due with 30 days of Construction Documents submittal.

For the assets listed in the contract as requiring COBie data sets, the following information is to be delivered in a COBie2 2.40 formatted file:

			A/E	100% DESIGN FOR CONTRACT DOCUMENTS (D_{100})		
Deliverable Stage	Proj Phase	FIU Required Data set	D_{100}	Appears in COBie Tab	Under Column	Comments
		For each Facility				
Deliverable 1	100% Design	Facility Name	✓✓	Facility	Name	Provided by FIU
		Facility Type	✓✓	Facility	Category	Provided by FIU
		Project Name	✓✓	Facility	Project name	Provided by FIU
		Site Name	✓✓	Facility	Site name	Provided by FIU
		Linear Units	✓✓	Facility	Linear Units	Default - FEET
		Area Units	✓✓	Facility	Area Units	Default - SQUARE FEET
		Volume Units	✓✓	Facility	Volume Units	Default - CUBIC FEET
		Currency Unit	✓✓	Facility	Currency Unit	Default - USD
		Area Measurement	✓✓	Facility	Area Measurement	Provided by FIU
		Project number	✓✓	Facility	Project number	FIU project number under which asset was installed
		For each Floor				
		Floor Name	✓✓	Floor	Name	
		Floor Classification	✓✓	Floor	Category	
		Description	✓✓	Floor	Description	
		For each Room				
		Room Name	✓✓	Space	Name	Per BIM Specification
		Space Classification	✓✓	Space	Category	Per BIM Specification
		Floor Name	✓✓	Space	Level	
		Space Description	✓✓	Space	Description	
		For each Asset Type				
		Asset Type Name	✓✓	Type	Name	Per BIM Specification
		Asset Type Classification	✓✓	Type	Category	Per BIM Specification
		Asset Type Description	✓✓	Type	Description	
		Asset Type	✓✓	Type	Asset Type	Default - FIXED
		Manufacturer		Type	Manufacturer	
		Model Number		Type	Model Number	
		Warranty Guarantor- Parts		Type	Warranty Guarantor- Parts	email address
		Warranty Duration- Parts		Type	Warranty Duration- Parts	email address
		Warranty Guarantor- Labor		Type	Warranty Guarantor- Labor	email address
		Warranty Duration- Labor		Type	Warranty Duration- Labor	email address
		Warranty Duration- Units		Type	Warranty Duration- Units	Default - YEAR
		Vendor		Type	Vendor	FIU purchased equipment only
		Purchase Order		Type	Purchase Order	FIU purchased equipment only
		Purchase Price		Type	Purchase Price	FIU purchased equipment only
		For each Asset				
		Asset Name	✓✓	Component	Name	Per BIM Specification
		Asset Type Name	✓✓	Component	Type Name	
		Asset Room Location	✓✓	Component	Space	
		Asset Description	✓✓	Component	Description	
		Asset #	✓✓	Component	Asset #	Provided by FIU
		Serial #		Component	Serial Number	Engineered equipment only- at a minimum on AHU, Chillers, Boilers
		Installation Date		Component	Installation Date	Default - Date of beneficial occupancy
		For each Contact				
		Email	✓✓	Contacts	Name	
		Classification	✓✓	Contacts	Category	
		Company	✓✓	Contacts	Company	
		Phone	✓✓	Contacts	Phone	
		For all Tabs				
		Created by	✓✓	All	Created by	email address
		Date	✓✓	All	Created on	
		Ex Ref	✓✓	All	EX Ref	Used when data is exported from BIM software

The **second COBie file deliverable** will be during submittal approval (Csa) phase, also provided by design team. This deliverable should be stated in the BIMPxP as it may be done incrementally or at one time after all approvals have been completed and models have been updated with approved assets. For the assets listed in the contract as requiring COBie data sets, the following information is to be delivered in a COBie formatted file:

			A/E	CONTRACTOR SUBMITTALS APPROVED (C_{SA})		
Deliverable Stage	Proj Phase	FIU Required Data set	C_{SA}	Appears in COBie Tab	Under Column	Comments
		For each Facility				
Deliverable 2	Submittals Approved	Facility Name	✓✓	Facility	Name	Provided by FIU
		Facility Type	✓✓	Facility	Category	Provided by FIU
		Project Name	✓✓	Facility	Project name	Provided by FIU
		Site Name	✓✓	Facility	Site name	Provided by FIU
		Linear Units	✓✓	Facility	Linear Units	Default - FEET
		Area Units	✓✓	Facility	Area Units	Default - SQUARE FEET
		Volume Units	✓✓	Facility	Volume Units	Default - CUBIC FEET
		Currency Unit	✓✓	Facility	Currency Unit	Default - USD
		Area Measurement	✓✓	Facility	Area Measurement	Provided by FIU
		Project number	✓✓	Facility	Project number	FIU project number under which asset was installed
		For each Floor				
		Floor Name	✓✓	Floor	Name	
		Floor Classification	✓✓	Floor	Category	
		Description	✓✓	Floor	Description	
		For each Room				
		Room Name	✓✓	Space	Name	Per BIM Specification
		Space Classification	✓✓	Space	Category	Per BIM Specification
		Floor Name	✓✓	Space	Level	
		Space Description	✓✓	Space	Description	
		For each Asset Type				
		Asset Type Name	✓✓	Type	Name	Per BIM Specification
		Asset Type Classification	✓✓	Type	Category	Per BIM Specification
		Asset Type Description	✓✓	Type	Description	
		Asset Type	✓✓	Type	Asset Type	Default - FIXED
		Manufacturer	✓✓	Type	Manufacturer	
		Model Number	✓✓	Type	Model Number	
		Warranty Guarantor- Parts	✓✓	Type	Warranty Guarantor- Parts	email address
		Warranty Duration- Parts	✓✓	Type	Warranty Duration- Parts	email address
		Warranty Guarantor- Labor	✓✓	Type	Warranty Guarantor- Labor	email address
		Warranty Duration- Labor	✓✓	Type	Warranty Duration- Labor	email address
		Warranty Duration- Units	✓✓	Type	Warranty Duration- Units	Default - YEAR
		Vendor	✓✓	Type	Vendor	FIU purchased equipment only
		Purchase Order	✓✓	Type	Purchase Order	FIU purchased equipment only
		Purchase Price	✓✓	Type	Purchase Price	FIU purchased equipment only
		For each Asset				
		Asset Name	✓✓	Component	Name	Per BIM Specification
		Asset Type Name	✓✓	Component	Type Name	
		Asset Room Location	✓✓	Component	Space	
		Asset Description	✓✓	Component	Description	
		Asset #	✓✓	Component	Asset #	Provided by FIU
		Serial #		Component	Serial Number	Engineered equipment only- at a minimum on AHU, Chillers, Boilers
		Installation Date		Component	Installation Date	Default - Date of beneficial occupancy
		For each Contact				
		Email	✓✓	Contacts	Name	
		Classification	✓✓	Contacts	Category	
		Company	✓✓	Contacts	Company	
		Phone	✓✓	Contacts	Phone	
		For all Tabs				
		Created by	✓✓	All	Created by	email address
		Date	✓✓	All	Created on	
		Ex Ref	✓✓	All	EX Ref	Used when data is exported from BIM software

The **third COBie file deliverable** will be from either the Design Team or Construction Team and will be defined in the BIMPxP. COBie data set for all assets listed in the contract and due once all assets have been installed. This too may be done incrementally or at one time after all installations have been completed and models have been updated.

			A/E	Contractor	CONTRACTOR INSTALLED (C_I)		
Deliverable Stage	Proj Phase	FIU Required Data set	C_{SA}	C_I	Appears in COBie Tab	Under Column	Comments
		For each Facility					
Deliverable 3	Installation	Facility Name	✓✓		Facility	Name	Provided by FIU
		Facility Type	✓✓		Facility	Category	Provided by FIU
		Project Name	✓✓		Facility	Project name	Provided by FIU
		Site Name	✓✓		Facility	Site name	Provided by FIU
		Linear Units	✓✓		Facility	Linear Units	Default - FEET
		Area Units	✓✓		Facility	Area Units	Default - SQUARE FEET
		Volume Units	✓✓		Facility	Volume Units	Default - CUBIC FEET
		Currency Unit	✓✓		Facility	Currency Unit	Default - USD
		Area Measurement	✓✓		Facility	Area Measurement	Provided by FIU
		Project number	✓✓		Facility	Project number	FIU project number under which asset was installed
		For each Floor					
		Floor Name	✓✓		Floor	Name	
		Floor Classification	✓✓		Floor	Category	
		Description	✓✓		Floor	Description	
		For each Room					
		Room Name	✓✓		Space	Name	Per BIM Specification
		Space Classification	✓✓		Space	Category	Per BIM Specification
		Floor Name	✓✓		Space	Level	
		Space Description	✓✓		Space	Description	
		For each Asset Type					
		Asset Type Name	✓✓		Type	Name	Per BIM Specification
		Asset Type Classification	✓✓		Type	Category	Per BIM Specification
		Asset Type Description	✓✓		Type	Description	
		Asset Type	✓✓		Type	Asset Type	Default - FIXED
		Manufacturer	✓✓		Type	Manufacturer	
		Model Number	✓✓		Type	Model Number	
		Warranty Guarantor- Parts	✓✓		Type	Warranty Guarantor- Parts	email address
		Warranty Duration- Parts	✓✓		Type	Warranty Duration- Parts	email address
		Warranty Guarantor- Labor	✓✓		Type	Warranty Guarantor- Labor	email address
		Warranty Duration- Labor	✓✓		Type	Warranty Duration- Labor	email address
		Warranty Duration- Units	✓✓		Type	Warranty Duration- Units	Default - YEAR
		Vendor	✓✓		Type	Vendor	FIU purchased equipment only
		Purchase Order	✓✓		Type	Purchase Order	FIU purchased equipment only
		Purchase Price	✓✓		Type	Purchase Price	FIU purchased equipment only
		For each Asset					
		Asset Name	✓✓		Component	Name	Per BIM Specification
		Asset Type Name	✓✓		Component	Type Name	
		Asset Room Location	✓✓		Component	Space	
		Asset Description	✓✓		Component	Description	
		Asset #	✓✓		Component	Asset #	Provided by FIU
		Serial #		✓✓	Component	Serial Number	Engineered equipment only- at a minimum on AHU, Chillers, Boilers
		Installation Date		✓✓	Component	Installation Date	Default - Date of beneficial occupancy
		For each Contact					
		Email	✓✓		Contacts	Name	
		Classification	✓✓		Contacts	Category	
		Company	✓✓		Contacts	Company	
		Phone	✓✓		Contacts	Phone	
		For all Tabs					
		Created by	✓✓		All	Created by	email address
		Date	✓✓		All	Created on	
		Ex Ref	✓✓		All	EX Ref	Used when data is exported from BIM software

The **final COBie file deliverable** will be from Design Team or Construction Team as defined in the BIMPxP that represents the As-Built models and will be a complete COBie data set for all assets listed in the contract, and due same time as As-Built models.

			A/E			FINAL RECORD DOCUMENTS	
Deliverable Stage	Proj Phase	FIU Required Data set	Record				
		For each Facility					
FINAL Deliverable	RECORD	Facility Name	✓✓	Facility	Name		Provided by FIU
		Facility Type	✓✓	Facility	Category		Provided by FIU
		Project Name	✓✓	Facility	Project name		Provided by FIU
		Site Name	✓✓	Facility	Site name		Provided by FIU
		Linear Units	✓✓	Facility	Linear Units		Default - FEET
		Area Units	✓✓	Facility	Area Units		Default - SQUARE FEET
		Volume Units	✓✓	Facility	Volume Units		Default - CUBIC FEET
		Currency Unit	✓✓	Facility	Currency Unit		Default - USD
		Area Measurement	✓✓	Facility	Area Measurement		Provided by FIU
		Project number	✓✓	Facility	Project number		FIU project number under which asset was installed
		For each Floor					
		Floor Name	✓✓	Floor	Name		
		Floor Classification	✓✓	Floor	Category		
		Description	✓✓	Floor	Description		
		For each Room					
		Room Name	✓✓	Space	Name		Per BIM Specification
		Space Classification	✓✓	Space	Category		Per BIM Specification
		Floor Name	✓✓	Space	Level		
		Space Description	✓✓	Space	Description		
		For each Asset Type					
		Asset Type Name	✓✓	Type	Name		Per BIM Specification
		Asset Type Classification	✓✓	Type	Category		Per BIM Specification
		Asset Type Description	✓✓	Type	Description		
		Asset Type	✓✓	Type	Asset Type		Default - FIXED
		Manufacturer	✓✓	Type	Manufacturer		
		Model Number	✓✓	Type	Model Number		
		Warranty Guarantor- Parts	✓✓	Type	Warranty Guarantor- Parts		email address
		Warranty Duration- Parts	✓✓	Type	Warranty Duration- Parts		email address
		Warranty Guarantor- Labor	✓✓	Type	Warranty Guarantor- Labor		email address
		Warranty Duration- Labor	✓✓	Type	Warranty Duration- Labor		email address
		Warranty Duration- Units	✓✓	Type	Warranty Duration- Units		Default - YEAR
		Vendor	✓✓	Type	Vendor		FIU purchased equipment only
		Purchase Order	✓✓	Type	Purchase Order		FIU purchased equipment only
		Purchase Price	✓✓	Type	Purchase Price		FIU purchased equipment only
		For each Asset					
		Asset Name	✓✓	Component	Name		Per BIM Specification
		Asset Type Name	✓✓	Component	Type Name		
		Asset Room Location	✓✓	Component	Space		
		Asset Description	✓✓	Component	Description		
		Asset #	✓✓	Component	Asset #		Provided by FIU
		Serial #	✓✓	Component	Serial Number		Engineered equipment only- at a minimum on AHU, Chillers, Boilers
		Installation Date	✓✓	Component	Installation Date		Default - Date of beneficial occupancy
		For each Contact					
		Email	✓✓	Contacts	Name		
		Classification	✓✓	Contacts	Category		
		Company	✓✓	Contacts	Company		
		Phone	✓✓	Contacts	Phone		
		For all Tabs					
		Created by	✓✓	All	Created by		email address
		Date	✓✓	All	Created on		
		Ex Ref	✓✓	All	EX Ref		Used when data is exported from BIM software

Appendix:

Sample BIMPxP and JBIMPxP

This is a SAMPLE of a BIMPxP and JBIMPxP. Teams are to use this as a guide and the information included should be listed at a minimum.

Title Page

This page should include the Project Name, Author and Date at a minimum.

Table of Contents

Sample Content listed below:

At a minimum the BIMPxP and JBIMPxP should address the following:

- BIM Project Execution Plan Overview
- Project Information
- Key Project Contact
- Project Goals / BIM Uses
- Organizational Roles / Staffing
- BIM Process Design
- BIM Information Exchanges
- BIM and Facility Data Requirements
- Collaboration Procedures
- Quality Control
- Technological Infrastructure Needs
- Model Structure
- Project Deliverables
- Delivery Strategy / Contract

Execution Plan Overview

The purpose of the BIM Execution Plan is to clearly and concisely detail the strategy for the use of BIM technologies and the results thereof. To successfully implement Building Information Modeling (BIM) on a project, the project team has developed this detailed BIM Project Execution Plan. The BIM Project Execution Plan defines uses for BIM on the project (e.g. design authoring, design coordination, field and shop drawings), along with a detailed design of the process for executing BIM throughout the project lifecycle.

The purpose of this plan is to outline the processes required in order to:

- Conduct information exchanges and handoffs
- Define how models and model data will be compiled, reviewed, and managed

- Review the Contract Documents and other trades' 3D / BIM shop drawings
- Manage BIM coordination meetings
- Communicate with the project team regarding building systems planning and coordination
- Document all issues, discrepancies, conflicts, and constructability reviews with team
- Issue action lists to responsible parties with deadlines
- Facilitate decision processes required to resolve all issues discovered in 3D / BIM review
- Verify that coordination assignments are completed
- Verify and maintain accurate as-built 3D / BIM files
- Provide Owner with a final, complete, coordinated model for future use with as-built conditions

Project Information

Project Information (items 1-5 to be provide in every BIM deliverable)

1. Project Owner:
2. Project Name:
3. Project Location/ Address:
4. Project Numbers
5. Brief Project Description:
6. Contract type

Project Schedule

Project Phase	Estimate Start date	Estimate Completion Date	Project Stake Holders Involved

Terminology

BIM (Building Information Modeling): A process involving the generation and management of digital representations of physical and functional characteristics of a facility.

Add Terms as needed for project clarification.

BIM Goals & Objectives

State BIM Goals and Objects for all project participants.

BIM Uses

Y	Plan	Y	Design	Y	Construct	Y	Operate
	PROGRAMMING	Y	DESIGN AUTHORING		SITE UTILIZATION PLANNING		BUILDING SYSTEM ANALYSIS
	SITE ANALYSIS	Y	PROGRESS REVIEWS	Y	CONSTRUCTION SYSTEM DESIGN		ASSET MANAGEMENT
	EXISTING CONDITION MODELING	Y	3D COORDINATION AND CLASH DETECTION	Y	COORDINATION AND CLASH DETECTION		SPACE MANAGEMENT AND TRACKING
	NAMING CONVENTIONS		STRUCTURAL ANALYSIS		DIGITAL FABRICATION		DISASTER PLANNING
	CAMPUS MASTER MODEL INTEGRATION		ENERGY ANALYSIS	Y	RECORD MODEL	Y	BIM2MAXIMO
			LIGHTING ANALYSIS		FIELD AND MATERIAL TRACKING		EXISTING CONDITION MODELING
		Y	PROGRAM VALIDATION		DIGITAL LAYOUT – BIM2FIELD	Y	CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBie)
			MECHANICAL ANALYSIS		COST ESTIMATION (5D)		
			OTHER ENG. ANALYSIS SUSTAINABILITY (LEED) EVALUATION		LASER SCANNING AND POINT CLOUD INTEGRATION		
			CODE VALIDATION				
			PRELIMINARY CONSTRUCTION SCHEDULING (4D)				
			COST ESTIMATION (5D)				
		Y	AS BUILT MODEL				
		Y	EXISTING CONDITIONS MODELING				
			CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBie)		CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBie)		

For each BIM Use selected, identify the team within the organization (or organizations) who will staff and perform that Use.

BIM USE	ORGANIZATION	NUMBER OF TOTAL STAFF FOR BIM USE	LOCATION(S)	LEAD CONTACT
3D coordination	Contractor A			
	B			
	C			

BIM Planning & Preparation

This section outlines the various resources that need to be brought together in order to successfully initiate, manage, and complete the processes defined above:

- Contacts, Roles and Responsibilities
- Communications Methods & Procedures
- Software and Hardware Requirements
- File Formats
- File Exchange Methods & Procedures
- Schedule / Milestone

Contacts

ROLE	ORGANIZATION	NAME	EMAIL	TIME ZONE	PHONE
Project Manager	AGENT	[John Doe]			
Project Manager	AFCEE				
District BIM Manager	AGENT				
Project Manager(s)	[Company]				
BIM Manager(s)	[Company]				
Architecture Lead	[Company]				
Civil Lead	[Company]				
Electrical/Telecom Lead					
Fire Protection Lead					
Mechanical Lead					
Plumbing Lead					
Structural Lead					
Other Project Roles					

Roles and Responsibilities:

Each Team member that has modeling responsibilities will provide a BIM/Coordination Manager. This role can be combined with other roles but is their responsibility to attend or be involved in the coordination process which includes but is not limited to 3D model based coordination meetings and model review meetings. This person will have decision making abilities to make adjustments to layout and coordination during the modeling process.

Role	Responsibility
Design / Construction BIM Manager	
BIM Coordinator	
Model Manager	

Communications Methods & Procedures:

Model managers shall be the point of contact for all model coordination. File sharing shall be accomplished via the use of an online file-transfer site (XX) to allow access and sharing of all necessary information, documents, and models. (XX) will setup and grant all of the consultants' access rights.

Modeling

Origin Monument, Location, and Base

(xx) will provide (XX) with the origin monument, grids and levels. The starting origin shall be the Location with Project Base Point (PBP) aligned. The column grid starting point of A-1 will align with the starting origin mentioned.

Units shall be Imperial units. Grid intersection A-1 of the structural grid found on sheet ( ) and elevation 0'-0" (T.O.S. GROUND FLOOR (+16'-6" NGVD)) shall be used as the origin point for all models, and an object named "ORIGIN MONUMENT," and placed on a unique layer named "ORIGIN MONUMENT", 12"x12" in plan and 100 feet high shall be inserted at the origin point of all files in accordance with the below example diagram.

Scope of Work & Level of Development

Discipline Model	LOD	Modeler	Responsible Party for QA/QC	Notes
Architecture				
Structural				
Mechanical				
Electrical				
Plumbing				
Fire Protection				
Furnishing (appliance)				
Furnishing (casework)				

Software and/or Hardware Requirements

List software used to create BIMs.

File Formats

Per FIU BIM to Standard.

Software:

BIM USE	USER	SOFTWARE	VERSION
DESIGN AUTHORING	ARCH	XYZ DESIGN APPLICATION	
DESIGN AUTHORING	STRUCTURAL	XYZ DESIGN APPLICATION	
DESIGN AUTHORING	MECHANICAL	XYZ DESIGN APPLICATION	
DESIGN AUTHORING	ELECTRICAL/TELECOM	XYZ DESIGN APPLICATION	
DESIGN AUTHORING	PLUMBING	XYZ DESIGN APPLICATION	
DESIGN AUTHORING	FIRE PROTECTION	XYZ DESIGN APPLICATION	
DESIGN AUTHORING	CIVIL	XYZ DESIGN APPLICATION	
4D MODELING		4D MODELING SOFTWARE	
COST ESTIMATION		COST ESTIMATION SOFTWARE	
EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING SOFTWARE	
SITE UTILIZATION PLANNING		SITE UTILIZATION PLANNING SOFTWARE	
CONSTRUCTION SYSTEM DESIGN		CONSTRUCTION SYSTEM DESIGN SOFTWARE	
DIGITAL FABRICATION		DIGITAL FABRICATION SOFTWARE	
3D CONTROL AND PLANNING		3D CONTROL AND PLANNING SOFTWARE	
3D COORDINATION		3D COORDINATION SOFTWARE	
DESIGN REVIEWS		DESIGN REVIEWS SOFTWARE	
STRUCTURAL ANALYSIS		STRUCTURAL ANALYSIS SOFTWARE	
LIGHTING ANALYSIS		LIGHTING ANALYSIS SOFTWARE	
ENERGY ANALYSIS		ENERGY ANALYSIS SOFTWARE	
LEED EVALUATION		LEED EVALUATION SOFTWARE	
CODE VALIDATION		CODE VALIDATION	
PROGRAMMING		PROGRAMMING	
SITE ANALYSIS		SITE ANALYSIS	

Model Requirements

Per FIU BIM Standard

Coordination and BIM Management

Coordination Procedures

Coordination Strategy:

The coordination team will meet weekly to discuss coordination. Every (XX) meeting will be a mandatory on-site meeting. The other meetings will be held via (xx). It is the responsibility of each trade contractor to have their work completed and ready to review 48 hours prior to the meeting each week.

MEETING TYPE	REQUIRED PER CONTRACT	PROJECT STAGE	FREQUENCY	PARTICIPANTS	LOCATION
BIM REQUIREMENTS KICK-OFF					
BIM EXECUTION PLAN DEMONSTRATION	YES			w/ AGENT	
DESIGN COORDINATION					
OVER-THE-SHOULDER PROGRESS REVIEWS	YES				
ANY OTHER BIM MEETINGS THAT OCCURS WITH MULTIPLE PARTIES					

Each trade is responsible for:

- Duplicate Items in same place: Please verify prior to uploading your models to the File Exchange Project Folder that you do not have duplicate components in the same place. This can cause parts counts to be off as well as false clashes during coordination verification.
- Self-Intersecting Models: Verify that parts do not self-intersect in the same system (ex. Pipes crossing each other without fitting attachments).
- Run clash detection analysis for their respective trade system against the Architectural/Structural design models to ensure that there are no conflicts between the architectural/structural elements and their system(s).
- Post updated drawings/models at least once per week only if changes have occurred, and 48 hours prior to the clash detection analysis run by the BIM Manager.
  Clash reports will be run for MEPF systems in conflict with other trades and systems. A clash analysis report will be generated by the BIM Manager which involves looking at each individual clash, and documenting it, by saving the appropriate viewpoints. The Manager will create a (XX) file showing the clash viewpoints and corresponding PDF showing clashes. This clash report and (XX) file will be posted to the file exchange project folder and corresponding notice sent by the Manager to all parties involved.

- Review the clash detection report generated by the BIM Manager before the weekly meeting and arrive at the meeting prepared to address the unresolved clashes in a constructive manner.
- Each trade is required to collaborate with each other trade through email, telephone and in person to resolve basic clashes outside of the weekly coordination meetings. A report will be generated by each trade documenting the resolutions of basic clashes. It is expected that the weekly coordination meetings are held to address difficult areas that are not able to be coordinated between the multiple trades themselves. At these meetings, the resolution will be mutually agreed upon by involved parties, and a trade will be assigned as having to "move." This assigned trade will adjust the respective model and repost it for the following weeks meeting. All trades are responsible to update and post the changes agreed upon prior to the following coordination meeting.

File Exchange Methods & Procedures

File exchange will be conducted via (XX). Each consultant will receive an invitation to access the project folder. (XX) will be responsible for maintaining and integrating all of the 3D trades' models into a single consolidated master model. This master model will be available to all parties for review. The master model will be updated weekly and accessible for download from (XXX).

Each party will be required to notify all affected trades on the contact list when a new file is uploaded. The sooner that people have access to the updated files, the better coordinated all of the trades can be. An effort will be made to automate the notification system directly from the Exchange Server being used.

Preliminary BIMs will be provided by ( ) at the start of the project and will include Base, Architectural, and Structural models. This will serve as a framework for MEP trades to begin modeling their systems.

(XX) will provide an updated (xxx) coordination model weekly showing clashes and notations. Each party is responsible for reviewing the saved reports and all notes each week as the new document is published. Even if said clashes or notes are not resolved before they have been assigned, please be prepared to discuss the clashes and notes in the following coordination meetings.

Once the updated coordination model is released, all previous models should be archived, considered previous revisions and no longer valid to model from.

(XX) will combine and review the newly updated files and will re-check for clashes and verify changes. This will become the new basis for the next master coordination model and will include any new viewpoints, notes, redlines and clashes.

The weekly coordination meetings will require all parties inclusive of all sub-contractors as well as the (XX)' BIM Manager and Project Team Member to be available by both telephone and webcast or in person if applicable.

This process will be repeated and coordination meetings will continue until all members sign off on the final design and construction procedures.

File Naming Structure

Per FIU BIM Standard.

BIM Hierarchy Protocols

The project team will decide the construction order and location. Precedence and priority will also be defined for critical areas.

Each trade / system will get a modeling priority number from 1 to 5

BIM coordination process follows a traditional sequence of drawing/modeling those systems with the most constraints on their routing and then following with those trades that have more flexibility in their placement. Coordination will be expected to start as soon as contracts are awarded and follow the typical sequence:

1:

2:

3:

Change Management

The process of BIM Coordination is the process of continually updating and managing changes to trade-specific Models. Those changes result from 'clashing' models against each other and deciding which trade needs to move in order to 'clear' a clash or conflict.

(XX) will model following an agreed-upon hierarchy system. Clash Avoidance methods will be used based on that system.

While individual disciplines need to take care to 'avoid' clashing against another by following predetermined priorities and zones, the clash detection and resolution process -- aka BIM Coordination -- shall be repeated enough times to clear all constructability conflicts. Some refer to this process as the "Lather, Rinse, Repeat" process.

As that process gets repeated, areas will be deemed 'clean', or 'signed-off' on. (XX) and the Trade Contractor for each discipline will make that determination. Only when an area is signed-off on can Layout Drawings be produced for the respective area.

Timeline Schedule of Delivery

Timeline: The modeling and BIM Coordination Process is

Models, Clash Logs, and MIRs --- Weekly

Coordinated / Signed Areas will be delivered as (XX)

Discipline	Project Phase	Modeling Start Date	Modeling End Date	Coordination Start Date	Coordination End Date	Project Stakeholders
Architecture						
Structure						
Electrical						
Mechanical						
Plumbing						
Fire Protection						
Civil / Site						

Shop & Field Implementation & Execution

(XXX) will prepare architectural and structural layouts.

The official Contract Documents are still the traditional Construction Documents along with the Specifications and Qualifications – Subcontractors are not relieved from verifying compliance with CDs.

Final Submission

(XYZ) will deliver final BIMs per trade/or discipline in (XYZ) format, and a federated BIM in (XYZ) format to FIU.

BIM SUBMITTAL ITEM	STAGE	FORMAT	NOTES
QA/QC reports – Model Standards Check Report			
QA/QC reports - Interference Report (2.4.2)			
IFC file			
Native files			
Visualization Model (Navigator, Navisworks, 3dPDF, Google Earth, etc.)			
List of all submitted files (Excel spreadsheet preferred)			
COBie			
Final Design Submittal			
Construction Submittals			
As-Built Submittal (3.6)			
[Other BIM Deliverables]			

BIM Execution Plan

Project Name:

Project Number:

By signing below, this BIM Execution Plan is herewith adopted and agreed upon between the signed companies.

Prime Contractor	Date
Prime Architect	Date
Mechanical Subcontractor	Date
Electrical Subcontractor	Date
Plumbing Subcontractor	Date
Fire Protection Subcontractor	Date
Construction Manager	Date
Owner Project Manager	Date

Model Progression Schedule

DATE									
RP = RESPONSIBLE PARTY	MODEL PROGRESSION SCHEDULE								
	300 / DSG INTENT BIM		350 /CONSTRUCTABILITY COORD		400 / 2D SHOP-DWGS		500 / As-BUILT		
PROJECT CONTROL	LOD	Y/N	LOD	Y/N	LOD	Y/N	LOD	Y/N	COMMENTS
References									
Grid									
Levels									
Location									
Origin									
Spatial									
Occupancy									
Regions									
Rooms									
Spaces									
Project Information									
SITE	LOD	Y/N	LOD	Y/N	LOD	Y/N	LOD	Y/N	COMMENTS
Hardscape									
Existing Conditions									
Temporary Conditions	300								
Curbs & Gutters	300		350				500		
Fencing	300		350				500		
Paved Areas	300		350				500		
Pergolas & Canopies	300		350				500		
Ramps	300		350				500		
Retaining Walls	300		350				500		
Roads	300		350				500		
Services Structures	300		350				500		
Sidewalks	300		350				500		
Site Element Demolition									
Site Element Relocation									
Site Element Remediation									
Special Features	300		350		400		500		
Softscape									
Existing Conditions									
Planting	300				400		500		
Topography	300		350				500		
Trees	300				400		500		
Water Features	300		350		400		500		
Markings & Signage									
MOT (Maintenance of Traffic)	300								
Existing Conditions									
Temporary Conditions	300								
Monument Signs	300						500		
Parking Signage									
Parking Spaces									
Paving Markings									

	Road Signage								
	Temporary Signage								
CIVIL		LOD	Y/N	LOD	Y/N	LOD	Y/N	LOD	Y/N	COMMENTS
Features									
	Existing Conditions								
	Temporary Conditions	300							
	Airfields								
	Earthwork	300						500	
	Recreation Areas								
	Site Clearing								
	Site Development								
	Site Preparation								
	Tunnels								
Services									
	Existing Conditions								
	Temporary Conditions	300							
	Communication Systems	300		350		400		500	
	Electrical	300		350		400		500	
	Fire Protection	300		350		400		500	
	Fuel	300		350		400		500	
	Gas	300		350		400		500	
	Sewer	300		350		400		500	
	Site Lighting	300		350		400		500	
	Specialty	300		350		400		500	
	Storm	300		350		400		500	
	Water	300		350		400		500	
ARCHITECTURAL		LOD	Y/N	LOD	Y/N	LOD	Y/N	LOD	Y/N	COMMENTS
Interior									
	Existing Conditions								
	Drop Ceilings	300		350				500	
	Flooring	300		350				500	
	Furring and Build-outs			350				500	
	Glazing	300		350				500	
	Interior Doors	300		350				500	
	Interior Walls	300		350				500	
	Non-Bearing Columns	300		350				500	
	Pilasters	300		350				500	
	Railings	300		350				500	
	Soffits	300		350				500	
	Toilet Accessories	300		350				500	
	Toilet Partitions	300		350				500	
	Trim Elements	300		350				500	
Exterior									
	Existing Conditions								
	Entry Canopy	300		350				500	
	Curtain Walls	300		350				500	
	Doors	300		350				500	
	Gutters and Spouts	300		350				500	
	Non-Bearing Walls	300		350				500	
	Reveals	300		350				500	
	Specialty Features	300		350				500	
	Sun Control Elements	300		350				500	

All piping to be modeled (LOD 300 = 2'' & Larger) (LOD 350 = 1'' & Larger)

	Trim Elements	300		350				500		
	Windows	300		350				500		
Roofs										
	Existing Conditions									
	Copings	300		350				500		
	Coverings	300		350				500		
	Curbs & Accessories	300		350				500		
	Equipment Screening	300		350				500		
	Lightning Protection			350				500		
	Parapets	300		350				500		
	Soffit & Facia	300		350				500		
	Specialty Features	300		350				500		
	Substrates	300		350				500		
Furnishings										
	Existing Conditions									
	Appliances	300		350		400		500		
	Casework / Cabinetry	300		350		400		500		
	Fixed Furnishings	300		350		400		500		
	Furniture Systems	300		350		400		500		
	Movable Furnishings									
STRUCTURAL		LOD	Y/N	LOD	Y/N	LOD	Y/N	LOD	Y/N	COMMENTS
Substructure										
	Existing Conditions									
	Foundations & Footings	300		350		400		500		
	Grade Beams	300		350		400		500		
	Piles & Pile Caps	300		350		400		500		
	Slabs on Grade	300		350		400		500		
	Specialty Foundations	300		350		400		500		
	Stem Walls	300		350		400		500		
Superstructure										
	Existing Conditions									
	Beams & Joists	300		350		400		500		
	Bridging					400		500		
	CMU Walls	300		350		400		500		
	Columns	300		350		400		500		
	Conveying Pits and Sumps	300		350		400		500		
	Curbs	300		350		400		500		
	Equipment Support Framing	300		350		400		500		
	Expansion Joints	300		350		400		500		
	Floor Deck Structures	300		350		400		500		
	Lintels & Tie Beams	300		350		400		500		
	Ramps	300		350		400		500		
	Retention Walls	300		350		400		500		
	Shear Walls	300		350		400		500		
	Specialty Structures	300		350		400		500		
	Stairs	300		350		400		500		
	Stiffeners & Bracing					400		500		
	Tie Columns	300		350		400		500		
	Trusses	300		350		400		500		
MECHANICAL		LOD	Y/N	LOD	Y/N	LOD	Y/N	LOD	Y/N	COMMENTS
	Existing Conditions									
	Heating System Equipment	300		350		400		500		

	Access panels	300		350		400		500	
	Controls & Instrumentation	300		350		400		500	
	Cooling System Equipment	300		350		400		500	
	Diffusers & Dampers	300		350		400		500	
	Distribution Equipment	300		350		400		500	
	Duct Fittings & Accessories	300		350		400		500	
	Flexible Ductwork	300		350		400		500	
	Hangers					400		500	
	Louvers	300		350		400		500	
	Mechanical Piping	300		350		400		500	
	Pipes Fittings & Accessories	300		350		400		500	
	Registers & Grills	300		350		400		500	
	Rigid Ductwork	300		350		400		500	
	Risers	300		350		400		500	
	Servicing / Maintenance Areas	300		350		400		500	
	Sleeves	300		350		400		500	
	Specialty HVAC Systems & Equipment	300		350		400		500	
	System Clearances	300		350		400		500	
	Terminal & Package Units	300		350		400		500	
ELECTRICAL		**LOD**	**Y/N**	**LOD**	**Y/N**	**LOD**	**Y/N**	**LOD**	**Y/N**
	Existing Conditions								
	Risers	300		350		400		500	
	Access panels	300		350		400		500	
	Cable Trays	300		350		400		500	
	Data Racks	300		350		400		500	
	Distribution Conduit < 1-1/2"	300		350		400		500	
	Distribution Conduit > 1-1/2"	300		350		400		500	
	Electrical Equipment	300		350		400		500	
	Hangers					400		500	
	Junction Boxes	300		350		400		500	
	Lighting Fixtures	300		350		400		500	
	Panels	300		350		400		500	
	Power Devices	300		350		400		500	
	Receptacles & Switches	300		350		400		500	
	Sleeves	300		350		400		500	
	Specialty Electrical Systems	300		350		400		500	
	Switchgear	300		350		400		500	
	System Clearances	300		350		400		500	
	Transformers	300		350		400		500	
PLUMBING		**LOD**	**Y/N**	**LOD**	**Y/N**	**LOD**	**Y/N**	**LOD**	**Y/N**
	Existing Conditions								
	Plumbing Fixtures	300		350		400		500	
	"Flexible" Pipe & Fittings < 1"							500	
	Access panels	300		350		400		500	
	Hangers					400		500	
	Plumbing Accessories	300		350		400		500	
	Plumbing Equipment	300		350		400		500	
	Rain Water Drainage	300		350		400		500	

All piping to be modeled (LOD 300 = 2'' & Larger) (LOD 350 = 1'' & Larger)

All piping to be modeled (LOD 300 = 2'' & Larger) (LOD 350 = 1'' & Larger) Junction Boxes modeled only when connected to conduits that are modeled or if embedded into concrete slab.

All piping to be modeled (LOD 300 = 2'' & Larger) (LOD 350 = 1'' & Larger)

Rigid Piping & Fittings	300		350		400		500		
Risers	300		350		400		500		
Sleeves	300		350		400		500		
Specialty Plumbing Systems	300		350		400		500		
System Clearances	300		350		400		500		
FIRE PROTECTION	**LOD**	**Y/N**	**LOD**	**Y/N**	**LOD**	**Y/N**	**LOD**	**Y/N**	**COMMENTS**
Existing Conditions									
Risers	300		350		400		500		
Sprinklers & Drops	300		350		400		500		
Rigid Piping & Fittings	300		350		400		500		
Fire Protection Equipment	300		350		400		500		
Accessories	300		350		400		500		
Drain Valves	300		350		400		500		All piping to be modeled (LOD 300 = 2'' & Larger) (LOD 350 = 1'' & Larger)
Standpipes	300		350		400		500		
Access panels	300		350		400		500		
System Clearances	300		350		400		500		
Sleeves	300		350		400		500		
Hangers					400		500		
Specialty Fire Protection Systems	300		350		400		500		
Specialty Fire Protection Accessories	300		350		400		500		
SECURITY	**LOD**	**Y/N**	**LOD**	**Y/N**	**LOD**	**Y/N**	**LOD**	**Y/N**	**COMMENTS**
Existing Conditions									
Cameras	300		350		400		500		
Alarms	300		350		400		500		
Card Readers	300		350		400		500		
Sensors	300		350		400		500		
Control Systems	300		350		400		500		
SPECIALIZED SYSTEMS	**LOD**	**Y/N**	**LOD**	**Y/N**	**LOD**	**Y/N**	**LOD**	**Y/N**	**COMMENTS**
Specialty Construction									
Existing Conditions									
Specialty Building Features									
Specialty Systems	300		350		400		500		
Specialty Instrumentation									
Conveying Systems									
Existing Conditions									
Baggage Handling System									
Elevators & Lifts	300		350		400		500		
Escalators & Moving Walks	300		350		400		500		
Other Conveying Systems									
Equipment									
Existing Conditions									
Access Zones									
Clearance Zones	300		350		400		500		
Commercial Equipment									
Institutional Equipment									
Laboratory Equipment									
Other Specialty Equipment									

Deliverable Summary

This table is a summary overview. Please read the Standard for complete details and requirements.

	Deliverable	Responsibility	Software
Contract Award	Final BIMPxP	Design Team	Word
Conceptual Schematic Phase	Architectural Massing Model Preliminary Energy/ Solar Orientation Analysis	Design Team	Revit for A/MEP,S Analysis in approved alternative.
Advanced Schematic Design Phase	Architectural Model Schematic Energy Model Program & Space Validation Massing Model Civil Model COBie Data	Design Team	Revit for A/MEP,S Revit or Civil 3D for Civil Program Validation Revit or approved alternative.
Design Development	Architectural Model Civil Model(s) MEP Model(s) Structural Model Program Validation Report Discipline Interference Reports Sustainable Design & LEED Credit Documentation COBie Data	Design Team	Revit for A/MEP,S Revit or Civil 3D for Civil Navisworks for Design Coordination Program Validation, Sustainability / LEED review in Revit or approved alternative.
Construction Documents **LOD 300 BIMs**	Architectural Model Civil Model MEP Model(s) Structural Model Pre-bid Collision Report Phasing Models (if applicable) COBie Data	Design Team	Revit for A/MEP,S Revit or Civil 3D for Civil COBie Data sets Navisworks for Design Coordination IFC export from certified software (for Record Keeping & Interoperability)
Bidding & RFP& RFP	Federated Design BIM Model Design BIMPxP	Design Team Owner	Navisworks PDF

Construction Phase **<u>LOD 350 BIMs</u>**	Coordination Models Collision Reports Architectural MEP/ FP Models Structural Models Fabrication Models (LOD 400 if elected) Phasing Models COBie Data	Construction Team (GC & Trades)	Navisworks for Clash Detection & Coordination for Installation Trade models must be in file formats compatible with Navisworks
Project Close-out **<u>LOD 500 BIMs</u>**	As Built Models Record Documents Project Drawings O &M Manuals COBie Data	Construction Team	Navisworks Model Revit & Civil 3DArch/Struct/MEPF/Civil IFC export in latest format (for Record Keeping & Interoperability) – Arch/Structural/MEP COBie Data sets.

Glossary

2D Two dimensional

3D Three dimensional

4D BIM + Schedule (Time) = 4D

5D BIM + Cost = 5D

A/E Architect and Engineer

AHJ Authorities Having Jurisdiction (AHJ)

As-Constructed BIM The updated Contractor BIMs which represent what was installed in the field.

As-Built BIM Design Intent Models that have been updated throughout the construction process. These changes and updates have been communicated from the GC to the Designer through comments, annotations and mark-ups from the As-Built Documents or red lines.

BIM Building Information Model or Building Information Modeling

BIM Proficiency Matrix A matrix design to measure the expertise of the firm as it relates to using BIM on a project.

BIMPxP Building Information Modeling Project Execution Plan

BPM BIM Project Manager

CAD Computer-Aided Design

CAFM Computer- Aided Facility Management

CD Construction Documents

CMMS Computerized Maintenance Management System: A type of management software that performs functions in support of operations and maintenance (O&M) programs.

COBie Construction Operation Building Information Exchange. An information standard that captures facility data generated during the facility's design, construction and commissioning phases. It is a data Specification.

CPS COBie Progression Schedule

Construction BIM Building Information Model typically representing a single building system created for purposes of planning, scheduling, coordinating, fabricating, and installing during construction. Model elements are accurate in terms of size, shape, location, quantity and orientation and may include fabrication, assembly, detailing and non-geometric information. MEPF System models include COBie

	data. Construction BIMs are maintained in the native format of the authoring software.
Coordination BIM	Composite model that includes multiple Design or Construction BIMs, registered spatially, used for the purpose of interference checking (clash detection), visualization and 4D applications during construction. Coordination BIMs are maintained in the native format of the coordination software.
CI	Contractor Installation
Csa	Contractor Submittal Approval
D100	100% Design Stage / Construction Document
DB	Design Build
DD	Design Development
DQC	Deliverable Quality Control
DWG	DWG is a binary file format used for storing two and three dimensional design data and metadata. It is the native format for several CAD packages.
Federated Model	An aggregation of Models in a single database.
FLCM	Facility Life Cycle Management
FM	Facility Management or Facility Manager
IFC (2X3)	Industry Foundation Classes: an object oriented neutral file format with a data model developed by the buildingSMART (International Alliance of Interoperability, IAI) to describe, exchange and share information typically used with the building and facility management industry sector. IFC (2X3) is an International Standard. (ISO 16739)
JBIMPxP	Joint BIM Project Execution Plan
Level of Detail	The amount of parts modeled inside an object or system.
LOD	Level of Development. The specific minimum content requirements and associated Authorized Uses or each Model Element at six progressively detailed levels of completeness.
MasterFormat	, a publication of CSI and CSC, is a master list of numbers and titles classified by work results. It primarily used to organize project manuals and detailed cost information, and to relate drawings notations to specifications.
MEPF	Mechanical, Electrical, Plumbing, Fire Protection
MIR	Model Information Request

MPS	Model Progression Schedule (MPS) also known as the Model Element Table as referenced in the AIA G202 document and is a matrix that defines specific model elements by Uniformat classification.
NBIMS	National Building Information Modeling Standard- United States, Version 2 (NBIMS-US v2)
OmniClass	OmniClass Construction Classification System – Open Source- is a classification system for the construction industry. It incorporates other extant systems currently in use as the basis of many of its Tables – MasterFormat for work results and UniFormat for elements.
PxP	Project Execution Plan
Record BIM	The updated BIMS that come from the architect that includes the contractors AS Constructed BIMS.
RFI	Request for Information
RFP	Request for Proposal
RFQ	Request for Qualifications
RP	Responsible Party
SD	Schematic Design
VDC	Virtual Design and Construction
VDCO	Virtual Design Construction and Operation (VDCO)
VMP	Version Management Process

Acknowledgements

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Developed by: FIU BIM Committee: Chaired by Mr. Brian Perez

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References Used:

National Building Information Modeling Standard – United States, Version 2 (NBIMS- US v2)

BIM Forum's 2013 LOD Specification

Construction Specification Institute (CSI) 2011 OmniClass Tables

LACCD Building Information Modeling Standard

University of Florida BIM Guides & Standards

Indiana University BIM Guideline

VA BIM Guide 2012

Broward County Aviation Department (BCAD) - BIM Standard

George Tech University

USC BIM Guidelines