EMORY UNIVERSITY Campus Services

Document Delivery Standards

2016 Edition

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CONTENTS

SECTION 1: INTRODUCTION

This standard is intended as a foundation for information sharing, and it will serve to simplify the transfer of data from the original building, or facility design applications to Emory University's Facility Management applications. The ultimate goal, through the development and enforcement of this standard, is to ensure create of an accurate and consistent electronic database and archive, or "information model," which can be made available throughout the entire life-cycle of its facilities, for purposes other than the original construction.

Recognizing the evolving nature of computer technology, Emory is committed to the development of this standard to keep pace with technology as it relates to current business practices in the AEC and facilities management industries. To this end, Emory University has adopted the United States National CAD Standard (NCS), Version 4.0, jointly published and copyrighted by the NIBS (*National Institute of Building Sciences,* the AIA *(American Institute of Architects),* and the CSI *(Construction Specifications Institute).* By adopting the NCS, the burden of maintaining a proprietary standard is eliminated, and the maintenance of electronic facility information is greatly streamlined and enhanced. For more information, please go to *http://www.buildingsmartalliance.org/ncs/*.

This standard is solely intended for informational purposes only, and the requirement and submission of Drawings, Specifications and other documents in electronic format does not change any contractual or legal requirements. All electronic data/CAD documentation produced by the consultant will become the property of the University in accordance with project contract. The documentation may be re-used by the University without any additional compensation to the consultant. The consultant will not use the data/CAD documentation produced for non-project purposes without the written permission of the University. The following is the only acceptable disclaimer that shall be placed on any electronic document submittal:

> The submitted electronic file versions of Drawings, Specifications and other documents have been prepared specifically for this project. The information may be compiled from many sources and to the best of the Author's knowledge is accurate to industry standards, however, all information has NOT been field verified. Any and all uses of these files, or the information contained herein, is bound to the same terms and conditions specified under "Use of Architect's Drawings, Specifications and other Documents", as may be amended, of the Architect/Owner Agreement for this project.

A note on BIM (Building Information Modeling)

Building Information Modeling (BIM) is rapidly transforming the practice of AEC document production. Many architectural and engineering firms are adopting this technology as their preferred design application, which has important implications on the entire project delivery process. Refer to the Emory contract for specific requirements in relation to the use and application of BIM. When a consultant uses a BIM application as part of the project delivery process, the consultant must provide Emory with the final model(s) upon substantial completion. This does not, however, relieve the other requirements set forth in this standard.

FICM (Facilities Inventory Classification Manual)

For space planning and facilities management purposes, Emory classifies all of its built space according to the *Facilities Inventory Classification Manual (FICM),* produced by the Post-Secondary Education, last updated in 2006, with the following exceptions:

1) Emory does *not* include any covered, yet open exterior space in gross square footage calculations.

2) Emory *does* include unfinished attic space that contains major mechanical equipment, regardless of headroom height, in gross square footage calculations.

3) Emory considers atriums and double height volumes as floor openings, and this square footage is factored into the GSF.

For more information on FICM, go to http://nces.ed.gov/pubs2006/ficm/index.asp. **All consultants must use this standard's methodology when performing and providing area calculations.**

Clarification of Emory University's 'As-Built' Definition

In 2009, Emory University implemented proprietary contract documents. These documents use the following criteria to define Record Documents and Progress Documents. For the purposes of these Standards, *Record Documents* refer to Architectural 'As Designed' documents and *Progress Documents* refer to GC/CM 'As-built' documents.

Record Documents are the final version of the Construction Documents that have been modified by Architect/Engineer at Final Completion to reflect the "as-built" or actual in-place construction shown in the final Progress Documents, referencing all Changes, Requests for Information, Supplemental Instruction and Existing Conditions affecting such construction.

Progress Documents are Construction Documents that Construction Manager regularly updates during the progress of the Work to reflect the "as-built" or actual in-place construction, referencing all Changes, Requests for Information, Supplemental Instructions, and Existing Conditions affecting such Work.

SECTION 2: SUMMARY OF BASIC REQUIREMENTS & DELIVERABLES

For practical purposes, construction projects can be classified into the following 4 basic types, based on scope, cost, and impact to the structure / infrastructure:

1) **Interior Project:** Typically finishes and furniture.

2) **Equipment/Utility Project:** replacement / repair of existing equipment, as maintenance. Alteration to utility infrastructure, usually outside of any structure.

3) **Minor Renovation:** some alteration to structure, architectural, or building system, generally less than $100,000.

4) **Capital Project:** A new building or major alterations to structure, architectural, or building system, more than $100,000.

The electronic documentation requirements, (including acceptable file format) for each project type will vary and are summarized below. While an effort has been made to apply practical expectations for each type of project, please note that paper documents should be converted to electronic via scanning, with the goal of making all of the information accessible through the Emory intranet. Also, if drawings were created with CAD, then the documentation *must* be submitted in DWG format. The lists should be understood to be distinct types of information, not necessarily a separate document, as one document could conceivably contain more than one type of information, or each information item may take more than one document.

All submitted documentation, regardless of format shall be labeled with the Emory building ID number, as well as either the capital project number or work order number associated with the project, without exception. For an explanation of the Emory building ID, please refer to **Section 4, Room Numbering Guide**. The Emory project manager will be responsible for communicating that the proper project number is communicated to the contractor.

The following is a summary of expected electronic documentation to be submitted for each project type, and each item should be considered as applicable to the particular project's scope of work:

1) **Interior Project:**
   - Finish schedule or finish specifications (XLS, DOC, PDF, DWG)
   - Finish plan, showing location of specified finishes (PDF, DWG)
   - Furniture specifications (XLS, DOC, PDF, DWG)
   - Furniture plan, showing location of all furniture (PDF, DWG)
   - Signage plan, showing all signage locations and specifications (PDF, DWG)
   - Warranties (PDF)
   - Paint color schedule with manufacturer's paint mixture formulas.
   - Cleaning care instructions for all finishes
   - Schedule of installed finishes.

2) **Equipment/Utility Project:**
   - Equipment Specifications and O&M manuals (PDF, DOC, HTML)

- Equipment plan, showing location of replacement equipment (PDF, DWG)
- Shop drawings (PDF, DWG)
- All pertinent discipline drawings and specifications, especially civil topological or utility surveys. If a civil survey was not produced, any utility location reports (PDF,DWG)
- All Civil utility and topological surveys should be compatible with AutoCAD Map 3D, without loss of fidelity, and be GIS referenced to the Georgia State Plane coordinate system.
- Warranties (PDF)
- Test Reports, such as Testing and Balance, fire pump test (DOC, XLS, PDF)

3) Minor Renovation:

- **Any items from #1 or #2 that apply**
- Progress Documents (as -builts) Drawings from the contractor (PDF, DWG)
- All architectural drawings and specifications created to permit, or complete the project (PDF, DWG)
- All major discipline drawings and specs, (eg. mechanical or electrical) if affected (PDF, DWG)
- All subcontractor shop drawings, used to fabricate or install elements (PDF, DWG)

4) Capital Project:

- **Any items from #1, #2, or #3 that apply**
- **Additional requirements that apply to Capital Projects:**
  - As early in the design development phase as possible, and **no later than the 100% DD submittal**, all architectural floor plans ***must*** be submitted with a written request for CS IT to provide a room numbering scheme in time for the final room numbers to be placed on all drawings in the 100% CD set. (PDF, DWG) (refer to **Section 4, Space Numbering Guide**, for details)
  - At 100% CD phase, all major discipline drawings (TIF, PDF, or DWG) **with the additional requirement that all architectural floor plans, roof plans, and attic plans must be submitted in DWG format. (see Section 3, Emory Space Planning file format)**
  - At substantial completion, or no later than 90 days afterwards, all Record Documents from the architect as defined and described in the contract ***must*** **be submitted in DWG format.**
  - All Progress Drawings (as-builts) from the contractor as defined and described in the contract. The following list of Progress Drawings (as-builts) must be included:
    - Record drawings from the A/E team for all disciplines.
    - Civil – water system Progress Documents (as -builts) from the Contractor.
    - Civil – sanitary sewer system Progress Documents (as -builts) from the Contractor.
    - Civil – storm sewer system Progress Documents (as -builts) from the Contractor.
    - Irrigation – irrigation system Progress Documents (as-builts) from the Contractor.
    - Site mechanical – steam system Progress Documents (as -builts) from the Contractor.
    - Site mechanical – chilled water system Progress Documents (as -builts) from the Contractor.
    - Site – natural gas system Progress Documents (as -builts) from the Contractor.
    - Site – electrical system Progress Documents (as -builts) from the Contractor.

- HVAC piping Progress Documents (as -builts) from the Contractor.
- HVAC ductwork Progress Documents (as -builts) from the Contractor.
- Plumbing Progress Documents (as -builts) from the Contractor.
- Controls submittal Progress Documents (as -builts) from the Contractor.
- Paint color schedule.
- Elevator drawings.
- Electrical Progress Documents (as -builts) from the Contractor.
- Security system Progress Documents (as-builts) from the Contractor.
- Fire Protection (sprinkler) Progress Documents (as -builts) from the Contractor.
- Fire alarm Progress Documents (as -builts) from the Contractor.

Emory standard discipline and drawing type indicators

For the purpose of creating a searchable archive, Emory classifies all drawings according to one of the following disciplines and drawing type. If a consultant chooses to name a drawing by a discipline or type not included in the list below, it must be submitted with a file name that begins with the closest discipline's letter designator, and end with the closest drawing type's two-letter designator.

Discipline	Type	Type (continued)
		SV – SURVEY
EC - EMERGENCY CONTACT	**CP** - CEILING PLAN	**UP** - UTILITY PLAN
EV - EMERGENCY VALVE	**DP** - DEMOLITION PLAN	**LC** - LIFE CYCLE
N - NETCOM	**DT** - DETAILS	**RP –** ROOF PLAN
V - EVACUATION	**EP** - ELECTRICAL PLAN	**PW –** POWER PLAN
A - ARCHITECTURAL	**EL** - ELEVATIONS	**SR –** SECURITY
C - CIVIL	**QP** - EQUIPMENT	**AV –** AUDIO VISUAL
E - ELECTRICAL	**XP** - EXISTING PLAN	**CM –** COMMUNICATION
G - GENERAL	**FS** - FIRE SAFETY	**RD –** RISER DIAGRAM
M - MECHANICAL	**KP** - FIRE SPRINKLER AND PIPING	**OD –** ONE LINE DIAGRAM
P - PLUMBING	**FP** - FLOOR PLAN	**OT –** OTHER
S - STRUCTURAL	**NP** - FOUNDATION PLAN	**FH –** FINISH PLAN
I - INTERIOR	**GP** - GRADING AND DRAINAGE	**EN –** ENLARGED PLAN
Q - EQUIPMENT	**HP** - HVAC PLAN	**IR –** IRRIGATION PLAN
F - FIRE PROTECTION	**LP** - LIGHTING PLAN	**SD –** SHOP DRAWINGS
L - LANDSCAPE	**NA** - NOT AVAILABLE	**CT –** CONTROLS
LC - LIFE CYCLE	**DG** - PHASING DIAGRAM	**PR –** PROFILE
HA – ABATEMENT	**PZ** - PIPING	**RW –** ROADWORK
	PP - PLUMBING PLAN	
	SH - SCHEDULES	
	SC - SECTIONS	
	SP - SITE PLAN	

This table illustrates the expected documentation for each project type, and corresponding acceptable formats.

- lower case - acceptable format
- UPPER CASE - preferred format
- underlined text - required format

PDF may be substituted by TIF format. This list may also be used by Emory project managers as a checklist for the specific project requirements. **Documents must be uploaded using Emory's Project Document Upload System as defined in Section 6.**

Emory University reserves the right to refuse acceptance of any electronic documentation that it deems not in compliance with the standards set forth in this document.

Project Type → **Req'd Docs ↓**	**Interior**	**Equipment/ Utility Infrastructure**	**Minor Renovation**	**Capital Project**	**Responsibility**
Record Drawings For All Discplines					**Architect**
Warranty Info / Letter	PDF, doc	PDF, doc	PDF, doc	PDF, doc	Contractor
Operation/Maint. Manual(s)	PDF, doc	PDF, doc	PDF, doc	PDF, doc	Contractor
Finish/Furniture Specs / Plans	PDF, DWG	N/A	PDF, DWG	DWG	Contractor or internal
Equipment Plan	N/A	PDF, DWG	PDF, DWG	DWG	Contractor
Elevator Drawings	N/A	N/A	N/A	DWG, PDF, doc	Contractor
Test Reports	N/A	PDF, xls, doc	PDF, xls, doc	PDF, xls, doc	Contractor
Architectural	PDF, DWG	PDF, DWG *as applies*	PDF, DWG	DWG	Architect
Paint Color Schedule	PDF, doc	N/A	PDF, doc	PDF, doc	Contractor or Internal
Cleaning care instructions for all finishes	PDF, doc	N/A	PDF, doc	PDF, doc	Contractor
Civil	N/A	N/A	N/A	DWG,PDF	Contractor / Architect
Civil-Water System Record Drawings	N/A	DWG, PDF	N/A	DWG, PDF	Contractor
Civil-Sanitary Sewer System Record Drawings	N/A	DWG, PDF	N/A	DWG, PDF	Contractor

Civil-Storm Sewer System Record Drawings	N/A	DWG, PDF	N/A	DWG, PDF	Contractor
Site Mechanical-Steam System Record Drawings	N/A	DWG, PDF	N/A	DWG, PDF	Contractor
Site Mechanical-Chilled Water System Record Drawings	N/A	DWG, PDF	N/A	DWG, PDF	Contractor
Site-Electrical System Record Drawings	N/A	DWG, PDF	N/A	DWG, PDF	Contractor
Site-Natural Gas System Record Drawings	N/A	N/A	N/A	DWG, PDF	Contractor
Site Electrical	N/A	PDF, DWG	PDF	DWG, PDF	Contractor
Electrical Record Drawings	N/A	DWG, PDF	DWG, PDF	DWG, PDF	Contractor
Fire Protection (sprinkler) Record Drawings	N/A	N/A	DWG, PDF	DWG, PDF	Contractor
Fire Alarm Record Drawings	N/A	N/A	DWG, PDF	DWG, PDF	Contractor
HVAC Piping Record Drawings	N/A	DWG, PDF	DWG, PDF	DWG, PDF	Contractor
HVAC Ductwork Record Drawings	N/A	DWG, PDF	DWG, PDF	DWG, PDF	Contractor
Landscape Record Drawings	N/A	N/A	PDF, DWG *as applies*	DWG	Architect
Controls Submittal Record Drawings	N/A	N/A	DWG, PDF	DWG, PDF	Contractor
Plumbing Record Drawings	N/A	N/A	DWG, PDF	DWG, PDF	Contractor
Security / Alarm	N/A	PDF, DWG	PDF, DWG	DWG, PDF	Contractor
Shop Drawings	N/A	PDF, DWG *as applies*	PDF, DWG *as applies*	PDF, DWG *as applies*	Contractor

SECTION 3: CAD Drawing Conventions / BIM Modeling Conventions

A. CAD Drawing Conventions

As stated in the Introduction, Emory University has adopted the National CAD Standard, v 4.0, as a guide for all AEC consultants to use as they are preparing CAD documents for use on Emory projects. All consultants doing business with Emory are strongly encouraged to obtain the necessary license to this document to ensure that the CAD documents that they create are in compliance with NCS 4.0, and it is expected that all CAD files follow the recommendations set forth in this document, to the extent possible.

The NCS 4.0 can be summarized as follows:

- **AIA CAD Layer Guidelines**
  Originally produced by American Institute of Architects, this section describes layer naming hierarchy, such as Discipline Designator, Major Group, Minor Group, and Status fields. All layer names used in submitted CAD files ***must*** comply with these guidelines. (A list of Emory's internal standard layers is given below, with the discussion of the Emory Architectural Template File.)

- **Uniform Drawing System**
  Originally produced by the Construction Specifications Institute, this section is composed of interrelated modules consisting of standards, guidelines, and other tools for the organization of drawing information, and complements the CSI MasterFormat for specifications. Important topics cover file naming conventions, standard abbreviations, and standard symbology. It is expected that all CAD documentation submitted to Emory follow these guidelines to the extent possible.

- **Plotting Guidelines**
  The purpose of this section is to allow consistent black-and-white and color plotting from various configurations within CAD programs. An important development in this area is the fact that most CAD programs have evolved to allow for independent specifications of color and line width through the use of plot styles.

Emory Space Planning Internal Standard and Template

The current CAD operating platform for Campus Services is AutoCAD . It is not required that CAD documentation be created with this platform, but it is mandatory all submitted CAD documentation must be AutoCAD format compatible, and all .DWG files *must* be AutoCAD 2007 or later format. Early CAD file submittals (at or prior to 100% CD) will help identify problems with format.

All electronic files are placed in a web-based Electronic Document Management System (EDMS), and used for reference in maintaining and renovating the facility for the remainder of its life-cycle. This application includes a viewer feature that allows users without a DWG viewer program installed on their computer to view DWG files. It does not, however allow the use of reference files (xref's), and will not

be able to view them. Therefore, all xref files must be bound to the parent file, as well as submitted separately. Additionally, any custom plot style file must be submitted with the parent file.

While most CAD files are placed into the EDMS as received, Campus Services Space Planning modifies architectural floor plans into linked production files for its CAFM application, which incorporates a two-way linkage from the graphic entities in the CAD files to non-graphic attribute data from an Oracle database. Since these files are shared with other applications, and play a vital role in the daily work processes at Emory, they must be maintained in a more rigorous and consistent manner. It therefore follows that in addition to the requirements set forth, Emory makes additional requirements for architectural floor plans, attic plans, and roof plans. An additional set of these drawing types should be submitted using the **Architectural Floor Plan Template** file available on Campus Services' Design and Construction Standard website. In addition to the requirements above, these CAD files have the following requirements:

- Must not contain any additional layers other than those already in the template file.
- Need only the inner and outermost surfaces of the wall components.
- All objects must be placed on the closest appropriate layer, and designated color *'By Layer'.*
- All three dimensional objects must be reduced to 2 dimensions,
- All blocks used, other than those contained in the template file, must be exploded into elemental objects, and placed on one provided layer for each original block definition. All block definitions must be purged from the file.
- Room numbers shall be single-line text, justified top-center, style Romans 10" (R10) and placed on the *'LNK_RM' layer.*

These types of files *must* be submitted no later than the issuance of 100% CD, and again at substantial completion reflecting any changes that may have occurred during the construction process.

List of Internal Standard Layers

0	**A-SITE**
A-ANNO-GRID	**A-SPACE-SHADE**
A-ANNO-MISC	**A-WALL-FIRE**
A-ANNO-SYMB-EVAC	**A-WALL-FULL**
A-ANNO-TTLB-EVAC	**A-WALL-MOVE**
A-ANNO-TTLB-EMLC	**A-WALL-PRHT**
A-ANNO-TTLB-NTCM	**Defpoints**
A-COLS	**E-ANNO-TEXT**
A-DOOR	**G-ANNO-GISL**
A-EQPM-FIXD	**GROSS_LOCATION**
A-FLOR-CASE	**LNK_CATV**
A-FLOR-EVTR	**LNK_DATA**
A-FLOR-HRAL	**LNK_DATA_VOICE**
A-FLOR-LEVL	**LNK_EMP**
	LNK_EQUIP
	LNK_FIBER

A-FLOR-OTLN	**LNK_FLR**
A-FLOR-PFIX	**LNK_LABEL**
A-FLOR-STRS	**LNK_ROOM**
A-GLAZ	**LNK_SPC**
A-ROOF	**LNK_VOICE**
A-ROOF-OTLN	**VP**
Life Safety Plan Requirement:	
A-WALL-FIRE	**Upon completion of construction documents, the Architecture/Engineer shall submit additional Life Safety Plan, in which Fire Walls/Fire Barriers shall be drawn by using layer "A-WALL-FIRE" and indicated fire-resistance rating.**

B. BIM Modeling Conventions

BIM Modeling

The BIM models shall fully describe the design of the building(s) and site for the Project at each phase. They shall include model objects, spaces, assemblies, systems and project data in the form of a building and site model to include design and construction drawings, project manual, product data, and schedules of all building elements and components to describe all design and construction work of the Project in accordance with the BEP. Level of Development guidelines are detailed in SECTION 8: "The BIM Execution Plan (BEP) Guidelines".

The BIM model, comprised of a parametric, interconnected database, allows for modeling, visualization, documentation, and analytical processes. Accurate information, imbedded into each model object, space, assembly and system creates a complete and timeless database for the building.

The BIM model shall be used for design and construction analysis, evaluation, scheduling, costing, bidding and construction and for the BIM Asset Information Database (BIM-AID) over the life of the building. The Project Deliverables are described in the Architectural Contract Deliverables Exhibit, this document, and in the Project's Professional Services Agreements (the AE and the CM/GC Agreements), and in accordance with the BEP.

The Design BIM model is passed from the Architect/ Engineer to the General Contractor upon completion of Pre-Design, Schematic Design and Design Development for pricing and scheduling, and upon completion of Construction Documents. The AE Design BIM Model evolves into the CM/GC Construction BIM Model for use by the General Contractor and the subcontractors and suppliers for final bidding, construction sequencing, scheduling, submittals, shop drawings and fabrication through the construction and closeout, and then to the Owner for as-built drawings and for facilities management over the building's life.

The BIM authorizing software for Architectural objects, spaces, assemblies and systems, and code requirements is to be no higher version than Autodesk Revit 2014. The BIM Execution Plan (BEP) establishes the BIM authoring software for any other models used on the Project to best facilitate construction analysis, evaluation, scheduling, bidding, fabrication and construction.

BIM Model Requirement for Campus Service – Space Management

Upon completion of construction documents, the Architecture/Engineer shall submit copies of Revit models, which is developed by using no higher than Autodesk Revit 2014, to Campus Service Space Planning. Campus Service Space Management team will modified architectural Revit Model into linked production file, which incorporates with a two-way link between the Revit Model and Oracle Database. It therefore follows that in addition to the requirements set forth, Emory makes additional requirements for architectural Revit Model.

- Revit Architectural Modeling Requirement
  - Overlapping of design elements
  - Space encloses. All spaces must be bounded by walls, or room separator if applicable
  - Every space must have a name and room number
  - There is only one space instance per space
  - All walls must be connected to the top of slab at bottom and bottom of slab at top (if full height)
  - Resolve all orphans
  - Since Campus Service Planning will link Revit Model to the Database System and create Web-based 3D modeling to show the usage of space, the following additional requirements will be needed by the Campus Service Space Management team
    - For each space, create a generic floor with the thickness 1/4 inch.
    - Use the room number as the floor type
- Clean up architectural Revit Model by removing
  - Partial floor plan, enlarge plan, etc.
  - Sections
  - Drafting views
  - Detailed views
  - 2D tags, revision clouds
  - 2D component families
  - Linked CAD drawings
- For each floor, keep one floor plan which shows whole floor, and one ceiling plan which shows whole ceiling
- Floor plan should be incorporated with 3D furniture, such as caseworks, lab benches, and etc.
- Revit MEP Modeling Requirements
  - Mapping MEP space numbers and names to architectural space numbers and names
  - There should be the Equipment Schedules in BIM Model categorized by Electrical Equipment, Mechanical Equipment, and Plumbing Equipment. The content of Equipment Schedules should follow by the Section "BIM Data at Closeout – The BIM Asset Information Database (BIM-AID)" in **Emory BIM Guidelines – Scope, Deliverable Progress**, in which the Unique Identifier should be "Asset Tag" provided by Emory.

SECTION 4: Space Numbering Guide

It is the responsibility of Campus Services Space Planning to approve all space numbering schemes, and to provide room numbers in a timely fashion upon receipt of architectural floor plans at the 50% CD phase. The goal is to work with both end-users and the architectural design firm to have final space numbering reflected in all files contained in the 100% CD set. In order to help facilitate this process, below is the Emory Space Numbering Guide, which may be used in early design, and submitted for approval at any time before 100% CD.

There are two equally important purposes for space numbering and the accompanying signage; one is to easily direct a visitor to a person or function, and the second is to manage the space and its attributes within the CAFM database. Therefore ALL spaces MUST be identified and numbered with a unique identifier, even though all spaces may not be given physical signage. This unique identifier will be a combination of three fields, the Emory Building I.D. (a number assigned by CS IT to each building), the Floor ID, plus a unique Space Number.

Following are the basic guidelines:

1. All floors will be designated by a "FLOOR ID" representing the level. This ID should begin with the lowest occupied level as "01". This may be followed by a description i.e. "01" = ENTRY or "02" = PLAZA etc. but the level itself will not be denoted as "Lower Level" or "Plaza Level". If a level is used exclusively for mechanical equipment or is less than ten percent (10%) of the area of a typical floor, it may be designated as "0B" = BASEMENT or "SB" = SUB-BASEMENT. A Floor ID will be assigned to all levels including roofs, penthouses, and penthouse roofs. The intent is to have a designation that clearly denotes the floor location relative to the entire facility. If a new building is to connect to existing facilities, consideration must be given to match the level designation and description of the adjoining facility.

2. If there are less than 10 levels, including roof and penthouse levels, and if no level can have more than 99 spaces, the space number will consist of three digits with the first digit designating the level number, the second and third representing the space. If either condition is not met, the number will consist of four digits.

3. If the facility is part of a complex, or has distinct features that may benefit from duplicating numbers on a single level, the number may be prefaced with a letter. For example the School of Law "M" designates MacMillan and "G" designates Gambrell Hall at the Callaway Center "N" designates North, "C" designates Central and "S" designates South.

4. Space numbering must first be looked at to provide for direction. Where the numbering begins is therefore usually specific to the facility. Numbers should begin where the main entrance to the floor occurs - usually this is at the main entrance to the building or on upper floors, at the elevator lobby. From this point numbering should ascend in a clockwise direction.

   The level number 'x'100 (eg. 100, 200, etc.) should not be used except for major common spaces in a logical location. Reading Rooms, Board Rooms etc.

5. Spaces should be numbered, not doors. If there is more than one door opening into a single space, all doors should have the same space number. There may be exceptions to this rule, for example a space that opens onto two separate corridors. If in order to make sense for direction to a room, to have two different numbers, the "official" number assigned to the space will be the lower number. The other number will be associated with a Space Name = "see QQQQ" where "QQQQ" = the official number.

6. Moving in the direction of travel (typically clockwise), even numbers should be on the left, odd on the right. Numbers should be similar to street numbering, sequential across the corridor skipping numbers as necessary to maintain number relationship.

7. If the plan suggests that spaces may be divided in the future, sequential numbers can be held in reserve. Since alpha suffixes are used for rooms inside rooms, if spaces are added in the future between two consecutive numbers, a decimal system will be used, i.e. a new space added between 302 and 303 would be 302.1.

8. Spaces inside spaces shall have the main space number followed by an alpha character, i.e. Spaces inside Space 302 would be designated 302A, 302B, 302C etc. Spaces inside 302B would be designated 302BA, 302BB etc. If a space is inside a large numbered space, such as a library reading room or an open office plan, the individual spaces may have their own sequential number.

9. Cubicles inside large spaces should be given the main space number followed by an alpha designation. If there are both permanent rooms and cubicles in the same space, the permanent rooms should be numbered first.

10. All spaces, including Restrooms, Janitor's Closets, Storage and ITD Telecom/Network, should be numbered sequentially with other spaces.

11. Stairs, Corridors, Vestibules, Elevators, Lobbies and other spaces typically not numbered with a sign (Stair signs should have stair number on sign) are numbered as follows: [Level] [S, C, V, E or L] [Descriptive letter (S=south, N=north etc.) or number] example - 2S3; 1CN; 3E1; 1L2

12. Floor Openings (upper levels of atriums, lobbies etc.), Crawl Spaces (or unexcavated spaces), significant Mechanical Shafts (Y), Roofs, Exterior Spaces, and other usually non occupied areas that may not be numbered in the field, will also be assigned numbers as follows: [Level] [(FO, CS, Y, R, X] [Sequential Number] for example – 2FO3; BCS2; 1Y5; 8R1; 1X2

SECTION 5: Evacuation Maps

For all capital projects, it is the responsibility of the architectural design firm to produce Evacuation Route maps for signage as required by building code. Posting of evacuation signage is usually required at time of inspection for certification of occupancy. Emory facilities comprise over 300 buildings and strives to maintain a consistent standard to all evacuation signage across campus. Therefore all evacuation maps *must* be created using the provided Evacuation Map template file, available for download on Campus Services' Design and Construction Standard website. It is important to note that the standard evacuation maps and template are based on a paper space environment, and dependent on the previously described Space Planning Production Life Cycle floor plan files. **All evacuation maps must be approved in writing by the Emory Police / Fire Safety Office prior to posting.**

SECTION 6: Document Upload Application (FTP) Guide

All electronic file submittals *must* be made using this application, unless specific written approval from CSIT is given to submit using an alternative procedure.

Campus Services IT has developed a web application that allows the upload of all electronic documentation to an ftp site. The url address for this application is:

https://emap.fmd.emory.edu/uploadapps/LoginForm.aspx
The Login ID is EMORY. Obtain the password from the Emory Project Manager.

The Emory project manager will provide the contractor with the application's password. Once logged in you will find a **green** help button to download the Document Upload System Quick User Guide. This document will give detailed instructions on using the application.

SECTION 7: Emergency Valves and Special Rooms Project.

The location of all emergency valves and panels or special rooms (mechanical room, elevator rooms, other building support spaces) will be provided either in the as-built drawings at project close out that involves new constructions or any renovation or by the building mechanic by marking up the floor plans. Special Rooms are spaces within the building that contain facility support equipment. Examples would be elevator rooms, server rooms, etc. A set of blocks have been created for the emergency valves and panels to be inserted in the drawing. The special rooms are needed to be marked in the floor plan by using polyline to enclose the space. A list of the emergency valves and panels are shown below:

NAME	**BLOCK NAME**
Sprinkler Control Valve	EM_SPRINKLER SYSTEM
Standpipe & Sprinkler System	EM_SPRINKLER SYSTEM
Sprinkler Pump and Controls	EM_SPRINKLER SYSTEM
Sprinkler	EM_SPRINKLER SYSTEM
Sprinkler Riser	EM_SPRINKLER SYSTEM
Fire Panel	EM_FIRE PANEL
NAME	**BLOCK NAME**
Fire Alarm	EM_FIRE ALARM
Fire Department Standpipe	EM_STANDPIPE
H2O Hydrant	EM_H2O HYDRANT
Fire Hydrant	EM_FIRE HYDRANT
Fire Pump	EM_FIRE PUMP
Fire Department Connection	EM_FIRE DEPARTMENT CONNECT
Fire Hose	EM_FIRE HOSE
Electrical Room	EM_ELECTIRCAL ROOM
Electrical Panel	EM_ELECTIRCAL PANEL
Electrical Disconnect	EM_ELECTRICAL DISCONNECT
Emergency Power Disconnect	EM_EMERGENCY POWER DISCONNECT
Air Handler Unit	EM_AIR HANDLER UNIT
Gas Meter	EM_GAS METER
Natural Gas	EM_NATURAL GAS
Domestic Water	EM_DOMESTIC COLD WATER
Potable Water	EM_POTABLE WATER
Auxiliary Water	EM_AUXILLIARY WATER
Hot Water Supply	EM_HOT WATER SUPPLY
Hot Water Return	EM_HOT WATER RETURN
Chilled Water Supply	EM_CHILLED WATER SUPPLY
Chilled Water Return	EM_CHILLED WATER RETURN

Condensate	EM_CONDENSATE
Water	EM_WATER
Water Shut Off	EM_WATER SHUT OFF
Hot Water Heater	EM_HOT WATER HEATER
Expansion Tank	EM_EXPANSION TANK
Steam Supply	EM_STEAM SUPPLY
Steam Return	EM_STEAM RETURN
Generator	EM_GENERATOR
Chiller Equipment	EM_CHILL EQUIPMENT
Dryer	EM_DRYER
Compressor	EM_COMPRESOR
Oxygen	EM_OXIGEN
NO2 NITRUS OXIDE	EM_NO2 NITRUS OXIDE
Access Card	EM_ACCESS CARD
Fire Box w/Keys	EM_CARD ACCESS
Sanitary Drain	EM_SANITARY DRAIN
Storm Drain	EM_STROM DRAIN
Hazardous Material Storage	EM_HAZARDOUS MATERIAL STORAGE

NAME	**BLOCK NAME**
Special Room	EM_SPECIAL ROOM
BSL 2 Labs	EM_LABORATORIES
BSL 3 Labs	EM_LABORATORIES
Radiation Labs	EM_LABORATORIES
Magnetic Labs	EM_LABORATORIES
Laser Microscope Labs	EM_LABORATORIES

SECTION 8: The BIM Execution Plan (BEP) Guidelines

On projects exceeding $500,000 construction cost, or at the discretion of Emory University (Owner), and upon selection of the Architect and Engineer Consultants (AE) and the Construction Manager/ General Contractor (CM/GC), and within thirty (30) days after the selection, the AE and CM/GC shall prepare and submit the "BIM Execution Plan" (BEP) for the Project for review, and approval, by Emory University.

The BIM Execution Plan (BEP) is prepared in conjunction with the current "Design and Construction Standards" and the "Document Delivery Standards". The BEP delineates roles and responsibilities of each participant, the tools and support software to facilitate interaction, the level of detail and scope of shared information among participants and the processes at specific stages to produce the intended results.

The BIM Execution Plan (BEP) provides the framework for the Owner, the AE and the CM/GC to deploy Building Information Modeling (BIM) technology and best practices.

The BEP plan delineates roles and responsibilities of each participant, the tools and support software to facilitate the interaction, the level of detail and scope of shared information among participants and the processes at specific stages to produce the intended results.

The BIM authorizing software for Architectural objects, spaces, assemblies and systems, and code requirements is to be no higher version than Autodesk Revit 2014. The BIM Execution Plan (BEP) establishes the BIM authoring software for any other models used on the Project to best facilitate construction analysis, evaluation, scheduling, bidding, fabrication and construction.

A BIM Manager for the Project is assigned from the AE staff to manage the BIM process and the BIM models. The BIM manager shall be responsible for predetermining content and format of the models, for updating models and for distributing accurate model content during each phase.

BIM Modeling Guidelines by Phases

Pre-Design Modeling Phase (Requirements Development) – Level of Development 100 (LOD 100)

BIM Model Elements Content Requirements

- Building massing, area and volume is modeled within the required authoring software and placed on the site, oriented per BIM standards and guidelines.
- Quantities, sizes, location, shape and orientation are *approximate*.
- 3D model must be GIS located
- Create Floor for each room using Revit floor family, or a format that can be converted into Revit floor family. For each room floor, room number as TYPE must be used.
- Construction costs are simply *based on current area and volume* using conceptual estimating techniques and compared to the budgeted GMP.

Applications for BIM Model Analysis

- Model is analyzed based on area and volume established in the space program.

- Model is analyzed for *general* performance for energy and sustainability guidelines from the Owner's BIM standards and guidelines.
- Model may be used to estimate construction costs based on current area and volume using conceptual estimating techniques.
- Model used to analyze schedule and sequencing of assemblies and systems, including alternative assemblies and systems.

Schematic Design Modeling Phase (Conceptualization) – Level of Development 200 (LOD 200)

BIM Model Elements Content Requirements

- Model elements are modeled as *generalized* objects, spaces, assemblies and systems.
- Quantities, sizes, location, shape and orientation are *approximate*.
- Construction costs are estimated by the CM/GC from design documents and narrative developed by the AE and in accordance with the BEP.

Applications for BIM Model Analysis

- Model is analyzed for *generalized* costs of objects, spaces, assemblies and systems.
- Program requirements are validated.
- Description of building elements is prepared by the AE describing architectural, structural and MEP systems for use by the CM/GC to develop the Construction Cost Model (Estimate).
- Model is analyzed for *general* performance for energy and sustainability guidelines from the Owner's BIM standards and guidelines.
- Model is analyzed for interference checking of objects, spaces, assemblies and systems per Owner's BIM standards and guidelines.
- Model used to analyze schedule and sequencing of assemblies and systems, including alternative assemblies and systems.
- Model used to address energy, water, building envelope, HVAC, sustainability, LEED goals, standards of quality.
- BIM Asset Information Database (BIM-AID) begins and is populated, initially, by the Design Professionals with attributes (data) from the BIM model. A sample BIM-AID template is provided by the Owner in accordance with the BEP.

Design Development Modeling Phase (Detailed Development) - Level of Development 300 (LOD 300)

BIM Model Elements Content Requirements

- Model elements are modeled as *specific* objects, spaces, assemblies and systems.
- Quantities, sizes, location, shape and orientation of objects, spaces, assemblies and systems are *accurately* portrayed in the model.
- Construction costs are estimated from *accurate* quantity takeoffs by the CM/GC in accordance with the BEP.

Applications for BIM Model Analysis

- Model is analyzed for performance and suitability with selected *specific* objects, spaces, assemblies and systems.
- Model is analyzed for interference checking of objects, spaces, assemblies and systems per Owner's BIM standards and guidelines.
- Model is analyzed for performance of energy and sustainability requirements for *specific* objects, spaces, assemblies and systems as described in the Owner's BIM standards and guidelines.
- Construction costs estimates are based on *accurate* quantity takeoffs of specific assemblies and systems.
- Model is used to show CM/GC prepared schedule and sequencing of *detailed specific* objects, spaces, assemblies and systems and detailed elements.
- Model is used to address energy, water, building envelope, HVAC, sustainability, LEED goals, standards of quality.
- BIM Asset Information Database (BIM-AID) continues and is populated by the design professionals with attributes (data) from the BIM model. A sample BIM-AID template is provided by the Owner.
- Model is developed to the level of Design Development documents suitable for DD approval and authorization to proceed with LOD 400 Phase – Construction Documents phase, including shop drawings and fabrication drawings by suppliers and subcontractors in accordance with the BEP.

Construction Documents Modeling Phase (Implementation Documentation) - Level of Development 400 (LOD 400)

BIM Model Elements Content Requirements

- Model elements are modeled as *specific* objects, spaces, assemblies and systems and suitable for complete shop drawings and fabrication drawings.
- Quantities, sizes, location, shape and orientation of objects, spaces, assemblies and systems are *accurately* portrayed in the model containing complete fabrication, assembly and detailing information.
- Construction costs are estimated from *accurate* quantity takeoffs by the CM/GC in accordance with the BEP.

Applications for BIM Model Analysis

- Model elements are modeled as *virtual representations* of the objects, spaces, assemblies and systems, suitable for construction in accordance with the BEP.
- Model is analyzed for performance, suitability and coordination of selected *specific* objects, spaces, assemblies and systems and meeting energy and sustainability guidelines from the Owner's BIM standards and guidelines.
- Model is analyzed for interference checking of objects, spaces, assemblies and systems per Owner's BIM standards and guidelines.
- Construction costs estimates are based on *actual costs and quantity takeoffs* using the "buyout" costs of specific objects, spaces, assemblies and systems by the CM/GC.

- Model is used to show CM/GC prepared schedule and sequencing of *detailed specific* objects, spaces, assemblies and systems and detailed elements including construction means and methods.
- Model is used to address energy, water, building envelope, HVAC, sustainability, LEED goals, standards of quality.
- BIM Asset Information Database (BIM-AID) continues and is populated by the design professionals with attributes (data) from the BIM model.
- Model is developed to the level of Construction Documents, suitable for CD approval and authorization to proceed with the execution of all construction documents in accordance with the BEP.

Construction, Closeout, Facilities Management/ Operations Phase - Level of Development 500

BIM Model Elements Content Requirements

- Model elements are modeled as *constructed* objects, spaces, assemblies and systems.
- Quantities, sizes, location, shape and orientation are *accurate* as-built.
- The Design BIM Model is transferred to the CM/GC and becomes the Construction BIM Model.

Applications for BIM Model

- The AE Design BIM Model is transferred to the CM/GC and becomes the CM/GC Construction BIM Model.
- Model is used to construct the Project.
- Model is used for scheduling and sequencing of *detailed specific* objects, spaces, assemblies and systems and detailed elements including construction means and methods.
- CM/GC subcontractors and suppliers may use the BIM model to prepare shop drawings and fabrication models.
- The CM/GC is responsible for generating and maintaining accurate ***Progress Documents*** during the progress of the Work to reflect the "as-builts" or actual in-place construction in accordance with the BEP.
- The AE is responsible for coordinating the ***Record Documents***, the final version of the Construction Documents that have been modified by AE at Final Completion to reflect the "as-builts" or actual in-place construction shown in the final Progress Documents in accordance with the BEP.
- BIM Asset Information Database (BIM-AID) becomes the responsibility of the CM/GC during the construction phase and is populated by the CM/GC with inputs of attributes (data) from the subcontractors and suppliers building and supplying the Project. In accordance with the BEP and within ninety (90) days after closeout, the completed BIM-AID is delivered to Campus Services.
- BIM-AID database is utilized by Campus Services for the ongoing operation of the building, for maintenance, renovations, additions or retrofits over the useful life of the building.
- Model is available for use for safety planning and means of egress or changes of use.
- Model is available for use for future energy and sustainability analysis of alternative building components, objects, spaces, assemblies and systems.

BIM Data at Closeout – The "BIM Asset Information Database" (BIM-AID)

The BIM Asset Information Database (BIM-AID) provides campus services with a comprehensive source of data on key building components, equipment, systems and assemblies available quickly and easily. The BIM-AID spreadsheet is organized in BIM categories with listed attributes (data fields) of essential information on each asset.

A sample BIM-AID spreadsheet is available. Refer to the Emory contract for specific requirements in relation to the use and application of BIM-AID.