00 00 10
BIM REQUIREMENTS
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For the BIM Execution Plan (BEP) refer to Section 00 00 10.01 BIM Execution Plan.

1.0 - PURPOSE, USE AND REQUIREMENTS

The purpose of this BIM Section is to establish baseline requirements for Design Professionals and Contractors in their Building Information Modeling (BIM) efforts related to the design and construction of University of Georgia (UGA) facility projects.

Where BIM is required as a deliverable, the BIM Team (Design Professional and Contractor on a specific project collaborating on BIM requirements) shall refer to and comply with the requirements of the BIM Standards. BIM is required on all projects with total funding of $5 million or greater. On all other projects BIM is encouraged but not required.

The use and application of BIM when required will apply to all phases of the Project's lifecycle, including master planning, program analysis, project definition and schematic design, design and construction phases, and facility management. BIM is an evolving tool and the BIM Team, through the BIM Execution Plan (BEP; refer to Section 00 00 10.01 BIM Execution Plan) development process, is encouraged to bring forth ideas and suggestions to make the process as efficient and beneficial as possible. As each project is unique, the BIM Execution Plan will be specific and customized to each project.

The BIM deliverable does not replace the standard project deliverables as defined in the Design Professional's and Contractor's Contracts; BIM is considered an additional deliverable. UGA requires that all design and construction document deliverables for projects are created and derived from the building information models, and expects that information in the model be coordinated, resolved and updated with the 2D Contract Document deliverables.

It is UGA's intent to reuse the BIM models and associated data for continuing lifecycle management of the buildings, including facilities management and future development/redevelopment of those future existing buildings. It is the goal and intention that UGA shall receive deliverables to meet the needs of two separate departments. One objective being OUA, requiring an accurate As-Built BIM model with final component data to be used for future building renovations, additions and future building planning and management; the other objective being a BIM model and Construction Operations Building Information Exchange (COBie) deliverable for FMD to capture facility and operations data that will be integrated with Computer Aided Facilities Management (CAFM) software. BIM models shall be provided throughout the design, construction and closeout phases along with corresponding data collection from the BIM models, to be submitted in COBie format to capture and record final close out data.

It is not the intent of UGA to require additional, unnecessary, or duplicative modeling efforts, and UGA recognizes that different models may be generated or not depending on each BIM Team entities' abilities or normal work processes. For example, many fabricators (ductwork, fire sprinkler piping, etc.) use software that can be developed and read in Navisworks. However, the Navisworks information cannot be brought into the Design Professional's Revit model. UGA ideally desires a complete As-Built Revit model, but does not require and does not want to pay for duplicative work to take the systems modeled in Navisworks and to remodel them in Revit.

The Navisworks software will allow the Revit model to be imported into the Navisworks model resulting in a complete As-Built viewable model. UGA can use Navisworks viewing software to look at the entire model to locate information embedded in the model. In this scenario, UGA will receive as final

deliverables both Revit model (missing items that were only modeled in Navisworks) and a Navisworks model (with Revit model imported into it). If the BIM Team is able to originally model all the required items in Revit without duplicating efforts, then for example, one less type of model is required as a deliverable.

UGA cannot use the Navisworks model to model future projects after the completion of the current project and will have specific features remodeled in Revit in the future if deemed appropriate for that future project. It is hoped that the software translation issues will be resolved soon and the issue of multiple types of models due to software incompatibilities will disappear.

Accepted software is listed below, however, other software shall be considered subject to their capabilities and benefits to the Project. Direct any questions regarding the BIM Standards to the Office of University Architects (OUA):

1. Authoring and Design Software for Architecture, Interior Design and Structure: Revit Architecture, Revit Structure, ArchiCAD, Bentley Architecture, Digital Project, Tekla Structures, Vectorworks Designer.
2. Authoring Software for MEP, FP, and Specialty Consultants: Revit MEP, ArchiCAD MEP, AutoCAD MEP, AutoCAD Architecture. MEP shall use BIM Authoring Software, but may use 3D object-oriented software.
3. Civil Design: AutoDesk Civil 3D, Bentley Inroads
4. Coordination and Spatial Conflict Checking: Navisworks, BIMSight, Solibri Model Checker
5. Model Checking Utilities (Spatial validation and Industry Foundation Class) Solibri, BIMSight, Navisworks
6. Energy analysis and modeling: DOE2, EcoDesigner, Ecotect, IES-VEware, EnergyPlus, eQuest, Breen Building Studio, Trane/Trace, Vasari

2.0 – DEFINITIONS AND TERMS

These terms and definitions are specified for BIM Requirements. Other general definitions and abbreviations can be found in Section 00 00 02 Terms. Also refer to Section 00 00 03 Modifications to General Requirements of BOR Contracts.

Accuracy

The level of detail and the level of precision expected at various points in the Project process are dependent on the required level of design (LOD). Accuracy refers to the placement, sizing, and representation of building components. The scale represents a mixture of 3D and 2D content at the one end to a fully 3D model at the other end that will be used in Interference Checking and As-Built/Record drawings.

As-Built Model

A digital representation of a facility produced through BIM during the construction phase of a project that contains data and other relevant information from the design model and tracks changes during construction. These are Construction Models that have been updated throughout the construction process and reflect the final As-Built condition of the Project and includes relevant component data that will be needed for COBie data output. Typically, a model

provided by the Contractor that is a concurrent model to the Design Intent/Record Model provided by the Design Professional.

Building Information Model (BIM)

An acronym for "Building Information Modeling", or "Building Information Model" that is a digital representation of the physical and functional characteristics of a facility and a shared resource that forms a basis for decisions during its life-cycle, from conception to demolition.

BIM Deliverables

Information (in numerous formats) that may be required by Contract or agreement to be submitted or passed to another party and to UGA.

BIM Execution Plan (BEP)

An outline that defines the scope of BIM implementation, identifies the process flow for BIM tasks, defines information exchanges, and the infrastructure needed for support. A plan created from the UGA's BIM Execution Plan template that is to be submitted within thirty (30) days after Contract award. Refer to Section 00 00 10.01 BIM Execution Plan.

BIM Process

A generic name for the practice of performing BIM. This process can be planned or unplanned. The BIM process may also be referred to as the BIM execution process or the BIM project execution process. The BIM project execution planning process suggests diagramming the BIM process using process maps.

BIM Process Maps

A diagram of how BIM will be applied on a project. The BIM project execution plan proposes two levels of process maps: BIM overview map and detailed BIM use process maps.

BIM Team

All Design Professionals, Contractors, and Consultants charged with delivering BIM information as defined in the BIM Standards, and listed in the BEP for a specific project.

BIM Use

A method of applying building information modeling during a facility's life-cycle to achieve one or more specific objectives.

Computer-Aided Facility Management (CAFM)

UGA's FMD utilizes a CAFM software program to assist with maintenance of facilities.

Construction Model

A digital representation of a facility produced through BIM during the construction phase of a project that contains data and other relevant information from the design model and tracks changes during construction. Typically, this BIM Model is provided by the Contractor and may be used for quantity take offs, construction sequencing and phasing, clash detection, modeling of delegated design elements, and data tracking of submittal information.

COBie - Construction Operations Building Information Exchange

COBie is a standard of information exchange that allows information to be captured during design and construction in a format that can be used during the operations of a building once completed. Final COBie format deliverable will be in (.XLSX) spreadsheet form.

Critical Path Modeling

Critical Path Modeling is a method of demonstrating Integrated Project Delivery. It sets a plan within the BIM Team that accounts for the activities of each discipline and how they interact with each other. It builds upon a critical path method for those activities, and allows the Project Team to schedule a complete project.

Design Intent Model

A digital representation of a facility produced through BIM to provide design intent for use in construction that is coordinated with other engineering disciplines. This type of BIM model is typical provided by the Design Professional Team and will be used to produce a combination of 3D and 2D information that is then utilized to produce the Contract drawings for construction.

.DWG

.DWG is a native AutoCAD file format. It is a widely used file format for exchanging drawing information and 3D information to different programs. While not a database file type, it still has lots of uses for exchanging information.

.GBxml

A .GBxml file is a Green Building file type. It is used to run simulations through energy modeling software. It is a widely accepted file format for those types of software.

Interior Design

Interior Design is defined as the selection of interior materials, finishes, and furnishings.

Integrated Project Delivery (IPD)

Integrated Project Delivery is a collaborative effort by Design Professionals to maximize performance and efficiency in all phases of a project.

Level of Development (LOD)

Describes the completeness to which model elements representing components, systems, or assemblies are developed at progressive project phases. This development includes geometric and non-geometric data.

Navisworks

Navisworks is software that allows for the viewing of multiple model formats. This ability to "view" these files also allows for Navisworks to simulate the interaction between model files. That includes collision reporting, time lining, and coordination.

.NWC

An .NWC file is a Navisworks Cache File that is used by Navisworks to quickly read many other file types. All linked files in Navisworks have an .NWC file created automatically. In addition, Revit will export directly to the very small file type of .NWC for quick access by Navisworks.

.NWD

A much larger file than the .NWC, the .NWD file shows a snapshot in time of Navisworks file. No linked files exist but all geometry is included.

Phases

The phases of a project can be described in two different ways as the adoption of IPD terminology starts to penetrate the BIM Execution Plan and the IPD Methodology Plan. Below is a list of the traditional names followed by the IPD name:

Pre-Design/Conceptualization Phase
Schematic Design/ Criteria Design Phase
Design Development/ Preliminary Design/ Detailed Design Phase
Construction Documents/Implementation Phase
Agency Permit & Bidding/Agency Coordination & Final Buyout
Construction
Occupancy

Record Model

Design Intent Models that have been updated throughout the construction process. These changes and updates have been communicated from the Contractor to the Design Professional

through the comments, annotations, and mark-ups from the As-Built Documents. These typically, but not always, are discipline specific models.

.RVT

An .RVT file is a native REVIT file type. It is also the deliverable file format for all projects. This includes all of the Design Professional Team's models.

Simple Building Information Modeling (SBIM)

SBIM is a concept of producing a "light" model that can be used for simulating the building's performance very early within the design process. SBIM is the process of modeling only the exterior envelope, and the interior volumes to produce a lean model that energy modeling software can use easily.

3.0 – PROCESS

In addition to previously stated requirements, Design Professionals and their consultants may use their own in-house standards, components and details that embed the best practices of the firm. BIM shall be created by the BIM Team that includes all geometry, physical characteristics, and component data needed to describe the design intent and Construction Documentation. All drawings and schedules required for assessment, review, bidding, and construction shall be derived from the BIM models either directly (as in schedules, floor plans, elevations, sections, project specific details, etc.) or indirectly (as may be the case with standard details). The process is to include requirements for accuracy and proficiency, Level of Development, BIM Execution Planning, Integrated Project Delivery, interference checking, COBie data management, and other requirements as defined in this section.

3.1 - ACCURACY AND PROFICIENCY

BIM models shall provide accurate and correct final information about the building project and its components. Use industry standard and accepted nomenclature or UGA nomenclature (when provided or required) for objects and spaces. Use model checking tools before submission. Objects in BIM should be created and categorized appropriately within the BIM model. System families such as walls, floors, roofs, sweeps, etc. shall be properly created and categorized as what they are. Component families such as furniture, casework, specialty equipment, plumbing equipment, mechanical equipment, etc., shall also be properly created and categorized as to what they are so that component elements can be properly scheduled, quantified, and controlled within the model and have appropriate data associated with those components for latter data capture in the COBie deliverable. Use of generic component models, in-place families and/or groups should be minimized or avoided as much as possible. Modeling of the building and its components should be modeled precisely and accurately as much as possible, yet no less accurate than industry standard construction tolerances for the components being modeled. For objects that are not easily accommodated within the program due to special circumstances, such as complexity or uniqueness, then modeling an approximation of it that conforms closely to its size and look is acceptable along with categorizing it accordingly. All such occurrences should be documented and communicated to the Project Manager in writing. Accuracy and proficiency shall be expected with both 3D and 2D content.

3.2 - LEVEL OF DEVELOPMENT (LOD)

Level of Development (LOD) management should be utilized to assign the expected level of development for the Project at the various project phases, along with what team parties are responsible for the specific LOD for each of the components defined in the BEP, at the various project phases.

The following are general LOD descriptions:

1. LOD 100: Conceptual Design - Overall building massing
2. LOD 200: Schematic Design and Preliminary Design - Generalized systems and assemblies with approximate quantities, sizes, shapes, location and orientation for analysis of required systems, including daylight, views and energy.
3. LOD 300: Construction Documents - Detailed systems and elements. Modeling and detailing sufficient enough to meet requirements of the Contract documents for permitting and construction.
4. LOD 400: Shop Drawings for Fabrication and Assembly
5. LOD 500: As-Built & Record Models & Drawings for Maintenance and Operations - Includes UGA required elements for final model.

3.3 – BIM EXECUTION PLANNING

UGA requires a BIM Execution Plan (BEP) that is customized for the specific needs and requirements of each project. Utilize the UGA BEP Template as a starting point for developing each projects BEP. The BEP shall define the uses and responsibilities of BIM on the Project and its detailed process throughout the lifecycle of the Project. Once the plan is approved, the Team is required to follow it, monitor their progress against the plan, and make adjustments to the plan as appropriate. The BIM Execution Plan shall be considered a living document that will continue to change and evolve over the course of the Project.

The steps include the following:

1. Within 30 days of Design Professional contract award:
    A. BIM Execution Plan Overview
    B. Project Information
    C. Key Project Contacts
    D. Project Goals/BIM Uses
        i. Data Commissioning
        ii. Performance Monitoring
    E. Organizational Roles/Staffing per phase
    F. BIM Process Design
    G. BIM Information Exchanges
    H. BIM and Facility Data Requirements
    I. Collaboration Procedures
    J. Quality Control Reviews
    K. Technological Infrastructure Needs
    L. Model Structure
    M. Project Deliverables Per Phase
    N. Delivery Strategy/Contract

2. Template: Utilize the UGA BIM Template as the starting point for project specific BEP.

When developing the BEP project goals for the BIM model and BIM data, the desired end results should be identified. How will the model be used during the Project and after the Project is completed? What data will need to be captured and delivered in COBie spreadsheet format? How will that data be used by the Owner? How will these objectives start to define how the model and its data are created and defined?

3.4 – INTEGRATED PROJECT DELIVERY (IPD) METHODOLOGY PLAN

The BIM Team's IPD Methodology Plan should be integrated into the BEP and be subject to the same submittal and review time table as the BEP. The IPD Plan must include a high level of integrated design, identification of Project Team members and how they will interact with each other during the Project, and a critical path method using modeling and model information validation.

While it is understood that most projects will not be a full IPD project in the strictest sense of the word due to current contract structure, there are however many aspects of IPD methodology that can and should be integrated with BIM. Most notably, the IPD aspects of the planning for and sharing of model information with and between the Design Professional and constituents but also with the Contractors and Subcontractors should be incorporated. A plan for collaboration between the Design Professional and Contractor (and Subcontractor) should be outlined in such a way as to provide for this collaboration to start occurring as soon as feasibly possible within the design and construction phase process.

An important aspect of this IPD Methodology Plan is the outlining of how data will be developed and progressed throughout the Project. Outlining and assigning who is responsible for the data and model development at each phase and at what point the data will be handed off to a different party. This will be especially important with regards to how COBie data will be developed and coordinated, this is because multiple parties will be responsible for different data entry at different phases, and all data will have to be integrated at the end into a unified single deliverable for submittal to UGA.

A detailed description and mapping of what data will be needed as part of the final delivery is an important part of the BEP & IPD methodology. For example; data fields will be need to be defined for uploading into the Owner's CAFM program. Required data fields that are available in the BIM model will have to be identified and data that will have to come from other sources will have to be identified. These required data fields will then need to be mapped to their corresponding COBie data fields. It will be necessary to show how required data that can be captured from the BIM model will get from the BIM model(s) to the COBie spreadsheets and finally uploaded into the Owner's FM database program. In addition, data that was entered into the COBie spreadsheets separately from the model and that need to be re integrated back into the BIM model(s) will need to be identified. If there are multiple models then the data from each model will have to be identified and managed so that data from multiple models can be consolidated together into the required COBie worksheets. This will require a great deal of integrated delivery coordination and planning from the Project Team.

The BEP and IPD methodology cannot be delivered in isolation. No one party within the BIM Team can adequately outline the execution plan, while also obtaining the necessary team member commitments

for successful BIM implementation. Full coordination and collaboration by all parties is an absolute necessity. The following aspects of an integrated work plan shall be addressed:

1. Setup of initial BIM Schedules and project parameters within the BIM model to establish and organize the capture of spatial and component data information for future distribution and export.
2. Use Omniclass Table 13 for spatial naming conventions and Omniclass numbers for all spatial data. Where multiple naming options are available determine which Omniclass names will be utilized.
3. Use Omniclass Table 23 for component and product naming conventions and Omniclass numbers for all building components requiring COBie information. Determine which components and products will be tracked and data collected.
4. Determine the specific data required for each space or component and the assignment of spatial, system, component and other data responsibilities and authorship.
    A. Spatial data
    B. FF&E components
    C. Structural components
    D. Special Equipment components
    E. Mechanical Equipment components
    F. Electrical Equipment components
    G. Plumbing Equipment & Accessories
    H. Design phase versus Construction phase data
    I. Commissioning Data
    J. Close-out Data
    K. As-Built / Record model and associated data
5. Coordinate the authorship and responsibility at each phase and establish procedures and schedules for when component data responsibility will transfer to another BIM Team entity. (i.e Mechanical components – initial BIM schedules and project parameters for future data entry established by Architect, then actual modeled components to be originally authored by Mechanical Engineer, transferred to Contractor for submittal phase development by Subcontractor, utilized in clash detection, and final data entry of submitted component data such as make, model, and serial numbers. Then any required data by the Commissioning Provider, and final delivery of all final As-Built modeling and component data into final deliverable formats to the Owner, including BIM Model and COBie spreadsheets.)
6. Recognize and identify separate deliverable requirements for both OUA and for FMD, and provide plan for meeting separate needs of each owner entity requirements.
    A. OUA will require an As-Built Model sufficiently developed and modeled for use in planning and design of future project additions and alterations to the current project. Due to incompatibilities of software and the desire not to duplicate modeling efforts, OUA will accept multiple As-Built Models if necessary to document all of the required information. For example, a Revit model (that is missing As-Built ductwork) and a Navisworks model (that has the Revit model imported and includes the ductwork) may be accepted in lieu of one Revit model.
    B. In addition to OUA requirements, FMD will also require As-Built Data in COBie format suitable for integration into their CAFM software.
7. Identify data that may need to be reintegrated into a combined final As-Built Model, if data was not generated from that model.

The workflow and progress of this information gathering, collecting and submitting may vary depending on size and type of project, data desired, abilities of the various parties involved, and contractual relationship of the various parties. It is estimated that a minimum of three to four meetings will be needed to develop the overall strategy, and all key decision makers will need to be involved, including (but not limited to) the Design Professional, Owner's Representatives, Structural & MEP Engineers, Contractor, major Subcontractors, and Commissioning Provider as early in the process as feasibly possible. It may become necessary to revise and update the BEP as additional parties and stake holders come on board. The BEP shall be revised, updated and resubmitted at each major project phase.

4.0 – OBJECTIVES, APPLICATION & DELIVERABLES

The following items are specific BIM deliverables and/or coordination items required at the completion of each phase. These are in addition to the traditional deliverables required by Contract or other deliverables required in the UGA Design and Construction Standards.

4.1 – PRE-DESIGN/CONCEPTUALIZATION

1. **Project Objectives and BEP**: Provide a written summary description of project objectives as part of the initial BIM Execution Plan (BEP) for review and approval.
2. **Programming and Planning Tools**: The Design Professional is encouraged to use electronic programming and planning tools that integrate into their BIM software to capture early cost, schedule and program information. Deliverables at the end of Pre-Design shall verify and confirm the program, budget, schedule, and targeted building efficiency. The Design Professional shall use BIM & Planning software for use in supporting comparative costs analysis of various design options.
3. **Existing Building Conditions**: The Design Professional shall model existing conditions needed to coordinate the extent of the new construction work where work includes additions or alterations. Contact Project Manager for drawing inventory of existing buildings for use as a base reference only. Refer to Section 01 31 00.01 Access to Existing Documents. Unless otherwise specified, the Design Professional is responsible for verification of existing conditions and ensuring that all electronic deliverables are accurate and comply with requirements.
4. **Simplified BIM (SBIM) Model**: The Design Professional shall develop a simplified BIM model formatted for use in conceptual energy modeling for comparative analysis and other early Pre-Design Conceptualization efforts, this may be in the form of a simplified mass model or other LOD: Level One type of model as appropriate for the early analysis requirements listed in this phase. At least three design options shall be developed and presented; including site information.
5. **Site & Topographical Surveys**: Topographical surveys shall be received from Project Manager in electronic format in a format that allows for importing into the BIM Team's BIM software. Exact requirements vary by project and shall be coordinated with the Project Manager. Site information shall be included as part of the Pre-Design Conceptualization phase and coordinated with the required three design options. Any site, environmental or historic building aspects or constraints should be addressed in the Pre-Design Conceptualization models as required.
6. **Energy Modeling Requirements**: The purpose at this early phase, is to narrow down design strategies to meet project's energy goals and targets, including the reduction of energy demand

by optimizing building form and orientation and daylight. Comparative energy analysis shall be based on local climate data and actual site conditions for summer and winter. The BIM Team shall utilize the simplified BIM model for use in conceptual energy modeling for comparative analysis, as appropriate for the early analysis software chosen by the BIM Team. At least three design options that meet the Project program and budget shall be compared and results given in "Percent Better" or "Percent Worse".

7. **Visualization**: The SBIM model shall be utilized to produce 3D & 2D views of each scheme required as appropriate to demonstrate integration of proposed schemes with the surrounding roads, drives, pedestrian paths, access, and program requirements. Deliverables shall include rendered views as required to communicate early concept design intent.

4.2 – SCHEMATIC DESIGN

1. **Project Objectives, BEP & Budget**: Provide a written description of project objectives as part of the initial BIM Execution Plan (BEP) for review and approval. Schematic Design defines the optimum design solution to meet UGA's aesthetic, program, budget and schedule while still being on track for energy, sustainability (if required) and building code requirements. Updated Budget/Cost estimates and updated Schedule shall also be provided at this phase.
2. **Program and Space Validation**: Provide a program and space validation report that utilizes spatial data, which includes room areas derived from the BIM model. Program verification software (for example: Trelligence Affinity) that integrates with the BIM model is encouraged. Areas shall include assignable areas (ASF) and non-assignable areas. Mechanical, electrical, telecommunications, housekeeping, toilet facilities, corridors and other circulation areas shall be labeled and their areas tabulated. Figures for net floor area and gross area shall be tabulated for compliance with Building Efficiency Target. Gross areas include wall thicknesses and open voids, per floor. In addition provide initial spatial data in COBie format (see COBie Data item below).
3. **Existing Building Conditions & Existing Utilities Report**: The Design Professional shall continue to model existing conditions needed to coordinate the extent of the new construction work where work includes additions or alterations. Unless otherwise specified, the Design Professional is responsible for verification of existing conditions and ensuring that all electronic deliverables are accurate and comply with requirements. At this phase an existing utilities report should also be provided for impact on schematic design solution.
4. **BIM Model**: All information required for Schematic Design level of development shall be graphically and alphanumerically correct, included in, and derived from the BIM model. Including, room and building areas and names. Model shall meet UGA's functional and aesthetic requirements while still meeting budgetary and sustainability demands. BIM model to be sole source of all 2D drawings, being derived from the model. Generic and "place holder" system and component families may be utilized for this model deliverable. The model shall contain a high level of accuracy and proficiency as the design develops. Provide work set organization and coordinate work set management as part of BEP.
5. **Site & Topographical Surveys**: The site BIM model shall be geo-referenced to the correct coordinate system. Establish protocols and procedures for sharing and coordinating BIM Model origin points so that all consultant models may be correctly loaded into one another's models for reference, coordination and documentation purposes. Document the procedures for coordination in the BEP. Surveys shall be projected in State plane coordinates Georgia West using the horizontal North American Datum 1983 and the vertical North American Vertical

Geodetic Datum 1988 both in units of feet. Design Professional shall coordinate with Project Manager on contour interval and requirements for surveys. See 02 21 00 Surveys for specific requirements. It is understood that not all BIM programs are compatible with State map coordinate references, if so establish a common origin point between BIM models and Survey / Site information and document in the BEP.

6. **Energy Modeling Requirements**: BIM Team shall continue development of energy model on the selected scheme for Schematic Design to optimize focus on the most promising energy saving strategies. Document how the model will progress at each phase and which BIM Team member is responsible for the energy model at each phase. (For example, the early phase energy analysis might be performed by the architect utilizing a basic level program such as Revit in conjunction with Green Building Studio, then progress to an energy consultant who might utilize a more advanced program such as Ecotect or IES-VEware, and then finally progress to the Mechanical Engineer who will do final energy modeling using a program like eQuest.) Document a plan for how the energy model will develop in each phase of the Project, identifying responsible parties, software, and integration with the BIM model in the BEP. Information shall include life-cycle cost (LCC) and return on investment (ROI).
7. **Visualization**: The BIM model shall be utilized to produce 3D & 2D views of each scheme required as appropriate to demonstrate development of the selected scheme for Schematic Design. Deliverables shall include any rendered views as required to communicate Schematic Design intent.
8. **Collision Report**: At this phase additional models and information may not yet be developed enough for true interference or clash detection. Provide plan for future phase interference and/or clash detection in the BEP.
9. **COBie Data**: At Schematic Design Phase initial COBie data shall be limited to Facility, Floor and Space information only. COBie Data shall be submitted in spreadsheet format, using the most current version of COBie. The following COBie worksheets shall be provided in the Schematic Design deliverable:
    A. **COBie Table 6-20 Worksheet 01**: Contact (People/Offices/Companies)
    This worksheet may be generated in the spreadsheet outside of the BIM program
    B. **COBie Table 6-21 Worksheet 02**: Facility (Identification of facility (ies))
    This worksheet may be generated in the spreadsheet outside of the BIM program
    C. **COBie Table 6-22 Worksheet 03**: Floor (description of vertical levels)
    This worksheet may be generated in the spreadsheet outside of or derived from the BIM model
    D. **COBie Table 6-23 Worksheet 04**: Space (Spaces within a floor)
    This worksheet shall be derived from the BIM model utilizing scheduled rooms from the BIM model, including assignable and non-assignable areas; mechanical, electrical, telecommunications, housekeeping, toilet facilities, corridors and other circulation areas.

Coordinate actual data needed in each worksheet with OUA and FMD requirements. Document required data necessary in COBie worksheets and document the components which need to have data generated and captured in the BEP. It is not necessary to provide data on all model components only those required. Schedule planning meetings to determine the scope and extents of elements and components that will need to be captured in COBie worksheets, and provide a mapping scheme for migrating data fields in the BIM model to the data fields in the COBie spreadsheets as part of the BEP.

4.3 – PRELIMINARY DESIGN (DESIGN DEVELOPMENT)

1. **Project Objectives, BEP & Budget**: The BIM Team shall provide a written description of project objectives as part of the initial BIM Execution Plan (BEP) for review and approval. Preliminary Design will show the refinement of the scope of work identified during the Schematic Design Phase. It will also have reconciled the impact of the engineering disciplines on the Schematic Design, and have major structural and MEP systems modeled at this time to demonstrate the integration of the original schematic design concepts with the engineering requirements. Updated Budget/Cost estimates and updated Schedule shall also be provided at this phase. BEP should document the various design models from the BIM Team entities. Use BIM software to extract more accurate figures for cost estimating. Outputs shall be on spreadsheets and submitted at the end of this phase.
2. **Program and Space Validation**: Provide an updated program and space validation report that utilizes spatial data which includes room areas derived from the BIM model. Verify building efficiency targets. In addition provide spatial data in COBie format (see COBie Data item below)
3. **Existing Building Conditions & Existing Utilities Report**: The Design Professional shall continue to model existing conditions needed to coordinate the extent of the new construction work where work includes additions or alterations. Unless otherwise specified, the Design Professional is responsible for verification of existing conditions and ensuring that all electronic deliverables are accurate and comply with requirements. At this phase existing utilities should be identified, documented and coordinated with base MEP systems and show how new MEP systems will tie into the existing utilities.
4. **BIM Model**: All information required for Preliminary Design level of development shall be graphically and alphanumerically correct, included in, and derived from the BIM model. Including, room and building areas and names. Model shall meet UGA's functional and aesthetic requirements while still meeting budgetary and sustainable, if this is required, demands. BIM model to be sole source of all 2D drawings, being derived from the model. Generic and "place holder" system and component families should be replaced with proposed system and component families. A model to contain a high level of accuracy and proficiency as the design develops. Provide additional scope of work coordination regarding how final building elements are going to be modeled between BIM Team entities and documented in the BEP. For example certain structural elements such as floor slabs can be the responsibility of the Architect or Structural Engineer. In some cases the elements may be duplicated, copy/monitor may be utilized, if so, how and for which elements, document in BEP. Additional modeling Requirements:
    A. **Architectural Systems Requirement**: Architectural Site Plan, existing building elements or conditions, demolished items, new interior and exterior walls (not generic types), ceilings, soffits, sun control elements, floors and roof systems, penthouses and roof structures, fenestration and doors, vertical circulation, built in millwork and architecturally significant equipment, furnishings and fixtures, plumbing fixtures.
    B. **Structural Engineering Requirements**: Foundations, framing, shear and load bearing walls, brick ledges, steel bracing, edge of slab conditions, lintels.
    C. **HVAC Systems Requirements**: Equipment such as fans, VAV's, compressors, chillers, cooling towers, air handlers, etc.; Distribution ductwork modeled to outside ductwork or duct insulation; Diffusers, louvers, hoods, radiant panels, perimeter units, wall units; Show clearances required for equipment access, removal or repair as invisible solids.

D. **Electrical Systems Requirements**: Transformers, generators, main distribution panels, switchgear, main IDF's, conduit and feeders larger than ¾" diameter, outlets, switches, junction boxes, lighting fixtures and controls, fire alarm permanently mounted fixtures, building controls and clearance zones for access.
E. **Plumbing, Process Piping & Fire Protection Requirements**: Waste/Vent, Supply or Process Piping at or over ¾" (includes any insulation); plumbing fixtures; sprinkler lines larger than ¾" diameter, sprinkler heads, pumps, stand pipes, wall hydrants, connections and risers.
F. **Specialty Consultants Requirements**: Equipment provided or specified by consultant with rough – in connection points for all utilities and clearances required. Extent of modeling shall be per the BIM Execution Plan.

5. **Site & Topographical Surveys**: The model shall include topography with level of detail per the BIM Execution Plan. Model should include surrounding areas that affect drainage system or have other impacts. Landscaping elements shall include planted areas, beds and berms, hardscape, site paving and storm water management structures or systems.
6. **Energy Modeling Requirements**: Continued development of energy model on the selected scheme from Schematic Design to optimize focus on the most promising energy saving strategies is required. Parametric studies to better understand the energy use of each building component are required. Model shall meet any target requirements for sustainability and/or LEED or other third party verification. Model shall include all the design and operating parameters that affect energy consumption after occupancy. Expected occupant numbers and hours, lighting use, equipment use, and other user data shall be included to attain a closer approximation of actual use. Requirements shall include options for Energy Conservation Measures (ECM) to achieve further reductions in water, electricity or energy in the facility. Information shall include life cycle cost (LCC) and return on investment (ROI). Update the plan for how the energy model will be utilized at this and future phases of the Project, identifying responsible parties, software, and integration with the BIM model in the BEP.
7. **Collision Report**: At this phase additional models and information shall be developed enough for true interference and/or clash detection. Discipline Collision Reports: Collision report shall include; structure against electrical and specialty equipment; ductwork / piping against electrical equipment; ductwork / piping against floors and the building envelope; ductwork / piping against structural framing elements.
8. **COBie Data**: At Preliminary Design Phase COBie data shall be submitted in spreadsheet format, using the most current version of COBie. The following COBie worksheets shall be provided in the Preliminary Design deliverable:
   A. **COBie Table 6-20 Worksheet 01**: Contact (People/Offices/Companies)
   B. **COBie Table 6-21 Worksheet 02**: Facility (Identification of facility (ies))
   C. **COBie Table 6-22 Worksheet 03**: Floor (description of vertical levels)

   The following worksheets shall be derived from the BIM model utilizing scheduled rooms/elements from the BIM model.
   D. **COBie Table 6-23 Worksheet 04**: Space (Spaces within a floor)
   E. **COBie Table 6-26 Worksheet 07**: Component (named components & equipment)

Coordinate actual data needed in each worksheet with OUA and FMD requirements. Document required data necessary in COBie worksheets and document the components which need to have data generated and captured in the BEP. It is not necessary to provide data on all model components only those

required. Schedule planning meetings to determine the scope and extents of elements and components that will need to be captured in COBie worksheets, and provide a mapping scheme for migrating data fields in the BIM model to the data fields in the COBie spreadsheets as part of the BEP.

4.4 – CONSTRUCTION DOCUMENTS (CONTRACT DOCUMENTS)

1. **Project Objectives, BEP & Budget**: The BIM Team shall provide a written description of project objectives as part of the initial BIM Execution Plan (BEP) for review and approval. Continued development of the model so that the design intent and scope of work is detailed and annotated, graphically clear for accurate bidding, scheduling and construction purposes. Updated Budget/Cost estimates and updated Schedule shall also be provided at this phase. BEP should document the various design models from the BIM Team entities. Use BIM software to extract more accurate figures for cost estimating. Outputs shall be on spreadsheets and submitted at the end of this phase.
2. **Program and Space Validation**: Provide an updated program and space validation report that utilizes spatial data which includes room areas derived from the BIM model, and verifies that final design matches original program intent. Verify building efficiency targets. In addition provide spatial data in COBie format (see COBie Data item below).
3. **Existing Building Conditions & Existing Utilities Report**: The Design Professional shall continue to model existing conditions needed to coordinate the extent of the new construction work where work includes additions or alterations. Unless otherwise specified, the Design Professional is responsible for verification of existing conditions and ensuring that all electronic deliverables are accurate and comply with requirements. At this phase existing utilities shall be identified, documented and coordinated with base MEP systems and show how new MEP systems will tie into the existing utilities.
4. **BIM Model**: All information required for Construction Documents level of development shall be graphically and alphanumerically correct, included in, and derived from the BIM model, including Room and Building Areas and names. Model shall meet UGA's functional and aesthetic requirements while still meeting budgetary and sustainable, if this is required, demands. The BIM model to be the sole source of all 2D drawings, being derived from the model. Generic and "place holder" system and component families should be replaced with actual representational system and component families that accurately reflect the desired design intent. The model is to contain a high level of accuracy and proficiency as the model is developed. Maintain parametric links within the model so that plans, sections elevations, custom details, schedules and 3D views are automatically generated and referenced. 2D details and section information should be consistent with and accurately match with corresponding 3D information within the scale being referenced. Do not hide 3D geometry that does not match 2D details and then draw a differing condition in 2D, 3D geometry shall accurately reflect design intent of 2D detailing. Provide additional scope of work coordination regarding how final building elements are going to be modeled between BIM Team entities and document in the BEP. Refine load calculations, wind pressure, daylighting, acoustics, natural ventilation, code issues. Extent of modeling shall be per the BIM Execution Plan. Additional modeling requirements:
    A. **Architectural Systems Requirement**: Architectural Site Plan, existing building elements or conditions, demolished items, new interior and exterior walls (not generic types), ceilings, soffits, sun control elements, floors and roof systems, penthouses and roof

structures, fenestration and doors, vertical circulation, built in millwork and architecturally significant equipment, furnishings and fixtures, plumbing fixtures.

B. **Structural Engineering Requirements**: Foundations, framing, shear and load bearing walls, brick ledges, steel bracing, edge of slab conditions, lintels.
C. **HVAC Systems Requirements**: Equipment such as fans, VAV's, compressors, chillers, cooling towers, air handlers, etc.; Distribution ductwork modeled to outside ductwork or duct insulation; Diffusers, louvers, hoods, radiant panels, perimeter units, wall units; Show clearances required for equipment access, removal or repair as invisible solids.
D. **Electrical Systems Requirements**: Transformers, generators, main distribution panels, switchgear, main IDF's, conduit and feeders larger than ¾" diameter, outlets, switches, junction boxes, lighting fixtures and controls, fire alarm permanently mounted fixtures, building controls and clearance zones for access.
E. **Plumbing, Process Piping & Fire Protection Requirements**: Waste/Vent, Supply or Process Piping at or over ¾" (includes any insulation); plumbing fixtures; sprinkler lines larger than ¾" diameter, sprinkler heads, pumps, stand pipes, wall hydrants, connections and risers.
F. **Specialty Consultants Requirements**: Equipment provided or specified by consultant with rough – in connection points for all utilities and clearances required. Extent of modeling shall be per the BIM Execution Plan.

5. **Site & Topographical Surveys**: The model shall include topography with level of detail per the BIM Execution Plan. Model should include surrounding areas that affect drainage system or have other impacts. Landscaping elements shall include planted areas, beds and berms, hardscape, site paving and storm water management structures or systems.
6. **Energy Modeling Requirements**: Provide comparison of proposed final design to the minimally code-compliant base-case building. Model shall meet any target requirements for sustainability and/or LEED or other third-party verification as well as energy performance requirements listed in Section 01 81 00 Facility Performance Requirements. Model shall include all the design and operating parameters that affect energy consumption after occupancy. Expected occupant numbers and hours, lighting use, equipment use, and other user data shall be included to attain a closer approximation of actual use. Requirements shall include options for Energy Conservation Measures (ECM) to achieve further reductions in water, electricity or energy in the facility. Information shall include life cycle cost (LCC), return on investment (ROI), and Energy Use Intensity (EUI). Design Professional shall coordinate with UGA PM to incorporate the latest utility and energy rates from the UGA Office of Utility and Energy Management.

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7. **Collision Report**: Pre-Bid Collision Reports. Collision reports to verify that no major unresolved collisions are occurring in the Design Professional Design Intent Models. Discipline Collision Reports: Collision report shall include; structure against electrical and specialty equipment; ductwork / piping against electrical equipment; ductwork / piping against floors and the building envelope; ductwork / piping against structural framing elements.
8. **COBie Data**: At Construction Document Phase COBie data shall be submitted in spreadsheet format, using the most current version of COBie. The following COBie worksheets shall be provided as part of the Construction Document deliverable:
    A. **COBie Table 6-20 Worksheet 01**: Contact (People/Offices/Companies)
    B. **COBie Table 6-21 Worksheet 02**: Facility (Identification of facility (ies))
    C. **COBie Table 6-22 Worksheet 03**: Floor (description of vertical levels)

The following worksheets shall be derived from the BIM model utilizing scheduled rooms/elements from the BIM model.

D. **COBie Table 6-23 Worksheet 04**: Space (Spaces within a floor)
E. **COBie Table 6-26 Worksheet 07**: Component (named components & equipment)

Coordinate actual data needed in each worksheet with OUA and FMD requirements. Document required data necessary in COBie worksheets and document the components which need to have data generated and captured in the BEP. It is not necessary to provide data on all model components only those required. Schedule planning meetings to determine the scope and extents of elements and components that will need to be captured in COBie worksheets, and provide a mapping scheme for migrating data fields in the BIM model to the data fields in the COBie spreadsheets as part of the BEP.

4.5 – BIDDING/PROCUREMENT PHASE

1. **General:** Depending on how project is to be delivered, additional BIM requirements for model sharing may or may not be required on a project-by-project basis. Document any specific BIM deliverables for this phase in the BEP.

4.6 – CONSTRUCTION PHASE

1. **BIM Execution Plan (BEP) Review**: The BIM Team and UGA shall review the BEP and make necessary changes and updates to ensure the smooth continual coordination of BIM modeling information and data collection and integration. The BEP shall be updated to include commissioning into the BIM and COBie process.
2. **Design Intent Model**: The BIM Team shall continuously maintain and update the Design Intent Model(s) with changes from Construction Change Orders and As-Built mark-ups provided by the Contractor(s) during construction. Updated models shall be provided in .RVT format per the BEP for frequency and location.
3. **Construction Models**: A BIM construction model(s) shall be developed and maintained by the Contractor in .RVT format. The Contractor shall be provided a copy of the Design Professional's BIM Models(s), the Contractor shall then utilize that model to develop a concurrent construction model that he will develop for Construction Phase needs. The Construction phase model may be developed and modified as required to inform: materials, quantities, sequencing, phasing, clash detection, etc. as required by the Contractor and the Subcontractors. Additional Construction Models shall also be developed for fabrication, coordination and shop drawings. These additional Construction Models may be in other formats other than BIM, if they are in other formats other than .RVT then the Contractor shall review and consolidate those models utilizing Navisworks, and providing a coordinated Navisworks model as a deliverable in .NWD format, during the construction phase at a frequency to be documented in the BEP. As-Built modeling and documentation in the Construction .RVT and .NWD models by the Contractor shall be concurrent with updates to the Design Intent Model(s) by the Design Professional Team. It is not the intent of UGA to require additional, un-necessary, or duplicative modeling efforts, and UGA recognizes that different models may be generated or not depending on each BIM Team entities abilities or normal work processes. UGA in any event would like a consolidated As-Built Model in Navisworks (.NWD) that will consolidate all differing modeling methods into one reference. Discussion among all BIM Team parties is expected in determining final BIM deliverables, and all final deliverables shall be documented in the BEP and agreed to by all parties.

4. **COBie Data**: At the beginning of the Construction Phase the Contractor shall take over responsibility for the COBie Data for elements and component data. The Design Professional will maintain responsibility for the COBie Data for spatial data (Rooms and Areas) and other general information. The purpose and intent is for the Contractor to provide the additional data that will come from the shop drawing and product submittal process, delegated design elements, and redesigned systems that are the responsibility of the Contractor and Subcontractors. The following COBie worksheets (1-4) shall be the responsibility of the Design Professional Team and provided as part of the Construction Phase deliverables per the BEP:
    A. **COBie Table 6-20 Worksheet 01**: Contact (People/Offices/Companies)
    B. **COBie Table 6-21 Worksheet 02**: Facility (Identification of facility(ies))
    C. **COBie Table 6-22 Worksheet 03**: Floor (description of vertical levels)
    D. **COBie Table 6-23 Worksheet 04**: Space (Spaces within a floor)

    The following COBie worksheets (5-7) shall be derived from the BIM model utilizing scheduled information from the BIM construction model and shall be provided by the Contractor per the BEP.
    E. **COBie Table 6-26 Worksheet 07**: Component (named components & equipment)

Coordinate actual data needed in each worksheet with OUA and FMD requirements. Document required data necessary in COBie worksheets and document the components which need to have data generated and captured in the BEP. It is not necessary to provide data on all model components only those required. Schedule planning meetings to determine the scope and extents of elements and components that will need to be captured in COBie worksheets, and provide a mapping scheme for migrating data fields in the BIM model to the data fields in the COBie spreadsheets as part of the BEP.

4.7 – PROJECT CLOSEOUT

1. **Record Model & Drawings:** The BIM Team shall provide the final update to the Design Intent BIM Model(s) thus producing the Record BIM Model. Record model to contain all changes from Construction Change Orders and As-Built markups provided by the Contractor throughout the Construction Phase process. Final Record Model shall be provided in .RVT format and .IFC formats. Record drawings will be provided as updated 2D documentation of Contract Drawings in .PDF and .DWG format or as otherwise defined in the Contract and Section 01 77 00 Project Closeout.
2. **As-Built Model & Drawings**: The Contractor shall provide the final update to the Construction BIM Model(s) thus producing the As-Built BIM Model. As-Built BIM Model(s) to contain all changes from Construction Change Orders and As-Built markups and documentation as recorded by the Contractor throughout the Construction Phase process. Final As-Built Model shall be provided in .RVT format, .IFC format, and .NWD format.
3. **COBie Data**: The following COBie worksheets (numbered 1-4) shall be the responsibility of the Design Professional Team and shall be provided as part of the Project Closeout Phase deliverables per the BEP:
    A. **COBie Table 6-20 Worksheet 01**: Contact (People/Offices/Companies)
    B. **COBie Table 6-21 Worksheet 02**: Facility (Identification of facility(ies))
    C. **COBie Table 6-22 Worksheet 03**: Floor (description of vertical levels)
    D. **COBie Table 6-23 Worksheet 04**: Space (Spaces within a floor)

The following COBie worksheets (numbered 5-11) shall be derived from the BIM model utilizing scheduled information from the BIM Construction Model(s) and shall be provided by the Contractor as part of the Project Closeout Phase deliverables per the BEP.

E. **COBie Table 6-24 Worksheet 07**: Component (named equipment)

Coordinate actual data needed in each worksheet with OUA and FMD requirements. Document required data necessary in COBie worksheets and document the components which need to have data generated and captured in the BEP. It is not necessary to provide data on all model components only those required. Schedule planning meetings to determine the scope and extents of elements and components that will need to be captured in COBie worksheets, and provide a mapping scheme for migrating data fields in the BIM model to the data fields in the COBie spreadsheets as part of the BEP

5.0 – COMPONENT WORKSHEET

Use the following Component Worksheet for determining which components will be tracked and assigned COBie data. This is a general list that may need to be expanded depending on the Project and its components, adjust as needed and include as part of the BEP documentation and as the starting point for determining the extent of COBie data modeling required for each project.

Components to have COBie Data		
SITE		
	Area Wells / Grating	N
	Equipment Curbs	N
	Building Pads	N
	Planting	N
	Sidewalks	N
	Parking Stripes	N
	Roads	N
	Property lines	N
	Topography	N
General		
Exterior		
	Walls	N
	Wall system	N
	Windows	N
	Glazing	N
	Mullions	N
	Header / Sill Height	N
	Doors	N
	Jambs	N
	Door Type	N
	Hardware	N
	Steps	N
	Ramps	N
Interior		
	Walls	N
	Walls to Deck	N
	Walls above ceiling	N
	Walls – Partial height	N
	Wall Types	N
	Doors	N
	Door types	N
	Door jambs	N
	Door header height	N
	Door Schedule	N
Windows		
	Window Types	N
	Glazing	N
	Mullions	N
	Header / Sill Height	N
Circulation		
	Floor Type	N
	Floor Finish	N
	Handrails	N

	Raised Floor System	N
	Stairs	N
	Ramps	N
	Elevator	Y
	Escalators	N
Restrooms		
	Toilet partitions	N
	Toilets	N
	Grab bars	N
	Sinks	N
	Fixtures & Accessories	N
Misc.		
	Wall Protection / Corner Guards	N
	Fixed millwork	N
	Fire Extinguishers	N
	Mechanical Chases	N
	Vertical penetrations	N
	Floor penetrations	N
	Columns - Architectural	N
	Room Numbers	Y
	Personnel assignment / occupant	N
Kitchen Equipment		
	Stove	N
	Grill	N
	Vent hood	N
	Prep table	N
	Mixer	N
	Walk-in cooler/freezer	N
	Reach-in cooler/freezer	N
	Fryer	N
	Fire suppression equipment	N
	Steam table	N
	Cold food table	N
	Ice machine	N
	Soda fountain	N
Rooftop		
	Roof type	N
	Roof construction	N
	Vent pipes	N

	Exhaust fans	N
	Roof drains	N
	Gutters	N
	RTU curbing	N
	Roof railings	N
	Parapet walls	N
	Roof top mechanical equipment	Y
	Skylights	N
Reflected Ceiling Plans		
	Ceiling Type	N
	Skylights	N
	Signage	N
	Electrical fixtures	N
	Electrical devices	N
Specialty Equipment		
	Cold rooms	N
	Emergency drench hose	N
	Emergency eye wash	Y
	Emergency shower	Y
	Emergency shower/eyewash	Y
	Eyewash shower	N
	Exhaust fumehood	Y
Furniture		
	Desk	N
	Chair	N
	Table	N
	Side chair	N
	Bookshelf	N
	File cabinet	N
	Credenza	N
	Desktop computer	N
	Laptop computer	N
	Monitor	N
	Printer	N
	Copier	N
	Plotter	N
	UPS	N
	Phone - handset	N
	Phone - mobile	N
	Fax machine	N

	Artwork	N
	Casework - fixed	N
Structural		
	Beams	N
	Columns	N
	Connections	N
	Gusset plates	N
	Bolts	N
	Flange widths	N
	Joists	N
	Anchor bolts	N
	Base plates	N
	Misc. steel	N
Mechanical		
	HVAC equipment	Y
	HVAC registers/returns	N
	Sprinklers	N
	Air terminals – supply/returns	Y
	HVAC flex ducts	N
	HVAC trunks	N
	HVAC ducts	N
	Sprinkler trunk	N
	Mechanical equipment	Y
	Sprinkler heads	N
	Sprinkler lines	N
	Fire hoses	N
	AHU 100 + tons	Y
	AHU 25/99 ton	Y
	AHU 3/24 ton	Y
	Air compressor	Y
	Air drier	Y
	Computer AC unit	Y
	Condensing unit	Y
	Constant velocity	N
	Cooling tower	N
	Custodial chemical dispenser	N
	CW pump	N
	DDTU	N
	Dehumidifier	N
	Domestic water filters	N
	Dryer	N
	Energy recovery unit	Y
	Exhaust fan	Y

	Exhaust fan/fumehood	Y
	Fan coil unit	Y
	Fresh air supply fan	N
	Fumehood	Y
	HVAC vents	N
	Pack AC	N
	Residential furnace	N
	Return air fans	N
	Roof top AC unit	N
	SAC	N
	Steam humidifier	Y
	Steam boiler	Y
	Terminal reheat unit	Y
	Terminal unit	Y
	UHBE	N
	UHBG	N
	UHBS	N
	UHBW	N
	Unit heater electric	N
	Unit heater water	Y
	VAV	Y
	Window AC	N
	Hot water pumps	Y
	Domestic booster pumps	Y
	Process chilled water pumps	Y
	Solar panel (water)	Y
Electrical		
	Switches	N
	Receptacles	N
	Data/CATV outlets	N
	Alarm devices	N
	Thermostats	N
	Sconces	N
	Fire cabinets	N
	Electrical panels	Y
	Wiring troughs in slabs	N
	Floor receptacles	N
	Light fixtures	Y
	Speakers	N
	Exit lights	Y
	Emergency exit lights	Y
	Cameras	N
	Exhaust fans	Y
	Emergency strobes	N

	Electrical conduits >/= ¾”	Y
	Electrical conduits < ¾”	N
	Data lines	N
	Fire dampers	N
	Hangers	N
	Cable trays	N
	Data port ID	N
	Circuit ID	N
	Transformers	Y
	Transformer switches	Y
	Emergency generator	Y
	Switchboard	Y
	Switchgear	Y
	High voltage switches	Y
Plumbing		
	Plumbing fixtures	N
	Major plumbing trunk lines	N
	Minor plumbing supply lines	N
	Plumbing drain lines	N
	Disconnects and shut off valves	N
	Hose bibbs	N
	Fire connections	N
	Acid dilution tanks	Y
	CD pump	N
	Chiller	N
	Chiller process	Y
	Coalescing filters	N
	Faucets	N
	Floor drains	N
	Roof drains	N
	Grease traps	N
	Heat pump	N
	Heater	N
	Hot water strainer	N
	HW pump	N
	Inlet vane	N
	Liebert unit	Y
	Outdoor fountain	N
	PIU	N
	Processed chilled water	N
	Processed chilled water filter	N
	Water fountains	Y
	Domestic hot water	Y
	Hot water boiler	Y

	VAC pump	Y
	Main chilled water valves	Y
	Main domestic water valves	Y
	Back flow prevention	Y
	FM 200	Y
	Main line sewer system	Y
	Cisterns	Y