SHSU BIM-FM Requirements: Table of Contents

Section 0 - Executive Summary

Building Information Modeling (BIM) and Facilities Management (FM) Data Requirements

Section 1 – Strategy and Objectives

Knowing the strategy and objectives of Sam Houston State University (SHSU) in Building Information Management for Facilities Management (BIM-FM) is important for all project delivery teams (AEC + CxA) in order to satisfy the expectations and project requirements. The strategy and objectives section states that the BIM-FM process and documentation was undertaken by SHSU in order to provide direction and to equip project teams for facilities management data specification, collection, validation, and ultimately handover to SHSU. Handover deliverables shall be in a digital format and support operational objectives and efficiencies, such as import to the asset management (CMMS - Computerized Maintenance Management System) system FAMIS.

Section 2 – FM BIM Execution Plan (FM-BEP)

Developing and communicating a clear plan for carrying out BIM-FM is necessary for each project team. The FM BIM Execution Plan (also referred to as a FM-BEP) section provides an outline and framework for planning how BIM-FM is to be accomplished at the project level. The overall intent is to allow and require project delivery team members to communicate to SHSU how they intend to meet the BIM-FM requirements. Each member of the AEC team shall submit a plan per the stated requirements in this section. The Facilities Data Integrator (FDI) receives each plan and reviews it according to the contracted section requirements for that team member. This plan outlines items such as: company roles, contact information, AEC team collaboration procedures, information exchange schedules, quality control procedures, and others. Submitted execution plans enable the Facilities Data Integrator (FDI), an agent of the owner (SHSU), the ability to better guide and manage teams to accomplish BIM-FM deliverables. The BEP allows teams to demonstrate how they will comply with the prescriptive requirements as well as the performance based requirements. This leaves room for project delivery teams to impose their own means and methods where prescriptive requirements do not exist.

Section 3 - FM Data Criteria

The FM Data Criteria is the largest section of the BIM-FM Requirements documents. It is a detailed specification and guide to understanding how project information shall be organized and delivered to SHSU. This is the most prescriptive part of the BIM-FM process due to the specific and structured data requirements for SHSU's configuration of FAMIS. This section outlines what data is to be collected (i.e., what do we need), in what format (i.e., how do we need it delivered), division of responsibility (i.e., who is to collect specific information), and deliverable schedules (i.e., when are the milestone deliverables over the project's duration). This level of detail is required in order to properly communicate and contract these requirements with the project delivery team members in each standalone contract with the owner (i.e., AE, CM, CxA, others). In the absence of this level of detail, confusion will be present and the process for BIM-FM will break down. This section introduces a role called the Facilities Data Integrator (FDI) to the project delivery team who is chosen by the owner to manage and ensure correct execution of BIM-FM data requirements and process across the entire project delivery process. This section references attachments and specific SHSU roles for providing the latest version of facilities-specific data to be incorporated into projects.

Section 1: Strategy and Objectives

Explanation of the BIM Strategy and Objectives

Sam Houston State University (SHSU) desires to use technology to improve construction projects and the way they are handed over, keeping in mind operational objectives and efficiency. The strategy and objectives of SHSU in Building Information Modeling for Facilities Management (BIM for FM) is important for all project delivery teams (AEC + CxA) in order to satisfy expectations and project requirements. This section describes the reasoning behind BIM for FM process and documentation undertaken by SHSU, and explains the intent to provide direction and to equip project teams for facilities management data specification, collection, validation, and ultimately handover to SHSU. Handover deliverables shall be in a digital format and support operational objectives and efficiencies, such as import to the asset management (CMMS - Computerized Maintenance Management System) system using FAMIS. Through the establishment of BIM for FM requirements, SHSU will obtain consistent and useful handover deliverables (digitally formatted) that support operations and maintenance for many years to come. SHSU's purpose in standardization is to facilitate and produce a repeatable process at the Huntsville campus that can be employed on capital projects of various sizes.

The intent of this document is not to add unreasonable scope upon individual project team members, but rather to provide a method and format for capturing useful project information that is already being managed throughout the planning, design, construction, and commissioning phases. In some cases, project team members will realize efficiencies by following these guidelines and having a consistent project repository of facility data and associated documents. For other team members that already use a thorough system for tracking project spaces, equipment, and documents, this guideline will have little impact upon their current project workflows other than to specify the owner's requirements. By SHSU investing in the development of this process, they will be able to contract for these requirements in the course of the normal project delivery process, reduce change orders, reduce rework, and allow project team members the opportunity to align their project delivery processes and data management processes in advance of the performance of work. This alignment is intended to eliminate rework situations and streamline the project delivery process for digital data and documents for handover and integration by the Facilities Data Integrator (FDI) into the owner's operations and maintenance systems, namely FAMIS.

SHSU requires BIM to be used in a way that supports project success and advancing operational and maintenance workflows. Some specific BIM uses that the project team will be required to support include but are not limited to: 1) coordinated record set / as-built 3D Models, 2) coordinated Facilities Management Navisworks models designed for identifying building systems, and 3) FM data set production (for use in COBie data set compilation) with associated documents to be imported to FAMIS by the Facilities Data Integrator (FDI). The process established and confirmed by SHSU does not require each project delivery team member to be a 3D modeling subject matter expert, an FM data subject matter expert, or a COBie subject matter expert. Instead, the project team members are required to provide elements of the facilities management data set requirements over the life of the project in an open-standard format or in a manner that enables the Facilities Data Integrator (FDI) to extract the same information using industry standard tools and software. These project details will be documented and confirmed by the approval of the BIM Execution Plan (BEP) elements for each team member. BEP revisions may be required as team members are added and as the overall plan evolves for the project team members. One of the FM Data Integrator's roles is to manage the overall BIM-FM Data process and oversee the compilation (i.e., integration) of

the FM Data while ensuring that configuration control is maintained for revisions and changes over the lifecycle of the project. Thus, team members are expected to provide the same type of project information they normally produce for use at specific points in the project lifecycle. These are outlined along with the specific details of the role of FM Data Integrator in other sections of the specifications. The BIM Execution Plan (BEP) will outline and document the project specific processes to be employed and will provide a mechanism for owner review and approval of the FM Data process via submittals for review and approval by the FDI. In this manner, additional services are not expected from the project delivery team members because SHSU is not asking for new deliverables but rather, the same information in a modified format in advance of contracting and work production to eliminate the occurrence of rework.

Description of Existing Infrastructure and other Operational Interfaces

SHSU currently uses FAMIS 2 as its computerized maintenance management system (CMMS), but will soon be transitioning to FAMIS 360. FAMIS supports the import of COBie (Construction Operations Building Information Exchange) data, which is an industry recognized open standard data format. COBie is one "tool" that is used in this process to organize and format the FM Data for use. The data structure (ex, Asset Groups) from FAMIS will help guide the assembly of COBie data at SHSU. These data structure rules have guided and informed the development of these requirements, and when followed correctly, will ensure project teams have built the COBie data-set in a manner that is consistent with SHSU CMMS requirements and data structures.

SHSU currently uses 3D models as a tool in facilities management. By requiring project teams to coordinate and share building models, allowance is made for immediate and future needs of the university. Therefore, all 3D Facilities Models (i.e., models from the AE (design intent) and the CM (as-built)) shall be provided in an acceptable format (see the FM data specifications) and not in any other proprietary or subscription based software. Additional requirements can be found in the FM data specifications.

As the construction industry and technology advances, SHSU will make incremental changes to the BIM for FM requirements over time. The current specifications represent the first generation of FM Data specifications and changes are expected to be accepted and processed that will integrate future technologies and workflow changes over time. However, these must be evaluated by SHSU for adoption from the industry and integrated into the project delivery strategy and handover requirements in light of how SHSU does FM work and how they want to receive and process project information (data), documents, and models.

Explanation of SHSU Expectations

The FM data specifications developed for and applied to this project are an evolving guideline for capturing BIM data at SHSU. However, a specific set of requirements does apply to this contract per the identified Exhibit. With each new building, this specification may require the attention of a Facilities Data Integrator (FDI) to ensure current requirements are appropriate and/or are updated for additional scope that was unforeseen at the writing of the current publication. This updating process will continue to "build-out" and enhance the overall FM Data specifications in a way that creates a more robust specification based upon project scopes and building/project types at SHSU. The first generation FM Data specifications have been formulated to capture as much institutional information as possible based upon past FM Data projects conducted. It should be noted that each owner has a varying array of interests and requirements that are driven by their perception of the value to the FM process.

Thus, these requirements are likely to be modified over time as more operating experience is gained in the use of FM Data and associated documents.

The FM Data Integrator shall also assess each project teams' ability to perform the scope of the BIM and FM data requirements and provide specific recommendations for implementing requirements on a project by project basis. The role and responsibility of FM Data Integrator is outlined in other sections of this guide. However, the general responsibility is to manage the BIM process and the FM Data on projects and to ensure the correct execution of these BIM for FM Data guidelines. The role of the FM Data Integrator can be performed by different parties within the project delivery team during construction or within SHSU (i.e., internal direct staff or a third party consultant) throughout a project's life cycle.

SHSU expects that all large scale projects will use the current BIM for FM requirements and produce an FM data-set for import into the CMMS. However, the Director of Facilities Management will determine expectations in regard to these requirements on projects under five million ($5M) dollars. Project team members will each be expected to contribute to the project's FM Data requirements where appropriate, contracted, and as explained through this specification.

Specific information regarding responsibility and accountability are detailed in other sections of this specification. However, some of the general expectations include but are not limited to the following: 1) the party responsible for space planning will be expected to provide a schedule of spaces with use categories and associated space attributes, 2) the A/E in the design phase will be expected to provide square footage information, equipment locations, and scheduled equipment design information, 3) the construction contractor will be responsible for providing equipment manufacturer, model, asset attribute information, and associated documents as the submittal process is completed. The construction contractor will be expected during construction to assign documents (drawings, submittals, O&M's, and others) to equipment and serial numbers via the FM Data format as well. The contractor will produce a coordinated model prior to field installation.

Section 2 - BIM Execution Plan (BEP)

The objective of this section is to provide a project specific plan on how the BIM for FM requirements and deliverables will be accomplished. Each member of the AEC team shall submit a plan, to the Facilities Data Integrator (FDI), conforming to the requirements set forth in this section and other parts of the BIM specifications. The intent is for the BIM Execution Plan (BEP) to clearly identify how the project team members will comply with the BIM for FM Data requirements as well as how they will cooperate and coordinate with the other team members.

Following the review of individual BIM Execution Plans, the Facilities Data Integrator (FDI) shall coordinate a meeting to provide a Team BIM Execution Plan (BEP). The Team Execution Plan shall provide considerable detail on deliverable schedules, review points and process, grading, and handover requirements. For more information on aspects of the team execution plan, see other sections and exhibits to the BIM for FM requirements.

The submittal process is employed to allow team members to respond to the requirements on two main fronts. First, the BIM and FM requirements have certain aspects that are prescriptive. That is, SHSU requires certain elements of the requirements in a particular content, format, and timeframe from specific team members. See the requirements for further details. Secondly, the BIM and FM requirements have certain aspects that are performance based. That is, the owner desires and requires certain outcomes and results to be achieved. However, the owner does not want to impose means and methods of deliverable or result production that are unreasonable. Thus, the team member, for these elements of the BEP, is allowed to propose and describe their plan, approach, and means/methods for achieving the requirements and desired outcome. This is intended to provide reasonable flexibility for the team members in order to allow for workflow and deliverable production efficiency when and where an owner's need for a prescriptive requirement does not exist.

The following outline is a "framework" only and the team members are encouraged to add additional sections and subsections to the plan as needed. The framework below is intended to communicate the minimum content required (not the maximum). We recognize that many project delivery team members have prepared and executed multiple BEP's in the past. The intent in this specification is to launch the BEP development process and not to limit the BEP contents to this document. Team members are encouraged to add information to the extent needed to clearly communicate their implementation intent and plans. Several different BEP formats have been developed in the industry and this specification and framework is not intended to be a limiting factor in the team members' efforts to communicate and seek approval from the owner for the BEP. As the BEP is incrementally developed by the team members, additional details and clarifications are expected to be required to clarify how team members will interact and deliver on the entire set of requirements. It is expected that the BEP will have multiple revisions as the team iterates to a completed project and meets the overall requirements. The intent is also to eliminate rework on elements of the BEP that are approved. Team members are expected to consider downstream team members in the process and take every reasonable measure to minimize and eliminate rework. The

FM Data Integrator will assist in this determination and will be the primary party representing the owner in the BEP approval process.

Section A: Project Information

Project Data

1. Project Owner:
2. Project Name:
3. Project Location & Address:
4. Contract Type/Delivery Method:
5. Concise Project Description: [number of facilities, general size, etc.]
6. Additional Project Information: [unique BIM project characteristics and requirements]
7. Project / Contract Numbers: [Contract Number, Task Order, Project Number, etc.]
8. Project Schedule / Phases / Milestones: [include BIM milestones, pre-design activities, major design reviews, stakeholder reviews, and other major events which occur during project lifecycle]

Project Schedule

Project Phase / Milestone	Estimated Start Date	Estimated Completion Date	Project Stakeholders Involved
X% Schematic Design			
X% Design Development			
X% Construction Documents			
Buy-out			
Submittals			
Install			
Close-Out			
Handover			

Key Project Contacts

List of lead BIM contacts for each organization on the project.

Role	Organization	Contact Name	Location	E-Mail	Phone
Project Manager(s)					
BIM Manager(s)					
Discipline Leads					
Other Project Roles					

Section B: Project Goals

Acknowledgment of BIM and FM Data Requirements

1. Identify Major BIM and FM Data Goals / Objectives: [state major BIM & FM data goals, actions to implement, evidence the goal has been achieved, and participants involved]

Section C: BIM Uses

Acknowledgment of BIM and FM Data Requirements

1. Identify Major BIM uses on the project: [state major BIM use cases, their author, other users, and file types (if applicable)]
2. Identify Project Assets: [see 'SHSU Asset Requirements Matrix' and indicate project assets]
3. Identify Elements to by Modeled and the responsible party to model such elements along with Level of Detail on each element.
4. Identify other areas of particular interest in BIM that require clarity: [origin point, scale, model maintenance, other CAD/BIM Guidelines applicable, design coordination, field coordination, etc.]

Section D: BIM Use Staffing

Organizational Roles / Staffing

1. BIM for FM Roles and Responsibility:

2. BIM Use Staffing: [for each BIM & FM use selected, identify the team within the organization(s) who will staff and perform that use and estimate the personal time required. This helps the owner understand the level of effort (i.e., staffing plan) expected by the team members in delivery of the requirements.

BIM for FM Use	Organization	Number of Total Staff for Use	Estimated Worker Hours	Location(s)	Lead Contact
COBie					
Field Coordinated Model					
FM Model					

Section E: Collaboration Procedures

1. Collaboration Strategy: [describe how the project team will collaborate. Include items such as communication methods, document management and transfer, file naming structure, and record storage, etc.]
2. Meeting Procedures: [the following are examples that should be considered]

Meeting Type	Project Stage	Frequency	Participants	Location
BIM for FM Requirements Kick-Off				
BIM for FM Execution Plan Demonstration				
Design COBie				
Construction COBie				
Any other BIM meetings that occur with multiple parties				

3. BIM for FM Delivery Schedule of Information Exchanges for Submission & Approval: [document the exchange of COBie and Model data that occurs during the project:]

Information Exchange	File Sender	File Receiver	One-Time or Frequency	Due Date or Start Date	Native File Type
Design COBie	Architect	Contractor	One-Time	NTP	.xls

Section F: Process for Data Verification – QA/QC

1. Overall Strategy for Quality Control: [describe the strategy to control the quality of the data and model delivered]
2. Quality Control Checks:[the following check should be performed to assure quality]

Checks	Definition	Responsible Party / Parties	Software Program(s)	Frequency
Visual Check	Ensure that the model and data have not excluded field items and requirements have been followed			
COBie Compliancy Check	Ensure that the COBie standard has been followed in the building of Facilities Data			
Standards Check	Ensure that the BIM for FM Format Requirements have been followed (naming standards, all data points collected, etc.)			
Accuracy	Ensure that all Facilities Data provided is 100% accurate			

3. Accuracy and Tolerances:
    a. *Note: At any time during the project where the data errors grow to a point above 10% of the entire data set; the owner reserves the right to take appropriate corrective action such as having another party finish the BIM for FM deliverable at the expense of the responsible party in error. The FDI's role is to take preliminary steps to preclude this action. However, if timely completion of the FM data process is delayed by an unreasonable amount of time, the owner may direct such corrective actions be taken.*

Section G: Technological Infrastructure Needs

1. Software [List software that COBie data and Model will be created and maintained in]
2. Modeling Content (conforming to SHSU Asset Requirements Matrix)

Project Deliverables [list the BIM for FM deliverables for the project and the format in which the information will be delivered]

BIM for FM Submittal Item	Stage	Approximate Due Date	Format	Notes
Record Model				
Coordination Model				
FM Model				
COBie				
COBie Docs				

Section H: Process for Data Collection

1. Describe methods for collecting data during the project and how the team member intends to coordinate and collaborate with the Facilities Data Integrator (FDI).

Section J: Field Coordination

1. Describe methods to be used for managing field coordination during the project and how the Contractor intends to coordinate and collaborate with subcontractors and their models in field installation.

2. Attach documents intended for use in guiding coordination efforts. Guidelines should be at a minimum to the detail of BIM Forum MEP Spatial Coordination Requirements for BIM and have 1inch and above conduit modeled.

Section K: Update of the BEP

1. Provide Plan for revising BIM Execution Plan at each stage.

It is expected that the Design & Construction team provide additional documents (as needed) to coordinate BIM uses not detailed in this document. Those documents can be attached as Appendix to this document.

Attachments to Section 2 – BIM Execution Plan (BEP)

These are not attachments to the BEP but are critical parts of the requirements that must be considered in the development of and updates to the BEP.

- Exhibit 2.A - Grading Fields and Procedures
- Exhibit 2.B - Sample Project Schedule
- Exhibit 2.C – Close-Out Procedures

Coordinate the BEP development with each of the following and all parts of Exhibit E.

Section 3 – FM Data Requirements

- Exhibit 3.A – Responsibility Assignment Matrix (RAM) with Timeline (XLS File)
- Exhibit 3.B – Facilities Data Integrator (FDI) Role
- Exhibit 3.C – Asset Type Matrix
- Exhibit 3.D – FM Model Criteria

Exhibit 2.A - Grading Fields and Procedures

1. Explanation

The Facilities Data Integrator (FDI), shall provide ongoing evaluation (i.e., grading) of BIM for FM deliverables. The following provides an example of what aspects of the data deliverable shall be considered when grading. Also provided are methodologies, though not strictly required to be followed, for grading purposes.

Much of the successful grading is dependent upon a clear schedule being created during the BIM Execution Plan stage. This project schedule, should be mostly contributed to by the AEC team, however, the FDI is ultimately responsible for the final schedule that the AEC team will be held to. This schedule shall be reviewed and approved by the Owner as part of the BIM Execution Plan approval process.

2. Required Data Categories

At the beginning of the project, the owner will determine the data categories that should be imported to their CMMS. Those categories will allow the data to be consistently sorted and categorized in the owner's CMMS across multiple projects. The "Required Categories" section of the grading standard will measure how many of the owner's specified categories have been included in the data set. Example: Are the project AHU's, VAV's, and major shut-off valves present within COBie? This specific part of the review does not confirm that the ten AHU's in the project have all been incorporated into COBie; rather, that AHU's are being collected, in general.)

Required categories of data are determined at project setup according to the specifications and correspond to the different tabs in the COBie format standard. The grade will be assigned according to the number of categories completed in the appropriate tabs. Only categories in compliance with the specifications will count towards the number of scheduled categories required per month.

$$\textbf{Grade} = \frac{\textbf{number of categories completed to date}}{\textbf{number of categories scheduled to date}}$$

3. Required Fields

At the beginning of the project, the owner will determine, with the help of the FDI, the data points of information that should be imported to their CMMS for each category, as described above. Those project data points will provide the O&M personnel the right information to efficiently and successfully steward the building for it's useful life. The "Required Fields" section of the grading standard will measure whether or not the owner's specified data points have been included in the data set. Example: If the project's AHU's, VAV's, & Shut-off valves are present within COBie, then are their data fields populated to match the current data schedule requirements? This specific part of the review does not confirm that any AHU's in the project have been incorporated into COBie; rather, that if AHU's are being collected, that their required data fields (model #, serial #, belt size, etc.) are being populated.)

A schedule will be created that depicts the required amount of data points for each category in each tab at specified intervals. Only cells in a populated row will count for or against the grade given. This grade is not intended to simply measure the quantity of cells filled, rather to compare the amount of cells actually populated with those that should be populated.

$$\textbf{Grade} = \frac{\textbf{number of completed cells}}{\textbf{number of required cells}}$$

4. Quantity

At the beginning of the project the owner, with the assistance of the FDI, will conceptually estimate the number of rows of information per tab that will be in the final COBie spreadsheet. This number will be divided into a per month requirement that is loaded into the deliverable schedule. By requiring a quantity of rows delivered per month, the owner can insure that the deliverable is being continually progressed by team members at an appropriate interval.

The Quantity grade, then, will measure the quantity of populated rows in each tab of the COBie spreadsheet. Unlike the *Required* grading standard, rows do not need to be fully populated to add to the *Quantity* count, because that aspect is graded elsewhere. The number of required rows to be completed per tab per month will be taken directly from the schedule.

$$\textbf{Grade} = \frac{\textbf{number of rows completed to date}}{\textbf{number of rows scheduled to date}}$$

5. Quality Control / Quality Assurance

5.1 – Format Requirements

Format requirements are found in the BIM for FM Specifications, and dictate how certain columns in COBie will be populated. These format requirements allow the project to integrate into the owner's CMMS, providing consistent names, abbreviations, and descriptions. The Format section of the grading measures whether the naming formats provided in the owner's specifications have been accurately followed in the building (compilation) of the COBie data. The columns that require formatted entries will be the only graded items.

A grade will be assigned as a percentage; formula as follows:

$$\textbf{Grade} = \frac{\textbf{number of graded cells} - \textbf{number of cells formatted incorrectly}}{\textbf{number of graded cells}}$$

5.2 – COBie Format Requirements (Version 2.24)

It is very important that the data provided be in COBie 2.24 standard if it is to be successfully imported to the owner's CMMS. The COBie grading portion measures the ability of the data-set to conform to the COBie 2.24 standard. Example: (Cells that cross-reference data on another tab must have precisely the same name; so a type being referenced from the component sheet should have the perfect character match as the corresponding type name in the type sheet.)

A grade will be assigned as a percentage; formula as follows:

$$\textbf{Grade} = \frac{\textbf{number of graded cells} - \textbf{number of cells in error}}{\textbf{number of graded cells}}$$

5.3 - Accuracy (Sample)

It is necessary that all information entered into COBie accurately reflects the field conditions. If data accuracy is inconsistent, O&M objectives will be frustrated and the deliverable will be of little value to the owner. The Accuracy grade will measure the correctness of the data. Cells containing inaccurate information will be marked as an error.

The BIM Execution Plan shall address field data accuracy procedures. Field data shall be independently verified and/or sampled to ensure accuracy. This can be accomplished by a variety of means. One example is to have the Cx Agent verify as they perform equipment checkout and testing. Another example is that the FDI can conduct field data sampling. Experience has shown that a reasonable measure of independent field verification of the AEC data deliverables is in the best interest of the owner. This verification does not relieve the AEC team members from their responsibilities to provide correct information.

A grade will be assigned as a percentage; formula as follows:

$$\textbf{Grade} = \frac{\textbf{total number of data points checked} - \textbf{total number of errors}}{\textbf{total number of data points checked}}$$

SHSU - SAMPLE PROJECT SCHEDULE

		Total	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16
			Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-14	Feb-15	Mar-15
1-Contact	Required Categories	8	2				4	6	7	7	8	8	8					
	Required Fields/Columns	14	14				14	14	14	14	14	14	14					
	Proposed Quantity (Rows)	*300*	10				25	40	50	60	75	90	105					
2-Facility	Required Categories	1	1															
	Required Fields/Columns	5	5															
	Proposed Quantity (Rows)	1	1															
3-Floor	Required Categories	3	3															
	Required Fields/Columns	6	6															
	Proposed Quantity (Rows)	*4*	4															
4-Space	Required Categories	65	65															
	Required Fields/Columns	10	10															
	Proposed Quantity (Rows)	*100*	100															
5-Zone	Required Categories	5		2	3	5												
	Required Fields/Columns	6		6	6	6												
	Proposed Quantity (Rows)	*50*		20	30	50												
6-Type	Required Categories	80		20	40	80	5	10	16	32	48	64	80					
	Required Fields/Columns	17		6	6	6	17	17	17	17	17	17	17					
	Proposed Quantity (Rows)	*100*		25	50	100	5	10	20	40	60	80	100					
7-Component	Required Categories	100		25	50	100	20	5	10	20	40	60	80	100	100	100	100	
	Required Fields/Columns	12		7	7	7	5	3	4	5	6	7	8	9	10	11	12	
	Proposed Quantity (Rows)	*1500*		375	750	1500	300	75	150	300	600	900	1200	1500	1500	1500	1500	
8-System	Required Categories	20		5	10	20												
	Required Fields/Columns	6		6	6	6												
	Proposed Quantity (Rows)	*25*		5	15	25												
11-Job	Required Categories	100												20	40	60	80	100
	Required Fields/Columns	13												13	13	13	13	13
	Proposed Quantity (Rows)	*200*												40	80	120	160	200
														PM -->				
12-Document	Required Categories	10		1	1	1	2	2	2	2	2	2	3	4	5	6	8	10
	Required Fields/Columns	10		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Proposed Quantity (Rows)	*1200*		20	40	100	130	160	190	220	250	280	380	500	650	800	1000	1200
				Drawings -->			Submittals -->			Submittals -->			Model Viewpoints -->		O&M -->		Cx -->	
13-Attribute	Required Categories	400								40	80	120	160	200	240	280	340	400
	Required Fields/Columns	8								8	8	8	8	8	8	8	8	8
	Proposed Quantity (Rows)	*500*								50	100	150	200	250	300	350	425	500
14-Coordinate	Required Categories	1														1	1	
	Required Fields/Columns	9														9	9	
	Proposed Quantity (Rows)	*50*														25	50	

Notes:
Zone & System row count based on COBie 2.24 method of one system/zone per row.
See Section 2: BIM Execution Plan with Exhibit 2.A.
Required Categories (see Section 3 FM Data Specificaitons)
Required Fields/Columns (See Section 3 with RAM Exhibit 3.A)
Proposed Quantity (Rows)
Yellow milestone represents AE handover to Constructor

Exhibit 2.C – Close-Out Procedures

End User Review & Acceptance

Test imports of the COBie data and documents may be performed leading up to final acceptance and review. However, once the COBie file has been successfully test imported into _COMPMS_, the Facilities Data Integrator (FDI) shall notify the Owner. The Owner then shall notify each end user to review assets identified as belonging to their respective department (organization). Areas of particular interest in review shall include those items that are shared between multiple end users/departments; ex: large Utility Water Valves should be reviewed by both Facilities Plumbing and Utilities Water Distribution.

This review exercise will ensure that all assets are accepted and are being maintained after handover. This also provides the owner's personnel an opportunity to become familiar with the new assets being added to their stewardship and to establish preventive maintenance (PM) procedures and/or to apply standing PM's to these newly uploaded assets.

Following notification to the owner, each end user shall have thirty (30) calendar days to review assets and schedule a meeting with the Facilities Data Integrator (FDI) and Owner to address any concerns and/or corrective actions that may be needed. If data concerns/issues have not been provided in writing to the Facilities Data Integrator within this 30 day period, acceptance by the end user shall be considered to be confirmed. The Facilities Data Integrator will be responsible to develop and submit a schedule to the Owner for how end user concerns (if any) will be resolved.

Owner Review and Acceptance

Following End User Review and Acceptance, the Owner is responsible to review and provide final comments for the Facilities Data Integrator to address with AEC team. If no comments have been received by the Owner within thirty (30) calendar days of end user acceptance AND completion of final punch list items, Owner acceptance shall be granted to the FDI. This process should generally follow overall project substantial and final completion to ensure that all team members remain engaged in the FM data process.

AEC Team Final Handover

Per the BIM Execution Plan, regularly scheduled COBie data and document submissions will be reviewed and reported on by the Facilities Data Integrator at the agreed upon review intervals.

At the final scheduled COBie report, the Facilities Data Integrator shall provide the AEC team and Owner a final punch list to address all outstanding items in the COBie data to be corrected. If all outstanding items have not been completed within the subsequent fourteen (14) calendar days, the owner may elect to take reasonable corrective actions as outlined in other parts of these specifications.

AEC team members that are contracted for COBie deliverables are responsible to validate (i.e., verify by their own means and methods) their own work prior to regularly scheduled submissions to the FDI. This will greatly shorten Corrective Action reports provided by the Facilities Data Integrator and the meetings allocated to review these

reports with the AEC team on a prescribed and regular basis. The basic premise here is that progressive elaboration and "building up" of the FM data occurs over multiple phases of the project duration.

Final Handover Deliverables Include (but may not be limited to):

- Project team compliance and conformance to the FM Data requirements (the FM Data Specification).
- COBie Version 2.24 file (latest approved version) with all documents in one folder.
- Record Set/As-built models (including all native files and one federated NWD file).
- Facilities Model with saved viewpoints of all COBie components per the FM Data requirements (the FM Data Specification).

Section 3 - FM Data Specification

Note: This document must be carried out in alignment with other sections of the SHSU BIM & FM Guidelines and Specifications. Furthermore, a Responsibility Assignment Matrix (RAM) for each Column of information per COBie Tab has been developed in conjunction with this Data Specification. The RAM outlines who (what party) is responsible for populating these data fields (COBie fields) with the correct data and at what time. See Exhibit 3.A. Parties include, at a minimum the following project team members and primary contacts. Each company may have parties collecting data on their behalf for the COBie population functions.

- FM Data Integrator - FDI (Chosen party by Owner)
- Owner (SHSU Facilities)
- Planning / Programming Architect
- Architect/Engineer (and sub-consultants)
- Construction Contractor (and sub-contractors)
- Commissioning Agent

This document is a guide to understanding how the FM (COBie) data from the project records will be organized. COBie Version 2 formatted data is a project deliverable to SHSU for use with their FM/CMMS. In the COBie XLS format, data has various classifications per the following color codes:

text Required (yellow)

text Required foreign key (orange)

text Required if mapping to authoring software (purple)

text Required, if specified (green)

text Regional, owner, or product specific data (blue)

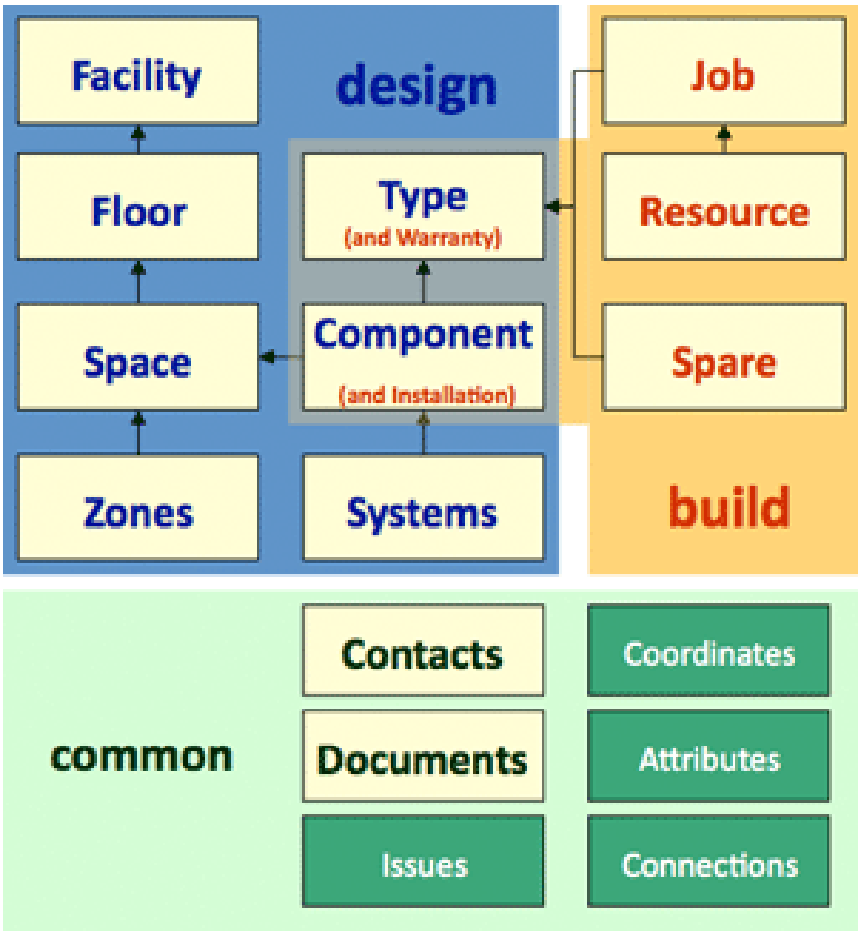
This document will refer to data columns in COBie 2 by their respective colors, which will be a guide to what is required and what is optional. The objective of this document is to record the Owner's COBie 2 data requirements in advance of collecting and entering the data for the project.

This data specification can be used on other existing facilities with appropriate review and reconciliation as needed. Varying building types on a University campus may necessitate revisions to this data specification as coordinated with the Owner. It is important to note that while this document records data requirements for the COBie file, it is not intended to be a guide for how to collect COBie data or for how to build a COBie data-set. Means and methods for collecting and building COBie files are left up to the individual parties. Relationships inherent in the COBie format are to be maintained at all times during data formulation and shall be progressively verified and proven by the Facilities Data Integrator (FDI).

COBie 2 consists of sixteen (16) separate "tabs" of Excel data worksheets as represented by the boxes below. Each tabbed worksheet is included below with more detail about the data on each

worksheet and what constitutes that data set (or content). Also included is a final section for "lesson's learned" which mostly incorporates lessons learned from FAMIS use/import. **Also, please see important notes at the end of this document.**

Each worksheet has a series of column fields (A, B, C, etc) like a normal Excel spreadsheet. This specification will work through each "tab" and each "column" to define the data content for the COBie deliverable.



Section 3 - FM Data Specification

Tab 1: Contact (Provider)

The contacts in COBie represent, but are not limited to, the following personnel on the project. The other parties that get listed in Tab 1 are the "Providers". Typically, contacts are personnel who are responsible for originating data in COBie. Providers are people/companies who have provided labor and/or material to build the project. Providers will be discussed in Tab 6 (Types) in more detail.

- Authors of COBie information (data) (includes architects, engineers, other)
- Product manufacturers (vendors)
- Warranty guarantors
- Spare parts providers
- Prime contractors / subcontractors
- Project management staff
- Commissioning agents
- Test and Balance engineers (TAB)
- Construction materials testing companies (CMT)
- Other testing agencies (HiPOT, etc.)
- Utility service providers (power, water, communication, gas, etc.)
- Owner's Space Management Agent
- Owner's Facility Management Agent
- Owner's CMMS Management Agent
- Other key owner contacts needed for support in authoring COBie data
- Other project contacts and providers

Note: Division of responsibility for this project.

- Owner shall provide all contacts that are under the direct management of SHSU PDC, such as the architect, engineers, testing labs, commissioning agents, and other third party contacts, inclusive of utility providers (Electric, Gas, etc.).
- Owner to provide to Contractor current contact lists for vendors, contractors, & manufactures. Contractor to match case perfectly with COBie contacts
- Contractor to send FDI a list of project contacts that are duplicates of current Owner manufacturers, contractors, or vendors, yet with different contact information. FDI to prompt owner to decide if contact should be duplicated or if a new contact should be created.
- The contractor shall enter all contacts and providers (of labor and materials) that are under the management of their firm and subcontractors / vendors. These are also inclusive of "providers" for warranty (labor and materials) items.
- Owner shall provide all contacts they deem appropriate that are not covered by the above two entries.

Column A (yellow): Email
Enter the contact's e-mail address. This is the "primary key" for contacts. Where a specific person was not available, the company's email address or URL was provided (http://www.example.com/html).

Column B (orange): CreatedBy
The individual who created the data (or provided the information) will have their e-mail address appear here. The data is colored orange in XLS because it is an established key.

Column C (yellow): Created On
This is a date-time stamp for when the data was created.

Column D (yellow): Category
This is the category (or project "role") of the contact (or provider). This correlates to FAMIS "vendor codes".

Categorize the list of Contacts as follows:

- Contractor
- Architect
- Engineer
- Consultant
- Manufacturer
- Supplier

Column E (yellow): Company
This is the name of the company that the contact (or provider) works for during the project.

Note: Use Owner provided vendor names for manufacturers/suppliers and contractor codes for contractors.

Column F (yellow): Phone
Enter the contact's phone number or a main company phone number. Format in the United States shall be 123-456-7890. For international phone numbers, include the international exchange, as applicable, before the local number.

Column G (purple): ExtSystem
This is a reference column for BIM data that is "automatically created" in another authoring tool (software). This would be the "external authoring tool", if present.

Column H (purple): ExtObject
This is a reference column for BIM data that is "automatically created" in another authoring tool (software). This would be the "external object name", if present.

Column I (purple): ExtIdentifier
This is a reference column for BIM data that is "automatically created" in another authoring tool (software). This would be the "external object identifier", if present.

Column J (green): Department
Enter a department code or name (description), as applicable, for the contact (provider). If contact is a contractor, provide contractor company name in this field.

Column K (green): Organization Code
Enter an organizational code or name (description), as applicable, for the contact (provider).

Column L (green): Given Name
This is the first name of the contact (provider).

Column M (green): Family Name
This is the last name of the contact (provider).

Column N (green): Street
Enter the contact's street address or business address, as applicable.

Column O (green): Postal Box
Enter the contact's postal box or business address, as applicable. Enter as "PO Box 1234" for consistency.

Column P (green): Town
Enter the contact's town of residence or the company town.

Column Q (green): StateRegion
Enter the contact's state or region for the applicable address. For addresses in the United States, use the two character identifier for the state (i.e., TX for Texas, LA for Louisiana, etc.). Do not write out the entire state name.

Column R (green): PostalCode
Enter the contact's postal code for the applicable address. Typically, a five (5) digit code applies (i.e. 77840). If a four (4) digit extension is applicable then include that information as well in the following format (i.e. 77840-0123).

Column S (green): Country
Enter the contact's country. If in the United States, then use "USA".

Tab 2: Facility

The facility worksheet lists the "buildings" in the project and identifies the measurement standards that apply to the COBie data. Facilities consist of "floors" (see Tab 3 for Floors).

Column A (yellow): Name
This is a unique "facility" name (building name, site phase name, etc.). COBie 2 only supports single facility BIM data. That is, only one row is allowed in the Facility Tab for each COBie file. If multiple facilities are constructed in a single project, multiple COBie files shall be provided per facility.

Note: Facility names shall be obtained from the owner for each project and shall correlate to the building number assigned by Space Management.

Column B (orange): Created By
The individual who created the data (or provided the information) will have their e-mail address appear here. The data is colored orange in XLS because it is a previously established key.

Column C (yellow): Created On
This is a date-time stamp for when the data was created.

Column D (yellow): Category
This is the category of the facility. Category relates to FAMIS 'property type code', obtain list from Owner, CMMS Manager.

Note: The category shall be directed by Owner.

Column E (yellow): ProjectName
Enter the project name.

Column F (yellow): SiteName
Enter the site name.

Column G (yellow): LinearUnits
Units of measure applied to all worksheets.

Note: Use "feet" for this project.

Column H (yellow): AreaUnits
Units of measure applied to all worksheets.

Note: Use "squarefeet" for this project.

Column I (yellow): VolumeUnits
Units of measure applied to all worksheets.

Note: Use “cubicfeet” for this project.

Column J (yellow): CurrencyUnits
Units of measure applied to all worksheets.

Note: Use “dollars” for this project.

Column K (yellow): AreaMeasurement
This is the area measurement standard applied on the project spaces. It could be ANSI/BOMA or a client specific measuring procedure required by the institution / owner.

Note: Enter “SHSU Defined” for this project as the measurement methodology is specifically defined by the institution for reporting purposes.

Inside wall to inside wall is the standard measurement technique at SHSU.

Column L (purple): ExtSystem
This is a reference column for BIM data that is “automatically created” in another authoring tool (software).

Column M (purple): ExtObject
This is a reference column for BIM data that is “automatically created” in another authoring tool (software).

Column N (purple): ExtIdentifier
This is a reference column for BIM data that is “automatically created” in another authoring tool (software).

Column O (purple): ExtSiteObject
This is a reference column for BIM data that is “automatically created” in another authoring tool (software).

Column P (purple): ExtSiteIdentifier
This is a reference column for BIM data that is “automatically created” in another authoring tool (software).

Column Q (purple): ExtFacilityObject
This is a reference column for BIM data that is “automatically created” in another authoring tool (software).

Column R (purple): ExtFacilityIdentifier
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column S (green): Description
Provide an extended description of the facility. This correlates to FAMIS "building description" and shall be specified by the Owner.

Column T (green): Project Description
Provide an extended description of project.

Column U (green): Site Description
Provide an extended description of the site of the project.

Note: Use campus name as default.

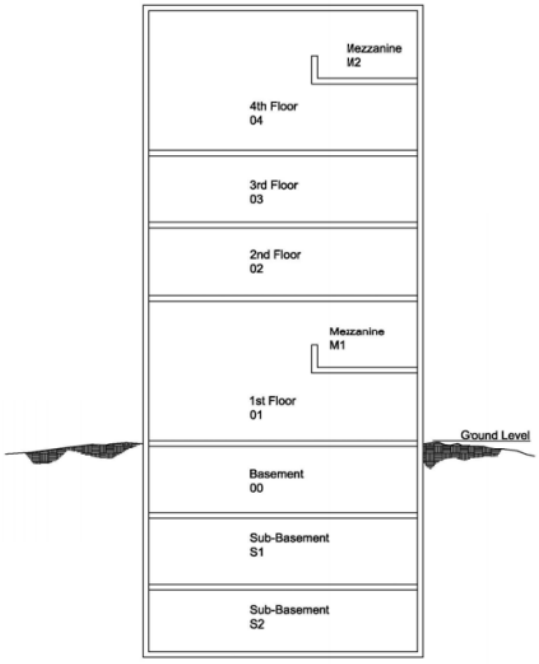
Column V (green): Phase
Provide the phase number of project. Ex: Phase 1

Tab 3: Floor

The floor worksheet is associated with floors within a specific facility. Floors can be vertical floors (ground, 1, 2, 3, other, etc.) as named by the designer. Floors can also include basements, crawl spaces, roofs, and site areas outside of the buildings when these areas have assigned Components (See Tab 7). Floors are horizontal planes that include specific "spaces" (see Tab 4 for Spaces).

Column A (yellow): Name
This is a unique "floor" name for the facility and the primary key for all floors. Floors correlate to FAMIS "floor ID". Confirm the list of "floor IDs" (below) with Owner's CMMS Manager.

Floor numbers are two characters in length. Zero fill the first position of the Floor field for floors less than 10 (01, 02, etc.). A basement should be coded as '00'. Sub-basements should be coded with an 'S' in the first position and the sub-basement number in the second position (S1, S2, etc.). Mezzanines should be coded with an 'M' in the first position and the mezzanine number in the second position (M1, M2, etc.) See illustration:



Column B (orange): CreatedBy

The individual who created the data (or provided the information) will have their e-mail address appear here. The data is colored orange because it is a previously established key.

Column C (yellow): CreatedOn

This is a date-time stamp for when the data was created.

Column D (yellow): Category

This is the category of the floor. Categories for floors shall be floor, roof, or site.

Column E (purple): ExtSystem

This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column F (purple): ExtObject

This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column G (purple): ExtIdentifier

This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column H (green): Description

Provide an extended description of the floor, per the Owners approval.

Column I (green): Elevation
Provide height above established project datum.

Note: The project datum shall be taken as Elevation 0'-0" at the ground level (LEVEL 1).

Column J (green): Height
Provide floor to floor height, as applicable. Provide the floor to floor heights as listed on construction drawings.

Tab 4: Space

The space worksheet includes the project's space name. Spaces are cross-referenced to floors from Tab 3. Space data also includes the following: space function, floor identification, area measurement, and the owner's room number (final way finding nomenclature), if different from the contract document space naming protocol.

Column A (yellow): Name
This is a unique "space" name for the area and the primary key for all spaces. Space name correlate to FAMIS "location code".

Note: For this project, this field will be the room numbers indicated on the final way finding. For exterior spaces, provide location in reference to the building name (ex: 999-South, 999-East, 999-North, 999-West)

Note: The current maximum number of allowable characters for a space name is 15. Also, commas "," are not allowed in space names.

Column B (orange): CreatedBy
The individual who created the data (or provided the information) will have their e-mail address appear here. The data is colored orange because it is a previously established key.

Column C (yellow): CreatedOn
This is a date-time stamp for when the data was created.

Column D (yellow): Category
This is the category of the space. Answer the question: What kind of space is it?

Space Category correlates to FAMIS "location type" and shall be selected from list obtained from Owner's Space Management department. Categories shall be verified with Owner's Space Management department once they are input.

Note: Space functions codes will be confirmed by Owner and chosen from Texas Higher Educating Coordinating Board (THECB) space categories. FDI shall submit space schedule to Owner's Department of Space Management for review and approval of space categories.

Column E (orange): FloorName
This corresponds to what established floor the space exists on for floors defined in Tab 3 (Floors). The data is colored orange because it is a previously established key.

Column F (yellow): Description
Provide space description, as applicable. Space description correlates to FAMIS "location description".

Note: IF way finding space name differs from name on construction document then following the space description, provide the space name as indicated on the contract documents / drawing which shall be used with ": PLAN-" proceeding. (ex: "Mens Restroom : PLAN-104"

Maximum number of characters = 255

Column G (purple): ExtSystem
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column H (purple): ExtObject
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column I (purple): ExtIdentifier
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column J (green): RoomTag
Room tag provides a space for the Owner to assign facility specific data in COBie. If the way finding room numbering system is different from the construction document space naming convention from Column A, then the space number on the construction drawings shall be used in this field. This is a mandatory Owner specified field if way finding differs from construction document space naming or Owner provides other instruction prior to the way finding system being incorporated into COBie.

Note: Room Tag shall be entered as Construction Tag: Room. (Ex: Construction Tag: 101)

Note: Room Tag correlates to FAMIS "assignment ID" and has a maximum amount 25 characters.

Column K (green): UsableHeight

Provide usable height in each space per the measuring standards identified on Tab 2 for Facilities. This unit of measure is "feet". Use decimal format (i.e., 10 feet 6 inches of height would be 10.5, and 8 feet 4 inches of height would be 8.33). This is a mandatory Owner specified field unless removed from the project execution plan by the FDI with the Owner's permission.

Column L (green): GrossArea

Provide gross area in each space per the measuring standards identified on Tab 2 for Facilities. This unit of measure is "square feet". Use decimal format to two places (i.e., one hundred fifty six square feet would be 156.00). This is a mandatory Owner specified field unless removed from the project execution plan by the FDI with the Owner's permission.

Note: GrossArea correlates to FAMIS "User Gross SqFt" and allows a maximum of 15 characters.

Column M (green): NetArea

Provide usable net area in each space per the measuring standards identified on Tab 2 for Facilities. This unit of measure is "square feet". Use decimal format to two places (i.e., one hundred fifty six square feet would be 156.00). This is an optional data field for use the Owner and is not required to make other parts of the COBie data set functional.

Note: This data shall be provided by Owner as a result of their space survey. If the data is provided before the COBie data set is handed over to Owner, then it shall be input into COBie so that it is part of the final data set. Otherwise, Owner shall input the data into the FM system at a later date, if needed.

Note: Net Area correlates with FAMIS "User Usable SqFt" and allows a maximum of 15 characters.

Tab 5: Zone

The zone worksheet is used to assign spaces (see Tab 4) to specific zonal classifications, as needed by the Owner. Zones can be established by functional space organization, by contract specific requirements, and by any number of other sorting criteria. Zones will be established for the following types of criteria, as deemed necessary by the owner for use in the FM/CMMS system. The following shall be assumed the minimum amount of zone types per COBie; however, the FDI shall confirm each with the owner per facility:

Zones:

- HVAC Support Locations (rooms fed by a specific air handling device (AHU, FCU, VAV, etc.)
- Electrical Rooms (group of facilities electrical rooms)
- Mechanical Rooms (group of facilities mechanical rooms)
- Non Occupancy (groups of facility rooms that are not reported as occupied space and are outside of space reporting)

Column A (yellow): Name
Provide zone names. Within COBie, zones are specific to the corresponding facility and should not correspond to areas in other facilities. Zone should read per the following example below:

Name	Description
Mechanical Rooms (866)	Zone Type (Building Number)
AHU-1 (Support Locations-866)	Parent Asset (Support Locations-Building Number)

Note: Spaces that should not be included in space reporting, and are outside of original space inventory provided to FDI, should be flagged in a zone named "Non Occupancy"

Note: Space Name correlates with FAMIS "Zone Code" and allows a maximum of 15 characters.

Maximum number of characters = 15

Column B (orange): CreatedBy
The individual who created the data (or provided the information) will have their e-mail address appear here. The data is colored orange because it is a previously established key.

Column C (yellow): CreatedOn
This is a date-time stamp for when the data was created.

Column D (yellow): Category
Provide category code for the named zone from the following list: Mechanical, Electrical, HVAC Support.

Note: Space Category correlates with FAMIS "Zone Type" and allows a maximum character count of 15.

Column E (orange): SpaceNames
Assign spaces to each named zone, as applicable. Given that multiple zones will (could) exist and that spaces will be associated with each zone, a space may be assigned to multiple zones. Data in XLS format will be spaces separated by commas, thus representing one unique zone per row in COBie.

Column F (purple): ExtSystem
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column G (purple): ExtObject
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column H (purple): ExtIdentifier
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column I (green): Description COBie2.4 update
This is a description of the Zone and should read per the following list: Mechanical Room Zone, Electrical Room Zone, HVAC Support Locations.

Tab 6: Type (and Warranty)

The type worksheet categorizes components (see Tab 7) and includes warranty information.

Column A (yellow): Name
Provide a name for the "type" of component that serves as the primary key for all types.

See Exhibit 3c: Asset Type Matrix for required types.

Note: One limiting factor for types in the COBie 2 format is that Column H is for a "model number". Therefore, at a minimum for project planning purposes, types would need to be created for each model number within a family of components (like AHU's). Example: If there are three (3) different models of AHU's, then there would need to be three (3) unique "types" of AHU's to correspond.

Note: Create Types that may have families of components with same model numbers. We will not be able to create a unique Type by model number in all instances. However, refer to the notes in Column H below for more details. In some case (ex., doors and other assets shown as one per building in Exhibit 3c: Asset Type Matrix) it may not be advantageous to create a unique type by model number. In the case of doors, a consolidated Type (i.e., Arch-Doors-00001) can be created to house door submittal documents for groups of doors.

When creating Type names use the following naming convention.

Type Description-#####

Where:

Type Description	A short description of the Type's contents. (Doors, Panels, Pumps) Often the description will correlate with the component name
######	Number starting with 001 to allow no type duplication over facility with similar equipment and varied model numbers.

Examples:	Description Name
Fire-Alarm Check Valve-	6" Alarm Check Valve

001	
Fire-Check Valve-001	2” – 12” Fire Water Check Valves
Plumb-Ball Valve-003	½” – 2” Bronze Ball Valves
Mech-Single Duct VAV-010	Single Duct Variable Air Volume Fans
Elec-Transformer-001	Low Voltage Energy Efficient, TP1 Dry-Type Transformer
Fire-Fire Detector-001	HFP-11 FireFinder Detector

Note: See Component section for additional Type naming.

Column B (orange): CreatedBy
The individual who created the data (or provided the information) will have their e-mail address appear here. The data is colored orange because it is a previously established key.

Column C (yellow): CreatedOn
This is a date-time stamp for when the data was created.

Column D (yellow): Category
This is the category of the type. Answer the question: What kind of product is it? Categories correlate to FAMIS “Asset Groups” and should be chosen from Exhibit 3c: Asset Type Matrix obtained by Owner CMMS Manager.

Note: COBie Type Categories selected and entered from the Exhibit 3c: Asset Type Matrix will be verified by Owner and corrections made, as directed. Also, where the Asset Type Matrix appears to be missing an critical Asset Type that is present in the project, inquire with the project FDI.

Maximum number of characters = 25

Column E (yellow): Description
Provide a short but unique description of the Type’s contents.

Examples for Description:
Hollow Metal Doors (AND ALL ASSOCIATED ITEMS)

Column F (yellow): AssetType
Choose from “fixed” or “moveable” for the asset type to describe how the asset is employed in the current project.

Note: Pick “fixed” or “moveable”.

Column G (orange): Manufacturer
Product (type) manufacturer selected from the Contacts (Providers) (see Tab 1). The data is colored orange because it is a previously established key.

Note: This field corresponds to the “provider” of the product and is different from Contacts although the providers are listed in the Contacts tab of COBie. Providers are directly related to business entities that have supplied labor and/or materials that will be subject to Warranty terms.

Column H (yellow): ModelNumber
Provide product (type) model number (typically, provided before installation in accepted submittals).

Column I (orange): WarrantyGuarantorParts
Product (type) manufacturer selected from the Contacts (see Tab 1). The data is colored orange because it is a previously established key. Ask this question: Who is the warranty provider for parts?

Note: This field corresponds to the “provider” of the product and is different from Contacts although the providers are listed in the Contacts tab of COBie. Providers are directly related to business entities that have supplied labor and/or materials that will be subject to Warranty terms.

Column J (yellow): WarrantyDurationParts
Provide the parts warranty duration for the product (type) in the units of Column M.

Note: Warranty start dates correspond with substantial completion per phased turnover, unless directed otherwise by available documents or owner.

Column K (orange): WarrantyGuarantorLabor
Product (type) manufacturer selected from the Contacts (see Tab 1). The data is colored orange because it is a previously established key. Ask this question: Who is the warranty provider for labor?

Note: This field corresponds to the “provider” of the product and is different from Contacts although the providers are listed in the Contacts tab of COBie. Providers are directly related to business entities that have supplied labor and/or materials that will be subject to Warranty terms.

Column L (yellow): WarrantyDurationLabor
Provide the labor warranty duration for the product (type) in the units of Column M.

Note: Warranty start dates correspond with substantial completion per phased turnover, unless directed otherwise by available documents or owner.

Column M (yellow): WarrantyDurationUnit
Provide the warranty duration unit of measure that will apply to warranty durations listed in Column J (parts) and Column L (labor).

Note: Duration unit shall be in "year". Warranty Log provided by Owner.

Column N (purple): ExtSystem
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column O (purple): ExtObject
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column P (purple): ExtIdentifier
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column Q (green): ReplacementCost
Provide the replacement cost for the type of product.

Column R (green): ExpectedLife
Provide the expected service life for the product (type) in units of time per Column S.

Column S (green): DurationUnit

Designate the expected life units of measure.

Note: Duration unit shall be in "year" or "months".

Column T (green): WarrantyDescription
Provide warranty description where there are special warranties for the product. For example; if there is a 5 year warranty for a water heater's tank, and a standard 1 year warranty for all other components of the water heater, include these details in the warranty description field. Actual warranty documents will be attached to the corresponding type, when available. Otherwise, leave this field blank.

Tab 7: Component (and Installation)

Section 3 - FM Data Specification

The component worksheet is used to document the "scheduled" items that originate during the design process and related to specific locations (spaces) in the facility. There are additional pieces of component data added during the construction process as detailed in the following section (i.e., serial numbers, installation dates, and asset numbers). Because components are those pieces of equipment that are scheduled and/or located on the drawings, equipment accessories (those pieces of equipment that are located on components, yet with unique model numbers & serial numbers) not seen on the drawings are not incorporated into the COBie file, unless specifically mentioned in the latest Asset Type Matrix as seen in Exhibit 3C. For example: supply air fans on water heaters are not in the COBie data, however, the water heaters themselves are. Components that can be seen in the field but not in the drawings are not incorporated into the file, unless specifically called for in Exhibit 3c: Asset Type Matrix attachment.

See Exhibit 3c: Asset Type Matrix for required components.

Column A (yellow): Name
Provide a name for the component that serves as the primary key for all components.

Component names are typically taken from the contract document schedules for MEP equipment, architectural items, and other scheduled components.

Note: Component Name correlates with FAMIS "Asset Description".

Maximum number of characters = 255 - (Component Description Count)

Note: Components that are scheduled on the contract documents shall have the same name (i.e., mark number) as the equipment schedule. See the SHSU Instrumentation and BAS Tag Nomenclature (can be obtained from AE Guidelines from the SHSU Facilities Management Website) for specific components naming conventions and content for those components that are not uniquely named on contract drawings. At the writing of this spec the nomenclature could be found here: http://www.shsu.edu/dept/facilities-management/ae-guidelines/

Any equipment that does not contain an unique name on the drawings or on the Nomenclature document shall be submitted with recommendation to the FDI.

Column B (orange): CreatedBy
The individual who created the data (or provided the information) will have their e-mail address appear here. The data is colored orange in XLS because it is a previously established key.

Column C (yellow): CreatedOn
This is a date-time stamp for when the data was created.

Column D (orange): TypeName

Provide cross reference to the previously established (keyed) types on Tab 6. The data is colored orange in XLS because it is a previously established key.

Column E (orange): SpaceNames
Provide cross reference to the previously established (keyed) spaces on Tab 4. Ask the question: Where is this component located in the facility? The data is colored orange because it is a previously established key. A component can only be located in one Space. Therefore, all components in a COBie data set must have a unique name.

Note: The space name shall be consistent with spaces provided by Owner's space inventory matrix.

Column F (yellow): Description
Provide a brief description of the component. If the component is located in a large common area provide a location descriptor too. Ex: smoke detector, south smoke detector

Maximum number of characters = 255 - Component Name Count

Column G (purple): ExtSystem
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column H (purple): ExtObject
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column I (purple): ExtIdentifier
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column J (green): SerialNumber
Provide the component serial number. If no serial number provided or available then "n/a" is entered in this field.

Column K (green): InstallationDate
Provide the component installation date. This date shall be taken as the Substantial Completion date, unless directed otherwise by available documents or owner. Currently, FAMIS does not accept Installation date for components; however, this is an item that may be captured as an attribute. If this date is the same as warranty start date, this field will not be captured as an attribute.

Column L (green): WarrantyStartDate

Provide the component warranty start date. This date shall be taken as the Substantial Completion date, unless directed otherwise by available documents or owner.

Column M (green): TagNumber
Provide the component tag number (i.e., brass tags, name tags, security/fire points, etc.) assigned and attached during construction and/or operations, as applicable.

Column N (green): BarCode
Provide component bar codes, as applicable.

Column O (green): AssetIdentifier
Provide specific identification numbers or names, as applicable.

Tab 8: System

The system worksheet defines the building systems that are built from components. This worksheet allows multiple components to be assigned to a system.

Minimum Systems are as follows:
- HVAC Children - (provide HVAC equipment downstream of air handling devices)
- Electrical Children - (provide equipment downstream of panel)
- Building Systems – (provide system information per indicated in Asset Type Matrix)

Column A (yellow): Name
Provide a unique name for each building system. The Owner shall be given a list of proposed systems by the FDI and provide approval for each one. Refer to Exhibit 3c: Asset Type Matrix for building systems. For Parent/Child Systems provide the component name in the System name. See below examples:

Name	Name – Description
Food Service (866)	Building System (Building Number)
AHU-1 (Children 866)	Component Name (“Children” Building Number)

Maximum number of characters = 25

Column B (orange): CreatedBy
The individual who created the data (or provided the information) will have their e-mail address appear here. The data is colored orange in XLS because it is a previously established key.

Column C (yellow): CreatedOn
This is a date-time stamp for when the data was created.

Column D (yellow): Category
This is the category of the system. Categories shall be assigned per list below:

- HVAC Children
- Electrical Children
- Building Systems

Maximum number of characters = 25

Column E (orange): ComponentName
Provide list of components that are part of this unique system. Every component is assigned to at least a primary system. Components are assigned based on the system they serve, not based upon the system that they are supplied from. For example, if a Variable Frequency Drive (VFD) is supplied by an electrical system but serves an Air Handling Unit (AHU) then the VFD is grouped within the same system as the AHU.

The data is colored orange in XLS because the component names are previously established keys. Data in XLS format will be components separated by commas, thus representing one unique System per row in COBie.

Column F (purple): ExtSystem
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column G (purple): ExtObject
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column H (purple): ExtIdentifier
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column I (green): Description COBie2.4 update
Provide description of System. See table for examples:

Description	**Description – Description**
Food Service Assets for 866	Building System + "Assets for" + Building Number
AHU-1 Child Assets for 866	Component Name + "Child Assets for" + Building Number
1LLS Child Assets for 866	Component Name + "Child Assets for" + Building Number

Tab 9: Spare

The spare worksheet organizes facility information related to items such as parts suppliers, replacement parts ordering, required lubricants, supplier ordering information, and others.

Column A (yellow): Name
Provide a unique name for each spare record.

Column B (orange): CreatedBy
The individual who created the data (or provided the information) will have their e-mail address appear here. The data is colored orange in XLS because it is a previously established key.

Column C (yellow): CreatedOn
This is a date-time stamp for when the data was created.

Column D (yellow): Category
This is the category of the spare parts and will include items like part, part set, lubricant, spare, spare set, other.

Column E (orange): TypeName
What product (type) requires these spare items? The data is colored orange in XLS because it is a previously established key.

Column F (yellow): Suppliers
Provide list of suppliers who can provide the subject spares. Provide e-mail address for supplier.

Column G (purple): ExtSystem
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column H (purple): ExtObject
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column I (purple): ExtIdentifier
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column J (green): Description
Provide a free form description, as needed, to supplement the line item entry.

Column K (green): SetNumber
Provide set number, as available, for ordering purposes.

Column L (green): PartNumber
Provide part number, as available, for ordering purposes.

Tab 10: Resource

The resource worksheet organizes information related to labor, materials, tools, and training for the purpose of O&M support.

Column A (yellow): Name
Provide a unique name for each resource record.

Column B (orange): CreatedBy
The individual who created the data (or provided the information) will have their e-mail address appear here. The data is colored orange in XLS because it is a previously established key.

Column C (yellow): CreatedOn
This is a date-time stamp for when the data was created.

Column D (yellow): Category
This is the category code for the resources, which shall be one of the following: material, tools, or training.

Column E (purple): ExtSystem
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column F (purple): ExtObject
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column G (purple): ExtIdentifier
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column H (yellow): Description
Provide a free form description, as needed, to supplement the line item entry.

Tab 11: Job

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The job worksheet organizes facility management procedures and requirements such as the items listed below.

Job Examples:

- Adjustments
- Calibrations
- Emergency Operations Plans
- Inspections
- Operational Instructions
- Preventive Maintenance Plans (procedures)
- Preventive Maintenance Schedules
- Safety Procedures
- Startup Procedures
- Shutdown Procedures
- Testing Schedules
- Troubleshooting Plans
- Other facility and operational documents

Column A (yellow): Name

Provide a unique name for each job record.

Column B (orange): CreatedBy

The individual who created the data (or provided the information) will have their e-mail address appear here. The data is colored orange in XLS because it is a previously established key.

Column C (yellow): CreatedOn

This is a date-time stamp for when the data was created.

Column D (yellow): Category

This is the category of the job. Answer the question: What kind of job is it? Categories can include safety, PM (preventive maintenance), calibration, emergency, inspection, operations, start-up, shut-down, and others as defined by the owner's facilities department.

Column E (yellow): Status

The status column is used by the contractor for pre-substantial completion records and prior to turn over to the owner. Status codes can include, not yet started, started, and completed.

Column F (orange): TypeName

What type of item is the job associated with from Tab 6 (Type)?

Column G (yellow): Description

What needs to be done for this job record? Individual tasks can be separated (in XLS format) by commas.

Column H (yellow): Duration
Provide the estimated duration of the job for units listed in Column I.

Column I (yellow): DurationUnit
Provide the duration time unit (i.e., minutes, hours, days, etc).

Column J (yellow): Start
Provide start date for job.

Column K (yellow): TaskStartUnit
Provide the unit of time that the job is to be performed relative to the start date in Column J. Use month or year. That is, using the start date, will the frequency period key off of the month for the start or the year for the start. Jobs are organized by monthly increments or annual increments.

Column L (yellow): Frequency
Provide frequency (interval period) that the job is to be performed per the Column M units. Frequency shall be month (for monthly) and year (for annual).

Column M (yellow): FrequencyUnit
Provide the frequency time unit for the job (i.e., month or year).

Column N (purple): ExtSystem
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column O (purple): ExtObject
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column P (purple): ExtIdentifier
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column Q (green): TaskNumber
Provide the job (task) number code. This is typically an identifier created by the owner's facility manager for the corresponding job (task, procedure, etc).

Column R (green): Priors
Provide list of prior jobs performed during the construction period before turn-over to the owner's facility department.

Column S (green): ResourceName

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Provide list of required resources to perform the job. This can include trade categories, full time equivalents (FTE's), equipment, special tools, training, certifications, and other job specific resources.

Tab 12: Document

The document worksheet is an index of the physical documents (in electronic format) associated with the project and links the documents to equipment and project records. These documents will typically be records such as submittals, commissioning records, test reports, inspection reports, product manuals, drawings, models and other related documents.

All project drawings will be assigned to spaces represented in them. For example, if A101 is seen in Structural, Architectural, Electrical, & Mechanical drawings section, each of those drawings should be attached to A101 as a COBie Document. Every space represented in a drawing shall be linked to that drawing in COBie.

Also, each component shall have a model viewpoint file. This is a facilities model with a saved viewpoint of the component. This model with saved viewpoints shall be as-built and also be colored and formatted for easy viewing of assets. All ceilings should be 50% transparent and all systems (electrical, chilled water, heating water, etc.) shall be uniquely color coded consistent with current SHSU system coloring schema. See Exhibit 3d: FM Model Criteria

Column A (yellow): Name
Provide a unique name for each document record.

Document Types	Naming Standard
System Readiness Checklist	CX - SRC Equipment/System Name
Functional Performance Tests	CX - FPT Equipment/System Name
Integrated Systems Tests	CX - IST System Name
Submittals	SUB - Equipment
Finish/Hardware Schedules	Drawing - Name Schedule
Point to Point List	Drawing - PTP System Description
Operations & Maintenance Manuals	OM - Equipment Name
Model Viewpoints	Model – HTML Name
Warranty	Warranty - Equipment Name
Drawing	Drawing - Drawing Number
Training	Training – Unique Description
TAB	TAB – Unique Description
Manufacturer Testing & Inspection	TEST – Equipment Name
Field Image	Image – Equipment Name

Column B (orange): CreatedBy

The individual who created the data (or provided the information) will have their e-mail address appear here. The data is colored orange in XLS because it is a previously established key.

Column C (yellow): CreatedOn
This is a date-time stamp for when the data was created.

Column D (yellow): Category
Provide the document category. Ask the question: What kind of document is it? Recommended categories include the following. For this project we will use these categories for these documents. Category is not a field that FAMIS will import.

Examples:
Commissioning Data = Certificates
Schedules & Drawings = Design Data
Model Viewpoints = Model

Document Examples:
- Drawings
- Product Data
- Samples
- Design Data
- Test Reports
- Certificates
- Submittals
- Manufacturer Instructions
- Shop Drawings
- Operations and Maintenance
- Warranties
- Model
- Training Videos
- Others

Column E (yellow): ApprovalBy
Provide information related to who approved the document for use in COBie. Examples include: contractor certified, information only, owner approved, and others. Approval By is not a field that FAMIS will import.

Column F (yellow): Stage
Provide the stage (status) of the document approval. The only options include: submitted, approved, and as built. Stage is not a field that FAMIS will import.

Column G (yellow): SheetName

Provide the COBie worksheet name (Tab name) that the document is being cross referenced to such as type, component, etc. Third party COBie authoring tools maintain these relationships in the database and publish this information on export to the COBie format once the data relationships are established.

A document will be referenced to the lowest common denominator of facilities data. For example, submittal data that applied to all equipment in a certain type will be attached to the Type (Tab 6) level and not to each Component (Tab 7). Similarly, Grounding Data for a facility will cover several types, and components, and systems so the document will be cross referenced to the System(s) applicable in order to limit the number of documents in the database.

Column H (yellow): RowName
Provide the corresponding row name (Column A) for the above sheet (Tab name) that the document is being cross referenced to. Some documents will need to be cross referenced to several row names and this is possible. Third party COBie authoring tools maintain these relationships in the database and publish this information on export to the COBie format once the data relationships are established.

Column I (yellow): Directory
Provide the directory or location where the document can be found.

Column J (yellow): File
Provide a unique name for each document as they will typically all reside in a common directory called “document” per Column I above.

Column K (purple): ExtSystem
This is a reference column for BIM data that is “automatically created” in another authoring tool (software).

Column L (purple): ExtObject
This is a reference column for BIM data that is “automatically created” in another authoring tool (software).

Column M (purple): ExtIdentifier
This is a reference column for BIM data that is “automatically created” in another authoring tool (software).

Column N (green): Description
Provide a description of the document in short narrative form if the previous columns of information are insufficient.

Column O (green): Reference

Provide a reference to other project information, as applicable. For example, this could be used to cross-reference to other COBie data sources or program designations such as a specification section, a drawing number, or another source of information. For submittal documents, use the contract document specification sections as the reference. Reference is not a field that FAMIS will import.

Tab 13: Attribute

The attribute worksheet typically captures pre-established object-based design parameters (for named components). Attributes are descriptors for Components, Spaces, Types & Systems.

See Exhibit 3c: Asset Type Matrix for required attributes per type.

Some attributes have been included per owner's request. These include attributes for spaces (recording the VAV that feeds into the room), VAV boxes (recording which space it will feed into). Where there is multiple attributes surrounding a single object, like a motor, attributes will be numbered (1,2,3, etc.).

Site attributes include location coordinates of the building & its orientation along with components.

NOTE: All attributes referencing panel-boards and breakers should be verified prior to use. Also, during any work on equipment that contains electrical components proper lock-out tag-out and testing for de-energized equipment should be done. Technicians should never rely solely upon the correctness of attribute data before beginning work on equipment that has electrical power run to it.

Column A (yellow): Name
Provide unique name for each record, this can be done by giving a short description of the attribute and then following with the name of the component, space, type or system to which the attribute is associated with. Ex: "capacity - Switchboards & Panelboards_1"

Maximum number of characters = 25

Column B (orange): Created By
The individual who created the data (or provided the information) will have their e-mail address appear here. The data is colored orange in XLS because it is a previously established key.

Column C (yellow): Created On
This is a date-time stamp for when the data was created.

Column D (yellow): Stage

Enter stage of Attribute. Select most applicable from the following list: As-Built, Submitted, Approved, Exact Requirement, Maximum Requirement, Minimum Requirement, Requirement

Column E (orange): Sheet Name
Provide the COBie worksheet name (Tab name) that the document is being cross referenced to such as type, component, etc. Third party COBie authoring tools maintain these relationships in the database and publish this information on export to the COBie format once the data relationships are established.

Column F (orange): Row Name
Provide the corresponding row name (Column A) for the above sheet (Tab name) that the document is being cross referenced to. Some documents will need to be cross referenced to several row names and this is possible. Third party COBie authoring tools maintain these relationships in the database and publish this information on export to the COBie format once the data relationships are established.

Column G (yellow): Value
Value contains the actual description to the component, space, floor, or type that is to receive an attribute. For instance, if Gallons per Minute for a Pump was a desired field to capture, the actual GPM number (ex: 300 GMP) would be the value.

Column H (yellow): Unit
Unit describes the value. For example, if dimensions of a pump should be captured, inches/feet/centimeters/millimeters would be the unit to describe this dimension.

Column I (purple): ExtSystem
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column J (purple): ExtIdentifier
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column K (purple): ExtObject
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column L (green): Description
Use description to describe the attribute used; ex: "supply fan capacity", "HVAC CHILDREN", "HVAC SUPPORT LOCATION", etc.

Tab 14: Coordinate

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Coordinates are GIS points that locate the facility, floors, spaces, & components. This project has only selected to use Coordinates for Site components. Currently FAMIS will only import two decimal places on coordinates; in the future, there will be continued development of their tool to receive more. Where more than two decimal places are needed, the coordinate will placed as an attribute.

For SITE Components, all were geographically located via satellite & the latitude/longitude reference is included. If using Google Earth, these coordinates may be entered into the "search bar" for automatic locating. For Security & Fire components, address from Shop Drawings will be input into Tag Number cell on "COMPONENT" sheet.

Note: Only enter coordinates for Components. Do not use coordinates for spaces.

Column A (yellow): Name
Provide unique name for each record. Enter the name of the object being located and "COORDINATE" for the coordinate name. Ex: "SS MANHOLE 1 COORDINATE"

Column B (orange): Created By
The individual who created the data (or provided the information) will have their e-mail address appear here. The data is colored orange in XLS because it is a previously established key.

Column C (yellow): Created On
This is a date-time stamp for when the data was created.

Column D (yellow): Category
Enter "point".

Column E (orange): Sheet Name
Provide the COBie worksheet name (Tab name) that the document is being cross referenced to such as type, component, etc. Third party COBie authoring tools maintain these relationships in the database and publish this information on export to the COBie format once the data relationships are established.

Column F (orange): Row Name
Provide the corresponding row name (Column A) for the above sheet (Tab name) that the document is being cross referenced to. Some documents will need to be cross referenced to several row names and this is possible. Third party COBie authoring tools maintain these relationships in the database and publish this information on export to the COBie format once the data relationships are established.

Column G (yellow): CoordinateXaxis
This field should contain the latitudinal coordinate (in degrees) of the object being described, IF AVAILABLE

Column H (yellow): CoordinateYaxis
This field should contain the latitudinal coordinate (in degrees) of the object being described, IF AVAILABLE

Column I (yellow): CoordinateZaxis
This field should contain the altitude (in feet above sea-level) of the object being described, IF AVAILABLE

Column J (purple): ExtSystem
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column K (purple): ExtIdentifier
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Column L (purple): ExtObject
This is a reference column for BIM data that is "automatically created" in another authoring tool (software).

Tab 15: Connection

The connection worksheet will not be implemented on this project and is beyond the original intent of COBie data production.

Tab 16: Issue

The issue worksheet will not be implemented on this project and is beyond the original intent of COBie data production.

TEMPLATE BELOW:

Column A (yellow):
Column B (yellow):
Column C (yellow):
Column D (yellow):
Column E (yellow):
Column F (yellow):
Column G (yellow):
Column H (yellow):
Column I (yellow):
Column J (yellow):
Column K (yellow):
Column L (yellow):
Column M (yellow):
Column N (yellow):
Column O (yellow):
Column P (yellow):
Column Q (yellow):
Column R (yellow):
Column S (yellow):

Column T (yellow):
Column U (yellow):
Column V (yellow):
Column W (yellow):
Column X (yellow):
Column Y (yellow):
Column Z (yellow):
Column AA (yellow):
Column BB (yellow):

Important Notes:

NOTE: All attributes (See TAB 13) referencing panel-boards and breakers should be verified prior to use. Also, during any work on equipment that contains electrical components, proper lock-out/tag-out and testing for de-energized equipment should be followed correctly. Technicians should never rely solely upon the correctness of attribute data before beginning work on equipment that has electrical power run to it.

Exhibit 3.A.1: Data Collection and Schedule		Architect will be responsiblle to provide information for all green cells indicated with "X" per Section 3 (FM Data Requirements). See below for scheduled delivery milestone.		Contractor will be responsiblle to provide information for all orange cells indicated with "X" per Section 3 (FM Data Requirements). See below for scheduled delivery milestone.			Facilities Data Integrator will be responsiblle to provide information for all purple cells indicated with "X" per Section 3 (FM Data Requirements). See below for scheduled delivery milestone.
COBie2 Worksheet	COBie2 Field	(35% Design) Design Development	(100% Design) Construction Document	Submittals	Install	Close Out	Handover
Introduction		Architect / Engineer	Architect / Engineer	Contractor	Contractor	Contractor	Facilities Data Integrator
	Title						
2.24	Version						
	Release						
	Status						
	Region						
	Purpose						
	Outline						
Contact		Design Team		Contruction Team, Subcontractors, & Manufacturers from Approved Submittals	Update if necessary	Update if necessary	
A	Email	x		x	x	x	
B	CreatedBy	x		x	x	x	
C	CreatedOn	x		x	x	x	
D	Category	x		x	x	x	
E	Company	x		x	x	x	
F	Phone	x		x	x	x	
G	ExtSystem						
H	ExtObject						
I	ExtIdentifier						
J	Department			x	x	x	
K	OrganizationCode						
L	GivenName	x		x	x	x	
M	FamilyName	x		x	x	x	
N	Street	x		x	x	x	
O	PostalBox	x		x	x	x	
P	Town	x		x	x	x	
Q	StateRegion	x		x	x	x	
R	PostalCode	x		x	x	x	
S	Country	x		x	x	x	
Facility							
A	Name	x					
B	CreatedBy						
C	CreatedOn						
D	Category	x					
E	ProjectName						
F	SiteName						
G	LinearUnits						
H	AreaUnits						
I	VolumeUnits						
J	CurrencyUnits						
K	AreaMeasurement						
L	ExtSystem						
M	ExtProjectObject						
N	ExtProjectIdentifier						
O	ExtSiteObject						
P	ExtSiteIdentifier						
Q	ExtFacilityObject						
R	ExtFacilityIdentifier						
S	Description	x					

T	ProjectDescription	x					
U	SiteDescription	x					
V	Phase						
Floor							
A	Name	x					
B	CreatedBy	x					
C	CreatedOn	x					
D	Category	x					
E	ExtSystem						
F	ExtObject						
G	ExtIdentifier						
H	Description	x					
I	Elevation	x					
J	Height	x					
Space			Update	Update if Necessary	Update if Necessary	Update if Necessary	
A	Name	x	x	x	x	x	
B	CreatedBy	x	x	x	x	x	
C	CreatedOn	x	x	x	x	x	
D	Category		x	x	x	x	
E	FloorName	x	x	x	x	x	
F	Description	x	x	x	x	x	
G	ExtSystem						
H	ExtObject						
I	ExtIdentifier						
J	RoomTag				x	x	
K	UsableHeight		x	x	x	x	
L	GrossArea		x	x	x	x	
M	NetArea		x	x	x	x	
Zone		Space Use Zones	Update & add HVAC Zones	Update if Necessary	Update if Necessary	Update if Necessary	
A	Name	x	x	x	x	x	
B	CreatedBy	x	x	x	x	x	
C	CreatedOn	x	x	x	x	x	
D	Category	x	x	x	x	x	
E	SpaceNames	x	x	x	x	x	
F	ExtSystem						
G	ExtObject						
H	ExtIdentifier						
I	Description	x	x	x	x	x	
Type		Scheduled	Update	Update with Accepted Submittals	Update if Necessary	Update if Necessary	
A	Name	x	x	x	x	x	
B	CreatedBy	x	x	x	x	x	
C	CreatedOn	x	x	x	x	x	
D	Category	x	x	x	x	x	
E	Description	x	x	x	x	x	
F	AssetType			x	x	x	
G	Manufacturer			x	x	x	
H	ModelNumber			x	x	x	
I	WarrantyGuarantorParts			x	x	x	
J	WarrantyDurationParts			x	x	x	
K	WarrantyGuarantorLabor			x	x	x	
L	WarrantyDurationLabor			x	x	x	
M	WarrantyDurationUnit			x	x	x	
N	ExtSystem						
O	ExtObject						
P	ExtIdentifier						
Q	ReplacementCost			x	x	x	
R	ExpectedLife			x	x	x	
S	DurationUnit			x	x	x	
T	WarrantyDescription		x	x	x	x	
Component				Update with Accepted Submittals	Update if Necessary	Update if Necessary	
A	Name		x	x	x	x	
B	CreatedBy		x	x	x	x	

C	CreatedOn		x	x	x	x	
D	TypeName		x	x	x	x	
E	SpaceNames		x	x	x	x	
F	Description		x	x	x	x	
G	ExtSystem						
H	ExtObject						
I	ExtIdentifier						
J	SerialNumber				x	x	
K	InstallationDate				Special Warranty Items	x	
L	WarrantyStartDate				Special Warranty Items	x	
M	TagNumber		x	x	x	x	
N	BarCode				If available	If available	
O	AssetIdentifier				x	x	
System		Building Systems	Update & add HVAC & Elec Parent/Child	Update if Necessary	Update if Necessary	Update if Necessary	
A	Name	x	x	x	x	x	
B	CreatedBy		x	x	x	x	
C	CreatedOn		x	x	x	x	
D	Category		x	x	x	x	
E	ComponentNames		x	x	x	x	
F	ExtSystem						
G	ExtObject						
H	ExtIdentifier						
I	Description	x	x	x	x	x	
Spare							
A	Name						
B	CreatedBy						
C	CreatedOn						
D	Category						
E	TypeName						
F	Suppliers						
G	ExtSystem						
H	ExtObject						
I	ExtIdentifier						
J	Description						
K	SetNumber						
L	PartNumber						
Resource							
A	Name						
B	CreatedBy						
C	CreatedOn						
D	Category						
E	ExtSystem						
F	ExtObject						
G	ExtIdentifier						
H	Description						
Job							
A	Name						
B	CreatedBy						
C	CreatedOn						
D	Category						
E	Status						
F	TypeName						
G	Description						
H	Duration						
I	DurationUnit						
J	Start						
K	TaskStartUnit						
L	Frequency						
M	FrequencyUnit						
N	ExtSystem						
O	ExtObject						
P	ExtIdentifier						
Q	TaskNumber						

R	Priors						
S	ResourceNames						
Document			Drawings	Update & add Submittal with Approval	Update & add Model Linking	Update and add Commissioning and O&M's	Complete Model Linking
A	Name		x	x	x	x	x
B	CreatedBy		x	x	x	x	x
C	CreatedOn		x	x	x	x	x
D	Category		x	x	x	x	x
E	ApprovalBy						
F	Stage						
G	SheetName		x	x	x	x	x
H	RowName		x	x	x	x	x
I	Directory		x	x	x	x	x
J	File		x	x	x	x	x
K	ExtSystem						
L	ExtObject						
M	ExtIdentifier						
N	Description		x	x	x	x	x
O	Reference				x	x	x
Attribute				Add submittal data	Update if Necessary	Update if Necessary	Reverse system & zones
A	Name			x	x	x	x
B	CreatedBy			x	x	x	x
C	CreatedOn			x	x	x	x
D	Category			x	x	x	x
E	SheetName			x	x	x	x
F	RowName			x	x	x	x
G	Value			x	x	x	x
H	Unit			x	x	x	x
I	ExtSystem						
J	ExtObject						
K	ExtObject						
L	Description			x	x	x	x
Coordinate					Site Equipment	Update if Necessary	Update if Necessary
A	Name				x	x	x
B	CreatedBy				x	x	x
C	CreatedOn				x	x	x
D	Category				x	x	x
E	SheetName				x	x	x
F	RowName				x	x	x
G	CoordinateXAxis				x	x	x
H	CoordinateYAxis				x	x	x
I	CoordinateZAxis				x	x	x
J	ExtSystem						
K	ExtIdentifier						
L	ExtObject						
Connection							
A	Name						
B	CreatedBy						
C	CreatedOn						
D	ComponentName1						
E	ComponentName2						
F	ConnectionType						
G	ExtSystem						
H	ExtIdentifier						
I	ExtObject						
J	Description						
Issue							
A	Name						
B	CreatedBy						
C	CreatedOn						
D	Type						
E	Risk						
F	Chance						
G	Impact						

H	SheetName1						
I	RowName1						
J	SheetName2						
K	RowName2						
L	Description						
M	Owner						
N	Mitigation						
O	ExtSystem						
P	ExtObject						
Q	ExtIdentifier						
PickLists							
	ApprovalBy						
	AreaUnit						
	AssetType						
	Category-Facility						
	Category-Space						
	Category-Element						
	Category-Product						
	Category-Role						
	CoordinateSheet						
	ConnectionType						
	CoordinateType						
	DocumentType						
	DurationUnit						
	FloorType						
	IssueCategory						
	IssueChance						
	IssueImpact						
	IssueRisk						
	JobStatusType						
	JobType						
	objAttribute						
	objAttributeType						
	objComponent						
	objConnection						
	objContact						
	objCoordinate						
	objDocument						
	objFacility						
	objFloor						
	objIssue						
	objJob						
	objProject						
	objResource						
	objSite						
	objSpace						
	objSpare						
	objSystem						
	objType						
	objWarranty						
	objZone						
	ResourceType						
	SheetType						
	SpareType						
	StageType						
	ZoneType						
	LinearUnit						
	VolumeUnit						
	CostUnit						

Exhibit 3.B - Facilities Data Integrator Role

Role: Facilities Data Integrator (FDI)

Description: Manager of BIM for FM Process on Design/Construction Projects

Overall Responsibility: Ensure correct execution of the SHSU BIM for FM Requirements

Specific Responsibilities Include (but are not limited to):

Planning / Programming Phase

- Determine feasibility of FM data collection for proposed projects.
- Confirm FM data requirements are to be employed on certain design/construction jobs.
- Update (if needed) and provide latest BIM for FM requirements to new projects.
- For unique projects, reconcile the FM requirements and update the FM requirements.
- Setup project responsibilities and roles per Owner's directives and BIM for FM requirements.
- Integrate FM data requirements into the project delivery process for RFQ, RFP, and other contracting processes for the design, construction, commissioning, and other team members.
- Establish budget allocations in the capital budget for FM data functions on the project.
- Review and assess project team members (i.e., AEC teams) for their ability to comply with requirements (via RFQ and RFP activities) and the review of "draft" BIM Execution Plans.
- Other duties as required to implement the SHSU BIM and FM requirements and specifications.

Design / Construction / Commissioning Phases

- Hold kick-off and orientation meetings detailing BIM for FM requirements.
- Review and assess submitted BIM Execution Plans from AEC project team members.
- Hold meetings for BIM for FM Execution Plan review and project coordination planning including deliverable schedules.
- Adjust AEC team BIM for FM scope, if necessary, and in accordance with Owner's directives and specific or unique project requirements not listed in the latest FM data specifications.
- Monitor progress, assess quality, and confirm accuracy of ongoing data collection and validation process.
- Hold regular project meetings with project team members to discuss the progress and quality of the deliverables and the schedule for incremental deliverable development.
- Conduct payment application reviews of the FM data deliverables for AEC payment process.
- Inspect and evaluate (i.e., grade) deliverables in accordance with BIM for FM requirements and project schedules.
- Integrate owner data into project data set, as applicable for OFOI / OFCI assets.
- Integrate project team data deliverables into latest acceptable COBie format for test uploads to CMMS (FAMIS).
- Conduct several incremental / test uploads to FAMIS to confirm data migration is functional. If not functional, take corrective actions as needed.
- Ensure facility models are setup for O&M facility viewer and integration with CMMS model linking functions.

- Provide necessary minor adjustments to models to make them lighter and user friendly for O&M purposes (ex: transparent ceilings and site ground, contrast colors appropriately, etc).
- Other duties as required to implement the SHSU BIM and FM requirements and specifications.

Qualifications for the Facilities Data Integrator (FDI) Role

- Any team member (Architect, Engineer, General Contractor, Consultant, Commissioning Agent, or Owner's Representative, etc.) that can show successful management of past FM Data (specifically, the COBie 2.24 format) projects that have been imported to a client's (i.e., owner's) CMMS and are currently in use for Asset Management functions.
  - provide references of qualifying projects
  - provide references of owners/clients currently using the imported COBie formatted data for Asset Management

- Any team that can demonstrate understanding of the SHSU BIM for FM requirements and provide an example for how each section is carried out using a sample higher education project of their choice. Samples should include the following, at a minimum:
  - COBie sample files shall successfully import to SHSU FAMIS and include a minimum of the following for sample data sets: 10 contacts, 5 spaces, 1 zone, 5 types, 10 components, 2 systems, 10 documents, and 15 equipment attributes matching the most current SHSU requirements.
  - Ability to complete the SHSU BIM Execution Plan outlining their role as a Facilities Data Integrator on the sample project.

- It is recommended that the Facilities Data Integrator (FDI) chosen for a specific project *not* be someone who already has a substantial responsibility with BIM for FM data production (authorship) on that project. This would typically exclude the AEC team from functioning as the FDI. This criteria allows for objectivity (independent verification) and helps to prohibit a conflict of interest in the evaluation (grading) functions by the FDI. Since the FDI's role is essentially data commissioning, independent quantity and quality verification is desirable since the information will be used in operational workflow processes.

Exhibit 3.C - Asset Type Matrix

Asset Group / COBie "Type Category"	Comments	System	Attributes
DOOR POSITION SWITCH	One Per Building	ACCESS	
EXT RDR		ACCESS	
EXTERIOR DOORS, KEYED		ACCESS	
INT RDR		ACCESS	
LOCK	One Per Building	ACCESS	
LOCKBOX		ACCESS	location
			asset number
OPENER		ACCESS	
SPECIAL ACTION DOORS		ACCESS	Door Type

Asset Group / COBie "Type Category"	Comments	System	Attributes
MANHOLE		ALL	GPS coordinate
METER		ALL	meter type
			remote reading
			reading ranges
			temp range
			Instrumentation tag number
TANKS		ALL	capacity*
			tank volume
			max system temp
			max system pressure
CABINET		ARCHITECTURAL	paint finish
			color
			hardware type
			part number
CEILINGS	One Per Building	ARCHITECTURAL	
EXT WALLS	One Per Building	ARCHITECTURAL	
FIXED PARTITIONS		ARCHITECTURAL	color

Asset Group / COBie "Type Category"	Comments	System	Attributes
FIXED SEATING	One Per Building	ARCHITECTURAL	
FLOORS	One Per Building	ARCHITECTURAL	
INT WALLS	One Per Building	ARCHITECTURAL	
MISC ARCHITECTURAL		ARCHITECTURAL	any associated finishes
OPERABLE PARTITIONS		ARCHITECTURAL	color
ROOF		ARCHITECTURAL	
WINDOW COVERING	One Per Building	ARCHITECTURAL	

Asset Group / COBie "Type Category"	Comments	System	Attributes
WINDOWS	One Per Building	ARCHITECTURAL	
ELEVATOR		CONVEYING	power*
			electrical panel name*
			weight limit
			speed
			src hp rating
			mg motor power
			starting amps
			accelerating amps
HOISTS & CRANES		CONVEYING	power*
			electrical panel name*
			weight limit
			speed
			src hp rating
			mg motor power
			starting amps
			accelerating amps
LIFTS		CONVEYING	power*
			electrical panel name*
			weight limit
ESCAPE PPE		EH&S	
FIRST AID DEVICES		EH&S	
SPILL EQUIPMENT		EH&S	

Asset Group / COBie "Type Category"	Comments	System	Attributes
AUTOMATIC TRANSFER SWITCH		ELEC	power*
			electrical panel name*
			capacity*
BATTERY SYSTEMS		ELEC	power*
			electrical panel name*
			capacity*
			supply voltage
			supply voltage offset
BUILDING GROUNDING SYSTEMS	One Per Building	ELEC	
DP	DISTRIBUTION PANEL	ELEC	power*
			electrical panel name*
			capacity*
			main bus current
			aic rating
EQUIPMENT DISCONNECTS	One Per Building	ELEC	
EXIT LIGHT	One Per Building	ELEC	
EXTERIOR LIGHT FIXTURES	One Per Building	ELEC	

Asset Group / COBie "Type Category"	Comments	System	Attributes
GENERATOR		ELEC	power*
			electrical panel name*
			capacity*
			electric generator efficiency
			gfci capable
			number of sources
			maximum power output
			start current factor
			fuel type
			fuel storage
			fuel capacity
			operating rpm limits
			engine cooling type
			engine size
			number of batteries
			battery capacity
HV SWITCH		ELEC	power*
INTERIOR LIGHT FIXTURES	One Per Building	ELEC	
LC	LOAD CENTER	ELEC	power*
			electrical panel name*
			capacity*
			main bus current
			aic rating
LIGHTING CONTROL EQUIPMENT		ELEC	power*
			electrical panel name*
LIGHTNING PROTECTION	One Per Building	ELEC	

Asset Group / COBie "Type Category"	Comments	System	Attributes
MCC	MOTOR CONTROL CENTER	ELEC	power*
			electrical panel name*
			capacity*
			operating weight
			type of support
			horizontal bus current
			vertical bus current
			short circuit interrupting rating (KAIC)
			minimum bus bracing (KAIC)
MDP	MAIN DISTRIBUTION PANEL	ELEC	power*
			electrical panel name*
			capacity*
			operating weight
			type of support
			horizontal bus current
			vertical bus current
			short circuit interrupting rating (KAIC)
			minimum bus bracing (KAIC)
MOTOR		ELEC	power*
			electrical panel name*
			capacity*
			HP
			efficiency
			drive line (horizontal, etc.)
			break horse power in bhp
PKL LIGHT	One Per Building	ELEC	
	PARKING LIGHT		
POWER EQUIPMENT		ELEC	power*
			electrical panel name*
			capacity*
PULL BOX	SITE DUCT BANK PULLS	ELEC	location in space (ex: south wall, near parking lot)
			power*
SOLAR/PV EQUIPMENT	One Per Building	ELEC	power*
			electrical panel name*
			capacity*
			cell type

Asset Group / COBie "Type Category"	Comments	System	Attributes
			power tolerance
			number of cells
SURGE PROTECTORS		ELEC	power*
			electrical panel name*
			max allowed voltage drop
			net impendance
UPS SYSTEM		ELEC	power*
			electrical panel name*
			supply voltage
			supply voltage offset
			connected conductor function
XFMR	TRANSFORMER	ELEC	power*
			electrical panel name*
DEFIBRILLATOR		EMERGENCY	location in space (ex: south wall, near bathrooms)
EMG LIGHT	One Per Building	EMERGENCY	
EMG PHONE		EMERGENCY	location in space (ex: south wall, near parking lot)
EYEWASH		EMERGENCY	
FIRST AID		EMERGENCY	location in space (ex: south wall, near bathrooms)

Asset Group / COBie "Type Category"	Comments	System	Attributes
FUME HOOD		EMERGENCY	power*
			electrical panel name*
			capacity*
			maximum air flow rate
			temperature range
			maximum working pressure
			termperature rating
			nominal air flow rate
			open pressure drop
			leakage fully closed
MISC EMERGENCY EQUIPMENT		EMERGENCY	
SF SHOWER		EMERGENCY	temper water
			flow rate
ANNUNCIATORS		FIRE ALARM	
DAMPERS		FIRE ALARM	capacity*
			maximum air flow rate
			nominal air flow rate
			open pressure drop
			leakage fully closed
			IP address
			BAS address
			Parent DDC Panel Name
FIRE ALARM DEVICES	INDICATING DEVICES	FIRE ALARM	
FIRE ALARM PANEL		FIRE ALARM	power*
			electrical panel name*

Asset Group / COBie "Type Category"	Comments	System	Attributes
FIRE INITIATING DEVICES		FIRE ALARM	
FIRE DEPARTMENT CONNECTIONS		FIRE SUPPRESSION	
FIRE EXTINGUISHERS		FIRE SUPPRESSION	
FIRE HYDRANTS		FIRE SUPPRESSION	PSI
			GPM
			line tap size
			GPS coordinates
FIRE SUPPRESSION SYSTEM	One Per Building	FIRE SUPPRESSION	
SPRINKLERS	One Per Building	FIRE SUPPRESSION	
APPLIANCE		FOOD SERVICE	
COLD TABLE		FOOD SERVICE	

Asset Group / COBie "Type Category"	Comments	System	Attributes
CONVEYER		FOOD SERVICE	
COOK TOP		FOOD SERVICE	
COOLER		FOOD SERVICE	power*
			electrical panel name*
			capacity*
			compressor oil type
			referigerant type
			compressor type
FREEZER		FOOD SERVICE	power*
			electrical panel name*
			capacity*
			compressor oil type
			referigerant type
			compressor type
ICE MAKER		FOOD SERVICE	power*
			electrical panel name*
			capacity*
			compressor oil type
			referigerant type
			compressor type
MISC		FOOD SERVICE	
OVEN		FOOD SERVICE	
VENT HOOD		FOOD SERVICE	

Asset Group / COBie "Type Category"	Comments	System	Attributes
WASH STATIONS		FOOD SERVICE	
AHU		HVAC	power*
			electrical panel name*
			capacity*
			air filter type
			return fan capacity
			supply fan capacity
			fan ext pressure drop
			chilled water rate
			coil flow
			coil velocity
			coil capacity
			coil pressure drop
			entering air temp db/wb
			leaving air temp db/wb
			entering water temp
			leaving water temp
AIR VALVE		HVAC	capacity*
			maximum operating pressure
			valve operation
			type of valve
			location in space
ATU	AIR TERMINAL UNIT	HVAC	power*
			electrical panel name*
			capacity*
			air flow min
			air flow max
			pressure drop
BOILERS		HVAC	power*
			electrical panel name*
			capacity*
			energy source
			partial load efficiency curves
			outlet temperature range
			nominal energy consumption
			nominal efficiency
			heat output
			pressure rating
			normal operating pressure set point
			maximum allowable pressure
			maximum boiler temperature
			boiler design temperature
			water storage capacity
			type of boiler
			number of passes

Asset Group / COBie "Type Category"	Comments	System	Attributes
CHILLERS		HVAC	power*
			electrical panel name*
			capacity*
			chiller cooling capacity
			chilled water inlet/outlet temp
			chilled water flow rate
			chilled water pressure drop
			cooling water inlet/outlet temp
			cooling water flow rate
			cooling water pressure drop
			hot water inlet/outlet temp
			hot water flow rate
			hot water pressure drop
COMPRESSORS		HVAC	power*
			electrical panel name*
			capacity*
			has hot gas bypass
			ideal capacity
			nominal capacity
			max pressure
			compressor type
CONTROL DEVICES		HVAC	IP address
			BAS address
			Parent DDC Panel Name
CONTROLLER		HVAC	analog inputs
			digital inputs
			IP address
			BAS address
			Parent DDC Panel Name
COOLING TOWER		HVAC	power*
			electrical panel name*
			capacity*
			nominal capacity
			flow arrangement
			capacity control
			control strategy
			number of cells
			basin reserve volume
			lift elevation difference
			operation temperature range
			ambient design dry bulb temp
			ambient design wet bulb temp
DAMPERS		HVAC	capacity*
			maximum air flow rate
			nominal air flow rate
			open pressure drop
			leakage fully closed

Asset Group / COBie "Type Category"	Comments	System	Attributes
			IP address
			BAS address
			Parent DDC Panel Name
DHUM	DEHUMIDIFIER	HVAC	power*
			electrical panel name*
			capacity*
			nominal moisture gain
			internal control
			water requirement
			saturation efficiency curve air pressure drop curve
DXU	DIRECT EXPANSION UNIT	HVAC	
ERU		HVAC	power*
			electrical panel name*
			capacity*
			supply fan ext. static pressure
			supply fan max hp
			exhaust fan ext static pressure
			exaust fan total hp
			cfm range
			weight
FAN		HVAC	power*
			electrical panel name*
			capacity*
			air flow - maximum
			nominal pressure drop
			efficiency rating
			belt type
			drive line (horizontal, etc.)
			interlock
			pressure
FCU		HVAC	power*
			electrical panel name*
			capacity*
			exit static pressure
			entering air temp db/wb
			leaving air temp db/wb
			entering water temp
			leaving water temp
			total capacity
			sensible capacity
			chilled water flow
			cooling coil delta P
			fan motor hp
			filter type
			fan type
			type of fan drive

Asset Group / COBie "Type Category"	Comments	System	Attributes
			fan size (inches)
			fan efficiency in % or pf
			static pressure in "inches"
FILTERS	One Per Building	HVAC	
GRILLS	One Per Building	HVAC	
HEAT EXCHANGERS		HVAC	electrical panel name*
			capacity*
			exchanger type
			dry weight
			fluid volume
			max temp
			recommended coolant
HEATERS		HVAC	power*
			capacity*
			entering air temp db/wb
			leaving air temp db/wb
			electrical panel name*
HUMIDIFIER		HVAC	power*
			electrical panel name*
			capacity*
			nominal moisture drop
			internal control
OAHU	OUTSIDE AIR HANDLING UNIT	HVAC	power*
			electrical panel name*
			capacity*
			air filter type
			return fan capacity
			supply fan capacity
PKG UNIT		HVAC	power*
			electrical panel name*
			capacity*
			nominal condensing temp
			nominal evaporating temp
			nominal heat rejection rate
PUMP		HVAC	power*

Asset Group / COBie "Type Category"	Comments	System	Attributes
			electrical panel name*
			capacity*
			feet head
			suction pressure
			type (endsuction, inline, etc)
			max temp
			max pressure
			suction size
			discharge size
SENSORS		HVAC	location in space
SEPERATORS		HVAC	capacity*
			tank volume
STRAINER		HVAC	capacity*
		PLUMB	tank volume
			type
UNIT HEATER		HVAC	power*
			electrical panel name*
			capacity*
			temp rise
VFD	VARIABLE FAN DRIVE	HVAC	power*
			electrical panel name*
			minimum output frequency
			maximum output frequency
WATER VALVES		HVAC	capacity*
		PLUMB	maximum operating pressure
			valve operation
			type of valve
			location in space
			evap small temp difference
			condensor small temp difference
			small temperature difference
HAND BOXES		IRRIGATION	GPS coordinate

Asset Group / COBie "Type Category"	Comments	System	Attributes
IRRIGATION SYSTEM		IRRIGATION	
CLEAN OUT	One Per Building	PLUMB	
DISPOSAL		PLUMB	location
			voltage
			electrical panel name*
DRAIN	One Per Building	PLUMB	
FAUCETS	One Per Building	PLUMB	
FLUSH VALVES	one per building	PLUMB	
PURIFIERS		PLUMB	filter face velocity
			media surface velocity
			pressure drop
			particle geometric mean diameter
			water filter type
			location
RPZ	PRESSURE REDUCING VALVE	PLUMB	inlet pressure
			outlet pressure
			minimum capacity
			valve size
			location

Asset Group / COBie "Type Category"	Comments	System	Attributes
SINKS	One Per Building	PLUMB	
TRAPS		PLUMB	maximum operating pressure
			water inlet temperature range
			flow coefficient
URINALS	One Per Building	PLUMB	
WATER CLOSET	One Per Building	PLUMB	
WATER FOUNTAIN		PLUMB	fountain type
			electrical panel name*
WATER HEATER		PLUMB	power*
			electrical panel name*
			capacity*
			flow rate recovery at 100˚
			storage capacity
			steam supply entering coil pressure
			entering water temp
			PSI
			leaving water temp
			gas
ANIMAL EQUIPMENT		RESEARCH	
BIO HAZARD EQUIPMENT		RESEARCH	

Asset Group / COBie "Type Category"	Comments	System	Attributes
INCUBATORS		RESEARCH	power*
			electrical panel name*
			capacity*
			heating range
			cooling range
			type
			compressor type
LAB EQUIPMENT		RESEARCH	
LAB STERILIZER		RESEARCH	steam temperature
			type
RESEARCH EQUIPMENT		RESEARCH	
SECURITY CAMERAS		RESEARCH	
SECURITY PANEL		RESEARCH	
BOLLARDS	One Per Building	SITE	
LIGHTING POLES	One Per Building	SITE	

Asset Group / COBie "Type Category"	Comments	System	Attributes
SIGN	One Per Building	SITE	
TRAFFIC CONTROL	One Per Building	SITE	
WASTE EQUIPMENT		SITE	

Exhibit 3.D - FM Model Criteria

A valuable part of the BIM process, models provide opportunity to improve communication during planning, design, construction, and operations. Outstanding implications exist for the use of models in facilities management; however, model integration is not currently a common management tool at Sam Houston State University (SHSU). Desiring to always improve, SHSU is committed to the innovative use of tools such as models that help staff to better steward facilities. A continued improvement of operational workflows is an expected result from the use of model deliverables.

The intent of this section is to include the minimum criteria for 3D models as they relate to the BIM for FM Deliverables alone. This section does not replace or lessen modeling criteria in other sections of SHSU specifications or contract requirements related to other BIM Use Cases (applications of BIM for other objectives).

Native Files from As-Built / Field Coordinated Model

The construction contractor shall provide two versions of the native files that support the as-built / field coordinated model at multiple times before project closeout and at substantial completion. These files are the model instances that build the federated coordination models. One version shall be the native files saved from the design / trade software it was created in. The other version shall be the interoperable / sharing formats from the design / trade software it was created in. Examples of interoperable formats include: LandXML, gbXML, DWG, IFC, ASCII, FBX, etc. The intent for design / trade files and interoperable formats is to allow opportunities for integration in future design work, allowing for record update with field changes, and much more.

FM Model

The construction contractor shall provide two versions of the as-built / field coordinated model in re-savable NWD format at multiple times before close-out (per the BIM Execution Plan) and at substantial completion of the project. As-built models shall at a minimum include all components represented in the COBie deliverable for spaces and components (named equipment). Exception to this shall be all building level assets (clocks, seating, faucets, etc.), fire initiating and indicating devices, and BAS sensors.

One version of the NWD provided model shall be the final as-built model per the field coordination effort.

The second version of the NWD model shall be optimized (stripped down and lightweight) for Facilities Management use. Optimization shall allow for easy navigation and viewing of assets. Particular optimization shall include, but not be limited to, ceilings at fifty percent transparency and the hiding of all doors. Also, included shall be the unique color-coding of all building systems (electrical, chilled water, heating water, domestic water, etc.) per the current SHSU coloring schema. The coloring schema shall be documented in the BIM Execution Plan as well.

Each component in COBie shall have a minimum of one saved viewpoint in the model. Exception to this shall be all building level assets (clocks, seating, faucets, etc.), fire initiating and indicating devices, and BAS sensors. These saved viewpoint files shall be attached to the component in the documents portion of COBie.