

A STEP-BY-STEP GUIDE TO THE CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBIE) SPREADSHEET

PURPOSE OF THIS GUIDE

This guide provides a step-by-step guide to manually enter data directly into the COBIE Excel spreadsheet. This guide, the COBIE specification, development project, and template spreadsheet are all posted on the Whole Building Design Guide (www.wbdg.org) under the COBIE “Resource Page”.

WHO SHOULD USE THIS GUIDE

This guide is intended for those who will be directly entering COBIE data using the template spreadsheet, “2007-09-08-COBIE-Spreadsheet.xls.” General information about COBIE may be found at www.wbdg.com.

GET THE LATEST VERSION

This guide’s version number is “3.0(2003)”. Please check www.wbdg.org to verify you have the latest version of the guide.

IF YOU HAVE QUESTIONS?

If you have questions about the requirements in this document, you must contact your local project management team. The author and contributors to this document are not authorized to answer questions related to specific projects.

TABLE OF CONTENTS

Purpose of this guide	1
Who should use this guide.....	1
Get the latest version.....	1
If you have questions?	1
Table of Contents.....	2
Table of Figures.....	4
Read then discuss with project team.....	5
Know how to use a spreadsheet.....	5
Do you have the correct template version	5
Overview	6
Before you start – General Instructions	7
Color code legend.....	7
Required Data – “ID Number”	8
Required Data – “Created By”	8
Required Data – “Created ON”	8
Optional Data – Purple “External” Data Columns	8
Optional Data – Green Data Columns	8
What if I don’t know required information?	9
What if I have to change data?.....	9
What if I have to delete data?	9
What if you need additonal rows?	9
Deleting Blank rows.....	10
Color Coding Required.....	10

CONTENTS (CONT.)

Part 1. Providing your Contact Information	10
Part 2. Providing Designer Data	11
Entering Facility Data.....	13
Entering FLOOR Data	13
Entering SPACE Data.....	14
Entering System Data	15
Entering Register Data.....	17
Entering Named Equipment	20
Archive COBIE Designer Data	21
Part 3. Contractor Quality Control (CQC).....	21
Part 4. Installing Equipment.....	22
Archive COBIE Installed Equipment Data	25
Part 5. Manufacturers' Operations Data.....	25
Entering Product Manuals.....	25
Entering Warranty Data.....	26
Entering Spare and Replacement Part Data	27
archive COBIE Manufacturers' Operations data.....	29
Part 6. Commissioning Data.....	29
Entering System Instruction Data.....	30
Entering System Test Data.....	31
Entering System Certification Data	31

CONTENTS (CONT.)

Part 7. Job Plan Data	32
Entering Job Plan Resources.....	33
Entering Job Plans.....	33
Archive COBIE Commissioning Data	36
Acknowledgements.....	36
Sponsors.....	37
Comments on this Document.....	38

TABLE OF FIGURES

Figure 1. COBIE Schematic	Error! Bookmark not defined.
Figure 2. COBIE Designer Data	12
Figure 3. Register and Components.....	17

READ THEN DISCUSS WITH PROJECT TEAM

Read this whole guide prior to entering any data into the spreadsheet to ensure you understand what data needs to be entered and how the spreadsheet is used. Discuss and document these requirements at a COBIE “kick-off” meeting where the impacts of and decisions about the use of this tool can be clearly discussed among all parties involved and any issues resolved prior to entering any data.

Failure of your team to understand the scope of the COBIE Spreadsheet and its application to your project can result in re-entry of data and delays in production of the COBIE deliverable.

KNOW HOW TO USE A SPREADSHEET

You must have some experience using spreadsheets to successfully compile the COBIE data. If you have not used spreadsheets before, but will be entering COBIE data yourself, it is recommended that you complete the web-based Excel training provided on Microsoft’s web site before you begin.

As of Sept 2007 the web site for these training programs may be found at (<http://office.microsoft.com/en-us/training/CR061831141033.aspx>)

DO YOU HAVE THE CORRECT TEMPLATE VERSION

The “2007-09-08-COBIE-Spreadsheet.xls” described in this guide includes additional formatting that simplifies, and supersedes, the COBIE July 2007 update. Note that the COBIE July 2007 update had superseded the initial COBIE specification published in December 2006 in Appendix B of the National Building Information Model Standard, Version 1 - Part 1.

As noted previously, all COBIE related information may be found through the Whole Building Design Guide (www.wbdg.com) under the COBIE Resource Page.

OVERVIEW

Today, most construction contracts require the handover of paper documents containing equipment lists, product data sheets, warranties, spare part lists, preventive maintenance schedules, and other information. Gathering this information at the end of the project can be expensive since most of the information is created earlier in the project. The purpose of the COBIE Spreadsheet is to standardize and simplify the work required to capture and handover the required project information.

A key innovation of the COBIE approach is to accommodate the capture of project data as it is created during design, construction and commissioning rather than waiting until the end of the project. Figure 1. COBIE Timeline~~Error! Reference source not found.~~, shows when COBIE data is developed over the course of a typical project. Designers provide floor, space, and equipment layout information. Contractors provide make, model, and serial numbers of installed equipment. Of course, much of the data provided by contractors comes from product manufacturers who also provide product data sheets and recommended maintenance instructions.

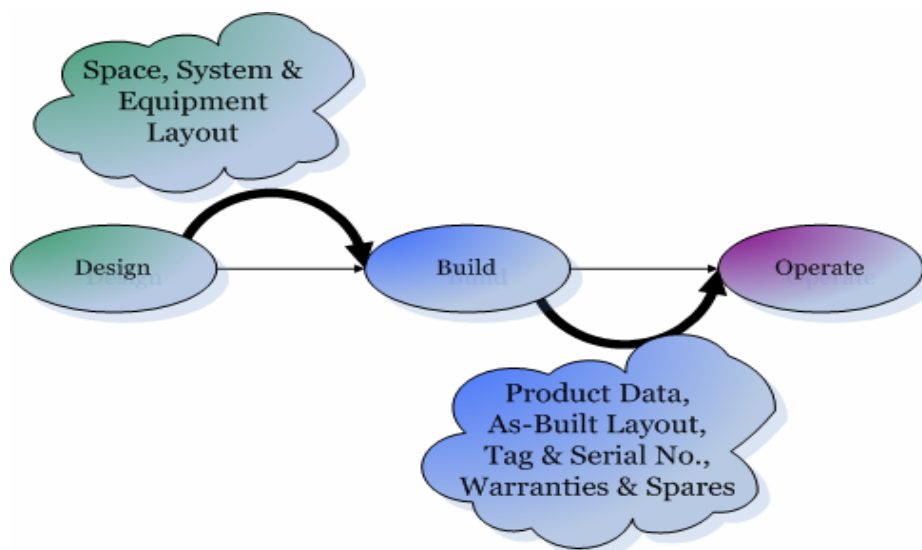


Figure 1. COBIE Timeline

You may be entering the data as the project progresses, at the end of construction, or after a project to document as-built conditions. Regardless of the timing, following the steps in the paragraphs below is the easiest way to complete the spreadsheet. These steps are grouped together based on when the data is created in the COBIE Timeline. The “Parts” identified below

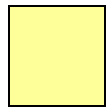
match information shown on the **Instructions** worksheet found at the front of the COBIE Spreadsheet.

BEFORE YOU START – GENERAL INSTRUCTIONS

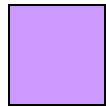
Before you start entering COBIE data, there are some general instructions that pertain to all COBIE worksheets. Information about these general instructions is NOT repeated as part of the specific instructions for each worksheet.

COLOR CODE LEGEND

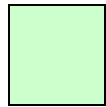
COBIE worksheet tabs names and columns are color-coded to allow you to quickly know what data must be provided, what data should be provided if it applies, and what data is optional.



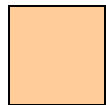
Required data, a value must appear in all 'yellow' cells



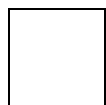
Optional data, may be required as described in this guide



Optional data, required if specified in your project



Reference data, required as described in this guide



A formula cell that should not be changed

REQUIRED DATA – “ID NUMBER”

The first column, Column A, in every worksheet contains the **ID** number of the data in that row. Other worksheets may need to reference the **ID** number this data, therefore, you must NOT change the **ID** number provided in Column A.

REQUIRED DATA – “CREATED BY”

Every worksheet requires you to identify your **ID** number in the **CreatedBy** column. After entering your **Contact** information a list of **Contacts** is provided. You must select your name from the list for every row you add.

REQUIRED DATA – “CREATED ON”

Every worksheet sets the date that you entered the information using the **CreatedDate** and **CreatedTime** fields. You should not change this automatically created data.

OPTIONAL DATA – PURPLE “EXTERNAL” DATA COLUMNS

Many worksheets have purple columns that allow the identification of **ExternalSystemID** and **ExternalSystemName**. These columns are provided to allow team members to track data that is contained in their own internal information systems. The team should determine, during the kick-off meeting if these fields will be used. If they are used, they must be used consistently for all rows of data in a given worksheet.

OPTIONAL DATA – GREEN DATA COLUMNS

Many worksheets have columns with green, optional, columns. In general these columns are not to be filled out unless specified by in the project. If they are specified, then they are required to be completed for all rows. Partial provision of data in green columns is not allowed without explicit team agreement during the COBIE “kick-off” meeting.

WHAT IF I DON'T KNOW REQUIRED INFORMATION?

If you don't know or don't have the required information, or if the information is not available, please enter the text **n/a** for "not available" or "not applicable."

WHAT IF I HAVE TO CHANGE DATA?

COBIE does not allow editing of data previously sent to others. As long as you are working on the data on your own, you may edit the data as needed. Once you transmit the data to others, you cannot directly edit the previously provided data.

To show a change to previously submitted data, copy the entire original data row to a new row. Update the data needed in the new row, and then change the value of the **ReplacesID** to the original data row. Note that software systems will typically only load non-replaced data.

WHAT IF I HAVE TO DELETE DATA?

COBIE does not allow you to delete data previously sent to others. As long as you are working on the data on your own, you may delete the data as needed. Once you transmit the data to others, you cannot directly delete the previously provided data.

The word "withdrawn" is used in COBIE to identify data that should not be provided in the current COBIE data set.

To withdraw data, copy the entire original data row to a new row. Change the value of the **ReplacesID** to the original data row. Change the value of the **Withdrawn** column to **Yes**. Note that software systems will typically only load non-withdrawn records.

For active records the **Withdrawn** column must be left to its default position of **No**.

WHAT IF YOU NEED ADDITIONAL ROWS?

The columns required for COBIE data have been "filled" with the needed color and "bordered" with a line. If, however, you need more than 200 rows in a given data sheet, you may copy the last blank row and paste it to as many additional rows as needed.

Once you have pasted the additional rows, you will have to manually adjust some of the “named range” formulas to ensure that pick lists include the values of rows beyond the last original row. Pick lists in COBIE rely on the first column of every worksheet, Column A, to provide the ID number of the row. In some cases an additional last column is provided on the worksheets to ease the selection of worksheet data on different tables.

You will need to have some expertise in working with spreadsheets to perform this operation without error. If you have a question on this procedure, ask your project team members for assistance **BEFORE** to filling these new rows with data.

DELETING BLANK ROWS

Before submitting your COBIE Spreadsheet for review you should clean up unused rows in the spreadsheets. Do NOT remove color coding.

COLOR CODING REQUIRED

Color coding is required in all COBIE deliverable to allow rapid review of your data against the COBIE Spreadsheet template’s required and optional data fields.

PART 1. PROVIDING YOUR CONTACT INFORMATION

Before entering data about your building into the spreadsheet enter your name, address, and contact information in the **01-Contact** worksheet. This information will be used to identify you as the author of the information you provide. Establishing information authorship is important to ensure questions or issues that arise can be addressed quickly.

The following these instructions for entering data in the **01-Contact** worksheet.

- 1.1. Select the **01-Contact** worksheet tab.
- 1.2. Do **NOT** change the data in Column A - - as noted in “Before you start – General Instructions”
- 1.3. Select the description that best suits your employer from the pick list in the **ContactRole** column. For example, if you represent a designer, select **34-25 21 00**

Architect from the list. If you work for a Construction contractor, select **34-35 14 00 Contractor**.

- 1.4. The optional purple columns **ExternalSystemname**, **ExternalNameID**, and **ExternalOfficeID** may be left blank unless you are trying to cross-link data between your offices information systems and the data in the COBIE Spreadsheet.
- 1.5. Next, enter your name, office address, and contact information in the columns from **F** through **S**. Columns highlighted in yellow are required. Columns in green are optional columns.
- 1.6. You may either enter all of the individuals and companies who will be adding data to the spreadsheet at one time, or you can return to **01-Contact** later and add them. Regardless of when the entry occurs, it is **critical** that anyone entering information into any worksheet has first entered their name and contact information in the **01-Contact** worksheet.

PART 2. PROVIDING DESIGNER DATA

Figure 1. COBIE Timeline, identifies designer data as the layout of the facility, building systems, and materials, products, and equipment. Ideally, designer data will be entered by the Building Information Model (BIM) or Computer Aided Design and Drafting (CADD) manager during design. As the design progresses, more information will be available to enter into the spreadsheet.

Figure 2. COBIE Designer Data, shows how designer information is organized in the COBIE format. In each project there will be one or more “facilities” identified. If you are constructing five buildings within a single project then each of the buildings would be listed as a separate facility. If you are installing a reach of articulated concrete mattress on a levee, then you might include a single reach “facility” or project record for the entire project.

Figure 2. COBIE Designer Data, illustrates that in COBIE facilities are comprised of “Floors”. These floors are the large “cubes” or primary spatial containers in which your project occurs. For example, in a multi-story building, each story is a “floor”. On the levee project, there may be a single “floor” that represents the entire 3-D space boundary for the project.

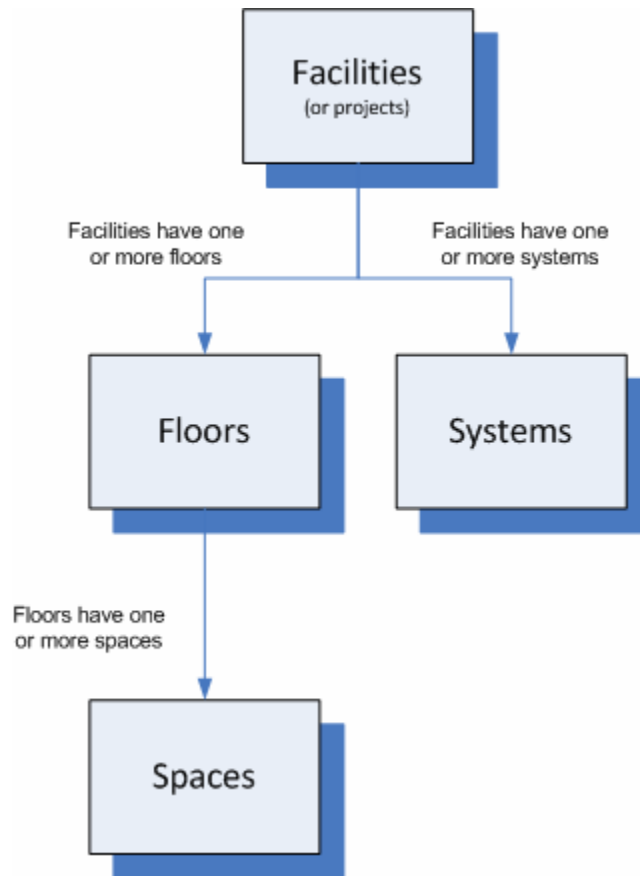


Figure 2. COBIE Designer Data

Once the overall 3-D boundary for the “floors” has been identified, then the sub-elements may be identified. There are required to be one or more spaces, as shown in Figure 2. COBIE Designer Data, for each floor. In a building, spaces are identified by room numbers. On a levee project, spaces may be identified by each “reach” of levee, or the amount of revetment that can be installed in a day.

In addition to the physical space being defined for by the project, COBIE also captures a list of the “systems” or building services that comprise the project. In a building project these systems would include the major building “services” and utilities. For a horizontal project, there may only be a single type of “system” being installed.

The paragraphs below will help you to enter the first portion of the Designer-specific project data, shown in Figure 2. COBIE Designer Data, into the COBIE data spreadsheet.

ENTERING FACILITY DATA

There must be one “facility” for each COBIE file. Even if the project is not a traditional “facility,” the **02-Facility** worksheet must be used to capture the name of the project. To complete this worksheet, follow the instructions below.

- 2.1. Select the **02-Facility** worksheet tab.
- 2.2. Do **NOT** change the data in Column A - - as noted in “Before you start – General Instructions”
- 2.3. Enter **FacilityName**

ENTERING FLOOR DATA

Floors are the “vertical” levels within the facility. If your project includes landscaping and parking lots, add a “Floor” called “Site Work”. Buildings should also have a “Floor” called “Roof.”

Floors do not need to span the entire footprint of a building. The “floor” of the atrium is the bottom most level for that atrium. “Floors” for mezzanines, elevated walkways, or other intermediate levels should be separately identified in the COBIE Spreadsheet.

There must be at least one “floor” for each “facility.” To complete this worksheet, follow the instructions below.

- 3.1. Select the 03-Floor worksheet tab
- 3.2. Do **NOT** change the data in Column A - - as noted in “Before you start – General Instructions”
- 3.3. Select the **FacilityID** that contains the floor from the list provided.
- 3.4. Most traditional buildings will not include “composite” floors. Traditional buildings will not require the selection of a **FloorReferenceID**.
- 3.5. Enter **FloorName**

- 3.6. Provide optional green data, if specified by your specific contract. If floor areas values are provided for one floor, then they should be provided for all floors. When identifying floor areas the calculation method must also be specified. If you do this by hand, enter “manual take off”. If this is done with software without specific identification of the method used, enter the name and version of the software that calculated the data.

ENTERING SPACE DATA

Spaces are the “horizontal” areas within the “floors” of the facility. In addition to the listing of spaces within a building, spaces should be identified outdoors and on rooftops if different types of construction occur in those spaces. For example, if your project has work such as landscaping and parking lots, then you added a “Floor” called “Site Work”. Within “Site Work” you may have a “Space” for “Parking Lot”, “Sidewalk”, and “Mechanical Pad”.

There must be at least one “Space” per “Floor”. Spaces may also be organized into zones as described below. To complete this worksheet, follow the instructions below.

- 4.1. Select the 04-Space worksheet tab
- 4.2. Do **NOT** change the data in Column A - - as noted in “Before you start – General Instructions”
- 4.3. Select the **FloorID** that contains the floor from the list provided.
- 4.4. The **SpaceFunction** list is a detailed outline provided by the Construction Specification Institute. Some may find it easier to review the list as shown in this last worksheet and then select the relevant value from the **SpaceFunction** list. You may not change values in this or any other list found on the last worksheet.

In some cases there may not be a precise selection for the exact function of the space you are entering. In this case select a space function at a higher level. You should try and find space functions that can be re-used as you enter additional similar spaces.

Once you have established an appropriate **SpaceFunction** selection, you may reuse that selection, where needed by cutting and pasting that value.

- 4.5. Spaces may be organized into groups identified as wings or circulation areas. COBIE can support the definition of one method of grouping per facility. If your building has

such groupings, and you are directed to include those groupings, then begin the space list with these high-level groups.

If the groups go across floors, then you will need to include one group space of that type per floor. If you have two floors and a roof, and want to show the grouping of spaces into wings, then you will need three “grouped” spaces per wing. For “Wing A” these grouped spaces would be as follows: “Wing A. First Floor”, “Wing A. Second Floor”, “Wing A. Roof.” Similarly, “Wing B” would require “Wing B. First Floor”, “Wing B. Second Floor,” and “Wing B. Roof.”

Enter groups of spaces starting with the highest-level spaces. Once you enter the highest-level spaces, you will be able to assign individual spaces within these groups by selecting the appropriate high-level space from the **SpaceReferenceID** pick list.

If your building does not include these groupings, or if you are directed not to include them, you may ignore the optional **SpaceReferenceID** list.

- 4.6. Enter the room number identified in the floor plans in the **SpaceName** field.
- 4.7. Provide optional green data, if specified by your specific contract. If floor areas values are provided for one floor, then they should be provided for all floors. When identifying floor areas the calculation method must also be specified. If you do this by hand, enter “manual take off”. If this is done with software without specific identification of the method used, enter the name and version of the software that calculated the data.

ENTERING SYSTEM DATA

Building systems, or services, are the set of components that work together to provide a specific functionality for your project. Often these systems provide services that we think of as “utilities.” Examples of such utilities include: electric, heating, cooling, water, and sewer. Other systems provide basic structural or other functionality such as “structural system” or “building enclosure.”

A minimum of one “System” record for each major building system in each “Facility” contained in the spreadsheet is required. Systems may also be organized into zones. To complete this worksheet, follow the instructions below.

- 5.1. Select the **05-System** worksheet tab.
- 5.2. Do **NOT** change the data in Column A - - as noted in “Before you start – General Instructions”
- 5.3. Select the **FacilityID** that contains the facility in which the system is installed from the list provided.
- 5.4. The **SystemFunction** list is a detailed outline provided by the Construction Specification Institute. Some may find it easier to review the list as shown in this last worksheet and then select the relevant value using the **SystemFunction** list. You may not change values in this or any other list found on the last worksheet.

In some cases there may not be a precise selection for the exact function of the space you are entering. In this case select a space function at a higher level. You should try and find space functions that can be re-used as you enter additional similar spaces.

Once you have established an appropriate **SystemFunction** selection, you may reuse that selection, where needed by cutting and pasting that value.

- 5.5. Systems may be organized into groups such as zones. Zones are frequently used to segment the control of HVAC systems, identify circuits of electrical systems, or areas under centralized fire protection. COBIE can support the definition of one type of zone, per system, per facility. If your building has such groupings, and you are directed to include those groupings, then begin the space list with these high-level groups.

Zones will be used to group materials, products, and equipment. As a result, you can use zones to show things that are both inside and outside the building. For example if you have an electrical system defined in your building the system can be used to identify transformers outside the building as well as the electrical switchgear in the electrical utility room inside the building.

If your building does not include zones in the design documents, or if you are directed not to include them, you may ignore the optional **SystemReferenceID** list.

- 5.6. Enter the name of the system, or subsystem, shown in the design in the floor plans in the **SystemName** field.

ENTERING REGISTER DATA

The submittal register lists the materials, products, and equipment that are planned for installation in each facility. Sets of submittals are required for each type of material, product, and equipment as defined in your contract document.

Typically the register will be created during the design phase. In design-bid-build the submittal register is typically a complete deliverable based on the compiled set of requirements identified in the design drawings. In design-bid-build projects the submittal register should be developed in parts as major work packages are completed and sent to construction. The best time to capture register data is during design, when the data is originally created. If, however, you are required to create COBIE data following the completion of construction, you should speak with your project manager to determine the location of the designer's submittal register.

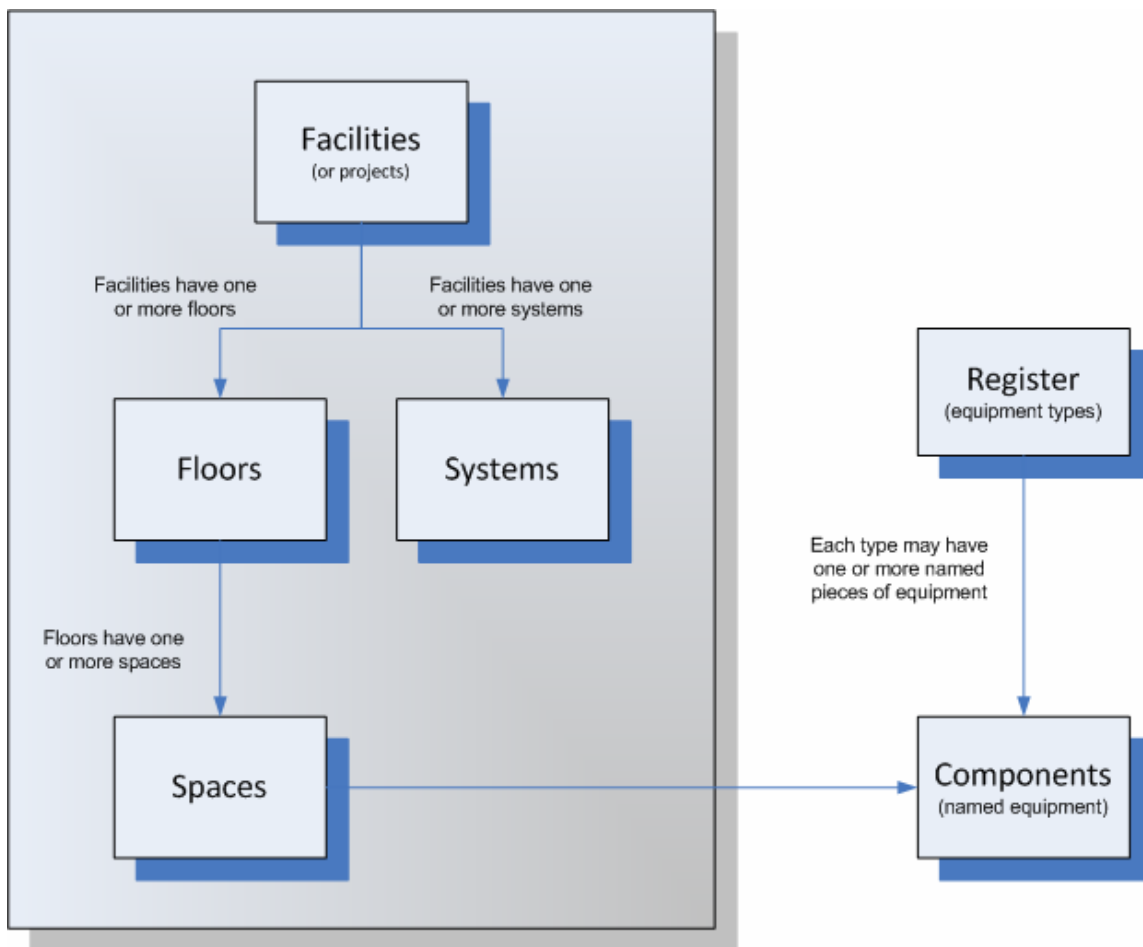


Figure 3. Register and Components

For design-bid-build contracts, the submittal list identifies the documentation required to be submitted prior to the installation of those products. For design-build contracts, the submittal list documents the products installed in the building. Regardless of contract form, some submittals must be provided prior to installation for “owner approval”. The majority of submittals are, however, “contractor certified” to meet project requirements. The submittal register identifies, for each submittal, if the documents to be submitted require owner approval or only contractor certification.

The **Register** worksheet is the key to associating data provided by the designer with data provided by the contractor. By having an electronic **Register** with as-built data from later in construction, O&M personnel will be able to find who to call in case of warranty repair, replacement parts, and job plans.

As shown in Figure 3. Register and Components, the **Register** defines the types of material, products, and equipment to be installed anywhere in the entire project. The **Components** are those products or equipment specifically named on design plans or models.

Follow the instructions below to enter information into the **Register**.

- 6.1. Select the **06-Register** worksheet tab.
- 6.2. Do **NOT** change the data in Column A - - as noted in “Before you start – General Instructions”
- 6.3. The **ProductType** list is a detailed outline provided by the Construction Specification Institute. Some may find it easier to review the list as shown in this last worksheet and then select the relevant value using the **ProductType** list. You may not change values in this or any other list found on the last worksheet.

In some cases there may not be a precise selection for the exact type of product you are entering. In this case select a product at a higher level. You should try and find products type values that can be re-used as you enter additional similar spaces.

Once you have established an appropriate **ProductType** selection, you may reuse that selection, where needed by cutting and pasting that value.

- 6.4. Select the **RegisterType** that best describes the submittal to be provided. You must identify the manufacturers’ “catalog cut” for the material, product, or equipment with the **RegisterType** selection of “**Product Data**”. There must be at least one “**Product Data**” selection, used for the manufacturer’s catalog cuts, used for each type of manufactured product or equipment installed in the building. There may, of course,

also be other types of submittals such as testing reports, certifications, for that product as well.

The **Product Data** selection allows COBIE data to be used by commercial O&M and BIM software.

- 6.5. Select the **AssetType** that best describes the way that the submittal is to be installed in the building.

There are two types of assets identified in COBIE. “**Fixed**” assets are those products that are permanently installed in the building. Examples of **Fixed** assets include pumps, electrical panels, wall-to-wall carpet, and drywall. “**Moveable**” assets are those assets that may be moved from room to room (or from facility to facility). Examples of Moveable assets are furniture, telephones, and computer components. The designer will have to identify the classification of asset type when entering the data.

- 6.6. Select the **ApprovalBy** value that identifies who will be responsible to check the contract requirements against the contents of the document. The majority of submittals will be “**Contractor Certified**”. Some submittals will, however, require explicit approval before procurement can begin.

You must discuss the requirements for the approval of specific submittals with your project manager before entering this data.

- 6.7. If directed by your project manager, identify the system(s) to which the submittal belongs using the purple **SystemIDList** field. To enter this data find the **SystemID** numbers(s) for the related systems from the system worksheet. If you have identified zones in the system worksheet, select the highest level zone that applies. If there are multiple values to enter, enter each ID separated by a comma.
- 6.8. If directed by your project manager, identify the individual spaces where materials and products (not individually named in the design) are located. The lowest level space names, not space “zones,” should be identified for this effort. Since there will typically be multiple values to enter, enter each room number separated by a comma.
- 6.9. Enter the name of the submittal in the **RegisterName** field.
- 6.10. Enter the specification or building code section where the requirements for the submittal may be found in the **RegisterReference** field.

- 6.11. If directed by your project manager, identify the direct cost of replacing the entire set of materials, products, or equipment referenced by the submittal, and the expected life of the product in the green **ExpectedCost** and **ExpectedLife** columns. Units must also be identified whenever there is a value for **ExpectedCost** and **ExpectedLife**. If this optional information is provided, it should be provided for all submittals of type “**Product Data**”.

ENTERING NAMED EQUIPMENT

The submittal register provides a catalog of the types of materials, products, and equipment that will be installed in the facility during construction. There are also likely to be individual instances of some products or equipment identified in the drawings. Mechanical equipment, for example, is often specifically named on design drawings. Air Handling Units may be referred to as “AHU-1,” “AHU-2,” etc... The **Component** worksheet captures the specifically named equipment, and links it to the proper submittal register type.

As shown in Figure 3. Register and Components, the **Component** worksheet also allows the designer to identify the specific spaces that contain each named piece of equipment.

Other types of equipment will not be named until they are installed by the contractor. The naming of these products, such as mechanical system valves, occurs when the contractor places a brass, or other “permanent” tag on the product. These tags are identified in the contractor’s **Installation** worksheet and are NOT to be included in the designer’s **Component** worksheet.

Follow the instructions below to enter named equipment in the **Component** worksheet.

- 7.1. Select the **07-Component** worksheet tab.
- 7.2. Do **NOT** change the data in Column A - - as noted in “Before you start – General Instructions”
- 7.3. Select the **SpaceID** where the named equipment is located.
- 7.4. Select the **RegisterID** containing the **Product Data** for that type of equipment.
- 7.5. Identify the **ComponentName** for this equipment. Use the abbreviation provided by the designer not the spelled out name for the component, e.g. use “AHU-1” and not “Air Handling Unit – 1”.

ARCHIVE COBIE DESIGNER DATA

If you have followed the steps above, you have now completed the required minimum set of data regarding the design of your project.

At this time the provision of data in the **08-Attribute** and **09-Worksheet** are not required for those manually entering COBIE data.

Whether you have created the COBIE data over the course of the entire project, after construction completion, or following project turn-over, you should now create an archive copy of the COBIE data and submit it to the project manager for approval. Once approval has been given, additional data gathered during the construction phase can be added.

PART 3. CONTRACTOR QUALITY CONTROL (CQC)

As you decide what specific products to purchase, you or your purchasing department will identify the product data sheets that contain the manufacturer and model of the products you intend to purchase. These data sheets should be available directly over the World Wide Web in PDF format. You may be able to provide the manufacturers' data directly to the project manager through the method specified in the contract. Regardless of the project managers' requirement for paper copies, COBIE requires electronic versions of all submittals.

COBIE requires the electronic version of every individual submittal document be contained on a data disk that also includes the COBIE Spreadsheet.

Submittals that require an actual physical item, such as color chips or window installation samples will be documented by digital photographs that highlight critical aspects of that installation. COBIE must include a minimum of one photograph of each physical submittal required.

To ensure that data can be reused by O&M personnel, items such as shop drawings should be provided in their native CADD or BIM software formats. In addition, high-resolution PDF versions of these documents, either in 2-D for CADD software or 3-D for BIM software must be provided.

The COBIE Spreadsheet may be used to track the submission and approval of these submittals. We assume that the project manager has defined how they require submittals to be provided and tracked; therefore, such efforts are outside the scope of this Guide. If this is the case, the **10-Schedule**, **12-Transmittal** and **13-Action** worksheets are not required to be provided. The **11-Document** worksheet, however, must contain the list of the documentation for every submittal that was "approved" throughout the submittal review process.

To complete the **Document** worksheet, follow the steps below. Note that the numbering of these steps is not sequential, but has been set to match the number of the **Document** worksheet.

- 11.1. Select the **11-Document** worksheet tab.
- 11.2. Do NOT change the data in Column A - - as noted in “Before you start – General Instructions”
- 11.3. Enter a name or phrase that describes the contents of the document in the DocumentName field. The name or phrase should not contain acronyms that are not widely understood by the O&M staff who will be using your data in years to come. Note that this will likely not be the actual name of the document. For example, the file “D:\cobiedata\electricaldata\switches.pdf” could have a DocumentName of “Electrical Switchgear”.
- 11.4. It is assumed that documents referenced in this worksheet are provided on a data disk. Enter the directory of the document in the DocumentDirectoryName field. Do not enter the drive letter or opening or closing directory marks. For example, the file “D:\cobiedata\electricaldata\switches.pdf” will have a DocumentDirectoryName of “cobiedata\electricaldata”.
- 11.5. Enter the name of the physical data file in the DocumentFileName. Do not enter the drive letter, path or directory marks. For example, the file “D:\cobiedata\electricaldata\switches.pdf” will have a DocumentFileName of “switches.pdf”.
- 11.6. Enter the three letter designation of the type of the file provided in **DocumentType**. Do not enter the drive letter, path, file name or directory marks. For example, “D:\cobiedata\electricaldata\switches.pdf” will have a **DocumentType** of “pdf”. For readability this value should always be provided in lower case text.

PART 4. INSTALLING THE EQUIPMENT

As products (incl. materials and equipment) are installed, information about these products are captured in the **14-Installation** worksheet. You will need to review the specific requirements of

your contract for the full scope of the information that should be entered in the **14-Installation** worksheet.

Those entering COBIE information manually will have a mandatory minimum set of equipment related information to provide: installed equipment, tagged products, and product data. The specific information is as follows:

- (1) There must be one row in the **Installation** worksheet for each row in the **Component** worksheet. Data required is make, model, and serial number. If tags are included on these **Components** the tag number must also be listed.
- (2) Those commodity products not individually named in as **Components**, such as valves or doors, that receive some type of individual tags as part of their installation will be shown with a separate **Installation** row for each individual tag. Data required is make, model, and tag number.
- (3) Product data without individual serial or tag numbers will be identified by a single record in the **Installation** table. As a minimum there must be at least one matching row in the **Installation** table for each every **Product Data** row in the **Register**. Data required is make and model.

Since there are specific mandates that data in the **Component** and **Register** worksheets be listed in the **Installation** worksheet, the following procedure should be used when filling out the information in this worksheet to ensure that the required data is provided.

- (1) Create a blank record in the **Installation** worksheet for each item in the **Component** worksheet.
- (2) Create a blank record in the **Installation** worksheet for every installed product with a tag number,
- (3) Finally, for all **Register** items that are not in the **Component** list or have tags, create one row in the **Installation** worksheet.

During the CQC portion of this guide, it was stated that only the approved submittal documents should be listed in the **Document** worksheet. Given the lack of submittal processing information in the standard COBIE deliverable, identified in this Guide, the **Installation** worksheet will link the documents submitted to the materials, products, and equipment that the documents describe. Every row in the **Document** worksheet, except those pertaining to

general provision contract clauses, must be referenced at least once in the **Installation** worksheet.

Since changes occur between design and construction, the **Installation** worksheet allows you to identify any changes in location associated with as-built conditions. Do not recreate data provided during design, only identify as-built variations from the design data provided in the **Component** worksheet.

To complete the **Installation** worksheet, follow these steps: Note that the numbering of these steps is not sequential, but has been set to match the number of the **Installation** worksheet.

- 14.1. Select the **14-Installation** worksheet tab
- 14.2. Do NOT change the data in Column A - - as noted in “Before you start – General Instructions”
- 14.3. Select the value from the submittal register to which the installed equipment belongs using the RegisterID list.
- 14.4. If the information is a named Component, then the purple field ComponentID is a required field.
- 14.5. If the location of the materials, products, or equipment is different than that identified in the design, then the changed data should be listed in the **SpaceIDList** field.
- 14.6. The documents related to this installation must be identified in the purple column **DocumentIDList**. For similar products, the document ID list may be copied for these products. Since CQC data is not being provided, there **must** be a minimum of one document (i.e. **Product Data**) identified for each row of the **Installation** worksheet.
- 14.7. Enter the name of the product in the **InstallationName** field.
- 14.8. Enter the name of the manufacturer in the **InstallationManufacturer** field
- 14.9. Enter the model number in the **InstallationModel** field.
- 14.10. Enter the serial number of the product in the **InstallationSerialNumber** field. If the item does not have a serial number enter “n/a”.

- 14.11. If the product has a tag number installed by the Contractor as part of the contract, then the green field **InstallationTagNumber** is required and should be completed for all tagged products.
- 14.12. If the product has attributes needed for reordering, these should be provided in the green field **InstallationDescription** an example of such a value would be carpet dye lots.

ARCHIVE COBIE INSTALLED EQUIPMENT DATA

If you have followed the steps above, you have now completed the required minimum set of data to identify the as-built materials, products, and equipment installed in your project. You should make an archive copy of the file and submit it for owner approval.

PART 5. MANUFACTURERS' OPERATIONS DATA

Standard construction contracts require product data as part of the O&M handover documents. Given that manufacturers provide this data on the World Wide Web, and following the delivery of the products, this information can be captured in the COBIE Spreadsheet as it is submitted. Regardless of the format for the data provided by the manufacturer it must be provided with the COBIE disk as PDF files. These files will be first added to the list of **Documents** and then referenced in the set of product data worksheets.

The set of product data worksheets include the **Manuals**, **Warranty**, and **Spare** and replacement parts lists.

ENTERING PRODUCT MANUALS

To complete the **Manuals** worksheet, follow these steps: Note that the numbering of these steps is not sequential, but has been set to match the number of the **Manual** worksheet.

- 15.1. Select the **15-Manual** worksheet tab.
- 15.2. Do **NOT** change the data in Column A - - as noted in "Before you start – General Instructions"

- 15.3. Select the value from the document list that contains the PDF version of the manual using the **DocumentID** list. If there are multiple documents that apply, type the ID number of each one in a list separated by commas.
- 15.4. Select the value from the submittal register to which the manual belongs using the RegisterID list. If there are multiple register items that apply, type each one in a list separated by commas. There should be **NO** spaces between the numbers and commas in this list.
- 15.5. If the information pertains to only one of named pieces of equipment, then you are required to provide that list in the purple column **InstallationIDList**. Unless noted in this column it is assumed that the item found in this row pertains to all of the equipment installed against the selected **RegisterID**.
- 15.6. If the information pertains to a system, and not just to individual register items, then you are required to provide that system, or list of systems, in the purple **SystemIDList**.
- 15.7. Enter the name of the manual in the **ManualName** field.

ENTERING WARRANTY DATA

To complete the **Warranty** worksheet, follow these steps: Note that the numbering of these steps is not sequential, but has been set to match the number of the **Warranty** worksheet.

- 16.1. Select the **16-Warranty** worksheet tab.
- 16.2. Do **NOT** change the data in Column A - - as noted in "Before you start – General Instructions"
- 16.3. Select the value from the document list that contains the PDF version of the warranty certificate using the **DocumentID** list. If there are multiple documents that apply, type the ID number of each one in a list separated by commas.
- 16.4. Select the value from the submittal register to which the warranty belongs using the **RegisterID** list. If there are multiple register items that apply, type each one in a list separated by commas.

- 16.5. Of key concern to those receiving warranties, is the list of companies that can be called to respond to warranty calls. Each of these companies should be listed in the **01-Contact** worksheet. The ID number of the firm(s) that will respond to warranty calls must be provided in the **GuarantorIDList** field.
- 16.6. If the information pertains to only one of named pieces of equipment, then you are required to provide that list in the purple column **InstallationIDList**. Unless noted in this column it is assumed that the item found in this row pertains to all of the equipment installed against the selected **RegisterID**.
- 16.7. If the information pertains to a system, and not just to individual register items, then you are required to provide that system, or list of systems, in the purple **SystemIDList**.
- 16.8. Enter the name of the warranty in the **WarrantyName** field. This name should identify the type of equipment to which the warranty applies; for example. “Funk & Wagnall 50 GPM Pump Warranty”
- 16.9. Enter the start and end dates for the warranty in the **WarrantyStart** and **WarrantyEnd** columns. Note that the format for these fields is expected to be “dd-MMM-yyyy”, e.g. 31-Dec-2007. Using the three letter abbreviation of the data will ensure that there is not confusion that could arise with numerical date information.

ENTERING SPARE AND REPLACEMENT PART DATA

Today, replacement part information is provided in paper manuals by product manufacturers. Often the information is provided as an illustration such as an “exploded” parts diagram. In the diagram each part is listed by name with its associated serial number. Ultimately, we would like manufacturers’ to provide the complete list of spare parts names and serial numbers as data in COBIE so that parts could be ordered without picking the number from a diagram. The COBIE **Spare** worksheet can accommodate both a link to the diagram as well as the future provision of the complete set of parts.

To complete the **Spare**, replacement parts, and lubricants worksheet, follow these steps: Note that the numbering of these steps is not sequential, but has been set to match the number of the **Spare** worksheet.

- 17.1. Select the **17- Spare** worksheet tab.

- 17.2. Do **NOT** change the data in Column A - - as noted in “Before you start – General Instructions”
- 17.3. This worksheet may contain a number of different types of information needed by O&M staff. This information is identified in the **SpareType** field. Information that may be provided includes: Spare Parts, or Spare Part Sets, “Replacement” Parts or Part Sets, Lubricants, or other data.
- (1) **Spare** parts are parts provided on site following the installation of the equipment or building handover.
 - (2) **Parts** are “replacement” parts that must be ordered prior to arriving on site.
 - (3) **Sets** of spares or parts help to organize a list of spares or replacement parts if they are list as individual rows of data. If there is sufficient adoption of COBIE, we hope that manufacturers will eventually provide this data in COBIE format. In the mean time, the worksheet supports the identification of the document that contains the spare data. At least with this O&M data workers will have an easier time identifying the needed parts that are on-hand and where to find replacement parts.
 - (4) Specific types of **Lubricants** are often required for specialized equipment. This type allows the rapid identification of any such specialized consumable products needed for correct equipment operations.
- 17.4. Select the value from the document list that contains the PDF version of the parts diagram using the **DocumentID** list. If there are multiple documents that apply, type the ID number of each one in a list separated by commas.
- 17.5. Select the value from the submittal register to which the parts, spares, or lubricant belongs using the **RegisterID** list. If there are multiple register items that apply, type each one in a list separated by commas.
- 17.6. Of key concern to those receiving replacement parts data, is the list of companies that can be called to respond to supply parts calls. Each of these companies

should be listed in the **01-Contact** worksheet. The ID number of the firm(s) that can provide parts must be provided in the **SpareProviderIDList** field.

- 17.7. If the information pertains in a given row pertains to a set of parts. The set of parts to which the current row belongs must be identified by the list in the purple column **SpareSetIDList**.
- 17.8. If the information pertains to only one of named pieces of equipment, then you are required to provide that list in the purple column **InstallationIDList**. Unless noted in this column it is assumed that the item found in this row pertains to all of the equipment installed against the selected **RegisterID**.
- 17.9. If the information pertains to a system, and not just to individual register items, then you are required to provide that system, or list of systems, in the purple **SystemIDList**.
- 17.10. Enter the name of the part, part set, or document containing the part diagram, in the **SpareName** field. This name should identify the type of equipment to which the part, part set or document applies.

ARCHIVE COBIE MANUFACTURERS' OPERATIONS DATA

If you have followed the steps above, you have now completed the required minimum set of data needed for O&M staff to operate and maintain the individual products, materials, and equipment installed in your project. You should make an archive copy of the file and submit it for owner approval.

PART 6. COMMISSIONING DATA

After equipment installation, the systems to which the equipment belongs must be tested. HVAC systems, for example depend on pumps, fans, condensing units, dampers, and control devices. Commissioning allows these individual components to be “tuned” to provide the required system functionality. Depending on the system, independent system “certifications” may be required. Following this testing and certification, operational instructions are provided for the system.

The requirement for the provision of commissioning data will typically be identified in the submittal register. There must be a register record for each item listed in the commissioning data worksheets described below.

Today, these documents are provided in paper format. COBIE requires that these documents be provided in PDF file format. The documents themselves will be listed in the **Document** worksheet, and also cross-listed in the **Instruction**, **Test**, and **Certification** worksheets described below.

ENTERING SYSTEM INSTRUCTION DATA

To complete the **Instruction** worksheet, follow these steps: Note that the numbering of these steps is not sequential, but has been set to match the number of the **Instructions** worksheet.

- 18.1. Select the **18- Instruction** worksheet tab.
- 18.2. Do **NOT** change the data in Column A - - as noted in “Before you start – General Instructions”.
- 18.3. Select the value from the document list that contains the PDF version of the instructions using the **DocumentID** list. If there are multiple documents that apply, type the ID number of each one in a list separated by commas.
- 18.4. Select the value from the submittal register to which the instructions belongs using the **RegisterID** list. If there are multiple register items that apply, type each one in a list separated by commas.
- 18.5. If the information pertains to only one of named pieces of equipment, then you are required to provide that list in the purple column **InstallationIDList**. Unless noted in this column it is assumed that the item found in this row pertains to all of the equipment installed against the selected **RegisterID**.
- 18.6. If the information pertains to a system, and not just to individual register items, then you are required to provide that system, or list of systems, in the purple **SystemIDList**.
- 18.7. Enter the name of the instructions document in the **ManualName** field.

ENTERING SYSTEM TEST DATA

To complete the **Test** worksheet, follow these steps: Note that the numbering of these steps is not sequential, but has been set to match the number of the **Test** worksheet.

- 19.1. Select the **18-Test** worksheet tab.
- 19.2. Do **NOT** change the data in Column A - - as noted in “Before you start – General Instructions”.
- 19.3. Select the value from the document list that contains the PDF version of the test documents using the **DocumentID** list. If there are multiple documents that apply, type the ID number of each one in a list separated by commas.
- 19.4. Select the value from the submittal register to which the test documents belongs using the **RegisterID** list. If there are multiple register items that apply, type each one in a list separated by commas.
- 19.5. If the information pertains to only one of named pieces of equipment, then you are required to provide that list in the purple column **InstallationIDList**. Unless noted in this column it is assumed that the item found in this row pertains to all of the equipment installed against the selected **RegisterID**.
- 19.6. If the information pertains to a system, and not just to individual register items, then you are required to provide that system, or list of systems, in the purple **SystemIDList**.
- 19.7. Enter the name of the test document in the **TestName** field.

ENTERING SYSTEM CERTIFICATION DATA

To complete the **Certification** worksheet, follow these steps: Note that the numbering of these steps is not sequential, but has been set to match the number of the **Certification** worksheet.

- 20.1. Select the **20-Certification** worksheet tab.
- 20.2. Do **NOT** change the data in Column A, **CertificationID**, this first column of all worksheets is reserved and provides the local ID number for the data.

- 20.3. Select the value from the document list that contains the PDF version of the certification documents using the **DocumentID** list. If there are multiple documents that apply, type the ID number of each one in a list separated by commas.
- 20.4. Select the value from the submittal register to which the certification documents belongs using the **RegisterID** list. If there are multiple register items that apply, type each one in a list separated by commas.
- 20.5. If the information pertains to only one of named pieces of equipment, then you are required to provide that list in the purple column **InstallationIDList**. Unless noted in this column it is assumed that the item found in this row pertains to all of the equipment installed against the selected **RegisterID**.
- 20.6. If the information pertains to a system, and not just to individual register items, then you are required to provide that system, or list of systems, in the purple **SystemIDList**.
- 20.7. Enter the name of the certification document in the **CertificationName** field.

PART 7. JOB PLAN DATA

Job plans are the manufacturer’s instructions for the scheduled maintenance tasks needed to keep equipment within an efficient operating range. There are a variety of different job plans required in COBIE. These plans are: Preventative Maintenance (**PM**), **Safety**, **Trouble-shooting**, **Start-Up**, **Shut-Down**, and **Emergency** operations. In addition to the plans themselves, there are also requirements that O&M personnel must address prior to starting either an entire plan, or a specific task within a plan. At the current stage of COBIE these pre-start requirements are called “resources.”

The resources in COBIE that, if applicable, are required to be provided are: **Materials**, **Tools**, and **Training**. Failure of a crew to have the materials or tools, or have taken the required training should result in stopping work prior to the completion of the associated job plan. Since resources may be used across multiple tasks within a given job plan COBIE lists that data first, and then lists the job plan data.

ENTERING JOB PLAN RESOURCES

To complete the **Material**, **Tool**, and **Training** worksheets, follow these steps: Note that the numbering of these steps has been set to match the number of the **Material** worksheet. Please follow these steps for all three of the job plan resource sheets.

- 21.1. Select the **21-Material** worksheet tab.
- 21.2. Do **NOT** change the data in Column A, **CertificationID**, this first column of all worksheets is reserved and provides the local ID number for the data.
- 21.3. Select the value from the document list that contains the PDF version of the materials using the **DocumentID** list. If there are multiple documents that apply, type the ID number of each one in a list separated by commas.
- 21.4. Select the value from the submittal register to which the materials documents belongs using the **RegisterID** list. If there are multiple register items that apply, type each one in a list separated by commas. There must be no spaces between the commas and the numbers.
- 21.5. If the information pertains to only one of named pieces of equipment, then you are required to provide that list in the purple column **InstallationIDList**. Unless noted in this column it is assumed that the item found in this row pertains to all of the equipment installed against the selected **RegisterID**.
- 21.6. If the information pertains to a system, and not just to individual register items, then you are required to provide that system, or list of systems, in the purple **SystemIDList**.
- 21.7. Enter the name of the materials document in the **MaterialsName** field.
- 21.8. Follow the steps above to complete the **Tool** and **Training** worksheets. With minor exception in naming, the columns of the **Material** worksheet directly matches up with the **Tool** or **Training** worksheets.

ENTERING JOB PLANS

Like spare parts lists, manufacturer recommendations for scheduled maintenance and other job plans are contained within text documents. While it is the intention of the COBIE effort to facilitate manufacturers to provide actual “computable” data, today, the COBIE format accepts either PDF documents for job plans or the actual list of job plan tasks.

To complete the **PM, Safety, Trouble, StartUp, ShutDown, and Emergency** job plan worksheets, follow these steps: Note that the numbering of these steps has been set to match the number of the **PM** worksheet. Please follow these steps for all the job plan resource sheets.

- 24.1. Select the **24-PM** worksheet
- 24.2. Do **NOT** change the data in Column A, **PMTaskID**, this first column of all worksheets is reserved and provides the local ID number for the data.
- 24.3. Select the value from the submittal register to which the job plan belongs using the **RegisterID** list. If there are multiple register items that apply, type each one in a list separated by commas.
- 24.4. Since the COBIE Spreadsheet cannot define when COBIE data is actually being created, it may be that the contractor has operated the building prior to occupancy and has completed some tasks prior to handover. The **TaskStatus** column allows you to identify those tasks completed by the contractor prior to handover. If the jobs have not been completed, select “Not Started Yet” from the list provided.
- 24.5. Select the value from the document list that contains the PDF version of the materials using the **DocumentIDList**. If there are multiple documents that apply, type the ID number of each one in a list separated by commas. Do not add spaces between commas and numbers. If specific job plan data is not provided in a given data row, there must be a link to the document that contains the data using the **DocumentIDList**
- 24.6. If the information pertains to only one of named pieces of equipment, then you are required to provide that list in the purple column **InstallationIDList**. Unless noted in this column it is assumed that the item found in this row pertains to all of the equipment installed against the selected **RegisterID**.

- 24.7. If the information pertains to a system, and not just to individual register items, then you are required to provide that system, or list of systems, in the purple **SystemIDList**.
- 24.8. If the job plan requires specific **Material, Tools, or Training** prior to the start of the job, then that information must be identified by listing the numbers of the ID numbers of the associated in a comma delimited list in the **Material, Tools, and/or Training** purple columns.
- 24.9. Enter the number of the job plan task in the **TaskNumber** field. In cases where the manufacturer provides only PDF files containing the tasks, the value 'n/a' for "not applicable," should be provided in the **TaskNumber** field.
- 24.10. Enter the name of the task (or documents related to the task) in the **TaskName** field. In cases where the manufacturer provides only PDF files containing the tasks, the value 'n/a' for "not applicable," should be provided.
- 24.11. Since manufacturers could provide a detailed set of tasks, the **TaskDuration** field is provided. In cases where the manufacturer provides only PDF files containing the tasks, the value 'n/a' for "not applicable," should be provided.
- 24.12. If there is a value other than "n/a" listed in the **TaskDuration** field, then the units associated with that duration must be selected from the **TaskDurationUnits** list.
- 24.13. The time following building handover after which the task should be completed, should be provided in the **TaskStart** field. In cases where the manufacturer provides only PDF files containing the tasks, the value 'n/a' for "not applicable," should be provided.
- 24.14. If there is a value other than "n/a" listed in the **TaskStart** field, then the units associated with that duration must be selected from the **TaskStartUnit** list.
- 24.15. Following the start of the first job plan, the frequency with which the plan should reoccur should be provided in the **TaskFrequency** field. In cases where the manufacturer provides only PDF files containing the tasks, the value 'n/a' for "not applicable," should be provided.

- 24.16. If there is a value other than “n/a” listed in the **TaskFrequency** field, then the units associated with that duration must be selected from the **TaskFrequencyUnit** list.
- 24.17. Follow the steps above to complete the remaining job plan worksheets. With minor exception in naming, the columns of the job plan worksheet directly matches up with the **PM** worksheets. The only exception is “emergency” plans which are not scheduled on a recurring basis.

ARCHIVE COBIE COMMISSIONING DATA

If you have followed the steps above, you have now completed the last set of data needed for the entire electronic construction handover data set. You should make an archive copy of the file and submit it for owner approval.

ACKNOWLEDGEMENTS

The following persons are acknowledged for their contribution to this document. They are listed here in alphabetical order:

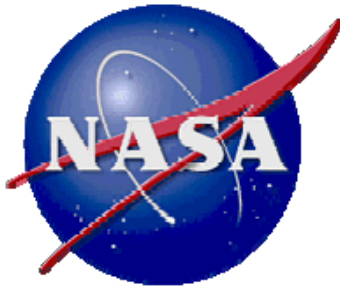
William Brodt
National Aeronautics and Space Administration
Washington, DC

Glenn Hunt
Peripheral Systems, Inc.
Oley, PA

Jean Swalley
Overseas Buildings Operations
Roslyn, VA

SPONSORS

The author and contributors to this document would like to acknowledge the following sponsors of the COBIE effort.



National Institute of Building Sciences
Facilities Information Council
National BIM Standard



COMMENTS ON THIS DOCUMENT

Please forward comments or suggestions you may have on this document to its primary author at the address provided below. Email submissions only so that your comments may be cataloged and managed for the next update.

E. William East
Engineer Research and Development Center
bill.east@us.army.mil