University of Tennessee Building Information Model Project Execution Plan and Standards Guide

August 2020

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1. INTRODUCTION

1.1. MISSION OF THE UNIVERSITY BIM STANDARDS

The mission of the University of Tennessee Knoxville (University) Building Information Modeling (BIM) standards is to utilize BIM technology for the purposes of Capital Project Planning, Facilities Management and Campus Administration and Services-related throughout the University of Tennessee.

These standards are an amendment to the requirements outlined by the State of Tennessee Office of the Architect (OSA) BIM Standards (https://www.tn.gov/osa.html) and identify specific BIM needs to fit the University's goals. Project Teams should follow OSA's latest standards for complete information on requirements, or clarification of definitions and responsibilities.

1.2. PURPOSE AND APPLICATION OF UNIVERSITY BIM STANDARDS

The University has adopted BIM as a tool for project documentation and development, as-built record documentation, and facility management. These guidelines are intended to act as standards for BIM development from schematic design to project closeout. These guidelines will assist with the establishment of protocols for the development, use, transmission, and exchange of digital data, defining expectations of Level of Development for Model Elements at various milestones of the project. These standards encompass the development of the following key BIM Project Deliverables:

BIM DELIVERABLE	PROJECT PHASE
BIM Execution Plans	Updated at the end of each phase
Design BIMs	End of Construction Documents Phase
Record BIMs (Design BIMs and Construction BIMs)	Project Closeout
Construction Drawings	Per Designer Manual's Requirements

The University has made every attempt to provide these standards as complete as possible. However, if there are items not covered in this guide, please contact the University's Facilities Services Project Manager for guidance.

1.3. PROJECT BIM GOALS AND OBJECTIVES

The University's major BIM goals and objectives for each project are listed below.

GOAL DESCRIPTION	PROJECT PHASE	RESPOSIBLE PARTY
Provide the University a LOD 350 model including ARCH, MEP and Structure for Construction	Construction	CM/GC

Provide the University a LOD 300 Conformed Design Model including for future planning purposes	Design	AE
Coordinate all disciplines through the design/construction process to reduce RFIs	Construction	CM/GC
Improve commissioning process by adding equipment information into BIM process	Lifecycle	University
Automated access to building asset information by linking the record information model to the University's computerized maintenance management system (CMMS).	Lifecycle	University

2. OBLIGATIONS TO USE BIM AND GENERAL PRINCIPALS

The following definitions of ownership and Level of Developments are specific to University projects.

2.1.OWNERSHIP AND RIGHTS OF DATA

It is important to the University to own, reuse, and properly manage building data throughout the facility lifecycle. The goal of the BIM process is to develop deliverables in support of the owner, and for utilization in facility management. University will retain ownership of all documentation created throughout the BIM process including Revit, DWG files, BIM Models and facility data developed for the project. The University may make use of this data following any deliverable. The University will release the Design and Construction Teams of any liabilities related to the model.

2.2. LEVEL OF DEVELOPMENT

The BIMForum's Level of Development (LOD) Specifications will serve as the framework for defining the progression of the model components. The LOD defines the relevant model element geometry to be included along with minimum parameters to facilitate the ongoing use of the BIM. The information below is referenced from the BIMForum's LOD Specification Version 2019. The Design and Construct Teams are expected to progress their models to the appropriate LOD as defined below. This defines both the geometry and non-graphic information to be included in the Record Construction BIM and Conformed Design Intent BIM.

- **LOD 100 – Conceptual Model:**

The Model Element may be graphically represented in the Model with a symbol or other generic representation, but does not satisfy the requirements for LOD 200. Information related to the Model Element (i.e. cost per square foot, tonnage of HVAC, etc.) can be derived from other Model Elements.

The Model would consist of overall building massing representative of area, height, volume, location and orientation that may be modeled in three dimensions.

- **LOD 200 – Approximate Model:**

Model Elements are modeled as generalized systems or assemblies with approximate quantities, size, shape, location, and orientation. Additional information may also be attached to Model Elements.

Model includes basic elements such as windows and doors. This level of modeling is for visualization and basic energy analysis and is similar to the schematic design or design development.

- **LOD 300 – Precise:**

Model Elements are graphically represented within the Model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.

Model Elements are suitable for construction and are the equivalent of traditional construction documents and shop drawings. This model level would be suitable for analysis and simulation of detailed elements and systems.

- **LOD 350 –University's Model Delivery:**

Model Elements are modeled as detailed assemblies that accurately represent specific systems, objects, or assemblies in terms of quantity, size, shape, orientation, and interfaces with other building systems with the detail necessary for cross-trade coordination and construction layout. Non-graphic information may also be attached to the Model Element.

The Model represent the project as it has been constructed and focus on facility management by identifying key building equipment and space information and including it in the Model. This includes ARCHIBUS equipment ID numbers and key equipment information outlined in Section 6.5.

- All models must contain the required space and equipment information outlines in Sections 6.4 and 6.5
- Data entry should be completed as soon as the equipment is installed and should not be held until the end of the project.
- All record drawings and documentation at the time of turnover must be provided in native file format. Elements included in the model must be detailed in both the 2D and 3D documentation for internal University use..
- All record drawings must be submitted in AutoCAD DWG, PDF and BIM in its native file format.

While the BIM Forum LOD Specification defines the minimum geometric requirements, Appendices B and C outline required components that will enable the University to link the Record BIMs with ARCHIBUS system for the facility lifecycle maintenance and operation requirements.

- **LOD 400 – Fabrication:**

The Model Element is graphically represented within the Model as a specific system, object, or assembly in terms of size, shape, location, quantity, and orientation with detailing, fabrication, assembly, and installation information. Non-graphic information may also be

attached to the Model Element. This Model level of development is considered suitable for fabrication and assembly.

- **LOD 500 –**

Model Elements are modeled as constructed assemblies actual and precisely representing size, shape, location, quantity, and orientation, including As-Built conditions. The Model represent the project as it has been constructed and focus on facility management by identifying key building equipment and space information and including it in the Model. This includes ARCHIBUS equipment ID numbers and key equipment information outlined in Section 6.5.

- All models must contain the required space and equipment information outlines in Sections 6.4 and 6.5
- Data entry should be completed as soon as the equipment is installed and should not be held until the end of the project.
- All record drawings and documentation at the time of turnover must be provided in native file format. Elements included in the model must be detailed in both the 2D and 3D documentation for internal University use. Elements must be marked or tagged and visual in both the 2D and 3D documentation.
- All record drawings must be submitted in AutoCAD DWG, PDF and BIM in its native file format.

While the BIM Forum LOD Specification defines the minimum geometric requirements, Appendices B and C outline required components that will enable the University to link the Record BIMs with ARCHIBUS system for the facility lifecycle maintenance and operation requirements.

3. BIM REQUIREMENTS FOR THE UNIVERSITY

The University will provide the following information (where available) to the Project Teams in support of the development and delivery of BIM according to these guides and standards.

- Provide verification that the Design Team's BIM is developed in accordance to the University's BIM Standards throughout the Design phase to ensure the Construction Team will receive an acceptable product to being their BIM work.
- Provide relevant project data as required by the BIM project execution plan.
- Models of existing facilities will be made accessible by the University along with other models, drawings and specifications of past projects for renovation, additions, and use in connecting to adjacent facilities.
- The University's Space Coordinator will coordinate information regarding floor level and elevation naming conventions outlined in the "Room Numbering and Floor/Level Conventions" section in the 2020 Design Guidelines and Preferences out with Design and Construction Teams.

3.1. UNIVERSITY OF TENNESSEE BIM MANAGER

The University will identify a BIM Manager for each project who will serve as the main point of contact between the Design Team, Construction Team, and the University for all BIM related issues. The University's BIM Manager responsibilities include:

- Collaborate with the Design and Construction teams to develop the BIM Execution Plan.
- Serve as liaison between all design and construction team members to the University for all BIM-related activities.
- Provide specific BIM Use Cases that identify unique project needs.
- Provide oversight and direction to all project team members so they are able to perform their work in accordance with the required deliverables outlined in this document.
- Provide final approval of to the project's BIM Execution Plan.
- Distribute BIM project documentation to project teams as outlined in Section 8.1
- Coordinate and participate with model reviews.

4. BIM FILES

4.1.MODEL NAMING

Design and Construction Teams are responsible for document the model naming for their final BIM deliverables following the naming convention below.

MODEL NAMING CONVENTION			
BUILDING NUMBER	MODEL AUTHOR	DATE	FILE EXTENSION

- Building Number: Official eight-digit building number. This building number will be provided to the Design and Construction Teams by the University's Project Manager.
- Model Author: Standard model author abbreviations as listed below. Model author abbreviations shall not be edited but can removed or added with the approval of the University as needed per project:

ABBREVIATION	MODEL AUTHOR
ARCH	Architect
STRCE	Structural Engineer
PLMBE	Plumbing Engineer
HVACE	HVAC Engineer
FRPTE	Fire Protection Engineer
ELCTE	Electrical Engineer
LOWVE	Low Voltage Engineer
CNTRM	Construction Manager
GNRLC	General Contractor
STRCTC	Structural Contractor
DSNGB	Design Builder
PLMBC	Plumbing Contractor
HVACC	HVAC Contractor
FRPTC	Fire Protection Contractor
	Other

- Date: Date format should be a four-digit year, two-digit month and two-digit day.

Example:

50110100	ARCH	20170928	.RVT

4.2. ARCHITECTURE MODELS

Architecture models constructed using Revit should not be delivered as central files. Models should be detached from the central file, worksets discarded, and delivered as fully contained files not attached to other models. Custom families should be delivered to the University attached to the models or as a separate file to be reloaded.

The architectural model file shall contain all architectural features for a building including but not limited to:

- Grid lines that are labeled and visible.
- Floor plans named according to the University's Room Numbering and Floor/Level Conventions.
- Building Elevation Plans
- Exterior Wall Systems
- Interior Wall Systems including landscape furniture
- Fire Rated Walls colored coded per the following guidelines:

WALL RATING	COLOR	RGB Formula
1-Hour	Yellow	255/255/0
1.5-Hour	Orange	255/128/0
2-Hour	Red	255/255/0

- Architectural Floor Slabs
- Roofing Systems
- Ceiling Plans
- Circulation including elevators, stairs, escalators and railings.
    - The room boundary of open stairs between two levels should be split between levels.
    - Room boundaries for multiple elevators in one open shaft should be equally split between the elevator cars.
- Room boundaries and tags per the University's Room Numbering and Floor/Level Conventions.
- Doors
- Windows, interior glazing, curtain walls and storefront.
- Classroom furniture
- Millwork and casework
- All plumbing fixtures
- Toilet partitions

4.3. STRUCTURAL MODELS

Structural models constructed using Revit should not be delivered as central files. Models should be detached from the central file, worksets discarded, and delivered as fully contained files not attached to other models. Custom families should be delivered to the University attached to the models or as a separate file to be reloaded.

The structural model file shall contain all architectural features for a building including but not limited to:

- Foundations
- Columns, beams and joists
- Column grids
- Brace frames and shear walls
- Structural slab
- Specialties

- Miscellaneous structural components.

4.4. MECHANICAL, ELECTRICAL AND PLUMBING MODELS

Mechanical, electrical and plumbing models constructed using Revit should not be delivered as central files. Models should be detached from the central file, worksets discarded, and delivered as fully contained files not attached to other models. Custom families should be delivered to the University attached to the models or as a separate file to be reloaded.

The mechanical model file shall contain all architectural features for a building including but not limited to:

- Mechanical equipment following the requirements outlined in Appendix B.
- Rain Leader
- Overflow Drain
- Vent
- Waste Water
- Domestic Cold Water
- Domestic Hot Water
- Fire Protection
- Gases
- Fire Alarm System
- Mechanical Ductwork
- Electrical Conduit
- Electrical Lighting
- Fire/Smoke Dampers
- Valves
- Plumbing Equipment and Fixtures
- Electrical Equipment
- Electrical Panels and Schedules
- Specialties

5. BIM REQUIREMENTS FOR DESIGNERS

5.1. BIM STANDARDS FOR DESIGNERS

OSA's standards should be reviewed for information regarding disciplines that are required to produce BIM, model accuracy specifications and BIM deliverables at each design phase deliverable.

5.2. BIM SOFTWARE

All BIM project participants are required to have their own software licenses and computers capable of running the needed software to perform their portion of work. The software and version used shall be identified in the BIM Execution Plan. Projects shall remain on the same software release throughout the life of the project if possible. Updates to a new software release should be discussed a project milestone. BIM-related files used by the Design Team will be shared through a common project site managed by the Design Team.

Design firms are required to perform internal coordination between disciplines to ensure quality project delivery.

5.3. GENERATE SPACE INVENTORY

Space information shall be collected for use in the University's Space Management System following these guidelines:

- Reference the U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Postsecondary Education Facilities Inventory and Classification Manual (FICM) (NCES 2006).
- Outside covered circulation areas of ten net square feet or greater shall be tracked and identified by name and room number, even if those spaces are not listed in the program.
- Spatial data shall be generated, and associated with bounding elements (walls, doors, windows, floors, columns, ceilings).
- The Net Square Footage (NSF) shall be modeled for each functional space. BIM Spaces shall be represented and broken down into area types (Example: Public Corridor, Mechanical, Office Staff, Classroom, etc.) as defined in Appendix A of the UT Physical Facilities Inventory 2017 document. A physical space may contain several areas that are treated individually (lobby, partitions, cubicles, entrance areas). If two areas have different functional space classifications, even though they are within the same physical space, they shall be modeled as two separate spaces. For example, a work area such as a built-in reception desk within an entrance or lobby shall be modeled as separate non-overlapping spaces. These spaces might also be grouped into a Zone, for visualization and analysis purposes (e.g., for thermal simulation calculations). Space/area schedules and diagrams must be dynamically updated from the model geometry.
- Review University's Room Numbering and Floor/Level Conventions for all floor levels and room number assignments. All room numbers shall be approved by University's Space Coordinator.

Refer to Appendix A for a list of parameters shall be associated with space elements. Attributes marked with an 'X' in the 'BIM' column should be populated by the Design or Construction Teams as appropriate.

5.4. GENERATE EQUIPMENT INVENTORIES

Each BIM equipment object shall contain geometric data and a set of attributes. Equipment attribute data shall have the ability to be extracted from the project BIM's deliverable and linked to our ARCHIBUS database. Refer to Appendix B for a list of attribute data that shall be provided for each piece of equipment as it is relevant to the project by the Design Team and populated by the Construction Teams as appropriate.

5.5. BIM DELIVERABLES BY PHASE

The Design Team shall follow OSA's standards for executing the appropriate deliverables at each phase of the design process. The following are University clarifications on BIM deliverables:

- Author the BIM Execution Plan for the design phase of a project. Review OSA's standards for requirements of the BIM Execution Plan. The following

- **Design BIM**: The Design Team will be required to submit their Design BIM at LOD 300 for each project discipline to the University as part of their construction documents package. This model will be made available to the construction teams.
- All BIM updates by the Design Team will be delivered to the Construction Team as a Design BIM at LOD 300 as defined by the BIMForum's LOD Specification Version 2019.
- Design BIM should include all required model parameters listed in Appendices B and C when delivered to the Construction Team.
- **Record BIM**: By the end of Closeout, the Designer shall provide the Designer's Record BIM at LOD 300 that reflects changes cause by Addenda, modifications, and observed changes recorded by the contractors.
- **Construction Drawings/Record Drawings**: By the end of Construction Phase, the designer shall provide Construction Documents as outlined by the Designer's Manual.

At the project's completion, final digital project documentation will be submitted to University by both the Design and Construction teams. This includes the following items that will ultimately become the University's As-Maintained and Archived BIMs. Deliverable requirements for both teams include:

DELIVERABLE	RESPONSIBLE PARTY
BIM Execution Plan	AE/CM/GC Firm
Design BIM (LOD 300)	AE Firm
Record BIMs (Native File Format) (LOD 500)	CM/GC Firm
Final 2D As-Built Drawings (PDF and DWG)	CM/GC Firm
Operations and Maintenance Manuals	CM/GC Firm
Equipment ID Tagging	CM/GC Firm

5.6. QUALITY CONTROL

The Construction and Design Teams will be responsible for verifying that the model meets the requirements described in University's Project Execution Plan and Standard Guides. The following checks should be performed to assure quality.

CHECKS	DEFINITION	RESPONSIBLE PARTY	SOFTWARE PROGRAMS	FREQUENCY
Visual Check	Review of all 3D design intent	AE Firm		
Visual Check	Review of all 2D design intent (Review of drawings)	AE Firm	PDF	
Coordination	Coordinate all disciplines including Arch, MEP and Structure to reduce construction RFI's and change orders	AE/CM/GC/UT/ Subs		
Record Model	Submit Record Model including required information defined by Model parameters included in Sections 6.4. and 6.4.	CM/GC		
Standard Checks	Ensure University's Standard Guides document have been followed	AE/ CM/GC /UT		

Model Integrity Checks	Ensure that the project room and equipment information has no undefined, incorrectly defined or duplicated elements	AE/ CM/GC /UT		
Model Integrity Checks	External model coordination should be performed between disciplines including clash detection and visualization	CM/GC		

5.7. CLASH DETECTION

Clash detection allows the project team to verify clearance, analyze conflicts, deliver quality documentation, and coordinate between disciplines to reduce RFI and Change Order submittals.

- It is the Design/Construction Teams responsibility to conduct and manage a Clash Detection process so that all major interferences between building components will have been detected and resolved before construction. The Design Team will be responsible for Clash Detection during the Design Phase. The Construction Team will be responsible for Clash Detection during the Construction Phase.

- The Design/Construction Teams BIM Managers shall assemble a composite BIM from all of the BIMs of each design discipline for the purpose of performing a visual check of the building design for spatial and system coordination. An updated clash report will be issued by the Design/Construction Teams BIM Manager to the project team at project milestones.

- Coordination software shall be used for assembling the various design BIMs to electronically identify, collectively coordinate resolutions, and track and publish interference reports between all disciplines.

- The Project Team shall review the model and the Clash Reports in coordination meetings on a regular as-needed basis until relevant spatial and system coordination issues have been resolved.

- During the construction phase, the accuracy of fabrication models shall be verified and approved, prior to submittal and fabrication. Fabrication contractors shall submit their BIMs to the Construction Team BIM Manager for integration and Clash Detection /coordination and resolution.

5.8. GEOREFERENCING

The Designer and the Designer's Consultants are required to geo-reference BIMs, site plans and associated construction drawings. The project geographical locations shall be set using Tennessee State Plane coordinates. The following datum should be used: North American Data 1983 (NAD83) HARN for horizontal control and North American Datum (NAVD) 1988 for vertical control.

5.9. EXISTING CONDITIONS

For renovations and/or additions projects, the University will provide BIM (where available) of existing campus buildings that have been converted from 2D to 3D. Each of these models will state that "no guarantee is implied as to the accuracy of dimensions or building features shown and users of the models assume full responsibility for verifying its accuracy."

5.10. STAFFING

The Designer shall identify a Design BIM Manager for each project. Individual assigned by the Design Team to serve as the main point of contact between the Design Team, Construction Team, and the University for all BIM related issues. The responsibilities below do not supersede the overall chain of command that exists on a project. The identification of BIM project-specific leadership roles will be outlined in the BIM Project Execution Plan as described in OSA's standards. Responsibilities include the following:

- Author the BIM Execution Plan for the design phase of a project.
- Advise and support the University's Facilities Services Project Manager, serving as the technical resource for all BIM-related issues.
- Provide oversight to the design BIM use cases.
- Ensures development and compliance with University's BIM Guides and Standards.
- Responsible for the development, coordination, publication, and verification that necessary configurations and standards required for seamless integration of design and construction modeling information has been implemented.
- Assembles the design model for coordination meetings.
- Facilitates use of the design models in design coordination/clash detection meetings and provides detection reports by the identification and resolution of collisions.
- Ensures that BIMs are used appropriately to test design requirements/criteria for functionality.
- Assumes responsibility for the proper classification of all spaces in the model according to the requirements listed in Appendices B and C to ensure direction downstream use for facility management.
- Schedules, coordinates, and facilitates BIM technical meetings between the Design Team and the University during the Design phase.
- The Design BIM Manager and discipline-specific BIM Managers are required to coordinate their LOD 300 building components, assemblies and systems.
- Determines the project BIM geo-reference point(s), and assures all technical discipline models are properly referenced.
- Primary interface between the Design and Construction Teams and the University for BIM data and file transfers as required at each design phase.
- Coordinates with the Construction Team BIM Manager to assure the creation of proper BIM final deliverables
- Monitors compliance with the University's Standards and Guides documents and related BIM Level of Development (LOD) requirements.

5.11. BIM EXECUTION PLAN

At the initiation of the project, the University's Facilities Services Project Manager will collaborate with the project's primary architect and engineer to identify the Design BIM Manager and other key individuals. These key individuals will be responsible to document the collaborative design and construction workflows that will meet the University's project

delivery requirements. The Design BIM Manager shall submit their BIM Execution Plan to the university within 60 days after contract has been signed. If the Construction Team was not under contract at this stage, they shall review and update the BIM Execution Plan as appropriate with information about the Construction Phase within 60 days after contract has been signed. The requirements of the BIM Execution Plan are outlined by OSA's standards.

6. BIM REQUIREMENTS FOR CONSTRUCTION

6.1.BIM STANDARDS FOR CONSTRUCTION

OSA's standards should be reviewed for information regarding disciplines that are required to produce BIM, model accuracy specifications and BIM deliverables at each design phase deliverable

6.2. OPEN STANDARDS AND COLLABORATION

The University encourages the use of open standards and collaboration tools to facilitate interoperability between the University, members of the Design Team, the Design Team and the Construction Team, and any other consultant involved in the BIM process.

During the construction phase, the Construction Team will maintain a record construction BIM which will be used by the Design and Construction Teams to review and compare any changes, deviations, additions or corrections to the BIM's as implemented during the construction process. The Construction Team will lead model review meetings focused on providing a 3D review of the model and where project team members will have the opportunity to ask questions and address concerns. The amount of model review meetings will be at the discretion of the University's Facilities Services Project Manager. Also, the Record Construction BIM model should be made available for on-going review by the University project team members.

Design and Construction teams shall outline what software will be used and how they intend to collaborate and share models to support the project's BIM Uses and develop the required deliverables.

6.3. BIM USES

The Construction Team and University shall identify project specific BIM uses based on the project scope and objective. These uses will be outlined in the BIM Execution Plan as explained in OSA's standards.

6.4. BIM SOFTWARE

All BIM project participants are required to have their own software licenses and computers capable of running the needed software to perform their portion of work. The Construction Team should use commercially available software that provides interoperability between the difference software applications used within a project. The software and version used shall be identified in the BIM Execution Plan. Projects shall remain on the same software release

throughout the life of the project if possible. Updates to a new software release should be discussed at project milestone.

6.5. BIM DELIVERABLES

The University's Facilities Services Project Manager will collaborate with the Construction BIM Managers to document when key deliverables will be submitted to the University. The Construction Team will assure all updates and/or revisions to the BIMs as necessary reflect the As-Built information. Overall responsibilities of the Construction Team include:

- **Record Construction BIM:** The Construction Team will be responsible for submitting a record construction model which will become the University's deliverable for use during the maintenance and operations of the facility. The model's progression to the approximate LOD will be achieved in accordance with the BIMForum 2019 LOD Specifications definitions outlined in Section 2.3.1.
- **Equipment ID Tagging:** The Contractor shall tag equipment following section 6.5.3.
- **Final Record Drawings:** The Construction Team shall deliver final As-Built drawings in PDF format to the University.
- **Operations and Maintenance Manuals:** The Construction Team shall deliver PDF copies of the O&M manuals. This will include manufacturer's documents including cut sheets, installation instructions, and recommended maintenance tasks, test data and reports. An electronic format of the O&M manuals shall be submitted along with the paper copies in PDF format.
- Incorporate final updates to material/equipment data and properties where installations differ from the basis of design included in the Design Teams BIMs.
- At substantial completion, the Construction Team will transmit the BIMs to the Design Team who will then incorporate updates and/or revisions causes by Addenda, modifications, and observed changes recorded by the contractors into the Record BIM.

At the project's completion, final digital project documentation will be submitted to the University by both the Design and Construction teams. This includes the following items that will ultimately become the University's As-Maintained and Archived BIMs. Deliverable requirements are outlined in Section 4 and include:

DELIVERABLE	RESPONSIBLE PARTY
BIM Execution Plan	AE/CM/GC Firm
Design BIM (LOD 300)	AE Firm
Record BIMs (Native File Format)	CM/GC Firm
Final 2D As-Built Drawings (PDF and DWG)	CM/GC Firm
Operations and Maintenance Manuals	CM/GC Firm
Equipment ID Tagging	CM/GC Firm

6.5.1. SPACE NAMING

The Contractor shall maintain the space object names, classifications, and designations that were developed during the design of the building.

6.5.2. EQUIPMENT NAMING

The Construction Team shall maintain the equipment object types and attributes that were developed during the design of the building.

Equipment objects shall be created, named, classified, and assigned attributes per the requirements in Appendix C or as required by the University. The Construction Team shall add any equipment objects that were not modeled by the Designer, but are required for the University's Facility Management. The Construction Team shall add equipment attribute data not available during design.

6.5.3. EQUIPMENT TAGGING

Modeled equipment shall receive a barcode so maintenance activities associated with that piece of equipment for it can be tracked. This will generally apply to building system equipment that is permanently attached to the building. Equipment that already has an IRIS asset tag should not be re-tagged; the IRIS barcode can be used to identify the equipment.

Barcode tags should be affixed at a location on the equipment where they will be readily visible and easy to find. Sufficient space in front of the tag should be provided so that it can be easily scanned. Tags should be affixed using an adhesive. The tag should not be placed where it will cover existing labels or where it is likely to be damaged.

Tags should follow the proposed design as shown below:

6.6. QUALITY CONTROL

The Construction Team and Design Teams will be responsible for verifying that the model meets the requirements described in University's Project Execution Plan and Standard Guides. The Construction Team shall review quality control requirements listed in Section 4.7.

6.7. CLASH DETECTION

Clash detection allows the project team to verify clearance, analyze conflicts, deliver quality documentation, and coordinate between disciplines to reduce RFI and Change Order submittals. The Construction Team shall review clash detection requirements listed in Section 4.8.

6.8. GEOREFERENCING

The Designer and the Designer's Consultants are required to geo-reference BIMs, site plans and associated construction drawings. The project geographical locations shall be set using Tennessee State Plane coordinates. The following datum should be used: North American Data 1983 (NAD83) HARN for horizontal control and North American Datum (NAVD) 1988 for vertical control.

6.9. STAFFING

The Construction Team shall identify a Construction BIM Manager for each project. Individual assigned by the Construction Team to serve as the main point of contact between the Design Team, Construction Team, and the University for all BIM related issues. The responsibilities below do not supersede the overall chain of command that exists on a project. The identification of BIM project-specific leadership roles will be outlined in the BIM Project Execution Plan. Responsibilities include the following:

- Author BIM Execution Plan in collaboration with the Design BIM Manager. If Construction BIM Manager is not part of the team during the design phase, provide updates for the construction phase once the Construction team has been assigned.
- Provide oversight to the construction BIM use cases as defined in Section 5.5.
- Ensures development and compliance with the University's BIM Guides and Standards.
- Overall responsibility for the Construction Teams BIMs coordinating creation and information developed during construction.
- Acts as the main point of contact for BIM and related issues between the Construction Team, subcontractors, the University, the Design Team and others as required.
- Facilitates use of composite BIM models in construction coordination/clash detection meetings and provides detection reports by the identification and resolution of significant collisions.
- Communicates with the Design Team, coordinates the data extraction sets required by the construction trades and ensures that these requests are met.
- Assumes responsibility for the proper classification of all equipment in the model to ensure direction downstream use for facility management.
- Coordinates with the Design Team to facilitate design changes in the field have been documented and are updated in the BIMs in a timely manner.
- Prior to approval and installation, works to integrate 3D fabrication models with the updated design model to ensure compliance with design intent.
- Coordinates update of as-constructed conditions in the Record (As-Built) BIM deliverable.
- Schedules, coordinates, and facilitates BIM technical meetings between the Construction Team and the University during the Construction phase.

6.10. BIM EXECUTION PLAN

At the initiation of the construction phase, the University Facility Services' Project Manager will collaborate with the GM/CM to update the BIM Execution Plan finalized during the Design Phase with information that identifies the protocols for the development and management of BIMs during the construction phase. The Construction BIM Manager shall submit their BIM Execution Plan to the university within 60 days after contract has been signed. The requirements of the BIM Execution Plan are outlined in OSA's standards.

APPENDIX A. SPACE MANAGEMENT INFORMATION

The table below lists the required attributes that shall be associated with space elements. All attributes should be included in the model, but only those marked with an 'X' should be populated by the Design or Construction Teams as appropriate.

DESCRIPTION	ARCHIBUS DATABASE FIELD	RESOURCES	BIM
Building Name	utk_name	Provided by the University	x
Building Code	utk_bl_id	Provided by the University	x
Floor Code	utk_fl_id	Room Numbering and Floor/Level Conventions	x
Floor Name	utk_fl.name	Basement Floor (Floor B) Mezzanine Floor (Floor M) First Floor (Floor 1) Second Floor (Floor 2), etc.	x
Room Number	utk_rm_id	Room Numbering and Floor/Level Conventions	x
Building Area	utk_Area_gross_int	Gross Interior Footage (GSF)	x
Room Area	utk_area	Net Square Footage (NSF)	x
Room Standard	utk_rm_std		
Room Category	utk_rm_cat	See Appendix C	x
Room Use	utk_rm_use	See Appendix C	
Area Type	utk_rm_type	See Appendix C	x
Number of Workspaces	utk_cap_em		
College ID	utk_dv_id		
Department Code	utk_dp_id		
Room Name	utk_name		
Department	utk_name		
Occupant	utk_em_id		
Occupancy Count	utk_Count_em	Seat count occupancy	x
Door Number	utk_rm_id_door	Room number based on signage	x
Room Height	utk_rm_height	Use main room height measurement	x
Room Width	utk_rm_width	Use longest width measurement	x
Room Length	utk_rm_length	Use longest length measurement	x
Funding	utk_fc_ic		
Card Access	utk_has_card	Y or N option field	x
Key Shop ID	utk_keyshopid		
Room Notes – Departments	utk_note_dept		
Room Notes – Facilities	utk_note_ft		
Responsible Cost Center	utk_dp_id		
Requestable	utk_requestable	Y or N option field	

APPENDIX B. BIM EQUIPMENT OBJECTS

Each BIM equipment object shall contain geometric data and a set of attributes. Equipment attribute data shall have the ability to be extracted from the project BIM's deliverable and linked to our ARCHIBUS database.

Equipment components shall have a unique equipment code named as followings:

Equipment Standard (eq_std)	-	Building ID (bl_id).Floor(fl_id).Room Number (rm_id).	-	Sequential Number

Example: WFTN-1610UA.01.104 -BFS-0001 (Water Fountain Bottle Filling Station #1 at Room 104, in the First Floor of 1610 University Avenue Building).

The following attribute data shall be provided for each piece of equipment as it is relevant to the project.

DESCRIPTION	ARCHIBUS DATABASE FIELD	OPTIONS	RESOURCES
Equipment Code	utk_eq_id		Concatenation of bl_id_reg & "-" & eq_std & "-" & <sequential number>
Building Code	utk_bl_id		Provided by the University
Floor Code	utk_fl_id		Room Numbering and Floor/Level Conventions
Room Number	utk_rm_id		Room Numbering and Floor/Level Conventions
Equipment Standard	utk_eq_std		See Appendix D
Equipment Category	utk_eq_cat		See Appendix D
Manufacturer	utk_mfr		
UT Tag #	utk_iris_tag_numer		
Model #	utk_modelno		
Serial #	utk_num_serial		
Equipment Status	utk_status	in = In Service out = Out of Service rep=In Repair stor = In Storage salv = Salvaged sold = Sold miss = Missing	Defaults to "in"
CSI Classification	utk_csi_id		See CSI Classification Codes

DESCRIPTION	ARCHIBUS DATABASE FIELD	OPTIONS	RESOURCES
Criticality	utk_criticality	1 = None 2 = Very Low 3 = Low 4 = Low to Moderate 5 = Moderate 6 = Moderate to High 7 = High 8 = Very High 9 = Hazard with warning 10 = Hazard without warning	Defaults to "1"
Equipment Condition	utk_condition	New Good Fair Poor	Defaults to “New”
Years Life of Expectancy	utk_qty_life_expct		
Isolation Transformer	utk_isolation_transformer		
VFD Size	utk_vfd_size		
VFD Brand	utk_vfd_brand		
RPM	utk_rpm		
Voltage	utk_voltage		
Enclosure	utk_enclosure		
Mounting	utk_mounting		
HP (Horsepower)	utk_hp		
PH (Phase)	utk_ph		
AMPS	utk_amps		
Duty	utk_duty		
Motor ID	utk_motor_id		
Frame	utk_frame		

DESCRIPTION	ARCHIBUS DATABASE FIELD	OPTIONS	RESOURCES
Vendor	utk_war_vendor		
Contact Info	utk_contact_info		
Warranty Description	utk_description		
Expiration Date	utk_date_expiration		
Warranty Code	utk_warranty_id		

APPENDIX C. ROOM CATEGORIES, USE AND AREA TYPE

A description of these area type codes can be found in the document below:
Appendix A of the UT Physical Facilities Inventory 2017 document.

ROOM CATEGORY	DESCRIPTION
01.000	Unclassified Areas
01.000	Unclassified Areas
01.000	Unclassified Areas
01.000	Unclassified Areas
01.100	Classroom Facilities
01.100	Classroom Facilities
01.100	Classroom Facilities
01.100	Classroom Facilities
01.100	Classroom Facilities
01.100	Classroom Facilities
01.200	Laboratory Facilities
01.200	Laboratory Facilities
01.200	Laboratory Facilities
01.200	Laboratory Facilities
01.200	Laboratory Facilities
01.200	Laboratory Facilities
01.200	Laboratory Facilities
01.200	Laboratory Facilities
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01.200	Laboratory Facilities
01.200	Laboratory Facilities
01.200	Laboratory Facilities
01.200	Laboratory Facilities
01.200	Laboratory Facilities
01.200	Laboratory Facilities
01.300	Office Facilities
01.300	Office Facilities

AREA TYPE	DESCRIPTION
50	Unclassified --Inactive, Avail.
60	Unclassified--Alteration, Conversion
70	Unclassified--Unfinished, New
80	Unclassified--Inactive, Renovation Required
10	Classroom
10.2	Classroom, Special Purpose
10.3	Class Auditorium, General
10.4	Class Auditorium, Special
10.6	Classroom, Seminar
15	Classroom Service
10	Laboratory, Class
10.1	Laboratory-DRY, Class
10.2	Laboratory-WET, Class
10.4	Laboratory, Class-Photo Darkroom
15	Laboratory Service, Class
15.4	Laboratory Svc, Class-Photo Darkroom
20	Laboratory, Open
20.4	Laboratory, Open-Photo Darkroom
25	Laboratory Service, Open
25.4	Laboratory Svc, Open-Photo Darkroom
50	Laboratory, Research/Non-Class
50.1	Laboratory-DRY, Research/Non-Class
50.2	Laboratory-WET, Research/Non-Class
55	Laboratory Svc,Research/Non-Class
55.1	Laboratory Svc,Research /NC-Glasswash
55.2	Laboratory Svc,Research /NC-Warmroom
55.3	Laboratory Svc,Research /NC-Coldroom
55.4	Laboratory Svc,Research /NC-Photo Darkroom
55.5	Laboratory Svc,Research /NC-Instrument
55.6	Laboratory Svc,Research /NC-Prep
55.7	Laboratory Svc,Research /NC-Storage
55.8	Laboratory Svc,Research /NC-Culture
55.9	Laboratory Svc,Research /NC-Autoclave
10.1	Office, Faculty
10.9	Office, Library Faculty

ROOM CATEGORY	DESCRIPTION
01.300	Office Facilities
01.300	Office Facilities
01.300	Office Facilities
01.300	Office Facilities
01.300	Office Facilities
01.300	Office Facilities
01.300	Office Facilities
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01.300	Office Facilities
01.300	Office Facilities
01.300	Office Facilities
01.300	Office Facilities
01.300	Office Facilities
01.300	Office Facilities
01.300	Office Facilities
01.400	Study Facilities
01.400	Study Facilities
01.400	Study Facilities
01.400	Study Facilities
01.400	Study Facilities
01.500	Special Use Facilities
01.500	Special Use Facilities
01.500	Special Use Facilities
01.500	Special Use Facilities
01.500	Special Use Facilities
01.500	Special Use Facilities
01.500	Special Use Facilities
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01.500	Special Use Facilities
01.500	Special Use Facilities
01.500	Special Use Facilities
01.500	Special Use Facilities
01.500	Special Use Facilities

AREA TYPE	DESCRIPTION
11	Office, Staff
11.2	Office, Program Staff
11.4	Office, Clerical
11.6	Office, Other Non-Exempt
12	Office, Student Employee
12.2	Office, Graduate Assistant
12.4	Office, Graduate Teaching Asst
12.6	Office, Graduate Research Asst
12.8	Office, Post-Doctoral
13	Office, Emeritus
13.2	Office, Visitor
15	Office Service
15.2	Suite/Department Corridor
50	Conference Room
55	Conference Room Service
10	Study, Reading
20	Library Stack
30	Library Open-Stack/Reading
40	Library Processing
55	Library/Study Service
10	Armory
15	Armory Service
20	Athletics/Physical Education
23	Athletics Spectator Seating
25	Athletics/Physical Ed Service
25.7	Athletics/Physical Ed Svc, Locker Room
30	Media Production
35	Media Production Service
35.4	Media Production Svc, Darkroom
40	Clinic, Non-Medical
45	Clinic Service, Non-Med
50	Demonstration
50.5	Staff Training
55	Demonstration Service
60	Agricultural Field Building
70	Animal Facilities
75	Animal Facilities Service
75.1	Animal Facilities Svc--Cage Wash
75.2	Animal Facilities Svc--Quarantine
75.3	Animal Facilities Svc--Surgery
75.4	Animal Facilities Svc--Surgery Prep

ROOM CATEGORY	DESCRIPTION
01.500	Special Use Facilities
01.500	Special Use Facilities
01.500	Special Use Facilities
01.500	Special Use Facilities
01.500	Special Use Facilities
01.500	Special Use Facilities
01.600	General Use Facilities
01.600	General Use Facilities
01.600	General Use Facilities
01.600	General Use Facilities
01.600	General Use Facilities
01.600	General Use Facilities
01.600	General Use Facilities
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01.600	General Use Facilities
01.600	General Use Facilities
01.600	General Use Facilities
01.600	General Use Facilities
01.600	General Use Facilities
01.600	General Use Facilities
01.700	Support Facilities
01.700	Support Facilities
01.700	Support Facilities
01.700	Support Facilities
01.700	Support Facilities
01.700	Support Facilities
01.700	Support Facilities
01.700	Support Facilities
01.700	Support Facilities
01.700	Support Facilities
01.700	Support Facilities
01.700	Support Facilities
01.700	Support Facilities
01.700	Support Facilities
01.700	Support Facilities
01.800	Health Care Facilities

AREA TYPE	DESCRIPTION
75.5	Animal Facilities Svc--Surgery Recovery
75.6	Animal Facilities Svc--Receiving
80	Greenhouse
85	Greenhouse Service
90	Other Special Use
90.5	Other Special--Dept Recharge
10	Assembly
15	Assembly Service
20	Exhibition
25	Exhibition Service
30	Food Facility
35	Food Facility Service
40	Day Care
45	Day Care Service
50	Lounge
55	Lounge Service
60	Merchandising
65	Merchandising Service
65.7	Merchandising Service, Locker Room
70	Recreation
75	Recreation Service
75.7	Recreation Service, Locker Room
80	Meeting Room
85	Meeting Room Service
10	Central Computer/Telecommunication
15	Central Computer/Telecom Service
20	Shop
25	Shop Service
25.7	Shop Service, Locker Room
30	Central Storage
35	Central Storage Service
40	Vehicle Storage
45	Vehicle Storage Service
50	Central Service
50.6	Laundry, Central
55	Central Service Support
60	Hazardous Materials Storage
70	Hazardous Waste Storage
75	Hazardous Waste Storage Service
80	Unit Storage
10	Patient Room

ROOM CATEGORY	DESCRIPTION
01.800	Health Care Facilities
01.800	Health Care Facilities
01.800	Health Care Facilities
01.800	Health Care Facilities
01.800	Health Care Facilities
01.800	Health Care Facilities
01.800	Health Care Facilities
01.800	Health Care Facilities
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01.800	Health Care Facilities
01.800	Health Care Facilities
01.800	Health Care Facilities
01.800	Health Care Facilities
01.800	Health Care Facilities
01.800	Health Care Facilities
01.900	Residential Facilities
01.900	Residential Facilities
01.900	Residential Facilities
01.900	Residential Facilities
01.900	Residential Facilities
01.900	Residential Facilities
01.900	Residential Facilities
02.100	Circulation Areas
02.100	Circulation Areas
02.100	Circulation Areas
02.100	Circulation Areas
02.100	Circulation Areas
02.100	Circulation Areas
02.100	Circulation Areas
02.200	Building Service Areas
02.200	Building Service Areas
02.200	Building Service Areas
02.200	Building Service Areas
02.200	Building Service Areas
02.200	Building Service Areas

AREA TYPE	DESCRIPTION
15	Patient Room Service
20	Patient Bath
30	Nurse Station
35	Nurse Station Service
35.7	Nurse Station Service, Locker
40	Surgery
45	Surgery Service
50	Treatment/Examination
50.7	Treatment/Examination, Radiology
55	Treatment/Examination Service
55.4	Treatment/Examination Service, Darkroom
60	Laboratory, Diagnostic
60.1	Laboratory, Diagnostic-Pharmacy
60.2	Laboratory, Diagnostic-Autopsy
60.6	Laboratory, Diagnostic-Bacteriology
65	Laboratory Service, Diagnostic
65.4	Laboratory Service, Diagnostic, Darkroom
70	Central Supplies (Health)
80	Public Waiting Room
90	Staff On-Call Facility
95	Staff On-Call Facility Service
10	Sleep/Study, No Bath/Toilet
19	Residential Bath/Toilet
20	Sleep/Study with Bath/Toilet
35	Sleep/Study Service
50	Residential Apartment
55	Residential Apartment Service
70	Residential House
01	Bridge/Tunnel
02	Elevator
03	Escalator
04	Loading Dock
05	Public Lobby
06	Public Corridor
07	Stairway
01	Custodial Supply Closet
02	Janitor Room
03	Public Restroom
03.1	Public Restroom, Unisex
03.3	Public Restroom, Female
03.5	Public Restroom, Male

ROOM CATEGORY	DESCRIPTION
02.200	Building Service Areas
02.200	Building Service Areas
02.200	Building Service Areas
02.200	Building Service Areas
02.300	Mechanical Areas
02.300	Mechanical Areas
02.300	Mechanical Areas
02.300	Mechanical Areas
02.300	Mechanical Areas
02.300	Mechanical Areas
02.300	Mechanical Areas

AREA TYPE	DESCRIPTION
03.7	Public Restroom Lounge
03.9	Public Restroom, Family
04	Trash Room
05	Wellness Room
01	Central Utility Plant
02	Fuel Room
03	Shaft
04	Utility/Mechanical, Unspecified
04.3	Computer/Communications
04.5	Electrical
04.7	Telephone wiring

ROOM USE	DESCRIPTION
0110	Inst Use - E & G (Use as a default)
0112	Inst Use - Auxiliary
0114	Inst Use - Athl / Recr
0116	Inst Use - Foundation
0120	Leased Out to Non-UT
0130	Shared Out to Non-UT
0210	Vacant - E & G
0212	Vacant - Auxiliary
0214	Vacant - Athl / Recr
0216	Vacant - Foundation

APPENDIX D. EQUIPMENT CATEGORIES AND STANDARDS

CATEGORY	STANDARD	DESCRIPTION
Air Handling Equipment		
	ACU-CR	Computer Room Air Conditioner
	ACU-DC	Condenser unit for computer room units.
	ACU-P/W	Portable Air Conditioner Unit
	ACU-PAK	Air Conditioning Unit
	ACU-PTAC	PTAC unit or through the wall unit.
	ACU-RTU	Packaged Rooftop Unit
	ACU-S/S-IDU	Air Conditioning Split Unit (indoor Unit)
	ACU-S/S-ODU	Condensing Unit (Outdoor Unit)
	ACU-SUDM	Ductless Mini Split Air Conditioning -
	ACU-SUDM-ODU	Condensing Unit (Outdoor Unit)
	AHU	Air Handling Unit
	AHU-MU	Make-Up Air Unit
	AHU-MZ	Multizone Air Handling Unit
	AIRCN	Air Curtain
	AIRDRY	Air Dryer
	COND UNIT-WC	Water Cooled Condensing Unit
	DAMP	Damper
	EXHAUST-AHD	Perchloric Acid Hoods
	FAN	Fan other than listed
	FAN-DEX	Dish Washer Exhaust Fan
	FAN-EX	Exhaust Fan
	FAN-MOTOR	Fan Motor
	FAN-OA	Outside Air Fan
	FAN-PS	Pressurized Supply Fan
	FAN-REL	Relief Fan
	FAN-RET	Return Fan
	FCU	Purge Fan
Air Pollution Control		
	AIR-MON	Air Monitor
	DSTCTR	Dust Collector

CATEGORY	STANDARD	DESCRIPTION
Building Systems		
	BUILD-AS	Building Automation System
Electrical Equipment		
	SBD	Switchboard
	SG-15KV	15KV Switchgear
	SWB-600V	600V Switchboards
	VISTA-15KV	
Elevators		
	ELEVATOR	Elevator
Energy Recovery		
	ERV-HRU	Energy Recovery Ventilation
Facilities Equipment		
	DSHW	Dishwasher
Fire Safety		
	FIRE-AS	Fire Alarm System
	FIRE-HYD	Fire Hydrant
	FIRE-MS	Fire Mist System
	FIRE-SP	Stand Pipe System
	FIRE-SPR	Fire Sprinkler System
	FIRE-SUP	Fire Suppression System
	FIRE-SUP-V	Fire Suppression Valves
	SMOKE-DET	Smoke Detector

CATEGORY	STANDARD	DESCRIPTION
Food Systems (Dining Facilities Only)		
	BEVMAKER	Beverage maker
	CONVEYOR	Tray conveyor
	COOKTOP	Cooktops
	CUTTERSLICER	
	DISP	Disposal- or Garbage Disposal
	FDWRMR	Food Warmer-
	FRYER	Fryers
	GRILL	Grills
	KETTLE	Steam kettle
	MIXER	Mixer
	OVEN	Oven
	TOASTER	Toaster
Fuel Oil		
	FOC	Fuel Oil Controls
Gas Fired Equipment		
	BOILER	Boiler
Generators		
	GEN	Electric Generator
	GEN-EMP	Emergency Power Generator
	NITGEN	Nitrogen Generator
Hazadous Material Control		
	FMEHD	Fume Exhaust Hood

CATEGORY	STANDARD	DESCRIPTION
HVAC Equipment		
	AIRCOMP	Air Compressor
	CHIL-AIR COOL	Chiller
	CHIL-CEN	Water cooled chiller
	CHIL-CEQ	Chiller disconnect, starter, and control equipment
	WFTN-CHIL	Drinking Fountain Water Chiller
	CHIL-PROCESS	Process Water Chiller
	COOLTWR	Cooling Tower
	HEATEX	Heat Exchanger
	HEATPUMP	Heat Pump
	HEATPUMP-WS	Water Source Heat Pump (WSHP)
Lifts		
	LIFT-DOCK	Dock Lifts and Levelers
Lighting		
	LGHT-CTL	Controls
	LGHT-EM	Emergency Light (Not an Emergency Exit Light Sign)
Meters		
	FLMTR	Water Flow Meter
	METER-COND	Condensate Meter
	METER-ELEC	Electric Meter
	METER-STM	Steam Flow Meter
	METER-WTR	Water Meter

CATEGORY	STANDARD	DESCRIPTION
Motors		
	MCC	Motor Control Center
Plumbing Equipment		
	BFPR	Backflow Preventer
	EXPTANK	Expansion Tank
	HEATEX	Heaters and Heat Exchangers
	LIFT-PMP	Pump room lift
	PUMP-W	Water Pump
Power		
	PDU	Power Distribution Unit
	PS	Power Supply
	PS-EM	Emergency Power Management System
	TVS	Transient and Surge Suppression
	VFD	Variable Frequency Drive
Pumps		
	PUMP-BF	Boiler Feed Water Pump
	PUMP-CHE	Chemical Water Treatment Pump
	PUMP-CIR	Circulating Pump
	PUMP-CRU	Condensate Return Pump Unit
	PUMP-CW	Chilled Water Pump
	PUMP-D	Domestic Cold Water Pump
	PUMP-DIW	Deionized Water Pump
	PUMP-FB	Fire Booster Pump
	PUMP-FH	Fire House Pump
	PUMP-FO	Fuel Oil Pump CSI # 23 12 13
	PUMP-GD	Gasoline Dispensing Pump CSI # 23 12 16
	PUMP-HW	Hot Water Pump
	PUMP-MU	Make up water pump
	PUMP-SUMP	Sump Pump CSI # 22 14 29
	PUMP-TWR	Condenser Water Pump
	PUMP-VAC	Vacuum Pump

CATEGORY	STANDARD	DESCRIPTION
Radiation Units		
	CORU	Convector Radiation Unit
Refrigerators and Freezers		
	COOLCOND	Cooler Condenser
Storage Tanks		
	TANK-HWS	Hot Water Storage Tank
Transformers		
	TRANSFMR	Electrical transformers
Valves		
	PIV	Post Indicating Valve
	VALVE-AUTOMATIC	Automatic valves
	VALVE-PRV	Pressure Reducing Valve
Water Fountains		
	WFTN	Water fountain - or Drinking Fountain.
	WFTN-BFS	Water Fountain Bottle Filling Stations