Designation: ~~E2166 – 12~~ E2166 – 16

Standard Practice for Organizing and Managing Building Data[1]

This standard is issued under the fixed designation E2166; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers the organization of building information to support informed decision making. The kinds of data considered in this practice includes text, numeric, and graphic data. The system of organization is applicable to a wide range of data collection and organization tasks from routine in-depth analysis of a single building, to situations where many buildings must be evaluated and prioritized in a short time frame.

1.2 The organizational structure is based on Classification for Building Elements and Related Sitework—UNIFORMAT II (Classification E1557), a system which groups building elements according to the way buildings are constructed and function.

1.3 The use of UNIFORMAT II provides a set of recognized summary levels that are relevant throughout the industries that design, construct, and manage buildings.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E631 Terminology of Building Constructions
E833 Terminology of Building Economics
E917 Practice for Measuring Life-Cycle Costs of Buildings and Building Systems
E1334 Practice for Rating the Serviceability of a Building or Building-Related Facility (Withdrawn 2013)[3]
E1557 Classification for Building Elements and Related Sitework—UNIFORMAT II
E1699 Practice for Performing Value Engineering (VE)/Value Analysis (VA) of Projects, Products and Processes
E1765 Practice for Applying Analytical Hierarchy Process (AHP) to Multiattribute Decision Analysis of Investments Related to Projects, Products, and Processes
~~E1836~~E1836/E1836M Practice for Building Floor Area Measurements for Facility Management
E2083 Classification for Building Construction Field Requirements, and Office Overhead & Profit

3. Terminology

3.1 *Definitions*—For definitions of general terms related to building construction used in this practice, refer to Terminology E631; and for general terms related to building economics, refer to Terminology E833.

4. Significance and Use

4.1 Use this practice to organize information that describes new or existing buildings of any size. The concepts presented here can also be applied to other categories of construction where a standard corresponding to UNIFORMAT II does not yet exist.

4.2 The hierarchical structure of UNIFORMAT II enables the user to focus on building elements in functionally consistent groups. It can be applied by an administrator initiating a data system as a facility standard, as well as a consultant reporting on building conditions.

4.2.1 A consistent method of arrangement for subject matter expedites the preparation and use of source documents, and simplifies the process of comparing information from several sources.

---

[1] This practice is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.81 on Building Economics.

Current edition approved ~~April 1, 2012~~Oct. 1, 2016. Published ~~April 2012~~October 2016. Originally approved in 2001. Last previous edition approved in ~~2007~~2012 as ~~E2166 – 07~~.E2166–12. DOI: ~~10.1520/E2166-12.~~10.1520/E2166-16.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] The last approved version of this historical standard is referenced on www.astm.org.

4.3 This practice is suitable for arranging the content of individual reports, managing physical files, as well as automated data applications. Personal computers operating commercially available software are able to meet the functional requirements of this practice.

4.4 This practice provides a consistent and comprehensive outline suitable to track the evolution of specific building conditions in one or many buildings. It can be applied to historical building data as well as new information.

4.5 Administration of this practice will reveal categories of building data that have been overlooked in prior data gathering efforts that did not rely on a systems approach. The comprehensive hierarchy of Systems and Elements, readily displays the amount and depth of information distributed among the categories and levels. The pattern of available information highlights voids among the categories. It is also possible to quickly focus on the quality and sufficiency of cataloged data to determine whether an appropriate level of detail exists to address the needs of decision-makers.

5. Procedure

5.1 Organize existing physical information to correspond to the categories of UNIFORMAT II. Initial data-gathering efforts for new or existing buildings can easily make information conform to the hierarchical structure of UNIFORMAT II.

5.2 Legacy data and pre-existing text are likely to be found in the prevailing style of the preparer. In order to preserve the clarity and continuity of concept presented in text which was arranged in a non-UNIFORMAT II outline, it will be necessary in many instances, to associate the same block of text to several hierarchical levels in order to adequately communicate conditions or intent.

5.3 Where a large body of existing data is available, the initial organizing effort will involve some degree of judgment based on the quality of existing historical data, the present condition of the subject building, and some expectation of the range of potential uses for the building. Make objective decisions on the acquisition, retention, and application of data. Avoid stacking data to force outcomes that are situationally perceived to be "obvious" or "inevitable."

5.3.1 Many buildings lack significant existing data for certain Systems. In order to reliably establish baseline conditions, consult with relevant building specialists. Direct consultants to provide copies of new studies in formats compatible with the facility's resident system.

5.4 Inventory a complete list of rooms or named spaces. Each room or space is delimited by a finite set of constructed entities such as floors, walls, and ceilings that correspond directly to a UNIFORMAT II element. Make on-site observations of existing building conditions, or compile available data from the drawings of a proposed building to develop a suitable inventory. Reference UNIFORMAT II elements to the constructed entities of the room inventory.

5.5 Develop a list of elements within the third level of UNIFORMAT II. Make distinctions among the functional attributes of similar elements. These distinctions form subsets of elements or types. A type refers to a kind of assembly that possesses a unique combination of function and components consistent with, and subordinate to, elements within the third level of the UNIFORMAT II outline. Elements which superficially appear to be similar are constructed with purposeful physical variations in order to accommodate a variety of functional or situational requirements. For example, the exterior envelope of certain buildings is uniform on all sides and on all levels while the exterior of other buildings vary by facade, as well as by groupings of floor levels. Partitions which separate rooms from each other possess different functional requirements, such as fire rating, than the partition that separates the rooms from the corridor, or a room from a stairwell. Limits of connections, distinctions of substrate conditions and basic functional definitions must also be discerned in order to definitively name a type. For example, within the family of partition types, wood stud-framing covered on each side with a single layer of gypsum wall board (GWB) is a wall type, as is a concrete masonry [unit] block (CMU) wall. If these walls are painted with the same kind of paint system, that paint system is the finish type common to both wall types. If the CMU wall is to be covered with GWB and painted, the GWB, furring or other sub framing, as well as the paint is considered to be a finish type since the GWB is incidental to the function of the CMU. If the CMU wall needs to achieve a certain fire-rating which is only possible with the application of plaster or stucco, the CMU plus the applied coating is considered together as a type, because the coating is essential to its basic function. Frequently, these types correspond to an existing standard assembly which has been tested and published by recognized testing laboratories or industry interest groups. Develop a list of types peculiar to the study building at the earliest opportunity.

5.6 Identify the connections between the different elemental types and segments of the same type. These connections or joints are designed to maintain the functionality of the system by mitigating certain conditions within designed limits. Develop a list of joint types rather than attempting to account for the joint as a component of an adjacent element type. The function of the joint is necessarily more complex than the types being joined. An awareness of the joint as an entity helps to focus attention on its functional criteria. For instance, a basic function of an exterior wall type is to keep weather out of the building. The joints must additionally accommodate movement, possibly provide galvanic isolation, and present an appearance consistent with an overall architectural vocabulary. The materials used to make joints are frequently unique to the joint and different than the materials comprising the basic types being joined. The useful life and maintenance cycles of many kinds of joints vary sufficiently from the adjacent assemblies to merit scheduled attention.

5.6.1 Organize the list of joint types to respond to relevant needs such as maintenance. The function and composition of the joint determines the nature and frequency of attention. Elastomeric sealant in an exterior wall for example, will fatigue or deteriorate

at a reasonably predictable rate based on the material and exposure. Joints which respond to specific events such as fire or earthquake need to be occasionally checked to confirm that the joint continues to have the capacity to perform as intended. After an event, those joints need to be inspected for repair or replacement. Fixed joints such as structural connections are of great interest during the design and construction phases, but generally require no further attention until the next renovation.

5.7 Naming conventions for types depend upon the needs of the study in the context of the overall building documentation effort and are not standardized in this practice.

5.8 Existing buildings frequently lack sufficient available documentation to confidently identify types without performing invasive exploration. Where such activity is not warranted at the time of the data gathering effort, identify only directly observable materials and note observable functions at the appropriate UNIFORMAT II level. Include more detailed information as it becomes known.

5.9 Associate relevant combinations of types. Within a single room, a structural element such as a column and an envelope element such as an exterior wall and two different interior wall types present the same finished appearance to the occupant. Associate all of these elements with the same finish type.

5.10 Use standard MASTERFORMAT[4] designations to identify the individual components and materials which are assembled to make up a type. The use of MASTERFORMAT at this level is consistent with industry accepted construction specifications and cost estimating practice.

5.11 Identify the relevant Mechanical Systems and distinguish the services and groups of components within each system that comprise a functionally and physically discrete entity. Each service distribution system begins at a piece of equipment that "originates" or "modulates" that service, is distributed through some form of duct, pipe, or wire, and terminates at a utilization device. In district heating and cooling systems, as well as public utility grids, such as water, gas, and electricity, a "shut-off" device and metering equipment are located where the service enters the building and for the purposes of the system, considered an "originator." Gas pressure regulators, booster pumps, and sewage ejectors similarly are considered in the category of "originators" because of their relationship to a grid external to the building. Some types of equipment contain components that terminate one service and originate another. For example, a boiler is a terminal device for a gas supply and a primary generator of hot water. If that hot water is supplied to the coils of an Air Handling Unit (AHU), the coil of the AHU is the utilization device for the hot water system. Most likely, the AHU will also contain cooling coils fed by a chilled water distribution system which begins at the chiller, a device which generates very cold water. The blower component of the AHU is the primary generator of conditioned air, which is distributed through ducts to diffusers or registers in a space.

5.12 Categorize Systems information to support both operations and management needs. Information organized at the level of a system presents a comprehensive overview of the effectiveness of that system. Based on the size of the building and the complexity of the respective systems, services can be further classified by functional zones that correspond to: (*1*) building specific areas, such as floor levels or horizontal fire-areas, (*2*) system specific limits such as zones served by dedicated equipment, (*3*) areas defined by metering, monitoring, or control points, and (*4*) component specific relationships such as trunks and branches, or sets of mains, submains, and circuits. Associations made according to this arrangement will allow parallel references that are useful to describe physical relationships, adjacencies, dependencies, and interconnections in large or complex facilities.

5.13 Make all reference to the systems, sub-systems, and components with a consistent nomenclature. Design documents frequently employ naming conventions that are coordinated with existing equipment identification tags. Coordinate documents with actual field conditions to resolve conflicting nomenclature where systems modifications have been made over time.

5.14 Associate beginning and end points of services system branches with a room identification. Inventory primary equipment and associate the equipment with the room in which it is located and the system branch it feeds. Associate capacities, relevant sizes, and other useful engineering data with the inventory.

5.15 Identify and list "in line" devices. Large systems have devices to adjust or "balance" the system through-put to achieve design conditions and other controls to isolate portions of the system for service or emergency considerations. Referring to the example air-handler, the hot water supply, and return lines as well as the chilled water supply and return lines usually have balancing valves to optimize the fluid temperature at the coil by altering the flow of water to that coil. "Stop" valves are also used in the system to isolate individual coils and distribution branches. The air delivered to the space is balanced or modulated by special dampers in the duct system. If a duct branch must pass through a fire-rated partition, the duct must contain a fire-damper in the plane of the partition to isolate the air handling system in the event of a fire. All such controls require access for periodic maintenance, inspection or emergency control. Associate these devices with the relevant system and the rooms in which they are located. Information concerning the need for special keys or tools required to actuate the device and guidance to identify obscure access points adds greater functionality to the data.

[4] MASTERFORMAT is the system developed by the Construction Specifications Institute (CSI) commonly used to organize material and product data (The Construction Specifications Institute, MasterFormat 2011 Update (Alexandria, VA: CSI, 2011)).