



Spatial Data Standards (SDSFIE)/Facility Management Standards (FMSFIE) Release 2.00

Buildings Entity Set

Buildings Space Entity Class

The development and incorporation of data standards for "Building Space Management" (i.e., graphic (visual features/objects on CADD/GIS drawings or maps) and non-graphic data requirements (i.e., relational database tables) for the management of spaces within buildings) was one of the priorities of the Facility Management Standard for Facilities, Infrastructure, and Environment (FMSFIE) (formerly called TSSDS & FMS) development effort. The data standard incorporated into the SDSFIE/FMSFIE Release 2.00 was developed through an evaluation of Building Space Management related features/data elements from: AF IWIMS (Air Force Interim Work Information Management System), Army Center for Public Works IFS (Integrated Facilities System), Patuxent River Naval Air Station (Pax) Facility Management Automation System (FMAS), Navy Crane APMM (Activity Planning and Management Model), Vandenberg AFB Space Management, Archibus, FIS (Facility Information Systems), Intergraph FM (Facilities Management) Span and the Building Owners and Managers Association (BOMA).

The incorporation of a "Building Space" related data standard into the SDSFIE/FMSFIE data model structure represents a first step in integration of FM related components from the A/E/C CADD Standard. The manner in which this was accomplished complies with the discussion included in Appendix A.

"Building Space" was created as a new Entity Class with the "Buildings" Entity Set. Three separate Entity Types with associated attribute tables were developed:

Entity Type	Object Type	Attribute Table
building_floor_area	G/GT Polygon	bgspaflr
building_room_area	G/GT Polygon	bgsparom
building_space_area	G/GT Polygon	bgspaspa

A correlation between the "Building Space" related A/E/C CADD Standard and SDSFIE/FMSFIE is provided in the Excel Spreadsheet entitled "space_sds_aec". It is assumed that the building floors and room outlines would first be developed during the building

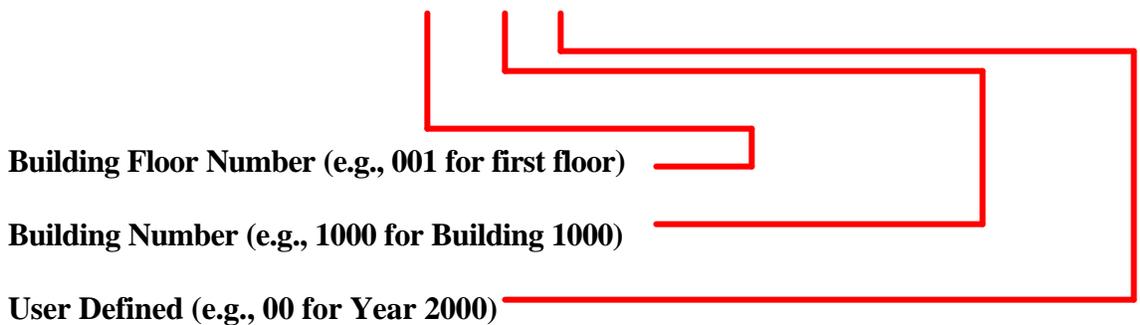
design/construction phases using the A/E/C CADD Standard. However, the following considerations restrict the direct use of drawings prepared in compliance with the A/E/C CADD Standard for "Building Space" FM requirements:

- a. The A/E/C CADD Standard does not specify the "Object Type" for the floor and room outlines. For example, floor and room outlines can be either simple lines or polygons (called polylines in AutoCAD terminology). To permit analysis using CADD/GIS software, the floor and room outlines have to be "closed" polygons.
- b. The A/E/C CADD Standard does not address "Building Space" outlines.
- c. The A/E/C CADD Standard does not provide a database schema with Attribute & Domain Tables, which are required to perform analysis of "Building Spaces".

The following steps can be followed to convert the A/E/C CADD Standard compliant drawings to SDSFIE/FMSFIE compliant CADD drawings for "Building Space" FM analysis and requirements. For CADD, and CADD-based GIS software, each Entity Class will comprise a separate Drawing/Design File.

- a. Using the "Save As" option, create a new drawing/design file with a SDSFIE/FMSFIE name. The appropriate A/E/C CADD Standard (and National CADD Standard) compliant drawing would be entitled "A-FPxxxx.dgn/.dwg", where "A" represents the "Architectural" discipline code, "FP" represents the drawing type code "Floor Plan", and "xxxx" representing "User-Defined" characters or code. The recommended CADD SDSFIE/FMSFIE name for the drawing would be "bgspaxxx", where "bg" stands for "Building" Entity Set, "spa" stands for "Building Space" Entity Class, and "xxx" can be "User-Defined". An alternative SDSFIE/FMSFIE CADD drawing design file naming convention could be:

bgspa xxx xxxx xx



For example:

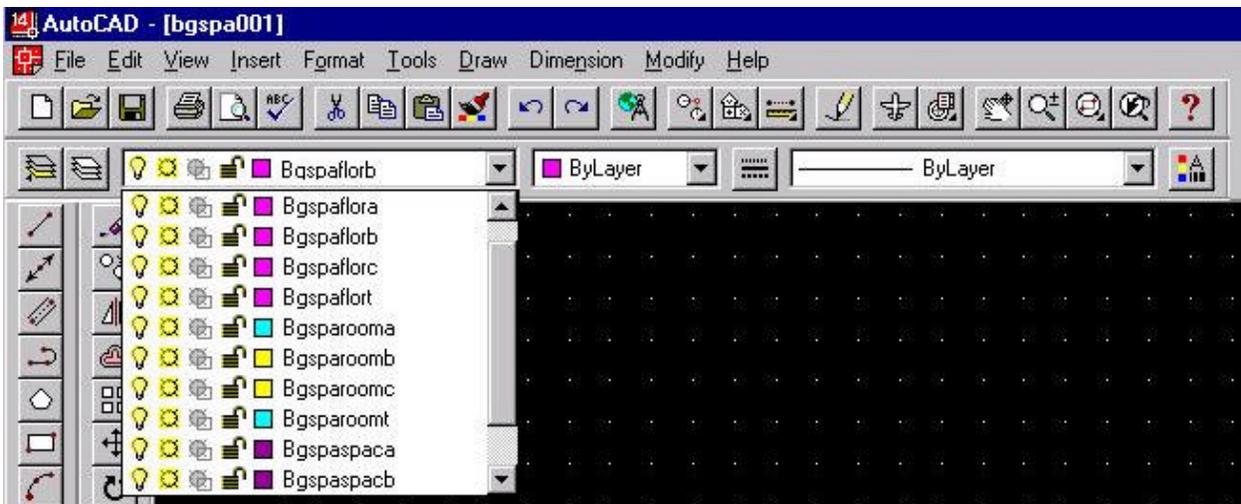
If Building Number 1400 has 5 floors, and if the User wants to differentiate Design Files by Calendar or Fiscal Year (e.g., FY 2001, there would be five separate Design Files (e.g., one for each floor):

bgspa005140001
 bgspa004140001
 bgspa003140001
 bgspa002140001
 bgspa001140001

b. For AutoCAD and MicroStation Users the CADD Level/Layer Names can be renamed (if necessary) as follows:

A/E/C AIA Format Name (AutoCAD)	A/E/C Level Number (MicroStation or AutoCAD)	SDSFIE Alpha Code (AutoCAD)	SDSFIE Layer or Level (MicroStation or AutoCAD)
A-FLOR-OTLN	15	bgspaflorb	15
A-FLOR-RPRM	18	bgsparoomb	18
A-FLOR-NUMB	14	bgsparooma	14
A-FLOR-IDEN	12	bgsparoomt	12

A sample completed "seed/prototype" drawing file is provided below:



c. Convert "Room" and "floor" outlines to closed polygons (if required). Build remaining SDSFIE/FMSFIE CADD levels/layers, and build "Space" polygons.

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d. Build the attribute and domain database tables associated with "Building Floor Area" (bgspaflr), "Building Room Area" (bgsparom), and "Building Space Area" (bgspaspa) using the SDSFIE/FMSFIE Generator application.

NOTE: All three tables are linked to the SDSFIE/FMSFIE table entitled "bggenstr" through the foreign key "buildng_id."

APPENDIX A

In developing the FMSFIE, The CADD/GIS Technology Center did not want to develop a separate "stand-alone" standard (i.e., a standard which contained graphic CADD and GIS standards different from those already depicted in the Spatial Data Standard for facilities, Infrastructure, and Environment (SDSFIE) (formerly called TSSDS and SDS) and A/E/C CADD Standard). The CADD/GIS Center's goals in development of the SDSFIE and A/E/C CADD Standard have been well defined, as described below:

- The A/E/C CADD Standard provides a CADD standard for the drawings prepared for design/construction projects. The emphases are on: (1) A graphic standard (i.e., colors, line types, fonts, and symbols) and (2) CADD level/layer assignments. The CADD drawings typically have a project specific "origin" (e.g., the origin of a building site plan may be based upon a temporary benchmark (TBM) established for the design and construction of that particular project) which is not geographically referenced (i.e., not geospatial, or directly related to a geographic coordinate system). For example, the A/E/C CADD standard would be used to prepare the necessary drawings for the construction of a building, parking area, and interior and exterior utilities.

The SDSFIE provides a standard for the development of a GIS or CADD drawing where all features (i.e., "real-world" objects) are geographically referenced. The emphases are on: (1) The geospatial referencing of each feature and (2) The collection and maintenance of accurate data concerning each feature, which is stored in relational database tables. For example, the SDSFIE would be used to: (1) Depict the graphic locations (using GIS or CADD software) of all buildings, parking areas, and exterior utilities at a military installation or civil works project, and (2) generate a database schema for geospatial feature attribute data.

The goal of the CADD/GIS Center is to provide a seamless graphic and nongraphic "life-cycle" CADD/GIS/FM project data model from the planning cycle or stage through the facility management/operations cycle or stage. For example, the ultimate goal is to permit the CADD drawings developed during the design and construction phase to be readily available for use in a GIS and for facility management, and vice versa. In a broad sense, the term "facility management" comprises the entire "life-cycle" project data model, thereby encompassing all three of the CADD/GIS Center's CADD/GIS/FM standard development efforts. In other words, to perform "facility management" activities, an organization will require use of: (1) GIS or CADD (as defined in the SDSFIE), (2) CADD (as defined by the A/E/C CADD standards), and (3) "business", event, and temporal data as defined by the FMSFIE.

Several different strategies and options were evaluated during 1997 and 1998 for integration of the FMSFIE with The CADD/GIS Technology Center's CADD and GIS standards development efforts (i.e., the SDSFIE and A/E/C CADD Standard). In early 1998, the following two options were presented to the FMS Task Group, Center's Field Working Groups (FWGs), and Center's Oversight Groups (i.e., Executive Working Group (EWG) and Field Technical Advisory Group (FTAG)):

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- Option 1: Incorporate the FMSFIE within the current SDSFIE Data Model. This option would involve the development and incorporation of FM Entity Classes within the appropriate existing SDSFIE Entity Sets.
- Option 2: Develop the FMSFIE as a separate standard. This option would involve the development of separate FM Entity Sets built around a data model structure similar to the existing SDSFIE Data Model.

Option 1 was chosen and implemented, beginning with the TSSDS/TSFMS Release 1.80.