

## CAD STANDARDS



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**Duval County Public Schools  
CAD Standards**

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**CAD Standards  
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# Duval County Public Schools

## CAD Standards

### 1.0 Scope and Purpose

Duval County Public Schools (DCPS) requires the use of computer-aided design (CAD) for all building design projects. Use of CAD systems facilitates management of construction documents by DCPS and facilitates the sharing of graphic information among design professionals working with DCPS. To realize the benefits that CAD systems offer, standards are needed for organizing information within CAD generated drawings. DCPS therefore requires that all CAD drawings conform to the CAD standards herein. It should be recognized that the CAD standards provide a general framework for CAD drawings submitted to DCPS. DCPS understands that no standard could be created that covers all situations that may be encountered when creating a CAD drawing. Design professionals should review specific deviations from the CAD standards with DCPS prior to proceeding with the deviations. DCPS considers the CAD standards to be a “living document” subject to change as the needs of DCPS change, as technological advancements are made or as input from the design professional community is received.

### 2.0 Definitions

- A. The following definitions are excerpted from “CAD Layer Guidelines – Recommended Designations for Architecture, Engineering and Facility Management Computer-Aided Design” published in 1990 by The American Institute of Architects Press, Washington, D.C.
  - a. **Attribute:** Text or numeric data attached to a symbol or entity in a CAD drawing. For example an attribute can be a manufacturer’s model number associated with a furniture symbol.
  - b. **CAD:** An acronym for computer-aided design. Some prefer CADD for computer-aided design and drafting.

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- c. **CAD Layer:** An attribute of an item in a CAD drawing commonly used for entity classification, to control entity visibility and to facilitate entity manipulation. The term “level” is used by some CAD software instead of “layer”.
- d. **Entity:** A geometric element or an item of data in a CAD drawing. Examples include lines, arcs, circles, text and symbols.
- e. **File:** A collection of information stored under a single name on a computer or storage medium.
- f. **Reference File:** A file or drawing that can be displayed as a background but cannot be edited. AutoCad software by Autodesk uses the term “external reference” or “xref” for this type of file.
- g. **Symbol:** A collection of CAD entities stored under a single name and available for use on other drawings. Some software programs use the term “block” or “cell” instead of “symbol”.

### 3.0 CAD Software

All CAD drawings delivered to DCPS as part of the phase review process, as part of a record drawing submission or for other record purposes, shall be compatible with AutoCad 2002. AutoCad is manufactured by Autodesk ([www.autodesk.com](http://www.autodesk.com)). CAD drawings shall be in AutoCad’s native .dwg format or in compatible .dxf format. Many terms used in these standards are specific to AutoCad. Most CAD software from other vendors uses similar terminology or has similar functions. Design professionals are not required to use AutoCad software but must provide drawing files compatible with AutoCad.

### 4.0 Consultant Requirements

- A. CAD drawings shall be submitted on a 700 MB recordable compact disc (CD-R). CD-R shall be formatted so it can be read by Microsoft Windows ® based PCs through a standard CD-ROM drive.

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- B. CDs shall be in a plastic jewel case. Both the case and CD shall be labeled with the following information:
  - a. DCPS Project Title
  - b. DCPS Project Number
  - c. Description of Contents (i.e. Phase III Submittal, Record Drawings)
  - d. Date
  - e. Design Professional's Name, Address and Telephone Number.
- C. Consultant shall submit CAD drawings that comply with these CAD standards. DCPS reserves the right to require design professionals to correct CAD drawings that do not comply and resubmit.

**5.0 Drawing Format**

- A. All drawings shall be generated using CAD software. Scanned, digitized or raster drawings are not acceptable unless specifically approved by DCPS.
- B. Preferred drawing sizes (sheet height x width):
  - a. 24 inches x 36 inches
    - i. For all construction documents unless specific approval for another size is given by DCPS.
  - b. 30 inches x 42 inches
    - i. For presentation drawings, large surveys and study drawings.
  - c. 8.5 inches x 11 inches or 11 inches x 8.5 inches:
    - i. For addenda, proposal requests and study drawings.
  - d. 11 inches x 17 inches and 18 inches x 24 inches:
    - i. For presentation and study drawings.
- C. Entities in a CAD drawing shall be drawn in model space at full size. Title blocks and text in CAD drawings may be in paper space ("layout" in AutoCad).
- D. CAD drawings should set up to be plotted from paper space at a scale of 1:1 (actual size). The lower left hand corner of the title block shall correspond to the origin (0,0). Plotting set up shall be "plot extents" (the rectangular area containing all entities). No entities shall be outside the extents of the title block.

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- E. Drawing measurements shall be in feet and inches or in decimals of a foot. Use of metric or SI dimensions is not required.
- F. Standard notes and dimensions on the drawings shall include text at least 3/32 inch high. Whereas DCPS utilizes half size reproductions of drawings for in-house use, this is the minimum size text that is legible at half size.
- G. Suggested font for standard notes and dimensions is RomanS. Design professionals may employ other fonts for titles and text but all text shall be legible at half size.
- H. Each entity shall be a single layer entity. Lines shall not be drawn on top of other lines. Entities that obscure other entities can lead to confusion when editing and plotting.

**6.0 Drawing Layer Format**

- A. CAD drawings can be produced with all entities on one layer however this technique would reduce the value of the CAD drawing for users who may only want to view and/or plot the walls and doors or another specific part of the drawing. Having all entities on one layer also complicates editing. For these reasons, each major drawing element shall be on its own layer. Major drawing elements are defined as walls, columns, doors, windows, fixtures, equipment, dimensions, hatch, space names, space numbers, general text, titles, title blocks, door symbols, view ports, etc. So that layers can easily be identified and managed by DCPS, design professionals shall employ a layering system that complies with the minimum standards set forth herein. These standards are based upon the layering guidelines published by The American Institute of Architects. Refer to Section 2.0, Definitions, for more information.
- B. Each layer shall have a layer name that is sufficiently descriptive to allow DCPS to understand the content of the layer. Each layer shall have a name in the following general format:
  - a. X-XXXX-XXXX-XXXX or Major Group-Minor Group-Modifier-User Defined.

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- b. Major Group (1 character): This identifies the discipline associated with the layer. Major group disciplines are:
    - i. A – Architectural
    - ii. S – Structural
    - iii. M – Mechanical
    - iv. P – Plumbing
    - v. F – Fire Protection
    - vi. E – Electrical
    - vii. C – Civil
    - viii. L – Landscape
  - c. Minor Group (±4 characters): This identifies major elements or assemblies on the layer such as walls, doors, ceilings, windows, etc. An appropriate abbreviation should be developed for each element.
  - d. Modifier (±4 characters): Optional portion of layer name that identifies different types of elements within the major group of elements. For example: full height walls from partial height walls, overhead doors from side hinged doors, emergency lighting from general lighting.
  - e. User Defined (±4 characters): Optional portion of layer name that further defines entities present on each layer. This field can be adjusted to accommodate specific project requirements.
- C. Example layer name: A-WALL-DEMO-STUD. This layer would identify an architectural element, walls, that are to be demolished and are constructed using studs. Other layer name suggestions are included in AIA’s “CAD Layer Guidelines”.
- D. Design professional should use as many layers as practical when constructing CAD drawings. In general, it is preferred to have more layers with fewer entities on each layer for maximum editing efficiency.
- E. When final record drawings are submitted to DCPS each layer shall be turned on and visible except as noted below. Unused layers should be purged from the drawing prior to submission.
- a. Layers containing entities that are required for drawing layout but do not contain useful drawing information can be turned off. An AutoCad related

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example would be layers containing viewports. In such case, the layer name should include “OFF” or similar text in the user defined portion of the layer name. For example: “A-SHBD-VPORT-OFF”. In this instance it is clear that this is an Architectural Layer (A), related to the sheetborder (SHBD), includes viewports (VPORT) and should be turned off (OFF) before plotting.

- F. To ease global editing of entities, all entities on a layer should have line type, line width and entity color associated with the layer. In AutoCad, all entities on a layer should have line type, line width and color set to “by layer”. Therefore the layer manager can be used to change the characteristics of all entities on the layer in a single operation.

### **7.0 File Management**

- A. Design professional should submit a plotting information file with the CAD drawings. This file shall describe the relationship between drawing entity colors and plotting color, plotting line width, plotting line opacity (solid or screened) and other plotting details. In AutoCad, this file is called a “color dependent plot style table” and has a .ctb extension. This file will allow DCPS to accurately plot the CAD drawing.
- B. CAD drawings should be organized so that one drawing file represents one drawing sheet. Drawing files containing more than one sheet of drawings where layers or layouts must be manipulated to plot the sheets in their final form are not acceptable.
- C. For simple referencing, CAD drawings should be named using a combination of sheet number and sheet title. For example: “A-1 Site Plan” or “Refl Clg Plan A5”. Record drawings should include such reference in the file name. For example: “A-1R Site Plan” or “Refl Clg Plan A5 RD”.
- D. CAD drawings submitted for record drawings shall not reference other drawings, symbols, fonts, blocks or attributes that are not part of the drawing file. Any externally referenced (xref) drawing should be bound to the subject drawing. All symbols, fonts, blocks or attributes shall be part of the subject drawing.

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- E. To reduce file size, all unused layers, line types, symbols, blocks or similar items shall be purged from the drawing prior to final submission.
- F. Compression of submitted drawing files should not be required given the file capacity of CDs. For projects where submitted files will not fit on one CD, submission of multiple CDs is preferable to file compression.

**End of CAD Standards**