

STATE OF UTAH  
DFCM  
CADD CRITERIA



Division of Facilities Construction and Management  
March 2012

## **PURPOSE**

This Criteria is part of an initiative to address the entire life cycle of facilities within the DFCM. Due to the long life cycle that may be expected of State facilities and future requirements for maintenance and remodeling, standards are crucial. Utah State has long needed a comprehensive standard for organizing drawings to ensure consistent electronic deliverables (products); therefore, after extensive research the DFCM has accepted the most current version of the United States National CAD Standard (NCS). The purpose of the DFCM CADD Criteria is to become an appendix (or supplement) to the United States National CAD Standard and will address DFCM specific requirements that are not covered in the United States National CAD Standard. \*Note: The CAD Criteria and the NCS should be read together as a whole and are not complete one without the other for all DFCM projects. The NCS can be obtained from:

<http://www.buildingsmartalliance.org>

<http://www.csinet.org/>

## **BACKGROUND**

The immediate benefits of CADD standards are many: consistent CADD products for customers; uniform requirements for A/E deliverables; sharing of products and expertise; and collection, manipulation, and exchange of database information. All A/E agreements dated on or after February 10, 2012 are required to comply with the current standard. DFCM recognizes that there are individual office standards that may need to change but are not responsible for time or budget restraints.

## **GENERAL CONDITIONS**

The listed rules, standards, codes, DFCM Design Criteria, DFCM CADD Criteria and its references shall be read together as a whole in order that all provisions may be operative. In case of conflict between any of the provisions of the rules, standards, codes and criteria documentation, the most stringent requirement shall govern. When none of the listed rules, standards, codes or criteria addresses an issue, contact the DFCM.

## **Contract Documents:**

These documents shall convey to all concerned (contractor, manufacturer, fabricator, etc.) the information necessary for the required work. It is essential that the documents be accurate and explicit. The elements of the contract documents shall be properly coordinated to minimize conflicts between drawings, notes, specifications and:

**A** Be sufficient for completion of the project and include site information, the extent, size, shape and generic types of materials, and the relationship between materials. Some duplication of items included in specifications may be desirable in the general notes for emphasis. If duplication does occur, the Architect and Engineer must carefully review the contract documents, notes & specifications for consistency.

**B.** Show permanent survey control points (benchmarks).

**C.** Complete finish, door, window, hardware and fixture schedules, or any other schedule that may apply to the project.

**D.** Contain complete dimensioning to construct the facility.

**E.** Show the relationship of existing utilities, easements, property interests and encumbrances that the Architect and Engineer have knowledge of or should have knowledge of by reasonable investigation, to those utilities, easements, property interests and encumbrances designated as new.

**Shop Drawings:** Shop drawings are defined in the DFCM Design Criteria's General Conditions.

**As Built Drawings:** DFCM requests record drawings in DWG format and in PDF so we can have a complete set of drawings that include modifications made during the construction phase.

The following modifications must be made to the record drawings

- Delete and purge the engineers seal
- Bind the x-references
- Delete additional tabs
- Include any image files

## **DELIVERY AND DATA EXCHANGE**

The need to exchange digital data (drawing files and database information) between DFCM elements and the A/E community necessitates answering many questions about electronic media, file format, etc. The overview presented should not be considered a standard or all-inclusive. It is presented only as a checklist of pertinent items.

## **DELIVERY MEDIA**

The preferred type of media for data exchange depends on both the hardware/software platforms utilized in creating a drawing/data file and the size of the file. Generally, files should be provided on CD-DVD or a large file sharing service.

When digital media are exchanged, an external label should contain, at a minimum, the following information clearly labeled:

- a) DFCM Project Name
- b) DFCM Project Number
- c) Name of architect and/or engineer and or Contractor (if known)
- d) Date issued
- e) Bound and in original format
- f) Also in PDF format

## **HARD COPY**

Not required unless otherwise specified in contract.

## **DRAWING FILE ORGANIZATION**

Organizing a set of drawings is influenced by many factors, including project size, complexity, regulatory and client requirements, and the type and number of contracts. The current United States National CAD Standard along with the supplemental DFCM CADD Criteria will provide guidelines for organizing drawing sets to accommodate these influences. Organization standards affect production, delivery, and identification of hard copy drawings as well as electronic CAD drawings.

The basic structure for organizing drawing sets is based on the traditional architectural/engineering disciplines. Drawings consist of plans, elevations, sections, large scaled views, details, schedules, diagrams, and 3D representations. The following standards shall apply for all DFCM projects.

## **ORIGIN (GLOBAL ORIGIN)**

The origin of a drawing file is important because it serves as the point of reference from which all other elements are located. Origins are typically defined (located) in a drawing file by the Cartesian coordinate system of x, y, and z or for AutoCad users 0,0,0.

A standard origin is most beneficial in the use of reference files and in translating between CADD applications.

## **MODEL FILES & SHEET FILES**

Two distinct types of CADD files are addressed in this standard: model files and sheet files.

A **model file** contains the physical components of a building such as walls, doors, columns, ductwork, piping etc. Model files are drawn at full scale and typically represent plans, elevations, sections etc. They must comply with the NCS in regard to layer/level usage and symbology

Model files can also contain dimensions and annotation or other non-component information as long as they are not sheet specific information.

A **sheet file** is the “finished product”, synonymous with a plotted CADD drawing file. A sheet file is a selected view of the model file(s) within a border sheet with the origin of each sheet located at the lower left-hand corner of the sheet border. Sheet files are plotted at full scale (1=1), since the model files are referenced into the sheet file at a particular scale ratio. A sheet file is the combination of referenced model files with sheet-specific text/symbols to create a final “ready-to-plot” CADD file.

## ELECTRONIC FILE NAMING

Consistent file naming and folder (directory) structures are necessary for management of the information that is reusable from project to project, as well as effective management of the graphical and non-graphical information related to a construction project. In naming the electronic sheet files the format should be consistent with the sheet identification. The industry standard file naming conventions are those developed by the AIA model file naming and CSI's sheet file naming as part of the United States National CAD Standard. For DFCM projects the 2-character discipline designator is preferred. Title blocks can be obtained from [cadservices@utah.gov](mailto:cadservices@utah.gov)

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<b>DFCM</b> 4110 State Office Building Salt Lake City, Utah 84114 Phone: (801) 538 - 3018		
 B your logo goes here		
This area stays blank for code official stamp		
NAME OF BUILDING Ye old School House		
PROJECT TITLE:		
BUILDING SCHOOLHOUSE CITY UTAH 88888		
MK7#	DATE7	DESC7
MK6#	DATE6	DESC6
MK5#	DATE5	DESC5
MK4#	DATE4	DESC4
MK3#	DATE3	DESC3
MK2#	DATE2	DESC2
MK1#	DATE1	DESC1
MARK	DATE	DESCRIPTION
ISSUE TYPE: ISSUR		
ISSUE DATE: DATE		
DFCM PROJECT NO: DFCM#		
DRAWN BY: NAME		
CHKD BY: NAME		
COPYRIGHT: CPYRT		
SHEET TITLE		
TITLE		
SHEET NUMBER		
<b>A-100-XX</b>		
SHEET 5 OF 50		
3		

User-Defined Designators

N = numerical character

A = alphabetical character discipline designator

## **DRAWING ORIENTATION**

All drawings or views should indicate the view presented. Ideally the floor plan should be shown on one sheet. If it cannot fit on one sheet, the floor plan should be subdivided into convenient segments with match lines provided to reference where the floor plan is continued.

Civil plans may orient the drawing in a manner that will allow the site plan to fit within the sheet boundary at the appropriate scale. Orient the site plan in the same manner as the floor plans whenever possible.

Every plan view shall have a north arrow orientation. Preferably, the plan north arrow shall point to the top of the drawing sheet. True north should be adjusted so the building grid and plan north arrow are parallel to the sheet orientation. The location of the north arrow and plan arrow should be placed in the lower right hand corner of the drawing block.

Scanning Scale Block: Mandatory Graphical and numeric scale Display throughout the drawing set must stay consistent. For example, a column plan detail should be shown in the same orientation as it is shown on the floor plan.

## **DIMENSIONING**

Dimensions must be adequate and accurate. Each wall and part of a detail must be tied to a fixed point such as a column centerline or an existing or bearing wall. **This applies to the plans and the enlargements associated with them.** Exercise care in placement of dimension lines and (arrows/slashes) to convey clear intent. See the NCS for acceptable dimensioning techniques.

## **OWNERSHIP**

DFCM has owner ship of all CAD files and facility data developed for the project