



# **CMW A/E/C CADD Standard**

**Version 1.0**

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## **1 – INTRODUCTION**

Within the framework of the re-engineering and optimization of its production processes, the Command of Military Works has undertaken a study to set-up a CADD standard system for the creation and provision of the Architectural, engineering and construction drawings. This will help enormously in streamlining the business process within the CMW. Some of the expected benefits are:

The system will allow a consistent classification of CADD drawing data for all the projects in the CMW. It will ensure a consistency in the symbolization thus in the presentation of the drawings. It will enable also a systematic re-use of the existing drawings for the new projects and a seamless and streamlined transfer as well as referencing of the drawings among architects, engineers and draftsmen.

The standard will allow for the introduction of automated production as well as quality control processes. It will also allow the easy implementation of facility management systems and integrated document and GIS management systems within CMW

Last but not least, CMW will be able to contribute efficiently in external systems such as a National Spatial Data Infrastructure NSDI, with highly organized and structured geospatial data.

The study has resulted in the establishment of this document which is the “ CMW A/E/C CADD Standard Version 1”.

The Standard covers the following areas:

- 1 – CADD data organization
- 2 – CADD data content
- 3 – CADD data symbolization
- 4 – Folder organization
- 5 – Drafting conventions
- 6 – Notations

The study has also resulted in the design of a new production line and the development of an application “Standard Production System” (SPS) to implement it.

The CMW CADD standard should be used as the sole reference for the creation of the CADD drawings by the CMW staff as well as the contractors delivering CADD drawings to CMW.

The CADD standard is created for AutoCAD drawings version 2007 or higher.

## **2 – DRAWING DATA ORGANIZATION**

### **2.1 - DISCIPLINES**

The CADD drawing data will be grouped in the following disciplines:

- G – General
- H – Hazardous Materials
- V – Survey and Mapping
- B – Geotechnical
- C – Civil
- L – Landscape
- S – Structural
- A – Architectural
- I – Interiors
- F – Fire Protection
- P – Plumbing
- M – Mechanical
- E – Electrical
- T – Telecommunication

### **2.2 - MODEL FILES**

CADD drawing data is further grouped into model files per each discipline. A model file is a CADD drawing file that contains the physical component of a facility. It is drawn at full scale. The drawing data for each discipline is organized into model files (see [Annex 1](#))

#### **2.2.1 - Model space**

AutoCAD provides a drawing area with infinite range in x, y, and z axis.

#### **2.2.2 - Model Units**

Building and facility elements, systems, or information should be drawn in model files in real dimensions using meters as model master unit.

#### **2.2.3 - Model Origin**

All the model files will have the same drawing origin which is  $x = 0, y = 0$   
Standardizing the drawing origin will have a direct benefit when using XREF files.

## 2.2.4 - Model files Naming Convention

A model filename will follow the format:

**P-NN-AMF-XX-XX.dwg**

Where:

- P is the project archive code of the project
- NN is the facility number
- A is the discipline designator (see [Annex 1](#))
- MF is the model file type (see [Annex 2](#))
- XX-XX is user defined (standardized architecture see [Annex 6](#))

Example:

9001-01-AFP-F1-P1.dwg

The drawing of the Floor Plan of the first floor, part 1 of the project number 9001 and facility number 1

## 2.2.5 - Model files Content (Layers)

Drawing data represent 4 types of features:

- Linear features such as walls and pipes
- Point features such as doors
- Text features such as notation and dimensions
- Area features such as patterns

This data is held in the AutoCAD layers. A layer is analogous to overlays in manual drafting. CMW layer organization is based on the AIA CAD Layer Guidelines and provides the basis of the CMW CADD data model. For organizational efficiency, the layers are further grouped into thematic groups.

[Annex 4](#) “**Model File Layers and Symbology**” provides an integral list of the model files, with their layer content, that constitute a CMW CADD drawing data model. This is based on the CAD/BIM center of the USA with the required modifications relevant to CMW workflow.

## 2.2.6 - Layer symbology

The layer symbology consists of line width, line color, line style, area patterns, text styles, and symbols. For symbology assignments for each of the drawing layers refer to [Annex 4](#) “**Model File Layers and Symbology**”.

### 2.2.6.1 - Text Styles

CMW drawings will be using the following fonts for annotation and dimensions placement

- **Monotext** font for schedules and some cases in title blocks. This font provides text with evenly spaced characters
- **Proportional** font for general notes, labels, and title blocks. It creates text with characters that are proportionally spaced
- **Slanted** font to be used where text needs to be easily distinguished from other text
- **dwm\_romant** for titles
- **mj** for block annotation

### 2.2.6.2 - Symbols

Symbols are created for each discipline group and provided as AutoCAD block drawings. For a complete list of symbols of each discipline refer to [Annex 5](#) “**Discipline Blocks, Line Styles and Patterns**”.

### 2.2.6.3 - Area Patterns

Similarly standard patterns are created for each relevant layer and provided as a pattern library. For a complete pattern list refer to [Annex 5](#) “**Discipline Blocks, Line Styles and Patterns**”.

### 2.2.7 - Model Files templates

The model file is the repository of the layers as well as their symbology. CMW has created drawing templates for each as per the list of model files in [Annex 2](#). These model file templates are used by the “Standard Production System” (SPS) program to create new drawings.

### 2.2.8 - Development of a model file and the use of XREFs

The creation of a model file will use the relevant model template, e.g. Floor Plan.dwg, with the appropriate model naming convention assigned. The “Standard Production System” (SPS) program should be used to create all drawings for CMW projects.

For more information on creating model files, and instructions on the SPS workflow, refer to the document: [CMW-CADD-STD-07](#) under the ...\\Standard\_documents folder.

## 2.3 - SHEET FILES

A Sheet file is a ready-to-plot CADD file. It is an assembly of referenced model files. A sheet file should be produced using paper space.

CMW has incorporated the following paper space sizes with the CMW standard title block in a standard sheet file (CMW\_TEMPLATE.dwg)

A0	for sheet file size A0
A1	for sheet file size A1
A2	for sheet file size A2
A3	for sheet file size A3

### 2.3.1 - Sheet file Naming Convention

A sheet filename will follow the format:

**P-NN-ABC-SS.dwg**

Where:

P	is the project archive code of the project
NN	the facility number
A	is the discipline designator (see <a href="#">Annex 1</a> )
B	is discipline designator level 2 (see <a href="#">Annex 3</a> )
C	is the sheet type (see Table 1 below)
SS	is the sheet serial number

Example:

3881-01-AZ1-01.dwg

The Sheet of the Floor Plan of the project number 3881 and facility number 01

Sheet Type	Designator
General (symbols legend, notes, etc.)	0
Plans (horizontal views)	1
Elevations (vertical views)	2
Sections (sectional views)	3
Large-Scale Views (plans, elevations, or sections that are not details)	4
Details	5
Schedules and Diagrams	6
User Defined	7
User Defined	8
3D Representations (isometrics, perspectives, photographs)	9

Table 1: Sheet type

### 2.3.2 - Creation of drawing sheet files

The creation of the sheet file starts by creating the sheet drawing file using the “Standard Production System” (SPS) program. Within the sheet drawing the required paper size can be selected. For instance if required to plot an A1 size sheet, switch to the A1 paper space layout, and fill in the required items in the title block areas.

Create the necessary viewports that will hold the drawing blocks or modules. Reference the model files that are required to go into this sheet in their right viewport and specify the viewport scales.

For more information on creating model files, and instructions on the SPS workflow, refer to the document: [CMW-CADD-STD-07](#) under the ... \Standard\_documents folder.

### 2.3.3 - Plotting

Plotting is an area where standardization is very essential. CMW opted for creating all its plots using the object color, line width, and line types used directly in the model files.

## 3 – FILE MANAGEMENT SYSTEM

In general terms, a construction project covers planning and pre-design activities, production of design and construction documents, bidding, construction, facilities management and maintenance. Throughout these phases drawings and specifications documents are produced and used by different groups. Therefore, good project management will definitely require effective management of these documents and this starts by organizing the project CADD data on a computer drive for easy retrieval.

Folder management is the available method for this purpose.



CMW project documents will be stored under a project folder that holds the unique identifier of the project. This corresponds to the project code (i.e. LF-295-07).

The project folder will be as follows:

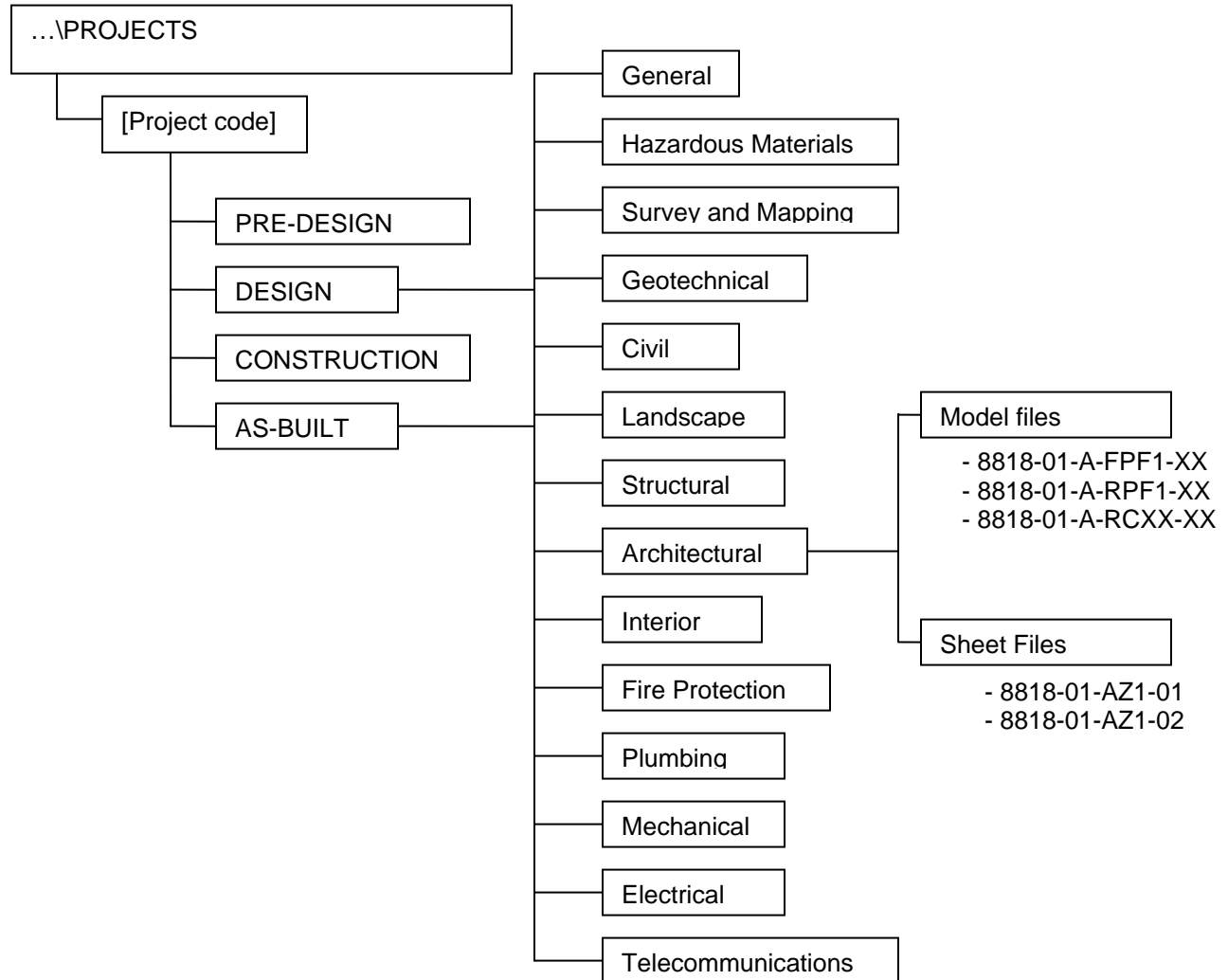


Figure 1: Folder structure for projects design

## **4 – DRAWING DATA COMPILATION**

CMW also provides guidelines for the drawing data drafting and presentation which covers the followings issues:

### **4.1 - DRAFTING GUIDELINES**

CMW CADD drawings should be drafted taking into account the following drafting guidelines in Module 4 of the USA National CAD standard version 3.1:

- Drawing Orientation and North Arrow
- Grid System overview
- Coordinate system overview
- Drafting precision
- Dimensions
- Identifying spaces and objects
- Sheet types

### **4.2 - NOTATIONS**

Notation, notes and text in CADD drawings should be placed taking as guidelines Module 7 of the USA National CAD Standard version 3.1.

## **5 – STANDARDS IMPLEMENTATION**

CMW has developed the application “Standard Production System” (SPS) for the implementation of the current CADD standard and the new production line. The user manual titled: **CMW CADD PRODUCTION WORKFLOW** (code [CMW-CADD-STD-07](#)) gives a step by step guide to this implementation.

## **6 – QUALITY ASSURANCE OF CADD DATA**

Refer to "**CADD DATA QUALITY CONTROL**" document (CMW-CADD-STD-05).

## **7 – CADD DELIVERABLE SPECIFICATIONS**

Refer to: **CADD DELIVERABLES SPECIFICATIONS** (code [CMW-CADD-STD-06](#))