



Miami University
Oxford, Ohio
Physical Facilities Department

CAD Standards
(Revised: September 2015)

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(Revised: February 2015)

Section 1 – GENERAL REQUIREMENTS

1.1 OVERVIEW

These standards pertain to the use, production and submittal of electronic CAD files at Miami University. They have been developed to provide direction to A/E firms performing work for Miami University. Any deviations from these standards must be approved by MU's Project Manager and by the CAD Designer. Consultants shall contact the MU Project Manager for the most current release of this document and any template files prior to the commencement of any work. Information regarding these standards is available on the Facilities Resource Center web page (<http://www.pfd.muohio.edu/index.jsp>). It should be noted that the most efficient and effective use of CAD is not necessarily the initial generation of the drawing file, but the capability to easily modify and reuse the file in the future. This includes the distribution of CAD files or parts thereof at Miami University's discretion. By establishing and adhering to a common set of standards, Miami University can achieve significant benefits including:

- Reduction of effort required for Miami University to produce electronic drawings and for drawing modifications.
- The ability to share and transfer reliable CAD data within the University and with outside firms working on university projects.
- The ability to perform university-wide space analysis.
- Consistency and quality across all aspects of the university data library.

Adherence to the standards and procedures contained herein is essential in preserving a homogeneous character in the drawings maintained by Miami University and in increasing the efficient use of project time and management.

Modifications to the standards and procedures in this manual may be necessary for specific situations. Proposed modifications must be approved in writing by the Project Manager and the CAD Designer. **Do not make arbitrary changes without prior approval.**

Before a project can be closed out and final payment from Miami University rendered, all specified materials must be submitted to the appropriate project manager or representative in accordance with standards and special instructions described throughout this document.

1.2 DRAWING FORMAT

Miami University requires that all project drawings be created and submitted using AutoCAD (.dwg file extension) software **only**. AutoCAD version 2012 or newer is required.

1.3 DRAWING CONTENT

Prior to submitting drawings to Miami University, AutoCAD files containing multiple drawing sheets shall be broken down into separate drawings containing single sheets. **NO MULTIPLE LAYOUT TABS ARE TO BE USED.**

All CAD drawings shall be purged of empty, unused, or non-essential drawing data.

All CAD drawings shall not contain any frozen layers. All unused entities on frozen layers should be erased, and the empty layer purged.

Drawing and extents must be checked to ensure that there are no objects outside the drawing limits.

All externally referenced data (XREF's) that were used in the Cad drawings shall be inserted and bound, using the "bind" command. **NO CAD DRAWINGS THAT CONTAIN XREF'S WILL BE ACCEPTED.**

Each final submitted drawing sheet shall have "As-Built" or "Record Drawing" clearly marked on every electronic and printed sheet.

Text styles and font may vary, however, the use of ROMANS.shx for most applications is desired. **CUSTOM FONTS NOT PACKAGED WITHIN AUTOCAD ARE NOT PERMITTED.**

All blocks must be created on layer "0". Nested block should be avoided.

All objects, layers and linetypes must be defined as "BYLAYER".

All drawing sets of more than 3 sheets should include a cover sheet that also includes a drawing index with sheet numbers and corresponding drawing titles.

All hatching shall be associative. Hatching shall not deviate from AutoCAD defaults.

1.4 MODEL SPACE/PAPER SPACE USAGE

The primary drawing(s) shall be created in model space.

All drawings created within model space must be drawn to full size (1:1 scale).

Any additional items such as details, dimensions, elevations, or sections should be drawn to full scale in model spaces.

General project graphic elements such as title blocks, legends, schematics, key plans, diagrams and notes should be drawn in paper space.

Scale objects using paper space viewports – zoom viewports to the appropriate scale.

Label scale of each viewport in paper space.

Viewports should be created on a "viewport" layer.

1.5 TITLE BLOCK INFORMATION

Each CAD drawing submitted shall have only one title block.

If using paper space, the title block should be placed with its lower left hand corner inserted at an origin of (0,0,0).

A/E firms may use their own title blocks as long as they include the following information:

Project Information:

- A/E Firm Name
- Project Name
- Building Name (if applicable)
- Project Number (if applicable)

Drawing Information:

- Drawing Title – indicating the drawing content, e.g. site plan, elevations, etc.
- Date of Drawing – original drawing date including significant revision dates
- Drawing Phase – clearly marked as Bid Set, Construction Drawings, As-Builts, etc.
- Drawing Scale – representing the intended plot scale of the drawing with title block
- North Arrow (if applicable)

1.6 DRAWING SUBMITTALS

All electronic and hard copy drawings shall be submitted to Miami University in a timely fashion, coinciding with the requirements of the contract and the needs of the Project Manager or CAD Designer.

The content of the electronic drawings must match the delivered hard copy version.

All electronic drawings shall be submitted on a CD and labeled with project name, type of drawing package (i.e. bid set, construction drawings, record drawings), and date created.

All electronic CAD record (as-built) drawings must be accompanied with a complete matching set of Adobe PDF drawings that can be incorporated into our electronic document management system.

In addition to the electronic CAD record drawings, hardcopy as-built or record drawing submittals shall be on bond paper for reproducibility.

All final submitted record drawings, both AutoCAD and PDF's, shall be named based on sheet number and drawing title.

Examples include: E100 First Floor Electrical Plan.dwg (or .pdf)

P2.01 Plumbing Details.dwg

C101 Site Utility Plan.dwg

T501 Telecommunication Riser Diagrams.dwg

NO PROJECT NUMBERS SHOULD BE INCLUDED IN DRAWING NAMES.

1.7 STANDARD COORDINATE SYSTEM

Any drawing utilizing a coordinate system shall correspond to the Ohio State Plane System, North American Datum, 1983 (NAD 83), in feet, for all map and plan view files. Where necessary for composing drawings on a sheet a user coordinate system named "PLAN VIEW" shall be established.

1.8 STANDARD SHEET SIZES AND FORMATS

All sheet sizes are to be limited to four standard formats. Required sheet size is specific to each project and is under the discretion of the University. They are as follows:

ANSI A Plot – 8-1/2" x 11"

ANSI B Plot - 11" x 17"

ARCH D Plot - 24" x 36"

ARCH E1 Plot - 30" x 42"

1.9 SHEET FILE NAMES

All sheet names, both electronic and hardcopy, shall include a discipline letter designation, along with a unique identifying number.

Examples: A-1, A-01 or A001 (Architectural Sheet 1)

E-10 or E010 (Electrical Sheet 10)

M-100 (Mechanical Sheet 100)

1.10 DRAWING UNITS

Most CAD files should use the architectural units (feet and inches) report format. Civil engineering CAD files may use the engineering units (feet and tenths) report format.

Section 2 – LAYERING STANDARDS

This section provides additional information regarding details and examples of the Miami University CAD layering requirements.

Miami University has adopted the AIA (American Institute of Architects) Layering Guidelines. The intent of the layering standard is to promote consistency between CAD drawings, and maximize the reusability of drawing data.

All CAD drawings submitted to Miami University shall adhere to the CAD layering guidelines and standards outlined in this document.

The effective use of CAD layering standards should:

- Allows users to isolate drawing elements by controlling the visibility of objects – improving system performance and eliminating visual clutter.
- Facilitate the sharing of information between drawings.
- Allow users to control display and printing characteristic such as color, linetype, line weight, etc.

When submitting drawings, **no** objects shall be on layer “0”.

Purge each drawing of unused layers prior to submittal.

2.1 LAYER NAME FORMAT

The AIA layer naming scheme followed by Miami University is organized as a hierarchy. This structure is intuitive, concise, easy to understand, and allows for expansion and customization. Layer names are defined using characters identifying disciplines, minor groups and modifiers. Disciplines are always identified by a single character. Each group is separated by a hyphen.

Examples: A-WALL-DEMO (Architectural Wall to be Demolished)
E-EMER-LITE (Electrical Emergency Lighting)
M-HVAC-SUPP-IDEN (Mechanical HVAC Supply Duct Identification)
C-SSWR-MNHL (Civil Sanitary Sewer Manhole)

The following discipline characters are defined as followed:

A Architecture
C Civil
E Electrical
F Fire Protection
G General
H Hazardous Material
I Interiors
L Landscape
M Mechanical
P Plumbing
S Structural
T Telecommunications

Section 3 - BIM (Building Information Modeling) REQUIREMENTS

3.1 AS-BUILT DELIVERABLES

All BIM models shall be done using Autodesk Revit (.rvt format). The Design Team shall update their respective models with contractor recorded changes (Record Documents). Republish record documents in paper, .dwg and .pdf formats. They must also submit full Revit models(s) with all needed objects and reference drawings, in original authored software prior to final payment.

3.2 GEO-REFERENCED MODEL

The Design Team shall geo-reference site plans and building models to the following: Ohio State Plane Coordinate System, NAD 1983, Ohio South 3402 (feet)

Section 4 – OWNERSHIP AND RIGHTS OF DATA

Miami University has ownership of all CAD files, BIM models, and facility data developed for the project. Miami University may make use of the data following any deliverable.