

THE UNIVERSITY OF TEXAS
MD Anderson
~~Cancer Center~~

Making Cancer History[®]

CAD Standards Manual

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**CAD Standards Manual
Revision Record**

1	6/3/2005	Complete CAD Manual Revision and Reorganization in conjunction with AutoCAD 2005 upgrade
2	4/1/2012	Changed language to support primary CAD standard for project deliverables and update to 2010 software. Added file translation standards.
3	3/1/2015	Change language to support AutoCAD version change to 2014. Replace MDACC with MD Anderson.
4	12/13/2024	Change language to support AutoCAD Version change to 2023. Change language to update departments. Change language to update “Key Terms” Change language to update MD Anderson-CMS

The University of Texas M.D. Anderson Cancer Center (MD Anderson) maintains Computer Aided Design (CAD) drawings of all the facilities it owns or leases. These drawings are used for planning, design, space management, and maintenance of the facilities. The department of EBSM BIM/FIM is responsible for maintaining the drawings and the standards used to develop the drawing files.

In order to maintain an up-to-date record of data and graphics, External and Internal Design Professionals and Construction Companies are required to provide CAD drawings as part of their services. Per Divisional Policy ADM1122, The Document Authority (MD Anderson Project Manager or their representative) must obtain mission critical documents throughout the project. They are provided a Project Closeout Checklist which they maintain to confirm mission critical documents are obtained per level of agreement and contract language.

In this document, the requirements for the CAD drawings are outlined to obtain a high quality, uniform set of documents that can easily be integrated into the MD Anderson system.

The layer names and line weights in the M.D. Anderson Cancer Center Standards are developed based on the guidelines of the United States National CAD Standard.

The following CAD Standards are effective as of December 13, 2024, and are subject to change. This manual is a continuously developing document and most of the standards established will not vary. However, in some instances, deviation may be accepted as explained within this document.

Management of the MD Anderson CAD Standards document which includes application of current information, distribution, development, and general maintenance, is performed through the MD Anderson BIM Director (MD Anderson-CSM). All sources providing design and consulting services shall obtain and verify a current dated revision of this document before returning drawings to M.D. Anderson. MD Anderson-CSM refers to:

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Section II Purpose and Application

The purpose of this manual is to describe the “system of standards” (Standards) that allow the MD Anderson mission groups, their business partners, and consultant firms, to make informed decisions on CAD related procedures and policies.

This manual is intended to specify the content and quality of the CAD drawing files delivered to and maintained by MD Anderson.

This manual is not intended to describe "how to" do CAD work.

1.0 Language

- 1.1 In this document the recommendations for a course of action are made with varying degrees of emphasis. As a rule;
 - 1.1.1 “may” - indicates a possible course of action
 - 1.1.2 “should” - indicates a preferred course of action
 - 1.1.3 “shall” - indicates a course of action where deviation is not allowed without written authority from MD Anderson-CSM.

2.0 Key Terms

- 2.1 “Final” – Incorporated “As-Built” information to reflect exact condition of building.
- 2.2 “Record As Built” – Redline documents obtained from the general contractor reflecting the changes made during construction that deviate from the construction documents.
- 2.3 “AutoCAD” - CAD software from Autodesk.
- 2.4 “CAD” - Computer Aided Drafting.
- 2.5 “CD” - Construction Documents.
- 2.6 “DD” - Design Development.
- 2.7 “DWG” - AutoCAD file format.

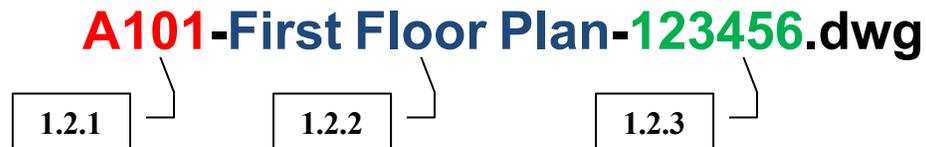
3.0 Software

- 3.1 The primary design software for M.D. Anderson is AutoCAD based and includes AutoCAD Architecture and AutoCAD MEP.
- 3.2 **If this document is more than 6 months old, please contact the MD Anderson-CSM for possible changes to the version supported information.**
- 3.3 As of December 13, 2024, the currently applied software is the 2023 version.

Section III CAD File Management

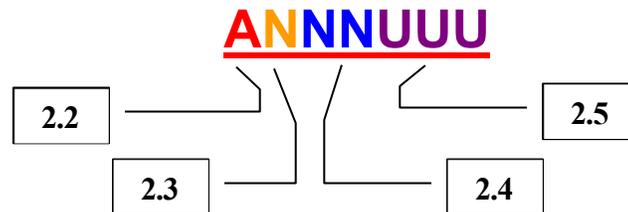
1.0 File Name Convention

- 1.1 File names are applied to support identification and document management requirements for MD Anderson. The intent of the file name is to reflect the sheet and subject information that the file represents.
- 1.2 Drawing file names should, at minimum, consist of:
 - 1.2.1 Sheet number for the project
 - 1.2.2 Sheet title
 - 1.2.3 MD Anderson project number (optional)



2.0 Project Sheet Name Convention

- 2.1 All Project sheets shall follow the standard format described in the National CAD Standard. An example is below.



- 2.2 The first one (1) alpha character denotes discipline. See Table III.3 (verify) for discipline value list.
- 2.3 The next one (1) numeric character describes sheet type. See Table III.4 (verify).
- 2.4 The next two (2) numeric characters denote the sheet sequence in the project set. Valid number values are “01” through “99”.
- 2.5 The next three (3) optional user defined alphanumeric characters are for use with supplemental drawings or phased work.

Sheet Type Designators		
0	General	Cover, Index, Legend, Abbreviations, Code, Locations, Fire/Evacuation, ADA General Notes,
1	Plans	Floor, Partial Floor, Demo, RCP, Roof, Foundation, Site, MEP, Life Safety
2	Elevations	Exterior, Interior, MEP
3	Sections	Building, Wall
4	Large Scale	Enlarged Floor, Toilet Plan, Stair Plan/Sections, Casework Elevations/Sections
5	Details	Site, Foundation, Roof, Ceiling, Column, Wall, Partition Types, Door, Window, MEP
6	Schedules Diagrams	Room Finish, Door, Window, MEP
7	Other	
8	Other	
9	3D	Isometrics, Perspectives, Photographs

3.0 Project Delivery

- 3.1 Consultants and related business partners are required to produce CAD drawings for any new construction or alterations/additions to existing facilities.
- 3.2 Project construction CAD drawings including floor plans, Life Safety, MEP systems, other systems, and Site Information (as applicable) shall be provided to the MD Anderson project manager during the project.
 - 3.2.1 Graphics representing the physical world shall be present in the model space.
 - 3.2.2 Graphics in model space must align to the same project origin point from file to file.
- 3.3 Project “Final” CAD Drawings shall be provided upon completion of the project to the MD Anderson project manager.
- 3.4 Project “Final” CAD Drawings shall include, at a minimum, all drawings that comprise the CD set
- 3.5 Project “Record As-Built” PDF drawing files shall be provided upon completion of the project to the MD Anderson project manager. Refer to Specifications 01 77 00 and 01 78 39 for requirements.
- 3.6 Projects requiring the subject information to be divided into sections on multiple sheets shall have a single CAD file representing the complete discipline subject information for each floor level provided, in addition to the CAD files for each sheet.
- 3.7 Each sheet shall be submitted in a separate CAD file.
- 3.8 All reference files shall be bound to sheet files.

- 3.9 Projects that utilize reference drawings or photos shall include all reference files with each project delivery.
 - 3.10 Projects using object linking and embedding (OLE) shall provide the reference files. The use of OLE should be avoided if possible.
 - 3.11 Projects that utilize font, linetype, and shape files not defined by this manual shall include such files in the project delivery.
 - 3.12 Expected CAD drawing delivery schedule:
Refer to Division 00 and 01 for information.
 - 3.13 CAD drawing files shall be delivered to MD Anderson using one of the following:
 - 3.13.1 CD-ROM or DVD-ROM
 - 3.13.2 Other delivery media may be used with approval of the MD Anderson-CSM
 - 3.14.4 MD Anderson PMIS System
 - 3.14 Project delivery media shall be clearly identified with external labels, a delivery index, and the appropriate electronic delivery description file stored on each media item.
 - 3.15 The description information shall include:
 - 3.15.1 Project identification (Name and MD Anderson Number)
 - 3.15.2 Drawing List with drawing description
 - 3.15.3 Associated support files and their support role
- 4.0 File Translation
- 4.1 Drawing Deliverables
 - 4.1.1 MD Anderson recognizes that many of its design and construction firms do not use the same version of drawing authoring software. MD Anderson expects that service providers who work with other file formats will submit DWG formatted CAD files upon project closeout that are fully compliant with all the standards outlined herein, and which have no significant loss of drawing entities or project data that can result from standard CAD file translation procedures.
 - 4.1.2 All DWG files and CAD drawing entities submitted at the end of a project must be able to be manipulated using standard AutoCAD drafting procedures. **Non-compliance with this policy may result in the rejection of CAD files submitted at project closeout in addition to delayed rendering of final project payment.** DXF files will not be accepted at project closeout as a substitution for DWG CAD file deliverables.
 - 4.2 Translation Testing Recommended
 - 4.2.1 For firms translating their native CAD file format into DWG format concerned about delivering compliant CAD files to MD Anderson upon project closeout, it is strongly recommended that thorough file translation testing be conducted early in the development of the project. This will assure early detection of file conversion issues, if any, and allow for corrective measures

to be taken before the project closeout period.

- 5.0 Project Source Data
 - 5.1 MD Anderson provides consultants and related business partners with copies of drawing files for reference only with no liability for their accuracy of the data for purposes of building construction.
 - 5.2 All consultants shall be required to carry out the normal standard of site investigations as required by their profession and in accordance with their conditions of contract.

Section IV CAD File Development

- 1.0 General Drawing Requirements
 - 1.1 All drawings final output should be on D size, 24" x 36", paper. Other standard sizes may be used in accordance with requirements described in later headings.
 - 1.2 The English language shall be used on all drawings, sketches, charts, and associated documents.
 - 1.3 All title blocks shall be of MD Anderson standard design layout.
 - 1.4 All drawings shall use MD Anderson standard layers and linetypes as described in later sections of this manual.
 - 1.5 Revisions to drawing data shall be identified by a revision cloud.
 - 1.5.1 One revision triangle with identification number corresponding to the revision number shall be placed in the cloud line.
 - 1.5.2 A description for the revision number shall be entered in the title block revision history.
 - 1.6 Space Inventory requirements for building floor plans.
 - 1.6.1 All room numbers and the useable floor area in square feet shall be noted on floor plans.
 - 1.6.2 A polyline shall outline the room along the inside face of the walls.
 - 1.6.3 The polyline shall be drawn on a separate layer, as indicated in the layer list.
- 2.0 Drawing Titleblock
 - 2.1 MD Anderson approved titleblocks are available
 - 2.1.1 In house through standard drawing templates and menu tools
 - 2.1.2 Externally under Supplemental Resources on the Owners Design Guidelines website
 - 2.2 The standard titleblocks developed for MD Anderson utilize features available in the AutoCAD 2023 version and up to current design software.
 - 2.2.1 The use of "Fields" for attribute values allows for automated titleblock information control and integration into other software features like the Project Navigator.

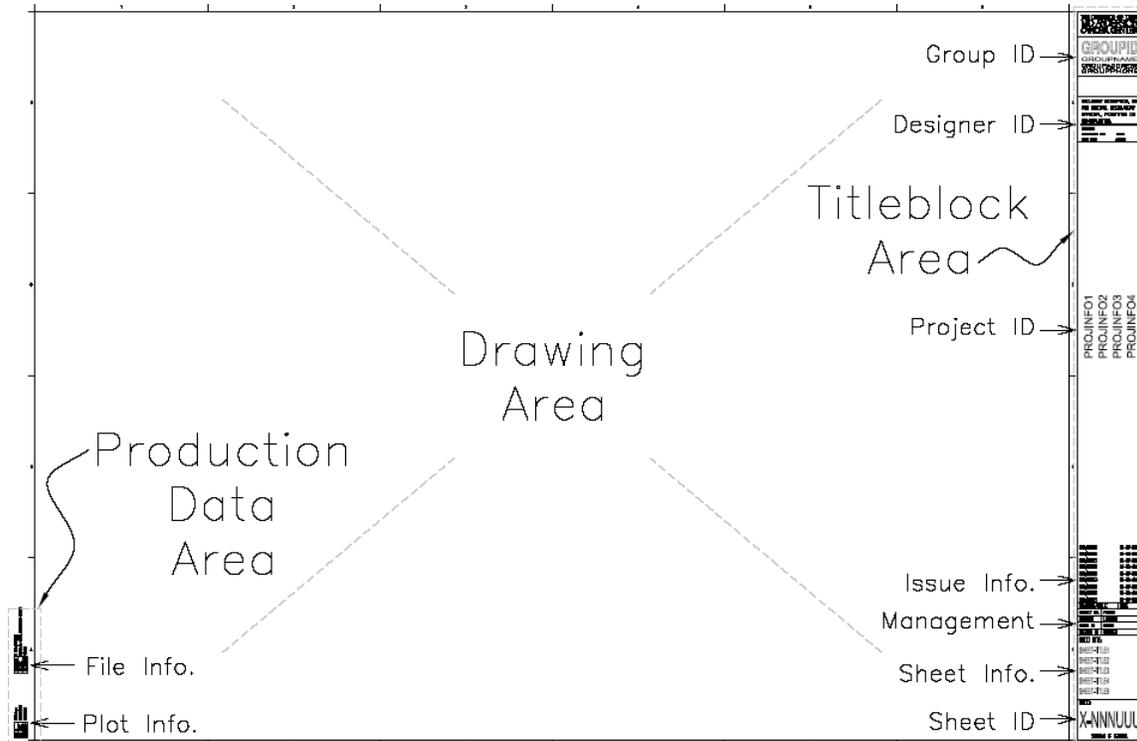


Figure 4

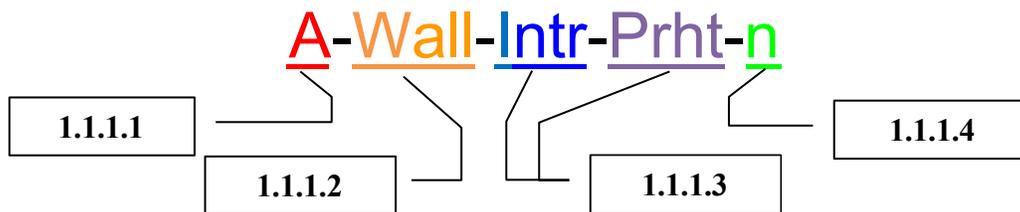
- 2.3 Title Block Area: That portion of a sheet containing project, client, designer, sheet identification and sheet management information. Title block area consists of several data blocks.
 - 2.3.1 Group ID – Institution Logo, Department logo, Name, Address, contact numbers
 - 2.3.2 Designer ID – Designers name and registration number, Professional seals, Issue Type and Date
 - 2.3.3 Project ID – Project description provided by the project manager
 - 2.3.4 Issue Information – Chronological issue of, and revisions to, the sheet.
 - 2.3.4.1 The initial entry shall be placed at the bottom of the issue list with subsequent entries placed above each previous entry.
 - 2.3.4.2 Two columns describe the issue information: Revision/Issue and Date.
 - 2.3.5 Management – Information generally used for project filing, record keeping, or other project management information.
 - 2.3.5.1 Information includes Project Number, Project Location, Drafter’s and Checker’s identification.
 - 2.3.6 Sheet Information – Type of information presented on the sheet.
 - 2.3.7 Sheet ID – Sheet Type designator, Sheet sequence, Total sheets with the set

- 2.4 Production Data Area: That portion of the sheet containing file and plotting information. Two pieces of information make up this area.
 - 2.4.1 File Information – Layout name, File name, File location
 - 2.4.2 Plot Information – Plot by, Plot device, Last plotted date
- 2.5 Production data is typically covered with the binding strip once a project sheet set has been assembled.

Section V Layers

1.0 Requirements

- 1.1 Layers are based on the AIA CAD Layer Guidelines found in the United States National CAD Standard.



- 1.1.1 There are four defined layer name data fields:
 - 1.1.1.1 Discipline Designator – required, one (1) character
 - 1.1.1.2 Major Group – required, four (4) character
 - 1.1.1.3 two Minor Group – optional, four (4) character
 - 1.1.1.4 Status – optional, one (1) character

- 1.2 All components of the drawing subject to service shall be drawn on layers to allow an accurate transfer of data to MD Anderson.
- 1.3 Layer requirements not met by the layer list provided shall be addressed through the MD Anderson -CSM.

2.0 Color and Linetype

- 2.1 Layer color shall be assigned as defined in the layer list.
- 2.2 Linetypes shall comply with linetype name and graphics indicated for each layer.
- 2.3 Consistent color and linetype is necessary to convey system information when viewing and plotting the CAD file.
- 2.4 Object property definitions should be set to “ByLayer”. Properties of objects should not be forced.
- 2.5 Linetype requirements not met by the linetype list provided shall be addressed through the MD Anderson -CSM.
- 2.6 A customized ACAD.lin file is available with AutoCAD line type definitions for MD Anderson custom linetypes.
 - 2.6.1 This file is available under Supplemental Resources on the on the Owners Design Guidelines website.
- 2.7 Linetypes of object shall be set to “ByLayer”.
- 2.8 Linetype scale should be set to “1” for all drawing objects.
- 2.9 The system variables LTSCALE, PSLTSCALE, and MSLTSCALE should all be set to 1, allowing for proper display of lines in both Model and Paper Space.

3.0 Lineweight and Plot Styles

- 3.1 MD Anderson "Master" Existing Condition drawings use AutoCAD "Style Based" plotting (using stb files). This allows the plotted output to be controlled by lineweight and plot style.
- 3.2 Lineweight and plot style shall be assigned as defined in the layer list.
- 3.3 Lineweight and plot style of objects shall be "ByLayer".
- 3.4 Drawings are intended to be plotted using the "AEC Standard" plot style table for black and white plots and the "AEC Standard Color" plot style table for color Plots. (To date, these files have not been modified from the AutoCAD supplied files provided with the 2023 version.)
- 3.5 Consistent lineweight and plotstyle is necessary to provide consistent plotted output.

4.0 Layer List

- 4.1 MD Anderson layers are primarily taken as supplied by the vertical AutoCAD Architecture and MEP software.
- 4.2 Where necessary MD Anderson has modified or added to meet the needs of the business while following the standard identified in this manual.
- 4.3 See Appendix A for the MD Anderson CAD Standard Layers.

Section VI Content

1.0 Requirements

- 1.1 Content (symbols, blocks, styles, devices, and other objects) should be used in creating drawings.
- 1.2 Where MD Anderson specifies a particular block or object it should be used.
 - 1.2.1 The application of MD Anderson standard Content will be determined on a project by project basis.
- 1.3 Available standard Content from MD Anderson are identified in the Standard Content Matrix below.
 - 1.3.1 Files are located under Supplemental Resources on the Owners Design Guidelines web site.

Standard Content Matrix

Discipline	AutoCAD 2D	AutoCAD Object (for ACA/MEP)	Revit Family	
General	Yes	None	N/A	
Architectural	Yes	Yes	N/A	
Interiors	Yes	None	N/A	
Fire Protection	Yes	Yes	N/A	
Mechanical	Yes	None	N/A	
Plumbing	Yes	Yes	N/A	
Electrical	Yes	Yes	N/A	
Telecommunications	Yes	None	N/A	
Security	Yes	None	N/A	
Life Safety	Yes	None	N/A	

Section VII Settings

2.0 Requirements

- 1.1 Settings are used to establish the basic drawing format. While the specific settings shown are for AutoCAD, the intent is to provide consistent graphic output.

3.0 Settings

1.1 Text Style

- 1.3.2 Fonts used shall be standard AutoCAD or Windows installed.

- 1.1.1 Size shall be minimum 3/32" plotted at full scale.

1.2 Drawing Units

- 1.3.3 Unit are Inches

- 1.3.4 Type is Architectural

- 1.3.5 Precision is 1/256"

- 1.3.6 Angle Type is Decimal Degree

- 1.3.7 Direction for Angle is Counter Clockwise

1.3 Drawing Units Other

- 1.3.1 Civil and Site should use the units as needed for their disciplines.

Appendix A MD Anderson CAD Standard Layers

Layer list can be found in a separate file located under Supplemental Resources on the Owners Design Guidelines web site.