

CP & DCM CAD STANDARDS MANUAL

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Overview

These CAD Standards developed over a series of meetings between the fall of 2020 into the summer of 2021 with representatives from Campus Planning, DCM, and Space Planning with the aim to provide consistent graphics and efficient tools in AutoCAD. After reviewing previous CAD Standards, the committee determined that this CAD Standard should be lean and not burden users with new and lengthy procedures. Instead, the standard should provide simple solutions for common issues.

Meetings focused on clarifying functional and graphic needs in the following areas: Layers, Title Blocks and Layouts, Text and Dimension Styles, and Annotative Scaling. Coming together to discuss these topics, techniques in current practice and desired procedures informed the development of the CAD standard and determined what features were necessary and which could be omitted.

Meeting agendas and minutes as well as materials used in the development of this standard can be found in the directory: **N:\BIM-CAD Standards Working Group\CAD Standards Working Group**

Thanks to the CAD Standards Work Group for their representation and input in the development of these Standards: Rommel Cordova-Fiori, Nan Wang, Mark Dunn, William Lizotte, Ludmilla Pavlova-Gillham, and P. Alexander Stoicheff. The development of the DWG and the resources explaining the CAD Standard are the work of P. Alexander Stoicheff.

I. Copying the Folder

1. To setup the CAD_template for use on your project:
 - a. Begin by copying the entire folder, *"2021_CAD_Template"* into your personal directory before copying it into the directory where you are currently working.
 - i. Right-click, copy. And then right-click paste into your directory.

- ii. The CAD Template can now be copied from your directory each time you need to use it. You can add sub-folders and other resources as you see fit to organize your projects.
 - b. Copy the 2021_CAD_Template folder from your personal directory into your working directory.
 - c. In the 2021_CAD_Template folder, right click the 2021_CAD_Template.DWG file and rename it appropriately for your project.
2. The template DWG is renamed for your project, and you may choose to rename the folder, or to drag the newly named DWG into a Work-files sub-folder of your current project.
 3. The template can now be opened for use.

II. Resolve Missing References

1. Reference files in the template are in the 'Resources' sub-folder in the 2021_CAD_Template folder.
 - a. If prompted by this window, click "Open the External References palette" (**Fig.1**)

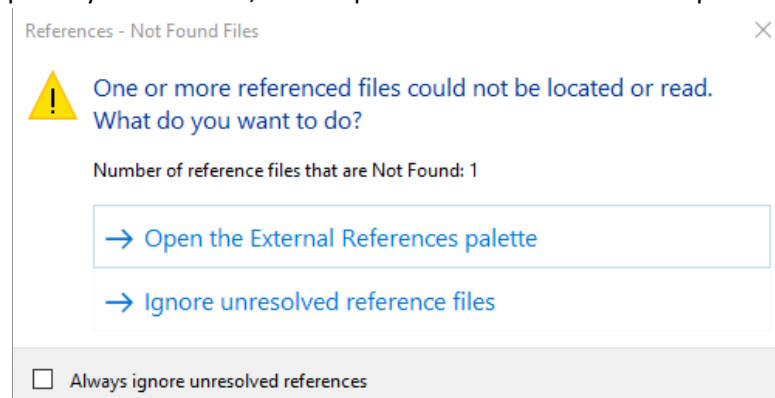


Fig.1

- b. Otherwise, type, **XREF** into the command line and press enter to open the External References panel.
 - c. Review the File References and look for an exclamation mark indicating a missing reference. Right-click the missing reference in the File References window, and click the option, "Select New Path..." that will open a browser for you to identify the location of the missing reference. (**Fig.2**)

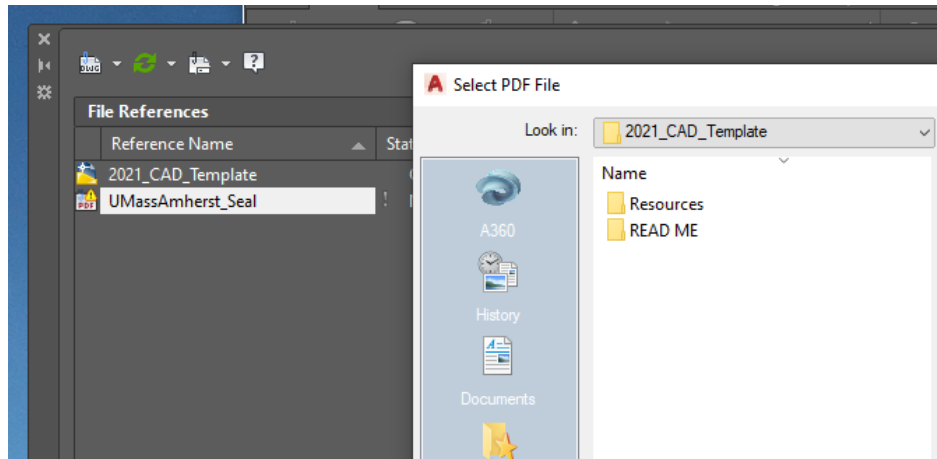


Fig.2

- d. Locate the directory where you copied the “2021_CAD_Template” folder, open it and then go into the sub-folder, “Resources”, look here for missing reference files. **(Fig.3)**

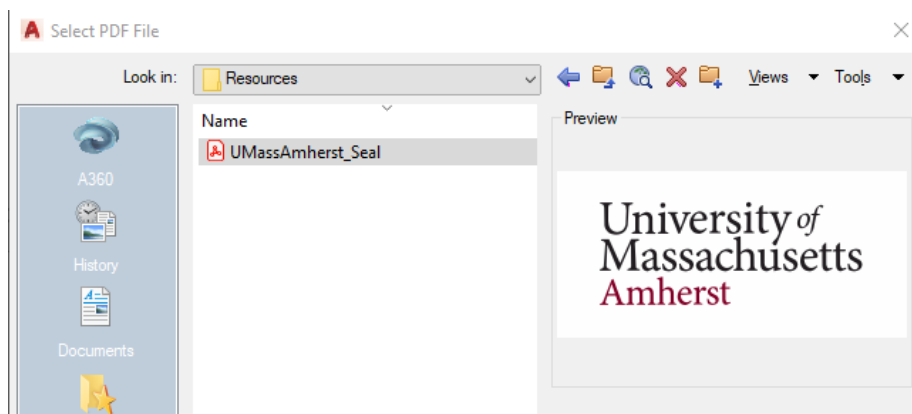


Fig.3

*To see how to load missing plot styles/ .ctb, see Loading Plot Styles

III. Loading Plot Styles

1. The 2021_CAD_Template comes with a Plot Style (.ctb) file “2021_CAD”. It has the Plot Styles from the Space_Planning.ctb and the pen-assignments used by Campus Planning.
 - a. 2021_CAD.ctb is located in the “Resources” sub-folder
2. To load a Plot Style to your AutoCAD:
 - a. Open the sub-folder “Resources” in the 2021_CAD_Template Folder
 - i. Click on the CTB file 2021_CAD and right-click, copy (ctrl+c)
 - b. In AutoCAD, on the command line, type **STYLESMANAGER**
 - c. This will open the directory where AutoCAD loads your plot-files **(Fig.1)**
 - d. Right-click, ‘paste’ (ctrl+v) the CTB file from Resources into this directory.

- i. *This is the process for loading any CTB file into your AutoCAD

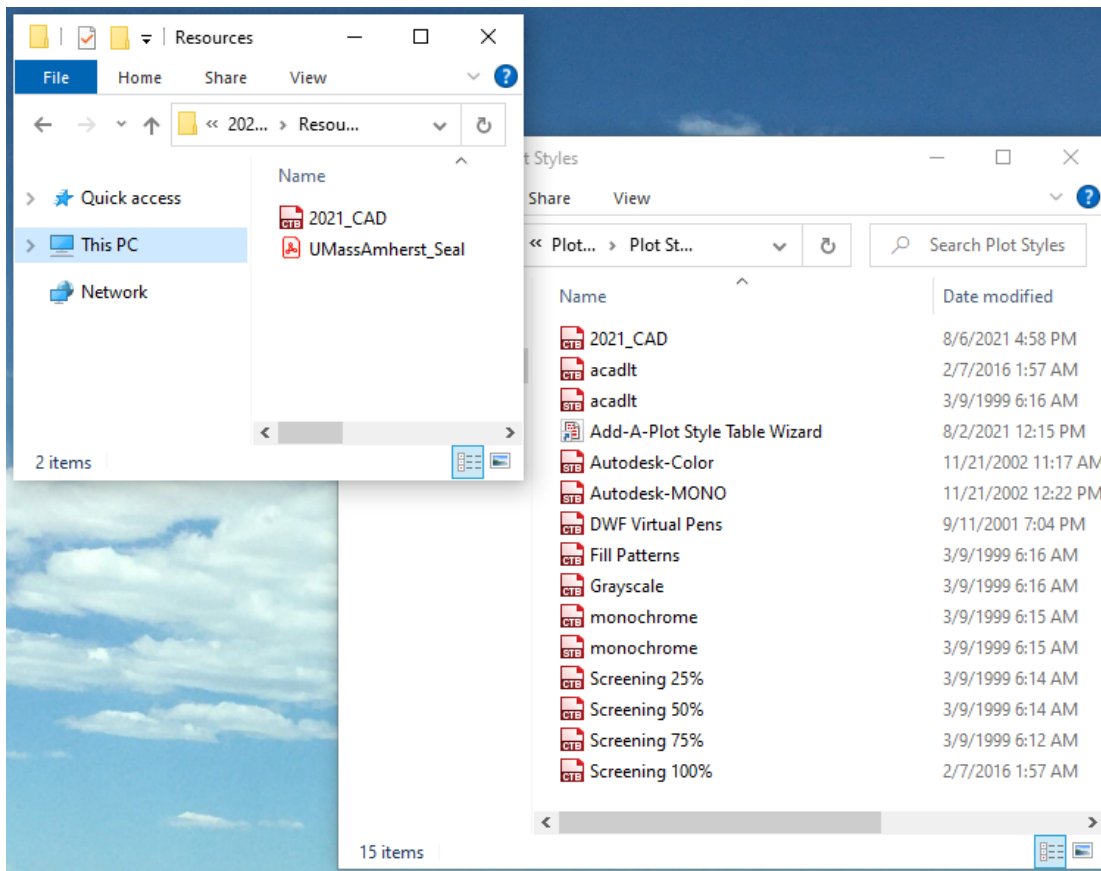


Fig.1

IV. Layers and Group Filters

1. Basic concept
 - a. Organization of the layers
 - b. The tab at the top is now limited to only the layers in the group you have selected
2. Managing Group Filters and Layers
 - a. To make a new layer, right-click in a blank space in the group filter and select new layer, and type a name for your layer. It will automatically be included in your Group Filter.
 - b. The other way to manage Layers is to create new group filters for specific tasks or for drawings that come from other agencies. Right-click on 'All' under the Filters side-bar, and select New Group Filter and give your group a name.
 - i. You can drag and drop layers from any group into your new filter. Layers will not be removed from the group filter that you selected them from. This is the process for making a group filter that is for a specific task. Consider dragging all layers *A-Detail-1* through *A-detail-5* into their own group while drawing details in order to have a slim number of layers in the drop-down menu.

- ii. The other option is to right click on your new Group Filter, and at the bottom click 'Select Layers' 'add'. This allows for the layers to be selected from model space by clicking the geometry individually or by drawing a window and selecting all layers within the window.
 1. ***This is absolutely the best thing to do after pasting a drawing into modelspace from somewhere else. It allows you to analyze what layers are being used, and provides an easy way to turn these layers on and off while you work.**

*A LIST OF LAYERS IS INCLUDED AT THE END OF THE DOCUMENT

V. Layout Space

1. Layouts of various sizes with Title Blocks, graphic scales, North Arrow, and the University Seal are included in the template as tabs at the bottom of the window.
 - a. If the seal is missing, follow the instructions in the section, '*Resolve Missing References*'
2. Open the 'Layout' Group Filter under Layer Properties Manager **Type LA into the command line, or click the 'Layer Properties' icon at the center of the Home Ribbon. (Fig.1)*

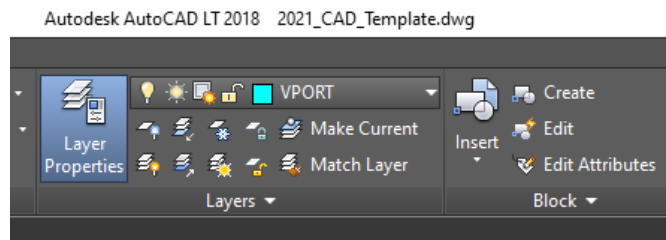


Fig.1

- a. All viewports are assigned to layer 'VPORT' **(Fig.2)**
- b. While working in the Group Filter, 'Layout', you can remove the layers that are not used by your department.

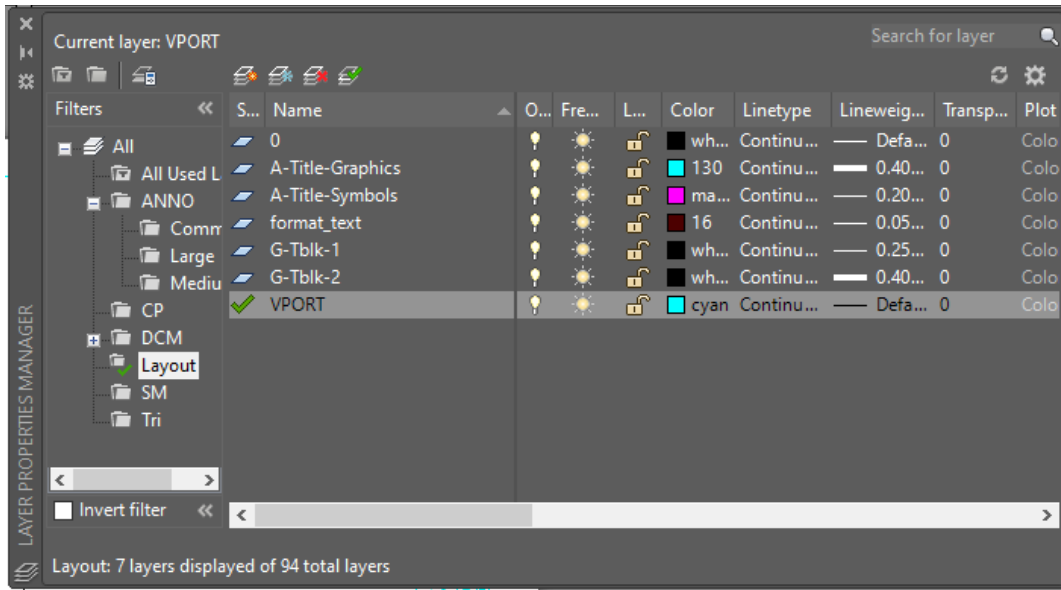


Fig.2

VI. Text and Dimension Styles

1. Styles are presets that designate the attributes for text and dimensions.
 - a. Including: text font, height, and if it has *Annotative Scaling* (the ability to maintain a consistent PaperSpace height (size on the paper) across viewports of different scales)
2. Read this section and the section on Annotative Scaling to learn how to use styles
3. Styles can be viewed/selected on the Annotate tab on the ribbon (**Fig. 1**)
 - a. *see next to Multiline Text, UMass Notes
 - b. *see next to Dimension, Dim-2021
 - c. *notice that both style titles have a Blue Cross-section of a Scale- this indicates that the styles are designed for annotative scaling
 - i. For more information on the significance of the Blue Scale, see the section on Annotative Scaling

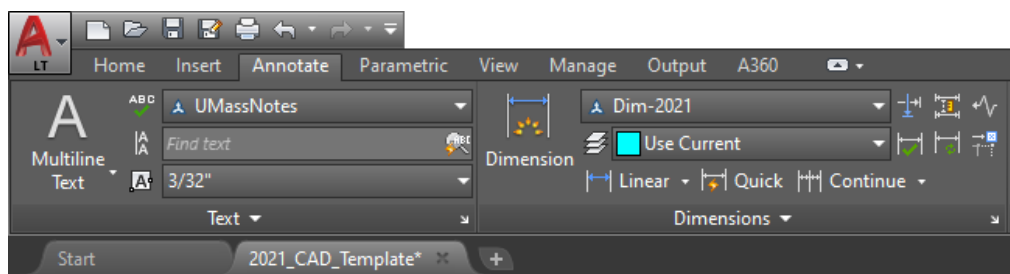


Fig. 1

4. Click on the drop down menu to view the available styles
 - a. Those styles with a Blue Scale are to be used while in ModelSpace
 - b. The names of the styles directly correspond with layer names found in the 'ANNO' Group Filter

- i. Select the Layer, and then select the associated style while writing MText

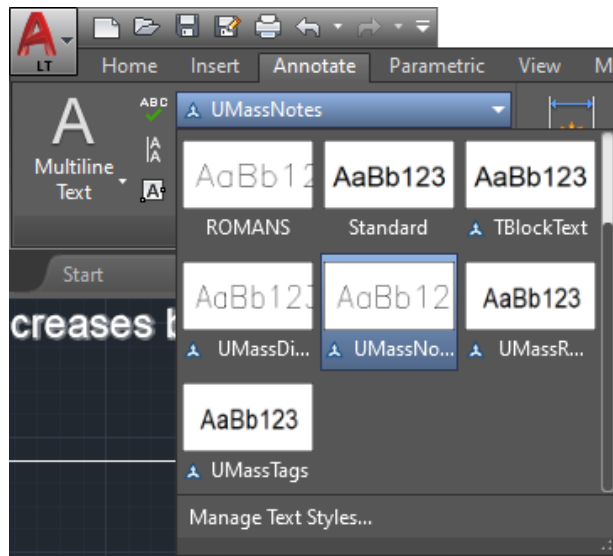


Fig. 2

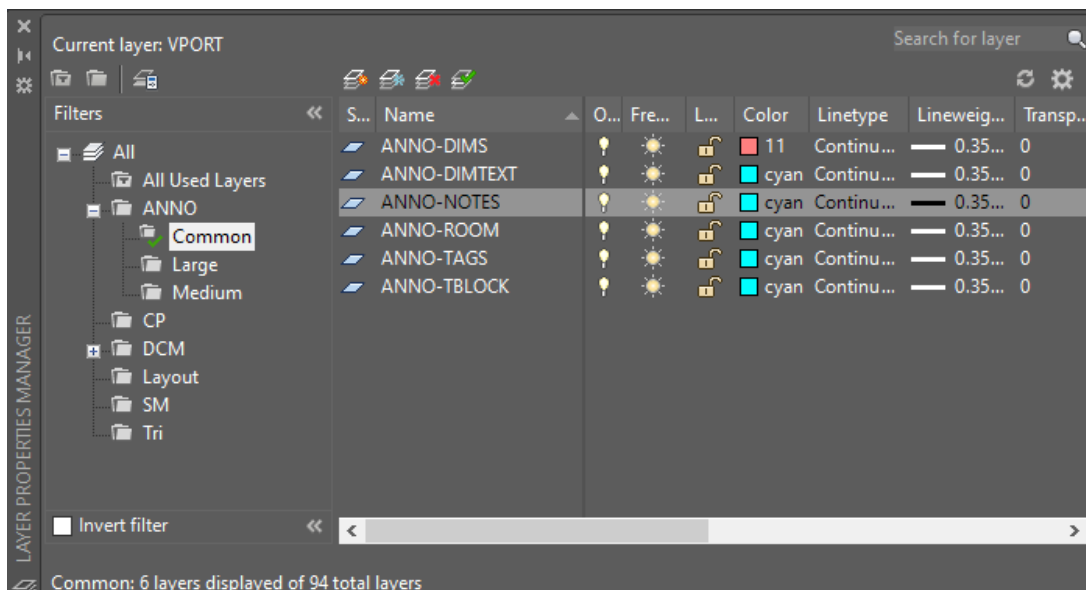


Fig. 3

- c. The Dimension Style, Dim-2021 is automatically applied to all dimension commands.
 - i. The text style, UMassDim Text is used by this style
5. The text styles are:
 - a. **UMassDimText**
 - i. Paper Text Height: 1/8"
 - ii. Use: displaying the numbers between dimension lines
 - iii. Use: special notes between dimension lines

- b. **TBlockText**
 - i. Paper Text Height: 3/16"
 - ii. Use: adding titles
- c. **UMassTags**
 - i. Paper Text Height: 3/32"
 - ii. Use: wall and material tags, window types, etc.
- d. **UMassNotes**
 - i. Paper Text Height: 3/32"
 - ii. Use: general notes
- e. **UMassRoom**
 - i. Paper Text Height: 1/4"
 - ii. Use: room names and numbers

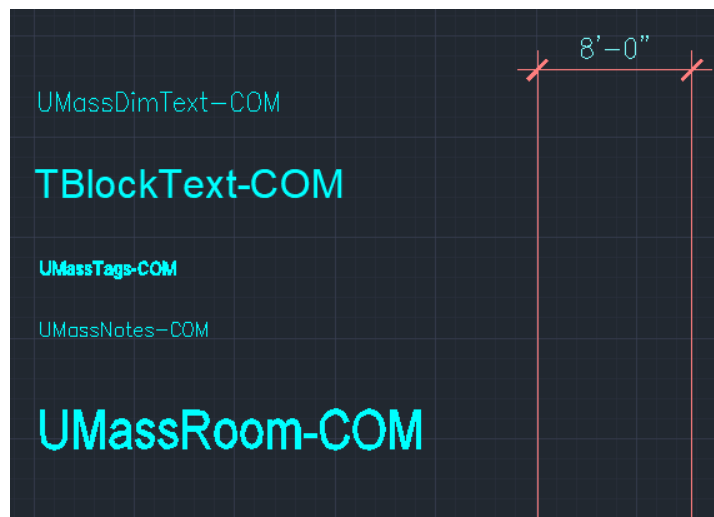


Fig. 4

VII. Annotative Scaling

1. Annotative scaling is a feature of Styles that sets a specific height for an object in ModelSpace that will reference a preset height (based on an applied Style) when viewed in a Viewport in PaperSpace. Thus, a Room Number that appears in a viewport at 1/16" = 1'-0" also appears at the same height on the sheet in a 1/4"=1'-0" viewport.
 - a. In this template Annotative Scaling is applied to Text and Dimension Styles.
 - b. Text and dimensions do not scale with the model. Instead their height, determined by their style, is consistent across the scales that they are set to appear.
2. Annotative Scaling Requires a small set of procedures to work correctly
 - a. The annotative scale of Modelspace should be set to the Scale of the viewport in which the geometry will appear.
 - i. Annotative objects are determined by their Text Paper Height

1. For example, UMass Notes print at $\frac{3}{32}"$, so if ModelSpace annotation scale is set to 1:1, any text will be unreadable as it will appear invisible in relation to a 20' length of wall (**Fig. 1**)
2. Thus, changing the annotation scale of ModelSpace reduces the size of geometry, but not the size of Styles with Annotative Scaling
 - a. See how in the images bellow the font becomes legible as the ModelSpace annotation scale is adjusted to $\frac{1}{4}" = 1'-0"$ (**Fig. 2**)

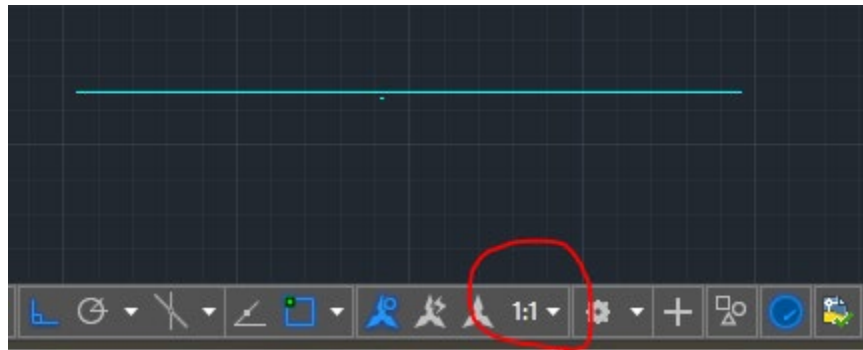


Fig. 1

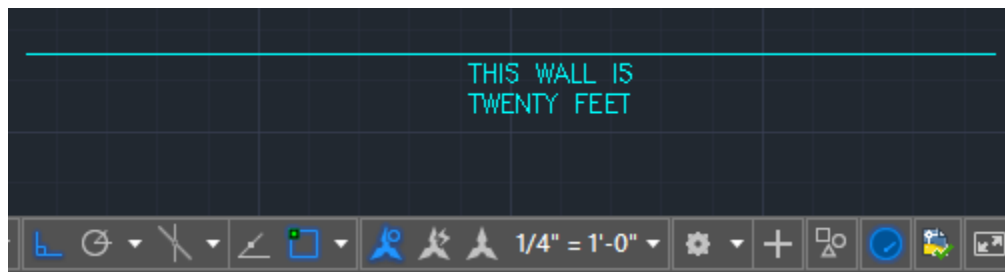


Fig. 2

- ii. So if the viewport is displaying at $\frac{1}{4}" = 1'-0"$ on a Layout in PaperSpace, ModelSpace annotation scale should be adjusted at the bottom right from 1:1 to $\frac{1}{4}" = 1'-0"$ at the bottom right corner of the screen (**Fig. 3**)
- iii. Be sure that the scale with a circle is activated (displayed blue)

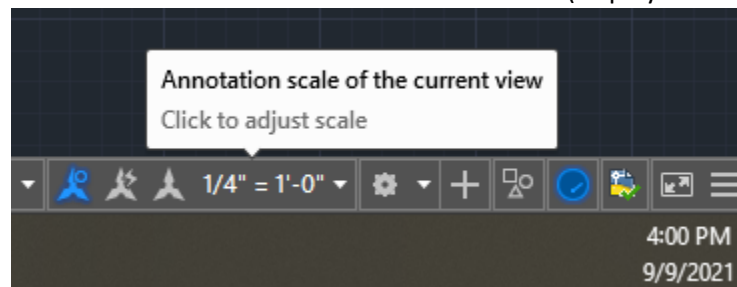


Fig. 3

3. Set the MText to the Annotation Scale in its properties window
 - a. Type **MO** to open the Object Properties window and click your text to see its properties (or right click on the MText, 'Properties')
 - b. Under 'Text' be sure that you are using the appropriate style, that it is annotative (symbolized by the cross-section of the scale), and click on 'Annotative scale' and a small rectangle should appear to the right (**Fig. 4**)
 - c. Click this rectangle, and a window openings, "Annotation Object Scale"
 - d. Click add, "Add Scales to Object" window opens, and add the scales (by double clicking them) that relate to the viewports where you want the object to appear
 - i. In the case of this example, we'll add 1/4"= 1'-0" and 1/8"=1'-0"
 - ii. We can add as many scales as we choose

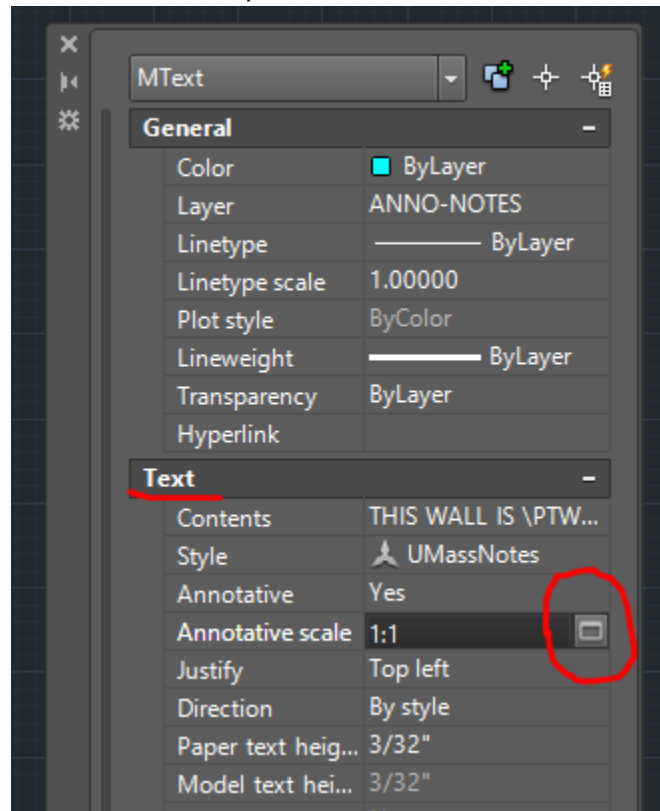


Fig. 4

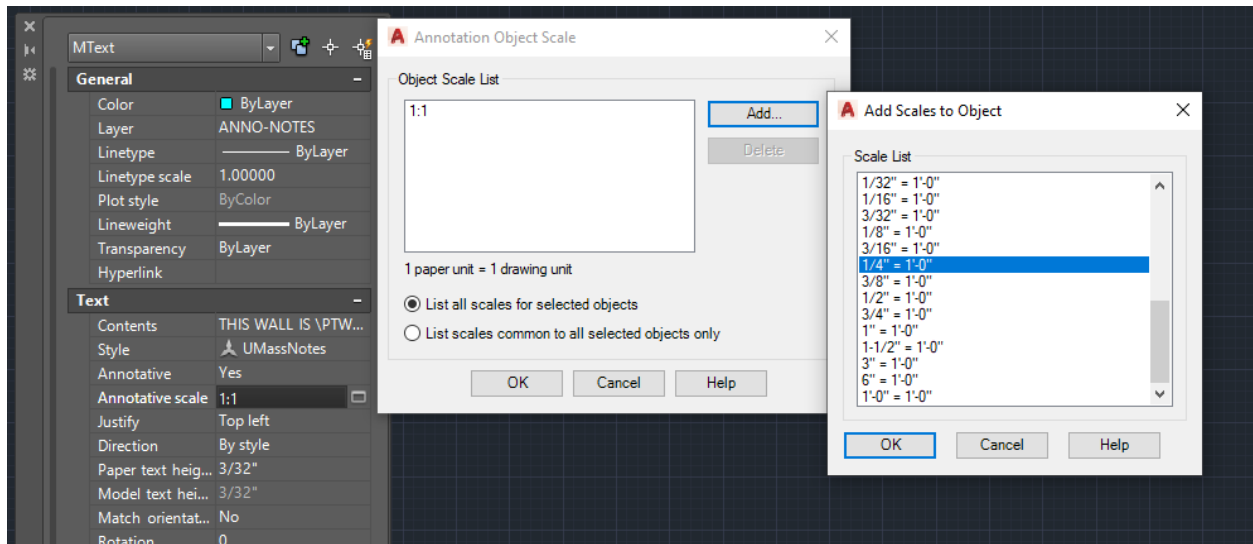


Fig. 5

4. Looking at a Layout with two viewports, on the left at $1/4" = 1'-0"$ and at the right at $1/8" = 1'-0"$ we can see the result: the cyan line changes scale while the text objects appear exactly the same size ($3/32"$) (**Fig. 6**)
 - a. Dimensions added to clarify the effect of annotative scaling

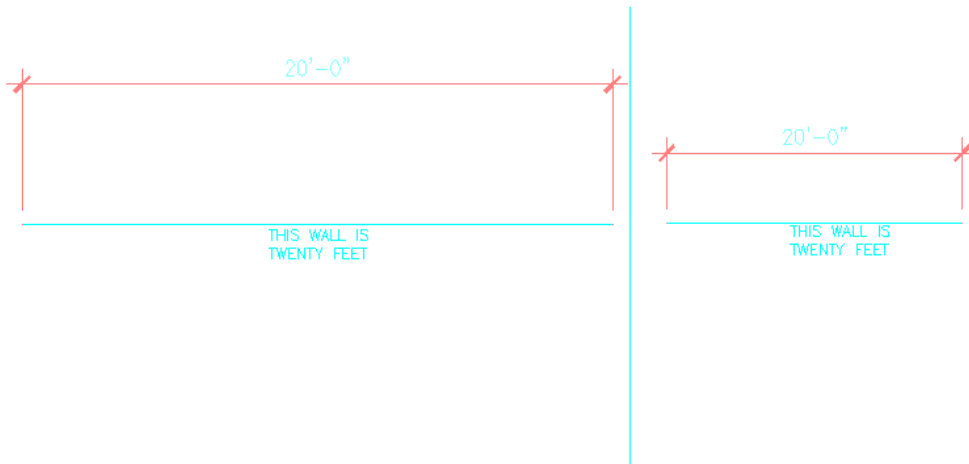


Fig. 6

ADDITIONAL EXAMPLE

*This section is an example that further demonstrates how annotative scales can be used to allow text to appear exclusively in viewports of the selected annotative scale

1. MText is written while the scale of the ModelSpace is set to $1/4" = 1'-0"$
 - a. The MText will automatically adopt $1/4" = 1'-0"$ as its annotative scale (**Fig. 7**)
 - i. This is a feature of the Text Style being Annotative.

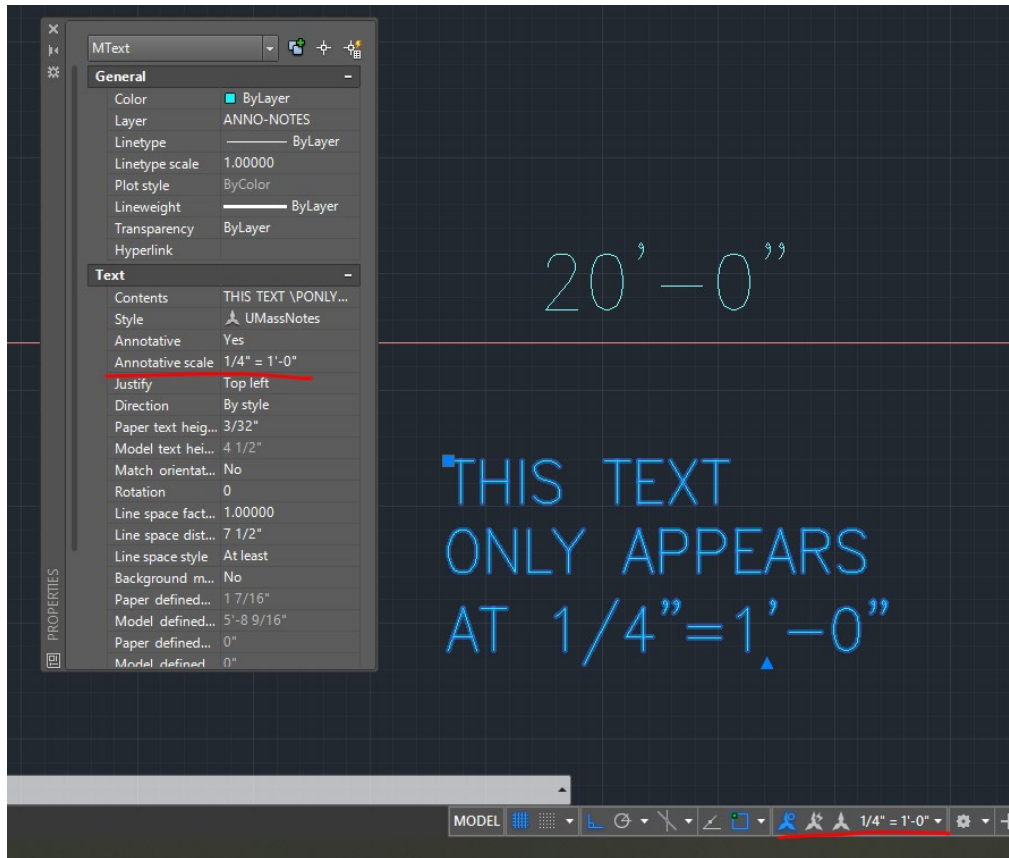


Fig. 7

- Without adding an $1/8"-1'-0"$ (through the procedures mentioned above) the text does not appear on viewports that are not $1/4"-1'-0"$ Fig. 8

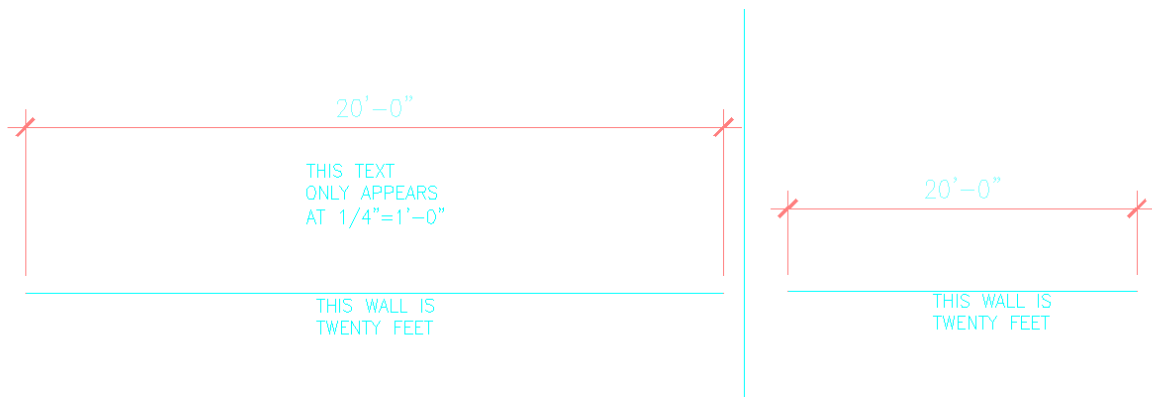


Fig. 8























BEST PRACTICE

- Make all drawing at 1:1 scale in ModelSpace
- Establish the viewports that will appear in your layouts
- Adjust the ModelSpace scale to match a layout

4. Make all notes, dimensions, etc. while ModelSpace is set to that scale
 - a. Because the annotation scale is automatically added as demonstrated by this example
5. When all annotation has been added that is needed to appear at the specific scale, decide if any annotation is needed to appear at other scales, and add those scales from the properties window
 - a. *Annotation Scales can be copied from one annotation to another using the **Match Properties (MA)** command

2021 CAD TEMPLATE LAYERS

CAMPUS PLANNING

| | | | | | |
|---|---|---|---|---|-------------|
|  |  |  |  |  | a-demo |
|  | | | | | a-furn |
|  | | | | | a-furn-add |
|  | | | | | a-furn-anno |
|  | | | | | a-lockable |
|  |  |  |  |  | a-overhead |
|  | | | | | a-wall-new |
|  | | | | | a-rev_cloud |
|  | | | | | hatch_walls |
|  | | | | | a-furn-add |
|  | | | | | a-wall-new |
|  | | | | | hatch_1 |
|  | | | | | hatch_2 |
|  | | | | | hatch_walls |

DCM

| | |
|--|-----------------------|
| | A-Ceiling-Soffit |
| | A-Demolition |
| | A-Demolition-Plumbing |
| | A-Detail-1 |
| | A-Detail-2 |
| | A-Detail-3 |
| | A-Detail-4 |
| | A-Detail-5 |
| | A-Detail-Break-Line |
| | A-Detail-Hatch |
| | A-Door-Lock-Symbol |
| | A-Door-New |
| | A-Elevation-1 |
| | A-Elevation-2 |
| | A-Elevation-3 |
| | A-Elevation-Existing |
| | A-Floor-Appliances |
| | A-Floor-Area |
| | A-Floor-Case-Work |
| | A-Floor-Code-Egress |
| | A-Floor-Hatch |

| | |
|-----------------------|------------------------|
| _____ - - - _____ | A-Structural-Grid |
| _____ | A-Title-Graphics |
| _____ | A-Title-Symbols |
| _____ | |
| _____ - - - - - _____ | DEMO-wall |
| _____ | E-Power-Equipment |
| _____ | |
| _____ | M-EQMT-SHIFT |
| _____ | P-Plumbing-Fixture-New |

SPACE MANAGEMENT

| | |
|-----------------------|------------------|
| _____ | 0 |
| _____ | A-ANNO-TEXT |
| _____ | A-DOOR |
| _____ | A-FLOR-LEVL |
| _____ | A-FLOR-LEVL-TEXT |
| _____ | A-FLOR-PFIX |
| _____ | A-GLAZ |
| _____ | A-WALL |
| _____ | A-WALL-PRHT |
| _____ | |
| _____ | G-Tblk-1 |
| _____ | G-Tblk-2 |
| _____ | |
| _____ | E-EQMT-SHFT |
| _____ | I-FURN-WKSF |
| _____ - - - - - _____ | A-CLNG |