

WEST REGION STANDARDS AND GUIDELINES FOR COMPUTER-AIDED-DRAFTING

To avoid complications due to differing drafting styles using the CAD software available, these standards were created to simplify sharing drawings between states in the West Region.

GENERAL INFORMATION

All drawings and details will be drawn to **REAL WORLD DIMENSIONS**. This allows users to add details and/or symbols without having to manipulate the scale. This also allows users to print/plot on a standard drawing sheet to a given scale. For example, 1 plotted-inch: 100 drawing units means 1" : 100' if the drawing units are in feet.

The Model Space plot factor should be indicated on the drawing as 1 plotted inch = X drawing units considering the appropriate size paper. If paper space is used the plot will be 1 plotted inch = 1 drawing unit.

The suggested Text Style is either **ROMANS** in the vertical position or **ROMANS** with a 22 degree obliquing angle, consistent throughout the entire project. The minimum plotted text height will be .06 inches (or units). The range for small text height is 0.06 to 0.12 inches ; medium text is 1.5 times the small text height used; and large text will equal 2 times small text height. When using a 22x34-inch sheet size, the minimum text height will be 0.12 inches for small text, 0.18 inches for medium text, and 0.24 inches for large text. This allows the text size to meet national standards should the drawing be reduced 50% .

The Hatch Pattern Scale when plotting should normally approximate 1/2 of the plotted scale. For example: plot scale is 1"=100'; therefore, hatch pattern scale is 50.

When drawing in real world dimensions, the line types may appear as continuous lines. The **LTSCALE** (Its command will generally need to be changed from the default value of "1" to "0.5" of the plot scale. (Example: plot scale is 1"=100'; therefore, LTSCALE = 50.) All linetypes need to be representative relative to the drawing geometry. All drawings shall be uncluttered and easily read.

Color and linetypes shall be set to **BYLAYER**. The American Standards Association recommends three line widths for finished drawings: thin, medium and thick. NRCS CAD drawings should follow this convention. The following pen sizes are defined as thin, medium and thick line widths:

PEN ASSIGNMENTS FOR PLOT/PRINT

| SIZE | COLOR | *PEN NO. | LINE WIDTH (Recommended for plot size 22x34) | **ALTERNATE |
|-------|-------------|----------|---|-------------|
| THIN | Color 1 (r) | 7 | Line width .005 in (.127 mm / Leroy size 5x0) | .002 in |
| THIN | Color 2 (y) | 7 | Line width .007 in (.18 mm / Leroy size 4x0) | .003 in |
| THIN | Color 3 (g) | 7 | Line width .010 in (.25 mm / Leroy size 3x0) | .005 in |
| THIN | Color 4 (c) | 7 | Line width .012 in (.30 mm / Leroy size 00) | .007 in |
| MED | Color 5 (b) | 7 | Line width .014 in (.35 mm / Leroy size 0) | .010 in |
| MED | Color 6 (m) | 7 | Line width .020 in (.50 mm / Leroy size 1) | .012 in |
| MED | Color 7 (w) | 7 | Line width .024 in (.60 mm / Leroy size 2) | .014 in |
| THICK | Color 8 | 7 | Line width .028 in (.70 mm / Leroy size 2.5) | .020 in |
| THICK | Color 9 | 7 | Line width .031 in (.80 mm / Leroy size 3) | .024 in |
| THICK | Color 10 | 7 | Line width .047 in (1.2 mm / Leroy size 4) | .028 in |

*Set **Pen No.** to 7 to print black lines when using a color plotter or printer.

The alternate pen widths may be used if your printer prints the recommended lines too thick. **The standard is: Color 1 will be the thinnest line and color 10 the thickest line. Not all brands of printers produce the same line widths—you will need to judge what comes closest to the recommendations, based on drawing clarity, and utilize corresponding line widths accordingly.

After color 10, the pattern is repeated. Example: Color 1, 11, 21, 31...251 will have a line width of .005 in; and Color 2, 12, 22, 32 ...252 will have a line width of .007 in; etc.

SHARING AND ARCHIVING DRAWINGS

Due to the different versions of CAD software and printers/plotters in use, a **CAD Record** shall be included to the right of the title block and placed on layer **cadrec**. This is a permanent record to document pen widths, plot factor, and drawing history. The CAD Record is to be updated by the drafts person at the time the drawing is created or revised. Layer **cadrec** will be left visible (ON) when the drawing is complete and ready for sharing or archiving.

CAD Record

DRAWING INFORMATION

Drafter's name _____ Software and Version _____
 Work phone number _____ English or Metric units _____
 City, State _____ Plotted inches = Units drawn (insert factor/scale)
 Sheet size _____ Factor 1= _____
 Sheet size _____ Factor 1= _____
 Named viewports _____

| SIZE. | COLOR | PEN NO. | LINE WIDTH (Recommended for plot size 22x34) | *ALTERNATE |
|--------------|--------------|----------------|---|-------------------|
| THIN | Color 1 (r) | 7 | Line width .005 in (.127 mm / Leroy size 5x0) | .002 in |
| THIN | Color 2 (y) | 7 | Line width .007 in (.18 mm / Leroy size 4x0) | .003 in |
| THIN | Color 3 (g) | 7 | Line width .010 in (.25 mm / Leroy size 3x0) | .005 in |
| THIN | Color 4 (c) | 7 | Line width .012 in (.30 mm / Leroy size 00) | .007 in |
| MED | Color 5 (b) | 7 | Line width .014 in (.35 mm / Leroy size 0) | .010 in |
| MED | Color 6 (m) | 7 | Line width .020 in (.50 mm / Leroy size 1) | .012 in |
| MED | Color 7 (w) | 7 | Line width .024 in (.60 mm / Leroy size 2) | .014 in |
| THICK | Color 8 | 7 | Line width .028 in (.70 mm / Leroy size 2.5) | .020 in |
| THICK | Color 9 | 7 | Line width .031 in (.80 mm / Leroy size 3) | .024 in |
| THICK | Color 10 | 7 | Line width .047 in (1.2 mm / Leroy size 4) | .028 in |

The standard is: Color 1 will be the thinnest line and color 10 the thickest line. Pattern repeats from color 11 to color 255. To print black lines on color printer the Pen No. is set to 7. *The alternate widths may be used if your printer prints the recommended lines too thick for 8.5x11 or 11x17 sheets.

Additional comments: _____

RECOMMENDED DIMENSION STYLE

| | | | |
|----------------------|---------------|---|-----------|
| Name style | NRCS?? | ?? Would represent the plotted scale of the drawing or detail | |
| Dimension Line | Spacing | 0.375 to 0.50 | |
| Extension Lines | Extension | 0.075 | |
| | Origin offset | 0.075 | |
| | Center mark | 0.10 | |
| Arrows | Arrow size | 1.5 times greater than small text height | |
| Text | Text height | 0.06 to 0.12 (.12 for 22x34 sheet size) or same as small text | |
| | Style | romans (same as small text) | |
| | Vertical | Above (most common agency practice) | |
| | Alignment | Align with dimension line (most common agency practice) | |
| Scale and Colors | Text gap | 0.0625 | |
| | Overall scale | dependent on plot scale of object | |
| | Colors | Dimension Line Color | (color 2) |
| | | Extension Line Color | (color 2) |
| Dimension Text Color | | (color 3) | |

RECOMMENDED LAYER NAMES

Layer names should be descriptive of the objects on that layer.

These following layers can be combined and/or expanded as needed. For example: An existing fence might be on a layer called XIST-FENCE; or, a woody debris structure might be on a layer called STRUC-WOODY.

Use the main item first and expand from there. This allows better layer management since AutoCAD or ACAD LT alphabetizes the layers. An example with expanded hatch layers might be as follows:

HATCH-GABION
HATCH-RIPRAP
HATCH-FILL
HATCH-EXC

New or proposed objects will have a thicker line width than existing objects. Most existing objects will have a line thickness of 0.003 or 0.007 in. In this case, you may want to expand layers with XIST before the main item as follows:

XIST-DIKE
XIST-FENCE
XIST-RIPRAP

(LAYERS CONTINUED)

RECOMMENDED LAYERS/COLORS

| LAYER NAME | DESCRIPTION | COLOR | LINETYPE |
|----------------|--|------------|---------------------------|
| ARW-N | North arrow | 3 | |
| ARW-S | Section arrow | 3 | |
| BLDG | Building | 6 | |
| BORDER | Title block border | 9 | |
| BOULDER | Boulders or large rock | | |
| CL | Centerline | 2 | center |
| CNTY | County lines | 2 | |
| CON_PERMIT | Construction Permit | | dashedx2/dashed |
| CONT | Contour lines | 1 and/or 2 | continuous and/or contour |
| DEFPOINTS | <i>this layer does not plot even when turned on</i> | | |
| DIM | Dimension | 3 | |
| DITCH | Ditch | 3 | trpldot |
| ESMT | Easement | | |
| FENCE | Fence line | 2/3 | |
| GEOLOGY | Geology information | 3 | |
| GRID | Grid lines | 1 and/or 2 | |
| GROUND | Natural ground | 3 | center2 |
| HATCH | Hatch patterns | 1 and/or 2 | |
| HIDDEN | Hidden object lines | 2 or 3 | hidden |
| MTCH | Match lines | | |
| PIPE | Pipeline | | |
| PL | Property line | | phantom |
| PNTS | Points | 1 | |
| REBAR or Steel | Rebar reinforcement | 7 | |
| RIPRAP | Riprap | | |
| RIVER | River boundary | 3 | |
| RLRD | Railroad | 2 | |
| ROAD | Roads | 3 | |
| RW | Right-of-way | | dashed2 |
| SCALE | Bar scale | 3 | |
| SLOPE | Slope arrows | 2 or 3 | |
| STATE | State boundary | 5 | |
| STRUC | Structures | 6 | |
| TBK | Top of bank | 5 or 6 | |
| TBM | Temporary benchmark | 3 | |
| TOE | Toe of slope | 5 or 6 | |
| TXT-L | Large text (2X small text ht) | 7 | |
| TXT-M | Medium text (1.5X small text ht) | 5 | |
| TXT-S | Small text (including dimensions) | 3 | |
| UTIL | Utilities | 2 or 3 | |
| VEGE | Vegetation | 2 or 3 | |
| XIST | Existing | 2 | |

REFERENCES

Where to find information on agency standards and guidelines related to drafting:

- National Engineering Manual (NEM) Part 541, Drafting, (210-541)
- TR-73 Computer-Aided-Drafting Standards
- Engineering Field Manual (EFM) Chapter 5, Part 3
- National Engineering Handbook (NEH) Part 6, Chapter 4.4, Detailing reinforced concrete structures
- General Manual (GM) Part 408, Records, (120-408)
- National Map Symbol Handbook, Title 170, Part 601