6.0 Chapter Six - Drafting Guidelines

This chapter covers guidelines and procedures for composing plan set sheets. Projects Plan sets consist of both planimetric sheets, which contain a plan (overhead) view of a Design model or Specialty Group Design Model and informational sheets that contain graphical or text-only information.

The planimetric sheets should be comprised of Model files drawn in real world coordinates and attached as reference files in real world coordinates to the sheet files, such as a plan and profile or an intersection detail. Informational sheets do not have to contain a plan view, but merely contain text such as General Notes, or details, or for example, a bridge finger joint assembly. These types of details do not need to reside in real world coordinates in either a model file or a sheet file.

It is recommended that text-only drawings are drawn entirely within the Sheet file, with no reference model attachment. If the file consists of text in a tabled format, the text and linework should be drawn on the appropriate Drafting levels. In the case of a finger joint detail, it is recommended that the linework be drawn in a model file, and the text and dimensioning be placed in the sheet file with the MicroStation Dimension Association set. These details will utilize the appropriate Drafting levels.

6.1 Creating New Files

Auto-populated drawing files, created with the use of the Project Creation Utility or drawing files created with the use of Specialty Group Specific Seed files can be used as Sheet files. The use of 2D or 3D files is acceptable at this time, but may change in the future. Review Chapter 5-CDOT Workspace Drafting Standards, Section 5.2 for more information about using seed files.

6.2 Annotation Scale - Model Properties and Linestyle Scale Factor

The Annotation Scale – Model Properties is necessary for defining the scale of text and dimensioning in both sheet files and model files. By default the Annotation Scale Lock is turned on. If text is being placed with the incorrect size, verify that this setting has not been turned off. The default model property setting is 1:100. If a different scaled drawing is desired, the user must edit the model properties. Annotation that has been placed by InRoads does not have model properties applied to it. However, it is acceptable to leave InRoads intelligent text, as InRoads places it. If a different scale is required, the annotation should be redisplayed with the InRoads software and the appropriate Global Scale factor. Review Chapter 5-CDOT Workspace Drafting Standards, Section 5.4.3, for more information about annotation scale.

The linestyle scale factor is required in order for custom linestyles to appear correct when plotted. The default linestyle scale factor is set to 1:100. Linestyles may be drawn or displayed at scale factors equivalent to the annotation scale factor. Only custom linestyles are affected by this scale factor, primitive MicroStation linestyles are not. The setting can be adjusted from the MicroStation pull-down Element > Line Styles > Custom. From this dialog box, the desired scale factor value can be entered. The save settings command must be used for this setting to remain. See Assembling Sheet Files below, for Model file ownership discussion.

6.3 Assembling Sheets Files

Once the sheet file has been created and the model properties set, assembly of the sheets with the use of reference files (where applicable) and standard CDOT Border Files can begin. An important note: planimetric sheets on coordinates should employ the use of MicroStation rotated views, not physical graphical element rotation. Any rotation of graphical elements will remove the real world coordinate values from those elements. The border cell will be inserted at a scale equivalent to the annotation scale, and be placed to encompass the model file. The use of reference file clipping commands will also be required. Review the CDOT Sheet File Creation, CDOT Sheet File Creation Multiple Scales or CDOT Creating Multiple Plan Sheets workflows for additional detail.

The Design Project Manager is responsible for coordinating the scale factors to be used on a project. The files will reside in the appropriate Specialty Group Folder Structure, in the Reference files folder. Each Specialty Group Lead "Owner" will be responsible for providing and maintaining various scaled Model files. For example, the Surveying group will be responsible for the topographic base mapping. If a certain scaled existing Topography is desired for use with project planimetric files, then the appropriate survey request form should be filled out by the PM. The Surveying department will then display the graphics through the use of the InRoads Surveying tools, at the desired scales and place the completed files in the Project Specific ROW_Survey/Drawings/Reference_Files folder. The Surveying department will be the owner of the "ProjectSpecificSurveyTopo01Scale50.dgn" model file. Other disciplines will reference the desired scale model file, to both model files for design purposes and sheet files for plan set creation purposes. Duplicate copies of model files will reside only in the "Owners" folder structure.

Model files that have not been completed, or ready for others to use as backgrounds on project plan sets will reside in the Specialty Group's Working folder. The designer's initials will be added to the "Working" model until such time that the file is ready for use. With the use of the MicroStation Standards Checker program, sheet files containing reference models attached from a directory other than the Specialty Group's Reference_Files folder location will not be accepted.

This requirement is necessary to ensure design responsibility and background file ownership.

6.3.1 Available Scales

The default scale for drawing files is 1:100. It is acceptable to create drawings at other scales when desired. These scales include both Engineering unit scales (1"=50', 1"=20') and Architectural unit scales (3/4"=1'-0") if required. Actual Planimetric Design models are to be drawn at true scale (1:1) in real world coordinates. The linestyle scale, cell placement scale and annotation scale are the only scale factors that should be considered. See Chapter 5-CDOT Workspace Drafting Standards, Section 5.1.2 for cell placement discussion.

6.3.2 Sheet Orientation to North

Sheet file view rotation commands should be used to rotate and move the sheet file window into position where north is orientated as desired.

6.3.3 Text Placement: Model vs. Sheet Files

Text annotation and dimensioning should be placed in the sheet files whenever possible using the dimension annotation lock. Intelligent text generated by InRoads and/or text spanning multiple sheets can be placed in the model file, if deemed appropriate by the designer. An example of text that can be placed in the model file would be contour annotation in a topography file or alignment stationing in an alignment file. Profile grid, profile annotation or cross section annotation usually is placed in a model file. Detail annotation, intersection information or matchline text usually is placed in a sheet file.

6.4 Referencing File Usage

The use of Reference files at CDOT is critical to all aspects of design and construction. This process becomes evident when multiple Specialty Groups, performing various aspects of the design process, interact on a project. In the case of a road widening project, the design team will need to reference the existing survey topographic base mapping model, the proposed drainage design model (culverts or stormwater management ponds), the proposed lighting relocation models, and the proposed permanent traffic striping model. The data exchange between disciplines is "real time" by the use of Discipline-specific reference models.

Reference file usage is very important for both the design phase and the Project Plan set creation phase. Once the appropriate and desired Reference model files are determined, the files can all be referenced to each other in each discipline's Master Model files. The Master Model file can then be referenced into the newly

created sheet file, with the use of several different reference file attachment methods. The use of nested attachments can be very useful and is an acceptable practice at CDOT.   All available reference file, nested attachment settings are acceptable (no nesting, live nesting or copy attachments). Reference file level manipulation can be achieved with each one of these methods.

6.4.1 Save Relative Path

The Save Relative Path setting is not acceptable practice at CDOT and should not be used. The CDOT Workspace uses the Project Configuration Files (PCF) to set the desired variables to locate project specific reference files within the project directory structure. The PCF file is created when the Select Group Environment Utility is run. The PCF file is located on the Project Manager's machine in the folder C:\Program Files\Workspace-CDOT\Standards-Local\Projects and can be mapped to across the network. The file can also reside on each person's machine, provided network mapping is consistent.

See Concepts of sharing documents and network usage and CDOT PCF Management workflow for additional detail.

6.4.2 True Scale

The reference file true scale setting is on by default in the CDOT Workspace. Units in the active model align 1:1 with units in the referenced model. For example, if the units in the active model are inches and the units in the referenced model are meters, meters are converted to inches so the elements are reference in at the same relative size.

6.4.3 Live Nesting

Reference file live nesting is an acceptable practice at CDOT but is not required. The Designer can choose which method of reference file attachment works best for them. There is a level synchronization problem with all methods of reference file attachment, due to software limitations. CDOT is working with the software developer to remedy this inconvenience to the CDOT user.

See CDOT MicroStation Level Synchronization workflow.

6.4.4 Coincident - World

The Reference file attachment method, Coincident - World, is the default CDOT workspace orientation setting and is the only attachment method for reference files that preserves the coordinate system values. This setting takes into account the global origin of the file being attached with respect to the active Model file or Sheet file. When attaching reference

files with named views, this setting is overridden, therefore named view attachments should never be used when real world coordinates are desired.

6.5 Model File vs. Sheet File

6.5.1 Model File

CDOT Model files are be comprised of planimetrically correct, 1:1, real world, intelligent, design graphics or contain drafted, detail information that is not required to be on a coordinate system. Model file information is typically created at a 1:1 scale factor and is attached as reference file to a Sheet file. The Model File is located in the project specific, Specialty Group, Reference_Files folder.
For example: 00000/Hydraulics/Drawings/Reference_Files folder.

6.5.2 Sheet File

CDOT Sheet files contain, an approved CDOT Border cell, attached from the General Cell Library, text annotation and associative detail dimensioning. It also contains Model file reference attachments with both planimetrically correct graphics and information graphics. A sheet file can physically contain text such as General Notes, summary of approximate quantities tables, appropriate border text, match lines, and North arrows. Hatching, patterning and raster image files may be referenced to the sheet files.

Sheet files are plotted to scale with either the MicroStation batch plotting method or individual plan sheet printing method. Sheet files are used to create the PDF files that will reside in the Plot_Sets folder for a milestone submittal (FIR, FOR or AD). The Sheet File is located in the project-specific, Specialty Group, Drawing folder. For example: 00000/Hydraulics/Drawings folder.

CDOT sheet file creation
CDOT sheet file creation - with multiple scales
CDOT Creating Multiple Plan Sheets

6.6 Key-Ins

Key-ins are typed instructions entered into the Key-in window within MicroStation to initiate MicroStation and InRoads functions. Key-ins provide shortcuts to command icons, and can be used for both MicroStation and InRoads commands. The key-ins can be saved in user defined function keys if desired, and can be retrieved through the use of the up and down arrow keys on the key board.

6.6.1 MicroStation Key-in References

6.6.2 InRoads Key-in References