

Chapter 8 - Cells and Patterns

Cells and patterns are groups of graphic elements that are used repeatedly. Cells are generally used as stand alone elements, like symbols and sheet borders. Patterns are used to fill in an area, usually to denote a material type or area of interest. This chapter explains what cells and patterns are and how they are used.

Chapter Objectives:

- Describe what Cell libraries are and how cells are stored in them
- Describe how a model is made into a cell
- discuss the cell library dialog box
- Identify the different types of cells
- Describe how to place a cell from the MicroStation and the CDOT menus
- Describe the different options available for placing patterns
- Describe how to place a patterns from the MicroStation and the CDOT menus

Understanding Cells

Cells are a permanent group of graphics. They are typically used for standard graphics (symbols, details, notes, borders, etc.), which may be used over and over on multiple projects. Cells are stored in a separate cell library file.

When you're ready to place the cell in your design file, attach the cell library to the file. You can then place the cell out of the library multiple times, like a rubber stamp. Once the cell is placed in the design file, it is a single element that exists in the design file. You do not have to have the cell library attached to see the cell.

Cell libraries

Cell libraries are just ordinary MicroStation design files that have a *.cel* extension. Cells can be organized into different libraries or you can place all cells in one library. CDOT uses discipline-specific cell libraries, where each group has its own library (Design, Bridge, Traffic, etc).

Cell Library = DGN file

The cell library file contains multiple models and each cell is stored in a separate model.

Cell = Model

What Are MicroStation Models?

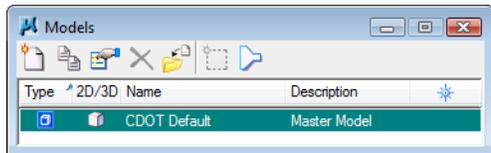
Models are “containers” for graphics within a DGN. Design files must have at least one model (named *CDOT Default* in the CDOT workspace), but can have many. Models in a DGN file are analogous to a workbook in an XLS file. Just like each workbook is a separate spreadsheet, each model is a separate set of graphics. And, you can have multiple models in a DGN just like multiple spreadsheets in a XLS file.

Note: Do not confuse *Model files* with *MicroStation Models*. They are two totally separate concepts. A *Model file* is a generic term used to describe any working file that contains graphics. A *MicroStation Model* is a separate container for graphics inside any MicroStation file – Model or Sheet file.

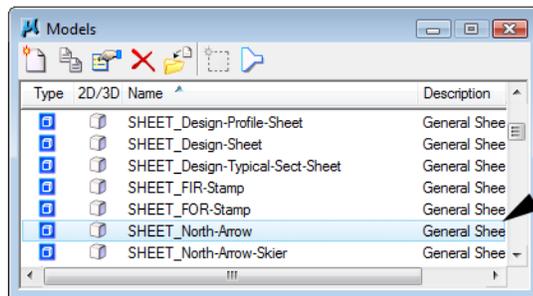
Models are accessed from the **Primary Toolbar**. They can be entirely different sets of graphics or different components of the same project (e.g. three separate models for plan, profile and cross sections in one project DGN file).



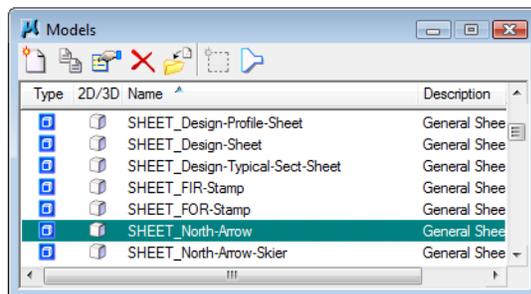
In almost all cases, you will work in one model -- the CDOT Default model in all model files and sheet files.



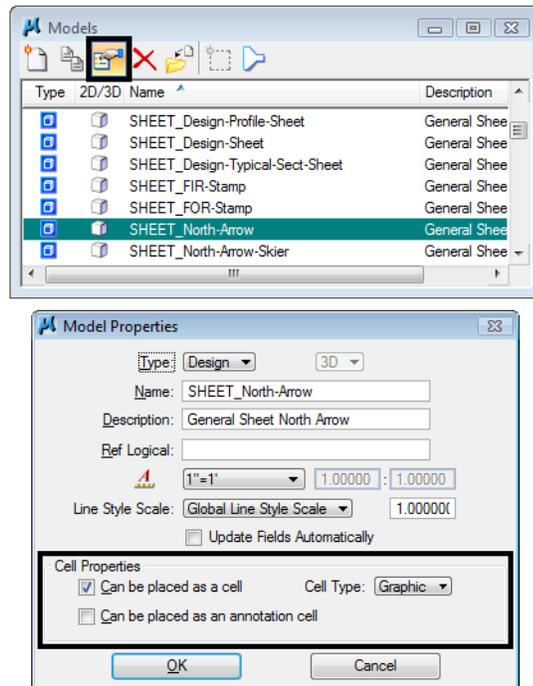
The one exception is when you're working directly in a cell library. Each cell in a cell library is actually just a separate model inside the cell library design file (cell=model). The design file containing the model (cell) can be attached to any other design file as a cell library, and then the model (cell) can be placed out of this file.



Models in a cell library. Each model is a cell.



In order for models to be placed as cells, the option *Can be placed as cell* must be toggled on in the model's properties. In the **Models** dialog box, select the **Edit Models Properties** command to turn this option on/off.



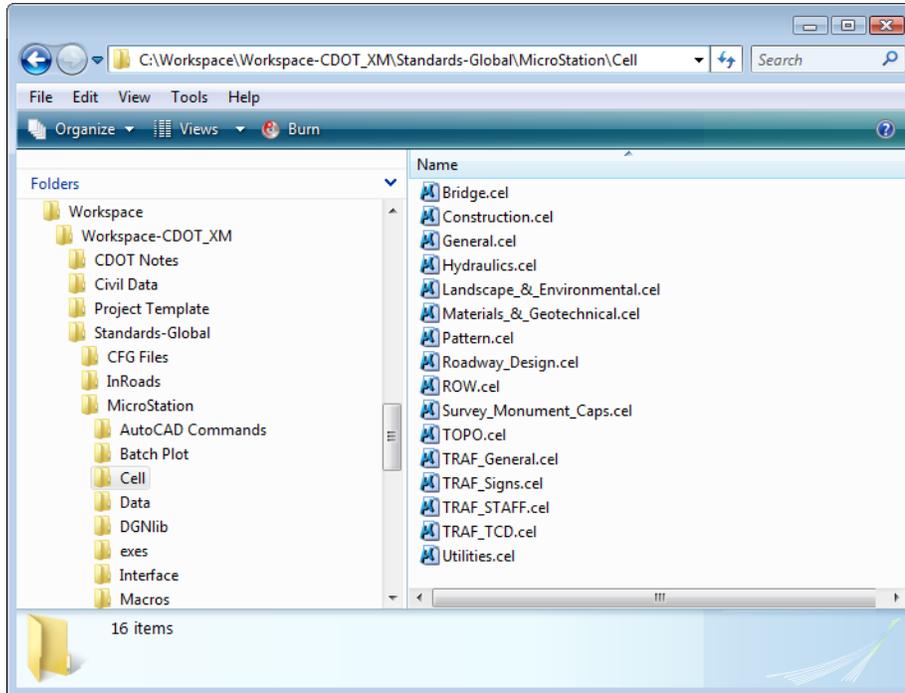
The design file's levels are shared among all models; however each model can have different levels turned on/off for different views. A **Global Display** or **Global Freeze** mode on the **Level Display** box carries through to all models.

Models can also be imported from other DGN files. This is a good way to copy a lot of graphics from one DGN to another, or a good way to build a cell library.

CDOT Cell Libraries

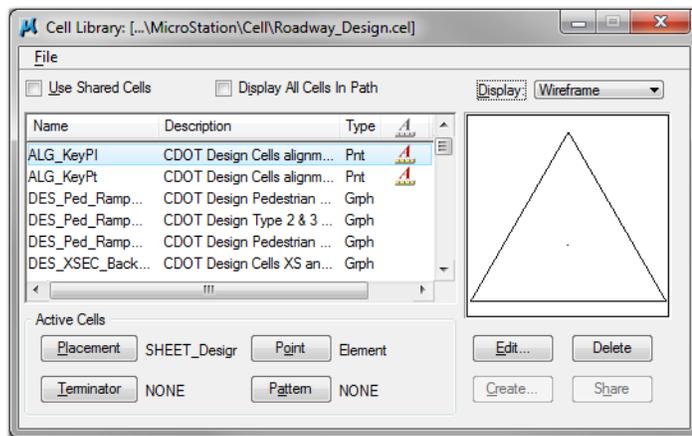
Many of the CDOT standard cells have been created and are stored in discipline-specific cell libraries (e.g. Design, Bridge, ROW). The appropriate cell library or libraries are attached to the discipline seed file. When you create a new file from a discipline seed file, the associated cell library is automatically attached to the new file.

The standard CDOT cell libraries are stored in the CDOT workspace in the folder `C:\Program Files\Workspace-CDOT\Standards-Global\MicroStation\Cells`. The discipline-specific as well as general cell libraries (used by all groups) are shown below.



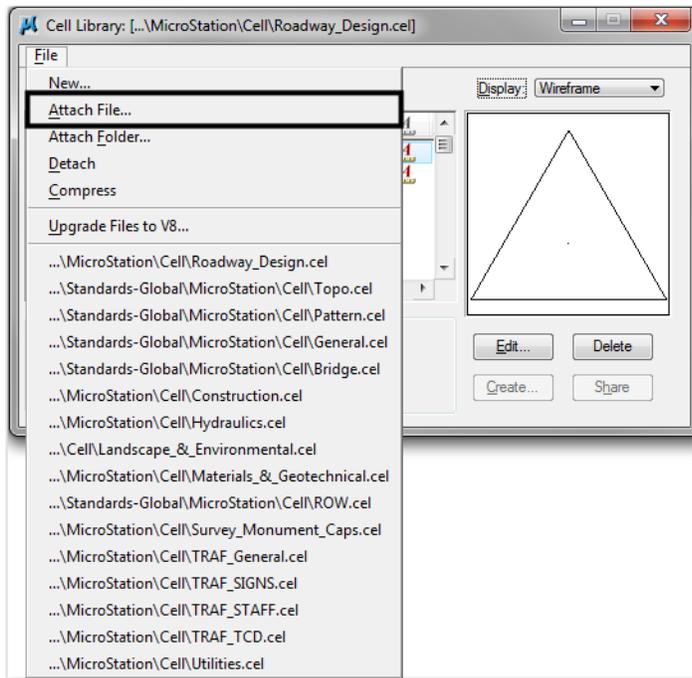
The Cell Library Dialog

To view all cells contained in a library, you can open the **Cell Library** dialog box. Select **Element > Cells**, or select **Cells** from the **Primary** toolbar.

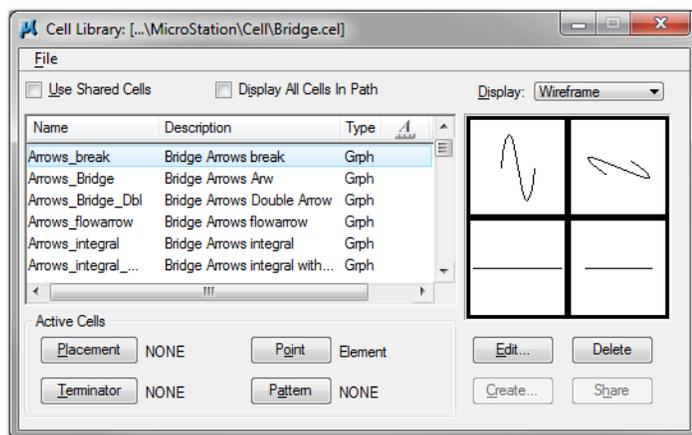
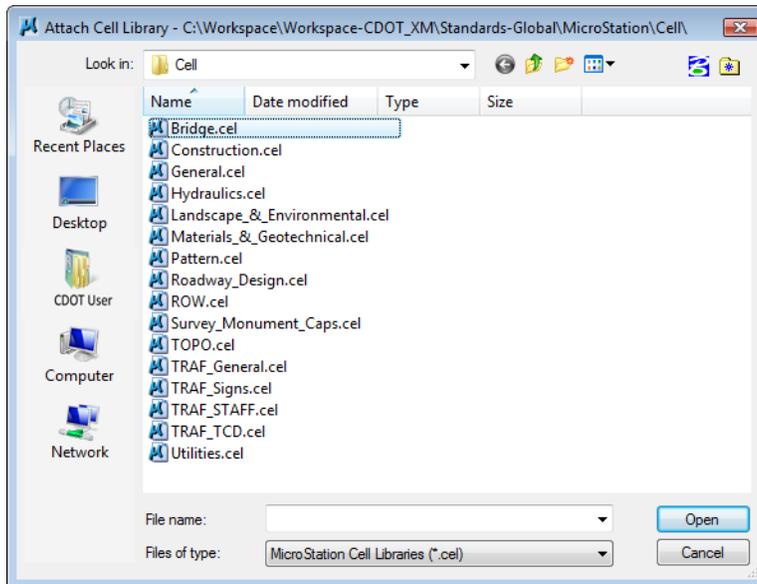


This opens your discipline cell library (attached via your seed file) and a list of cells is shown in the **Cell Library** dialog box.

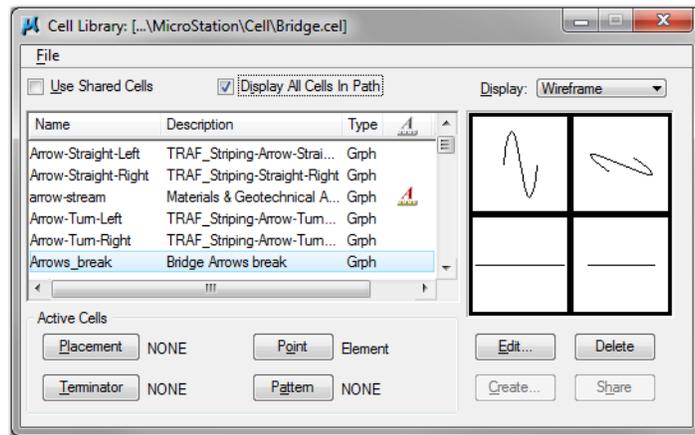
If you want to access cells from a different library, you can manually attach a library to your active design file. From the **Cell Library** dialog box, select **File > Attach File**.



When working in the CDOT workspace, the configuration automatically sets the correct path for *.cel* files. Select the library to open and then select **OK** to attach the library.



Note: You can only attach one cell library at a time; when you attach a library, it automatically detaches the current library and attaches the new one. Only the cells from the active library are shown in the list of cells. **However**, if you toggle on **Display All Cells in Path**, MicroStation displays cells from all of the CDOT libraries that are pathed in the CDOT configuration.



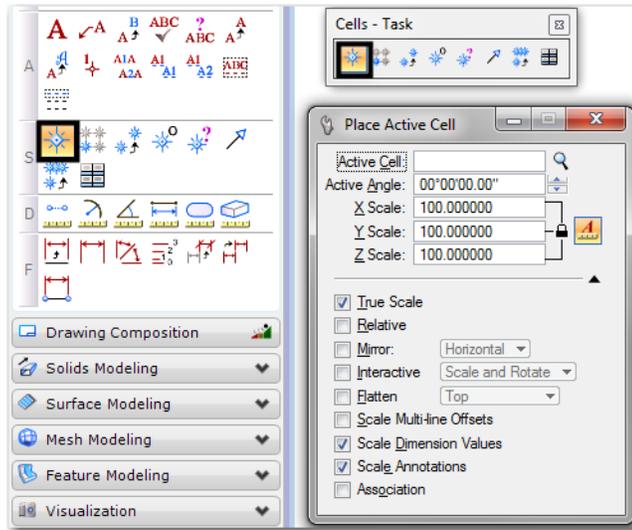
Types of cells

Cells are either **Graphic** cells or **Point** cells. **Graphic** and **Point** cells have different properties after they are placed in the design file. The properties of each type of cell are as follows:

	Graphic Cell	Point Cell
Symbology	Maintains active settings used when created	Takes on active settings when placed
Level	Level(s) as created (relative or absolute mode) when placed	Active level when placed
Snappable points	Keypoints	Cell Origin
View	View dependent — appears different according to the view (top, front, etc.)	View independent — appears as originally drawn in all views

Placing Cells with the Place Active Cell Command

You can place cells out of the cell library into your design file using the **Place Active Cell** command located on the **Cells** toolbar.



The command places either a point or graphic cell in the design file using the active placement parameters including:

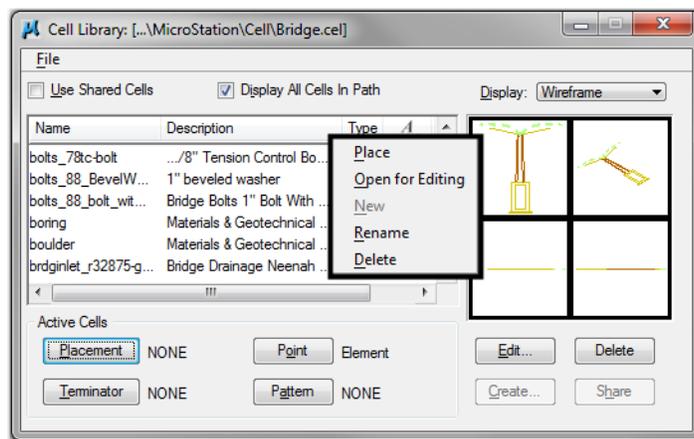
- Active cell name (you can browse out to the cell library and select the cell from a list – double-click the cell to make it active)
- Active scale (*as*= <scale factor >)
- Active angle (*aa*= <angle >)
- Active element symbology — for point cells only
- Active level — for point cells only

Other options include:

- **True Scale** - If the cell that was created with different units than those of the active model the cell is scaled to match units of the active model. The CDOT default for this option is *On*.
- **Relative** - This option is used to place a cell on the active level rather than the level it was created on. If the cell contains multiple levels, then the additional levels are selected starting from the active level based on the difference between the level numbers. The CDOT default for this option is *Off*.
- **Mirror** - This option flips the cell along the horizontal axis, vertical axis, or both axes. The CDOT default for this option is *Off*.
- **Interactive** - This option allows the user to adjust the scale, rotation, or both with data button input from the mouse. The CDOT default for this option is *Off*.
- **Flatten** - This option places the cell in a 2D or 3D drawing at the selected view rotation. The CDOT default for this option is *Off*.

- **Scale Multi-Line Offsets** - this option adjusts the distance between multi-line elements based on the active scale. The CDOT default for this option is *Off*.
- **Scale Dimension Values** - This option changes dimension values embedded in the cell, based on the active scale. The CDOT default for this option is *On*.
- **Scale Annotations** - This option changes the size of annotation items within the cell, based on the active scale. The CDOT default for this option is *On*.
- **Association** - This creates a group from the cell and the item selected when placing the cell. The CDOT default for this option is *Off*.

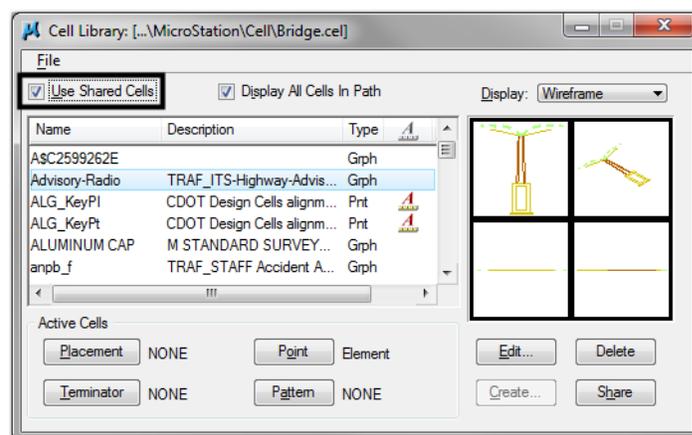
Note: You can also place a cell by <D> <D> clicking on it in the cell library dialog box. This sets the cell as the active Placement cell and automatically selects the **Place Active Cell** command. You can also <R> on the cell in the cell library dialog box and select **Place**.



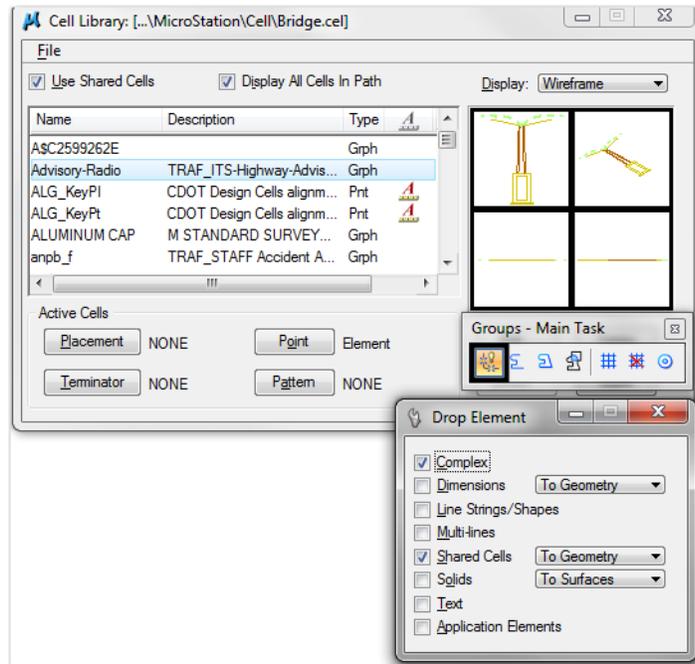
Shared Cells

Cells can be placed as *Shared*. Then, when you place multiple cells in a design file, MicroStation stores the shared cell definition data once, and all other instances of the cell placement reference this definition. Shared cells keep your design file efficient by writing the cell graphics to the file only once.

Note: To place a shared cell, toggle on **Use Shared Cells** in the cells dialog box.

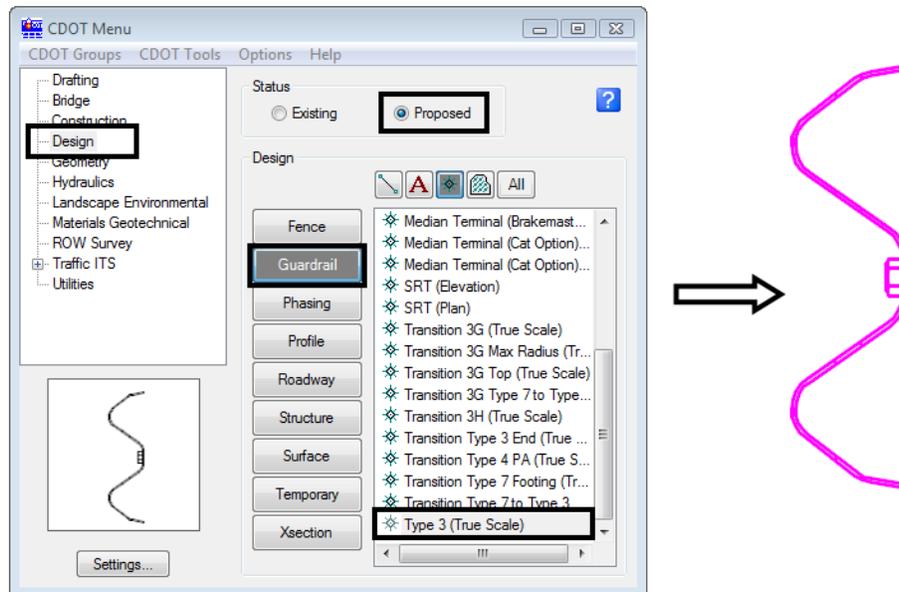


If you're placing a sheet border cell, do not place it as shared. If you do, you will not be able to edit the cell text. If you want to remove the share status of a cell, you can do so with the **Drop Element** command. You can drop a **Shared Cell** to a Normal Cell (for text editing) or to **Geometry** (individual graphics).

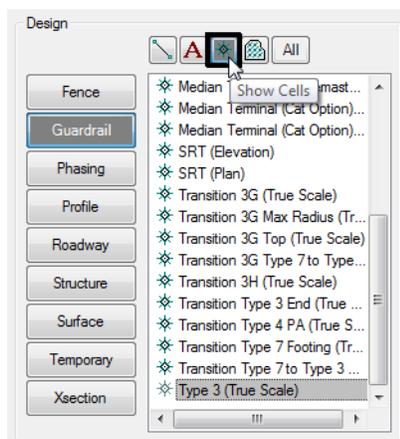


Placing Cells with the CDOT Menu

The CDOT Menu streamlines the process of placing cells. After selecting the **Group**, **Status** and **Category**, a list of available cells for that category is shown in the item selection window. Just select the cell item and then place it in your file. The proper level is set active and the **Place Active Cell** command is automatically selected. The specified cell is automatically set active and placed out of the appropriate cell library.



Note: You can set the Filter to Show Cells to filter only the cell items for a category.



Cell Divide Program

The *Cell Divide* program located on the *CDOT Menu* (CDOT Menu> Cell Divide), will divide any linear or curvilinear elements with the active cell. The program allows you to specify a length and angle to place the cell along the element.

More information

For more information on cells and cell libraries, see the CDOT CADD Manual, *Chapter Five – Drafting Standards, Section 5.1 Cell Libraries*.

5.1 Cell Libraries

The libraries are automatically loaded through the use of configuration variable cell library lists (MS_CELLLIST) and available from the Cell Library dialog box within MicroStation. When the user opens a design (.dgn) file in MicroStation, all of the 16 cell libraries will be available for attachment from the Cell library dialog boxes' File dropdown menu. The Cell Library dialog box contains a location for selecting the Display All Cells in Path. If this toggle is chosen, all cells within the workspace are available for use within the cell list. By default this toggle is not selected.

5.1.1 Types of Cells

There are two types of cells available within the CDOT workspace: Graphic cells and Point cells. The major differences include Graphic cells maintaining the symbology they were created with when placed and Point cells taking on the active symbology when placed. The one exception is when Graphic cells are created on the default level. In this case the cell will adopt the active symbology similar to a point cell. Another difference is cell rotation. Graphic cells will remain rotated as placed while Point cells are "view independent". View independent applies to both cells and text and means that if a view is rotated, a plan sheet for example, the cell or text will remain oriented to the view, not as rotated when placed. Graphic cells have become the main choice at CDOT and are utilized wherever possible and point cells have been removed in all but a few cases.

[Learn more about Cell Types](#)

5.1.2 Cell Placement

Cells have been created to be placed relative to the plot scale, or the active scale which should be equivalent to the Model Properties>Annotation Scale setting. Cells can be placed in either the Model file or the Sheet file, depending on what type of drawing is being produced. Most cells have been drawn at a 1:1 scale, based on the CDOT Seed file resolution, but there are some exceptions. The scaling exceptions are those cells discussed below. The insertion point of each cell is the coordinate 0,0,0 in each model. When cells are placed into a Model File, the individual Specialty Group lead is responsible for providing the base mapping. If a different scaled model is desired, the group lead should be contacted for the desired scale. The varying scaled base mapping should reside in the Specialty Group folder structure and referenced to the project plan set sheet files.

The Hydraulic (Hydraulics.cel) library contains many true size cells that have been drawn true size and must be placed at an active scale factor of 1 to be true scale. These cells include Plan and Elevation Inlet cells and Plan and Elevation End Sections cells. The Traffic (TRAF.General.cel) library also contains many striping pavement markings that have been drawn true size and must be placed at an active scale factor of 1 to be true scale.

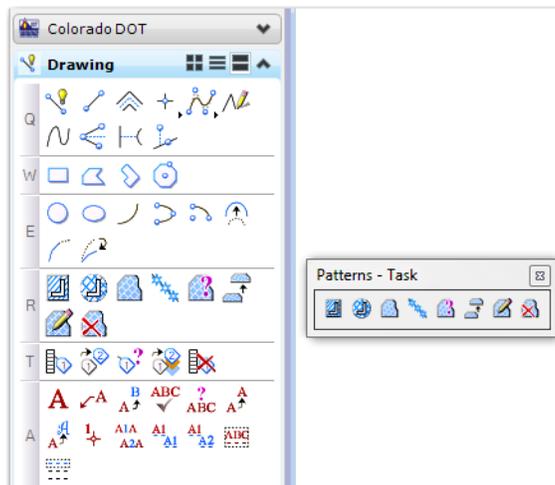
Creating Cells

For information on how to create a cell library and cells, see the lab *Create a Project Specific Border*.

Understanding patterns

You may have a need to pattern areas with a hatch, crosshatch or special pattern (concrete, rip-rap, etc.). Or, you may need to pattern linear elements like pavement lines with an asphalt pattern. For these situations, you'll use MicroStation's patterning tools.

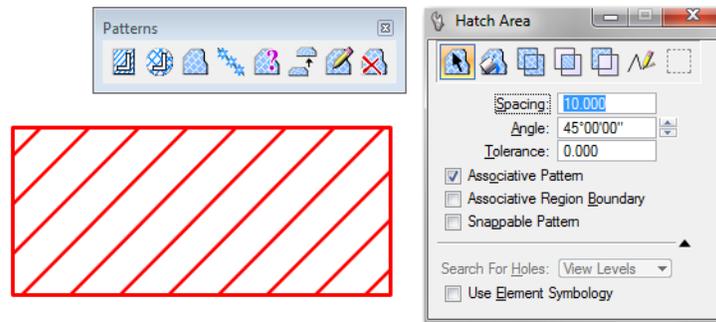
Patterns toolbar



The **Patterns** toolbar contains tools for hatching and cross-hatching shapes or areas. You can also pattern any line, shape or area with a cell. The **Pattern** tools include:

Hatch Area

The Hatch Area command hatches a closed shape or area in the active model or a reference. Set the **Spacing** (in master units) and **Angle** of the hatch line and turn on **Snappable Pattern** if you later want to snap to the pattern graphics (the hatch lines in this case). If you're patterning a curved element, key in a **Tolerance** or minimum distance for chording off the pattern around the curve.



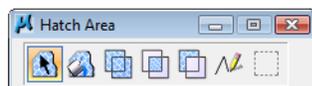
Toggle on **Associative Patterning** if you want the pattern to update if the element is modified. In addition, broken patterns can be re-associated by re-connecting the pattern shapes.

Toggle on **Associative Region Boundary** to place the pattern on different level from the patterned element (useful for removing the “box” around text

Toggle on **Search For Holes** when a hole element resides inside of the element to be hatched, but the two are not part of a group.

Toggle on **Use Element Symbology** if you want the hatching symbology to match the element's symbology.

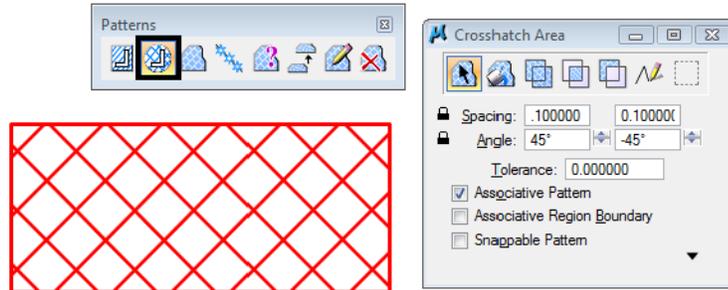
The icon bar at the top of the dialog box allows you to select the pattern method (how the area will be patterned), which includes (items listed in order from left to right on the icon bar):



- ◆ **Element** —a closed shape
- ◆ **Flood** — the area enclosed by a set of elements
- ◆ **Union** — area defined by the union of two or more closed shapes
- ◆ **Intersection** — area defined by the intersection between two or more closed shapes
- ◆ **Difference** — area defined by the difference between two or more closed shapes
- ◆ **Points** — an area defined by a series of data points where you dynamically define an area
- ◆ **Fence** — the area inside the fence

Cross Hatch Area

The **Cross Hatch Area** command uses similar settings to the **Hatch Area** command to cross-hatch an area.

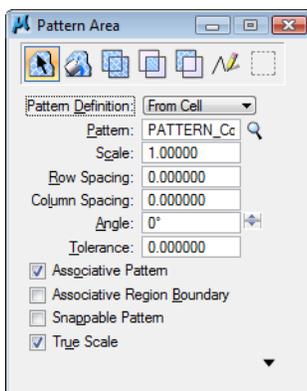
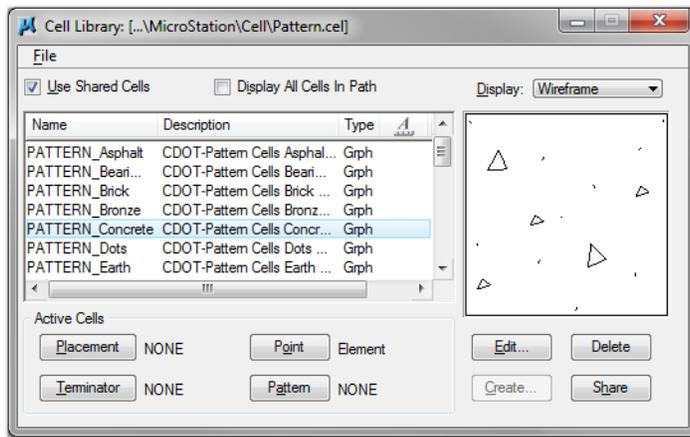


Pattern Area

This command patterns an area or closed shape with a cell. The pattern element(s) can be in the active design file or in references.



Key in the active **Pattern** cell or set it in the **Cells** dialog box (**Element > Cells**). If you toggle on **Display All Cells in Path**, all pattern cells begin with the cell name **PATTERN**.



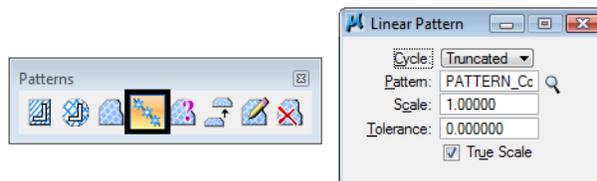
Set the active **Scale** to size the cell, the active **Angle** to determine the placement angle for the pattern graphics, and the pattern **Row** and **Column Spacing** in master units (distance between the tiled cells). The **True Scale** option will reconcile the difference between the cell model's working units and the working units of the design file model in which it is placed (e.g. patterning with a metric cell in an imperial design file model). For this option to work, the pattern cell must be a shared cell.

Other options are the same as noted for the **Hatch** and **Crosshatch** commands.

Linear Pattern

Linear Pattern patterns with a cell along an existing linear element. You can pattern both linear and curvilinear elements. Specify the **Cell**, **Scale** and **Tolerance** just like the **Pattern Area** command. In addition, the **Linear Pattern** command has the following **Cycle** options:

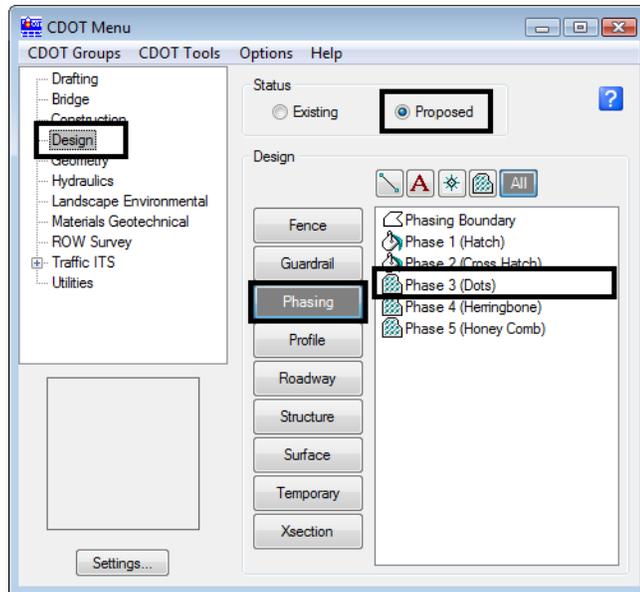
- ◆ **Truncated** – places the cell for the linear pattern using the specified active scale. Based on this scale, the last instance of the pattern may be truncated.
- ◆ **Complete** – adjusts the scale for pattern cell so that only complete instances of the cell are placed along the linear element.
- ◆ **Single** – patterns with one instance of a cell on each linear segment.
- ◆ **Multiple** – adjusts the scale for pattern cell so that only complete instances of the cell are placed along each segment of the linear element.



After patterning, you can turn off **Patterns** in the **Settings > View Attributes**. Doing so will display the original linear element.

Placing Patterns with the CDOT Menu

The **CDOT Menu** streamlines the process of placing patterns. After selecting the **Group**, **Status** and **Category**, a list of available patterns for that category is shown in the item selection window. Just select the pattern item and then data point inside the region to pattern. (The CDOT Menu uses the Flood method of patterning, so you must data point inside the region to pattern). The proper pattern level is set active and the appropriate pattern command is automatically selected (**Hatch Area**, **Cross Hatch Area**, **Pattern Area** or **Linear Pattern**). If patterning with a cell, the appropriate pattern cell is automatically set active.



Note: You can set the **Filter** to **Show Patterns** to filter only the pattern items for a category.

