

# CDOT MicroStation Essentials

## Course Curriculum

Revised: January 2010

### **Duration:**

Four days

### **Prerequisites:**

None

### **Course Objectives:**

The class is designed to teach all of the MicroStation fundamentals using CDOT standard configuration files. This includes CDOT's seed files, cell libraries, font and line style resource libraries, text styles, dimension styles and level libraries.

In addition to covering key features and functionality of MicroStation and the CDOT configuration other course objectives include:

- Understanding what CADD resources are available to shorten the learning curve and improve retention of material taught in class including the CADD web site, CADD Manual, CDOT workflows, etc.
- Creation of a CDOT CADD project
- Learn the overall CDOT design and sheet model workflow process for all disciplines
- Learn how to use the CDOT Menu and how it automates the process of complying with CDOT CADD standards
- The ability to apply the concepts taught in class to a CDOT project

Refer to the day-to-day schedule for additional objectives for the course.

### **What to Bring:**

Instructor will provide all materials required to complete this class.

### **Resources:**

Students will find electronic copies of the reference material and labs associated with this course online under the *Manuals and Training* page of the CADD and Engineering Innovation web page located at [www.dot.state.co.us/DesignSupport/CADD and Engineering Innovation](http://www.dot.state.co.us/DesignSupport/CADD%20and%20Engineering%20Innovation).

### **Instructional Media:**

This is an instructor-led hands-on course. Each student will have a computer for the duration of the course. The instructor will utilize a whiteboard and projection system for demonstrating key topics and techniques of the software. Students will access the reference material for this course electronically, either locally or online as noted under the section *Resources*.

The instructor will provide each student a hard copy of the lab material. Course data files will be pre-loaded on the computer used in class. As with the reference material, course data files will also be available online for students to download and work through at their convenience.

## **Material Requirements:**

A printed copy of the course labs will be provided in the class. The lab material will be used in conjunction with an electronic copy of the resource manual *A Practical Guide for Using MicroStation XM*. Students may be asked to refer to *A Practical Guide for Using MicroStation XM* during the lecture portion of the class for detailed explanations of how to use specific MicroStation commands and to gain an understanding of the command options.

## **CDOT Standards:**

This course uses all CDOT standard configuration files, including the CDOT Menu.

# **Class Schedule and Objectives**

## **DAY 1**

### **Objective:**

Show how to work within the CDOT CADD environment, demonstrate how to manage design graphics using levels, and how to effectively work in a 3D file.

### **1. Introduction to CDOT CADD Environment and Getting Started in MicroStation - 2.5 hours**

This topic introduces students to the CDOT CADD environment and the basic MicroStation interface, including how to manage design files. How users interact with MicroStation via the mouse, the status bar and the Key-in Browser is explained.

- Identify the Training Directory Structure
- Where to find MicroStation XM and InRoads XM reference material
- Where to find MicroStation XM and InRoads XM lab material
- Identify mouse settings and mouse mechanics
- Open an existing MicroStation design file
- Create a new MicroStation design file
- Navigate within a MicroStation design file
- Interface introduction
- How to get help

**Lab:** Getting Started in MicroStation

### **2. Levels - 2.5 hours**

Understand basic level operations (turning levels on/off, setting the active level), as well as how to manage level libraries is covered in this topic. Students also learn the benefit of using ByLevel symbology and how to use symbology overrides. CDOT standard level filters are also introduced.

- Attach the appropriate levels by using the Select Group program
- Use Level Display to turn levels on/off
- Use key-ins to turn levels on/off
- Set the active level for placing graphics
- Use shortcuts for turning all levels on/off

- Turn levels off by graphically selecting an element
- Turn different levels on/off in different views
- Customize the Level Display and Level Manager boxes
- Sort levels
- Save a view for later recall
- Access CDOT standard level filters
- Use level filters to manage levels and turn groups of level on/off

**Lab:** Levels

### 3. Working in a CDOT 3D Design Model - 2.0 hours

The objective of this topic is to understand the 3D tools that civil professionals need to work effectively in a design file. This is also very beneficial for students advancing to InRoads training.

- 2D vs. 3D
- Check the elevation of an element
- Rotate a view using the rv= key-in
- Rotate a view using the 3-point method
- Rotate a view by element
- Rotate to a standard view (Top, Front, etc.)
- Check and set the Active Depth
- Check and set the Display Depth

**Lab:** 3D View Control

## DAY 2

### **Objective:**

Identify when to use model files and sheet files, explanation of the CDOT directory structure, and learn how to create and manipulate design graphics using a variety of MicroStation tools.

### **Day 1 Review - 30 minutes**

### 4. CDOT MicroStation Workflow - 3.0 hours

Students will get an overview of the CDOT workflow to complete a CADD project. This includes creating a new project and a review of the design and sheet model workflow process using CDOT Standards.

- Model file workflow
- Sheet file workflow
- CDOT's CADD resources (web site, CADD Manual, CDOT workflows, etc.)
- Create a new project and project configuration file (PCF) using the Project Creation Utility program
- Re-assign a project number via the PCF
- Create a new design model using a CDOT seed file

- Create a new design model using an auto-populated model file
- Attach a reference
- Turn reference displays on/off
- Turn reference levels on/off

**Labs:** Creating the Project and Design Model

## 5. Creating Your Design Graphics - 2.5 hours

This chapter introduces the CDOT menu as a tool to automate placing graphics using CDOT standards. Design file basics are discussed in this topic to illustrate basic drawing tools (place line, blocks, circles, etc.). Other drawing tools are introduced in subsequent chapters. Precisely locating elements using tentative snaps, AccuSnap, and precision key-ins are introduced in this section. Students will practice using these tools to draw a simple standard detail.

- Access the CDOT Menu
- Use the CDOT Menu to set element attributes
- Use the CDOT Menu to place basic elements (lines, arcs, circles, shapes, etc.)
- Creating simple elements with MicroStation
- Delete, Undo and Redo
- Snap Lock and other locks
- AccuSnap
- Precision key-ins
- AccuDraw
- Element Information
- Change the element highlight color

**Lab A:** Drawing Basics using the CDOT Menu

**Lab B:** Draw the Median Island Nose Section

## 6. Manipulating and Modifying Design Graphics - 1 hour

This lab will cover the tools to modify a part of an element (extend, partial delete, fillet, etc.) or to manipulate a whole element (copy, rotate, scale, etc.) are covered in this topic. How to modify an element's attributes (color, level, style or weight) is also covered. This chapter introduces basic 3D drawing techniques, including the use of Depth Lock. Students also practice drawing with custom line styles.

- Use the CDOT Menu to place custom lines styles
- Change the direction of a directional line style
- Change the elevation of an element after placement
- Change the level on which an element was placed
- Update graphics to ByLevel Symbolology
- Work with nested references
- Use the Copy Attachment option for references
- Use the CDOT Menu to place custom line styles (Utility lines).

- Place elements in 3D using Depth Lock
- Manipulate elements using the Parallel Copy tool
- Modify elements using the Trim tools

## DAY 3

### **Objective:**

Students will learn about various types of graphic groups including cells and patterns, how to create each type of group and how each group functions within the design file.

### **Day 2 review - 30 minutes**

### **Manipulating and Modifying Elements (cont'd) 1 hour**

**Lab A:** Place Guardrail Lines

**Lab B:** Create 3D Utility Graphics

### **7. Cells and Patterns - 2.5 hours**

This topic illustrates how to place and use cells (a permanent group of MicroStation graphics). The different types of cells and their properties are also discussed. Students learn how to place cells from standard CDOT cell libraries using different placement parameters (active angle, active scale, symbologies, etc.). The chapter also covers how to pattern using hatch, cross-hatch or cells. Placing patterns with the CDOT menu is emphasized.

- Understanding cells and models
- Understand the different types of cells
- Placing cells with MicroStation
- Placing cells with the CDOT Menu
- Understanding patterns
- Placing patterns with the CDOT Menu

**Lab A:** Create Landscape Graphics

**Lab B:** Create Hydraulics Graphics

### **8. Grouping Design Graphics - 3 hours**

Students learn how to use fences and selection sets (using either Element Selection or PowerSelector tools) to create a temporary group of elements. The selected elements can then be manipulated as a group. Other semi-permanent types of groups (graphic groups and complex elements) are also covered. Complex elements are individual lines and arcs joined to create a complex chain or complex shape. Students then learn how to drop the complex status of these elements.

- Selection Sets
- Using fences
- Manipulating fence contents
- Creating and using graphic groups
- Understand complex elements (Create, Add and Drop)

**Lab:** Draw a Bridge Typical Section

## DAY 4

### **Objective:**

Demonstrate proper workflow for creating and annotating sheet files.

### **Day 3 review - 30 minutes**

### **9. Creating Sheets - 3.0 hours**

Use the CDOT sheet model workflow to create a variety of sheets. After creating the sheets, students learn how to measure the sheet graphics.

- Creating sheets - Roadway Design
- Creating sheets - Other Disciplines
- Rotating Views
- Placing Borders
- Measurement tools and measuring in 3D

**Labs:** Create a Plan/Profile Sheet for the Intersection

**Labs:** Create a project specific border

**Labs:** Create a 40-scale Plan sheet

**Labs:** Create a Typical Section sheet

**Labs:** Create a Bridge General Layout sheet at different scales

**Labs:** Create the Standards Plan List sheet

**Labs:** Create a Title sheet

### **10. Annotating and Plotting Sheets - 3.0 hours**

Learn how to annotate and dimension a drawing (sheet model) are the goals of this topic. Students learn how to use the CDOT standard text and dimension styles to speed their drawing annotation process. Emphasis is given to using the CDOT Menu to place text and dimensions using CDOT standards. After the sheets files have been annotated, students learn how to plot the sheets to a printer or PDF.

- Understanding Text and Text Styles
- Understanding Dimensions and Dimension Styles
- Placing Text
- Placing Notes
- Placing Dimensions
- Direct Printing
- Processing a Batch Print Job

**Labs:** Annotate the Intersection Plan/Profile sheet

### **Courses review / Q & A - 30 minutes**

Review how/where to find help after training